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Your pain reliever may also be diminishing your joy

Acetaminophen reduces both pain and pleasure, study finds

COLUMBUS, Ohio -- Researchers studying the commonly used pain reliever acetaminophen found it has a previously unknown side effect: It blunts positive emotions. In the study, participants who took acetaminophen reported less strong emotions when they saw both very pleasant and very disturbing photos, when compared to those who took placebos.

Acetaminophen, the main ingredient in the over-the-counter pain reliever Tylenol, has been in use for more than 70 years in the United States, but this is the first time that this side effect has been documented.

Previous research had shown that acetaminophen works not only on physical pain, but also on psychological pain. This study takes those results one step further by showing that it also reduces how much users actually feel positive emotions, said Geoffrey Durso, lead author of the study and a doctoral student in social psychology at The Ohio State University.

"This means that using Tylenol or similar products might have broader consequences than previously thought," Durso said. "Rather than just being a pain reliever, acetaminophen can be seen as an all-purpose emotion reliever."

Durso conducted the study with Andrew Luttrell, another graduate student in psychology at Ohio State, and Baldwin Way, an assistant professor of psychology and the Ohio State Wexner Medical Center's Institute for Behavioral Medicine Research. Their results appear online in the journal Psychological Science.

Way said people in the study who took the pain reliever didn't appear to know they were reacting differently. "Most people probably aren't aware of how their emotions may be impacted when they take acetaminophen," he said.

Acetaminophen is the most common drug ingredient in the United States, found in more than 600 medicines, according to the Consumer Healthcare Products Association, a trade group. Each week about 23 percent of American adults (about 52 million people) use a medicine containing acetaminophen, the CHPA reports.

There were two studies of college students. The first involved 82 participants, half of whom took an acute dose of 1000 milligrams of acetaminophen and half who took an identical-looking placebo. They then waited 60 minutes for the drug to take effect.

Participants then viewed 40 photographs selected from a database (International Affective Picture System) used by researchers around the world to elicit emotional responses. The photographs ranged from the extremely unpleasant (crying, malnourished children) to the neutral (a cow in a field) to the very pleasant (young children playing with cats).

After viewing each photo, participants were asked to rate how positive or negative the photo was on a scale of -5 (extremely negative) to +5 (extremely positive). They then viewed the same photos again and were asked to rate how much the photo made them feel an emotional reaction, from 0 (little or no emotion) to 10 (extreme amount of emotion).

Results in both studies showed that participants who took acetaminophen rated all the photographs less extremely than did those who took the placebo. In other words, positive photos were not seen as positively under the influence of acetaminophen and negative photos were not seen as negatively. The same was true of their emotional reactions.

"People who took acetaminophen didn't feel the same highs or lows as did the people who took placebos," Way said. For example, people who took the placebo rated their level of emotion relatively high (average score of 6.76) when they saw the most emotionally jarring photos of the malnourished child or the children with kittens. People taking acetaminophen didn't feel as much in either direction, reporting an average level of emotion of 5.85 when they saw the extreme photos. Neutral photos were rated similarly by all participants, regardless of whether they took the drug or not.

These findings seem dramatic, but one possibility is that acetaminophen changes how people judge magnitude. In other words, acetaminophen may blunt individuals' broader judgments of everything, not just things having emotional content, Durso said.

So the researchers did a second study in which they had 85 people view the same photos and make the same judgments of evaluation and emotional reactions as in the prior study. Additionally, participants in this second study also reported how much blue they saw in each photo.

Once again, individuals who took acetaminophen (compared to placebo) had evaluations and emotional reactions to both negative and positive photographs that were significantly blunted. However, judgments of blue color content were similar regardless of whether the participants took acetaminophen or not.

The results suggest that acetaminophen affects our emotional evaluations and not our magnitude judgments in general. At this point, the researchers don't know if other pain relievers such as ibuprofen and aspirin have the same effect, although they plan on studying that question, Durso said.

Acetaminophen, unlike many other pain relievers, is not a nonsteroidal anti-inflammatory drug, or NSAID. That means it not thought to control inflammation in the body. Whether that fact has any relevance to possible emotional effects of the drugs is still an open question, Durso said.

