http://www.bbc.com/news/health-29755469

Have the Danes cracked childhood obesity?

Denmark adopts scheme proven to help children shed pounds

By Malcolm Brabant BBC Health Check

Childhood obesity has become a global epidemic, but it is not easy to treat. Now a scheme proven to help children shed pounds by asking them and their families to make numerous lifestyle changes has been adopted across Denmark. A Danish paediatrician claims his pilot project has made a significant breakthrough in the battle against childhood obesity.

The scheme, in the town of Holbaek, has treated 1,900 patients and helped 70% of them to maintain normal weight by adjusting about 20 elements of their lifestyles. The way it tackles all aspects of the children's lives - and those of their families - sets it apart from traditional "small steps" approaches to losing weight.

According to the US Centers for Disease Control and Prevention, one in three children is now overweight and the incidence of obesity amongst adolescents has quadrupled over the past 30 years.

Dr Jens Christian Holm, who runs the scheme, urges other nations to learn from their experiences in confronting this global health challenge.

"In general, obese children are neglected. They are often lonely and many of them don't participate in activities with their peers. They lack self-confidence. With this scheme there is a real hope they can lose weight and have a good quality of life."

Obesity is an illness that is very hard for children to fight on their own, he says. "We create the environment and tools with which the children and their families can overcome this."

'This is tough'

At the beginning of the programme, children are admitted to hospital for 24 hours for extensive testing, including body scans to measure their body fat.

They also answer a detailed questionnaire about their eating habits and behaviour patterns. "We're not doing this for fun. This is tough," Dr Holm tells 10-year-old Jakob Christiansen during a consultation. Jakob weighs 72kg (11st 4lbs), at least 20 (3st 2lbs) too many. He's been bullied at school, has been depressed, and has been eating sweets for comfort. "He was hiding them," says his mother Elisabet.

A typical weight loss programme

The child's doctor creates a tailored plan with 15-20 strategies, which could include:

1 - No crunchy muesli or fruit yoghurts for breakfast - choosing oatmeal, dark brown bread, meat and fish instead

2 - No fast food or white bread for lunch; choose brown bread, meat, fish and vegetables instead

3 - Portions served up in the kitchen - no pots and pans at the dining table

4 - Plate proportions for dinner should be: half vegetables, a quarter brown rice, pasta or potatoes, and a quarter low fat fish or meat

5 - Wait 20 minutes before having second helpings - this allows time for the body to feel full

6 - Feel satisfied after each meal

7 - Only two pieces of fruit per day

8 - Fast food only once a month

9 - Sweets only once a week

10 - Snack only once a week

11 - Limit juice, iced tea, cocoa, soda or lemonade to once weekly - only half a litre in total

12 - Cycle or walk to school

13 - Organised physical activity eg dancing, handball or gymnastics

14 - Free physical activities like walking/biking after school, walking the dog or trampolining

15 - Screen time (television, computer or tablet) limited to two hours per day

16 - No television/computer access until 5pm

17 - Set a regular, early bedtime

"We just want the doctors to help Jakob lose weight so he can be a happy boy again."

Jakob informs Dr Holm that he cycles three kilometres to school. But exercise alone is not enough to combat what the paediatrician calls "this chronic disease".

"It's going to be really tough, but I'll fight as hard as I can. I'm sure I'll miss sugar and the fact that I can no longer laze around," says Jakob. In between tests, Jakob breaks for lunch of skinless chicken breast, raw carrots, red peppers and green salad. The programme requires wholesale changes in lifestyle to defeat the body's natural resistance to losing fat, and each child has a personalised treatment plan which targets 15-20 daily habits.

Dr Holm says that, unless children and their parents change these many habits, "the obesity will persist. People will get very frustrated, sad, and they will be lost".

Research showed that by following the programme, 70% of patients maintained their weight loss for four years. This success rate was achieved with an average of just over five hours of medical consultation per child per year.

It has now been adopted in eight other Danish municipalities, and Dr Holm believes other countries should establish similar treatment programmes. The district of Hedensted, in Mid Jutland, Western Denmark, is one of the places to have embraced Dr Holm's methods.

The programme is run by Rikke Christensen, a health visitor, who says it seems to work much better than the many approaches they tried in the past. "Sadly, we

experienced time and again, that it was difficult to recruit and motivate families. Now we see that we have finally found a method that works and families have really embraced."

One of her success stories is a nine-year old-boy who entered treatment with 40% body fat and high blood pressure. He was introverted, failed to thrive in school, and shunned physical exercise. He is still undergoing treatment but has reduced his body fat by a quarter. He is more outgoing, has participated in a five kilometre fun run, started to play football and "he's got a twinkle in his eye".

Dr Holm is vigorously targeting the passive time spent playing on computers or watching television. Some children are glued to their screens for up to 12 hours a day and the limit, he says, should be two. "Their entire life needs to be changed, because they tend to be lonely, tend to be ashamed of themselves so they need to do this, and to interact with other children in their daily lives."

Participants also have a set bed time to ensure more sleep. Previous research suggests this helps counter obesity by regulating hormones and reducing the urge to eat unhealthily when tired.

Mike Nelausen, 14, has become a standard bearer for the Holbaek project.

He used to weigh 85kg (13st 5lbs), but having embraced Dr Holm's evangelism, he has slimmed down by 23kg (3st 8lbs), and is no longer the target of playground bullies. "To begin with it was hard but then it became a part of my daily routine and it's much easier," says Mike, at his home in the village of Ugerlose. "I was sad because I was bullied. But now I'm smaller. I'm far happier, I've got more energy. And I no longer get upset when I stand on the scales."

As she scrapes and shreds carrots for a low calorie dish with minced beef, his mother Karina breaks down and weeps. "It was extremely hard to see him like that. We tried everything but he just kept on gaining weight. So when it finally started to work, we were really happy."

At supper, Mike only consumes one portion instead of his previous three, and sips a sparkling water. And then, despite the fact that it is raining, he slips out of the house for his nightly run around the village, a look of steely determination on his face. As Dr Holm says, the programme isn't easy. But the results are gratifying.

http://www.eurekalert.org/pub_releases/2014-11/uom-nns110714.php

New natural supplement relieves canine arthritis

A new product based on medicinal plants and dietary supplements relieves arthritis pain in dogs, with no side effects,

Arthritis pain in dogs can be relieved, with no side effects, by a new product based on medicinal plants and dietary supplements that was developed at the University of Montreal's Faculty of Veterinary Medicine. "While acupuncture and electrical stimulation are two approaches that have been shown to have positive effects on dogs, until now a few studies have investigated a plant-based approach to therapy," explained Professor Éric Troncy, senior author of the study. His findings were published in Research in Veterinary Science.

Troncy and his team worked with 32 dogs (and their owners!) who had been diagnosed with arthritis by X-ray and orthopaedic exam, and who all weighed more than 20 kilograms. By drawing on existing rodent studies and working with Pierre Haddad of the university's Department of Pharmacology, Troncy developed two formulas for his trial. These formulas are not currently commercially available.

The first formula, composed of curcumin, devil's claw, black current, Indian frankincense (Salai), willow bark, pineapple bromelaine and camomile, was developed to treat arthritis-induced inflammation. The second included the same ingredients, plus dietary supplements such as omega 3, chondroitin sulfate and glutamine, and was formulated in the hope that it would promote the regeneration of articulations.

Half the dogs received the first formula for four weeks and then the second formula for another four weeks. The other half, acting as the control, received a placebo. The outcomes were tested using three methods. Firstly, the dogs were filmed as they walked at a consistent speed over a special platform that captures the strength of each paw. Secondly, a special electronic collar recorded the dogs' daily activities. And finally, the owners were asked to provide their own evaluations of their dog's behaviour. The researchers were able to identify an improvement by the fourth week of the trial.

"After the eight week course, on average, the strength of the dogs receiving treatment had improved to the equivalent of a kilo of extra strength per paw, which is moreover. None of these dogs saw their health decline, unlike 35.8% of the dogs who were given the placebo," said Maxim Moreau, who was first author of the study.

The improvements were also reflected in the dogs' daily lives. The collars revealed that the dogs receiving treatment maintained their physical activity, and in fact the group average increased from six hours of daily activity to eight. Meanwhile, the dogs receiving the placebo were progressively less active. "In some cases, we recorded the dogs to ensure that the collar was recording actual physical activity rather than movements such as scratching," Troncy explained.

Nonetheless, the ratings from the owners were more mixed. "This third evaluation was more subjective and the contrast between the test group and the control group less stark," Troncy said. "We suspect that the owner may have forgotten what the animal's behaviour was like before it developed arthritis."

The findings raise the possibility of offering a new form of treatment to human beings. "The model of evaluation that we have used is the best for predicting the efficacy of anti-arthritis treatments. We can therefore consider that clinical trials on humans would have a good chance of having positive outcomes," Troncy said.

About this study:
This study was funded in part by a grant from ArthroLab Inc., an ongoing New Opportunities Fund grant (#9483) and a Leader Opportunity Fund grant (#24601) from the Canada Foundation for Innovation for the pain/function equipment, a Discovery Grant (#327158-2008; #441651-2013) from the Natural Sciences and Engineering Research Council of Canada for the bio-analyses and salaries, and by the Osteoarthritis Chair of the University of Montreal Hospital Centre, Université de Montréal. Maxim Moreau received a doctoral scholarship from the Canadian Institutes of Health Research (TGF-53914) - Strategic Training Initiative in Health Research program (MENTOR) and a doctoral scholarship from the Fonds de recherche du Québec-Santé.

http://www.eurekalert.org/pub_releases/2014-11/wuso-tcm111014.php

The cat's meow: Genome reveals clues to domestication

An international team has sequenced and analyzed the cat genome to better understand the animal's domestication

Cats and humans have shared the same households for at least 9,000 years, but we still know very little about how our feline friends became domesticated. An analysis of the cat genome by researchers at Washington University School of Medicine in St. Louis reveals some surprising clues. The research appears Nov. 10 in the Proceedings of the National Academy of Sciences Early Edition.

Cats have a relatively recent history of domestication compared with dogs; canines arose from wolves over 30,000 years ago.

"Cats, unlike dogs, are really only semidomesticated," said senior author Wes Warren, PhD, associate professor of genetics at The Genome Institute at Washington University. "They only recently split off from wild cats, and some even still breed with their wild relatives. So we were surprised to find DNA evidence of their domestication." One way scientists can understand the genetics of domestication is to look at what parts of the genome are altered in response to living together with humans, Warren added.

The researchers compared the genomes of domestic cats and wild cats, finding specific regions of the domestic cat genome that differed significantly.

The scientists found changes in the domestic cat's genes that other studies have shown are involved in behaviors such as memory, fear and reward-seeking. These types of behaviors - particularly those when an animal seeks a reward - generally are thought to be important in the domestication process.

"Humans most likely welcomed cats because they controlled rodents that consumed their grain harvests," said Warren. "We hypothesized that humans would offer cats food as a reward to stick around." This meant that certain cats that would normally prefer to lead solitary lives in the wild had an additional incentive to stay with humans. Over time, humans preferred to keep cats that were more docile.

Cat Genome Project

The cat genome sequencing project, funded by the National Human Genome Research Institute, part of the National Institutes of Health (NIH), began in 2007. The project's initial goal was to study hereditary diseases in domestic cats, which are similar in some cases to those that afflict humans, including neurological disorders, and infectious and metabolic diseases.

To obtain the high-quality reference genome needed for this research, the team sequenced a domestic female Abyssinian cat named Cinnamon. They chose this particular cat because they could trace its lineage back several generations. This cat's family also had a particular degenerative eye disorder the researchers wanted to study.

To better understand characteristics of domestication, the researchers sequenced the genomes of select purebred domestic cats. Hallmarks of their domestication include features such as hair color, texture and patterns, as well as facial structure and how docile a cat is. Cats are bred for many of these types of characteristics. In fact, most modern breeds are the result of humans breeding cats for their favorite hair patterns.

The Birman breed has characteristic white paws. Comparing the Birman to other breeds' genomes reveals that humans likely bred cats for this quality.

The team also looked at a breed called Birman, which has characteristic white paws. The researchers traced the white pattern to just two small changes in a gene associated with hair color. They found that this genetic signature appears in all Birmans, likely showing that humans selectively bred these cats for their white paws and that the change to their genome happened in a remarkably short period of time.

The group also compared the cat genome with those of other mammals - including a tiger, cow, dog and human - to understand more about the genetics of cat biology. "We looked at the underlying genetics to understand why certain abilities to survive in the wild evolved in cats and other carnivores," said Michael Montague, PhD, the study's first author and a postdoctoral research associate at The Genome Institute.

The differences they found in the cat genome help explain characteristics such as why cats are almost exclusively carnivorous and how their vision and sense of smell differ from other animals like dogs.

Solitary Carnivores

To digest their fatty, meat-heavy meals, cats need genes to efficiently break down fats. The team found particular fat-metabolizing genes in carnivores such as cats and tigers that changed faster than can be explained by chance. This more rapid change generally means these genes provide some sort of digestive advantage to carnivores that only consume animal proteins. The researchers did not find such changes in the same genes of the cow and human, who eat more varied diets and would not need such enhancements.

Cats also rely less on smell to hunt than dogs. So it is not surprising that the researchers found fewer genes for smell in cats than dogs. But they did find more genes related to an alternate form of smell that detects chemicals called pheromones, which allow cats to monitor their social environment, including seeking out the opposite sex. This ability is not as important to dogs, which tend to travel in packs. But it is crucial in cats, which are more solitary and may have more difficulty finding mates.

Cats also have better hearing than most other carnivores, including an ability to hear in the ultrasonic range to better track prey. Their vision is also exceptional in low light. "Cats tend to be more active at dawn and dusk," said Montague, "so they need to be able to detect movement in low light." Accordingly, the team identified specific genes that likely evolved to expand cats' hearing range and their vision in low light.

Even though the genomes of domestic cats have changed little since their split from wild cats, the new work shows that it is still possible to see evidence of the species' more recent domestication. "Using advanced genome sequencing technology, we were able to shed light on the genetic signatures of cats' unique biology and survival skills," said Warren. "And we were able to significantly jump start our knowledge about the evolution of cat domestication."

Collaborators in the research include Texas A&M University; University of Missouri-Columbia; University of California-Davis; Wellcome Trust Sanger Institute in the United Kingdom; Pompeu Fabra University in Spain; Centro de Analisis Genomico in Spain; Bilkent University in Turkey; Indiana Univeristy; Center for Cancer Research in Maryland; St. Petersburg State University in Russia; and Nova Southeastern University in Florida.

The research is funded by the National Human Genome Research Institute at the National Institutes of Health (NIH) (grant number U54HG0003079), the National Science Foundation (DBI-0845494), Morris Animal Foundation (D06FE-063 and D12FE-019), European Research Council starting grant (260372), the Spanish government (BFU2011-28549), National Center for Resarch Resources (R24RR016094 and R24 OD010928) and the Winn Feline Foundation (W10-014 and W09-009).

Montague MJ, Li G, Wilson RK, Lyons LA, Murphy WJ and Warren WC et al. Comparative analyis of the domestic cat genome reveals genetic signatures underlying feline biology and domestication. Proceedings of the National Academy of Sciences Early Edition. Nov. 10, 2014.

http://www.eurekalert.org/pub_releases/2014-11/fau-rfn110714.php

Researchers find novel approach to treating No. 1 cause of blindness in elderly

Study published in the Proceedings of the National Academy of Sciences

While oxygen is essential to our planet's life force and the way we function and stay healthy, high concentrations referred to as oxidative stress may very well be the cause of more than 70 widely-spread diseases such as cancer, heart disease, neurodegenerative diseases, and eye diseases including macular degeneration. Scientists at Florida Atlantic University's Charles E. Schmidt College of Science, as well as the Charles E. Schmidt College of Medicine, have found that sulindac, a known anti-inflammatory drug, can protect against oxidative damage due to age-related macular degeneration (AMD), one of the primary causes of vision loss in the elderly. Their findings were released today in an article titled "Pharmacological protection of retinal pigmented epithelial cells by sulindac involves PPAR-α" in the prestigious Proceedings of the National Academy of Sciences.

"What happens in age-related macular degeneration is that the retinal pigmented epithelial or RPE cells, which are essential to nourishing the retinal cells, are damaged by oxidative stress," said Herbert Weissbach, Ph.D., director and distinguished research professor in the Center for Molecular Biology and Biotechnology within the Charles E. Schmidt College of Science. "Our studies show that sulindac can protect RPE cells in culture against oxidative damage, suggesting that it could be an inexpensive and relatively non-toxic therapeutic approach for treating age-related macular degeneration."

Oxidative stress is mainly due to the imbalance between the free radicals produced within our bodies from the oxygen that we breathe in and the ability of the body to counteract or detoxify their harmful effects through neutralization by "antioxidants systems." This imbalance is the underlying basis of oxidative stress. Oxygen free radicals can also be produced by environmental agents including air pollution, radiation, cigarette smoking, excess stress and increased exposure to sunlight.

