http://www.eurekalert.org/pub_releases/2015-03/afot-abo031615.php

A breakfast of champions for diabetics

Tel Aviv University researcher says high-energy breakfast and modest dinner can control dangerous blood sugar spikes all day

Our modern epidemic of obesity has led to an alarming rise in the incidence of diabetes. More than 382 million people on the planet suffer from diabetes, predominantly type-2 diabetes. For these people, blood sugar surges - glucose spikes after meals - can be life threatening, leading to cardiovascular complications.

A new Tel Aviv University study published in Diabetologia proposes a new way to suppress deadly glucose surges throughout the day - eating a high-caloric breakfast and a more modest dinner. According to TAU's Prof. Daniela Jakubowicz and Dr. Julio Wainstein of the Wolfson Medical Center's Diabetes Unit, Prof. Oren Froy of the Hebrew University of Jerusalem, and Prof. Bo Ahrén of Lund University in Sweden, the combined consumption of a high-energy breakfast and a low-energy dinner decreases overall daily hyperglycaemia in type-2 diabetics.

"We found that by eating more calories at breakfast, when the glucose response to food is lowest, and consuming fewer calories at dinner, glucose peaks after meals and glucose levels throughout the day were significantly reduced," said Prof. Jakubowicz.

All in the timing

The new study was conducted on eight men and 10 women aged 30-70 with type-2 diabetes. Patients were randomized and assigned either a "B diet" or "D diet" for one week. The B diet featured a 2946 kilojoule (kj) breakfast, 2523 kj lunch, and 858kj dinner, and the D diet featured a 858 kj breakfast, 2523 kj lunch, and 2946 kj dinner. Both diets contained the same total energy measured in kilojoules, a food energy measurement similar to a calorie, but were consumed at different times through the day, with the larger meal taking place during breakfast in the B diet. The larger meal included two slices of bread, milk, tuna, a granola bar, scrambled egg, yoghurt and cereal; the smaller meal contained sliced turkey breast, mozzarella, salad and coffee.

Patients consumed their diets at home for six days before the day of testing. On the seventh day, each group consumed their assigned meal plan at the clinic, and blood samples were collected just before breakfast and at regular intervals after the meal. Blood sampling was repeated at the same intervals after lunch and dinner. Post-meal glucose levels were measured in each participant, as well as levels of insulin, c-peptide (a component of insulin), and glucagon-like-peptide 1 hormone (GLP-1, also known as incretin: an indicator of glucose metabolism that stimulates insulin release). Two weeks later, patients switched to the alternate diet plan, and the tests were repeated. The results of the study showed that post-meal glucose elevations were 20% lower and levels of insulin, C-peptide, and GLP-1 were 20% higher in participants on the B diet compared with those on the D diet.

What - and when - to eat

Despite the fact that both diets contained the same calories, blood glucose levels rose 23 percent less after the lunch preceded by a large breakfast.

"By demonstrating that a diet of high-energy breakfasts and more modest dinners is more effective in lowering overall daily post-meal glucose surges, we suggest that such a regimen is a powerful therapeutic approach for improving glycemic control and may potentially reduce cardiovascular complications in type- 2 diabetics," said Prof. Jakubowicz. "It is not enough to tell the diabetic patient what he or she should or should not eat. It is more important to emphasize that a more advantageous meal schedule should be followed."

The researchers are currently engaged in an extended study of the benefits of high-energy breakfast and reduced-calorie dinners over time.

http://bit.ly/1EqBjxF

Ice makes unlikely rocket fuel for CubeSats

Ice would make a fine rocket fuel, if you're a CubeSat.

13:26 16 March 2015 by Bas den Hond

These lightweight, low-cost satellites are made up of 1 litre modules, making them popular for student projects. Once they have hitched a ride into Earth orbit, they can do real science, such as monitoring the atmosphere or searching for extrasolar planets. But they are limited by the lack of a good propulsion system to keep them aloft longer and under control, says Angelo Cervone at Delft University of Technology in the Netherlands. "We have reached the maximum level of what you can do with small satellites without one."

So Cervone and his colleagues designed an ice-propelled rocket. The CubeSat would contain 100 grams of water ice. Once in space the ice would sublimate and release vapour molecules. These would then bounce against a hot plate to gain speed before escaping, causing a propulsion force. A prototype may fly in a few years.

Challenges ahead

Ice-powered propulsion could work well, says Paulo Lozano, director of the Space Propulsion Lab at the Massachusetts Institute of Technology, who is developing a CubeSat propulsion system based on accelerating charged particles. "It's based on solid propellant, and that is always a good idea," he says. "If you have something that can explode, it would pose a threat to the main payload. The challenge will be to keep the ice as ice all the time."

Cervone and his team are still working on how to keep the ice frozen while the satellite is waiting for lift-off, which could mean days on the launch pad. Freezing it after arrival in orbit is an option, but would complicate the design.

The CubeSat propulsion field is becoming crowded – in addition to ice rockets and Lozano's "Electrospray Thruster", a group at the University of Michigan is developing a third rocket using charged particles.

But different types of CubeSat propulsion may coexist, says Cervone, because the demands made on rockets are diverse. For instance, fuel efficiency is most important for travelling long distances, such as reaching asteroids and the outer planets. Charged particle propulsion might be best for this. But for orbital corrections and orientation control, you need more powerful propulsion, and your fuel only needs to last as long as the expected working life of the satellite – ice rockets might be best for that.

Journal reference: Acta Astronautica, DOI: 10.1016/j.actaastro.2014.12.003

http://www.eurekalert.org/pub_releases/2015-03/hcfe-omt031615.php

Omics methods: Towards a better prediction of the effects of substances at very low doses

The way in which hazardous organic substances get into human cells, their impact and how they are dispersed is another topic that scientists are investigating experimentally

Leipzig/Berlin. A public and scientific discussion is currently taking place focusing on the question whether substances at low concentrations may lead to health impairments in humans. For this reason, an increasing number of experimental studies to test such effects are currently conducted using different chemicals. It was possible to demonstrate, for example, that even low quantities of benzo[a]pyrene can have effects on the protein pattern and hence the metabolism and signal pathways in cells, even though the concentration is a hundred times below what is required to drive cells directly into apoptosis. This is the conclusion of studies undertaken by the Helmholtz Centre for Environmental Research (UFZ), Dresden University of Technology, and the German Federal Institute for Risk Assessment (BfR). These studies have now been published in the Journal of Proteome Research. The analysis of interlinked signal pathways taking advantage of different so-called "omics" technologies seems much more suitable for describing and monitoring unwanted effects than then previously used individual biomarkers.

The scientists undertook a detailed study of the effects of benzo[a]pyrene as a genotoxic model substance in cell cultures. Benzo[a]pyrene is long been known and one of the best studied carcinogenic substances. According to the current state of knowledge, there is no dose level without an effect, i.e. once reaching cells and tissues any quantity can be harmful. Ideally, consumers should never come into contact with such substances. The quantity of the substance in food must be reduced to levels as low as reasonably achievable. This approach is called the ALARA principle. Benzo[a]pyrene is a polycyclic aromatic hydrocarbon which is generated during incomplete combustion of organic materials. This means that it is very common and can be found, for example, in the smoke of cigarettes and in grilled meat.

Liver cells of mice were subjected for 24 hours to both a toxic and a benzo[a]pyrene concentration which was clearly below a threshold at which changes in the cell culture are typically observed. The changes in the levels of proteins and metabolites in the cells were then analysed. In this way, 190 proteins were identified - for a concentration that is toxic to the cell - which as a result of the treatment with benzo[a]pyrene underwent changes in their cellular quantity. At a concentration of only 50 nanomolar (nanomoles per litre) of benzo[a]pyrene, as many as 150 proteins were still found to be altered in their cellular levels. These effects of generally non-cell-toxic concentrations were clearly detectable in the case of benzo[a]pryrene and could not be predicted by effects of directly toxic concentrations.

By recording thousands of proteins and hundreds of metabolites, the chemically induced processes within cells can be described in detail. The large number of recorded molecules permits, on the basis of known functional connections, documenting the cellular reaction at the level of physiological signal pathways. Since a multitude of different proteins and metabolites are summarised for this purpose, the statement on a given signal pathway becomes clearly more robust and reliable than would be the case if a single protein was measured. The description of the effects of unwanted substances by means of this technique is also known as toxicoproteomics.

Benzo[a]pyrene is one of 105 substances which are classified as carcinogen by the International Agency for Research on Cancer (IARC). According to estimates, each US citizen, for example, on average absorbs 200 nanograms of benzo[a]pyrene per day. Due to the carcinogenic effect and prevalence of this substance, there is keen interest in understanding the underlying molecular mechanisms. In general, the presence of benzo[a]pyrene in the environment, which is also formed during natural incomplete combustion of organic substances, is to be considered unavoidable. The methods used in the research project confirms that concentrations of benzo[a]pyrene should ideally be minimised to such an extent as is "reasonably achievable" to prevent harmful health effects. Toxicoproteomic methods should in future also increasingly be used for analysing the effects of selected model substances for liver, immune cells, and other tissues.

Stefan Kalkhof, Franziska Dautel, Salvatore Loguercio, Sven Baumann, Saskia Trump, Harald Jungnickel, Wolfgang Otto, Susanne Rudzok, Sarah Potratz, Andreas Luch, Irina Lehmann, Andreas Beyer, Martin von Bergen (2015): Establishing the pathway and time-resolved benzo[a]pyrene toxicity on Hepa1c1c7 cells at toxic and subtoxic exposure. J. Proteome Res. 14: 164-182. http://dx.doi.org/10.1021/pr500957t

Murugaiyan, J., Rockstroh, M., Wagner, J., Baumann, S., Schorsch, K., Trump, S., Lehmann, I., von Bergen, M., Tomm, J.M. (2013) Benzo[a]pyrene affects Jurkat T cells in the activated state via the antioxidant response element dependent Nrf2 pathway leading to decreased IL-2 secretion and redirecting glutamine metabolism. Toxicol. Appl. Pharmacol. 269: 307-316. http://dx.doi.org/10.1016/j.taap.2013.03.032

Both studies were funded by the Helmholtz Alliance on Systems Biology and the Helmholtz Graduate School HIGRADE.

http://www.eurekalert.org/pub_releases/2015-03/mdcf-mcr031615.php

MDC cancer researchers identify new function in an old acquaintance

Enzyme shuts off protection program senescence

Cells have two different programs to safeguard them from getting out of control and developing cancer. One of them is senescence (biological aging). It puts cancer cells into a permanent sleep so they no longer divide and grow in an uncontrolled way. Now the research group led by Professor Walter Birchmeier (Max Delbrück Center for Molecular Medicine, MDC, Berlin-Buch) has discovered that an enzyme known to be active in breast cancer and leukemia blocks this protection program and boosts tumor growth. They succeeded in blocking this enzyme in mice with breast cancer, thus reactivating senescence and stopping tumor growth (EMBO-Journal, DOI 10.15252/embj.201489004)*.

The enzyme Shp2 belongs to a group of enzymes called tyrosine phosphatases. These enzymes are major cell growth regulators. Shp2, for example, plays an essential role in early embryogenesis and is also known to play a role in cancer. Some years ago researchers showed that Shp2 is upregulated in 70 percent of invasive breast cancers. These forms of breast cancer are particularly aggressive. Recent studies with human breast cancer cell lines have also shown that Shp2 mediates survival signals in cancer cells.

Reason enough for MDC cancer researcher Professor Birchmeier, who for years has been studying signaling in cancer, to further investigate this enzyme with his research team colleagues Dr. Linxiang Lan and Dr. Jane Holland. Also, current evidence shows that senescence may play an inhibitory role in breast cancer.

The MDC researchers therefore studied mice which carried the breast cancer gene PyMT. This oncogene rapidly initiates breast cancer, which also metastasizes. The researchers noted that the enzyme Shp2 is very active in these mice. They were able to show that Shp2 initiates a signaling cascade. Within this cascade Shp2 turns on different signaling molecules, but turns off the tumor suppressor genes p27 und p53. As a result, the senescence protection program is also shut off.

The question of interest was whether or not senescence can be turned on again. Is it possible to target Shp2 directly and shut it off? Using a small molecule, researchers of the biotech company Experimental Pharmacology and Oncology (EPO), based on the Berlin-Buch campus as is the MDC, were able to shut down the Shp2 gene in the mice with breast cancer. In this way they were able to reactivate the senescence program and stop the growth of the breast cancer cells. The small molecule was developed by the Leibniz-Institut für molekulare Pharmakologie (FMP) in Berlin-Buch. However, it is still an experimental drug and has not been licensed for use in human patients.

The next step was to find out which role Shp2 and its target genes play in human patients with breast cancer. Dr. Balázs Győrffy of Semmelweiss University in Budapest, Hungary, a longtime collaborator of Professor Birchmeier, looked at the retrospective data of almost 4,000 patients. After analyzing the data, he and his collaborators in Berlin are convinced that the activity of Shp2 and its target genes can predict the outcome of breast cancer: The less active Shp2 is, the higher the chance for the affected women to stay relapse-free after having undergone a successful breast cancer therapy.

"Our data suggest that senescence induction by inhibiting Shp2 or controlling its targets may be useful in therapeutic approaches to breast cancer," the researchers conclude. Cancer cells in the senescence mode secrete messenger molecules of the immune system (cytokines), enabling the body's defense system to identify these sleeping cancer cells and destroy them.

Shp2 Signaling is Essential to the Suppression of Senescence in PyMT-induced Mammary Gland Cancer in Mice Linxiang Lan1, Jane D. Holland1, Jingjing Qi1, Stefanie Grosskopf1, Regina Vogel1, Balázs Győrffy2,3, Annika Wulf-Goldenberg4, Walter Birchmeier1,

http://www.eurekalert.org/pub_releases/2015-03/uoh-hdz031615.php

High-dose zinc acetate lozenges may help shorten symptoms associated with the common cold

Zinc acetate lozenges may shorten common cold-associated nasal discharge by 34 percent and cough by 54 percent

According to a meta-analysis published in BMC Family Practice, high dose zinc acetate lozenges may help shorten diverse symptoms associated with the common cold.

The common cold is an infection caused by over a hundred viruses, and it is a major cause of days off school or work and visits to a doctor. A previous meta-analysis of three randomized trials found that high dose zinc acetate lozenges shorten the duration of colds by 42%. Since all of the three studies reported the

duration of diverse respiratory symptoms and of systemic symptoms such as muscle ache and headache, Harri Hemilä from Helsinki, Finland and Elizabeth Chalker from Sydney, Australia decided to investigate whether there are differences in the effect of zinc lozenges on different common-cold symptoms. When zinc acetate lozenges dissolve in the mouth, zinc ions are released into the saliva of the pharyngeal region where the levels are consequently high. Therefore the effects of zinc lozenges might be greatest on symptoms of the pharyngeal region such as sore throat, and less on nasal symptoms. However, when Hemilä and Chalker pooled together the results of the three studies, they found no evidence that the effects of zinc lozenges are less for nasal symptoms compared with respiratory symptoms originating from lower anatomical regions.

According to the calculations by Hemilä and Chalker, high dose zinc acetate lozenges shortened the duration of nasal discharge by 34%, nasal congestion by 37%, sneezing by 22%, scratchy throat by 33%, sore throat by 18%, hoarseness by 43%, and cough by 46%. Furthermore, they found strong evidence that zinc lozenges also shortened the duration of muscle ache by 54%. On the other hand, there was no evidence of zinc effect on the duration of headache and fever. However, the latter two symptoms were infrequent in the three studies and therefore no definite conclusions can be drawn on headache and fever.

Adverse effects of zinc were minor in the three studies. Therefore Hemilä and Chalker conclude from their research that "zinc acetate lozenges releasing zinc ions at doses of about 80 mg/day may be a useful treatment for the common cold, started within 24 hours, for a time period of less than two weeks."

http://www.medscape.com/viewarticle/841297

10 Scripts Never to Write

An attempt to provide clear guidance through the quagmire of opioids, addiction, mental health, and pain

Charlie P. Reznikoff, MD

Editor's Note: *This post originally appeared at the Society of Hospital Medicine's blog*, The Hospital Leader.

A few months ago while attending the general medical floor, I met a 60-year-old patient in a tragic situation. She was holding her household together - cooking for, cleaning up after, and parenting her granddaughters, managing the family finances, and trying to reform her two 20-something daughters who preferred partying to raising their kids. One day she just collapsed. In the emergency room, she was diagnosed with widely metastatic cancer of unknown primary. Liver. Bones. Lung. She had less than 6 months to live.

She had pain. Prior to her diagnosis, her pain was unmedicated. She had dealt with the pain because she prioritized her family over her needs. With the diagnosis of terminal cancer, she learned that she would never see her granddaughters grow up or help her daughters mature. She was comfortable in the caretaking role, but the roles would reverse as she would become dependent on others in her final months. Her grief was profound. She suffered tremendously and expressed her suffering as pain from her bony metastases.

Within 24 hours of admission to the hospital, she was on continuous intravenous hydromorphone. We had to lower the dose before family meetings so she could participate meaningfully. In my role as a hospitalist, I believed that the hydromorphone I prescribed was appropriate. But the addiction medicine part of me asked, "What happened?" She was living with her pain 24 hours before admission, and she required heavy palliation 24 hours after. Her disease had not progressed in that time. Only after she had knowledge of her cancer, or maybe its implications, did she report pain. Maybe losing her role as the caretaker, or leaving her home, full of cues to be the caretaker, caused her to experience more clearly what was happening in her body. Or maybe we just pushed opioids on her.

Treating pain is rife with uncertainties like this. There is no biomarker for pain. Assessing pain is dependent on the communication skills of the patient and doctor. Pain is not one thing but many, and all are in interplay. Opioids complicate, not simplify, the treatment of pain. Opioids powerfully relieve psychiatric symptoms, but they are not indicated for any such conditions. How could I tell if hydromorphone was relieving this patient's nociceptive pain or quelling her suffering? That is probably a false distinction because each cause of pain compounds the other.

If you consider patients with addiction, mental health issues, and pain, the picture becomes muddier. "Pain" in such a person is like "dyspnea" in a patient with heart failure and chronic obstructive pulmonary disease. Pain warrants opioids like dyspnea warrants furosemide: sometimes, with caution, but not always, and not reflexively. Yet addicts suffer more than almost anyone with nociceptive pain. Patients with pain, addiction, and mental illness can challenge any doctor's ability to deliver safe and compassionate care. Since I started lecturing on pain management, I've tried to furnish my audience with usable tools to better care for these complicated patients.

My first attempt to provide clear guidance through the quagmire of opioids, addiction, mental health, and pain was a talk called "Ten Prescriptions Never to Write." My speeches have evolved a bit since then. Prohibiting behavior is less useful than offering solutions, which I hope to do in my talk at Hospital Medicine 2015. I left the title the same, as a reminder not to get paralyzed by hopelessness, so common for this topic.

I will not give you a David Letterman–style countdown of scripts never to write at the lecture. I will give it to you right now, below. Please react to these verboten prescriptions, question me, debate, and offer your own anecdotes on this topic.

Ten Prescriptions Never to Write:

1. Alprazolam (Xanax®) (lorazepam [Ativan®] is safer)
2. Methadone for pain, unless very experienced
3. Opioids greater than 100 mg morphine equivalents daily
4. Carisoprodol (Soma®) or butalbital, which are short-acting barbiturates
5. Tramadol; it is not a safer option for high-risk patients
6. Short-acting psychostimulants (amphetamine, methylphenidate)
7. Meperidine (Demerol®)
8. Long-acting hydrocodone (Zohydro®)
9. Any opioid until you've assessed the patient's addiction and mental health background
10. Any prescription while the patient is under duress

http://www.eurekalert.org/pub_releases/2015-03/uom-sm031515.php

Scientists make surprising finding in stroke research

Scientists at The University of Manchester have made an important new discovery about the brain's immune system that could lead to potential new treatments for stroke and other related conditions.

Inflammation is activated in the brain after a stroke, but rather than aiding recovery it actually causes and worsens damage. That damage can be devastating. In fact, stroke is responsible for 10% of deaths worldwide and is the leading cause of disability. Therefore, understanding how inflammation is regulated in the brain is vital for the development of drugs to limit the damage triggered by a stroke.

Dr David Brough from the Faculty of Life Sciences, working alongside colleagues including Professors Dame Nancy Rothwell and Stuart Allan, has studied the role of inflammasomes in stroke. These inflammasomes are large protein complexes essential for the production of the inflammatory protein interleukin-1. Interleukin-1 has many roles in the body, and contributes to cell death in the brain following a stroke.

Dr Brough explains: "Very little is known about how inflammasomes might be involved in brain injury. Therefore we began by studying the most well researched inflammasome NLRP3, which is known to be activated when the body is injured. Surprisingly we found that this was not involved in inflammation and damage in the brain caused by stroke, even though drugs are being developed to block this to treat Alzheimer's disease." Further studies using experimental models of stroke demonstrated that it was actually the NLRC4 and AIM2 inflammasomes that contribute to brain injury, rather than NLRP3.

This discovery was unexpected, since NLRC4, was only known to fight infections and yet Dr Brough and colleagues found that it caused injury in the brain. This new discovery will help the Manchester researchers discover more about how inflammation is involved in brain injury and develop new drugs for the treatment of stroke. The research was funded by the Wellcome Trust and Medical Research Council and has been published in PNAS.

As well as identifying new targets for potential drug treatments for stroke Dr Brough points out how little we currently know about how the immune system works in the brain. He says: "We know very little about how the immune system is regulated in the brain. However, its important we understand this since it contributes to disease and injury. For example, in addition to stroke, Alzheimer's disease has an inflammatory aspect and even depression may be driven by inflammation."

http://nyti.ms/1AFw4sW

Older Really Can Mean Wiser

Understanding how mental faculties can improve with age

By BENEDICT CAREY MARCH 16, 2015

Behind all those canned compliments for older adults - spry! wily! wise! - is an appreciation for something that scientists have had a hard time characterizing: mental faculties that improve with age.

Knowledge is a large part of the equation, of course. People who are middle-aged and older tend to know more than young adults, by virtue of having been around longer, and score higher on vocabulary tests, crossword puzzles and other measures of so-called crystallized intelligence.

Still, young adults who consult their elders (mostly when desperate) don't do so just to gather facts, solve crosswords or borrow a credit card. Nor, generally, are they looking for help with short-term memory or puzzle solving. Those abilities, called fluid intelligence, peak in the 20s. No, the older brain offers something more, according to a new paper in the journal Psychological Science. Elements of social judgment and short-term memory, important pieces of the cognitive puzzle, may peak later in life than previously thought.