These results may also have an impact on psychological theory, Way said. An important question in psychological research is whether the same biochemical factors control how we react to both positive and negative events in our lives. A common theory is that certain factors control how we react to the bad things that happen in life -- for example, how devastated people feel when they go through a divorce.

But this study offers support to a relatively new theory that says that common factors may influence how sensitive we are to both the bad as well as the good things in life. That means the person who is more devastated by a divorce may thrive more than others when they get a promotion at work or have some other extremely positive event happen.

In this study, acetaminophen may have tapped into the sensitivity that makes some people react differently to both positive and negative life events.

"There is accumulating evidence that some people are more sensitive to big life events of all kinds, rather than just vulnerable to bad events," Durso said.

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New evidence for how green tea and apples could protect health

Scientists from the Institute of Food Research have found evidence for a mechanism by which certain food compounds could help protect our health.

Dietary studies have shown that people who eat the largest amounts of fruit and vegetables have a reduced risk of developing chronic conditions, such as heart disease and cancer.

There could be several reasons for this. Some fruit and vegetables naturally contain high amounts of compounds called polyphenols, which could provide protective health benefits.

In this study, Dr Paul Kroon and his team at IFR have shown that polyphenols in green tea and apples block a signalling molecule called VEGF, which in the body can trigger atherosclerosis and is a target for some anti-cancer drugs.

In the body, VEGF is a main driver of blood vessel formation in these cell types via a process called angiogenesis.

Angiogenesis is crucial in cancer progression, as well as in the development of atherosclerotic plaques and plaque rupture which can cause heart attacks and stroke.

Using cells derived from human blood vessels, the researchers found that low concentrations of the polyphenols epigallocatechin gallate (EGCG) from green tea and procyanidin from apples stopped a crucial signalling function of VEGF.

Inhibition of VEGF signalling by dietary polyphenols has previously been implicated in other studies, but this study provides the first evidence that polyphenols can directly interact with VEGF to block its signals, at the levels you would see in the blood stream after eating polyphenol rich foods.

"If this effect happens in the body as well, it provides very strong evidence for a mechanism that links dietary polyphenols and beneficial health effects," said Dr Paul Kroon, Research Leader at IFR.

The polyphenols also activated another enzyme signalling system that generates nitric oxide in the blood, which helps widen the blood vessels and prevent damage. This was unexpected, as VEGF itself stimulates nitric oxide, and anti-cancer drugs that block VEGF also reduce nitric oxide, leading to an increased risk of hypertension in some users.

Reference: Potent inhibition of VEGFR-2 activation by tight binding of green tea epigallocatechin gallate and apple procyanidins to VEGF: Relevance to angiogenesis, Christina W. A. Moyle et al, Molecular Nutrition and Food Research, 59(3) 401-412 doi: 10.1002/mnfr.201400478

http://www.eurekalert.org/pub_releases/2015-04/ucl-his041315.php

Human immune system can control re-awakened HIV, suggesting cure is possible

May be possible to possible to cure HIV with a 'kick and kill' strategy

The human immune system can handle large bursts of HIV activity and so it should be possible to cure HIV with a 'kick and kill' strategy, finds new research led by UCL, the University of Oxford and the University of North Carolina at Chapel Hill.

The 'kick and kill' strategy aims to cure HIV by stimulating the immune system with a vaccine, then re-awakening dormant HIV hiding in white blood cells with a chemical 'kick' so that the boosted immune system can identify and kill them.

While this approach is promising in theory, it was previously unclear whether the human immune system would be able to control HIV following full-blown reactivation of the virus. The new research, published in Clinical Infectious Diseases, demonstrates that this is possible using a single patient case study.

"Our study shows that the immune system can be as powerful as the most potent combination drug cocktails," explains study co-author Dr Ravi Gupta (UCL Infection & Immunity). ". We're still a long way from being able to cure HIV patients, as we still need to develop and test effective vaccines, but this study takes us one step closer by showing us what type of immune responses an effective vaccine should induce."

The study looked at a single 59 year old man in London who was an 'elite controller', meaning that his immune system could control HIV for a long time without needing treatment. Elite controllers, who make up 0.3% of HIV patients, eventually require treatment to prevent progression to AIDS but they can go a lot

longer without treatment because their immune systems are more active against HIV.