Many older people develop macular degeneration as part of the body's natural aging process. There are different kinds of macular problems, but the most common is age-related macular degeneration. AMD affects the macula, the part of the eye that allows you to see fine detail. AMD gradually destroys sharp, central vision, which is needed for seeing objects clearly and for common daily tasks such as reading and driving. Currently, no cures exist for the majority of age-related macular degeneration cases.

http://www.eurekalert.org/pub_releases/2014-11/uoaf-adr110714.php

Archaeologists discover remains of Ice Age infants in Alaska

Remains of two Ice Age infants represent the youngest human remains ever found in northern North America

The remains of two Ice Age infants, buried more than 11,000 years ago at a site in Alaska, represent the youngest human remains ever found in northern North America, according to a new paper published in the Proceedings of the National Academy of Sciences.

These are stone projectile points and associated decorated antler foreshafts from the burial pit at the Upward Sun River site. **UAF photo courtesy of Ben Potter**

The site and its artifacts provide new insights into funeral practices and other rarely preserved aspects of life among people who inhabited the area thousands of years ago, according to Ben Potter, a researcher at the University of Alaska Fairbanks and the paper's lead author.

Potter led the archaeological team that made the discovery in fall of 2013 at an excavation of the Upward Sun River site, near the Tanana River in central Alaska. The researchers worked closely with local and regional Native tribal organizations as they conducted their research. The National Science Foundation funded the work.

Potter and his colleagues note that the human remains and associated burial offerings, as well as inferences about the time of year the children died and were buried, could lead to new thinking about how early societies were structured, the stresses they faced as they tried to survive, how they treated the youngest members of their society, and how they viewed death and the importance of rituals associated with it.

Potter made the new find on the site of a 2010 excavation, where the cremated remains of another 3-year-old child were found. The bones of the two infants were found in a pit directly below a residential hearth where the 2010 remains were found.

"Taken collectively, these burials and cremation reflect complex behaviors related to death among the early inhabitants of North America," Potter said.

In the paper, Potter and his colleagues describe unearthing the remains of the two children in a burial pit under a residential structure about 15 inches below the level of the 2010 find. The radiocarbon dates of the newly discovered remains are identical to those of the previous find - about 11,500 years ago - indicating a short period of time between the burial and cremation, perhaps a single season.

Also found within the burials were unprecedented grave offerings. They included shaped stone points and associated antler foreshafts decorated with abstract incised lines, representing some of the oldest examples of hafted compound weapons in North America.

"The presence of hafted points may reflect the importance of hunting implements in the burial ceremony and with the population as whole," the paper notes.

The researchers also examined dental and skeletal remains to determine the probable age and sex of the infants at the time of the death: One survived birth by a few weeks, while the other died in utero. The presence of three deaths within a single highly mobile foraging group may indicate resource stress, such as food shortages, among these early Americans.

Such finds are valuable to science because, except in special circumstances like those described in the paper, there is little direct evidence about social organization and mortuary practices of such early human cultures, which had no written languages.

The artifacts - including the projectile points, plant and animal remains - may also help to build a more complete picture of early human societies and how they were structured and survived climate changes at the end of the last great Ice Age. The presence of two burial events - the buried infants and cremated child - within the same dwelling could also indicate relatively longer-term residential occupation of the site than previously expected.

The remains of salmon-like fish and ground squirrels in the burial pit indicate that the site was likely occupied by hunter-gatherers between June and August.

"The deaths occurred during the summer, a time period when regional resource abundance and diversity was high and nutritional stress should be low, suggesting higher levels of mortality than may be expected give our current understanding" of survival strategies of the period, the authors write.

http://www.eurekalert.org/pub_releases/2014-11/lu-ots110414.php

Odor that smells like blood: Single component powerful trigger for large carnivores

People find the smell of blood unpleasant, but for predatory animals it means food.

When behavioural researchers at Linköping University in Sweden wanted to find out which substances of blood trigger behavioural reactions, they got some unexpected results. Matthias Laska is professor of zoology, specialising in the sense of smell. For some time his focus has been on scents that directly affect the behaviour of animals. "For predators, food scents are particularly attractive, and

much of this has to do with blood. We wanted to find out which chemical components create the scent of blood," he says.

The study, conducted at Kolmården Wildlife Park, found that for the animals, one particular component of blood odour was just as engaging as the blood odour itself. "It's a completely new discovery that raises interesting questions on evolution," says Prof Laska. The study has been published in the scientific journal PLOS ONE.

When Prof Laska did a search for the contents of volatile substances in mammalian blood, he found nothing. Human blood has been analysed for disease markers, but we have very little information on the substances that give blood its characteristic scent.

A master's student was sent to Friedrich-Alexander-Universität in Erlangen Germany, to analyse mammalian blood with the help of gas chromatography and mass spectrometry, methods used for separating and identifying chemical compounds in a sample. The machine detected some 30 substances, of which some are decomposition products from fats. But the machine lost the job to the human scent experts who had also been engaged. They identified scents that the gas chromatograph missed completely.

One substance stood out: an aldehyde called trans-4,5-epoxy-(E)-2-decenal, which emits the typical metallic scent that humans associate with blood.

Once the researchers had identified a scent candidate that the predators should be attracted to, they wanted to test whether the predators were actually attracted to it in reality. So they designed a study to be conducted at Kolmården Wildlife Park, involving four predator species. How would the four predators - Asian wild dogs, African wild dogs, South American bush dogs and Siberian tigers - react when they caught a whiff of the scent?

Half-metre long wooden logs were impregnated with four different liquids: lab-produced aldehyde, horse blood, fruit essence, and a near-odourless solvent. The animals were exposed to one scent per day in their regular enclosure, while a group of students carefully observed their behaviour.

The results were unequivocal. The logs containing aldehyde were just as attractive stimuli as those containing blood, while the two other logs aroused little interest. The commonest behaviours were sniffing, licking, biting, pawing and toying. The tiger was the most persistent, while the South American bush dogs lost interest more quickly than the other species. The study is the first to show that a single component can be just as attractive as the complex odour.

"How this has developed through evolution is an interesting question. Perhaps there is a common denominator for all mammalian blood," says Prof Laska.

He has plans for several follow-ups of the study, including how prey animals such as mice react to blood odour. For the wildlife park, the study provided results that can be used in its daily operations. Animals in captivity require stimulation, so as not to deteriorate or become fat. The odourised logs can be a popular addition to the animal's environment.

Article: Behavioral responses to mammalian blood odor and a blood odor component in four species of large carnivores by S. Nilsson, J. Sjöberg, M. Amundin, C. Hartmann, A. Buettner and M. Laska. PLOS ONE November 10, 2014.
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Anxiety can damage brain

Accelerate conversion to Alzheimer's for those with mild cognitive impairment

Toronto, Canada - People with mild cognitive impairment (MCI) are at increased risk of converting to Alzheimer's disease within a few years, but a new study warns the risk increases significantly if they suffer from anxiety.

The findings were reported on Oct. 29 online by The American Journal of Geriatric Psychiatry, ahead of print publication, scheduled for May 2015.

Led by researchers at Baycrest Health Sciences' Rotman Research Institute, the study has shown clearly for the first time that anxiety symptoms in individuals diagnosed with MCI increase the risk of a speedier decline in cognitive functions - independent of depression (another risk marker). For MCI patients with mild, moderate or severe anxiety, Alzheimer's risk increased by 33%, 78% and 135% respectively.

The research team also found that MCI patients who had reported anxiety symptoms at any time over the follow-up period had greater rates of atrophy in the medial temporal lobe regions of the brain, which are essential for creating memories and which are implicated in Alzheimer's.

Until now, anxiety as a potentially significant risk marker for Alzheimer's in people diagnosed with MCI has never been isolated for a longitudinal study to gain a clearer picture of just how damaging anxiety symptoms can be on cognition and brain structure over a period of time. There is a growing body of literature that has identified late-life depression as a significant risk marker for Alzheimer's. Anxiety has historically tended to be subsumed under the rubric of depression in psychiatry. Depression is routinely screened for in assessment and follow-up of memory clinic patients; anxiety is not routinely assessed.

"Our findings suggest that clinicians should routinely screen for anxiety in people who have memory problems because anxiety signals that these people are at greater risk for developing Alzheimer's," said Dr. Linda Mah, principal investigator on the study, clinician-scientist with Baycrest's Rotman Research

Institute, and assistant professor in the Department of Psychiatry at the University of Toronto. Dr. Mah is also a co-investigator in a multi-site study lead by the Centre for Addiction and Mental Health, and partially funded by federal dollars (Brain Canada), to prevent Alzheimer's in people with late-life depression or MCI who are at high risk for developing the progressive brain disease.

"While there is no published evidence to demonstrate whether drug treatments used in psychiatry for treating anxiety would be helpful in managing anxiety symptoms in people with mild cognitive impairment or in reducing their risk of conversion to Alzheimer's, we think that at the very least behavioural stress management programs could be recommended. In particular, there has been research on the use of mindfulness-based stress reduction in treating anxiety and other psychiatric symptoms in Alzheimer's - and this is showing promise," said Dr. Mah.

The Baycrest study accessed data from the large population-based Alzheimer's Disease Neuroimaging Initiative to analyze anxiety, depression, cognitive and brain structural changes in 376 adults, aged 55 - 91, over a three-year period. Those changes were monitored every six months.

All of the adults had a clinical diagnosis of amnestic MCI and a low score on the depression rating scale, indicating that anxiety symptoms were not part of clinical depression.

MCI is considered a risk marker for converting to Alzheimer's disease within a few years. It is estimated that half-a-million Canadians aged 65-and-older have MCI, although many go undiagnosed. Not all MCI sufferers will convert to Alzheimer's - some will stabilize and others may even improve in their cognitive powers.

The Baycrest study has yielded important evidence that anxiety is a "predictive factor" of whether an individual with MCI will convert to Alzheimer's or not, said Dr. Mah.

Studies have shown that anxiety in MCI is associated with abnormal concentrations of plasma amyloid protein levels and T-tau proteins in cerebrospinal fluid, which are biomarkers of Alzheimer's. Depression and chronic stress have also been linked to smaller hippocampal volume and increased risk of dementia.

In addition to Dr. Mah, the research team included Dr. Malcolm Binns (statistician scientist at Baycrest's Rotman Research Institute, and assistant professor of the Dalla Lana School of Public Health at the University of Toronto), and Dr. David Steffens (Department of Psychiatry, University of Connecticut Health Centre).

The study was supported by the National Institutes of Health, and the Geoffrey H. Wood Foundation.

http://www.eurekalert.org/pub_releases/2014-11/ehs-bhn111014.php

Beta-blockers have no mortality benefit in post-heart attack patients, say researchers

Studies raise questions about traditional management of heart attack patients after discharge from hospital, reports The American Journal of Medicine

Philadelphia, PA - Beta-blockers have been a cornerstone in the treatment of heart attack survivors for more than a quarter of a century. However, many of the data predate contemporary medical therapy such as reperfusion, statins, and antiplatelet agents, and recent data have called the role of beta-blockers into question. Two new studies published in The American Journal of Medicine evaluated the traditional management of these patients after their discharge from the hospital and in the light of changing medical treatment, as well as the impact of the discharge heart rate and conventional treatment with beta-blockers.

In a study by Bangalore et al. researchers analyzed 60 randomized trials with 102,003 patients evaluating beta-blockers in myocardial infarction. Each of these trials enrolled at least 100 patients. Fourteen trials (20,418 patients) provided data on a follow-up longer than one year. Trials were stratified into those that took place in the reperfusion era (more than 50% undergoing reperfusion or receiving aspirin/statin) and those that took place before the reperfusion era.

Researchers evaluated the impact of contemporary treatment (reperfusion/aspirin/statin) status on the association of beta-blocker use and outcomes in heart attack patients; the role of early intravenous beta-blocker; and the required duration of beta-blocker use. They found that beta-blockers have no mortality benefit in contemporary treatment of heart attacks.

"In patients undergoing contemporary treatment, our data support the short-term (30 days) use of beta-blockers to reduce recurrent heart attacks and angina, but this has to be weighed at the expense of increase in heart failure, cardiogenic shock, and drug discontinuation, without prolonging life," explains lead investigator Sripal Bangalore, MD, MHA, of NYU Langone Medical Center, New York. "The guidelines should reconsider the strength of recommendations for beta-blockers post myocardial infarction."

In the second study, researchers led by senior investigator François Schiele, MD, PhD, Chief of Cardiology at the University Hospital Jean Minjoz, Besançon, France, aimed to describe the determinants of discharge heart rate in acute coronary syndrome patients and assess the impact of discharge heart rate on five-year mortality in hospital survivors. Over the last twenty years there has been growing interest in the use of heart rate as a marker for risk stratification in cardiovascular diseases, and as a prognostic factor for global and cardiovascular

mortality. However, few data are available regarding the long-term impact of discharge heart rate.

The discharge heart rate was recorded in over 3,000 patients discharged over a one month period in 223 participating institutions in the French Registry of Acute ST Elevation or non-ST-Elevation Myocardial Infarction (FAST-MI). Patients were followed over five years. The objective of FAST-MI is to evaluate practices for managing heart attacks (myocardial infarctions) in "real life" conditions, and to measure their relationship with acute and long-term outcomes of patients admitted to coronary care units for heart attack in France, irrespective of the type of health care establishment to which the patients were admitted. An elevated ST segment seen on an electrocardiogram indicates that a relatively large amount of heart muscle damage is occurring, and is what gives this type of heart attack its name.

Heart rate was categorized into four groups: over 60, 61-67, 68-75, and over 75 beats per minute. High heart rate was defined as more than 75 beats per minute. Landmark analysis was performed at one year.

"We found several factors related to a high heart rate. They included ST-elevation myocardial infarction, diabetes, chronic obstructive pulmonary disease, bleeding/transfusion during hospitalization, left ventricular dysfunction, renal dysfunction, and prescription of beta-blockers at discharge. Women were also more likely to have a high heart rate," says Dr. Schiele.

"We found that the discharge heart rate is significantly related to one-year mortality, and that patients discharged with a high heart rate are at higher risk of death during the first year, irrespective of beta-blocker use," he concludes.

http://bit.ly/1wyDlYF

Gingivitis Bacteria Triggers a Tailspin in Your Mouth

In small numbers a keystone pathogen can still cause destruction

Oct 14, 2014 |By Diana Crow

The vast majority of microbes that live in and on our bodies do not put our health at risk, but many can cause problems if their populations grow out of control. So the immune system keeps their numbers in check, culling resident bacteria here and there.

A few microbial species have found ways to sabotage the immune system and skew the balance of power in their favor. Take Porphyromonas gingivalis, a mouth-dwelling bacterium that has long been the prime suspect behind gum disease. Even in small numbers, P. gingivalis can stop white blood cells from producing certain chemicals that kill bacteria. Without these chemicals to restrict their growth, all the bacterial populations in the mouth - including those that had been contributing to a healthy ecosystem - grow explosively, causing tissue damage known as gingivitis.

In two recent studies, a team of University of Pennsylvania researchers led by dental microbiologist George Hajishengallis figured out the mechanism behind P. gingivalis's subterfuge. Building on that knowledge, the scientists discovered that blocking a key chemical signal returned the microbial communities in the mouths of mice to normal.

The standard care for gingivitis is a professional tooth cleaning and more flossing, which temporarily reduce bacterial numbers but do not restore white blood cells' ability to kill. As such, dentists cannot do much to treat recurring inflammation. The team says the finding may lead to future treatment options.

Keystone pathogens may be the culprits behind other chronic inflammatory diseases, too, Hajishengallis says. But to pin down links, scientists need to better understand how keystone bacteria manipulate the checks and balances that allow humans to live in harmony with trillions of microbes.

http://phys.org/news/2014-11-global-worsening-watery-dead-zones.html

Study: Global warming worsening watery dead zones

Global warming is likely playing a bigger role than previously thought in dead zones in oceans, lakes and rivers around the world and it's only going to get worse, according to a new study.

Nov 10, 2014 by Seth Borenstein

Dead zones occur when fertilizer runoff clogs waterways with nutrients, such as nitrogen and phosphorous. That leads to an explosion of microbes that consumes oxygen and leaves the water depleted of oxygen, harming marine life.

Scientists have long known that warmer water increases this problem, but a new study Monday in the journal Global Change Biology by Smithsonian Institution researchers found about two dozen different ways - biologically, chemically and physically - that climate change worsens the oxygen depletion.

"We've underestimated the effect of climate change on dead zones," said study lead author Andrew Altieri, a researcher at the Smithsonian's tropical center in Panama.

The researchers looked at 476 dead zones worldwide - 264 in the United States. They found that standard computer climate models predict that, on average, the surface temperature around those dead zones will increase by about 4 degrees Fahrenheit (slightly more than 2 degrees Celsius) from the 1980s and 1990s to the end of this century.

The largest predicted warming is nearly 7 degrees (almost 4 degrees Celsius) where the St. Lawrence River dumps into the ocean in Canada. The most prominent U.S. dead zones, the Gulf of Mexico and the Chesapeake Bay, are

projected to warm 4 degrees (2.3 degrees Celsius) and nearly 5 degrees (2.7 degrees Celsius) respectively.

Warmer water holds less oxygen, adding to the problem from runoff, said co-author Keryn Gedan, who is at both the Smithsonian and the University of Maryland. But warmer water also affects dead zones by keeping the water more separate, so that oxygen-poor deep water mixes less. "It's like Italian dressing that you haven't shaken, where you have the oil and water separate," Altieri said.

When the water gets warmer, marine life's metabolism increases, making them require more oxygen just as the oxygen levels are already dropping. Other ways that climate change affects dead zones includes longer summers, ocean acidification and changing wind and current patterns, the study said.