The postdoctoral fellows Joshua Hartshorne of M.I.T. and Laura Germine of Harvard and Massachusetts General Hospital analyzed a huge trove of scores on cognitive tests taken by people of all ages. The researchers found that the broad split in age-related cognition - fluid in the young, crystallized in the old - masked several important nuances.

"This dichotomy between early peaks and later peaks is way too coarse," Dr. Hartshorne said. "There are a lot more patterns going on, and we need to take those into account to fully understand the effects of age on cognition."

The new paper is hardly the first challenge to the scientific literature on age-related decline, and it won't be the last. A year ago, German scientists argued that cognitive "deficits" in aging were caused largely by the accumulation of knowledge - that is, the brain slows down because it has to search a larger mental library of facts. That idea has stirred some debate among scientists.

Experts said the new analysis raised a different question: Are there distinct, independent elements of memory and cognition that peak at varying times of life? "I think they have more work to do to demonstrate that that's the case," said Denise Park, a professor of behavior and brain science at the University of Texas at Dallas. "But this is a provocative paper, and it's going to have an impact on the field."

The strength of the new analysis is partly in its data. The study evaluated historic scores from the popular Wechsler intelligence test, and compared them with more recent results from tens of thousands of people who took short cognitive tests on the authors' websites, testmybrain.org and gameswithwords.org. The one drawback of this approach is that, because it didn't follow the same people over a lifetime, it might have missed the effect of different cultural experiences, said K. Warner Schaie, a researcher at Penn State University.

But most previous studies have not been nearly as large, or had such a range of ages. Participants on the websites were 10 to 89 years old, and they took a large battery of tests, measuring skills like memory for abstract symbols and strings of digits, problem solving, and facility reading emotions from strangers' eyes.

At least as important, the researchers looked at the effect of age on each type of test. Previous research had often grouped related tests together, on the assumption that they captured a single underlying attribute in the same way a coach might rate, say, athleticism based on a person's speed, strength and vertical leaping ability.

The result of the new approach? "We found different abilities really maturing or ripening at different ages," Dr. Germine said. "It's a much richer picture of the life span than just calling it aging."

Processing speed - the quickness with which someone can manipulate digits, words or images, as if on a mental sketch board - generally peaks in the late teens, Dr. Germine and Dr. Hartshorne confirmed, and memory for some things, like names, does so in the early 20s. But the capacity of that sketch board, called working memory, peaks at least a decade later and is slow to decline. In particular, the ability to recall faces and do some mental manipulation of numbers peaked about age 30, the study found, "a fact difficult to assimilate into the fluid/crystalized intelligence dichotomy."

The researchers also analyzed results from the Reading the Mind in the Eyes test. The test involves looking at snapshots of strangers' eyes on a computer screen and determining their moods from a menu of options like "tentative," "uncertain" and "skeptical."

"It's not an easy test, and you're not sure afterward how well you did," Dr. Germine said. "I thought I'd done poorly but in fact did pretty well." Yet people in their 40s or 50s consistently did the best, the study found, and the skill declined very slowly later in life.

The picture that emerges from these findings is of an older brain that moves more slowly than its younger self, but is just as accurate in many areas and more adept at reading others' moods - on top of being more knowledgeable. That's a handy combination, given that so many important decisions people make intimately affects others.

No one needs a cognitive scientist to explain that it's better to approach a boss about a raise when he or she is in a good mood. But the older mind may be better able to head off interpersonal misjudgments and to navigate tricky situations.

"As in, 'that person's not happy with all your quick thinking and young person's processing speed - he's about to punch you,'" said Zach Hambrick, a psychology professor at Michigan State University.

The details of this more textured picture of the aging brain are still far from clear, and social measures like the Reading the Mind in the Eyes test have not been used much in this kind of research, Dr. Hambrick and other experts said. And it is not apparent from the new analysis whether changes in cognition with age result from a single cause - like a decline in the speed of neural transmission - or to multiple ones. But for now, the new research at least gives some meaning to the empty adjective "wily."

http://nyti.ms/1BPUYJ4

Preparing for Ebola, but Stopping Lassa Fever

Last fall, with the Ebola epidemic raging, the small nation of Benin, a few countries away from the outbreak zone, experienced a cluster of unexplained deaths.

By PAM BELLUCK

In mid-October, a 12-day-old baby was taken to a hospital in Tanguiéta, in northwest Benin, and died two days later. By early November, three employees of the hospital, St. Jean de Dieu, were dead too.

Ultimately, 16 people fell ill and nine died, including a prominent pediatrician. Ebola was suspected because of symptoms like vomiting and diarrhea. But in mid-November, lab tests were negative for the virus.

"There was a lot of panic," Catherine Smallwood, a technical officer with the World Health Organization, said. "They didn't know what it was." W.H.O. described the incident recently in a report on its website.

The day the Ebola tests came back negative, Dr. Smallwood and a W.H.O.-led team happened to arrive in Benin, part of an effort to help 14 vulnerable African countries prepare for a possible Ebola outbreak. The team suggested that the samples be tested for Lassa fever, a related virus that had never been seen in Benin. The Lassa tests were positive.

At that point, Dr. Smallwood said, the W.H.O. team initiated “an Ebola response” - only against a different disease. Lassa, common in parts of West Africa and most likely transmitted through rat feces, can be treated with the drug ribavirin, but steps to keep infection from spreading are similar to those for Ebola.

“The entire staff of the hospital was in shock, so much in shock that they weren’t really able to react,” Dr. Smallwood said. “We had to insist that they take measures.” The staff created an isolation center, donned protective equipment and began monitoring roughly 200 people who had come in contact with Lassa patients.

Team members traveled about 250 miles to Ouogui, the baby’s home village. Her father, a traditional healer, had taken the infant to her grandfather in Tanguiéta after her mother and another of the healer’s three wives had become ill and died. The healer “believed that some curse was being put upon him and his family,” Dr. Smallwood said. After learning that the culprit was a disease, he seemed relieved and “basically self-isolated his house and lit cinders around it, a traditional way of telling people to stay away.”

The international Ebola-preparedness effort helped Benin extinguish the Lassa outbreak. Since late November, no new cases have emerged.

http://www.bbc.com/news/science-environment-31909935

Repeated remembering 'wipes similar memories'

Recalling a particular memory can cause us to forget another, similar memory - and neuroscientists have now watched this process happen using brain scans.

By Jonathan Webb Science reporter, BBC News

Inside the brains of human subjects, they pinpointed the unique imprints of two visual memories that were triggered by the same word. Then they watched as repeatedly recalling one of the images caused the second, interfering memory to vanish.

The study is published in the journal Nature Neuroscience.

The results suggest that our brains actively delete memories that might distract us from the task at hand.

"People are used to thinking of forgetting as something passive," said lead author Dr Maria Wimber from the University of Birmingham.

"Our research reveals that people are more engaged than they realise in shaping what they remember of their lives."

Deleting distractions

Dr Wimber performed the study with colleagues from the MRC Cognition and Brain Sciences Unit in Cambridge. She told the BBC the implications of the new findings were not as simple as a "one in, one out" policy for memory storage. "It's not that we're pushing something out of our head every time we're putting something new in. "The brain seems to think that the things we use frequently are the things that are really valuable to us. So it's trying to keep things clear - to make sure that we can access those important things really easily, and push out of the way those things that are competing or interfering."

The idea that frequently recalling something can cause us to forget closely related memories is not new; Dr Wimber explained that it had "been around since the 1990s". But never before had scientists managed to confirm that this was the result of an active suppression of the interfering memory, rather than just a passive deterioration. What made the discovery possible was identifying reliable indicators that her subjects were recalling a given picture, inside their visual cortex.

She did this by getting them to do a number of "boring" tasks in the brain scanner, before the memory trials even began. This might involve looking at a picture of Marilyn Monroe, or Albert Einstein, many times over. "We show people visual pictures of these memories over and over again - and we can sample the prototypical brain response to those pictures," Dr Wimber explained.

This allowed the researchers to discover what was distinctive about the "Monroe" pattern compared to the "Einstein" one. Then, by triggering them both with the same, unrelated word (eg "sand") but only asking for one to be remembered, they were able to watch, say, the Monroe trace persist while Einstein withered and faded.

Dr Wimber hopes the findings could prove useful in psychology, where erasing specific memories is sometimes exactly what patients need.

"Forgetting is often viewed as a negative thing, but of course, it can be incredibly useful when trying to overcome a negative memory from our past," she said. "So there are opportunities for this to be applied in areas to really help people."

Dr Hugo Spiers, a senior lecturer in behavioural neuroscience at University College London, told BBC News the research was exciting and elegantly done. "This is an example of good brain imaging research," he said. "The results go beyond simply revealing that a brain region is involved in memory: they provide insights into the mechanisms used by the brain to achieve this."

The work also impressed Dr Eva Feredoes, who studies memory mechanisms at the University of Reading. She said the finding could even prove useful for tackling memory loss in dementia.

"We know that memories compete with each other at different stages while they are being remembered and when they are retrieved, with the losers of the competition forgotten from memory," Dr Feredoes said. "Solving this complex 'competition' could pave the way for new research into new treatments in diseases that affect memory, such as dementia. Importantly, there are now several techniques to improve brain function. Combined with these results, we have viable mechanisms and brain areas to target with these techniques."

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Arm is safer access point than groin for catheter-based heart procedures

Researchers urge new guidelines for common procedure to assess blockage in arteries

SAN DIEGO - Patients with acute coronary syndrome undergoing coronary angiogram, a procedure used to assess blockages in the heart's arteries, had a significantly lower risk of major bleeding and death if their interventional cardiologist accessed the heart through an artery in the arm rather than the groin, according to research presented at the American College of Cardiology's 64th Annual Scientific Session. Study authors said the results should prompt a re-evaluation of clinical guidelines and that the arm, currently used in a minority of cases in the United States, should be the preferred approach for most catheter-based heart procedures.

The study did not show a significant reduction in one of its two primary endpoints, a composite rate of death, heart attack or stroke 30 days after a catheterization procedure. However, the second primary endpoint, which included those events plus major bleeding, showed a significant reduced risk in patients randomized to receive a catheter via the arm, known as the radial approach, rather than the groin, known as the femoral approach. In addition, patients receiving a catheter via the groin faced a significantly higher risk of death, which was driven by increased bleeding complications in these patients, the study authors said.

"I believe the evidence from our study should compel a switch to the radial approach as the preferred method," said Marco Valgimigli, M.D., Ph.D., associate professor of cardiology and senior interventional cardiologist at the Erasmus University Medical Center in the Netherlands and the study's lead author. "I hope that a new generation of interventional cardiologists will be specifically trained in the radial approach and that more medical centers will build up their expertise in this procedure."

The study is the first large trial to show radial access improves patient outcomes and that it reduces dangerous bleeding beyond the bleeding that can occur near where the catheter is inserted. U.S. interventional cardiologists currently use the arm for catheter-based heart procedures in less than 15 percent of cases. The approach is more common in Europe, where interventional cardiologists use the arm roughly half of the time or more.

"This study shows that interventional cardiologists who are experienced with the radial approach have nothing to lose and everything to gain by using the arm as the access point for these procedures," Valgimigli said. In addition to improving outcomes, the radial approach can also save on medical costs because it typically results in a quicker recovery and shorter hospital stay, Valgimigli said.

During a coronary angiogram - performed in more than 1 million people in the United States each year - an interventional cardiologist examines the heart's arteries using miniscule medical equipment threaded to the heart through a catheter placed in an artery in the groin or arm. If a blockage is found, the surgeon typically uses the same catheter to inflate or expand a small device to push aside plaque and open the artery, a procedure known as angioplasty or stenting.

The study randomized more than 8,400 angiogram patients at 78 hospitals in four European countries to receive angiogram via the arm or the groin. All study participants had acute coronary syndrome, a condition that includes the two types of heart attack - ST-elevation myocardial infarction and non-ST elevation myocardial infarction - or unstable angina, a type of severe chest pain that is due to the buildup of plaque in the heart's arteries.

Patients receiving radial access suffered major bleeding, death, heart attack or stroke within 30 days in 9.8 percent of cases as compared to 11.7 percent in those receiving femoral access. The difference was largely attributable to major bleeding, which occurred in 1.6 percent of patients receiving radial access and 2.3 percent of patients receiving femoral access, and death, which occurred in 1.6 percent of patients receiving radial access and 2.2 percent of patients receiving femoral access.

Study authors attributed the fact that the study did not meet its other co-primary endpoint to a higher-than-usual bar for statistical significance, a result of the inclusion of two co-primary endpoints in the study rather than only one. The study found no differences with respect to rates of heart attack or stroke.

Interventional cardiologists have typically favored catheter access through the groin because it involves a larger artery that is less prone to spasm, an event that can limit the ability to move medical equipment through the catheter. Although the artery in the arm is closer to the surface and thus easier to access, the artery's smaller size makes the radial approach more technically difficult and requires the use of smaller equipment.

Because the radial approach is more difficult to perform, the study showed the hospital's level of experience with this method had a substantial impact on patient outcomes. To build the level of experience necessary to maximize the benefits of the radial approach, a given surgeon should use the radial approach in at least 80 percent of cases, Valgimigli said. However, the femoral approach is still appropriate for certain types of procedures that require the use of larger equipment, such as transcatheter aortic valve implantation or TAVI.

The study, called the Minimizing Adverse Hemorrhagic Events by Transradial Access Site and Systemic Implementation of AngioX Program (MATRIX), also tested the effects of the anticoagulant drug Bivalirudin. Those results are being reported separately.

The study was funded by the Gruppo Italiano Studi Emodinamica (Italian Society of Interventional Cardiology), which received research grants from the Medicines Company, the maker of Bivalirudin, and the medical device company Terumo. The study was designed and conducted by Valgimigli and co-investigators.

http://www.eurekalert.org/pub_releases/2015-03/imc-sfi031615.php

Study finds imaging tool to diagnose heart conditions is more accurate and safer

New heart imaging technology is significantly more accurate, cheaper and safer

New heart imaging technology to diagnose coronary heart disease and other heart disorders is significantly more accurate, less expensive and safer than traditional methods, according to a new study by researchers from the Intermountain Medical Center Heart Institute in Salt Lake City.

Researchers at the Intermountain Medical Center Heart Institute compared Single Photon Emission Computed Tomography (SPECT), currently the most commonly used imaging diagnostic tool, with a new imaging technology - coronary-specific Positron Emission Tomography (cardiac PET/CT).

They found the differences were dramatic.

Researchers found that cardiac PET/CT imaging diagnosed heart problems with certainty 88 percent of the time, while SPECT imaging gave a clear diagnosis only 30 percent of the time. Results of the study were presented at the American College of Cardiology 64th annual Scientific Session in San Diego. "We've found that cardiac PET/CT scans offer higher accuracy and much better image quality," said Kent Meredith, MD, cardiologist at the Intermountain Medical Center Heart Institute and the lead researcher of the study. "We have much more confidence in the results and there is far less radiation exposure for patients."

When the imaging procedure gives uncertain results, physicians must then use alternative invasive diagnostic techniques like coronary angiograms and cardiac catheters. Researchers found that cardiac PET/CT scans reduced the need for these additional procedures by more than 50 percent.

In addition to higher image quality and accuracy, cardiac PET/CT also eliminates most of the drawbacks of SPECT, which had difficulty scanning patients who were female, obese, or had prominent liver or GI tract activity. Cardiac PET/CT can easily scan all of those patients, Dr. Meredith said.

Both the SPECT and cardiac PET/CT scanners use a radioactive tracer to create an image of the heart. SPECT imaging emits a single electron with relatively low energy. Because the energy is low, it takes more of the radioactive tracer to make an image, and the image isn't very clear. In addition to a higher dose of radiation, the SPECT radioactive tracer has a very long half-life and will remain in the patient's system for up to two days.

Cardiac PET/CT imaging uses two high-energy electrons for the radioactive tracers. Since the electrons are high-energy, a much smaller dose is required and the image quality is far better. The half-life of the radioactive tracer is only two minutes and the radiation is completely out of the patient's system within 20 minutes.

For years, physicians have primarily used SPECT scans to diagnose coronary artery disease and other heart problems. However, use of cardiac PET/CT imaging is growing. To verify the difference between cardiac PET/CT and SPECT scans for diagnosing heart problems, researchers compared outcomes of patients at the Intermountain Medical Center Heart Institute who were scanned using the SPECT scanner in 2012 to those scanned by the PET scanner in 2013. They screened from a pool of 1,000 patients from each year, and narrowed it down to 197 SPECT patients and 200 cardiac PET/CT patients who had both an imaging test and a heart catheter. The study also looked at how often each scan falsely diagnosed a patient with a heart condition. Researchers found that the SPECT gave a false positive about six percent of the time, while the cardiac PET/CT imaging never gave a single false positive during the study period.

"The results of the cardiac PET/CT imaging were very dramatic. A significant improvement over SPECT imaging," said Dr. Meredith.

The more accurate results offered by cardiac PET/CT imaging translates into a greatly reduced need for invasive diagnostic procedures, which pose more risks to patients and are more expensive. That means cardiac PET/CT imaging eliminates unnecessary invasive procedures, which saves patients money and reduces their risks of complications and infections. Using the cardiac PET/CT also reduces the amount of radiation patients are exposed to by a factor of 10. SPECT scans typically give patients a 30 milliSeivert dose of radiation while the dose from the cardiac PET/CT is just 2 milliSeiverts.

http://www.eurekalert.org/pub_releases/2015-03/acoc-rcr031615.php

Routine clot removal after heart attack not beneficial, may increase risk

Routine thrombectomy during angioplasty associated with no benefit and increased stroke rate

SAN DIEGO - A technique used to clear blood clots from arteries to the heart in about 20 percent of patients undergoing angioplasty appears to increase the risk of stroke without providing the intended benefit, according to a study presented at the American College of Cardiology's 64th Annual Scientific Session.

The new study, which included more than 10,000 patients undergoing angioplasty in response to a severe heart attack, randomly assigned half of the patients to receive angioplasty alone and half to receive angioplasty with manual thrombectomy, in which the surgeon uses a syringe to create suction to remove clots. Mechanical thrombectomy was not tested.

After six months of follow-up, researchers found no differences between patients who received angioplasty alone versus those who also received manual thrombectomy in terms of the study's primary endpoint, a composite of the rates of cardiovascular death, subsequent heart attack, cardiogenic shock and the most severe category of heart failure.

"The message from this study is that thrombectomy should not be used as a routine strategy," said Sanjit Jolly, M.D., associate professor and interventional cardiologist at McMaster University, Hamilton, Ontario, Canada, and the study's lead author. "Given the downsides we observed, the findings suggest thrombectomy should be reserved as a bailout therapy to be used only when an initial angioplasty attempt fails to open up the artery."

In the study, bailout thrombectomy was performed in 7 percent of the patients assigned to receive angioplasty alone.

A heart attack occurs when a blood clot blocks the heart's coronary artery. Angioplasty is a common procedure used to clear the blockage by threading a device to the coronary artery through an artery in the groin or arm. Once the device is near the site of the blockage, it inflates or expands to push aside plaque and open the artery. More than 1 million people in the United States undergo this procedure each year.

Thrombectomy is an additional technique that can be combined with angioplasty in which the cardiologist creates suction to remove blood clots from the artery. It has been thought that removing clots in this way could reduce the likelihood of subsequent heart attacks or other problems. Current guidelines leave it to physicians to decide whether to routinely perform thrombectomy during angioplasty or use it only as a backup strategy in cases where the angioplasty fails to open the blockage.

The rate of cardiovascular death, subsequent heart attack, cardiogenic shock and the most severe category of heart failure was 6.9 percent in the group receiving thrombectomy and 7 percent in the control group, a difference that was not statistically significant. In addition to revealing no differences in the composite primary endpoint or the individual components of this endpoint, the analysis also showed no significant differences in the study's secondary endpoint, which included the primary endpoints plus stent thrombosis, an often-fatal condition in which a clot develops in an artery that has been propped open with a stent, or the need for revascularization, a second surgery to clear or bypass the coronary artery.

The study showed a statistically significant increase in stroke in the thrombectomy group. It is possible that removing a blood clot from the heart could increase the risk that the clot will be lost during the removal process and eventually travel to the brain, causing a stroke, but this explanation would likely apply only to strokes that occur soon after the procedure, Jolly said. The relatively small number of strokes observed in the study within 30 days - 33 patients, or 0.7 percent, in the thrombectomy group and 16 patients, or 0.3 percent, in the control group - leaves open the possibility that the finding was due to chance alone.

The researchers saw no difference in outcomes based on the size of the blood clots, despite previous speculation that the procedure might be particularly beneficial in patients with larger clots.

"There are still open questions that aren't resolved by our study, and this procedure could still be beneficial for a small subset of patients," Jolly said. "Clearly, for patients who fail an initial angioplasty attempt, thrombectomy may be very important and is really the only way to open up the artery. We did not design the trial to test the effectiveness of selective or bailout thrombectomy."

All of the thrombectomies performed in the study were done using an approach known as manual thrombectomy, in which a syringe attached to a tube is used to create suction to remove the clot. Mechanical thrombectomy, an approach that uses machinery to create the suction, was not tested.

Previous smaller studies have suggested benefits of routine thrombectomy or showed mixed results, but these studies involved fewer patients and some were limited to a single hospital. This study included patients from 87 hospitals and 20 countries.

"Our findings illustrate the importance of doing large trials," Jolly said. "There are many things in clinical practice that we believe are beneficial but need to be tested in large randomized trials. Only by doing this can we be certain of what helps patients and move the field forward."

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This study was simultaneously published online in the New England Journal of Medicine at the time of presentation.

http://www.eurekalert.org/pub_releases/2015-03/asu-wap031615.php

Wealth and power may have played a stronger role than 'survival of the fittest'

Number of reproducing males declined during global growth

Tempe, Ariz. - The DNA you inherit from your parents contributes to the physical make-up of your body - whether you have blue eyes or brown, black hair or red, or are male or female. Your DNA can also influence whether you might develop certain diseases or disorders such as Crohn's Disease, cystic fibrosis, hemophilia or neurofibromatosis, to name a few.