The patient in the study had both HIV and myeloma, a cancer of the bone marrow. The bone marrow produces white blood cells, including those that help to control HIV. To treat the patient's myeloma, his bone marrow was completely removed and replaced using his own stem cells. When the bone marrow was removed, the immune system was severely impaired, allowing the HIV to re-activate and replicate. This caused the level of virus in his bloodstream to rise from fewer than 50 copies per millilitre to approximately 28,000 copies per ml before immune function returned.

When the patient's immune function returned about two weeks after the transplant, the levels of HIV in his bloodstream rapidly fell. His immune system reduced HIV levels at a similar rate to the most powerful treatments available, bringing them back down to 50 copies per ml within six weeks.

"By measuring the strength of the immune system required to keep this virus under control in this rare individual, we have a better idea of the requirements for successful future treatment," says co-author Professor Deenan Pillay (UCL Infection & Immunity, and now also Director of the Africa Centre for Health and Population Studies, in South Africa). "We also managed to identify the specific immune cells that fought the infection. This is a single patient study, but nevertheless it is often the unusual patients who help us to understand the HIV disease process."

The patient was not given anti-HIV medication in this study due to concerns about side-effects affecting the myeloma treatment and low initial levels of HIV in his bloodstream. It is possible that an equally strong immune response in combination with powerful drugs could have cured the HIV completely, however this is far from certain.

"We need to be cautious in interpreting observations from a single subject," says Dr Nilu Goonetilleke, who began working on the study at the University of Oxford and is now at the University of North Carolina at Chapel Hill. "However, demonstration even from a single subject, that our immune system can rapidly control HIV-1 tells us a lot about the types of immune responses we should target and augment through vaccination."

Dr Gupta adds: "Drugs to stimulate reactivation of dormant HIV are still imperfect, and we do not know if they would be able to flush out all of the HIV from the body. Likewise, it remains to be seen whether a vaccine could enable a normal HIV patient's immune system to kill HIV with the full strength of an elite controller. Our study is a proof of principle and the results are promising, but it is unlikely to lead to a cure for at least a decade."

http://www.eurekalert.org/pub_releases/2015-04/thuo-scv041315.php

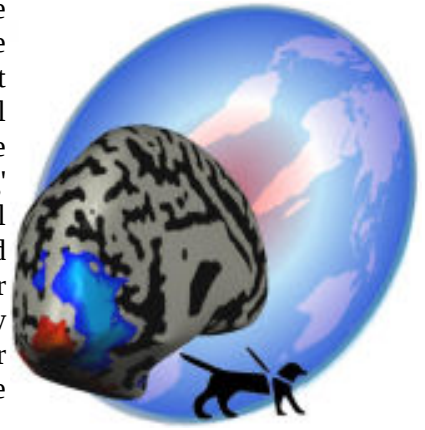
Study challenges view that sight-based brain sensory network organization is impaired with blindness

Is visual input essential to how the topographical map of the visual cortex develops in the human brain?

In new research published today, scientists at the Hebrew University of Jerusalem and in Germany and the USA show that the way in which the brain organizes its visual sense remains intact even in people who are blind from birth, and that at least the pattern of functional connectivity between the visual area and the topographical representation of space (up/down, left/right, etc.) can develop on its own without any actual visual experience.

The findings, reported in the prestigious peer-reviewed neuroscience journal Brain, dispel the nearly half-century belief that the visual cortex - the area of the brain concerned with the sense of sight - completely fails to develop properly in people who are blind at birth, suggesting it might not be completely correct.

"Though the 'blind brain' wiring may change greatly in the blind in its frontal language related parts, it still retains the most fundamental topographical and functional connectivity organizational principles of the visual cortex, known as 'retinotopic mapping' - the processing of two-dimensional visual images through the eye," said co-lead researcher Amir Amedi, associate professor of medical neurobiology at the Hebrew University's Edmond and Lily Safra Center for Brain Sciences and IMRIC, the Institute for Medical Research Israel-Canada.