Donald Boesch, a University of Maryland ecologist who wasn't part of the study and works at a different department than Gedan, said there is not enough evidence to say that climate change has already played such a big role in the spread of dead zones. But he said the study is probably right in warning that future warming will make the problem even worse.

http://www.bbc.com/news/health-29991092

Ebola outbreak: MSF says new Liberia tactics needed

New rapid response tactics are needed to defeat the Ebola virus in Liberia, according to the charity Medecins Sans Frontieres (MSF).

By James Gallagher Health editor, BBC News website

More than 6,600 people have been infected in the country, but figures suggest the number of new infections has started to fall. MSF says it now has more hospital capacity than patients and called for a shift in tactics. It wants rapid response teams to tackle Ebola hotspots when they flare up.

Liberia has been the worst-hit country in the Ebola epidemic with nearly half of all cases. However, it is the first to begin to turn around its fortunes - the rate of new infections is continuing to increase in Guinea and Sierra Leone.

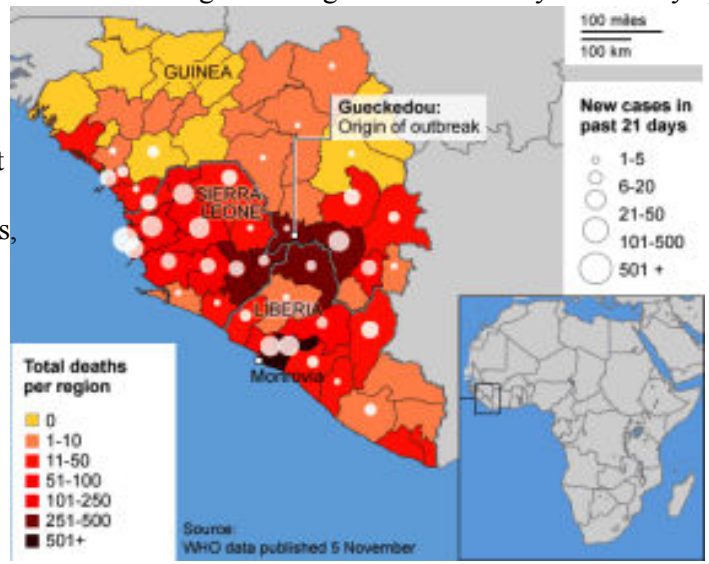
The World Health Organization said it was feeling confident that it was getting the upper hand on the virus in Liberia. MSF said that its treatment centre in the capital Monrovia had 250 beds but was treating just 50 patients. Meanwhile a site in Foya, in the north of the country, has not had a single patient since 30 October.

MSF's head of operations in Liberia, Fasil Tezera, said: "The international response is finally getting off the ground. "Isolation units in Monrovia and some other parts of the country now have adequate capacity and we must adapt the strategy if we want to stay ahead of the curve and beat the epidemic."

Sudden outbreaks of Ebola will continue to emerge in towns and villages in Liberia as the epidemic progresses.

Mr Tezera said: "Priority should be given to a more flexible approach that allows a rapid response to new outbreaks and gets the regular healthcare system safely up and running again."

Such teams would specialise in isolating patients, tracing those who came into contact with the sick, organising safe burials, decontamination and mobilising local communities. US, Britain and other countries have been building treatment centres and training healthcare workers in the affected countries.



Ebola cases

Hospitals

Alongside these teams, MSF called for efforts to support the few remaining hospitals in the country. It is setting up Ebola screening points next to hospitals so that fear of Ebola does not force them to close. In order to achieve their new strategy, MSF is calling on governments to be more flexible with the money they pledge to tackling Ebola.

Dr Nico Heijenberg, the MSF emergency coordinator, said: "Much of the international aid funding for the Ebola response is earmarked for specific projects. "Instead, international donors and implementing organisations should deploy their resources with flexibility so that they can be used where they are needed most."

However, there remains concern that the number of cases could go up again in Liberia. There have already been false dawns in Guinea, where the number of patients increased following earlier drops in hospital admissions.

Meanwhile in Liberia, President Ellen Johnson Sirleaf says four soldiers and their commanding officer will be punished after a boy was killed during protests against quarantine measures in Monrovia.

The boy was shot and others were injured in the incident in August.

A disciplinary board found the soldiers were "guilty of indiscretion and exhibited indiscipline".

http://bit.ly/1wyI8cF

There Is Always Something Else to Do

If you ever hear your doctor say we are going to do something because there is nothing else to do, be afraid. Be very afraid.

John Mandrola

First of all, it should be self-evident that if caring and empathy and relief of suffering count as doing something, there is always something to do for patients.

A growing problem in medicine, especially in death-denying specialties like cardiology and oncology, is that having nothing else to do translates to not having a cure or a promise of immortality. In times past, such misthink wasn't so hazardous. Now, however, the inability to see failing organs as the natural order has never been scarier.

Caregivers in 2014 choose from a vast array of tools to prolong death and, in the process, destroy one's humanity. It has become quite easy to make human beings worse. We have ventilators, dialysis machines, restraints, shocking devices (and vests), mind-altering drugs, and nursing homes - where, contrary to popular speech, elderly patients rarely go to get stronger.

Caregivers in 2014 are also burdened with distorted expectations. When a 90-year-old person dies, he does not die of heart failure, kidney failure, or stroke; he dies of old age. I'm not sure when this notion got lost, but it is long gone.

Here is a case:

An elderly man presented with symptoms of a stroke. The good news was he recovered quickly. The bad news was what he went through. The really bad news was the endemic misthink underlying this case.

The frail but functional gentleman endured a lengthy hospital stay, which I mention because the danger of immobilizing the elderly is underappreciated. During this long stay he underwent numerous expensive and invasive tests, all of which confirmed what was obvious from the original brain scan: he had a small stroke from age-related blood-vessel disease (atherosclerosis).

Now to what almost happened. More than one of his doctors noted that the anticlotting drug he was taking to prevent strokes had failed. Drugs should not fail. And when they do, they must be changed. That's when I got the call. "Is it okay to change this patient to drug X?"

"No. It is not."

There were numerous reasons I said no. The first was that he was doing well on the "failing" medication. It was doing other important things for him. The second reason was that no drug reduces the risk of stroke or heart attack to zero. The third and main reason for not switching was a complete lack of evidence to support using the new drug for this scenario. Maybe it would be better, but we don't know, because it's not been studied for this problem. What's more, the proposed drug requires good kidney function to maintain balance (steady-state levels). This patient, like many elderly patients, had impaired kidney function.

Perhaps you can see the issue.

Treatment was being switched solely because there was nothing else to do.

How did I deal with this situation?

I leveled with the patient. Literally. I sat down in a chair next to his bed. (I was tired after a long day, so it felt good to sit.) I began with the good news: he was okay, and he was going to be okay tomorrow, too. It was a small stroke. He was going home soon. This truthful news brought a smile, which was nice to see.

He asked about the new medication.

I explained my reasoning. "Good," he said. "I looked that drug up. It's expensive. I could not have afforded it." I explained further that I could not predict the future, but he was on the best therapy we had to offer.

This was a mild case. Nothing terrible happened. It's not hard to imagine the trauma that could occur when a nothing-else-to-do mind-set drives caregivers to operate or deliver chemotherapy.

There remain many challenges for healthcare. One is surely how to see the natural order of life and death. Another is to count caring and empathy and relief of suffering as doing something.

http://www.eurekalert.org/pub_releases/2014-11/uoa-cmh111114.php

Controversial medication has benefits for breastfeeding

A controversial medication used by breastfeeding women should not be restricted because of the benefits it offers mothers and their babies, according to researchers at the University of Adelaide.

The medication domperidone has recently been the subject of warnings from the European Medicines Agency based on research that there is a link between the medication and fatal heart conditions. Domperidone has been banned in the United States for years because of fatal cardiac arrhythmias among cancer patients who had been prescribed the drug to prevent nausea and vomiting.

However, in many countries domperidone is used to help women experiencing difficulties with breastfeeding, as it's known to increase milk supply. In line with the overseas experience, Australia's Therapeutic Goods Administration is currently reviewing the need for further restrictions on the use of domperidone.

"There are currently calls for domperidone to be banned for use or heavily restricted because of claims it also puts mothers' lives at risk, but there is absolutely no evidence of this," says NHMRC Early Career Fellow Dr Luke Grzeskowiak from the University's Robinson Research Institute.

"Unfortunately the different uses of the medication have been tied into the one outcome - fatal cardiac arrhythmia. But its use in older and sicker patients compared with nursing mothers is completely different. "The risk of fatal heart conditions was seen to be increased primarily in men, and among people aged over 60 years. No studies to date have shown an increased cardiac risk from domperidone for women trying to breastfeed," Dr Grzeskowiak says.

In a letter published in the Journal of Human Lactation, Dr Grzeskowiak says despite its use being "off-label", domperidone remains widely used in clinical practice for women experiencing low milk supply, with no reports of significant adverse effects.

"In contrast, recent research has demonstrated that domperidone is well tolerated by breastfeeding mothers and is associated with modest improvements in breast milk volume. This is important, as breastfeeding is associated with significant reductions in infant disease and mortality, as well as providing long-term benefits for the mother, with reductions in the incidence of certain cancers," he says.

"These wide-ranging benefits should outweigh what amounts to largely theoretical risks associated with the use of domperidone for low milk supply. Further restrictions regarding the use of domperidone for lactation do not appear warranted and risk subjecting breastfeeding women to further emotional trauma as well as not being in the interests of the long-term health of them or their babies."

http://www.eurekalert.org/pub_releases/2014-11/uoc - hbb111014.php

Humans' big brains might be due in part to newly identified protein

Brain cell growth is spurred by protein absent in brains of mice

A protein that may partly explain why human brains are larger than those of other animals has been identified by scientists from two stem-cell labs at UC San Francisco, in research published in the November 13, 2014 issue of Nature.

Key experiments by the UCSF researchers revealed that the protein, called PDGFD, is made in growing brains of humans, but not in mice, and appears necessary for normal proliferation of human brain stem cells growing in a lab dish.

The scientists made their discovery as part of research in which they identified genes that are activated to make specific proteins in crucial stem cells in the brain known as radial glial cells. The discovery stems from a collaboration between the laboratories of leading radial glial cell scientist Arnold Kriegstein MD, PhD, director of the Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research at UCSF, and Michael Oldham, PhD, who recently made a rapid career leap from graduate student to principal investigator and Sandler Fellow at UCSF.

Radial glial cells make the neurons in the growing brain, including the neurons in the cerebral cortex, the seat of higher brain functions. The cerebral cortex varies in size 10,000-fold among mammals. Changes in the timing, location and degree of cell division and nerve cell generation by radial glial cells can dramatically alter the shape and function of the cortex. The UCSF team discovered that PDGFD is secreted by human radial glial cells and acts on radial glial cells as well as other progenitor cells in the developing brain.

"To the best of our knowledge this is the first example of any signaling pathway affecting the proliferation of radial glial cells whose activity has changed during mammalian evolution," Oldham said. "We think that the expression of PDGFD in this signaling pathway is likely to be part of the reason the human brain is so much bigger that the mouse brain."

Although the UCSF research team found that the majority of genes that are active in radial glial cells are the same in humans and mice, they identified 18 genes that are active in human but not mouse radial glial cells during development of the cerebral cortex.

They focused on PDGFD, already known to be a key component of growth signaling pathways in other tissues but not in the brain, because it appeared to have the biggest effect on brain cell growth in a crude preliminary experiment. When they exposed mouse radial glial cells to PDGFD, it caused the cells to increase their numbers more rapidly than normal. When they blocked the receptor for this protein in human radial glial cells, where it is naturally produced, they found that the population of these cells grew more slowly than normal.

By helping to drive growth of the human cortex, PDGFD might have played an evolutionary role in the huge increase in cortical size in the evolution of mammals leading to the emergence of humans, according to Kriegstein.

"There is a correlation between brain size and cognitive abilities among primates, so it seems that a mechanism for generating large numbers of neurons would have at least a rough correlation with cognitive abilities," said Kriegstein.

The human brain is more than three times bigger than the chimpanzee brain. Might chimp radial glial cells also lack activity for some of the 18 genes identified in the study?

"We're not claiming that these are the genes that make us human, or that they are what makes our brains so much bigger than chimp brains," Oldham said.

Kriegstein's lab team plans to compare radial glial cells derived from induced pluripotent stem cells - that in turn have been developed from the skin cells of chimps and humans - in hopes of shedding more light on differences between the species.

Earlier studies that aimed to find molecular causes for differences in mouse and human brains focused on proteins previously identified in the mouse brain. Researchers measured and compared production of these same proteins in the human brain. But the earlier studies totally missed proteins made uniquely in these key human brain stem cells.

For the Nature study Oldham developed a new experimental design and analytical strategy to identify a gene-expression signature of human radial glial cells with only a single tissue sample. The UCSF researchers prepared 87 cross sections from the front to the back of a single human prenatal cortical specimen. They then used microarrays to determine which genes were switched on to make protein-encoding messenger RNA in each cross section. Using custom software, they identified groups of genes that were similarly activated over the cross sections, a procedure that pointed to genes that were switched on together in the same types of cells, including radial glial cells.

Six of the gene modules they identified this way contained genes already known to be switched on in the radial glial cells of mice. But these modules also included additional genes that the researchers concluded were switched on in human but not mouse radial glial cells. They confirmed the results from their computational analysis by using lab methods to detect specific messenger RNAs and proteins in samples of brain tissue.

In addition to Oldham and Kriegstein, the Nature study co-authors include UCSF postdoctoral fellows Jan H. Lui, PhD, Tomasz Nowakowski, PhD, Alex A. Pollen, PhD, and Ashkan Javaherian, PhD.

The study was funded by the National Institutes of Health, the Bernard Osher Foundation, the California Institute for Regenerative Medicine, the Damon Runyon Foundation, and by the University of California San Francisco Program for Breakthrough Biomedical Research, which is funded in part by the Sandler Foundation.

http://www.eurekalert.org/pub_releases/2014-11/niod-nrc111214.php

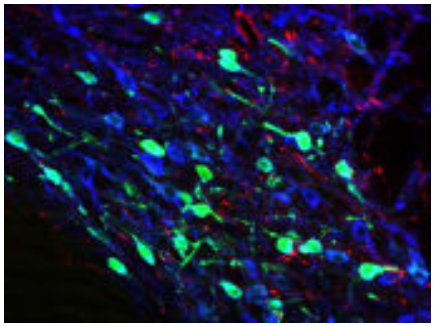
NIDA researchers confirm important brain reward pathway

NIH study in rodents identifies a pathway that starts with glutamate and ends with activation of dopamine reward system

Details of the role of glutamate, the brain's excitatory chemical, in a drug reward pathway have been identified for the first time. This discovery in rodents - published today in Nature Communications - shows that stimulation of glutamate neurons in a specific brain region (the dorsal raphe nucleus) leads to activation of dopamine-containing neurons in the brain's reward circuit (dopamine reward system).

Dopamine is a neurotransmitter present in regions of the brain that regulate movement, emotion, motivation, and feelings of pleasure. Glutamate is a neurotransmitter whose receptors are important for neural communication, memory formation, and learning. The research was conducted at the Intramural Research Program (IRP) of the National Institute on Drug Abuse (NIDA), which is part of the National Institutes of Health.

The research focused on the dorsal raphe nucleus, which has long been a brain region of interest to drug abuse researchers, since nerve cells in this area connect to part of the dopamine reward system. Many of the pathways are rich in serotonin, a neurotransmitter linked to mood regulation.



This is a partial view of labelled neurons in reward circuitry that starts in dorsal raphe (pictured - ventral tegmental area). **Dr. Marisela Morales, NIDA IRP**

Even though electrical stimulation of the dorsal raphe nucleus promotes reward-related behaviors, drugs that increase serotonin have low abuse potential. As a result, this region of the brain has always presented a seeming contradiction, since it is involved in drug reward but is also abundant in serotonin - a chemical not known for a role in drug reinforcement. This has led researchers to theorize that another neurotransmitter may be responsible for the role that the dorsal raphe nucleus plays in reward.

"We now have strong evidence of a reward pathway that starts with stimulation of glutamate neurons in the dorsal raphe nucleus and ends in activation of the dopamine reward system," said NIDA Director Dr. Nora D. Volkow. "These findings help us better understand the brain's reward circuitry and opens up new avenues of research into the neurobiology of drug addiction."

In these rodent models, researchers used special tracers and labelling compounds to confirm that this circuit in the reward pathway begins with glutamate cells in the dorsal raphe nucleus that connect to dopamine cells in the ventral tegmental area, which in turn travel to the nucleus accumbens, a brain structure linked to motivation, pleasure, and reward. After verifying the pathway, investigators used optogenetic techniques (using light to control activity of modified cells) and chemical blockers to confirm that glutamate, not serotonin, is responsible for activating this reward circuitry.

"This glutamatergic pathway is the first fully characterized link between electrically stimulated reward circuitry and the dopamine system on which it depends," said Dr. Marisela Morales, NIDA IRP scientist and senior author on the paper. "The discovery of this specific brain pathway opens new avenues to examine its participation in a variety of disorders related to motivation."