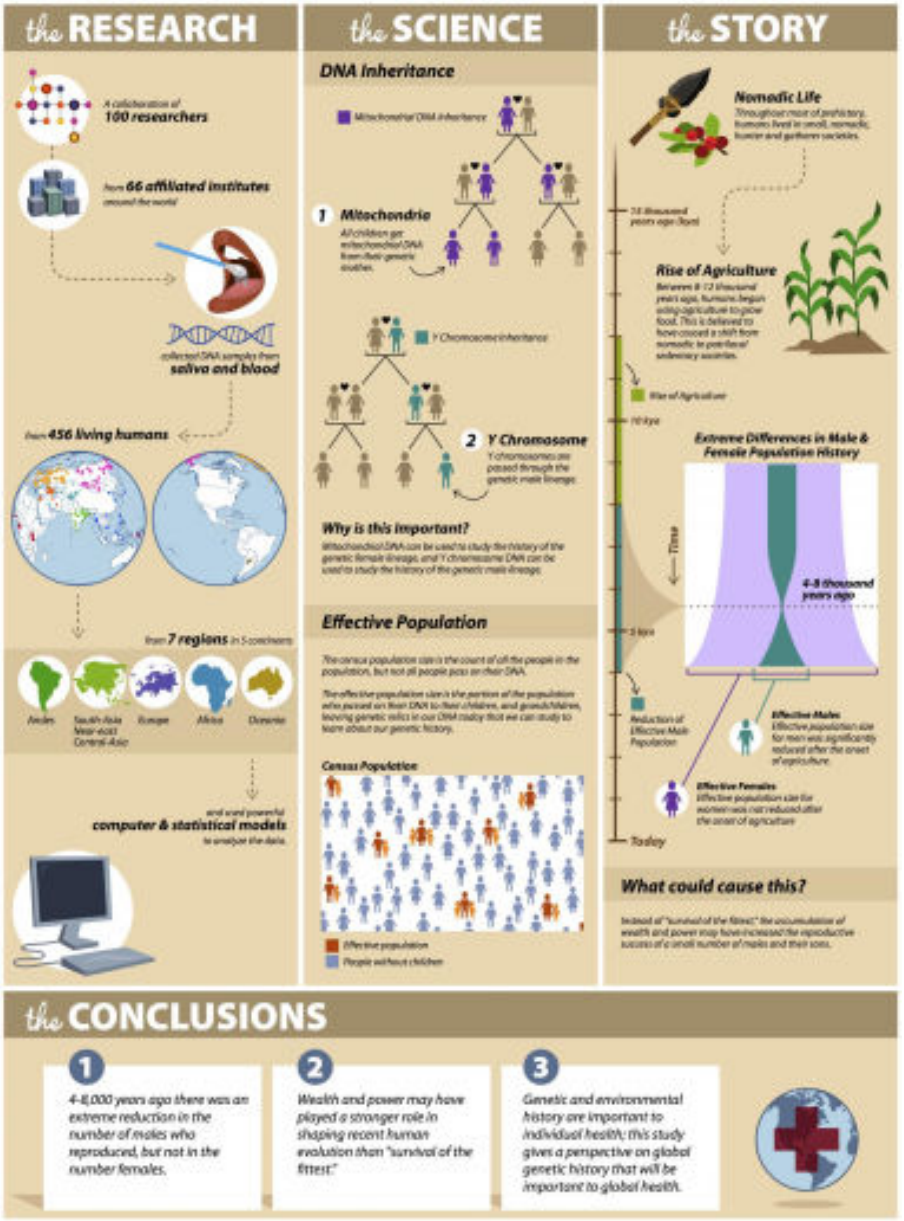
In a study led by scientists from Arizona State University, the University of Cambridge, University of Tartu and Estonian Biocentre, and published March 13 in an online issue of the journal Genome Research, researchers discovered a dramatic decline in genetic diversity in male lineages four to eight thousand years ago - likely the result of the accumulation of material wealth, while in contrast, female genetic diversity was on the rise. This male-specific decline occurred during the mid- to late-Neolithic period.

Melissa Wilson Sayres, a leading author and assistant professor with ASU's School of Life Sciences, said, "Instead of 'survival of the fittest' in biological sense, the accumulation of wealth and power may have increased the reproductive success of a limited number of 'socially fit' males and their sons."

It is widely recognized among scientists that a major bottleneck, or decrease in genetic diversity, occurred approximately 50 thousand years ago when a subset of humans left Africa and migrated across the rest of the world. Signatures of this bottleneck appear in most genes of non-African populations, whether they are inherited from both parents or, as confirmed in this study, only along the father's or mother's genetic lines.

"Most surprisingly to us, we detected another, male-specific, bottleneck during a period of global growth. The signal for this bottleneck dates to a time period four to eight thousand years ago, when humans in different parts of the world had become sedentary farmers," said senior author Toomas Kivisild from the Division of Biological Anthropology, University of Cambridge.

Researchers studied DNA samples taken from the saliva or blood of 456 males living in seven regions of five continents including Africa, the Andes, South-Asia, near East and Central Asia, Europe and Oceania. Scientists specifically studied the Y chromosome, which is passed down through the male lineage, and the mitochondria, which is passed to offspring by the genetic mother.



Four-thousand to 8,000 years ago, there was an extreme reduction in the number of males who reproduced, but not in the number females. Wealth and power may have played a stronger role in shaping recent human evolution than "survival of the fittest."

Sabine Deviche

After using computer and statistical modeling, they found the two extreme "bottlenecks" in human genetic history, specifically the second found only in the male lineage.

The researchers said studying genetic history is important for understanding underlying levels of genetic variation. Having a high level of genetic diversity is beneficial to humans for several reasons. First, when the genes of individuals in a population vary greatly, the group has a greater chance of thriving and surviving - particularly against disease. It may also reduce the likelihood of passing along unfavorable genetic traits, which can weaken a species over time.

According to Monika Karmin, a leading author from University of Tartu, Estonia, their findings may have implications related to human health.

"We know that some populations are predisposed to certain types of genetic disorders," said Karmin. "Global population evolution is important to consider, especially as it relates to medicine."

"When a doctor tries to provide a diagnosis when you are sick, you'll be asked about your environment, what's going on in your life, and your genetic history based on your family's health," added Wilson Sayres, who is also with ASU's Biodesign Institute. "If we want to understand human health on a global scale, we need to know our global genetic history; that is what we are studying here."

The researchers believe this will be relevant for informing patterns of genetic diversity across whole human populations, as well as informing their susceptibility to diseases.

Wilson Sayres said the next step is to continue the research by gathering a greater number of DNA samples, increasing the diversity of the samples, and working with anthropologists and sociologists to gain a broader perspective on the findings.

The research was funded jointly by several sources, with primary support from the University of Tartu and Estonian Biocentre. Researchers from 66 institutions around the world participated in this study.

http://www.eurekalert.org/pub_releases/2015-03/w-dsl031315.php

Diet soda linked to increases in belly fat in older adults

Safety of chronic diet soda consumption raises concerns

A new study published in the Journal of the American Geriatrics Society shows that increasing diet soda intake is directly linked to greater abdominal obesity in adults 65 years of age and older. Findings raise concerns about the safety of chronic diet soda consumption, which may increase belly fat and contribute to greater risk of metabolic syndrome and cardiovascular diseases.

Metabolic syndrome - a combination of risk factors that may lead to high blood pressure, diabetes, heart disease, and stroke - is one of the results of the obesity epidemic. In fact, the World Health Organization (WHO) estimates that 1.9 billion adults were overweight (body mass index [BMI] of 25 or more) in 2014. Of this group, 600 million people fell into the obese range (BMI of 30 or more) - a figure that has more than doubled since 1980.

In an effort to combat obesity, many adults try to reduce sugar intake by turning to nonnutritive or artificial sweeteners, such as aspartame, saccharin, or sucralose. Previous research shows that in the past 30 years, artificial sweeteners and diet soda intake have increased, yet the prevalence of obesity has also seen a dramatic increase in the same time period. Many of the studies exploring diet soda consumption and cardiometabolic diseases have focused on middle-aged and younger adults.

"Our study seeks to fill the age gap by exploring the adverse health effects of diet soda intake in individuals 65 years of age and older," explains lead author Sharon Fowler, MPH, from the University of Texas Health Science Center at San Antonio. "The burden of metabolic syndrome and cardiovascular disease, along with healthcare costs, is great in the ever-increasing senior population."

The San Antonio Longitudinal Study of Aging (SALSA) enrolled 749 Mexican- and European-Americans who were aged 65 and older at the start of the study (1992-96). Diet soda intake, waist circumference, height, and weight were measured at study onset, and at three follow-ups in 2000-01, 2001-03, and 2003-04, for a total of 9.4 follow-up years. At the first follow-up there were 474 (79.1%) surviving participants; there were 413 (73.4%) at the second follow-up and 375 (71.0%) at the third follow-up.

Findings indicate that the increase in waist circumference among diet soda drinkers, per follow-up interval, was almost triple that among non-users: 2.11 cm versus 0.77 cm, respectively. After adjustment for multiple potential confounders, interval waist circumference increases were 0.77 cm for non-users, 1.76 cm for occasional users, and 3.04 cm for daily users. This translates to waist circumference increases of 0.80 inches for non-users, 1.83 inches for occasional users, and 3.16 inches for daily users over the total 9.4-year SALSA follow-up period.

"The SALSA study shows that increasing diet soda intake was associated with escalating abdominal obesity, which may increase cardiometabolic risk in older adults," Fowler concludes. The authors recommend that older individuals who drink diet soda daily, particularly those at high cardiometabolic risk, should try to curb their consumption of artificially sweetened drinks.

This study is published in the Journal of the American Geriatrics Society. Media wishing to receive a PDF of this article may contact sciencenewsroom@wiley.com.

Full citation: "Diet Soda Intake Is Associated with Long-Term Increases in Waist Circumference in a Biethnic Cohort of Older Adults: The San Antonio Longitudinal Study of

Aging." Sharon P.G. Fowler, Ken Williams and Helen P. Hazuda. Journal of the American Geriatrics Society; Published Online: March 17, 2015 (DOI: 10.1111/jgs.13376). URL Upon Publication: http://doi.wiley.com/10.1111/jgs.13376

http://www.eurekalert.org/pub_releases/2015-03/uoc - bd031115.php

'Smart bandage' detects bed sores before they are visible to doctors

New bandage uses electrical currents to detect early tissue damage from pressure ulcers, or bedsores, before they can be seen by human eyes

Berkeley - Engineers at the University of California, Berkeley, are developing a new type of bandage that does far more than stanch the bleeding from a paper cut or scraped knee. Thanks to advances in flexible electronics, the researchers, in collaboration with colleagues at UC San Francisco, have created a new "smart bandage" that uses electrical currents to detect early tissue damage from pressure ulcers, or bedsores, before they can be seen by human eyes - and while recovery is still possible.

"We set out to create a type of bandage that could detect bedsores as they are forming, before the damage reaches the surface of the skin," said Michel Maharbiz, a UC Berkeley associate professor of electrical engineering and computer sciences and head of the smart-bandage project. "We can imagine this being carried by a nurse for spot-checking target areas on a patient, or it could be incorporated into a wound dressing to regularly monitor how it's healing."

The researchers exploited the electrical changes that occur when a healthy cell starts dying. They tested the thin, non-invasive bandage on the skin of rats and found that the device was able to detect varying degrees of tissue damage consistently across multiple animals.

Tackling a growing health problem

The findings, to be published Tuesday, March 17, in the journal Nature Communications, could provide a major boost to efforts to stem a health problem that affects an estimated 2.5 million U.S. residents at an annual cost of $11 billion. Pressure ulcers, or bedsores, are injuries that can result after prolonged pressure cuts off adequate blood supply to the skin. Areas that cover bony parts of the body, such as the heels, hips and tailbone, are common sites for bedsores. Patients who are bedridden or otherwise lack mobility are most at risk.

"By the time you see signs of a bedsore on the surface of the skin, it's usually too late," said Dr. Michael Harrison, a professor of surgery at UCSF and a co-investigator of the study. "This bandage could provide an easy early-warning system that would allow intervention before the injury is permanent. If you can detect bedsores early on, the solution is easy. Just take the pressure off."

Bedsores are associated with deadly septic infections, and recent research has shown that odds of a hospital patient dying are 2.8 times higher when they have pressure ulcers. The growing prevalence of diabetes and obesity has increased the risk factors for bedsores.

"The genius of this device is that it's looking at the electrical properties of the tissue to assess damage. We currently have no other way to do that in clinical practice," said Harrison. "It's tackling a big problem that many people have been trying to solve in the last 50 years. As a clinician and someone who has struggled with this clinical problem, this bandage is great."

Cells as capacitors and resistors

The researchers printed an array of dozens of electrodes onto a thin, flexible film. They discharged a very small current between the electrodes to create a spatial map of the underlying tissue based upon the flow of electricity at different frequencies, a technique called impedance spectroscopy.

The researchers pointed out that a cell's membrane is relatively impermeable when functioning properly, thus acting like an insulator to the cell's conductive contents and drawing the comparison to a capacitor. As a cell starts to die, the integrity of the cell wall starts to break down, allowing electrical signals to leak through, much like a resistor.

"Our device is a comprehensive demonstration that tissue health in a living organism can be locally mapped using impedance spectroscopy," said study lead author Sarah Swisher, a Ph.D. candidate in electrical engineering and computer sciences at UC Berkeley.

To mimic a pressure wound, the researchers gently squeezed the bare skin of rats between two magnets. They left the magnets in place for one or three hours while the rats resumed normal activity. The resumption of blood flow after the magnets were removed caused inflammation and oxidative damage that accelerated cell death. The smart bandage was used to collect data once a day for at least three days to track the progress of the wounds.

The smart bandage was able to detect changes in electrical resistance consistent with increased membrane permeability, a mark of a dying cell. Not surprisingly, one hour of pressure produced mild, reversible tissue damage while three hours of pressure produced more serious, permanent injury.

Promising future

"One of the things that makes this work novel is that we took a comprehensive approach to understanding how the technique could be used to observe developing wounds in complex tissue," said Swisher. "In the past, people have used impedance spectroscopy for cell cultures or relatively simple measurements in

tissue. What makes this unique is extending that to detect and extract useful information from wounds developing in the body. That's a big leap."

Maharbiz said the outlook for this and other smart bandage research is bright. "As technology gets more and more miniaturized, and as we learn more and more about the responses the body has to disease and injury, we're able to build bandages that are very intelligent," he said. "You can imagine a future where the bandage you or a physician puts on could actually report a lot of interesting information that could be used to improve patient care."

Other lead researchers on the project include Vivek Subramanian and Ana Claudia Arias, both faculty members in UC Berkeley's Department of Electrical Engineering and Computer Sciences; and Shuvo Roy, a UCSF professor of bioengineering. Additional co-authors include Amy Liao and Monica Lin, both UC Berkeley Ph.D. students in bioengineering; and Yasser Khan, a UC Berkeley Ph.D. student in electrical engineering and computer sciences, who fabricated the sensor array.

Study co-author Dr. David Young, UCSF professor of surgery, is now heading up a clinical trial of this bandage.

The project is funded through the Flexible Resorbable Organic and Nanomaterial Therapeutic Systems (FRONTS) program of the National Science Foundation.

http://www.eurekalert.org/pub_releases/2015-03/miot-spo031715.php

Study: Prices of cancer drugs have soared since 1995

Researchers find a 10 percent annual increase, after inflation

The prices of leading cancer drugs have risen at rates far outstripping inflation over the last two decades, according to a new study co-authored by an MIT economist - but the exact reasons for the cost increases are unclear.

Since 1995, a group of 58 leading cancer drugs has increased in price by 10 percent annually, even when adjusted for inflation and incremental health benefits, the study finds. More specifically, in 1995, cancer drugs in this group cost about $54,100 for each year of life they were estimated to add; by 2013, such drugs cost about $207,000 per each additional year of life.

Those increases have sparked criticism in recent years from doctors, among other groups, who have questioned the pricing of major drugs. But the empirical results may also show, the researchers say, that rising price levels reflect a greater social tolerance for significant health-care costs.

"I think the value of good health has really increased enormously over the last few decades," says Ernst Berndt, the Louis E. Seley Professor in Applied Economics at the MIT Sloan School of Management, and co-author of a new paper detailing the study's findings. "We treasure it and are willing to pay a fair bit for that."

The paper notes that there have been some cases of political backlash in recent years - in Oregon, for instance - in response to proposed policies that would limit the ability of public insurance programs to buy expensive, life-extending cancer drugs. On the other hand, as the authors observe, patient cost-sharing in medical plans has also increased since 1995, limiting the extent to which demand can explain the changes. Patients do seem to be paying for improved quality, to an extent: The study found a positive correlation between the effectiveness of drugs and their prices. Cancer drug prices rise about 120 percent for each additional year of life gained by a patient, in aggregate.

"We found that the greater the improvement of the drug over the existing therapies, the higher the price," Berndt explains. "So price was related to quality - but price increased more than did quality." So what else is driving prices?

The paper, "Pricing in the Market for Anticancer Drugs," is published in the latest issue of the Journal of Economic Perspectives. In addition to Berndt, the co-authors are Peter B. Bach, a physician at Memorial Sloan Kettering Cancer Center in New York; Rena M. Conti, an assistant professor of health policy at the University of Chicago; and David H. Howard, an associate professor at Emory University's Rollins School of Public Health.

Globally, cancer drugs are the class of pharmaceuticals with the highest sales, at $91 billion in 2013; $37 billion of that spending was in the U.S. As in many major global markets, there is contention about what price levels are justified. The paper notes that in 2013, a group of 100 prominent oncologists claimed that drug companies' pricing policies involved a "simple formula: start with the price of the most recent similar drug on the market and price the new one within 10-20 percent of that price (usually higher)."

The paper notes that such assertions are at least consistent with "reference price models of demand," in which consumers' decisions to pay involve existing prices, rather than a measurement of intrinsic value. Berndt says such challenges are "probably credible," but notes that it is hard to assess how much money pharmaceutical companies have spent developing specific drugs.

"Typically drug companies and biotech companies simultaneously study all sorts of medicines," Berndt notes. Therefore, he adds, "It's extremely difficult to allocate historical costs of drug development to specific new drugs."

There may be some additional factors entering into the cost of cancer therapeutics today. The "340B" pricing program enacted by Congress in 1992, the paper notes, requires discounts for some hospitals and clinics, which may incentivize companies to raise prices to compensate.

Overall, the authors conclude, "We believe the direction of causation runs from prices to research and development costs - as prices increase, manufacturers are willing to spend more to discover new drugs - rather than the other way around."

Experts in the field say the authors have shed welcome light on an important trend in medicine. *The study was partially funded by a grant from the National Cancer Institute.*

http://www.eurekalert.org/pub_releases/2015-03/b-uoa031315.php

Use of anti-clotting drug more than 3 hours after stroke should be re-evaluated, say researchers

Evidence review suggests increased mortality with no clear benefit

Alteplase is a tissue plasminogen activator (tPA) that helps to disperse blood clots in a process called thrombolysis. Most major stroke guidelines support use of alteplase up to 4.5 hours after stroke onset, but Dr Brian Alper and colleagues believe that current guidance is based on uncertain evidence and they call for urgent reconsideration of the available data to guide policy decisions.

The UK regulator, the Medicines and Healthcare Regulatory Agency (MHRA), is planning to analyse all relevant sources of evidence and reassess the balance of benefits and risks for alteplase. Dr Alper and his team examined the most comprehensive sources of evidence and advice that working clinicians are likely to turn to for guidance on whether to use alteplase after stroke. These included American Heart Association and American Stroke Association guidelines, a 2014 Cochrane review, and a 2014 meta-analysis of individual patient trial data.

Each of these sources suggests that alteplase is more beneficial than harmful when given 3-4.5 hours after the onset of ischaemic stroke.

The researchers analysed the data supporting these conclusions and found inconsistent evidence on the effects of alteplase at 3-4.5 hours after stroke.

For example, some data support an increase in good functional outcome at three months, and others show a worse functional outcome at six months. As such, any single estimate of effect from currently available data is therefore likely to be unreliable, they write.

They say the key to resolving uncertainty about the benefits and harms of alteplase 3-4.5 hours after stroke "lies in publishing more of the underlying data forming the basis of the 2014 meta-analysis and reanalysing them transparently."

They acknowledge this may not "settle" the issue, but conclude: "Unless and until there are data showing unequivocal benefits to outweigh known harms, we believe that there should not be any strong recommendation or encouragement for use of alteplase beyond three hours after stroke."

http://www.eurekalert.org/pub_releases/2015-03/tl-tlg031615.php

Longer duration of breastfeeding linked with higher adult IQ and earning ability

Longer duration of breastfeeding is linked with increased intelligence in adulthood, longer schooling, and higher adult earnings

Longer duration of breastfeeding is linked with increased intelligence in adulthood, longer schooling, and higher adult earnings, a study following a group of almost 3500 newborns for 30 years published in The Lancet Global Health journal has found. "The effect of breastfeeding on brain development and child intelligence is well established, but whether these effects persist into adulthood is less clear,"* explains lead author Dr Bernardo Lessa Horta from the Federal University of Pelotas in Brazil.

"Our study provides the first evidence that prolonged breastfeeding not only increases intelligence until at least the age of 30 years but also has an impact both at an individual and societal level by improving educational attainment and earning ability. What is unique about this study is the fact that, in the population we studied, breastfeeding was not more common among highly educated, high-income women, but was evenly distributed by social class. Previous studies from developed countries have been criticized for failing to disentangle the effect of breastfeeding from that of socioeconomic advantage, but our work addresses this issue for the first time."*

Horta and colleagues analysed data from a prospective study of nearly 6000 infants born in Pelotas, Brazil in 1982. Information on breastfeeding was collected in early childhood. Participants were given an IQ test (Wechsler Adult Intelligence Scale, 3rd version) at the average age of 30 years old and information on educational achievement and income was also collected.

Information on IQ and breastfeeding was available for just over half (3493) participants. The researchers divided these subjects into five groups based on the length of time they were breastfed as infants, controlling for 10 social and biological variables that might contribute to the IQ increase including family income at birth, parental schooling, genomic ancestry, maternal smoking during pregnancy, maternal age, birthweight, and delivery type.

While the study showed increased adult intelligence, longer schooling, and higher adult earnings at all duration levels of breastfeeding, the longer a child was breastfed for (up to 12 months), the greater the magnitude of the benefits. For example, an infant who had been breastfed for at least a year gained a full four IQ points (about a third of a standard deviation above the average), had 0.9 years more schooling (about a quarter of a standard deviation above the average), and a higher income of 341 reais per month (equivalent to about one third of the average income level) at the age of 30 years, compared to those breastfed for less than one month.

According to Dr Horta, "The likely mechanism underlying the beneficial effects of breast milk on intelligence is the presence of long-chain saturated fatty acids (DHAs) found in breast milk, which are essential for brain development. Our finding that predominant breastfeeding is positively related to IQ in adulthood also suggests that the amount of milk consumed plays a role."*

Writing in a linked Comment, Dr Erik Mortensen from the University of Copenhagen in Denmark says, "With age, the effects of early developmental factors might either be diluted, because of the effects of later environmental factors, or be enhanced, because cognitive ability affects educational attainment and occupational achievements...By contrast, Victora and colleagues' study suggests that the effects of breastfeeding on cognitive development persist into adulthood, and this has important public health implications...However, these findings need to be corroborated by future studies designed to focus on long-term effects and important life outcomes associated with breastfeeding."