This functional magnetic resonance imaging map shows a center periphery connectivity mass in the primary visual cortex (V1) of the congenitally blind brain. **Ella Striem-Amit and Amir Amedi**

Operating within the Hebrew University's Faculty of Medicine, IMRIC coordinates research within the departmental areas of medical neurobiology, molecular genetics and biology, immunology and cancer research.

The researchers found that the same "mapping" divisions-of-labor present in the normally sighted brain are also present in the brains of people born blind as reflected from their resting state connectivity patterns. This fundamental organization of the visual cortex was even found in people whose eyes did not develop normally, suggesting normal eye development may not be necessary for

the establishment of large-scale functional connectivity network mapping in the most fundamental visual areas like V1, the primary visual cortex.

Contrary to conventional wisdom, the latest findings reported by Prof. Amir Amedi, Dr. Ella Striem-Amit and Smadar Ovadia-Caro suggest that some key features and properties of visual cortex organization do not require visual experience to progress. The study further adds that the brain's visual cortex does not lose all of its properties even when completely deprived of vision.

"Some of the brain's connectivity maps is hardwired, possibly dependent on genetically-driven processes that do not need any external sensory information for their activation, while other process might indeed need visual input to specialize," Amedi said. The visual brain resting-state connectivity networks separated to up vs. down, right vs. left, front vs. back are also present in the brain of those born blind, according the study. Videos and images for the media are available at http://www.brainvisionrehab.com/#!videosformedia/c1yju.

Previous research by neurophysiologists David Hubel and Torsten Wiesel, which earned them a Nobel Prize in 1981, suggested that sight restoration could not be attempted on people blind from birth. Therefore, they surmised, the blinded cortex could not enable the blind-from-birth to have sight.

According to Hebrew University's Amedi, this latest research, combined with other research conducted in the Amedi Lab for Multisensory Research, "means that it may be possible to successfully teach blind people to 'see with sounds and touch.'" Using tools of sensory substitution, it may be possible to aid people born blind (or late blind) in a variety of new ways in the future, including restoring high-order functional pattern recognition for objects, localization, shape and even numbers and text, as previously reported in the prestigious journal Nature Communications (Abboud et al., Nature Comm., 2015). Any blind person can download and train themselves on using such technologies for free via the following link: http://www.amedilab.com.

The research paper, "Functional connectivity of visual cortex in the blind follows retinotopic organization principles," appears in the peer-reviewed journal Brain (DOI: http://dx.doi.org/10.1093/brain/aww083; first published online 13 April 2015).

Research co-authors include Dr. Daniel Margulies (Humboldt University and Max Planck Institute for Human Cognitive and Brain Sciences, Germany); and Profs. Alfonso Caramazza (Harvard University and Università degli Studi di Trento, Polo di Rovereto, Italy) and Arno Villringer (Humboldt University and Max Planck Institute for Human Cognitive and Brain Sciences, Germany); Dr. Ella Striem-Amit, who recently earned her Ph.D. from Hebrew University and who is now pursuing a post-doctoral fellowship from Harvard University's Department of Psychology; and Smadar Ovadia-Caro, at the Mind and Brain Institute at Humboldt University.

The research or researchers were supported by a European Research Council grant and The James S. McDonnell Foundation scholar award (to Amir Amedi), The Edmond and Lily Safra Center for Brain Sciences (ELSC) Vision Center grant, and the German Excellence Initiative Grant to the Berlin School of Mind and Brain.

http://www.bbc.com/news/science-environment-32287609

Evidence of liquid water found on Mars

Nasa's Curiosity rover has found that water can exist as a liquid near the Martian surface.

By Paul Rincon Science editor, BBC News website

Mars should be too cold to support liquid water at the surface, but salts in the soil lower its freezing point - allowing briny films to form.

The results lend credence to a theory that dark streaks seen on features such as crater walls could be formed by flowing water.

The results are published in the journal Nature Geoscience.

Scientists think thin films of water form when salts in the soil, called perchlorates, absorb water vapour from the atmosphere.