The paper by Qi et al. can be found at http://www.nature.com/ncomms/index.html. For similar research currently being conducted by NIDA IRP in this area, go to: http://irp.drugabuse.gov/cnrb.php#Anchor-Anatomy-48213.

http://www.eurekalert.org/pub_releases/2014-11/gi-sdi111014.php

Semen directly impairs effectiveness of microbicides that target HIV

New generation of microbicides should contain compounds that break down amyloid fibrils in semen in order to increase drugs' effectiveness

In the fight against HIV, microbicides - chemical compounds that can be applied topically to the female genital tract to protect against sexually transmitted infections - have been touted as an effective alternative to condoms. However, while these compounds are successful at preventing transmission of the virus in a petri dish, clinical trials using microbicides have largely failed. A new study from the Gladstone Institutes and the University of Ulm now reveals that this discrepancy may be due to the primary mode of transportation of the virus during sexual transmission, semen.

"We think this may be one of the factors explaining why so many drugs that efficiently blocked HIV infection in laboratory experiments did not work in a real world setting," explains co-first author Nadia Roan, PhD, a visiting scientist at Gladstone and an assistant professor-in-residence in the Department of Urology at the University of California, San Francisco. "We've shown previously that semen enhances HIV infection, but this is the first time we've shown that this activity markedly reduces the antiviral efficacy of microbicides."

In the study, published today in Science Translational Medicine, researchers tested the effectiveness of several different types of microbicides targeting the HIV virus on cells that had been exposed to HIV alone compared with cells that were treated with both HIV and semen. Across the board, they saw that not only did the cells with semen have rates of HIV infection approximately ten-fold higher than normal, these microbicides were up to twenty times less effective at blocking the virus in these cells than in those not exposed to semen.

Semen markedly enhances the infectiousness of HIV through the presence of protein aggregates called amyloid fibrils. HIV binds to these fibrils, causing the virus to cluster together and increasing its ability to attach to and infect cells in the host - in this case the sexual partner of the infected individual. This effect is then sufficient to increase the infectiousness of the HIV virus, thereby diminishing the antiviral properties of the microbicides.

Senior author Jan Munch, PhD, from the University of Ulm says, "Our findings suggest that targeting amyloids in semen is an alternative strategy to improve drug efficacy. The next step is to create a compound or cocktail of drugs that targets both the HIV virus and these amyloid fragments and to test its effectiveness. Also, given that semen is the main means of transmission of HIV, future testing of microbicides in the lab should be performed in the presence of semen to better predict antiretroviral efficacy in real life."

To test that it was the HIV-enhancing ability of semen that was having this effect on the microbicides and not some other substance, the researchers repeated the experiments using semen from men whose semen does not enhance HIV infection due to a disorder called ejaculatory duct obstruction. In the presence of these samples, there was no decrease in effectiveness of the anti-viral microbicides, confirming the importance of the HIV-promoting effects of semen in counteracting the effectiveness of these drugs.

Most microbicides work by targeting the virus itself, attempting to break it down or blocking its ability to infect a cell. However, the heightened infectiousness of HIV in the presence of semen appears to over-power any anti-viral effects the microbicides possess. The one exception to this finding is a different type of microbicide that acts on the host cells' receptors, stopping the virus from latching on from within. In the current study, this microbicide, called Maraviroc, was equally effective in preventing infection both with and without the presence of semen.

"There are important potential clinical implications for this study," says Warner Greene, MD, PhD, director of the Gladstone Institute of Virology and Immunology and a senior author on the paper. "Microbicides were originally developed as a way to empower and protect women in sub-Saharan Africa who often don't have a way to negotiate safe sex or condom use. However, the first generation of microbicides were largely ineffective or worse, some even leading to increased transmission of the virus. This study sheds light on why these microbicides did not work, and it provides us with a way to fix this problem by creating a new compound drug combining antivirals and amyloid inhibitors."

http://www.eurekalert.org/pub_releases/2014-11/uou-dme111214.php

Did men evolve navigation skills to find mates?

Study links spatial ability, roaming distance and number of lovers

SALT LAKE - A University of Utah study of two African tribes found evidence that men evolved better navigation ability than women because men with better spatial skills - the ability to mentally manipulate objects - can roam farther and have children with more mates.

By testing and interviewing dozens of members of the Twe and Tjimba tribes in northwest Namibia, the anthropologists showed that men who did better on a spatial task not only traveled farther than other men but also had children with more women, according to the study published this week in the journal Evolution

and Human Behavior. "It's the first time anybody has tried to draw a line between spatial ability, navigation, range size and reproductive success. Most of this chain has been assumed in the scientific literature," says Layne Vashro, the study's first author and a postdoctoral researcher in anthropology.

Anthropology professor Elizabeth Cashdan, the study's senior author, says, "Some of the links have been demonstrated, but this study looks at the whole chain and that's what is novel about it."

"Among the most consistent sex differences found in the psychological literature are spatial ability and navigation ability, with men better at both," Vashro says. "In the anthropological literature, one of the most consistent behavioral differences between men and women is the distance they travel. This difference in traveling is assumed to explain the observed differences in spatial ability and navigation ability. Now, we've drawn a link between spatial ability and range size."

There is a demonstrated relationship between sex differences in how far some mammals - including voles and deer mice - range or travel, and sex differences in their spatial and navigation abilities. But until now, little has been known about this relationship in humans, Vashro adds. Funding for the study came in part from a dissertation improvement grant to Vashro from the National Science Foundation.

Male-Female Differences in Spatial Ability and Range Size

Cashdan says spatial skills include "being able to visualize spatial relationships and manipulate that image in your mind." Vashro says an example is to "visualize how you fit a bunch of things into the back of a truck, and how you could rotate them most efficiently to fit."

Cashdan notes that relative to other cognitive differences between the sexes, such as cultural differences in math skills, the difference in spatial skills is large, and it is found across cultures and in some other species. "That's why we think it may have evolutionary roots," she says.

"The argument in the literature is that you need good spatial ability to navigate successfully, and you need to navigate effectively to travel long distances in unfamiliar environments," Cashdan says. "That is the hypothesized link."

The new study connected links in that chain. "These findings offer strong support for the relationship between sex differences in spatial ability and ranging behavior, and identify male mating competition as a possible selective pressure shaping this pattern," the researchers conclude in their paper.

The study involved members of the Twe (pronounced tway) and Tjimba (pronounced chim-bah) tribes, which live in a mountainous, semiarid desert area. They have some goats and cows, and they collect berries, tubers and honey, and tend gardens with maize and some melons and pumpkin, Vashro says. They have dry season camps in the mountains, where they forage, and wet season camps near their gardens.

The Twe and Tjimba were good subjects for the study because they travel over distances of 120 miles during a year, "navigating on foot in a wide-open natural environment like many of our ancestors," Vashro says.

The tribes "have a comparatively open sexual culture," Vashro says. Cashdan adds, "They have a lot of affairs with people they're not married to, and this is accepted in the culture." Many men have children by women other than their wives. That also made the tribes good for the study, because "in a culture where you don't have mates outside of marriage, we're not going to expect as tight a relationship between range size and reproductive success," Cashdan says.

How does mating pressure favor navigation skills? "Navigation ability facilitates traveling longer distances and exploring new environments," Vashro says. "And the farther you travel, the more likely you are to encounter new mating opportunities."

Studying Foraging People in Namibia

During visits to Namibia's Kunene region during 2009-2011, Vashro had Twe and Tjimba participants perform different tasks. He looked for male-female differences and correlations among those differences:

To test the ability to rotate objects mentally, a computer screen displayed a series of hands palm up or palm down and oriented in different directions. After a trial period, 68 men and 52 women were shown a series of hands for up to 7.5 seconds per image and were asked to identify whether the pictured hand was a left hand or right hand. After excluding participants who didn't understand the task, the Utah researchers found males did better.

Another test of spatial perception involved a picture of a clear plastic cup with a horizontal water line in the middle. It was shown to 67 men and 55 women. Then they were shown a single page with four images of the cup tipped and the water line at varying angles. They were asked to identify the correct image, which showed the water line in the tipped cup parallel to the ground. This task also has been shown to be easier for men and also may be related to certain navigation skills. In the new study, the men also were significantly better at it than the women.

In another test, 37 men and 36 women were asked to point to nine different locations in the Kunene region, ranging from about 8 to 80 miles away. Vashro used a GPS compass to measure their accuracy. Men scored significantly better than women.

The researchers also measured the range size of Twe and Tjimba people by interviewing them and asking how many places they visited during the past year and the distance they covered to get to each location.

"Men traveled father than women and to more places than women," with both findings statistically significant, Cashdan says. On average, Vashro says, "men

reported visiting 3.4 unique locations across 30 miles per location on average in a year, while women reported visiting only two locations across 20 miles."

And in the key finding, men who did better on the mental rotation task reported traveling farther both during their lifetime and the past year, compared with men who didn't do as well on the mental rotation task. There was no difference in range size between women who did better and worse on the mental rotation task.

"It looks like men who travel more in the past year also have children from more women - what you would expect if mating was the payoff for travel," Vashro says.

"Why men should be better at mentally rotating objects is a weird thing," Cashdan says. "Some people think it is culturally constructed, but that doesn't explain why the pattern is shared so broadly across human societies and even in some other species. The question is why should men get better benefits from spatial ability than women? One hypothesis, which our data support, is that males, more than females, benefit reproductively from getting more mates, and ranging farther is one way they do this."

http://www.eurekalert.org/pub_releases/2014-11/jhub-oww111214.php

Older women with sleep-breathing problems more likely to see decline in daily functions

Risk more than doubles for women with moderate to severe breathing disruptions during sleep

Older women with disordered breathing during sleep were found to be at greater risk of decline in the ability to perform daily activities, such as grocery shopping and meal preparation, according to a new study led by researchers at the Johns Hopkins Bloomberg School of Public Health and the University of California, San Francisco.

The study was published Nov. 6 in the online edition of the Journal of the American Geriatrics Society.

The findings are notable given the aging of the population - an estimated 3.7 million Americans will turn 65 in 2015, and by 2030, 19 percent of the U.S. population will be 65 or older - and the fact that sleep-disordered breathing is treatable. Older adults are as much as four times as likely as middle-aged individuals to have problems with breathing during sleep.

Sleep-disordered breathing involves repeated interruptions or decreases in breathing during sleep, which often leads to fragmented sleep and hypoxemia, or low blood oxygen levels. Doctors rate the severity of sleep-disordered breathing with the apnea-hypopnea index (AHI), which reflects the number of breathing interruptions (apneas) and the number of significant decreases in breathing (hypopneas) per hour of sleep.

The study found that women with an AHI on the moderate to severe side, with 15 or more breathing disruptions per hour of sleep, had a 2.2 times greater odds of decline in daily activity functions during the evaluation period, which averaged five years between baseline evaluation and follow-up.

"Because sleep-disordered breathing can be treated effectively, it is possible that treatment could help prevent decline in important areas of functioning that allow older adults to remain independent," says Adam Spira, PhD, an associate professor in the Department of Mental Health at the Johns Hopkins Bloomberg School of Public Health and the study's lead author. "As is often the case, more research is needed to investigate this possibility."

Because the study was observational, the researchers can't conclusively state that sleep-disordered breathing caused the functional decline, but the research does point to a strong link.

Earlier studies involving older men have linked sleep-disordered breathing with frailty and death. The authors believe this is one of the first studies to assess the impact of sleep-disordered breathing on decline in older women's ability to perform basic functions associated with independent living.

The study included 302 women, with a mean age of 82.3 years. At the start of the study, participants underwent an in-home sleep evaluation. They were also asked whether they had any difficulty performing daily activities, including heavy housework, shopping and preparing meals, or any challenges with mobility, such as walking several blocks or climbing or descending stairs. Participants' self-reported daily activities and mobility were assessed once again in a follow-up evaluation.

The researchers say they believe it is the low blood-oxygen levels caused by sleep-disordered breathing that cause the trouble with daily tasks, and not sleep fragmentation, which is also increased by sleep-disordered breathing.

The authors note that women who reported no difficulties with daily activities during their baseline evaluation but a moderate-to-high AHI had a somewhat higher risk of reporting deterioration in daily-activity function in the follow-up evaluation. No links between sleep-disordered breathing severity and decline in mobility were observed.

The study was supported by National Institutes of Health (NIH) Grants AG026720, AG05394, AG05407, AR35582, AR35583, AR35584, R01 AG005407, R01 AG027576-22, 2 R01 AG005394-22A1, 2 R01 AG0275, 74-22A1, HL40489, K24AG031155.

"Sleep-Disordered Breathing and Functional Decline in Older Women" was written by Adam P. Spira, PhD, Katie L. Stone, PhD, George W. Rebok, PhD, Naresh M. Punjabi, MD, PhD, Susan Redline, MD, MPH, Sonia Ancoli-Israel, PhD and Kristine Yaffe, MD.

http://bit.ly/1H03dVI

Superconducting cable reliably supplies 10,000 households with electricity

KIT's fundamental research into superconducting materials and components as well as its feasibility studies contribute to the success of AmpaCity

180 days or 4300 hours – for this period, the AmpaCity superconducting cable in Essen, Germany, has been conducting power so far. On October 27, the project partners, inclusive of the Karlsruhe Institute of Technology, are taking positive stock. The superconductor transports five times more electricity than conventional copper cables with hardly any losses. Since its commissioning on April 30 this year, the cable of one kilometer in length has distributed about 20 million kilowatt hours, corresponding to the consumption of about 10,000 households in Essen.

"The AmpaCity project shows that it is possible to transfer fundamental research to application," Mathias Noe, Head of the Institute of Technical Physics of KIT and project partner of AmpaCity, says. "Research contributes to solving societal challenges, such as the transformation of the energy system in Germany. For this purpose, application-oriented fundamental research financed from federal funds takes place in close cooperation with innovative industrial development."

After 180 days of operation, the project partners now took a first positive stock. "So far, operation has taken place without any trouble. We have obtained valuable technical findings that helped us further optimize the superconductor system," said Dr. Joachim Schneider, Chief Technical Officer of RWE Deutschland. The project partners modified the system monitoring scheme for an optimal integration of the superconductor into the protection system of the Essen power grid. In addition, the cooling cycle of the cable was adapted to the special requirements of AmpaCity.

The AmpaCity flagship project that has meanwhile gained worldwide recognition is financed from funds of the Federal Ministry for Economic Affairs and Energy (BMWi). "The Energiewende needs courageous innovations for an efficient and secure design of tomorrow's energy system. That is why we deliberately selected this excellent project for funding under our energy research program," said Uwe Beckmeyer, Parliamentary Undersecretary of State with the Federal Minister for Economic Affairs and Energy, during his visit in Essen. The BMWi funded the project with EUR 5.9 million. An investment of EUR 13.5 million was made by the project partners. These are RWE as the grid operator, the cable manufacturer Nexans, and Karlsruhe Institute of Technology (KIT) that scientifically supports the field tests.

Prior to the AmpaCity project, KIT coordinated a detailed study relating to the technical feasibility and economic efficiency of the use of superconductors on the intra-urban medium-voltage level. Superconducting cables are the most reasonable option to reduce high-voltage cables in urban grids, to simplify the grid structure, and to dismantle resource- and area-consuming transformer stations. Copper medium-voltage cables can transmit high powers in cities at comparably low costs, but Ohmic losses are high. The preliminary study highlights the advantages associated with the use of 10,000-volt superconductors in the intra-urban distribution grid and the dismantling of high-voltage facilities. In the medium term, this would result in an enhanced efficiency, a leaner grid, and reduced operation and maintenance costs with a smaller consumption of areas in the city.

High-temperature superconductivity and power transport at minus 200 instead of minus 270°C is based on research conducted by Professor Alex Müller and Dr. Johannes Georg Bednorz, who were granted the Physics Nobel Prize in 1987 for their work. Thanks to the properties of the superconducting material, a special ceramic, and its cooling to minus 200°C, the cable is turned into an ideal electric conductor. In Essen, the 10,000-volt superconducting cable replaces a conventional 110,000-volt line.

http://bit.ly/11pQT0W

Skeleton Emerges From Mysterious Greek Tomb

A skeleton has emerged from the Alexander the Great-era tomb in Amphipolis in northern Greece, according to a news announcement by the Greek Ministry of Culture on Wednesday.

Nov 12, 2014 09:15 AM ET // by Rossella Lorenzi

At least one archaeologist has suggested that the remains, if male, could belong to Hephaestion, a close friend and possible lover of Alexander the Great - or someone like him. Archaeologists led by Katerina Peristeri found the human remains in a box-shaped grave. The 10.6 by 5.1-foot limestone burial was found at about 5.3 feet beneath the floor of the third chamber in the massive tomb site. Within the limestone grave, the archaeologists unearthed the remains of a wooden coffin, along with iron and copper nails, bone and glass fragments - most likely decorative elements of the coffin.

"Parts of the skeleton were found scattered within and outside of the grave. Obviously, an anthropological investigation will be carried on the remains," the Greek ministry of culture said in a statement.

According to Dorothy King, a classical archaeologist not involved in the excavation, the fact that the bones were found in and out of the sarcophagus, suggests the tomb was looted.

However, she noted the finding points to the deceased being someone uniquely important. “A burial like this in a sarcophagus, a whole body rather than a box with ashes, is unusual in Macedonia,” King told Discovery News. According to the scholar, most people who died abroad were buried in foreign land and only very important people like Alexander and Hephaestion, Alexander the Great’s close friend and possible lover, were embalmed to be returned.