This study was funded by the Wellcome Trust, International development Research Center (Canada), CNPq, FAPERGS, and the Brazilian Ministry of Health.

**Quotes direct from author and cannot be found in text of Article.*

http://www.eurekalert.org/pub_releases/2015-03/ohri-oba031315.php

Old blood as good as fresh in patients with life-threatening illnesses

New research shows that blood stored for three weeks is just as good as fresh blood

Just like milk and many other foods, blood used for transfusions is perishable. But contrary to popular belief, new research shows that blood stored for three weeks is just as good as fresh blood - findings published today in the New England Journal of Medicine.

The large clinical trial provides reassuring evidence about the safety of blood routinely transfused to critically ill patients. Supported by the Canadian Critical Care Trials Group and countless nurses, blood bank technologists, transfusion medicine and critical care physicians, Drs. Jacques Lacroix (Sainte-Justine University Hospital Research Center), Dean Ferguson and Alan Tinmouth (both of The Ottawa Hospital), and Paul Hébert (Centre de recherche du centre hospitalier de l'Université de Montréal) led a team of dozens of researchers from 64 Canadian and European centers.

The researchers undertook the Age of Blood Evaluation (ABLE) study, a randomized double-blind trial to compare mortality after 90 days in intensive care patients transfused with either fresh blood (stored for an average of six days) or older blood (stored for an average of 22 days). A total of 2,430 adults participated in the study, including 1,211 patients in the fresh blood group and 1,219 in the older blood group.

Tony Brett, a 48-year-old Ottawa man, is glad to have participated in the ABLE study while he was being treated for a life-threatening infection (sepsis) at The Ottawa Hospital. "Not only did blood transfusions help save my life, they also helped keep my mother alive, as she required many blood transfusions over the years, due to a blood disorder. I have also donated blood many times, so it is great to see that people are doing rigorous research to make sure that our blood supply is as safe and effective as possible", said the patient.

"Current blood bank practice is to provide patients with the oldest blood available. Some doctors, however, feel that fresh blood is better", said Dr. Paul Hébert, an intensive care physician-scientist at the Centre de recherche du CHUM and professor at the Université de Montréal.

The findings are unequivocal: "There was no difference in mortality or organ dysfunction between the two groups, which means that fresh blood is not better than older blood", said Dr. Dean Fergusson, a senior scientist at the Ottawa Hospital Research Institute and the University of Ottawa.

Specifically, 423 patients died within 90 days post-transfusion in the group of patients who received fresh blood, compared to 398 patients who died in the group that received older blood.

"Previous observational and laboratory studies have suggested that fresh blood may be better because of the breakdown of red blood cells and accumulation of toxins during storage. But this definitive clinical trial clearly shows that these changes do not affect the quality of blood", said Dr. Alan Tinmouth, a physician and scientist at the Ottawa Hospital Research Institute and the University of Ottawa.

According to current standards, blood is stored up to 42 days. But many doctors have begun to ask for fresh blood in recent decades, thinking that it's the right thing to do. This is made difficult because of a limited supply and because blood collection agencies and hospital blood banks distribute blood on a "first-in, first-out" basis to avoid wastage.

"Canadian Blood Services is very pleased to see the publication of the ABLE study. The study supports our current inventory management practices for patients receiving transfusions in the intensive care setting", said Dr. Dana Devine, chief medical and scientific officer at Canadian Blood Services.

Blood transfusions save lives, affirm the authors. There is no need to worry about the safety of the age of blood routinely used in hospitals. The same research team is conducting a clinical trial in pediatric patients. "This study should verify whether children react to fresh blood and older blood transfusions in the same way as adults", said Dr. Jacques Lacroix of the Sainte-Justine University Hospital Research Center and professor at the Université de Montréal.

About the study

The study, "The Age of Blood Trial in Critically Ill Adults", published online in the New England Journal of Medicine on March 17, 2015, was funded by the following organizations: Canadian Institutes of Health Research, the Fonds de recherche du Québec - Santé, the

NETSCC Health Technology Assessment (HTA) Program of the British National Institute for Health Research, and France's Affaires sociales et de la Santé. The authors also acknowledge the cooperation of the following blood collection agencies and blood banks: Canadian Blood Services, Héma-Québec, Établissement français du sang, and Sanquin (Netherlands).

http://www.eurekalert.org/pub_releases/2015-03/ki-log031715.php

Language of gene switches unchanged across the evolution

The language used in the switches that turn genes on and off has remained the same across millions of years of evolution, according to a new study led by researchers at Karolinska Institutet in Sweden.

The findings, which are published in the scientific journal eLife, indicate that the differences between animals reside in the content and length of the instructions that are written using this conserved language.

Tiny fruit flies look very different from humans, but both are descended from a common ancestor that existed over 600 million years ago. Differences between animal species are often caused by the same or similar genes being switched on and off at various times and in different tissues in each species.

Each gene has a regulatory region that contains the instructions controlling when and where the gene is expressed. These instructions are written in a language often referred to as the 'gene regulatory code'. This code is read by proteins called transcription factors that bind to specific 'DNA words' and either increase or decrease the expression of the associated gene.

The gene regulatory regions differ between species. However, until now, it has been unclear if the instructions in these regions are written using the same gene regulatory code, or whether transcription factors found in different animals recognise different DNA words.

In the current study, the researchers used high throughput methods to identify the DNA words recognised by more than 240 transcription factors of the fruit fly, and then developed computational tools to compare them with the DNA words of humans. "We observed that, in spite of more than 600 million years of evolution, almost all known DNA words found in humans and mice were recognised by fruit fly transcription factors", says Kazuhiro Nitta at the Department of Biosciences and Nutrition at Karolinska Institutet, first author of the study.

The researchers also noted that both fruit flies and humans have a few transcription factors that recognise unique DNA words and confer properties that are specific to each species, such as the fruit fly wing. Likewise, transcription factors that exist only in humans operate in cell types that do not exist in fruit flies. The findings suggest that changes in transcription factor specificities contribute to the formation of new types of cells.

The study of fundamental properties of gene switches is important in medicine, as faulty gene switches have been linked to many common diseases, including cancer, diabetes and heart disease. The research was funded by, among others, Center for Innovative Medicine at Karolinska Institutet and Göran Gustafsson Foundation.

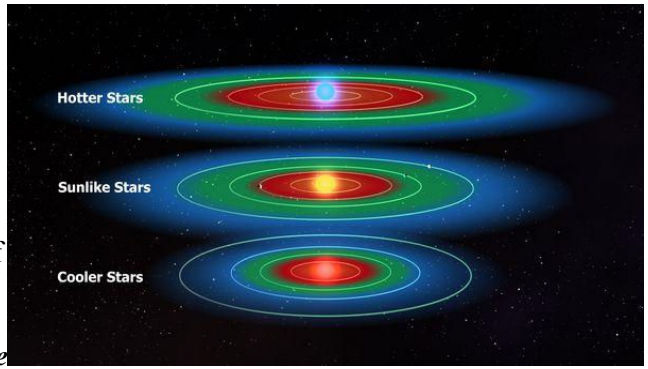
Study leader has been Jussi Taipale, Professor of Medical System Biology at Karolinska Institutet. Researchers in Finland, Germany and Switzerland also contributed to the study. Publication: 'Conservation of transcription factor binding specificities across 600 million years of bilateria evolution', Kazuhiro Nitta, Arttu Jolma, Yimeng Yin, Ekaterina Morgunova, Teemu Kivioja, Junaid Akthar, Komeel Hens, Jarkko Toivonen, Bart Deplancke, Eleen Furlong, Jussi Taipale, "eLife" online 17 March 2015, doi: org/10.7554/eLife.04837. Journal website: elifesciences.org

http://www.eurekalert.org/pub_releases/2015-03/uoc - pit031615.php

Planets in the habitable zone around most stars, calculate researchers

Billions of the stars in the Milky Way will have one to three planets in the habitable zone

Astronomers have discovered thousands of exoplanets in our galaxy, the Milky Way, using the Kepler satellite and many of them have multiple planets orbiting the host star. By analysing these planetary systems, researchers from the Australian National University and the Niels Bohr Institute in Copenhagen have calculated the probability for the number of stars in the Milky Way that might have planets in the habitable zone. The calculations show that billions of the stars in the Milky Way will have one to three planets in the habitable zone, where there is the potential for liquid water and where life could exist. The results are published in the scientific journal, Monthly Notices of the Royal Astronomical Society.



The illustration shows the habitable zone for different types of stars. The distance to the habitable zone is dependent on how big and bright the star is. The green area is the habitable zone, where liquid water can exist on a planet's surface. The red area is too hot for liquid water on the planetary surface and the blue area is too cold for liquid water on the planetary surface. **NASA, Kepler**

Using NASA's Kepler satellite, astronomers have found about 1,000 planets around stars in the Milky Way and they have also found about 3,000 other potential planets. Many of the stars have planetary systems with 2-6 planets, but the stars could very well have more planets than those observable with the Kepler satellite, which is best suited for finding large planets that orbit relatively close to their stars.

Planets that orbit close to their stars would be too scorching hot to have life, so to find out if such planetary systems might also have planets in the habitable zone with the potential for liquid water and life, a group of researchers from the Australian National University and the Niels Bohr Institute at the University of Copenhagen made calculations based on a new version of a 250-year-old method called the Titius-Bode law.

Calculating planetary positions

The Titius-Bode law was formulated around 1770 and correctly calculated the position of Uranus before it was even discovered. The law states that there is a certain ratio between the orbital periods of planets in a solar system. So the ratio between the orbital period of the first and second planet is the same as the ratio between the second and the third planet and so on. Therefore, if you knew how long it takes for some of the planets to orbit around the Sun/star, you can calculate how long it takes for the other planets to orbit and can thus calculate their position in the planetary system. You can also calculate if a planet is 'missing' in the sequence.

"We decided to use this method to calculate the potential planetary positions in 151 planetary systems, where the Kepler satellite had found between 3 and 6 planets. In 124 of the planetary systems, the Titius-Bode law fit with the position of the planets. Using T-B's law we tried to predict where there could be more planets further out in the planetary systems. But we only made calculations for planets where there is a good chance that you can see them with the Kepler satellite," explains Steffen Kjær Jacobsen, PhD student in the research group Astrophysics and Planetary Science at the Niels Bohr Institute at the University of Copenhagen.

In 27 of the 151 planetary systems, the planets that had been observed did not fit the T-B law at first glance. They then tried to place planets into the 'pattern' for where planets should be located. Then they added the planets that seemed to be missing between the already known planets and also added one extra planet in the system beyond the outermost known planet. In this way, they predicted a total of 228 planets in the 151 planetary systems.

"We then made a priority list with 77 planets in 40 planetary systems to focus on because they have a high probability of making a transit, so you can see them with Kepler. We have encouraged other researchers to look for these. If they are found, it is an indication that the theory stands up," explains Steffen Kjær Jacobsen.

Planets in the habitable zone

Planets that orbit very close around a star are too scorching hot to have liquid water and life and planets that are far from the star would be too deep-frozen, but the intermediate habitable zone, where there is the potential for liquid water and life, is not a fixed distance. The habitable zone for a planetary system will be different from star to star, depending on how big and bright the star is.

The researchers evaluated the number of planets in the habitable zone based on the extra planets that were added to the 151 planetary systems according to the Titius-Bode law. The result was 1-3 planets in the habitable zone for each planetary system.

Out of the 151 planetary systems, they now made an additional check on 31 planetary systems where they had already found planets in the habitable zone or where only a single extra planet was needed to meet the requirements.

"In these 31 planetary systems that were close to the habitable zone, our calculations showed that there was an average of two planets in the habitable zone. According to the statistics and the indications we have, a good share of the planets in the habitable zone will be solid planets where there might be liquid water and where life could exist," explains Steffen Kjær Jacobsen.

If you then take the calculations further out into space, it would mean that just in our galaxy, the Milky Way, there could be billions of stars with planets in the habitable zone, where there could be liquid water and where life could exist.

He explains that what they now want to do is encourage other researchers to look at the Kepler data again for the 40 planetary systems that they have predicted should be well placed to be observed with the Kepler satellite.

Fact box:

Titius-Bode law

The Titius-Bode law is a loose rule for planetary orbital periods and their distance from the Sun. The law was proposed in 1766 by J.D. Titius and was described mathematically by J.E. Bode in 1772. The law shows a relationship between the distance of the planets from the Sun based on a simple series of numbers: 0, 3, 6, 12, 24, 48, 96, 192, 384. Apart from the first two, the numbers are simply a doubling of the previous number. Then you add 4 to each number and divide it by 10 = 0,4 / 0,7 / 1,0 / 1,6 / 2,8 / 5,2 / 10,0 / 19,6 / 38,8. This gives a planetary system with stable orbits.

See also: http://www.nbi.ku.dk/english/sciencexplorer/the_space/exoplanets/video/
http://www.nbi.ku.dk/english/sciencexplorer/the_space/exoplanets_uffe_graae_joergensen/video/
Article: http://mnras.oxfordjournals.org/lookup/doi/10.1093/mnras/stv221
The article in ArXiv: http://arxiv.org/abs/1412.6230

http://www.eurekalert.org/pub_releases/2015-03/anu-sut031715.php

Scientists unknowingly tweak experiments: ANU media release

A new study has found some scientists are unknowingly tweaking experiments and analysis methods to increase their chances of getting results that are easily published

A new study has found some scientists are unknowingly tweaking experiments and analysis methods to increase their chances of getting results that are easily published. The study conducted by scientists at The Australian National University (ANU) is the most comprehensive investigation into a type of publication bias called p-hacking.

P-hacking happens when researchers either consciously or unconsciously analyse their data multiple times or in multiple ways until they get a desired result. If p-hacking is common, the exaggerated results could lead to misleading conclusions, even when evidence comes from multiple studies.

"We found evidence that p-hacking is happening throughout the life sciences," said lead author Dr Megan Head from the ANU Research School of Biology.

The study used text mining to extract p-values - a number that indicates how likely it is that a result occurs by chance - from more than 100,000 research papers published around the world, spanning many scientific disciplines, including medicine, biology and psychology.

"Many researchers are not aware that certain methods could make some results seem more important than they are. They are just genuinely excited about finding something new and interesting," Dr Head said. "I think that pressure to publish is one factor driving this bias. As scientists we are judged by how many publications we have and the quality of the scientific journals they go in.

"Journals, especially the top journals, are more likely to publish experiments with new, interesting results, creating incentive to produce results on demand."

Dr Head said the study found a high number of p-values that were only just over the traditional threshold that most scientists call statistically significant.

"This suggests that some scientists adjust their experimental design, datasets or statistical methods until they get a result that crosses the significance threshold," she said. "They might look at their results before an experiment is finished, or explore their data with lots of different statistical methods, without realising that this can lead to bias."

The concern with p-hacking is that it could get in the way of forming accurate scientific conclusions, even when scientists review the evidence by combining results from multiple studies.

For example, if some studies show a particular drug is effective in treating hypertension, but other studies find it is not effective, scientists would analyse all the data to reach an overall conclusion. But if enough results have been p-hacked, the drug would look more effective than it is.

"We looked at the likelihood of this bias occurring in our own specialty, evolutionary biology, and although p-hacking was happening it wasn't common enough to drastically alter general conclusions that could be made from the research," she said. "But greater awareness of p-hacking and its dangers is important because the implications of p-hacking may be different depending on the question you are asking."

http://www.eurekalert.org/pub_releases/2015-03/uov-eot031815.php

Evolution of the back-to-belly axis

By analysis of sea anemones, the origin of the second axis of the body of humans and animals were revealed

Most animals have a dorso-ventral (back-to-belly) body axis, which determines for instance the localized position of the central nervous system, dorsal in humans, ventral in insects. Surprisingly, despite enormous morphological differences, the same signaling molecules of Bone morphogenetic protein (BMP) molecules establishes the dorso-ventral axis including the central nervous system in both insects and vertebrates, which led to the conclusion that this molecular mechanism was already present in the common ancestor.

How deep can we trace the origin of the dorso-ventral axis? It turned out that sea anemones provides the answer: "By analysing the role of BMPs during embryogenesis of the sea anemone Nematostella vectensis, we could get insights into the evolution of animal body axes." says Ulrich Technau of the Department of Molecular Evolution and Development at the University of Vienna.

Two body axes in the sea anemone

Sea anemones belong to the phylum of cnidarians, such as corals, hydra and jellyfish and they evolved at least 600 Million years ago. Most textbooks consider cnidarians as radially symmetric, i.e. they have one apparent body axis, the oral-aboral axis. In their newest study in Cell Reports the scientists found that the sea anemone has even several BMPs and BMP antagonists. During early embryogenesis, these signaling molecules establish a complex interaction network to build up an activity gradient - "yet, perpendicular to the main body axis" explains Ulrich Technau. On the basis of detailed genetic analyses the authors conclude that the BMP signaling system is used for the establishment of a second body axis. However, the gradient of signaling molecules is interpreted and used differently in the sea anemone compared to vertebrates and insects.

Mesenteries instead of central nervous system

Instead of determining the position of the central nervous system, the sea anemone uses the BMP activity gradient to determine the position and formation

of so called "mesenteries", which are epithelial folds that reach into the gastric cavity, harboring retractor muscles and gonads.
Surprisingly, the BMP-gradient regulates the regional activation of "Hox genes", which are famous for their role in specifying the segmental identity along the main body axis, such as wings and legs in flies or ribs and limbs in vertebrates. This connection of a signaling system of the dorso-ventral body axis with regulator genes of the anterior-posterior body axis is surprising and unexpected. The researchers then asked how such signaling networks could have evolved over hundreds of millions of years in order to give rise to quite different morphological structures in various animal lineages. In a collaboration with mathematicians of the ETH Zürich they could show in mathematical modelling, which parts of the network were kept constant until today and which could be changed, in order to evolve new functions. "The BMP network is not only an example of a signaling system that is involved in axis formation for more than 600 Million years, but we can also learn from the comparison with sea anemones, how such important networks could evolve" summarizes Technau.

Publikation in "Cell Reports":Axis Patterning by BMPs: Cnidarian Network Reveals Evolutionary Constraints. Grigory Genikhovich, Patrick Fried, M. Mandela Prünster, Johannes B. Schinko, Anna F. Gilles, David Fredman, Karin Meier, Dagmar Iber und Ulrich Technau. In: Cell Reports 10. 1-9, 17. März 2015. DOI: http://dx.doi.org/10.1016/j.celrep.2015.02.035

http://www.eurekalert.org/pub_releases/2015-03/acs-hgt031815.php

How green tea could help improve MRIs

Green tea compounds successfully used to help image cancer tumors

Green tea's popularity has grown quickly in recent years. Its fans can drink it, enjoy its flavor in their ice cream and slather it on their skin with lotions infused with it. Now, the tea could have a new, unexpected role - to improve the image quality of MRIs. Scientists report in the journal ACS Applied Materials & Interfaces that they successfully used compounds from green tea to help image cancer tumors in mice.
Sanjay Mathur and colleagues note that recent research has revealed the potential usefulness of nanoparticles - iron oxide in particular - to make biomedical imaging better. But the nanoparticles have their disadvantages. They tend to cluster together easily and need help getting to their destinations in the body. To address these issues, researchers have recently tried attaching natural nutrients to the nanoparticles. Mathur's team wanted to see if compounds from green tea, which research suggests has anticancer and anti-inflammatory properties, could play this role.
Using a simple, one-step process, the researchers coated iron-oxide nanoparticles with green-tea compounds called catechins and administered them to mice with cancer. MRIs demonstrated that the novel imaging agents gathered in tumor cells and showed a strong contrast from surrounding non-tumor cells. The researchers conclude that the catechin-coated nanoparticles are promising candidates for use in MRIs and related applications.

The authors acknowledge funding from the University of Cologne and the EU Project Nanommune.

http://www.eurekalert.org/pub_releases/2015-03/uocp-oto031815.php

On the origin of theory: Were forensic examiners first to uncover 'ecological succession'?

Forensic examiners said to have discovered ecological succession 20 years before plant ecologists

For generations, students have been taught the concept of "ecological succession" with examples from the plant world, such as the progression over time of plant species that establish and grow following a forest fire. Indeed, succession is arguably plant ecology's most enduring scientific contribution, and its origins with early 20th-century plant ecologists have been uncontested. Yet, this common narrative may actually be false. As posited in an article published in the March 2015 issue of The Quarterly Review of Biology, two decades before plant scientists explored the concept, it was forensic examiners who discovered ecological succession.
According to Jean-Philippe Michaud, Kenneth Schoenly, and Gaétan Moreau, the first formal definition and testable mechanism of ecological succession originated in the late 1800s with Pierre Mégnin, a French veterinarian and entomologist who, while assisting medical examiners to develop methodology for estimating time-since-death of the deceased, recognized the predictability of carrion-arthropod succession and its use in forensic analysis. By comparison, studies generally cited by modern ecology textbooks as the earliest examples of succession were published in the early 1900s.
Michaud and colleagues found no evidence that plant and carrion ecologists were initially aware of each other's contributions. Instead, they describe the case as an example of multiple independent discovery, similar to how Darwin and Wallace each developed the theory of evolution by natural selection independent of one another. "[G]iven their disparity in subject matter, training, and institutional structures," the authors assert, "these two groups were unaware of each other's publications."
Despite marked differences between the two disciplines, however, plant ecology and carrion ecology accumulated strikingly similar parallel histories and

contributions. Both groups used succession-related concepts to refute the theory of spontaneous generation, for example, and both offered a qualitative framework of the mechanisms involved. As well, both placed high importance on typological concepts (e.g., "seres" in plant ecology and "squads" and decay stages in carrion ecology) and the roles of site and climate in shaping successional outcomes. Although side-by-side examinations of the histories of carrion ecology and plant ecology, especially under a lens of succession, reveal the clear paradigm shifts that formed each discipline and emphasize the different objectives and cultures that kept them apart, Michaud and colleagues believe these comparisons can ultimately serve to benefit each field. "By comparing the contributions of plant and carrion ecologists, we hope to stimulate future crossover research that leads to a general theory of ecological succession."

Jean-Philippe Michaud, Kenneth G. Schoenly, and Gaétan Moreau, "Rewriting ecological succession history: did carrion ecologists get there first?" The Quarterly Review of Biology Vol. 90, No. 1 (March 2015): pp. 45-66. http://www.jstor.org/stable/10.1086/679763

http://www.eurekalert.org/pub_releases/2015-03/wt-wdy031615.php

Who do you think you really are? The first fine-scale genetic map of the British Isles

Many people in the UK feel a strong sense of regional identity, and it now appears that there may be a scientific basis to this feeling, according to a landmark new study into the genetic makeup of the British Isles.