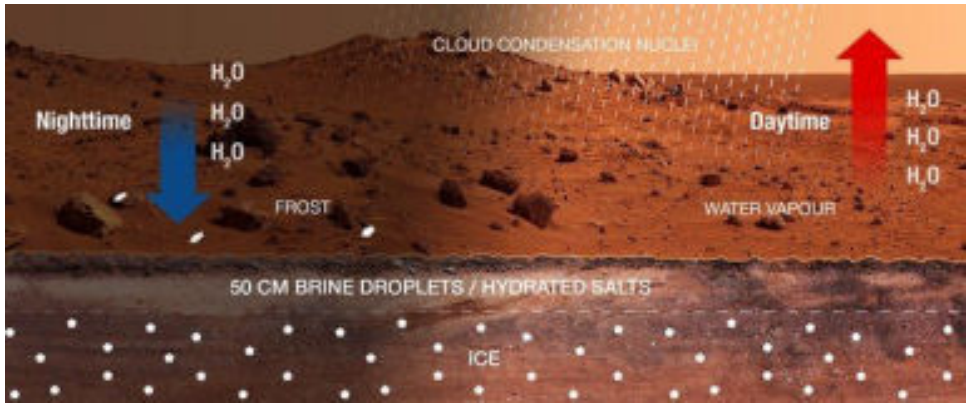
The temperature of these liquid films is about -70C - too cold to support any of the microbial life forms that we know about.

Forming in the top 15cm of the Martian soil, the brines would also be exposed to high levels of cosmic radiation - another challenge to life.

But it's still possible that organisms could exist somewhere beneath the surface on Mars, where conditions are more favourable.

Evaporation cycle

The researchers drew together different lines of evidence collected over a Martian year, and from different instruments carried by the Curiosity rover.



Scientists see a daily water cycle maintained by the brines

The Rover Environmental Monitoring System (REMS) - essentially the vehicle's weather station - measured the relative humidity and temperature at the rover's landing site of Gale Crater.

Scientists were also able to estimate the subsurface water content using data from an instrument called Dynamic Albedo of Neutrons (DAN). These data were consistent with water in the soil being bound to perchlorates.

Finally, the Sample Analysis at Mars (SAM) instrument gave the researchers the content of water vapour in the atmosphere.

The results show conditions were right for the brines to form during winter nights at the Martian equator, where Curiosity landed. But the liquid evaporates during the Martian day when temperatures rise.

Javier Martin-Torres, a co-investigator on the Curiosity mission and lead scientist on REMS, told BBC News the detection was indirect but convincing:

"What we see are the conditions for the formation of brines on the surface. It's similar to when people were discovering the first exoplanets.

"They were not seeing the planets, but they were able to see the gravitational effects on the star.

"These perchlorate salts have a property called deliquescence. They take the water vapour from the atmosphere and absorb it to produce the brines."

He added: "We see a daily water cycle - which is very important. This cycle is maintained by the brine. On Earth we have an exchange between the atmosphere and the ground through rain. But we don't have this on Mars."

While one might think that liquid water would form at warmer temperatures, the formation of brines is the result of an interaction between temperature and atmospheric pressure. It happens that the sweet spot for formation of these liquid films is at colder temperatures.

The fact that the scientists see evidence for these brines at the Martian equator - where conditions are least favourable - means that they might be more persistent at higher latitudes, in areas where the humidity is higher and temperatures are lower. In these regions they might even be present all year round.

Dark streaks on slopes seen by orbiting spacecraft have long been thought to be the product of running water seeping from the Martian soil.

But this interpretation has been contested.

"It's speculation at this point... but these observations at least support or go in this direction," said Dr Martin-Torres.

http://www.eurekalert.org/pub_releases/2015-04/tjnj-bmd040915.php

Bone mineral density improved in frail elderly women treated with zoledronic acid

Single intravenous dose of zoledronic acid improved bone mineral density in a group of frail elderly women

A single intravenous dose of the osteoporosis drug zoledronic acid improved bone mineral density in a group of frail elderly women living in nursing homes and long-term-care facilities, according to an article published online by JAMA Internal Medicine.

Nearly 2 million frail elderly Americans live in long-term care facilities and many of them have osteoporosis and bone fracture rates higher than less impaired elderly individuals. A hip fracture can be dire, decreasing mobility, independence and often leading to death, according to background in the study.