“I think that if the bones are male, they are most likely to be those of someone like Hephaestion,” King wrote in her blog. “The remains show that the sarcophagus was very elaborate and made of precious materials, as the sources say his funerary cortege was,” she added.

Hephaestion was a Macedonian nobleman and a battlefield general in the army of Alexander and was Alexander’s closest friend since childhood. The two were tutored under Aristotle.

Although more than one historian has suggested that the handsome Hephaestion had a physical relationship with his emperor, no contemporary source states that Alexander and Hephaestion were lovers.

Yet, according to Guy MacLean Rogers, professor of history at Wellesley College and the author of "Alexander: The Ambiguity of Greatness," modern sexual categories like homosexual, heterosexual, and bisexual did not exist at the time.

“In ancient Greece, acting upon a desire (sent by the god Eros) for another man or woman, simply did not lock any man or woman into a sexual camp,” Rogers wrote.

Whatever the nature of their relationship, when Hephaestion died in Ecbatana (modern Hamadan) in western Iran in October 324 B.C., Alexander mourned his loss by shaving his own hair, not eating for days, executing Hephaestion's doctor, and commissioning an expensive funeral pyre.

Alexander himself would die eight months later.

http://bit.ly/1vgDLaZ

Red Planet racers: Next Mars rovers get a speed boost

IT'S time for Martian rovers to put the pedal to the metal.

A system that lets rovers handle more of their own navigation could spell more speed for interplanetary explorers.

It's badly needed: the Curiosity rover, our best on the Red Planet, only covers about 200 metres per day. That's because when a rover encounters an obstacle it can't negotiate by itself, it must wait for instructions from its minders on Earth – a huge waste of time.

To get around this, Mark Woods of the Autonomy and Robotics Group at SCISYS in Bristol, UK, and colleagues have built Seeker. With the software loaded onto a rover, engineers can simply input desired waypoints for the rover to reach, and the system figures out the route using stored satellite images of the terrain.

Along the way, the rover's on-board cameras scan for rocks that are too small for the satellites to catch. If any are spotted, Seeker automatically adjusts the route to skirt around them. The system also uses the cameras and satellite images to monitor progress.

In 2012, Seeker was tested for the first time in the Atacama desert in Chile, a landscape similar to that of Mars. There, it guided the RoboVolc rover, built to traverse the edge of volcanoes, over several kilometres in a single day. The most recent trial, carried out last month, tested Seeker's ability to pilot a robot at night.

If all goes well Seeker could help the European Space Agency's ExoMars rover, which is planned for launch in 2018, find its way across vast stretches of Martian soil.

http://bit.ly/11aY7ou

The “Paper Effect” – Note Something Down And You’re More Likely To Forget It

Have you heard about the internet rewiring our brains and eating our memories?

By Christian Jarrett

In her new book Mind Change, publicity expert Baroness Professor Susan Greenfield claims this is what’s happening. She describes the “Google Effect” where the internet becomes like an external memory bank. She cites research published in 2011 by Betsy Sparrow and colleagues – people who saved facts on a computer were less able to recall those facts later as compared with people who were told the facts would be erased. If we rely on computers in this way, what might become of us? “Imagine that in the future people become so used to

external access for any form of reference that they have not internalized any facts at all," Greenfield warns. Greenfield is not alone in her fears. "Poor memory? Blame Google" was the Guardian headline at the time, and there were many similar responses.

Scary eh? Hold onto your seat. I fear the Professor and her ilk are missing a more immediate threat. Internet use is widespread and growing daily, but on a global scale it still lags behind the use of notepaper. Paper may have been invented over two thousand years ago, but I can reveal exclusively that it is only now that scientists have identified the true danger of this technology to our memories.

Michelle Eskritt and Sierra Ma at Mount St Vincent University in Canada challenged a group of undergraduates to play the card game Concentration on their own (also known as Pairs). In case you're unfamiliar – the idea is to memorize the locations of pairs of cards arranged in a grid. After the study time, all the cards are placed face down. Each turn, the player flips over one card and must then recall the location of its duplicate partner.

Here's the study's first twist – half the students were given the chance to make notes, on paper, about the locations and identities of the picture cards. The others had to rely on their biological memories housed in their skulls. Here's the second twist. After the study period, to their surprise, the note-taking students had their notes taken away. Both groups were then tested on the locations and identities of the different cards. The alarming result – the note-taking group performed much worse when it came to remembering the locations of the cards.

"One might have predicted that the note-taking group should show evidence of having better memory for the identity and location of the cards," the researchers said, "as it could be argued that the form of studying that they were engaged in was more active and elaborate than the forms used by the study group." Alas, no: the note-takers floundered. They relied on an external form of technology for memory storage and their own synapses sat idly by.

Make a note of this (actually don't, just remember it): Making notes is mind altering and eats your memories. Save your brain: Put down your pencil and step away from the note-pad.

http://www.eurekalert.org/pub_releases/2014-11/lu-cpl111314.php

Cold-induced pain linked to the garlic and mustard receptor

Mechanism in the body creating the connection between cold and pain found

Some people experience cold not only as feeling cold, but actually as a painful sensation. This applies even to fairly mild temperatures - anything below 20°C. A group of researchers from Lund University in Sweden have now identified the mechanism in the body that creates this connection between cold and pain. It turns out that it is the same receptor that reacts to the pungent substances in mustard and garlic.

Professor of Pharmacology Peter Zygmunt and Professor of Clinical Pharmacology Edward Högestätt have long conducted research on pain and the connection between pain and irritant substances in mustard, garlic and chilli. In large quantities, these strong spices can cause burning or irritant sensations in the mouth and throat, and can also cause rashes and swelling. When the eyes are exposed, these spices produce strong pain and lacrimation, a property that has been exploited in pepper spray and tear gas. The reason is that the substances affect nerves that are part of the pain system and that are activated by inflammation.

Ten years ago, the Lund research group identified the receptor for mustard and garlic, i.e. the way in which the pungent substances in the spices irritate the nerve cells. Since then, the question of whether this receptor also responds to cold has been a matter of debate. However, the researchers have now demonstrated that this is the case.

"We have worked with Professors of Biochemistry Urban Johanson and Per Kjellbom here in Lund to extract the human receptor protein and insert it into an artificial cell membrane. There we could see that it reacted to cold", explained Peter Zygmunt.

The findings increase our knowledge of the human body's temperature senses. However, they could also help all those who suffer from cold allodynia, i.e. who are over-sensitive to cold and experience pain when exposed to cold.

"These problems are very common in patients with chronic pain or diseases that affect the nervous system, such as diabetic neropathy. Patients undergoing chemotherapy can also become over-sensitive to cold as a side-effect of their medication. The discomfort and pain experienced by patients can start at relatively mild temperatures, within the temperature span to which the mustard and garlic receptor reacts", said Edward Högestätt.

Receptors for mustard and garlic are found in many locations in the body, including in the skin, bladder and gut. A number of pharmaceutical companies are now attempting to develop drugs to block the receptors in order to reduce problems such as itching, incontinence and pain. The Lund researchers believe that blocking the receptors ought also to relieve pain caused by cold.

Moreover, it is known that the mustard and garlic receptor reacts to chemical substances that irritate the airways. Possible new drugs for people who are affected by perfume, solvents, cigarette smoke, car exhausts and suchlike should therefore also benefit those who are over-sensitive to cold in the airways.

The discovery of the link between the mustard and garlic receptor and cold means that a further part of human temperature sensing has been charted.

"We already know that the chilli receptor not only reacts to chilli, but also to temperatures over 42°C, such as when you burn yourself on a fire. The menthol receptor reacts to temperatures under 28°C, which are perceived as pleasantly cooling. And now we know that the mustard and garlic receptor reacts to temperatures under 20°C", said Peter Zygmunt.

http://www.pnas.org/content/early/2014/11/10/1412689111

http://www.eurekalert.org/pub_releases/2014-11/ason-gsn110714.php

Guidelines say nearly all patients with chronic kidney disease should take statins

Two separate cholesterol management guidelines are in agreement

Washington, DC - Almost all people with pre-dialysis kidney disease should receive statins by current guidelines, reports a study appearing in an upcoming issue of the Journal of the American Society of Nephrology (JASN).

Because individuals with chronic kidney disease (CKD) have an increased risk for developing heart disease, preventive measures such as maintaining normal cholesterol levels are important. In 2013, two cholesterol management guidelines were published: one by the American College of Cardiology/American Heart Association (ACC/AHA) and another by the Kidney Disease Improving Global Outcomes Lipid Work Group (KDIGO). The ACC/AHA guideline recommends statin treatment for individuals with a high heart disease and stroke risk based on having a history of heart problems, diabetes, or very high cholesterol, or for those with an estimated 10-year risk ≥7.5% using a formula called the "Pooled Cohorts risk equations". In contrast, the KDIGO guideline recommends statin therapy for all individuals 50 to 79 years of age with CKD.

Although individuals with CKD are in general more likely to develop heart disease than individuals without CKD, some may be considered at low risk by the ACC/AHA cholesterol treatment guideline. So which guideline should these patients follow?

To investigate, Lisandro Colantonio, MD, MSc, Paul Muntner, PhD (University of Alabama at Birmingham School of Public Health) and their colleagues compared the two treatment recommendations using data from the REasons for Geographic and Racial Differences in Stroke (REGARDS) study, a large study of more than 30,000 US adults. Among the major findings:

92% of people with CKD are recommended to receive statin treatment by the ACC/AHA guideline vs. 100% according the KDIGO guideline.

50% of people with CKD who are recommended to receive statins are not taking them.

The new Pooled Cohort risk equations are accurate among people with CKD, indicating that physicians have a valid tool available to estimate heart disease risk for their patients with CKD.

"These results indicate that either guideline can be used to inform the decision to initiate statin therapy for people with CKD who are 50 to 79 years of age," said Dr. Colantonio. "They also show that there is an unmet treatment need and a missed opportunity for lowering heart disease risk among patients with CKD." Dr. Colantonio notes that "The accuracy of the pooled cohort risk equations in people with CKD is important given their high risk for heart disease and stroke. Physicians can use this tool in guiding therapy for patients with CKD."

Study co-authors include Usman Baber, MD, Maciej Banach, MD, PhD, Rikki Tanner, MPH, David Warnock, MD, Orlando Gutiérrez, MD, Monika Safford, MD, Christoph Wanner, MD, and George Howard, DrPH.

Disclosures: Drs. David Warnock, Monika Safford and Paul Muntner have received grant support from Amgen Inc. Dr. Lisandro Colantonio was funded with a Fulbright Scholarship to complete the PhD program in Epidemiology from the University of Alabama at Birmingham.

The article, entitled "Contrasting Cholesterol Management Guidelines for Adults with CKD," will appear online at http://jasn.asnjournals.org/ on November 13, 2014.

http://www.eurekalert.org/pub_releases/2014-11/miot-ptt111214.php

Pulling together the early solar system

New study finds that a strong magnetic field whipped the early solar system into shape.

Written by Jennifer Chu, MIT News Office

Infant planetary systems are usually nothing more than swirling disks of gas and dust. Over the course of a few million years, this gas gets sucked into the center of the disk to build a star, while the remaining dust accumulates into larger and larger chunks - the building blocks for terrestrial planets.

Astronomers have observed this protoplanetary disk evolution throughout our galaxy - a process that our own solar system underwent early in its history. However, the mechanism by which planetary disks evolve at such a rapid rate has eluded scientists for decades.

Now researchers at MIT, Cambridge University, and elsewhere have provided the first experimental evidence that our solar system's protoplanetary disk was shaped by an intense magnetic field that drove a massive amount of gas into the sun within just a few million years. The same magnetic field may have propelled dust grains along collision courses, eventually smashing them together to form the initial seeds of terrestrial planets.

The team analyzed a meteorite known as Semarkona - a space rock that crashed in northern India in 1940, and which is considered one of the most pristine known

relics of the early solar system. In their experiments, the researchers painstakingly extracted individual pellets, or chondrules, from a small sample of the meteorite, and measured the magnetic orientations of each grain to determine that, indeed, the meteorite was unaltered since its formation in the early galactic disk.

The researchers then measured the magnetic strength of each grain, and calculated the original magnetic field in which those grains were created. Based on their calculations, the group determined that the early solar system harbored a magnetic field as strong as 5 to 54 microteslas - up to 100,000 times stronger than what exists in interstellar space today. Such a magnetic field would be strong enough to drive gas toward the sun at an extremely fast rate.

"Explaining the rapid timescale in which these disks evolve - in only a few million years - has always been a big mystery," says Roger Fu, a graduate student in MIT's Department of Earth, Atmospheric and Planetary Sciences. "It turns out that this magnetic field is strong enough to affect the motion of gas at a large scale, in a very significant way." Fu and his colleagues, including Ben Weiss, a professor of planetary sciences at MIT, publish their results in the journal Science.

High fidelity

More than 99 percent of mass in a primordial galactic disk is composed of ionized gas, leaving less than 1 percent as solid particles - the dusty seeds of terrestrial planets. Observations of far-off galaxies have revealed that such massive amounts of gas are accreted, or absorbed, into the central star within just a few million years. However, theoretical models have been unable to identify a mechanism to explain such a rapid accretion rate.

"The idea that the disk gets depleted within just 3 million years is fundamental to understanding how planets form," Fu says. "But theoretically, that's difficult to do, and people have had to invoke all these intricate mechanisms to make that happen." There are theoretical models that incorporate magnetic fields as a mechanism for disk evolution, but until now, there has been no observational data to support the theories.

Fu points out that researchers have been searching since the 1960s - "with little success" - for evidence of early magnetic fields in meteorite samples. That's because, for the most part, the meteorites studied had been altered in some form or other. "Most of these meteorites ... were heated, or had water coursing through them, so the chances of any one meteorite retaining a recording of the most primordial magnetic field in the nebula was almost zero," Fu says.

He and his colleagues chose to analyze the Semarkona meteorite because of its reputation as a pristine sample from the early solar system.

"This thing has the unusual advantage of being unaltered, but also happens to be a really excellent magnetic recording device," Weiss says. "When it formed, it formed the right kind of metal. Many things, even though pristine, didn't form the right magnetic recording properties. So this thing is really high-fidelity."

From millimeter- to kilometer-sized planets

To determine whether the meteorite was indeed unchanged since its formation, the group identified and extracted a handful of millimeter-sized grains, or chondrules, from a small sample of the meteorite, and then measured their individual magnetic orientations.

As the meteorite likely formed from the accumulation of individual grains that tumbled onto the meteorite parent body during its assembly, their collective magnetic directions should be random if they have not been remagnetized since they were free-floating in space. If, however, the meteorite underwent heating at some point after its assembly, the individual magnetic orientations would have been wiped clean, replaced by a uniform orientation.

The researchers found that each grain they analyzed bore a unique magnetic orientation - proof that the meteorite was indeed pristine. "There's no other alternative but to say this recording is coming from an original nebular field," Fu says.

The group then calculated the strength of the original magnetic field, based on the magnetic strength of each chondrule. Their result could support one of two theories of early planetary disk formation: magnetorotational instability, the theory that a turbulent configuration of magnetic fields drove gas toward the sun, or magnetocentrifugal wind, the idea that gas accreted onto the sun via a more orderly, hourglass-shaped pattern of magnetic fields. The group's data also supports two theories of very early planet formation, while ruling out a third.

"A persistent challenge for understanding how planets form is how to go from micron-sized dust to kilometer-sized planets in only a few million years," Fu says. "How chondrules formed was probably instrumental to how planets formed."

Now, based on the group's results, Fu says it's likely that chondrules formed either as molten droplets resulting from the collisions of 10- to 1,000-kilometer rocky bodies, or through the spontaneous compression of surrounding gas, which melted dust particles together.

It's unlikely that chondrules formed via electric currents, or X-wind - flash-heating events that occur close to the sun. According to theoretical models, such events can only take place within magnetic fields stronger than 100 microteslas - far greater than what Fu and his colleagues measured.

"Until now, we were missing data," Fu says. "Now there is a data point. And to understand fully the implications of what 50 microteslas can do in a gas, there's a lot more theoretical work to be done."

This work was funded in part by NASA and the National Science Foundation.

http://www.eurekalert.org/pub_releases/2014-11/uonc-urs111314.php

UNC researchers silence leading cancer-causing gene

A novel siRNA-based molecule, developed by Chad Pecot, MD, successfully targets KRAS, a well-studied but hard to halt protein important for cancer development and metastasis.

CHAPEL HILL, NC - Researchers from the UNC School of Medicine and colleagues at The University of Texas MD Anderson Cancer Center have developed a new approach to block the KRAS oncogene, one of the most frequently mutated genes in human cancer. The approach, led by Chad Pecot, MD, an assistant professor of medicine at UNC, offers another route to attack KRAS, which has proven to be an elusive and frustrating target for drug developers.

The new method relies upon a specifically sequenced type of small interfering RNA - or siRNA. The findings, published in the journal Molecular Cancer Therapeutics, show that using a form of siRNA to halt KRAS not only dramatically stunted the growth of lung and colon cancers in cultured cells and mice but also stopped metastasis - the main cause of cancer deaths.