An international team, led by researchers from the University of Oxford, UCL (University College London) and the Murdoch Childrens Research Institute in Australia, used DNA samples collected from more than 2,000 people to create the first fine-scale genetic map of any country in the world.

Their findings, published in Nature, show that prior to the mass migrations of the 20th century there was a striking pattern of rich but subtle genetic variation across the UK, with distinct groups of genetically similar individuals clustered together geographically.

By comparing this information with DNA samples from over 6,000 Europeans, the team was also able to identify clear traces of the population movements into the UK over the past 10,000 years. Their work confirmed, and in many cases shed further light on, known historical migration patterns.

Key findings

There was not a single "Celtic" genetic group. In fact the Celtic parts of the UK (Scotland, Northern Ireland, Wales and Cornwall) are among the most different from each other genetically. For example, the Cornish are much more similar genetically to other English groups than they are to the Welsh or the Scots.

There are separate genetic groups in Cornwall and Devon, with a division almost exactly along the modern county boundary.

The majority of eastern, central and southern England is made up of a single, relatively homogeneous, genetic group with a significant DNA contribution from Anglo-Saxon migrations (10-40% of total ancestry). This settles a historical controversy in showing that the Anglo-Saxons intermarried with, rather than replaced, the existing populations.

The population in Orkney emerged as the most genetically distinct, with 25% of DNA coming from Norwegian ancestors. This shows clearly that the Norse Viking invasion (9th century) did not simply replace the indigenous Orkney population.

The Welsh appear more similar to the earliest settlers of Britain after the last ice age than do other people in the UK.

There is no obvious genetic signature of the Danish Vikings, who controlled large parts of England ("The Danelaw") from the 9th century.

There is genetic evidence of the effect of the Landsker line - the boundary between English-speaking people in south-west Pembrokeshire (sometimes known as "Little England beyond Wales") and the Welsh speakers in the rest of Wales, which persisted for almost a millennium.

The analyses suggest there was a substantial migration across the channel after the original post-ice-age settlers, but before Roman times. DNA from these migrants spread across England, Scotland, and Northern Ireland, but had little impact in Wales.

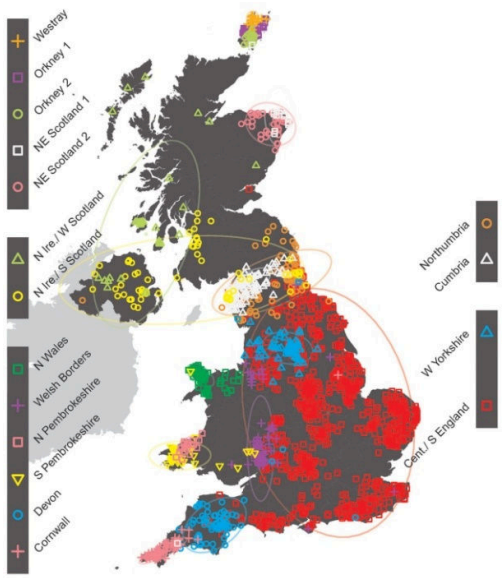
Many of the genetic clusters show similar locations to the tribal groupings and kingdoms around end of the 6th century, after the settlement of the Anglo-Saxons, suggesting these tribes and kingdoms may have maintained a regional identity for many centuries.

The Wellcome Trust-funded People of the British Isles study analysed the DNA of 2,039 people from rural areas of the UK, whose four grandparents were all born within 80km of each other. Because a quarter of our genome comes from each of our grandparents, the researchers were effectively sampling DNA from these ancestors, allowing a snapshot of UK genetics in the late 19th Century. They also analysed data from 6,209 individuals from 10 (modern) European countries.

To uncover the extremely subtle genetic differences among these individuals the researchers used cutting-edge statistical techniques, developed by four of the team members. They applied these methods, called fineSTRUCTURE and GLOBETROTTER, to analyse DNA differences at over 500,000 positions within the genome. They then separated the samples into genetically similar individuals, without knowing where in the UK the samples came from. By plotting each person onto a map of the British Isles, using the centre point of their grandparents' birth places, they were able to see how this distribution correlated with their genetic groupings.

The researchers were then able to "zoom in" to examine the genetic patterns in the UK at levels of increasing resolution. At the broadest scale, the population in Orkney (islands to the north of Scotland) emerged as the most genetically distinct.

At the next level, Wales forms a distinct genetic group, followed by a further division between north and south Wales. Then the north of England, Scotland, and Northern Ireland collectively separate from southern England, before Cornwall forms a separate cluster. Scotland and Northern Ireland then separate from northern England. The study eventually focused at the level where the UK was divided into 17 genetically distinct clusters of people.



A map of the United Kingdom shows how individuals cluster based on their genetics, with a striking relationship to the geography of the country. **Stephen Leslie**

Dr Michael Dunn, Head of Genetics & Molecular Sciences at the Wellcome Trust, said: "These researchers have been able to use modern genetic techniques to provide answers to the centuries' old question - where we come from. Beyond the fascinating insights into our history, this information could prove very useful from a health perspective, as building a picture of population genetics at this scale may in future help us to design better genetic studies to investigate disease."

Nb: Quotes From Several Of The Study Authors Listed In The Notes To Editors

Quotes from the paper authors:

Sir Walter Bodmer from the University of Oxford, who conceived the People of the British Isles study and co-led the work: *"The People of the British Isles study gave us a wonderful opportunity to learn about the fine-scale genetic patterns in the UK population. A key part of our success was collecting DNA from a geographically diverse group of people who are representative of their location. We are very grateful to all the volunteers who participated in the study."*

Professor Peter Donnelly, Director of the Wellcome Trust Centre for Human Genetics at the University of Oxford, who co-led the research: *"It has long been known that human populations differ genetically, but never before have we been able to observe such exquisite and fascinating detail. By coupling this with our assessment of the genetic contributions from different parts of Europe we were able to add to our understanding of UK population history."*

Dr Stephen Leslie, of Murdoch Childrens Research Institute in Australia, and one of the lead authors of the study: *"Rich genetic information such as this tells us a great deal about our history and augments what we know already from archaeology, linguistic and historical records. Much of what we've learned about our history comes from the successful people of society, as they leave the strongest marks on history and archaeology. By using genetics and powerful statistical methods, we have been able to tell the story of the masses."*

Dr Garrett Hellenthal, co-lead author of the study at UCL (University College London): *"To tease out the subtle genetic differences between UK regions we had to use sophisticated statistical methods that model how our genomes are made up of stretches of DNA, passed down the generations from our ancestors".*

Professor Simon Myers, from the University of Oxford, who co-led the development of the statistical approaches used in the study: *"In future, increasingly large datasets will allow us to learn even more about the genetic history of the UK, and the similarly rich histories of other world regions, by applying similar techniques."*

Professor Mark Robinson, an archaeologist on the project from the Oxford University Museum of Natural History, said: "The results give an answer to the question we had never previously thought we would be able to ask about the degree of British survival after the collapse of Roman Britain and the coming of the Saxons."

http://www.eurekalert.org/pub_releases/2015-03/jhm-wpw031215.php

Why people with diabetes can't buy generic insulin

Drug companies' incremental changes keep drugs patented, costly, Johns Hopkins study shows

Fast Facts

Drug companies have made incremental improvements that kept insulin under patent for more than 90 years.

Insulin can cost $120 to $400 per month for patients with no prescription drug coverage.

Many patients with diabetes have lapses in medication that can lead to serious complications requiring hospitalization.

A generic version of insulin, the lifesaving diabetes drug used by 6 million people in the United States, has never been available in this country because drug companies have made incremental improvements that kept insulin under patent from 1923 to 2014. As a result, say two Johns Hopkins internist-researchers, many who need insulin to control diabetes can't afford it, and some end up hospitalized with life-threatening complications, such as kidney failure and diabetic coma.

In a study published March 19, 2015, in the New England Journal of Medicine, authors Jeremy Greene, M.D., Ph.D., and Kevin Riggs, M.D., M.P.H., describe

the history of insulin as an example of "evergreening," in which pharmaceutical companies make a series of improvements to important medications that extend their patents for many decades. This keeps older versions off the generic market, the authors say, because generic manufacturers have less incentive to make a version of insulin that doctors perceived as obsolete. Newer versions are somewhat better for patients who can afford them, say the authors, but those who can't suffer painful, costly complications.

"We see generic drugs as a rare success story, providing better quality at a cheaper price," says Greene, an associate professor of the history of medicine at the Johns Hopkins University School of Medicine and a practicing internist. "And we see the progression from patented drug to generic drug as almost automatic. But the history of insulin highlights the limits of generic competition as a framework for protecting the public health."

More than 20 million Americans have diabetes, in which the body fails to properly use sugar from food due to insufficient insulin, a hormone produced in the pancreas. Diabetes can often be managed without drugs or with oral medications, but some patients need daily insulin injections. The drug can often cost from $120 to $400 per month without prescription drug insurance.

"Insulin is an inconvenient medicine even for people who can afford it," says Riggs, a research fellow in general internal medicine and the Berman Institute of Bioethics at Johns Hopkins. "When people can't afford it, they often stop taking it altogether." Patients with diabetes who are not taking their prescribed insulin come to Riggs' and Greene's Baltimore-area clinics complaining of blurred vision, weight loss and intolerable thirst - symptoms of uncontrolled diabetes, which can lead to blindness, kidney failure, gangrene and loss of limbs.

The two doctors decided to find out why no one makes generic insulin. A University of Toronto medical team discovered insulin in 1921, and in 1923, the university, which held the first patent, gave drug companies the right to manufacture it and patent any improvements. In the 1930s and 1940s, pharmaceutical companies developed long-acting forms that allowed most patients to take a single daily injection. In the 1970s and 1980s, manufacturers improved the purity of cow- and pig-extracted insulin. Since then, several companies have developed synthetic analogs.

Biotech insulin is now the standard in the U.S., the authors say. Patents on the first synthetic insulin expired in 2014, but these newer forms are harder to copy, so the unpatented versions will go through a lengthy Food and Drug Administration approval process and cost more to make. When these insulins come on the market, they may cost just 20 to 40 percent less than the patented versions, Riggs and Greene write.

http://www.eurekalert.org/pub_releases/2015-03/iu-isd031815.php

IU scientists discover mechanism that may help parasites manipulate their hosts

New way T gondii may modify brain cells could help explain changes in the behavior of mice and humans

INDIANAPOLIS - Rodents infected with a common parasite lose their fear of cats, resulting in easy meals for the felines.

Now IU School of Medicine researchers have identified a new way the parasite may modify brain cells, possibly helping explain changes in the behavior of mice - and humans.

The parasite is Toxoplasma gondii, which has infected an estimated one in four Americans and even larger numbers worldwide.

Not long after infecting a human, Toxoplasma parasites encounter the body's immune response and retreat to a latent state, enveloped in hardy cysts that the body cannot remove.

Before entering that inactive state, however, the parasites appear to make significant changes in some of the brain's most common, and critical cells, the researchers said.

The team, lead by William Sullivan, Ph.D., professor of pharmacology and toxicology and of microbiology and immunology, reported two sets of related findings about those cells, called astrocytes, March 18 in the journal PLOS ONE.

Astrocytes are found throughout the brain and are involved in a variety of important brain structures and activities.

Dr. Sullivan and his team evaluated the proteins in astrocyte cells and found 529 sites on 324 proteins where compounds called acetyl groups are added to proteins, creating a map called an "acetylome," much like a map of all the genes in a particular species is known as its "genome."In addition, 277 sites on 186 of the proteins had not been reported in previous studies of other types of cells.

This process of acetylation can alter the function, location or other aspects of those proteins in the cells, providing new insight into how these cells operate in the brain.

Having created the first acetylome for astrocytes, the researchers then found a significant number of proteins that were acetylated differently in brain tissue infected with Toxoplasma parasites.

"We don't know the impacts of these changes yet, but these discoveries could be particularly significant in understanding how the parasites persist in the brain and how this 'rewiring' could affect behavior in both rodents and humans," Dr. Sullivan said.

In a separate article, newly published in the March 2015 issue of the popular science magazine Scientific American MIND, Dr. Sullivan and IU School of Medicine colleague Gustavo Arrizabalaga, Ph.D, professor of pharmacology and toxicology and of microbiology and immunology, describe research by others dating back to the 1980s showing that rodents infected with Toxoplasma behave differently, including not only being unafraid of cat odors, but actually attracted to them.

In effect, research suggests, Toxoplasma modifies the host rodents' brains so that the animals will be eaten and the parasites can make their way to the cat intestinal system - the only place where Toxoplasma can sexually reproduce.

Intriguingly - and much more speculatively, Drs. Arrizabalaga and Sullivan warn - some research has suggested that Toxoplasma infection could alter human behavior, and that changes could vary by gender. One study found that infected men tend to be introverted, suspicious and rebellious, while infected women tended to be extraverted, trusting and obedient. Others have suggested an association with schizophrenia.

"The studies in humans have been relatively small and are correlative. In contrast, the behavioral changes seen in mice infected with Toxoplasma are much better characterized, although we still don't know the mechanisms the parasite employs to alter host behavior," Dr. Sullivan said. "But our analysis of the astrocyte acetylome changes could move us toward better understanding of Toxoplasma's actions and the implications for behavioral impacts."

Initial Toxoplasma infection generally causes symptoms similar to the flu, while the latent form of infection has little physical impact on healthy people. However, the parasites can become active again and cause tissue damage in people with compromised immune systems, such as patients receiving chemotherapy or infected with HIV. In addition, if a woman's initial infection with Toxoplasma occurs while she is pregnant, miscarriage or birth defects can result.

Humans can become infected if they don't wash carefully after collecting cat litter containing Toxoplasma.

Gardens and other areas frequented by wild and feral cats can become reservoirs for Toxoplasma, so experts recommend using gloves and masks when working in such areas. Unwashed vegetables and undercooked meats can also lead to Toxoplasma infection.

In addition to Dr. Sullivan, other contributors to the PLOS ONE paper were Anne Bouchut, Aarti R. Chawla, Victoria Jeffers and Andy Hudmon, all of the IU School of Medicine. Support for the research was provided by funding from the National Institutes of Health grants NS078171 and AI106435.

http://www.eurekalert.org/pub_releases/2015-03/tl-tlt031715.php

The Lancet: Targeted drug doubles progression free survival in Hodgkin lymphoma

Adults with hard-to-treat Hodgkin lymphoma given BV immediately after stem cell transplant survived twice as long without disease progression as those given placebo

A phase 3 trial of brentuximab vedotin (BV), the first new drug for Hodgkin lymphoma in over 30 years, shows that adults with hard-to-treat Hodgkin lymphoma given BV immediately after stem cell transplant survived without the disease progressing for twice as long as those given placebo (43 months vs 24 months).

The findings, published in The Lancet, are potentially practice changing for this young cancer population who have exhausted other treatment options and for whom prognosis is poor. "No medication available today has had such dramatic results in patients with hard-to-treat Hodgkin lymphoma"*, says lead author Craig Moskowitz, a Professor of Medicine at Memorial Sloan Kettering Cancer Center, New York, USA.

Hodgkin lymphoma is the most common blood cancer in young adults aged between 15 and 35 years. Most patients are cured with chemotherapy or radiotherapy. However, for patients who relapse, or do not respond to initial therapy, the treatment of choice is usually a combination of high-dose chemotherapy and autologous stem cell transplant (ASCT) - a procedure that uses healthy stem cells from the patient to replace those lost to disease or chemotherapy. While about 50% of patients who undergo this procedure are cured, for the other half treatment is palliative. BV is an antibody attached to a powerful chemotherapy drug that seeks out cancer cells by targeting the CD30 protein on Hodgkin lymphoma cells. BV sticks to the CD30 protein and delivers chemotherapy directly into the cancer cell to kill it. Recently, BV has been approved for relapsed or refractory Hodgkin lymphoma in 50 countries.

In the AETHERA phase 3 trial, Moskowitz and colleagues aimed to establish whether early treatment with BV after ASCT could prevent disease progression. They randomly assigned 329 patients with Hodgkin lymphoma aged 18 or older who were at high risk of relapse or progression after ASCT to 16 cycles of BV infusions once every 3 weeks or placebo.

At 2 years follow up, the cancer had not progressed at all in 65% of BV patients compared with 45% in the placebo group. "Nearly all of these patients who are progression free at 2 years are likely to be cured since relapse 2 years after a transplant is unlikely"*, explains Dr Moskowitz.

BV was generally well tolerated. The most common side effects were peripheral neuropathy (numbness or pain in the extremities due to nerve damage; 67% BV vs 13% placebo) and neutropenia (low white blood count; 35% vs 12%).

According to Dr Moskowitz, "The bottom line is that BV is a very effective drug in poor risk Hodgkin lymphoma and it spares patients from the harmful effects of further traditional chemotherapy by breaking down inside the cell resulting in less toxicity."*

Writing in a linked Comment, Professor Andreas Engert from the University Hospital of Cologne in Germany discusses how best to define which patients are at high risk of relapse and should be treated with BV. He writes, "AETHERA is a positive study establishing a promising new treatment approach for patients with Hodgkin's lymphoma at high risk for relapse. However, with a progression-free survival of about 50% at 24 months in the placebo group, whether this patient population is indeed high risk could be debated...An international consortium is currently reassessing the effect of risk factors in patients with relapsed Hodgkin's lymphoma to define a high-risk patient population in need of consolidation treatment. We look forward to a better definition of patients with relapsed Hodgkin's lymphoma who should receive consolidation treatment with brentuximab vedotin.

This study was funded by Seattle Genetics, Inc and Takeda Pharmaceuticals International Co

**Quotes direct from author and cannot be found in text of Article.*

http://bit.ly/1OhhPUo

Heart drug reduces risk of cancer spreading

Hope that a compound could be part of a new class of drugs designed to block tumour spread

15:25 18 March 2015 by Clare Wilson

Cancer is cruel: sometimes, life-saving surgery to cut out a tumour may be the very thing that spreads it to other parts of the body. But this spreading process can be hampered by giving a compound that is already used to treat heart failure.

Most people who die from cancer do so because their tumour has spread, or metastasised. Yet most of today's cancer drugs don't stop metastasis, they just kill any cancer cells they come into contact with.

The hope is that the compound could be part of a new class of drugs designed to block tumour spread. "This could be a very important advance," says Andrew Reynolds of the Institute of Cancer Research in London. Cancers are much easier to treat if they have not yet spread.

A few years ago, a team led by Takashi Nojiri of Osaka University in Japan was exploring whether giving a drug called atrial natriuretic peptide (ANP) to patients before lung cancer surgery could reduce subsequent heart problems. ANP is a signalling molecule found in the heart and has been used as a treatment for heart failure in Japan for 20 years. The approach worked – and it also had another benefit. Two years later, 91 per cent of people treated with ANP were free from secondary tumours, compared with 75 per cent of a control group.

You shall not pass

Experiments in mice revealed that the molecule makes blood vessel walls less sticky, preventing circulating cancer cells from adhering to them and pushing their way through to form new tumours.

Because ANP affects the blood vessels rather than the cancer cells, it could be used for all kinds of tumours, says Nojiri, who is working with the Japanese drug company Shionogi to turn ANP into a cancer drug.

As in Nojiri's study, if given before surgery, it could be used to reduce the chance of the operation "seeding" tumours elsewhere in the body. It is thought that cutting into the tumour sometimes lets cancer cells escape. ANP could also be used as a general anti-metastasis drug, given whether or not people need cancer surgery. Nojiri speculates that the presence of natural ANP in the heart might explain why secondary tumours rarely form there.

Journal reference: PNAS, DOI: 10.1073/pnas.1417273112

http://bit.ly/1GC4GQf

Development of farming led to genetic 'bottleneck' that influenced human evolution: researchers

With the introduction of agriculture, farmers may have been able to spend more time reproducing and less time trying to survive, spurring changes in genetic diversity.

Anthony Rivas

If you've ever wondered why people have varying skin tones, it's because about 1.2 million years ago, we all migrated from Africa, where dark skin protected us from the sun's damaging ultraviolet rays, to other areas of the world like Europe, where sunlight isn't so strong. Over time, skin became lighter to allow for the sun's absorption during winter months. When it comes to genetic diversity, those who left Africa brought with them only a small sample of the diversity that remained in Africa. This concept is known as a "bottleneck," and a recent study finds it happened again more recently, but only in men.

Conducted by researchers at Arizona State University, the study found that between 4,000 and 8,000 years ago, a bottleneck among only men caused genetic diversity to decline. Women's genetic diversity, on the other hand, thrived. The reason for this: Men began farming. And with that sedentary lifestyle came wealth, which allowed these few men to spend less time trying to survive, and more time reproducing.

"Instead of 'survival of the fittest' in biological sense, the accumulation of wealth and power may have increased the reproductive success of a limited number of 'socially fit' males and their sons," said the study's lead author Melissa Wilson Sayres, an assistant professor at the university's School of Life Sciences, in a press release. Speaking to the Pacific Standard, she said that for every 17 women who reproduced at the time, there was only one man doing the same.

The findings are important because they offer insight into how our evolution may not have been pushed along solely by natural selection - which stipulates that as man evolved, so did genetic traits that benefited his survival in a particular environment. But while this has been the common evolutionary rule for years, the new research suggests a cultural phenomenon may have inspired a genetic revolution as well.

The researchers discovered this by analyzing DNA samples from the saliva or blood of 456 men living in seven regions of five continents, including Africa, the Andes in South America, South Asia, near East and Central Asia, Europe, and Oceania - islands in the middle of the Pacific Ocean. They specifically looked at these men's Y chromosomes and mitochondrial DNA. By comparing these two, which are inherited exclusively from male and female ancestors, respectively, they're able to determine the number of female and male ancestors the populations had.

Wilson Sayres said the results can help inform researchers on not only genetic diversity but also disease on a global scale. "When a doctor tries to provide a diagnosis when you are sick, you'll be asked about your environment, what's going on in your life, and your genetic history based on your family's health," she said. "If we want to understand human health on a global scale, we need to know our global genetic history; that is what we are studying here." The team's next goal is to further its research with a larger amount of DNA samples.

Source: Karmin M, Saag L, Vicente M, et al. A recent bottleneck of Y chromosome diversity coincides with a global change in culture. Genome Research. 2015.

http://www.eurekalert.org/pub_releases/2015-03/ncsu-caw031715.php

Crocodile ancestor was top predator before dinosaurs roamed North America

A newly discovered crocodilian ancestor may have filled one of North America's top predator roles before dinosaurs arrived on the continent.

Carnufex carolinensis, or the "Carolina Butcher," was a 9-foot long, land-dwelling crocodylomorph that walked on its hind legs and likely preyed upon smaller inhabitants of North Carolina ecosystems such as armored reptiles and early mammal relatives. Paleontologists from North Carolina State University and the North Carolina Museum of Natural Sciences recovered parts of Carnufex's skull, spine and upper forelimb from the Pekin Formation in Chatham County, North Carolina. Because the skull of Carnufex was preserved in pieces, it was difficult to visualize what the complete skull would have looked like in life. To get a fuller picture of Carnufex's skull the researchers scanned the individual bones with the latest imaging technology - a high-resolution surface scanner. Then they created a three-dimensional model of the reconstructed skull, using the more complete skulls of close relatives to fill in the missing pieces.

This is a life reconstruction of Carnufex carolinensis. **Jorge Gonzales. Open access**

The Pekin Formation contains sediments deposited 231 million years ago in the beginning of the Late Triassic (the Carnian), when what is now North Carolina was a wet, warm equatorial region beginning to break apart from the supercontinent Pangea.

"Fossils from this time period are extremely important to scientists because they record the earliest appearance of crocodylomorphs and theropod dinosaurs, two groups that first evolved in the Triassic period, yet managed to survive to the present day in the form of crocodiles and birds," says Lindsay Zanno, assistant research professor at NC State, director of the Paleontology and Geology lab at the museum, and lead author of a paper describing the find.

"The discovery of Carnufex, one of the world's earliest and largest crocodylomorphs, adds new information to the push and pull of top terrestrial predators across Pangea."

Typical predators roaming Pangea included large-bodied rauisuchids and poposauroids, fearsome cousins of ancient crocodiles that went extinct in the Triassic Period. In the Southern Hemisphere, "these animals hunted alongside the earliest theropod dinosaurs, creating a predator pile-up," says Zanno. However, the discovery of Carnufex indicates that in the north, large-bodied crocodylomorphs, not dinosaurs, were adding to the diversity of top predator niches. "We knew that there were too many top performers on the proverbial stage in the Late Triassic," Zanno adds. "Yet, until we deciphered the story behind Carnufex, it wasn't clear that early crocodile ancestors were among those vying for top predator roles prior to the reign of dinosaurs in North America."

As the Triassic drew to a close, extinction decimated this panoply of predators and only small-bodied crocodylomorphs and theropods survived. "Theropods were ready understudies for vacant top predator niches when large-bodied crocs and their relatives bowed out," says Zanno. "Predatory dinosaurs went on to fill these roles exclusively for the next 135 million years."

Still, ancient crocodiles found success in other places. "As theropod dinosaurs started to make it big, the ancestors of modern crocs initially took on a role similar to foxes or jackals, with small, sleek bodies and long limbs," says Susan Drymala, graduate student at NC State and co-author of the paper. "If you want to picture these animals, just think of a modern day fox, but with alligator skin instead of fur."

N.C. Museum of Natural Sciences curator Vincent Schneider recovered the specimen, and it was analyzed by Zanno and Drymala, with contributions by Schneider. Sterling Nesbitt of Virginia Polytechnic Institute also contributed to the work. The researchers' findings appear in the open access journal Scientific Reports. "Early crocodylomorph increases top tier predator diversity during rise of dinosaurs" *DOI: 10.1038/srep09276*

Authors: Lindsay Zanno, Susan Drymala, NC State University and the NC Museum of Natural Sciences; Vincent Schneider, NC Museum of Natural Sciences; Sterling Nesbitt, Virginia Polytechnic Institute Published: March 19, 2015 in Scientific Reports

http://www.eurekalert.org/pub_releases/2015-03/nu-tiw031815.php

Trust increases with age; benefits well-being

New research suggests a bright side to getting older

EVANSTON, Ill. - - Hollywood has given moviegoers many classic portrayals of grumpy old men. But new research suggests that getting older doesn't necessarily make people cynical and suspicious.

Instead, trust tends to increase as people age, a development that can be beneficial for well-being, according to two new large-scale studies by researchers at Northwestern University and the University at Buffalo.

"When we think of old age, we often think of decline and loss," said study co-author Claudia Haase, an assistant professor of Human Development and Social Policy at Northwestern's School of Education and Social Policy.

"But a growing body of research shows that some things actually get better as we age," Haase said. "Our new findings show that trust increases as people get older and, moreover, that people who trust more are also more likely to experience increases in happiness over time."

The studies, combined into one research paper, have been published online in the journal Social Psychological and Personality Science. In the first study, the researchers examined the association between age and trust at multiple points in history, using a sample of 197,888 individuals from 83 countries.

The results suggested a positive association between age and trust, one that has existed for at least the past 30 years with little change over time. "This suggests that it's not simply about people being born at certain times," said study coauthor Michael Poulin, associate professor of psychology at the University at Buffalo.

The second study followed 1,230 people in the U.S. over time and found that these individuals became more trusting as they aged.

"For Millennials, Generation X, and Baby Boomers alike, levels of trust increase as people get older," said Haase, who directs Northwestern's Life-Span Development Lab. "People really seem to be 'growing to trust' as they travel through their adult years." One explanation for age-related increases in trust is that since older adults are increasingly motivated to give back to others, they believe them to be good and trustworthy, Poulin said.

"We know that older people are more likely to look at the bright side of things," Haase added. "As we age, we may be more likely to see the best in other people and forgive the little letdowns that got us so wary when we were younger."

Though trust can have negative consequences, especially among older adults at risk of falling for scams and fraud, the studies found no evidence that those negative consequences erode the benefits of trust.

"Both studies found a positive association between trust and well-being that was consistent across the life span, suggesting that trust is not a liability in old age," Poulin said. "Our findings suggest that trust may be an important resource for successful development across the life span," Haase added.

http://www.eurekalert.org/pub_releases/2015-03/uoz-ltt031915.php

Leadership: 10 tips for choosing an academic chair

Clear and realistic expectations are key to successfully hiring heads of departments

Clear and realistic expectations are key to successfully hiring heads of departments, say Professor Pierre-Alain Clavien, ***University of Zurich***, and Joseph Deiss, former President of the Swiss Confederation, in ***a commentary in Nature magazine***.

Selecting a chair for a position in clinical academic medicine is often problematic, with the diverse demands placed on the position proving a constant source of debate. Today's heads of departments are not only expected to be outstanding physicians, researchers, and teachers, but also adroit and cost-conscious managers. Finding people with such an extraordinary skill set is a formidable task.

To address this issue, Professor Clavien and the University of Zurich convened an international, conference in cooperation with other universities and institutions and the Swiss Academy of Medical Science (SAMS). Throughout the three-day conference, leading experts from industry, politics and academia critically examined procedures for appointing heads of departments in order to define generally applicable guidelines for appointing an academic chair.

Published as a commentary in Nature, the recommendations of the jury are summarized in ten tips outlining key criteria for top level appointments. One main cause of failing to hire successful chairs is conflicting expectations of the institutions involved, such as the hospital and the university. While the hospital may be seeking an effective manager, the university would prefer a top researcher. It is thus essential for the institutions involved to clearly define the job requirements. Aside from leadership qualities, emotional, personal and social skills are essential. And the closing tip in Nature: Don't forget that even the best people need regular feedback, mentoring and support.

http://www.eurekalert.org/pub_releases/2015-03/rumc-nmd031915.php

New MIND diet may significantly protect against Alzheimer's disease

Even moderate adherence shows reduction in incidence of devastating brain disease

CHICAGO - A new diet, appropriately known by the acronym MIND, could significantly lower a person's risk of developing Alzheimer's disease, even if the diet is not meticulously followed, according to a paper published online for subscribers in March in the journal Alzheimer's & Dementia: The Journal of the Alzheimer's Association.

Rush nutritional epidemiologist Martha Clare Morris, PhD, and colleagues developed the "Mediterranean-DASH Intervention for Neurodegenerative Delay" (MIND) diet. The study shows that the MIND diet lowered the risk of AD by as much as 53 percent in participants who adhered to the diet rigorously, and by about 35 percent in those who followed it moderately well.

"One of the more exciting things about this is that people who adhered even moderately to the MIND diet had a reduction in their risk for AD," said Morris, a Rush professor, assistant provost for Community Research, and director of Nutrition and Nutritional Epidemiology. "I think that will motivate people."

Morris and her colleagues developed the MIND diet based on information that has accrued from years' worth of past research about what foods and nutrients have good, and bad, effects on the functioning of the brain over time. This is the first study to relate the MIND diet to Alzheimer's disease.

"I was so very pleased to see the outcome we got from the new diet," she said.

The MIND diet is a hybrid of the Mediterranean and DASH (Dietary Approaches to Stop Hypertension) diets, both of which have been found to reduce the risk of cardiovascular conditions, like hypertension, heart attack and stroke. Some researchers have found that the two older diets provide protection against dementia as well.

In the latest study, the MIND diet was compared with the two other diets. People with high adherence to the DASH and Mediterranean diets also had reductions in AD - 39 percent with the DASH diet and 54 percent with the Mediterranean diet - but got negligible benefits from moderate adherence to either of the two other diets. The MIND diet is also easier to follow than, say, the Mediterranean diet, which calls for daily consumption of fish and 3-4 daily servings of each of fruits and vegetables, Morris said.

The MIND diet has 15 dietary components, including 10 "brain-healthy food groups" - green leafy vegetables, other vegetables, nuts, berries, beans, whole grains, fish, poultry, olive oil and wine - and five unhealthy groups that comprise red meats, butter and stick margarine, cheese, pastries and sweets, and fried or fast food. With the MIND diet, a person who eats at least three servings of whole grains, a salad and one other vegetable every day - along with a glass of wine - snacks most days on nuts, has beans every other day or so, eats poultry and berries at least twice a week and fish at least once a week and benefit. However, he or she must limits intake of the designated unhealthy foods, especially butter (less than 1 tablespoon a day), cheese, and fried or fast food (less than a serving a week for any of the three), to have a real shot at avoiding the devastating effects of AD, according to the study.

Berries are the only fruit specifically to make the MIND diet. "Blueberries are one of the more potent foods in terms of protecting the brain," Morris said, and strawberries have also performed well in past studies of the effect of food on cognitive function.

The MIND diet was not an intervention in this study, however; researchers looked at what people were already eating. Participants earned points if they ate brain-healthy foods frequently and avoided unhealthy foods. The one exception was that participants got one point if they said olive oil was the primary oil used in their homes.

The study enlisted volunteers already participating in the ongoing Rush Memory and Aging Project (MAP), which began in 1997 among residents of Chicago-area retirement communities and senior public housing complexes. An optional "food frequency questionnaire" was added from 2004 to February 2013, and the MIND

diet study looked at results for 923 volunteers. A total of 144 cases of AD developed in this cohort.

AD, which takes a devastating toll on cognitive function, is not unlike heart disease in that there appear to be "many factors that play into who gets the disease," including behavioral, environmental and genetic components, Dr. Morris said. "With late-onset AD, with that older group of people, genetic risk factors are a small piece of the picture," she said. Past studies have yielded evidence that suggests that what we eat may play a significant role in determining who gets AD and who doesn't, Morris said.

When the researchers in the new study left out of the analyses those participants who changed their diets somewhere along the line - say, on a doctor's orders after a stroke - they found that "the association became stronger between the MIND diet and [favorable] outcomes" in terms of AD, Morris said. "That probably means that people who eat this diet consistently over the years get the best protection."

In other words, it looks like the longer a person eats the MIND diet, the less risk that person will have of developing AD, Morris said. As is the case with many health-related habits, including physical exercise, she said, "You'll be healthier if you've been doing the right thing for a long time."

Morris said, "We devised a diet and it worked in this Chicago study. The results need to be confirmed by other investigators in different populations and also through randomized trials." That is the best way to establish a cause-and-effect relationship between the MIND diet and reductions in the incidence of Alzheimer's disease, she said.

The study was funded by the National Institute on Aging. All the researchers on this study were from Rush except for Frank M. Sacks MD, professor of Cardiovascular Disease Prevention, Department of Nutrition, at the Harvard School of Public Health. Dr. Sacks chaired the committee that developed the DASH diet.

http://bit.ly/1MXsQa2

American Bugs Almost Wiped Out France's Wine Industry

When the Great French Wine Blight hit in the mid 1800s, the culprit turned out to be a pest from the New World that would forever alter wine production

By Laura Clark smithsonian.com

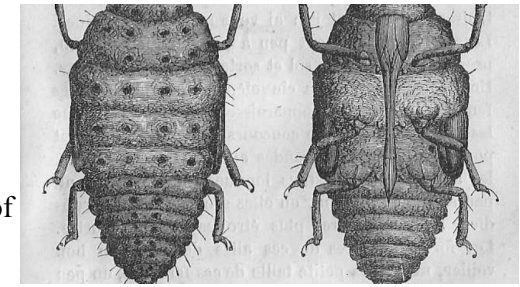
Around 150 years ago, France's reputation as one of the world's greatest producers of wine was under critical threat from a terrible blight. When scientists were finally able to determine the cause, they found the blame lay with a tiny parasitic insect that traveled over from the United States. But it wasn't really all America's fault; the French had imported the problem themselves, albeit unknowingly - and the impact on the wine industry would be momentous.

Levi Gadye over at io9 recently shared a fascinating exploration of just how "the Great French Wine Blight Changed Grapes Forever." Here's the story: As the global wine industry picked up speed in the 18th and 19th centuries, French vintners began to import American vines to ensure that their vineyards remained competitive. (After all, Americans had imported the French variety for centuries.)

"Amidst all the excitement surrounding the growing wine economy, the vine importers failed to notice a stowaway on their cargo," writes Gadye.

By the mid 1860s, an "unknown disease" began to destroy entire vineyards, causing grape vines to rot away, fruit and all. It crippled wine production and threatened the future of the whole industry.

The scientists sent to investigate eventually discovered that the plants were the victims of tiny, gross "louse of yellowish color" that were feasting on living vine roots, irreparably damaging them. After much debate the insects were identified as an American aphid-like bug called phylloxera. In the U.S., though, they only bothered the leaves of grape vines, where they were nowhere to be found on French plants.



A nymph of the Phylloxéra. (Maurice Girard Via Wikimedia Commons)

Finally, writes Gadye, it was discovered that "the phylloxera preferred the leaves of imported American vines, and the roots of local French vines." The French government offered 300,000 francs to anyone who could create an effective insecticide. But by the 1890s, when all other efforts seemingly failed, they started the long process of "developing hybrid or grafted vines that could thrive in French soils; resist phylloxera; and still make great wine."

So, they grafted French vines onto American rootstocks, as well as creating full hybrids. Now, notes Gadye, "nearly all French wine, including expensive French wine, comes from vines grafted onto American roots." That's right: the U.S. has a hand in some of Europe's most venerated vintages.

The wine blight that hit France would sweep the globe, with Chile being the only major wine producer to escape damaging infestation from the bad bug for reasons still speculated today. And we still aren't free and clear of the blight - it reared its head again in California during the 1980s, causing about $1 billion in damage. Yet, writes Gadye, there are a couple French vineyards that managed to escape damage from phylloxera for reasons that are still "a complete mystery." You can bet that the prized wine from those locales cost more than a pretty penny.

http://www.eurekalert.org/pub_releases/2015-03/nyu-oem031315.php

Our eyes multi-task even when we don't want them to, researchers find

Study shows human eyes can integrate multiple components of an item while underscoring the difficulty we have in focusing on a particular aspect of it

Our eyes are drawn to several dimensions of an object - such as color, texture, and luminance - even when we need to focus on only one of them, researchers at New York University and the University of Pennsylvania have found. The study, which appears in the journal Current Biology, points to the ability of our visual system to integrate multiple components of an item while underscoring the difficulty we have in focusing on a particular aspect of it.

"Even when we want and need to focus on one dimension of things we come across every day, such as the texture of your cat's fur rather than its lightness, we have difficulty doing so because our eyes want to survey several features at once," explains Michael Landy, a professor in NYU's Department of Psychology and the study's senior author. "Even though its light fur can often be used to aid in recognition, if it is partially in shadow and partially in sunlight, it would be best to ignore light intensity and use another dimension, such as texture or color. But when a visual task becomes difficult, we find that humans cannot ignore a visual dimension even if it harms their performance."

He and the study's lead author, Toni Saarela, a visiting scholar in the University of Pennsylvania's Department of Psychology, note that the findings point to the challenges faced by medical practitioners and airport screeners, who examine overlapping objects, through x-rays and security scanners readings, possibly outlined by different hues or brightness.

Previous studies have shown the human visual system is capable of simultaneously processing several traits of a single object. In general, this is beneficial as it allows us to combine these measurements (of brightness, hue, texture) to more efficiently identify an object. However, what if we need to spot only one aspect of an object? Are we able to block out components not relevant to our search?

Landy and Saarela's study focused on selective attention to specific visual aspects of an object, such as its color or texture. In a series of experiments, the researchers sought to determine under which conditions our ability to account for multiple aspects of an item aided object recognition and under which this ability served as a distraction.

In one, subjects were shown a series of single letters on a computer screen and asked if they could identify the letter. The letters were distinguished from the surrounding background in terms of color, texture, luminance (brightness) or combinations of two of these dimensions. Here, drawing upon the object's different visual features, the experiment's subjects successfully identified the letters, performing even better at the task when two dimensions were available (e.g., color and texture), underscoring the advantages of our visual "multi-tasking".

However, in a second experiment, the subjects were given a slightly different identification task. This time, they were asked to identify a letter defined by one dimension, such as luminance (i.e., a bright letter on a darker background), while ignoring a second dimension (e.g., texture variations). The texture variations in the stimulus sometimes outlined the same letter, but often indicated a completely different letter. The subjects were unable to completely ignore the second dimension, reporting the texture-defined letter that they were asked to ignore as often as they reported the luminance-defined letter.

These results, the researchers concluded, show that our ability to combine dimensions to improve object identification prevents us from ignoring a dimension when that is what our task requires.

The study was supported by grants from the National Institutes of Health (EY16165) and the Swiss National Science Foundation (PBELP1-125415).

http://www.eurekalert.org/pub_releases/2015-03/cwru-cwr031915.php ***Case***

Western Reserve global health expert urges action to eradicate yaws, tropical disease

Half a century ago, a concentrated global effort nearly wiped a disfiguring tropical disease from the face of the earth. Now, says Case Western Reserve's James W. Kazura, MD, it's time to complete the work.

In a perspective column in the Feb.19 New England Journal of Medicine, Kazura responded to a research article that demonstrated positive results from a single oral dose of azithromycin to 83.8 percent (13,302) of 16,092 residents of Lihir Island, Papua New Guinea.

"We have the medical knowledge to achieve global eradication, and new evidence establishes proof of principle that single-dose azithromycin is the right approach in attempting to eliminate yaws by 2020," said Kazura, professor of International Health and Medicine, and Director, Center for Global Health & Diseases, Case Western Reserve University School of Medicine. "But do we have the infrastructure and the financial and human resources to make it happen?"

From 1954 to 1962, the World Health Organization (WHO) and UNICEF partnered on a massive eradication effort that involved 46 countries and hundreds of millions of examinations. The campaign ultimately lowered prevalence by 95 percent, to 2.5 million. Unfortunately, a range of factors stopped the ongoing

progress, and by the 1970s, the disease again began to spread. WHO has set a new goal for eradication of 2020.

The results from Papua, New Guinea, give reason for hope. As an international team, including 16 authors reporting in the journal, the broad administration of the single-dose of azithromycin reduced prevalence of yaws from 2.4 percent to 0.3 percent within six months; at a year, the 0.3 percent figure remained unchanged.

Yaws is transmitted through direct contact with fluid from a skin ulcer of an infected individual into a skin abrasion or cut of an uninfected person. Because of the direct contact nature of the infection, yaws commonly occurs among children and family members. It also occurs in regions of the world with poor hygiene and lack of clean water for washing. That said, it is considered one of the infectious diseases with a realistic chance of eradication because it is only transmitted among humans. Building off the findings from New Guinea, Kazura cited four key steps toward the goal of global eradication.

First, total community treatment requires ongoing, high-quality monitoring for both active and latent yaws. Such follow-up surveillance requires a minimum three-year commitment to track and control yaws infection in the community.

Second, the health care systems in affected areas must be minimally adequate to obtain and then administer the single dose of azithromycin to each infected patient. In highly remote regions of the world, a minimally adequate health care infrastructure is often absent. Additionally, health care systems are strained by dealing with other infectious diseases such as malaria, worm parasites and possibly Ebola.

"If we are to succeed in eradicating yaws infection, azithromycin will have to be put in a package that can be handled in those places of the world where infrastructure is very weak," Kazura said. "This is a disease that occurs among the poorest of the poor in the world."

Third, he advocates more effective mapping systems to identify zones of high yaws incidence, and then moving surveillance and treatment resources to those regions. Yaws tends to be highly centralized in specific geographic locations rather than scattered through entire continents. Currently, the highest incidence of yaws distribution is in central Africa and the Southeast Asia island chains of Indonesia, Papua New Guinea and Solomon Islands.

Finally, eradicating yaws infection will require continued commitment from susceptible communities in terms of monitoring and treating the infection. The Papua New Guinea research by Mitja and colleagues did set the bar for yaws-affected communities throughout the world - azithromycin administration to 80 percent or more of eligible residents in the community. The effectiveness of total community treatment with one-dose azithromycin gives WHO the evidence it needs to obtain funding from government and non-government sources to apply available, inexpensive and safe tools to eradicate yaws infection.

"If total community treatment is done properly, yaws infection is gone forever," Kazura said. "Compared to malaria and worm infections, yaws eradication should be more approachable and much easier to achieve. Yaws is in line for that major step forward in advancing human health at the world level."

http://www.eurekalert.org/pub_releases/2015-03/uota-mpf031915.php

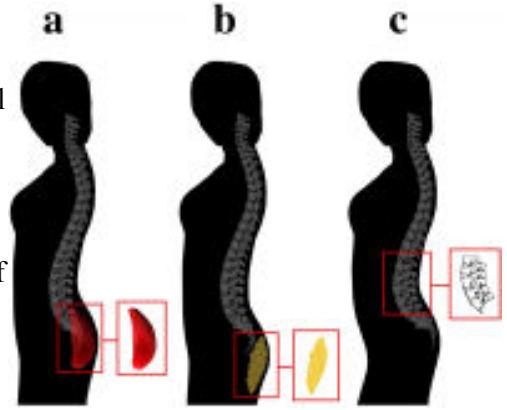
Men's preference for certain body types has evolutionary roots

A psychology study from The University of Texas at Austin sheds new light on today's standards of beauty, attributing modern men's preferences for women with a curvy backside to prehistoric influences.