"KRAS has been widely regarded as an undruggable protein, but we show that that's simply not the case," said Pecot, the study lead author and member of the UNC Lineberger Comprehensive Cancer Center.

KRAS is a signaling molecule - a protein switch that triggers a cascade of molecular events that tell cells to grow and survive. Mutations in the KRAS gene create a switch that is perpetually "on," causing cells to divide uncontrollably. KRAS mutations are present in roughly 30 percent of human cancers, particularly lung, colon, pancreatic, and thyroid.

"It is the elephant in the room," Pecot said. "KRAS was one of the first cancer-causing genes ever discovered, and it was the obvious target to go after. People have been trying for decades to hit it, but they haven't had much luck."

Inhibiting KRAS signaling has been tricky because it lacks good pockets or crevices for small molecules and drugs to bind to. Some researchers have tried instead to target the proteins downstream in the KRAS signaling cascade, but those attempts have also had limited success.

Rather than try another conventional approach, Pecot decided to use a new genetic tool known as RNA interference - or RNAi - to destroy the KRAS protein before it fully forms. RNAi uses bits of synthetically engineered RNA - the single-stranded molecule transcribed from DNA - to silence specific genes. These bits of RNA bind to specific genetic messages called mRNA in the cell and direct enzymes to recognize the messages as enemies. In this context, the enzymes destroyed the genetic messages of KRAS mRNA so that KRAS can't be made. As a result, the cells don't grow, replicate, or move nearly as well.

RNAi has shown great promise in the treatment of liver diseases, viral infections, and cancers. To see if this approach could thwart the KRAS oncogene, Pecot and his colleagues first had to test different sequences of RNA to determine which one most effectively tagged KRAS for destruction.

Of five RNA sequences, the researchers identified two candidates worthy to take into cancer models.

When they delivered these sequences into tissue culture cells, they found that the siRNAs destroyed more than 90 percent of the KRAS gene messages, significantly impairing the growth of cancer cell lines. The technique also led to marked reduction of two signaling molecules called pERK and pMEK, which lie downstream of KRAS and have been implicated in cancer cell proliferation and tumor growth.

Next, Pecot and his colleagues tested the siRNAs in mouse models of lung and colon cancer. They wrapped the sequences in protective lipid nanoparticles and delivered the siRNA solution into the mice. The researchers found that this treatment significantly slowed the growth of primary tumors. For example, tumors from colon cancer models that had been treated with the KRAS siRNAs were 69 percent smaller than tumors treated with control RNA sequences.

In addition, the researchers discovered that silencing KRAS stemmed the spread of cancer cells to other organs. The siRNA treatment reduced the number of these secondary malignant growths by about 80 percent in mice with lung cancer and to a similar degree in colon cancer models.

Pecot's findings come on the heels of two other papers using siRNAs to target KRAS, one from Frank McCormick's laboratory at the University of California at San Francisco and the other from Tyler Jacks' laboratory at the Massachusetts Institute of Technology.

What sets the UNC study apart is that it demonstrates that this approach can be used to control the development of metastatic disease.

"Having all three papers come out at about the same time is encouraging because it means that KRAS is druggable if you use outside-the-box methods," Pecot said. "Now, we essentially have three platforms for targeting KRAS with siRNAs that may get to the clinic."

Pecot said the results, while promising, are just a first step in combating this cancer-causing gene. Ultimately, the siRNA sequences will have to be designed to specifically target the mutant form of KRAS without disrupting the normal form of the gene, which is necessary for maintaining normal growth in healthy cells.

Other UNC co-authors include UNC graduate student Salma Azam, and research specialist Trent A. Waugh. The senior author of this study was Anil Sood, MD, a professor of cancer biology at the University of Texas MD Anderson Cancer Center.

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http://www.eurekalert.org/pub_releases/2014-11/ps-gfi111314.php

Genotype found in 30 percent of ALS patients speeds up disease progression

Mice bred to carry a gene variant found in a third of ALS patients have a faster disease progression and die sooner than mice with the standard genetic model of the disease, according to Penn State College of Medicine researchers.

Understanding the molecular pathway of this accelerated model could lead to more successful drug trials for all ALS patients.

Amyotrophic lateral sclerosis, commonly known as Lou Gehrig's disease, is a degeneration of lower and upper motor neurons in the brainstem, spinal cord and the motor cortex. The disease, which affects 12,000 Americans, leads to loss of muscle control. People with ALS typically die of respiratory failure when the muscles that control breathing fail.

Penn State researchers were the first to discover increased iron levels in the brains of some patients with the late-onset neurodegenerative disorders Parkinson's disease and Alzheimer's disease. A decade ago, they also identified a relationship between ALS and excess iron accumulation when they found that 30 percent of ALS patients in their clinic carried a variant of a gene known as HFE that is associated with iron overload disease.

For this study, the researchers crossbred mice with the HFE gene variant with the standard mice used in ALS research. "When we followed the disease progression and the behavior of our crossbred mice compared to the standard mice, we saw significant differences," said James Connor, vice chair of neurosurgery research and director of the Center for Aging and Neurodegenerative Diseases. The crossbred mice performed significantly worse on tests of forelimb and hindlimb grip strength and had a 4 percent shorter life span. The researchers published their findings in BBA Molecular Basis of Disease.

"The disease progression was much faster in the crossbred mice than in the standard mice," Connor said. "What we found is that when ALS happens in the presence of the HFE gene variant, things go downhill more quickly."

The lead investigator on this project, graduate student Wint Nandar, noticed that the HFE gene variant sped up disease progression and death in females but not males. Males with ALS die faster, on average, than females.

Connor said the variant may not have had time to accelerate the pace of the disease in male mice. An accelerated progression may show up in clinical trials in human males, who live longer with the disease than mice.

The researchers also studied how the HFE gene modified the pace of the disease in mice. The crossbred mice showed increased oxidative stress and microglial activation. Microglial cells normally help with repair in the body, but when over-activated they can promote unhealthy inflammation.

"They can make things worse instead of better," Connor said.

The mice were also found to have disruption of the neurofilaments, the tiny cables that transport nutrients through nerve cells. "It's a much worse environment when the gene variant is present," Connor said. "This makes it much easier for the disease to take off."

The findings could help direct more successful clinical testing of new drug treatments, which have traditionally had disappointing results. Because patients with H63D HFE have an accelerated form of the disease, their results could skew study findings.

"There might be drugs out there that work for 70 percent of the ALS population even though the studies don't show that when all of the data are looked at without consideration of the genetic background," Connor said.

Separating the data out could help find effective treatments for both those with the gene variant and the rest of the ALS population.

"How a drug is going to work on a carrier of the gene variant could be worse or it could be better, but it's likely going to be different," Connor said.

Additional researchers on this project are Elizabeth B. Neely, research associate; and Zachary Simmons, M.D., professor of neurology, all at Penn State College of Medicine. The Judith and Jean Pape Adams Charitable Foundation, the Paul and Harriett Campbell Fund for ALS Research, Zimmerman Family Love Fund and the Robert Luongo ALS Fund supported this research.

http://bit.ly/1q7yq4u

Research spawns eco-friendly cement substitute

David Stone's Ferrock "represents an amazing engineering achievement that has the potential to create a great, positive impact on the environment," says Doug Hockstad of Tech Launch Arizona.

When he was a Ph.D. student in the University of Arizona Department of Soil, Water, and Environmental Science, David Stone won a student innovation competition with the invention of an eco-friendly substitute for Portland cement. The U.S. Patent and Trademark Office issued a patent for the UA invention in 2013, and today, in collaboration with Tech Launch Arizona, Stone has licensed the technology from the UA and is starting a company called Iron Shell to commercialize his invention.

The invention, called Ferrock, uses the waste steel dust from industrial processes to create a cement-like material that is sustainable, strong and environmentally

superior to conventional cement. Cement is the binder in concrete, which also includes aggregate such as sand and gravel.

Along with turning a waste product that usually ends up in landfills into a useful product, Ferrock has another - perhaps even greater - environmental advantage. Annually, 4 billion metric tons of cement is made worldwide for use in concrete, and for every ton of cement manufactured, approximately one ton of carbon dioxide is released into the atmosphere.

Conversely, Ferrock hardens only when exposed to high concentrations of carbon dioxide, which is absorbed and trapped, making it a carbon negative material. This greenhouse gas diffuses into the wet mixture and reacts with the iron, creating iron carbonate and becoming part of the material's mineral matrix.

Lab testing shows that Ferrock is significantly stronger than Portland cement in compressive strength and several times stronger in flexural strength, meaning it can take more stress before bending and breaking. It also has superior resistance to cracking. Because hardening is caused by the rusting of iron dust, it is well-suited for use in salt water and other environments that are too corrosive for regular cement.

"This all started from an accidental discovery in a lab, which is actually the way it usually goes," Stone says. "That was back in 2002, and I included as much as I knew in my doctoral dissertation. But the work goes on. It has taken years to get just a basic understanding of the chemistry involved. But this shouldn't be surprising, since scientists are still trying to figure out Portland cement and they've had 200 years.

"I am into this for the long haul. Time is on our side, since in this era of global warming unsustainable processes like cement manufacture will have to give way to greener alternatives."

Doug Hockstad, Tech Launch Arizona's director of tech transfer, is excited by the prospects for Iron Shell.

"The technology stands to impact the world in a variety of ways," Hockstad says, "including both reduction of carbon dioxide production and sequestration of other carbon dioxide production, as well as recycling of waste products such as steel waste and in some cases, recycled glass. For all that, this represents an amazing engineering achievement that has the potential to create a great, positive impact on the environment."

Stone says TLA's role has been substantial.

"Scientist inventors are not exactly known for their business skills, but (TLA) believed in me from the beginning and felt that I should play a central role in the commercialization effort," he says. "They then demonstrated this belief by giving my own startup the exclusive license to the patent and the right to sublicense. The terms were very generous and demonstrated that they think this commercialization effort will succeed. Beyond that, they have continuously aided my efforts to find business advisors, get the expertise I need and build a team."

http://bit.ly/14utvkb

Health and Retirement study indicates people wildly underestimate how long they will live

The University of Michigan conducted a poll back in 1992, asking 26,000 men and women over the age of 50 and living in the U.S. what they thought about their chances of living to age 75, was it 10 percent, 50, 100?

Phys.org - It was all part of a Health and Retirement survey conducted to shed some light on what people were doing about saving for retirement in light of news that social security might not be the safety net many people have been hoping for. Now, 22 years later, researchers with the Brookings Institute have revisited the answers given by respondents and compared those numbers to how long those people actually did live - to see how well the people back then were able to guess how long they would live. As it turns out, most were wildly pessimistic.

In looking at the data, the researchers found that the most pessimistic of them all, those who believed they had zero chance of living to 75, were wrong in almost half the cases. On the other end of the extreme, those who were absolutely certain they would live to 75, were good predictors, a little over 78 percent of them were right. The rest fell somewhere in-between.

Such numbers are important because people are living longer and the population has shifted to the point where there is not enough young people paying into the social security pot to pay for all the retirees at the other end. Thus, people are having to save money on their own, and some, such as the folks at the Brookings Institute are afraid that if people are pessimistic about how long they'll live, they won't save enough should they outlive their expectations. But, they also offer a possible solution.

Their idea is convince people to buy a longevity annuity - it's a type of investment that pays a certain amount back over a certain number of years, which, as it turns out, is very similar to how social security works - only in this case, it's all private and is based entirely on how much an investor puts in initially. They point out how quickly an investment can grow and how important it is that people take their retirement more seriously. Of course for that to happen, some means will have to be found for convincing people that their chances for living into their old age, is a lot higher than they think.

More information: Better Financial Security in Retirement? Realizing the Promise of Longevity Annuities, www.brookings.edu/research/pap… ities-abraham-harris

Abstract

The shift in the U.S. retirement system away from company pensions and towards individual retirement accounts has placed greater responsibility on workers for ensuring the adequacy of their saving and managing those savings. Absent ready availability of or familiarity with suitable financial instruments, retirees increasingly are self-insuring against a variety of retirement risks, especially the risk of outliving their assets. One alternative to self-insuring against extended longevity is an insurance product known as a "longevity annuity." The essence of a longevity annuity is a fixed stream of payments that begins with a substantial delay from the time the contract is purchased - a longevity annuity purchased at age 60 or 65, for example, might begin payments at age 75, 80 or 85. The current market for longevity annuities faces many barriers, ranging from consumer decision making that does not account adequately for longevity risk to the fiduciary concerns of employers to incomplete markets for the hedging of risk by insurance companies. In this paper, we highlight how recent trends have precipitated a need for products that offer protection against longevity risk, consider whether longevity annuities can improve retirement security, highlight barriers to more widespread take-up of longevity annuities, and offer a menu of potential reforms to bolster this fledgling market.

http://www.bbc.com/news/health-30038307

'Dry January' linked to drinking less in long term

Giving up alcohol for a month can change people's drinking in the long term, meaning they drink less and get drunk less often, according to a study.

Researchers from the University of Sussex followed up nearly 900 participants in Alcohol Concern's Dry January campaign. Six months on, 72% had kept harmful drinking episodes down and 4% were still not drinking.

Participants were more likely to refuse alcohol in social situations too.

Dr Richard De Visser, senior lecturer in psychology at the University of Sussex, who led the research, said: "What's really interesting to see is that these changes in alcohol consumption were also seen in the participants who didn't complete the whole month alcohol-free.

"Even if participants took part but didn't successfully complete the 31 days, it generally led to a significant decrease across all the measures of alcohol intake."

Dry January is a campaign by Alcohol Concern aimed at social drinkers, encouraging them to give up alcohol for a month after the excesses of Christmas.

It had been suggested that a booze-free month could cause people to binge-drink the next month. But the charity said there was no evidence of this. The research showed that committing to a month off alcohol was more likely to lead to people moderating their drinking, it said. They were also more likely to say no to a drink on social occasions or when feeling upset or anxious.

For the research, around 3,800 people completed a questionnaire before they gave up alcohol in January 2014 and more than 1,600 completed a follow-up questionnaire in February. Nearly 900 people completed another follow-up questionnaire in August, six months later.

After going 31 days without alcohol, people taking part said they experienced a number of positive side-effects, such as sleeping better, losing weight and feeling more energetic. More than three-quarters of people said they had saved money and felt a sense of achievement.

Prof Kevin Fenton, national director of health and wellbeing at Public Health England, said the research showed that a month of abstinence can help people reset their relationship with alcohol. "Over-consumption of alcohol is a causal factor in more than 60 medical conditions including cancer, depression and dementia and yet more than half of adults who drink do so at a level above the recommended guidance. "Dry January has proved to be successful in helping people moderate their drinking and benefit from a healthier lifestyle, which is why Public Health England is supporting the initiative."

Commenting on the research, Prof Paul Wallace, chief medical adviser to alcohol education charity Drinkaware, said people should not be complacent. "It's important not to assume that having a break from alcohol for a while means it's OK to drink to excess the rest of the year. "It's also important to recognise that just because you can stop drinking alcohol for a period of time, it doesn't mean you don't need to continue to moderate your drinking in the long term."

http://bit.ly/1y7pbAc

Self-repairing software tackles malware

Suite of computer applications that defeat malware and automatically repair the damage it causes

Eric Eide, University of Utah research assistant professor of computer science, stands in the computer science department's "Machine Room" where racks of web servers sit. It is on these computers that Eide, U computer science associate professor John Regehr, and their research team created and tested A3, a suite of computer applications that defeat malware and automatically repair the damage it causes. The project could help lead to better consumer software defenses. Credit: Dan Hixson/University of Utah College of Engineering

Eric Eide, University of Utah research assistant professor of computer science, stands in the computer science department's "Machine Room" where racks of web servers sit. It is on these computers that Eide, U computer science associate professor John Regehr, and their research team created and tested A3, a suite of computer applications that defeat malware and automatically repair the damage it

causes. The project could help lead to better consumer software defenses. Credit: Dan Hixson/University of Utah College of Engineering

University of Utah computer scientists have developed software that not only detects and eradicates never-before-seen viruses and other malware, but also automatically repairs damage caused by them. The software then prevents the invader from ever infecting the computer again.

A3 is a software suite that works with a virtual machine - a virtual computer that emulates the operations of a computer without dedicated hardware. The A3 software is designed to watch over the virtual machine's operating system and applications, says Eric Eide, University of Utah research assistant professor of computer science leading the university's A3 team with U computer science associate professor John Regehr. A3 is designed to protect servers or similar business-grade computers that run on the Linux operating system. It also has been demonstrated to protect military applications.

The new software called A3, or Advanced Adaptive Applications, was co-developed by Massachusetts-based defense contractor, Raytheon BBN, and was funded by Clean-Slate Design of Resilient, Adaptive, Secure Hosts, a program of the Defense Advanced Research Projects Agency (DARPA). The four-year project was completed in late September.

There are no plans to adapt A3 for home computers or laptops, but Eide says this could be possible in the future. "A3 technologies could find their way into consumer products someday, which would help consumer devices protect themselves against fast-spreading malware or internal corruption of software components. But we haven't tried those experiments yet," he says.

U computer scientists have created "stackable debuggers," multiple de-bugging applications that run on top of each other and look inside the virtual machine while it is running, constantly monitoring for any out-of-the-ordinary behavior in the computer.