The study, published online in Evolution and Human Behavior, investigated men's mate preference for women with a "theoretically optimal angle of lumbar curvature," a 45.5 degree curve from back to buttocks allowing ancestral women to better support, provide for, and carry out multiple pregnancies.

"What's fascinating about this research is that it is yet another scientific illustration of a close fit between a sex-differentiated feature of human morphology - in this case lumbar curvature - and an evolved standard of attractiveness," said the study's co-author David Buss, a UT Austin psychology professor. "This adds to a growing body of evidence that beauty is not entirely arbitrary, or 'in the eyes of the beholder' as many in mainstream social science believed, but rather has a coherent adaptive logic."

This research, led by UT Austin alumnus and Bilkent University psychologist David Lewis, consisted of two studies. The first looked at vertebral wedging, an underlying spinal feature that can influence the actual curve in women's lower backs.



Buttock protrusion associated with (a) gluteal development indicating physical fitness, (b) adipose tissue deposition, and (c) vertebral wedging. Notes: All women exhibit identical buttock protrusion. Women (a) and (c) also exhibit an identical angle between the thoracic spine and buttocks (i.e., lumbar curvature). **The University of Texas at Austin**

About 100 men rated the attractiveness of several manipulated images displaying spinal curves ranging across the natural spectrum. Men were most attracted to

images of women exhibiting the hypothesized optimum of 45 degrees of lumbar curvature.

"This spinal structure would have enabled pregnant women to balance their weight over the hips," Lewis said. "These women would have been more effective at foraging during pregnancy and less likely to suffer spinal injuries. In turn, men who preferred these women would have had mates who were better able to provide for fetus and offspring, and who would have been able to carry out multiple pregnancies without injury."

The second study addressed the question of whether men prefer this angle because it reflects larger buttocks, or whether it really can be attributed to the angle in the spine itself. Approximately 200 men were presented with groups of images of women with differing buttock size and vertebral wedging, but maintaining a 45.5-degree curve. Men consistently preferred women whose spinal curvature was closer to optimum regardless of buttock size.

"This enabled us to conclusively show that men prefer women who exhibit specific angles of spinal curvature over buttock mass," said the study's co-author Eric Russell, a visiting researcher from UT Arlington.

This morphology and men's psychological preference toward it have evolved over thousands of years, and they won't disappear overnight.

"This tight fit between evolutionary pressures and modern humans' psychology, including our standards of attractiveness, highlights the usefulness that an evolutionary approach can have for expanding our knowledge not just of the natural sciences, but also the social sciences," Lewis said.

http://nyti.ms/1EzAAul

Scientists Seek Ban on Method of Editing the Human Genome

A group of leading biologists on Thursday called for a worldwide moratorium on use of a new genome-editing technique that would alter human DNA in a way that can be inherited.

By NICHOLAS WADE MARCH 19, 2015

The biologists fear that the new technique is so effective and easy to use that some physicians may push ahead before its safety can be assessed. They also want the public to understand the ethical issues surrounding the technique, which could be used to cure genetic diseases, but also to enhance qualities like beauty or intelligence. The latter is a path that many ethicists believe should never be taken.

“You could exert control over human heredity with this technique, and that is why we are raising the issue,” said David Baltimore, a former president of the California Institute of Technology and a member of the group whose paper on the topic was published in the journal Science.

Ethicists, for decades, have been concerned about the dangers of altering the human germline - meaning to make changes to human sperm, eggs or embryos that will last through the life of the individual and be passed on to future generations. Until now, these worries have been theoretical. But a technique invented in 2012 makes it possible to edit the genome precisely and with much greater ease. The technique has already been used to edit the genomes of mice, rats and monkeys, and few doubt that it would work the same way in people.

The technique holds the power to repair or enhance any human gene. “It raises the most fundamental of issues about how we are going to view our humanity in the future and whether we are going to take the dramatic step of modifying our own germline and in a sense take control of our genetic destiny, which raises enormous peril for humanity,” said George Q. Daley, a stem cell expert at Boston Children’s Hospital and a member of the group.

The biologists writing in Science support continuing laboratory research with the technique, and few if any scientists believe it is ready for clinical use. Any such use is tightly regulated in the United States and Europe. American scientists, for instance, would have to present a plan to treat genetic diseases in the human germline to the Food and Drug Administration.

The paper’s authors, however, are concerned about countries that have less regulation in science. They urge that “scientists should avoid even attempting, in lax jurisdictions, germline genome modification for clinical application in humans” until the full implications “are discussed among scientific and governmental organizations.”

Though such a moratorium would not be legally enforceable and might seem unlikely to exert global influence, there is a precedent. In 1975, scientists worldwide were asked to refrain from using a method for manipulating genes, the recombinant DNA technique, until rules had been established.

“We asked at that time that nobody do certain experiments, and in fact nobody did, to my knowledge,” said Dr. Baltimore, who was a member of the 1975 group. “So there is a moral authority you can assert from the U.S., and that is what we hope to do.”

Recombinant DNA was the first in a series of ever-improving steps for manipulating genetic material. The chief problem has always been one of accuracy, of editing the DNA at precisely the intended site, since any off-target change could be lethal. Two recent methods, known as zinc fingers and TAL effectors, came close to the goal of accurate genome editing, but both are hard to use. The new genome-editing approach was invented by Jennifer A. Doudna of the University of California, Berkeley, and Emmanuelle Charpentier of Umea University in Sweden.

Their method, known by the acronym Crispr-Cas9, co-opts the natural immune system with which bacteria remember the DNA of the viruses that attack them so they are ready the next time those same invaders appear. Researchers can simply prime the defense system with a guide sequence of their choice and it will then destroy the matching DNA sequence in any genome presented to it. Dr. Doudna is the lead author of the Science article calling for control of the technique and organized the meeting at which the statement was developed.

Though highly efficient, the technique occasionally cuts the genome at unintended sites. The issue of how much mistargeting could be tolerated in a clinical setting is one that Dr. Doudna's group wants to see thoroughly explored before any human genome is edited.

Scientists also say that replacing a defective gene with a normal one may seem entirely harmless but perhaps would not be.

"We worry about people making changes without the knowledge of what those changes mean in terms of the overall genome," Dr. Baltimore said. "I personally think we are just not smart enough - and won't be for a very long time - to feel comfortable about the consequences of changing heredity, even in a single individual."

Many ethicists have accepted the idea of gene therapy, changes that die with the patient, but draw a clear line at altering the germline, since these will extend to future generations. The British Parliament in February approved the transfer of mitochondria, small DNA-containing organelles, to human eggs whose own mitochondria are defective. But that technique is less far-reaching because no genes are edited.

There are two broad schools of thought on modifying the human germline, said R. Alta Charo, a bioethicist at the University of Wisconsin and a member of the Doudna group. One is pragmatic and seeks to balance benefit and risk. The other "sets up inherent limits on how much humankind should alter nature," she said. Some Christian doctrines oppose the idea of playing God, whereas in Judaism and Islam there is the notion "that humankind is supposed to improve the world." She described herself as more of a pragmatist, saying, "I would try to regulate such things rather than shut a new technology down at its beginning."

Other scientists agree with the Doudna group's message. "It is very clear that people will try to do gene editing in humans," said Rudolf Jaenisch, a stem cell biologist at the Whitehead Institute in Cambridge, Mass., who was not a member of the Doudna group. "This paper calls for a moratorium on any clinical application, which I believe is the right thing to do."

Writing in Nature last week, Edward Lanphier and other scientists involved in developing the rival zinc finger technique for genome editing also called for a moratorium on human germline modification, saying that use of current technologies would be "dangerous and ethically unacceptable."

The International Society for Stem Cell Research said Thursday that it supported the proposed moratorium.

The Doudna group calls for public discussion, but is also working to develop some more formal process, such as an international meeting convened by the National Academy of Sciences, to establish guidelines for human use of the genome-editing technique.

"We need some principled agreement that we want to enhance humans in this way or we don't," Dr. Jaenisch said. "You have to have this discussion because people are gearing up to do this."

http://www.eurekalert.org/pub_releases/2015-03/msu-rtd032015.php

Research team discovers backup system that helps sustain liver during crisis

Scientists from Montana State University and Sweden have discovered an antioxidant system that helps sustain the liver when other systems are missing or compromised.

BOZEMAN, Mont. - Like a generator kicking in when the power fails or an understudy taking the stage when a lead actor is sick, the newly found system steps up during a crisis. It's fueled by methionine, an amino acid that can't be manufactured in the body and doesn't come from herbal teas or supplements. People get it only by eating protein.

"This is an important finding," said Ed Schmidt, a professor in MSU's Department of Microbiology and Immunology and co-author of a newly published study in Nature Communications. "It tells us about humans and all living things. It's an alternative way to maintain the balance you need in your cells to be alive."

Schmidt and his collaborators at the Karolinska Institute published their findings March 20 in Nature Communications, a scientific journal affiliated with the prestigious international journal, Nature. Nature Communications covers all topics in physics, chemistry, earth sciences and biology. The Karolinska Institute is one of Europe's largest and most distinguished medical universities.

Some vitamins and supplements act as antioxidants, Schmidt said. They help protect cells from the damage that can lead to aging, cancers and inflammatory diseases. However, vitamins and supplements can't replace two known natural systems in liver cells: the thioredoxin and glutathione systems.

To investigate further, Schmidt's lab generated mice whose livers lacked key components of both systems. The mice were not robust. They were on the brink of failure, Schmidt said. And yet they survived.

Pursuing the mystery, the researchers found the third antioxidant system and said it has broad implications for health issues in humans. They said methionine was a surprising source of its power.

"Methionine, a sulfur-containing amino acid that is required in our diet so our cells can make proteins, is also a potent, but previously unrecognized antioxidant that, unlike any other antioxidant tested to date, can sustain the liver when the two other systems are absent or compromised," Schmidt said.

"It was well-known, hiding in the shadows," Schmidt continued. "It wasn't until we removed the two powerful universal systems and found that the liver would survive that we recognized the role of this third system."

Methionine is found in high levels in eggs, meat, fish, Brazil nuts, sesame seeds and cereal grains.

"There is plenty of it in a normal balanced diet," Schmidt said. "It's only in extreme cases where people are deprived of dietary protein, or possibly when they are exposed to some toxins, that this could be a problem."

First authors on the Nature Communications paper were Sofi Eriksson, a postdoctoral researcher at MSU and the Karolinska Institute in Sweden and Justin Prigge at MSU. Co-authors, in addition to Schmidt, were Emily Talago at MSU and Elias Arnér at the Karolinska Institute. Arnér is a Swedish biochemist, medical doctor and long-time collaborator of Schmidt's.

http://www.eurekalert.org/pub_releases/2015-03/uow-snc031915.php

Stinging nettle chemical improves cancer drug

A cancer drug could be made 50 times more effective by a chemical found in stinging nettles and ants, new research finds

A cancer drug could be made 50 times more effective by a chemical found in stinging nettles and ants, new research finds.

Researchers at the University of Warwick found that when the chemical, Sodium Formate, is used in combination with a metal-based cancer treatment it can greatly increase its ability to shut down cancer cells.

Developed by Warwick's Department of Chemistry, the drug, a compound of the metal ruthenium called JS07, is capable of exploiting a cancer cell's natural weaknesses and disrupts its energy generation mechanism. Laboratory tests on ovarian cancer cells have shown that when used in combination with Sodium Formate JS07 is 50 times more effective than when acting alone.

Derived from formic acid which is commonly found in a number of natural organisms including nettles and ants, Sodium Formate (E-237) is more commonly used as a food preservative.

The Warwick researchers developed a novel method for binding Sodium Formate with JS07 to form a more potent form of the drug.

The researchers subsequently found that the potent form of JS07 acts as a catalyst when it interacts with a cancer cell's energy-generating mechanism. This interaction disrupts the mechanism, causing the cell's vital processes to cease functioning and for the cell to shut down.

Lead-researcher Professor Peter Sadler explains:

"Cancer cells require a complex balance of processes to survive. When this balance is disrupted the cell is unable to function due to a range of process failures and eventually shuts down. The potent form of JS07 has proven to be very successful when tested on ovarian cancer cells".

The combination of Sodium Formate and JS07 provides a number of potential benefits to cancer patients, including a reduction in the negative side-effects compared with other traditional cancer treatments:

"By itself, JS07 is capable of shutting down cancer cells but when used in combination with Sodium Formate this ability is significantly increased. As a result, lower doses would be required to target cancer cells - reducing both the drug's toxicity and potential side-effects.", says Professor Sadler.

A further benefit is that once the potent form of JS07 has interacted with a cell's energy generation mechanism the remaining non-potent JS07 molecules can then be reused in combination with a fresh supply of Sodium Formate.

"When the potent form of JS07 interacts with a cell's energy generation mechanism, the Sodium Formate is used up in the process, but the JS07 itself is still viable to be used again. When it comes into contact with fresh supply of Sodium Formate it can again become potent, making this an efficient potential treatment".

The research could also lead to substantial improvements in cancer survival rates.

Co-researcher Dr Romero-Canelon says:

"Current statistics indicate that one in every three people will develop some kind of cancer during their life time, moreover approximately one woman dies of ovarian cancer every two hours in the UK according to Cancer Research UK. It is clear that a new generation of drugs is necessary to save more lives and our research points to a highly effective way of defeating cancerous cells"

The research, Transfer hydrogenation catalysis in cells as a new approach to anticancer drug design, is published by Nature Communications.

Notes for Editors:

This research was supported by the ERC (grant no. 247450), EPSRC (grant no. EP/F034210/1), University of Warwick IAS (fellowship for JJSB) and Science City (ERDF/AWM).

Sodium Formate, E-237, is an approved food additive - http://www.food-info.net/uk/e/e237.htm

http://www.eurekalert.org/pub_releases/2015-03/su-np032015.php

Power naps produce a significant improvement in memory performance

A short nap lasting about an hour can significantly improve memory performance.

Generations of school students have gone to bed the night before a maths exam or a vocabulary test with their algebra book or vocabulary notes tucked under their pillow in the hope that the knowledge would somehow be magically transferred into their brains while they slept. That they were not completely taken in by a superstitious belief has now been demonstrated by a team of neuropsychologists at Saarland University, who have shown that even a brief sleep can significantly improve retention of learned material in memory.

Sara Studte, a graduate biologist specializing in neuropsychology, working with her PhD supervisor Axel Mecklinger and co-researcher Emma Bridger, is examining how power naps influence memory performance. The results are clear: 'Even a short sleep lasting 45 to 60 minutes produces a five-fold improvement in information retrieval from memory,' explains Axel Mecklinger.

Strictly speaking, memory performance did not improve in the nap group relative to the levels measured immediately after the learning phase, but they did remain constant. 'The control group, whose members watched DVDs while the other group slept, performed significantly worse than the nap group when it came to remembering the word pairs. The memory performance of the participants who had a power nap was just as good as it was before sleeping, that is, immediately after completing the learning phase, says Professor Mecklinger.

The researchers were particularly focused on the role of the hippocampus - a region of the brain in which memories are 'consolidated' - the process by which previously learned information is transferred into long-term memory storage. 'We examined a particular type of brain activity, known as "sleep spindles", that plays an important role in memory consolidation during sleep,' explains Sara Studte. A sleep spindle is a short burst of rapid oscillations in the electroencephalogram (EEG). 'We suspect that certain types of memory content, particularly information that was previously tagged, is preferentially consolidated during this type of brain activity,' says Mecklinger. Newly learned information is effectively given a label, making it easier to recall that information at some later time. In short, a person's memory of something is stronger, the greater the number of sleep spindles appearing in the EEG.

In order to exclude the possibility that the participants only recall the learned items due to a feeling of familiarity, the researchers used the following trick: the test subjects were required to learn not only 90 single words, but also 120 word pairs, where the word pairs were essentially meaningless. Axel Mecklinger explains the method: 'A word pair might, for example, be "milk-taxi". Familiarity is of no use here when participants try to remember this word pair, because they have never heard this particular word combination before and it is essentially without meaning. They therefore need to access the specific memory of the corresponding episode in the hippocampus.'

The research teams draws a clear conclusion from its study: 'A short nap at the office or in school is enough to significantly improve learning success. Wherever people are in a learning environment, we should think seriously about the positive effects of sleep,' says Axel Mecklinger. Enhancing information recall through sleeping doesn't require us to stuff bulky tomes under our pillow. A concentrated period of learning followed by a short relaxing sleep is all that's needed.

The research work (DOI: 10.1016/j.nlm.2015.02.012) was carried out as part of the International Research Training Group '1457 "Adaptive Minds: Neural and Environmental Constraints on Learning and Memory" (Saarbrücken, Beijing)'.

The results have been published in 'Neurobiology of Learning and Memory'. The publication can be accessed via: http://www.sciencedirect.com/science/article/pii/S1074742715000362

http://nyti.ms/1HpJeSa

Biogen Reports Its Alzheimer's Drug Sharply Slowed Cognitive Decline

Experimental drug for Alzheimer's disease sharply slowed the decline in mental function in a small clinical trial

By ANDREW POLLACK MARCH 20, 2015

An experimental drug for Alzheimer's disease sharply slowed the decline in mental function in a small clinical trial, researchers reported Friday, reviving hopes for an approach to therapy that until now has experienced repeated failures.

The drug, being developed by Biogen Idec, could achieve sales of billions of dollars a year if the results from the small trial are replicated in larger trials that Biogen said it hoped to begin this year. Experts say that there are no really good drugs now to treat Alzheimer's.

Biogen's stock has risen about 50 percent since early December, when the company first announced that the drug had slowed cognitive decline in the trial, without saying by how much. Analysts and investors had been eagerly awaiting the detailed results, some of them flying to France to hear Biogen researchers present them at a neurology meeting on Friday.

The drug, called aducanumab, met and in some cases greatly exceeded Wall Street expectations in terms of how much the highest dose slowed cognitive decline. However, there was a high incidence of a particular side effect that might make it

difficult to use the highest dose. Still, the net impression was positive. "Out-of-the-ballpark efficacy, acceptable safety," Ravi Mehrotra, an analyst at Credit Suisse, wrote on Friday. Shares of Biogen rose $42.33, or 10 percent, to $475.98.

Alzheimer's specialists were impressed, but they cautioned that it was difficult to read much from a small early-stage, or Phase 1, trial that was designed to look at safety, not the effect on cognition. Also, other Alzheimer's drugs that had looked promising in early studies ended up not working in larger trials.

"It's certainly encouraging," said Dr. Samuel Gandy, director of the Center for Cognitive Health at Mount Sinai Hospital in New York, who was not involved in the study. He said the effect of the highest dose was "pretty impressive."

Aducanumab, which until now has been called BIIB037, is designed to get rid of amyloid plaque in the brain, which is widely believed to be a cause of the dementia in Alzheimer's disease. However, other drugs designed to prevent or eliminate plaque have failed in large clinical trials, raising questions about what role the plaque really plays.

Johnson & Johnson and Pfizer abandoned a drug they were jointly developing after it showed virtually no effect in large trials. Eli Lilly and Roche are continuing to test their respective drugs despite initial failures. Experts say there is some suggestion the drugs might work if used early enough, when the disease is still mild.

Biogen tried to increase its chances of success by treating patients with either mild disease or so-called prodromal disease, an even earlier stage. It also enrolled only patients shown to have plaque in their brains using a new imaging technique. In some trials of other drugs, some of the patients turned out not to have plaque, which could have been a reason the trials were not successful.

The results reported Friday were for 166 patients, who were randomly assigned to get one of several doses of the drug or a placebo. The drug not only slowed cognitive decline but also substantially reduced plaque in the brain, and higher doses were better than lower doses. Those are signs that the effects seen were from the drug.

"It would be kind of hard to get those kind of results by chance," said Dr. Rachelle S. Doody, director of the Alzheimer's Disease and Memory Disorders Center at Baylor College of Medicine, who was not involved in the study but has been a consultant to Biogen and many other companies.

On one measure of cognition, a 30-point scale called the mini-mental state exam or M.M.S.E., those receiving the placebo worsened by an average of 3.14 points over the course of a year. The decline at one year was only 0.58 points for those getting the highest dose and 0.75 points for a middle dose. The difference with a placebo was statistically significant for both doses.

On another measure of both cognition and the ability to function in daily tasks, patients in the placebo group worsened by an average of 2.04 points at one year. Those getting the highest dose of the drug had a decline of only 0.59, a statistically significant difference.

Some analysts said they would have been impressed if the drug had slowed the rate of cognitive decline by 20 or 30 percent. But the actual reduction for the high dose was above 70 percent. They said the drug's effect was stronger than that of Lilly's drug. A major side effect was a localized swelling in the brain, known as A.R.I.A.-E. This has been seen with other drugs in this class, though the rate for aducanumab seems higher.

Among patients with a genetic variant that raises the risk of getting Alzheimer's, 55 percent of those who got the highest dose suffered this side effect, and about 35 percent of the high-dose patients dropped out of the trial because of this. Among those without the genetic variant, 17 percent of those who got the highest dose suffered the side effect and 8 percent discontinued treatment.

Biogen said the swelling often did not cause symptoms and probably could be managed by watching for it and reducing doses. Dr. Doody and Dr. Gandy agreed. But Dr. Thomas M. Wisniewski, a professor of neurology at NYU Langone Medical Center, disagreed. "Most clinicians would find that unacceptable," he said in a conference call hosted by the Wall Street firm Evercore ISI. He said the side effect was "something you definitely don't want happening in your patients."

Over all, however, Dr. Wisniewski was enthusiastic, saying the drug looked to be "way better" than Lilly's.

A lesser dose might suffice. There were no discontinuations from this side effect among patients taking a middle dose. And that middle dose also seemed somewhat effective in slowing cognitive decline. The results were presented in Nice, France, at the International Conference on Alzheimer's and Parkinson's Diseases and Related Neurological Disorders.

http://bit.ly/1HnnDX6

Every Year Spring Gets 30 Seconds Shorter

But the good news is that summer will be that much longer thanks to some peculiarities in how the Earth moves

By Marissa Fessenden smithsonian.com

Today, spring has sprung: At 6:45 pm EDT, the Earth's titled axis will point neither away from the Sun nor toward, marking the vernal equinox and the official start of spring for the Northern Hemisphere. This year we have exactly 92.76 days of spring to enjoy before summer arrives, reports Laura Geggel for Livescience.com. And good news for the lovers of summer - it comes about 30 seconds earlier than it did last year.