Unlike a normal virus scanner on consumer PCs that compares a catalog of known viruses to something that has infected the computer, A3 can detect new, unknown viruses or malware automatically by sensing that something is occurring in the computer's operation that is not correct. It then can stop the virus, approximate a repair for the damaged software code, and then learn to never let that bug enter the machine again.

While the military has an interest in A3 to enhance cybersecurity for its mission-critical systems, A3 also potentially could be used in the consumer space, such as in web services like Amazon. If a virus or attack stops the service, A3 could repair it in minutes without having to take the servers down.

To test A3's effectiveness, the team from the U and Raytheon BBN used the infamous software bug called Shellshock for a demonstration to DARPA officials in Jacksonville, Florida, in September. A3 discovered the Shellshock attack on a Web server and repaired the damage in four minutes, Eide says. The team also tested A3 successfully on another half-dozen pieces of malware.

Shellshock was a software vulnerability in UNIX-based computers (which include many web servers and most Apple laptops and desktop computers) that would allow a hacker to take control of the computer. It was first discovered in late September. Within the first 24 hours of the disclosure of Shellshock, security researchers reported that more than 17,000 attacks by hackers had been made with the bug. "It is a pretty big deal that a computer system could automatically, and in a short amount of time, find an acceptable fix to a widespread and important security vulnerability," Eide says. "It's pretty cool when you can pick the Bug of the Week and it works."

Now that the team's project into A3 is completed and proves their concept, Eide says the U team would like to build on the research and figure out a way to use A3 in cloud computing, a way of harnessing far-flung computer networks to deliver storage, software applications and servers to a local user via the Internet.

The A3 software is open source, meaning it is free for anyone to use, but Eide believes many of the A3 technologies could be incorporated into commercial products. Other U members of the A3 team include research associate David M. Johnson, systems programmer Mike Hibler and former graduate student Prashanth Nayak.

http://www.eurekalert.org/pub_releases/2014-11/uoms-dsc111414.php

Do spinal cord injuries cause subsequent brain damage?

University Of Maryland School Of Medicine researchers find that spinal cord injuries can cause brain degeneration

Baltimore, Md. - Most research on spinal cord injuries has focused on effects due to spinal cord damage and scientists have neglected the effects on brain function. University of Maryland School of Medicine (UM SOM) researchers have found for the first time that spinal cord injuries (SCI) can cause widespread and sustained brain inflammation that leads to progressive loss of nerve cells, with associated cognitive problems and depression.

The research, published recently in two articles, one in of the Journal of Neuroscience, the other in Cell Cycle, highlights the close links between spinal cord injury and loss of brain function, and suggests potential treatment to prevent such changes.

"Animal studies have shown that traumatic brain injury, even mild repeated injuries, can result in progressive brain tissue damage and cognitive decline, as

well as widespread brain inflammation. But little research has examined whether these problems occur after spinal cord injuries," said UM SOM anesthesiology professor and noted neurobiologist Alan Faden, MD, who led the study.

"Our studies the first to show that isolated SCI can cause progressive loss of brain cells in key brain regions," said Faden. "The brain degeneration was demonstrated in different experimental models and animals. We also have identified certain molecular mechanisms responsible for these pathological changes and shown that certain drugs can prevent these injuries, including inflammation, brain cell loss, cognitive decline and depressive-like behaviors after injury."

"This is an important and significant advancement in our understanding of the overall effects of spinal cord injuries," said UM SOM Dean E. Albert Reece, MD, PhD, MBA. "The link between spinal trauma and brain function is now more clear, and we believe that further research in this area will offer the hope of new ways to treat this devastating trauma, and perhaps even reverse its effects on the brain."

http://www.eurekalert.org/pub_releases/2014-11/uog-cic111414.php

Chemical in coffee may help prevent obesity-related disease

Researchers at the University of Georgia have discovered that a chemical compound commonly found in coffee may help prevent some of the damaging effects of obesity.

Athens, Ga. - In a paper published recently in Pharmaceutical Research, scientists found that chlorogenic acid, or CGA, significantly reduced insulin resistance and accumulation of fat in the livers of mice who were fed a high-fat diet.

"Previous studies have shown that coffee consumption may lower the risk for chronic diseases like Type 2 diabetes and cardiovascular disease," said Yongjie Ma, a postdoctoral research associate in UGA's College of Pharmacy and lead author of the paper. "Our study expands on this research by looking at the benefits associated with this specific compound, which is found in great abundance in coffee, but also in other fruits and vegetables like apples, pears, tomatoes and blueberries."

During the past 20 years, there has been a dramatic increase in obesity in the United States. More than one-third of U.S. adults and approximately 17 percent of children are obese, according to the Centers for Disease Control and Prevention, and the annual medical cost of obesity is more than $147 billion.

Aside from weight gain, two common side effects of obesity are increased insulin resistance and the accumulation of fat in the liver. Left untreated, these disorders can lead to diabetes and poor liver function.

To test the therapeutic effects of CGA, researchers fed a group of mice a high-fat diet for 15 weeks while also injecting them with a CGA solution twice per week. They found that CGA was not only effective in preventing weight gain, but it also helped maintain normal blood sugar levels and healthy liver composition.

"CGA is a powerful antioxidant that reduces inflammation," said Ma, who works in the laboratory of professor Dexi Liu in the department of pharmaceutical and biomedical sciences. "A lot of evidence suggests that obesity-related diseases are caused by chronic inflammation, so if we can control that, we can hopefully offset some of the negative effects of excessive weight gain."

But the authors are quick to point out that CGA is not a cure-all. Proper diet and regular exercise are still the best methods to reduce the risks associated with obesity.

The mice in this study received a high dose of CGA, much higher than what a human would absorb through regular coffee consumption or a diet rich in fruits and vegetables.

However, the researchers do believe that CGA may form the foundation of a treatment for those who need extra help. They plan to conduct more research to develop an improved CGA formulation specifically for human consumption.

"We're not suggesting that people start drinking a lot of coffee to protect themselves from an unhealthy lifestyle," said Ma, who is also a member of UGA's Obesity Initiative. "But we do think that we might be able to create a useful therapeutic using CGA that will help those at risk for obesity-related disease as they make positive lifestyle changes."

Full version of the study, see http://link.springer.com/article/10.1007%2Fs11095-014-1526-9

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http://www.eurekalert.org/pub_releases/2014-11/ason-cpf111014.php

Clinicians provide first successful delivery of dialysis in Ebola virus disease

Providing hemodialysis to patients was previously thought to be too risky

Philadelphia, PA - Acute kidney injury occurs frequently in Ebola virus disease; however, providing hemodialysis to these patients was previously thought to be too risky because it involves large needles or catheters and potential contact with highly infectious blood. Clinicians recently accomplished the first known successful delivery of renal replacement therapy with subsequent recovery of kidney function in a patient with Ebola virus disease. Their protocol will be presented at ASN Kidney Week 2014 at the Pennsylvania Convention Center in Philadelphia, PA. It will also appear in an upcoming issue of the Journal of the American Society of Nephrology (JASN) and be released on the JASN website on Friday, November 14th.

The report by Michael Connor, Jr, MD, Harold Franch, MD (Emory University School of Medicine), and their colleagues details the measures the clinicians took to maximize safety and minimize risk of secondary transmission of Ebola virus, including careful considerations to the types of equipment used and the protocols that clinical staff followed. None of the staff developed Ebola virus disease after a 21-day observation period, and no detectable Ebola virus genetic material was found in the patient's dialysis waste fluids.

"In our opinion, this report confirms that with adequate training, preparation, and adherence to safety protocols, renal replacement therapies can be provided safely and should be considered a viable option to provide advanced supportive care in patients with Ebola" said Dr. Connor.

In light of their success, the team has proposed a set of clinical practice guidelines for acute renal replacement therapy in Ebola virus disease.

"More than anything else, in our report, we found that extra training of our volunteer ICU nurses made success possible. We thank them for their bravery and commitment." said Dr. Franch. "Our case also shows that dialysis is not a death sentence for patients suffering from Ebola virus disease and recovery of kidney function is possible."

Study co-authors include Colleen Kraft, MD, Aneesh Mehta, MD, Jay Varkey, MD, G. Marshall Lyon, MD, Ian Crozier, MD, Ute Ströher, PhD, and Bruce Ribner, MD.

Disclosures: The authors reported no financial disclosures.

The article, entitled "Successful Delivery of Renal Replacement Therapy in Ebola Virus Disease," will appear online at http://jasn.asnjournals.org/ on November 14, 2014.

http://phys.org/news/2014-11-key-block-life-deep-space.html

Key building block of life may have come from deep space

Researchers at UH Mānoa's Department of Chemistry have provided compelling evidence that glycerol, a key molecule in the origin of Earth's living organisms, may have occurred in space more than 4 billion years ago.

Glycerol represents the central building block in cells – the smallest structural and biological unit of all known living organisms on Earth.

The newly published research paper Synthesis of Prebiotic Glycerol in Interstellar Ices was authored by Professor Ralf Kaiser, and Drs. Surajit Maity and Brant M. Jones of the W.M. Keck Research Laboratory in Astrochemistry at UH Mānoa.

The research details the methods used to re-create in a laboratory how glycerol could have been formed in astrophysically relevant ices by ionizing radiation in interstellar space and carried by meteorites and comets to Earth prior to the existence of life.

In an ultra-high vacuum chamber cooled down to 5 degrees above absolute zero (5 Kelvin), the Hawai‘i team simulated icy "sand grains" coated with an alcohol – methanol. When zapped with high-energy electrons to simulate the cosmic rays in space, methanol reacted to form complex, organic compounds – specifically glycerol.

"Our hope and expectation is to propel astrobiologically related research involving the search for the molecular origin of life in our universe to the next level, ultimately leading to the production of an inventory of biorelevant molecules, which could have seeded the evolution of life as we know it," the authors wrote. This work challenges an alternative theory that glycerol and other prebiotic cell components were synthesized on Earth under hydrothermal conditions. "This requires cutting edge tunable lasers and vacuum ultraviolet light to probe the newly formed molecules," Kaiser and Jones added.

The researchers expect to define a benchmark for future sampling of distinct classes of astrobiologically relevant molecules like sugars, sugar alcohols and sugar acids. They hope to re-create nucleotides in the laboratory in next generation scattering experiments simulating conditions in the harsh environment of space. Nucleotides are a key components of ribonucleic acid implicated in the replication of living organisms.

More information: www.chem.hawaii.edu/Bil301/Kaiser%20Paper/p322.pdf

http://bit.ly/1vko969

Get Past the Vile Smell: Ginkgo Nuts Are Delicious

People have been feasting on these tasty little morsels since at least the 11th century

By Rachel Nuwer smithsonian.com

Autumn is here, and with it comes not only brisk breezes, beautiful leaves and pumpkins, but the vile reek of the ginkgo nut. Ginkgo trees—originally from Asia—now grow in cool climates around the world. When temperatures begin to fall, the trees' fan-shaped leaves might turn a beautiful gold, but that lovely display is not without its costs. Ginkgo nuts, which also appear at this time, have been described as smelling like hot garbage, odiferous cheese, dog poop or worse. Savvy foragers, however, know that the ginkgo's disgusting stench is deceiving. If you take the time to break through that outer husk, you'll be rewarded with a delicious morsel nestled inside. Here's *Edible Manhattan*, reporting back from a successful recent ginkgo nut-harvesting trip to Central Park:

The thing to know about ginkgos is that the fruit’s flesh is smelly, but the little pit within is not. And while you could take the whole fruits home to pick through, it’s easy to pluck them apart before bagging. After aging a bit on the sidewalk, each orb easily yields its heart, and I soon had a cup or two of what looked like apricot pits, stuck the bag in my pocket and went on my way. Back home I washed them in the colander, consulted Brooklynite Leda Meredith’s beautiful book *Northeast*

Foraging and toasted my haul on a sheet tray at 300 degrees for 30 minutes. It couldn't have been easier; I was soon cracking them open (I used my ricer to violate several shells at a time) and snacking on something enjoyably interesting, an ancient food that, to me, was entirely new.

As *Edible* notes, today's urban foragers are far from the first to have caught on to the ginkgo's secret. People have been feasting on ginkgo nuts for centuries. The first written records of them date back to an 11th century Chinese text. By the 15th century, cooks in Japan - who still commonly serve ginkgo nuts in dishes and on their own, skewered and grilled - were using them in desserts and as part of tea ceremonies.

Today, most of those gathering ginkgo nuts in New York City and other places in the U.S. are limited to "small crowds of Chinese matriarchs," *Edible* writes, although with the uptick of interest in urban foraging and local eating, the competition for those deceptively smelly morsels is probably going to get a lot stiffer.

http://www.bbc.com/news/health-30056311

Polio eradication programme reaches 'major milestone'

A "major milestone" in the battle to eliminate polio globally has been reached, the US Centres for Disease Control (CDC) has said.

By James Gallagher Health editor, BBC News website

Its experts think a second of the three forms of poliovirus has been eliminated after mass vaccination campaigns. Wild poliovirus type 3 has not been detected for more than two years. Type 2 was eradicated in 1999. Experts said the world was "closer than ever" to defeating polio but the situation in Pakistan was worrying. Polio is highly infectious and causes paralysis in up to one in 200 people. Some children die when the muscles that help them breathe stop working. But there has been huge progress in eliminating the disease. Cases have fallen from 350,000 in 1988 to 416 in 2013. The last case of type 3 poliovirus was detected in Pakistan in November 2012, according to the CDC report.

Endemic

"We may have eradicated a second of three; that's a major milestone," said Dr Stephen Cochi, a senior adviser at the CDC's Centre for Global Health.

However, a formal process - involving the Polio Global Certification Commission - is required before type 3 can be officially declared eradicated. That will not take place for at least another year. Type 1 remains endemic in three countries - Pakistan, Afghanistan and Nigeria.

Dr Cochi told the BBC: "It's the most prickly one. For reasons that are unclear, this is the most common cause of polio outbreaks and the most frequent cause of paralytic polio."

There has been progress in Nigeria, where cases have fallen to six so far this year from 53 in 2013. "But our biggest problem is getting worse in Pakistan," said Dr Cochi. Cases have leaped from 59 last year to 236 and counting in 2014.

Mass exodus

The Pakistani Taliban stopped polio vaccination programmes in some tribal areas of the country for about two years. Since the summer there has been a mass exodus of people from the region after military operations by Pakistan's army.

Dr Cochi added: "The good news is now those children are accessible in refugee camps or other parts of the country so they are getting vaccinated. "But the bad news is the poliovirus has spread all over the country and there have been cases from Karachi and Punjab province." It means there is a serious risk of polio spreading to other countries. The virus travelled from Pakistan to Syria in 2013.

Prof Walt Orenstein, from the vaccine centre at Emory University in the US, told the BBC: "Type 3 appears to be gone - I think it is overwhelmingly likely that we are there, but it's too soon to say we're definitely there. "So it's not a total victory, but it is very promising." But he warned: "Pakistan is a major concern, about 85% of wild type 1 poliovirus this year has been in Pakistan, but in Nigeria there is real hope we can get rid of type 1 even by the end of this year."

http://www.eurekalert.org/pub_releases/2014-11/ason-pam102314.php

Potassium additives may make low-sodium meats unsafe for patients with kidney disease

Amounts of potassium additives in reduced sodium meat products may be dangerous for kidney disease patients

Philadelphia, PA - Potassium additives are frequently added to sodium-reduced meat products in amounts that may be dangerous for patients with kidney disease, according to a study that will be presented at ASN Kidney Week 2014 November 11¬-16 at the Pennsylvania Convention Center in Philadelphia, PA.

Sodium-reduced foods are becoming increasingly available to consumers; however food manufacturers may use phosphate and potassium additives to replace the functional and flavor properties of sodium. Because individuals with kidney dysfunction must maintain diets low in phosphorus and potassium, it's unclear if sodium-reduced foods are safe for patients with kidney disease.

Arti Sharma Parpia, RD (St. Michael's Hospital, in Toronto) and her colleagues analyzed 19 sodium-reduced meat and poultry products from the main grocery store chains in Canada, noting the products' protein, sodium, phosphorus, and potassium content compared with the original meat products that were not low in sodium.

Among the major findings:

Sodium-reduced meat and poultry products contained 25% to 55% less sodium than their non-sodium-reduced counterparts.

The potassium content of sodium-reduced products ranged from 210 to 1500 mg/100g and was significantly higher than non-sodium-reduced products by 195 mg/100g.

Potassium-containing additives were found on the ingredient list in 63% of the sodium-reduced products and 25% of the non-sodium-reduced products.

The amounts of phosphorus did not differ significantly between the 2 groups.

Parpia noted that on average, the higher amount of potassium contained in the sodium-reduced meat and poultry products was equivalent to an extra serving of a high-potassium food. "Patients with chronic kidney disease need to be aware of the potential for higher potassium content in sodium-reduced foods, as they are educated to follow a low sodium diet and may inadvertently choose sodium-reduced foods without realizing the risk of an increased potassium load from additives," she said. "This research supports the mandatory inclusion of potassium content on nutrition fact tables, especially on product labels that claim to be reduced in sodium."

Study: "Sodium Reduced Meat and Poultry Products Contain a Significant Amount of Potassium from Additives" (Abstract SA-PO219)

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http://nyti.ms/1yLPxI5

Electrical Scalp Device Can Slow Progression of Deadly Brain Tumors

An electrical device glued to the scalp can slow cancer growth and prolong survival in people with the deadliest type of brain tumor, researchers reported on Saturday.