That extra half-a-minute we get for summer sun (or thunderstorms) means we have that much less time to enjoy spring's blooms. Spring has been getting shorter every year for thousands of years, thanks to a wobble in the Earth's axis. The wobble, called precession, means that Earth arrives the point in its orbit where the Northern Hemisphere is tilted toward the Sun the most - the summer solstice - a bit earlier every year.

At the same time, the Earth is orbiting around the Sun in an ellipse. This slightly squashed circle shape means that our planet moves faster when it's closer to the Sun and slower when we are farther. That speed change makes winter go quickly and summer go slower. (Sorry, residents of the Southern Hemisphere - for you that means that winter is slower and summer is faster.) That's why summer steals its seconds from spring. Also, fall is getting longer as winter gets shorter.

The interaction between the Earth's wobble and its varying orbital speed means that spring won't get shorter forever. Geggel spoke to amateur astronomer Larry Gerstman to help explain:

Over thousands of years, the shift in the time of the vernal equinox becomes more apparent. For instance, spring will be shortest in about the year 8680, measuring about 88.5 days, or about four days shorter than this year's spring, Gerstman said. (After that point, spring will lengthen again.)

Don't worry much about the change, unless you are an astronomer. The average person living day-to-day won't notice that spring is getting shorter. They are far more likely to notice earlier blooms and warmer days sooner in the season thanks to climate change.

http://nyti.ms/1HnoJ5d

W.H.O. Report Links Ingredient in Roundup to Cancer

The world's most widely-used weed killer can "probably" cause cancer, the World Health Organization said on Friday.

The organization's cancer arm, the International Agency for Research on Cancer, said glyphosate, the active ingredient in the Monsanto herbicide Roundup, was "classified as probably carcinogenic to humans." It also said there was "limited evidence" that glyphosate was carcinogenic in humans for non-Hodgkin lymphoma.

Monsanto, the world's largest seed company, said scientific data did not support the conclusions and called on the group to hold a meeting to explain the findings. "We don't know how IARC could reach a conclusion that is such a dramatic departure from the conclusion reached by all regulatory agencies around the globe," Philip Miller, Monsanto's vice-president for global regulatory affairs, said in a statement.

The U.S. government says glyphosate is considered safe. It is mainly used on crops like corn and soybeans that are genetically modified to survive it.

Glyphosate has been detected in food, water and in the air after it has been sprayed, according to the report. But its use is generally low in and near homes where people would face the greatest risk of exposure.

The evidence for the W.H.O.'s conclusion was from studies of exposure, mostly agricultural, in the United States, Canada, and Sweden that were published since 2001.

http://nyti.ms/1LMDvsM

Liberia Reports First Ebola Case in Weeks

A patient in Liberia has tested positive for the Ebola virus, health officials said Friday, more than two weeks after the last known case in the country had been discharged from the hospital.

By SHERI FINK and RICK GLADSTONE MARCH 20, 2015

The news deflated optimism that Liberia, one of the three West African countries hit by the Ebola epidemic that has killed more than 10,000 people since it began a year ago, would soon be officially declared free of the virus.

The patient, a 44-year-old woman from the Caldwell area near Monrovia, the capital, first developed symptoms around March 15, said Dr. Moses Massaquoi, leader of the Clinton Health Access Initiative in Liberia and national case manager of the Ebola response.

Health officials said it was unclear how the woman, a food seller, had been infected. She had not been on a monitoring list for possible exposure and she said she had not traveled outside Liberia. The Information Ministry issued a statement saying "initial suspicion is that it may be the result of possible sexual intercourse with an Ebola survivor."

While that is only speculative, researchers have found evidence that Ebola may persist in semen for up to three months after recovery, and abstinence is recommended.

In part for this reason, the World Health Organization intends to release new guidelines for when an Ebola epidemic ends, a W.H.O. official said.

To be declared Ebola-free, countries must wait 42 days from when the last patient tests negative for a second time. The new guidelines would recommend "heightened surveillance" for an additional 90 days, to take into account the potential for sexual transmission and hidden transmission chains.

Two Liberian triage nurses employed by the International Rescue Committee, an American relief agency, recognized the patient's symptoms when she arrived at Monrovia's Redemption Hospital on Thursday, Liz Hamann, the agency's project leader, said from Monrovia.

Acting on a well-rehearsed protocol, the nurses summoned a team from an adjacent Ebola isolation center run by Doctors Without Borders, who arrived in protective gear and took the patient for testing. The initial results came back positive on Friday. “We were all a little blindsided,” Ms. Hamann said.

Dr. David Nabarro, the United Nations secretary general’s special envoy on Ebola, was informed of the new case while traveling in Italy. He expressed disappointment but not surprise. “We will have unfortunately some periods in which our hopes are dashed at this stage in the outbreak,” he said in a telephone interview. “That’s just the way it is. That’s why we’re going to have to keep going without any kind of letup until the very end.”

New cases have declined sharply since last fall, when hundreds were becoming infected every week in Liberia, Guinea and Sierra Leone. Liberia has made the most progress. On March 5, what was thought to have been Liberia’s last patient was discharged, a celebratory moment.“We knew something like this could possibly happen, so we have all the necessary setup in place to address it,” Dr. Massaquoi said. Still, he said, “today has not been a good day for us.”

Liberia’s comeback has been considered a model of community organizing, which raised public awareness of the risks of transmission through physical contact and unsafe burials. Dr. Bruce Aylward, the World Health Organization’s top Ebola official, described the nurses who first suspected the new Liberia case as heroes. “They may have protected the whole country by finding the needle in the haystack,” he said in a phone interview. “It was because they were searching that haystack for the needle.”

http://www.eurekalert.org/pub_releases/2015-03/acs-smm022015.php

Special microbes make anti-obesity molecule in the gut

Microbes may just be the next diet craze.

DENVER - Researchers have programmed bacteria to generate a molecule that, through normal metabolism, becomes a hunger-suppressing lipid. Mice that drank water laced with the programmed bacteria ate less, had lower body fat and staved off diabetes -- even when fed a high-fat diet -- offering a potential weight-loss strategy for humans.

The team will describe their approach in one of nearly 11,000 presentations at the 249th National Meeting & Exposition of the American Chemical Society (ACS), the world's largest scientific society, taking place here through Thursday.

Obesity strongly increases the risk for developing several diseases and conditions, such as heart disease, stroke, type 2 diabetes and some types of cancer. One in three Americans is obese, and efforts to stem the epidemic have largely failed. Lifestyle changes and medication typically achieve only modest weight loss, and most people regain the weight. In recent years, numerous studies have shown that the population of microbes living in the gut may be a key factor in determining the risk for obesity and related diseases, suggesting that strategically altering the gut microbiome may impact human health.

One advantage to microbial medicine would be that it's low maintenance, says Sean Davies, Ph.D. His goal is to produce therapeutic bacteria that live in the gut for six months or a year, providing sustained drug delivery. This is in contrast to weight-loss drugs that typically need to be taken at least daily, and people tend not to take their medications as directed over time. "So we need strategies that deliver the drug without requiring the patient to remember to take their pills every few hours," Davies says.

For a therapeutic molecule, Davies and colleagues at Vanderbilt University selected N-acyl-phosphatidylethanolamines (NAPEs), which are produced in the small intestine after a meal and are quickly converted into N-acyl-ethanolamines (NAEs), potent appetite-suppressing lipids. The researchers altered the genes of a strain of probiotic bacteria so it would make NAPEs. Then they added the bacteria to the drinking water of a strain of mice that, fed a high-fat diet, develop obesity, signs of diabetes and fatty livers.

Compared to mice who received plain water or water containing control, non-programmed bacteria, the mice drinking the NAPE-making bacteria gained 15 percent less weight over the eight weeks of treatment. In addition, their livers and glucose metabolism were better than in the control mice. The mice that received the therapeutic bacteria remained lighter and leaner than control mice for up to 12 weeks after treatment ended.

In further experiments, Davies' team found that mice that lacked the enzyme to make NAEs from NAPEs were not helped by the NAPE-making bacteria; but this could be overcome by giving the mice NAE-making bacteria instead. "This suggests that it might be best to use NAE-making bacteria in eventual clinical trials," says Davies, especially if the researchers find that some people don't make very much of the enzyme that converts NAPEs to NAEs. "We think that this would work very well in humans."

The main obstacle to starting human trials is the potential risk that a treated person could transmit these special bacteria to another by fecal exposure. "We don't want individuals to be unintentionally treated without their knowledge," says Davies. "Especially because you could imagine that there might be some individuals, say the very young or old or those with specific diseases, who could be harmed by being exposed to an appetite-suppressing bacteria. So, we are working on genetically modifying the bacteria to significantly reduce its ability to be transmitted."

Davies acknowledges funding from the National Institutes of Health.

http://www.eurekalert.org/pub_releases/2015-03/acs-oat021915.php

Opossum-based antidote to poisonous snake bites could save thousands of lives

Scientists will report in a presentation today that they have turned to the opossum to develop a promising new and inexpensive antidote for poisonous snake bites.

DENVER - They predict it could save thousands of lives worldwide without the side effects of current treatments. The presentation will take place here at the 249th National Meeting & Exposition of the American Chemical Society (ACS), the world's largest scientific society. The meeting features nearly 11,000 reports on new advances in science and other topics. It is being held through Thursday.

Worldwide, an estimated 421,000 cases of poisonous snake bites and 20,000 deaths from these bites occur yearly, according to the International Society on Toxicology.

Intriguingly, opossums shrug off snake bite venom with no ill effects. Claire F. Komives, Ph.D., who is at San Jose State University, explains that initial studies showing the opossum's immunity to snake venom were done in the 1940s. In the early 1990s, a group of researchers identified a serum protein from the opossum that was able to neutralize snake venoms. One researcher, B. V. Lipps, Ph.D., found that a smaller chain of amino acids from the opossum protein, called a peptide, was also able to neutralize the venom.

But Komives says it appears that no one has followed up on those studies to develop an antivenom therapy -- at least not until she and her team came along. Armed with this information, they had the peptide chemically synthesized. When they tested it in venom-exposed mice, they found that it protected them from the poisonous effects of bites from U.S. Western Diamondback rattlesnakes and Russell's Viper venom from Pakistan.

The exact mechanism is not known, but recently published computer models have shown that the peptide interacts with proteins in the snake venom that are toxic to humans, she says. "It appears that the venom protein may bind to the peptide, rendering it no longer toxic."

Komives' team showed that they could program the bacteria E. coli to make the peptide. Producing the peptide in bacteria should enable the group to inexpensively make large quantities of it. The peptide should also be easy to purify from E. coli.

"Our approach is different because most antivenoms are made by injecting the venom into a horse and then processing the serum," says Komives. "The serum has additional components, however, so the patient often has some kind of adverse reaction, such as a rash, itching, wheezing, rapid heart rate, fever or body aches. The peptide we are using does not have those negative effects on mice."

Because the process is inexpensive, the antivenom has a good chance of being distributed to underserved areas across the globe, according to Komives. That includes India, Southeast Asia, Africa and South America, where poisonous snakes bite thousands of people every year. Komives says that based on the original publications, the antivenom would probably work against venoms from other poisonous snakes, as well as against scorpion, plant and bacterial toxins.

The new antivenom has another potential advantage: It likely could be delivered in just one injectable dose. "Since when a snake bites, it injects venom into the victim in different ways, depending on which part of the body is bitten and the angle of the bite, it is likely that each snake bite would need to be treated differently," says Komives. "It is common that additional antivenom needs to be injected if the patient continues to show the effects of the venom." But because the new antidote appears to have no side effects, at least in mice, it probably could be given in one large dose to attack all of the venom, making additional injections unnecessary, she explains. The team plans to test this theory soon. They also will make large quantities of the antivenom and test it on mice, using a wide variety of venoms and toxins.

Peptide that neutralizes rattlesnake venom in mice can be expressed in E. coli

Komives acknowledges funding from a Fulbright-Nehru fellowship and private sources.

http://www.eurekalert.org/pub_releases/2015-03/tl-tli031915.php

The Lancet Infectious Diseases: Experts warn of potential upsurge in mosquito and tick-borne diseases as UK climate gets warmer

Warming could accelerate the emergence of vector-borne diseases such as chikungunya, dengue fever, and West Nile virus

Climate change could accelerate the emergence of vector-borne diseases such as chikungunya, dengue fever, and West Nile virus in the UK, warn leading public health experts Dr Jolyon Medlock and Professor Steve Leach from the Emergency Response Department at Public Health England, writing in The Lancet Infectious Diseases journal.

Findings from the Review indicate that vector-borne diseases, which are transmitted by insects such as mosquitoes and ticks, are on the rise and have spread into new territories across Europe over the past decade (eg, malaria in Greece, West Nile virus in eastern Europe, chikungunya in Italy and France).

The authors say disease-carrying mosquitoes could also become widespread across large parts of Britain within the next few decades as the climate becomes

increasingly mild. More rainfall and warmer temperatures could provide ideal conditions for the Asian tiger mosquito (Aedes albopictus), which spreads the viruses that cause dengue and chikungunya, to breed and expand into the UK, particularly southern England. Climate change models predict suitable temperatures for 1 month of chikungunya virus transmission in London by 2041, and up to 3 months in southeast England by 2071 (see table, page 2).

Previously dengue transmission was largely confined to tropical and subtropical regions because freezing temperatures kill the mosquito's larvae and eggs, but rising temperatures could enable A albopictus to survive across large parts of England and Wales within decades. Climate change models indicate that just a 2°C rise in temperature could extend the mosquito's activity season by 1 month and geographical spread by up to 30% by 2030 (see table, page 2).

"Given the ongoing spread of invasive mosquitoes across Europe, with accompanying outbreaks of dengue and chikungunya virus, Public Health England has been conducting surveillance at seaports, airports, and some motorway service stations. Although no non-native invasive mosquitoes have been detected in the UK so far, a better system to monitor imported used tyres, in which disease-carrying mosquitoes lay their eggs, needs planning,"* says Dr Medlock.

The UK climate is already suitable for the transmission of West Nile virus which can be spread by several mosquitoes already found in the UK. However, a low number of mosquitoes and the limited spread of human-biting Culex spp have prevented any human cases so far. In the future, rising temperatures could make conditions more favourable for mosquitoes, say the authors. Moreover, the recent discovery of the Culex modestus mosquito species--considered to be the main carrier of the West Nile virus in Europe--at a number of sites across Kent could provide a suitable vector for transmission of the virus between infected birds and humans.

According to Professor Leach, "We are not suggesting that climate change is the only or the main factor driving the increase in vector-borne diseases in the UK and Europe, but that it is one of many factors including socioeconomic development, urbanisation, widespread land-use change, migration, and globalisation that should be considered. Lessons from the outbreaks of West Nile virus in North America and chikungunya in the Caribbean emphasise the need to assess future vector-borne disease risks and prepare contingencies for future outbreaks."*

The Review is published to coincide with the Impact of Environmental Changes on Infectious Diseases meeting in Sitges, Spain 23-25 March http://www.iecid2015.com/

http://bbc.in/1MZF3N2

Ebola: Early calls for help 'ignored' says MSF

A "global coalition of inaction" contributed to world's deadliest Ebola outbreak, the medical charity Medecins Sans Frontieres says.

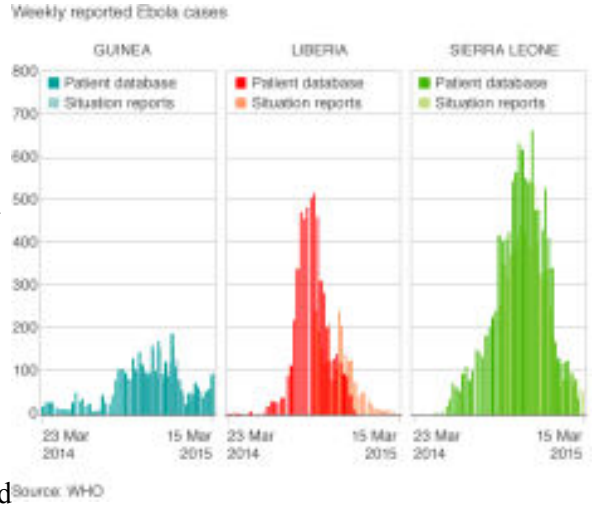
By Smitha Mundasad Health reporter, BBC News

Its report - a year after the outbreak was declared - suggests early calls for help were ignored by local governments and the World Health Organization.

The charity says "many institutions failed, with tragic and avoidable consequences." Ebola has killed more than 10,000 people in the last 12 months.

'Turned away'

Most deaths occurred in the worst-affected countries of Guinea, Liberia and Sierra Leone.



The first person to succumb to the disease during this outbreak is thought to have been a toddler in a remote part of Guinea. He died in December 2013. Three months later the WHO officially announced an outbreak. And it was a further five months before the organisation declared it a global health emergency. At this point more than 1,000 people had lost their lives.

Henry Gray, MSF emergency coordinator, told the BBC: "We were well aware this was something different in March and April last year and we did try to bring this to the attention of the WHO but also governments within the countries affected. "And of course it was frustrating that we weren't heard and that has probably led to the scale of the epidemic we see today." The charity says it should also have used more of its own resources earlier in the crisis.

The analysis, which includes dozens of interviews with MSF staff, says by the end of August treatment centres in Liberia where overwhelmed.

Healthcare workers were forced to turn away visibly ill patients "in full knowledge they would likely return to their communities and infect others".

In January 2015 at a rare emergency meeting, the WHO admitted it was too late to respond.

Dr Margaret Chan, director general, said: "The world, including WHO, was too slow to see what was unfolding before us."

Continued threat

There are now proposals to build-up a rapid response team to react more swiftly to future threats. Numbers are falling but MSF says the outbreak is not yet over.

Overall cases have not declined significantly since January, the charity warns.

Liberia recorded its first case in more than two weeks on Friday, dashing hopes the country would soon be declared virus-free.

In Guinea, cases are rising again after a dip at the beginning of the year.

Some patients in Sierra Leone are are not on lists of known Ebola contacts, suggesting chains of spread are going undetected.

Dr Derek Gatherer, at Lancaster University, said: "In retrospect, it is now apparent that the delay from December to March was crucial in the dissemination of the virus to several locations in eastern Guinea and then onto the capital, Conakry, which remains one of the few areas with active transmission."

But until zero cases are recorded in all three worst-affected countries for a period of at least six weeks, the outbreak will not be officially declared over.

http://www.bbc.com/news/world-africa-31985826

The hunters breaking an Ebola ban on bushmeat

Scientists believe bushmeat is the origin of the current Ebola outbreak. A year ago, Sierra Leone put a ban on bushmeat - but is it working?

By Mark Doyle BBC News, Kabala, Sierra Leone

The old man crouched in the undergrowth and started mewling. The sound was a cry of distress. But the old man was not in pain. He was imitating the sound of a baby antelope calling to its mother. Then the veteran hunter pointed a stick, posing as a rifle, in the direction he was sending his distress call.

He turned to me and said quietly: "My copy of a baby antelope voice will bring the mother antelope towards us".

Then he said, in a gentle voice: "When she comes near to me, I will kill her".

I was two hours drive outside the northern Sierra Leonean town of Kabala, in the ruggedly beautiful Wara Wara mountain range. I'd linked up with a group of traditional hunters who were demonstrating how the Ebola-inspired ban on bushmeat hunting in Sierra Leone isn't working. The ban came into force last year.

Scientists have warned that bushmeat - non-domesticated forest animals hunted for human consumption - is probably the natural reservoir of the Ebola virus.

Every now and then, the scientists say, the virus jumps from animals to humans. The jump is probably via human contact with fresh bushmeat blood.

"I do believe there's a scientific basis for believing the Ebola virus resides in bushmeat," said Bala Amarasakaran, a Sierra Leone-based expert on forest primates and conservation. "That's why the government introduced the ban on bushmeat trading, and I support it."

The Minister for Agriculture, Joseph Sam Sesay, confirmed to me that the ban was still in place and said it was broadly working. But in the Wara Wara mountain range, the bushmeat hunters I met were obviously active.

Sierra Leoneans can have a disarming tendency to be honest and dishonest at the same time. They appear to lie about some controversial topic. But they also smile knowingly at you as they talk. And then they find a way of telling you the truth anyway.

One of the hunters I met told me very clearly that he didn't seek out bushmeat any more because the government had banned the trade. But I teased out the truth by promising not to reveal his name, or the location we were in. So he then proceeded to show me freshly laid traps in the forest and several large joints of freshly killed antelope and wild "bush goat" meat.

Traditional hunters are an elite group in Sierra Leonean rural society.

True to the form of all hunting and fighting men, they are full of impressive stories. They boast of how large the buffalo they once killed was. They explain how they have supernatural powers; they can appear or disappear at will in the forest. In short, they say how tough and powerful they are.

These are not just tall tales. The traditional hunters of Sierra Leone are indeed highly skilled and resourceful men.

The group I was with showed me five different types of trap. Some were for taking chimpanzees (babu in the Sierra Leonean lingua franca Krio); some were for killing larger animals such as buffalo, deer or wild "bush cows". All the traps were complex arrangements of springing boughs of wood and a killer coil of wire that snared the animal by the foot or neck. One trap was an enticing doorway of bamboo designed to lure an unfortunate animal in.

A hunter crawled through the small doorway to demonstrate the process for me. He feigned garrotting himself with the waiting wire. The hunter then sprawled on the ground, screaming like an animal would do as it tried in vain to escape.

It was, I suppose, a grim display. But we all had to laugh out loud when the man-animal dramatically "died" and flopped into the undergrowth.

The hunters said they were showing me the traps as a "demonstration". But I realised this was all part of the playfully honest/dishonest Sierra Leonean show.

It was quite obvious to me that the forest path we had walked along to reach the traps was a well-trodden one. The hunters were clearly here regularly. There were freshly-cut tree stumps. And the men with me carefully re-set the "demonstration" traps as we left. They evidently saw no point in wasting a journey to the trap zone - even if it was with a visiting journalist.

The truth is that rural people in Sierra Leone rely on bushmeat for protein. It is also a delicacy. The culinary difference between bushmeat and farmed animals in Sierra Leone is like the difference in Europe between expensive, organic sirloin steak and tasteless frozen battery chicken.

My hunch - reading between the honest/dishonest lines - is that the hunters mounted their "demonstration" (that was in fact reality) because they were profoundly proud of their traditions and wanted to impress me. They succeeded. I admired the skill of these men.

I also admire conservationists like Mr Amarasakaran who are against the bushmeat trade.

But I doubt if traditional hunters are a major cause of Ebola spreading. The hunting group I was with only take an animal or two every day. The real cause of the spread of Ebola is a dysfunctional health care system and poor organisation by the government. I came away from the Wara Wara Mountains believing that the bushmeat trade would probably never be stamped out. And I was left wondering if the government of Sierra Leone is aiming at the correct targets.