By DENISE GRADY NOV. 15, 2014

The device is not a cure and, on average, adds only a few months of life when used along with the standard regimen of surgery, radiation and chemotherapy. Some doctors have questioned its usefulness. But scientists conducting a new study said the device was the first therapy in a decade to extend life in people with glioblastomas, brain tumors in which median survival is 15 months even with the best treatment.

The disease affects about 10,000 people a year in the United States and is what killed Senator Edward M. Kennedy in 2009. It is so aggressive and hard to treat that even seemingly small gains in survival are considered important.

The new findings mean the device should become part of the standard care offered to all patients with newly diagnosed glioblastomas, the researchers conducting the study said. The equipment consists of four pads carrying transducer arrays that patients glue to their scalps and change every few days. Wires lead to a six-pound operating system and power supply.

Except for some scalp irritation, the device has no side effects, the study found. But patients have to wear it more or less around the clock and must keep their heads shaved. It generates alternating, low-intensity electrical fields — so-called tumor-treating fields — that can halt tumor growth by stopping cells from dividing, which leads to their death. The researchers said the technology might also help treat other cancers, and would be tested in mesothelioma and cancers of the lung, ovary, breast and pancreas.

The equipment is made by Novocure, a company with headquarters on Jersey, an English island off the coast of France. It also has a research center in Israel and operations in the United States. The company is paying for the study, which involves 700 patients in 12 countries.

Novocure's device has been approved in the United States since 2011, but only to treat recurrent glioblastomas, not newly diagnosed ones. It costs $21,000 a month, and some insurers cover it. So far, Novocure has been providing it free to patients without insurance coverage, according to William F. Doyle, the company's executive chairman.

The study tested the device in newly diagnosed cases. The results were presented on Saturday in Miami, at a meeting of the Society for Neuro-Oncology, by Dr. Roger Stupp, the study director and chairman of the department of oncology and cancer at the University Hospital of Zurich.

The data came from the first 315 patients, who were followed from 18 to 60 months. They were assigned at random to one of two groups: 105 received standard treatment alone, usually consisting of surgery, radiation and the chemotherapy drug temozolomide; the other 210 received standard treatment and the electrical device.

Patients who wore the device fared better than those who did not: Their median survival was 19.6 months, compared with 16.6 months in those on standard treatment alone. Among those with the device, 43 percent survived two years, compared with 29 percent among those receiving only standard therapy.

"It was a surprise, and better than we would have expected," Dr. Stupp said in an interview.

The study design called for a data analysis partway through to monitor the patients' safety. When the monitoring board saw how much better patients were doing with the electrical fields, it recommended that the study be stopped so that the device could be offered to everyone. It was the first time that a monitoring board had recommended stopping a brain-cancer study because one treatment was so much better than another.

Dr. Patrick Y. Wen, director of neuro-oncology at Dana-Farber Cancer Institute in Boston, who was not involved with the study, said that until now, there had been some skepticism among doctors about the treatment. But "these results seem real," Dr. Wen said. "With these results, I think more people would definitely use it." Dana-Farber does not use the device, he said, but with the new data, "I think some patients will probably want to have it, and we will probably plan to use it going forward." A three-month increase in survival may not sound like much, he said, "but for our patients, it's not trivial."

Another neuro-oncologist not associated with the study, Dr. Nicholas Butowski of the University of California, San Francisco, described the Novocure device as "polarizing" and said, "Some of my colleagues just do not believe in it."

But Dr. Butowski added: "Perhaps it does work in some patients. It's got logic behind it." He said he would use it, though he suspected that the benefit was relatively small. He also described the device as being in its infancy, and said he expected that Novocure would find ways to make it more effective.

Maureen Piekanski, 59, a glioblastoma patient and study participant from Throop, Pa., learned about the device from her daughter, a nurse, who had combed the Internet for glioblastoma studies. "It appealed to me because it was noninvasive and it wasn't going to make me sick," Ms. Piekanski said. "It was worth a try. I had nothing to lose."

Before making her decision, Ms. Piekanski consulted several doctors, and one told her that she might as well put sewage on her head. She joined the study anyway, because she knew that even with the best available treatment, her outlook was bleak. She said her radiologist had told her, "If you get 15 months, you did good." She has been wearing the device since August 2011 - more than three years. Her tumor is gone, and the disease has not returned. She has M.R.I. scans every two months.

"I get two months at a time, always thinking I might have a recurrence," she said. There is no way to tell whether the device has been keeping her alive, or whether she would have done just as well without it. But when she completed the period she had signed up for in the study, and the researchers told her that she could stop wearing the device if she wanted to, she said, "Oh, yeah, I'm keeping it."

http://www.bbc.com/news/uk-wales-south-west-wales-30020003

Breastfeeding problems linked to injection after birth

New mothers given an injection after their baby is born are more prone to problems with breastfeeding, a study has indicated.

The drug ergotmetrine is offered to mothers to speed up the delivery of the placenta. But a Swansea University study of 288 women found those given the jab were more likely to report pain or difficulties when breastfeeding.

The mothers were also less likely to continue breastfeeding past two weeks. The report concluded the injection of the drug may interfere with natural hormones which support the breastfeeding process. The Swansea study recorded the experience of mothers with a baby aged 0-6 months. It showed that although there was no difference in the number who began breastfeeding, those who had the injection were less likely to still be doing it two weeks later.

Breastfeeding rates decrease

One of the authors of the report, Dr Amy Brown, said: "The findings are very interesting as they add to the growing evidence that medications that mothers receive during labour and birth might make breastfeeding more difficult and explain why, as the number of complicated births rises in the UK, breastfeeding rates have dropped.

"We knew previously that women who receive this injection were less likely to breastfeed but were unsure why this might happen. "This data tells us why: women are more likely to experience pain and difficulty breastfeeding their baby which leads to them moving to formula milk." The findings have been published in the scientific journal, Breastfeeding Medicine.

Co-author Dr Sue Jordan explained the injection might interfere with the body's natural responses to hormones known as oxytocin and prolactin, which regulate the production of milk. She called for further research to explore the options for new mothers to "understand the balance between protecting women from excessive blood loss and giving them the strongest chance of breastfeeding their baby".

http://www.eurekalert.org/pub_releases/2014-11/gumc-ja110614.php

'Not just a flavoring:' Menthol and nicotine, combined, desensitize airway receptors

Menthol acts in combination with nicotine to desensitize receptors in lungs' airways that are responsible for nicotine's irritation, say neuroscientists at Georgetown University Medical Center (GUMC).

WASHINGTON - "We know that a menthol cough drop soothes a scratchy, sore throat. The question we looked at is if and how it works when the irritant is nicotine," says a study author, Kenneth Kellar, PhD, a professor of pharmacology at GUMC. The findings, which represent work by Georgetown University investigators in GUMC's Department of Pharmacology & Physiology, will be presented by Hoai Ton, PhD, a post-doctoral researcher, on Sunday, Nov. 16 at Neuroscience 2014, the Society for Neuroscience's annual meeting in Washington. "This study supports the notion that menthol is not just a flavoring, but has a pharmacologic effect," Kellar says.

The U.S. Food and Drug Administration (FDA) is considering restrictions on menthol cigarettes because it has determined that menthol in cigarettes is likely associated with increased initiation and progression to regular cigarette smoking, increased dependence, and reduced success in smoking cessation, especially among African American menthol smokers. But FDA's review of the available research and evidence relating to menthol cigarettes, issued in July 2013, also concluded, "From the available studies, the weight of evidence supports the conclusion that menthol in cigarettes is not associated with an increase in disease risk to the user compared to non-menthol cigarette smokers."

At the same time, the use of menthol cigarettes is especially high among African-American smokers, and research has shown a higher rate of lung cancer in African American smokers compared to other smokers.

"The issue may be that menthol in the presence of nicotine may reduce the irritation enough that a smoker can inhale more deeply, bringing not just nicotine but toxic smoke products farther into the lungs," says co-investigator Gerald Ahern, PhD, an associate professor of pharmacology at GUMC. 'While beyond the scope of this study, it is possible that such deeper inhalation of menthol cigarettes, to the extent it occurs, increases the already substantial health harms from smoking."

The researchers say their study provides a better understanding of how menthol affects the function of the α3β4 receptor, one of the most prevalent nicotinic acetylcholine receptors expressed in the peripheral nervous system. These receptors are expressed in airway sensory nerves as well as other neurons.

"These receptors are also found in the brain, but we don't know yet what effect menthol has on those receptors, or whether they contribute, in any way, to nicotine addiction," Kellar says.

Study contributors also include research assistant Thao Olson. The research was funded by a National Institutes of Health grant (DA012976).

The authors report having no personal financial interests related to the study.

http://bit.ly/1qOgcjc

One of world's largest landslide deposits discovered in Utah

A landslide with a 90 kilometer-long debris field? That's pretty big.

by Scott K. Johnson - Nov 17 2014, 3:00 am TST

Some things can be too big to notice, as our flat-Earth-believing ancestors can attest, having failed to work out that the surface of the Earth curves around a sphere. Or, as the saying goes, you can focus on the details of some fascinating trees and miss interesting facts about the forest as a whole.

In southwest Utah, geologists had noticed some pretty cool "trees." The area had been volcanically active between 21 and 31 million years ago, building up a host of steep, volcanic peaks. A number of huge blocks of rock from these peaks, up to 2.5 square kilometers in area and 200 meters thick, are obviously out of place—they've been interpreted by geologists as the result of many landslides around the volcanoes. In a recent paper in Geology, David Hacker, Robert Biek, and Peter Rowley show that rather than being the result of many individual landslides, these are actually all part of one jaw-droppingly large event.

The deposit, called the Markagunt gravity slide, covers an area about 90 kilometers long and 40 kilometers wide and is hundreds of meters thick. During the event, all of this slid 30 kilometers or more. The scale puts run-of-the-mill landslides—as terrifying and deadly as they can be—to shame.

The slide is a huge sheet of various types of volcanic rock that broke loose and slipped along a clay-rich sedimentary layer beneath. As the lower portion slowed to a stop, the upper layers carried on, settling at the far end of the slide.

At the base, the signs of catastrophe are everywhere. There's a jumble of broken up rock up to 4 meters thick, and even zones of completely pulverized rock. Rock was shattered, sheared, and injected into fractures. In places where the friction was especially intense, rock was even melted, cooling to form thin layers of glass. But that kind of damage was localized—most of the slide is composed of huge blocks, each covering several square kilometers. Other than some faults (some of which formed after the slide), they're pretty much upright and intact.

Walking along the surface of the slide, the upper layers sit across a zone of ramp-like faults that cut upward through 150 meters of rock. This upper portion also contains some huge blocks, lots of fractures, and sheared zones. Mapping out the whole area, a consistent picture emerges—one of a single deposit that extends far beyond the area that had previously been described as containing many smaller slides.

Not a lot is known about what triggered the slide. The original tilt of the layers could only have been a few degrees, so a lot of rock must have started moving at the same instant in order to provide enough momentum to bring the whole thing down. They see four conditions that could lead to this kind of event. First, you build up a thick wedge of material ejected by the volcanoes (thickest close to the source). Second, you have some kind of weak layer below (the clay-rich sedimentary rock, in this case), which is tilted at least a little. Third, a swelling of magma beneath the field of volcanoes pushes the land surface upward in a dome, putting stress on the rocks around the sides. Finally, faults and fractures could form for several reasons, compromising the integrity of the rock. With all that in place, all you need is a violent eruption or earthquake to come along and set the slide in motion.

The Markagunt gravity slide is the largest known slide on land anywhere on Earth—tied with the Heart Mountain gravity slide in northwest Wyoming, that is. The similarity between the two goes beyond size. The Heart Mountain slide also occurred in an active volcanic field with the same characteristics.

That tells us that we might want to understand these events better, which the researchers say "constitutes a class of catastrophic collapse hazard not widely recognized within modern volcanic fields."

Geology, 2014. DOI: 10.1130/G35896.1 (About DOIs).

http://www.eurekalert.org/pub_releases/2014-11/bc-8mb111314.php

80 million bacteria sealed with a kiss

Partners who kiss each other at least 9 times a day share similar communities of oral bacteria

As many as 80 million bacteria are transferred during a 10 second kiss, according to research published in the open access journal Microbiome. The study also found that partners who kiss each other at least nine times a day share similar communities of oral bacteria.

The ecosystem of more than 100 trillion microorganisms that live in our bodies - the microbiome - is essential for the digestion of food, synthesizing nutrients, and preventing disease. It is shaped by genetics, diet, and age, but also the individuals with whom we interact. With the mouth playing host to more than 700 varieties of bacteria, the oral microbiota also appear to be influenced by those closest to us.

Researchers from Micropia and TNO in the Netherlands studied 21 couples, asking them to fill out questionnaires on their kissing behaviour including their average intimate kiss frequency. They then took swab samples to investigate the composition of their oral microbiota on the tongue and in their saliva.

The results showed that when couples intimately kiss at relatively high frequencies their salivary microbiota become similar. On average it was found that at least nine intimate kisses per day led to couples having significantly shared salivary microbiota.

Lead author Remco Kort, from TNO's Microbiology and Systems Biology department and adviser to the Micropia museum of microbes, said: "Intimate kissing involving full tongue contact and saliva exchange appears to be a courtship behavior unique to humans and is common in over 90% of known cultures. Interestingly, the current explanations for the function of intimate kissing in humans include an important role for the microbiota present in the oral cavity, although to our knowledge, the exact effects of intimate kissing on the oral microbiota have never been studied. We wanted to find out the extent to which partners share their oral microbiota, and it turns out, the more a couple kiss, the more similar they are."

In a controlled kissing experiment to quantify the transfer of bacteria, a member of each of the couples had a probiotic drink containing specific varieties of bacteria including Lactobacillus and Bifidobacteria. After an intimate kiss, the researchers found that the quantity of probiotic bacteria in the receiver's saliva rose threefold, and calculated that in total 80 million bacteria would have been transferred during a 10 second kiss.

The study also suggests an important role for other mechanisms that select oral microbiota, resulting from a shared lifestyle, dietary and personal care habits, and this is especially the case for microbiota on the tongue. The researchers found that while tongue microbiota were more similar among partners than unrelated individuals, their similarity did not change with more frequent kissing, in contrast to the findings on the saliva microbiota.

Commenting on the kissing questionnaire results, the researchers say that an interesting but separate finding was that 74% of the men reported higher intimate kiss frequencies than the women of the same couple. This resulted in a reported average of ten kisses per day from the males, twice that of the female reported average of five per day.

To calculate the number of bacteria transferred in a kiss, the authors relied on average transfer values and a number of assumptions related to bacterial transfer, the kiss contact surface, and the value for average saliva volume.

Shaping the oral microbiota through intimate kissing

Remco Kort, Martien Caspers, Astrid van de Graaf, Wim van Egmond, Bart Keijser and Guus Roeselers Microbiome 2014, 2:41

After embargo, article available here: http://www.microbiomejournal.com/content/2/1/41

http://www.eurekalert.org/pub_releases/2014-11/qmuo-mtc111414.php

Magic tricks created using artificial intelligence for the first time

Researchers working on artificial intelligence at Queen Mary University of London have taught a computer to create magic tricks.

The researchers gave a computer program the outline of how a magic jigsaw puzzle and a mind reading card trick work, as well the results of experiments into how humans understand magic tricks, and the system created completely new variants on those tricks which can be delivered by a magician.

The magic tricks created were of the type that use mathematical techniques rather than sleight of hand or other theatrics, and are a core part of many magicians' repertoires. The tricks, details of which are published today (Monday) in the journal Frontiers in Psychology, proved popular with audiences and the magic puzzle was put on sale in a London magic shop. The card trick is available as an app called Phoney in the Google Play Store.

Co-creator of the project, Howard Williams, explains how a computer can aid trick creation:

"Computer intelligence can process much larger amounts of information and run through all the possible outcomes in a way that is almost impossible for a person to do on their own. So while, a member of the audience might have seen a variation on this trick before, the AI can now use psychological and mathematical principles to create lots of different versions and keep audiences guessing."

The magic jigsaw involves assembling a jigsaw to show a series shapes, then taking it apart and reassembling it so that certain shapes have disappeared using a clever geometric principle. Creation of tricks of this kind involve several simultaneous factors such as the size of the puzzle, the number of pieces involved, the number of shapes that appear and disappear and the ways that the puzzle can be arranged. Something this complex is ideal for an algorithm to process, and make decisions about which flexible factors are most important.

The mind reading card trick involves arranging a deck of playing cards in a specific way then, based on a few seemingly innocuous pieces of information from the audience, identifying a card that has been seen selected from the deck and using an Android app to reveal the card on a mobile phone screen. The computer was used to arrange the decks in such a way that a specific card could be identified with the least amount of information possible. The program identified arrangements for the deck that on average required one fewer question to be asked before the card was found than with the traditional method. The app simply avoids the magician having to remember the order of the cards.

Professor Peter McOwan, part of the QMUL team who worked on the project, added:

"Using AI to create magic tricks is a great way to demonstrate the possibilities of computer intelligence and it also forms a part of our research in to the psychology of being a spectator. For example, we suspected that audiences would be suspicious of the involvement of technology in the delivery of a trick but we've found out that isn't the case."