Susan L. Greenspan, M.D., of the University of Pittsburgh, and coauthors conducted a clinical trial to determine the efficacy and safety of zoledronic acid to treat osteoporosis in frail elderly women living in long-term care facilities. Zoledronic acid was chosen because it can be given in a single intravenous dose and the effect can last for two years.

The two-year study included 181 women 65 or older with osteoporosis, including women with cognitive impairment, immobility and multiple coexisting illnesses, who were living in nursing homes and assisted-living facilities. Of the women, 89 were assigned to receive a single 5-mg dose of zoledronic acid and 92 were assigned to receive placebo, while all participants received daily vitamin D and calcium supplementation.

The authors measured hip and spine bone mineral density (BMD) at 12 and 24 months, as well as adverse events, which included falls.

The average total hip BMD increased more in the treatment group than in the placebo group both at 12 months (2.8 percent vs. -0.5 percent) and at 24 months (2.6 percent vs. -1.5 percent), according to the results. The average spine BMD also increased more in the treatment group than placebo group at 12 months (3 percent vs. 1.1 percent) and at 24 months (4.5 percent vs. 0.7 percent).

Overall, in the measure of adverse events, there were no significant differences in the number of deaths, fractures or cardiac disorders. The treatment and placebo groups' fracture rates were 20 percent (18 women) and 16 percent (15 women), respectively, and mortality rates were 16 percent (14 women) and 13 percent (12 women), respectively. There were no significant differences between groups in the number of single fallers but more participants in the treatment group has

multiple falls (49 percent vs. 35 percent), although this difference did not remain significant after adjusting for baseline frailty, the results indicate.

"In summary, we found that a single infusion of zoledronic acid in frail, cognitively challenged, less mobile elderly women improved bone density and reduced bone turnover for two years. This suggests that even a very frail cohort may benefit. However, prior to changing practice, larger trials are needed to determine whether improvement in these surrogate measures will translate into fracture reduction for vulnerable elderly persons," the study concludes.

(JAMA Intern Med. Published online April 13, 2015. doi:10.1001/jamainternmed.2015.0747. Available pre-embargo to the media at http://media.jamanetwork.com.)

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Commentary: Osteoporosis Treatment and Fracture Outcomes

In a related commentary, Robert Lindsay, M.B., Ch.B., Ph.D., of Helen Hayes Hospital, West Haverstraw, N.Y., writes: "In this issue of JAMA Internal Medicine, Greenspan and colleague present intriguing data on zoledronic acid, one of the most potent drugs in the bisphosphonate family - if not the most potent - approved for treatment of osteoporosis."

"First, this study includes 181 participants rather than the thousands usually involved in fracture studies. ... As the authors point out, the study was not designed as a fracture study," the author continues.

"So what lessons can we derive from this study? ... It would be premature to use this study to immediately modify our clinical use of potent bone-active agents in the nursing home population with documented osteoporosis (i.e. those who have a low BMD as a major risk factor for fracture). ... Finally, this study draws attention to the need for large controlled clinical trials to determine if a combination of fall prevention strategies and treatment with bone-active drugs might produce additive benefits on fractures, especially in high-risk populations such as those living in nursing homes. These studies will be difficult, and Greenspan and her colleagues are to be congratulated on beginning to fill this void," the commentary concludes.

(JAMA Intern Med. Published online April 13, 2015. doi:10.1001/jamainternmed.2015.0757. Available pre-embargo to the media at http://media.jamanetwork.com.)

Editor's Note: *Please see the article for additional information, including other authors, author contributions and affiliations, financial disclosures, funding and support, etc.*

http://www.eurekalert.org/pub_releases/2015-04/uol-foc041315.php

Fragment of continental crust found under south east Iceland

An international team, including researchers at the University of Liverpool, have shown that south east Iceland is underlain by continental crust.

The team found that the accepted theory, that Iceland consists only of very thick oceanic crust, is incorrect. Maps of crustal thickness produced from satellite gravity data, together with geochemical, plate tectonic reconstruction and mantle plume track analysis (an upwelling of abnormally hot rock), were used to show that south east Iceland is underlain by continental crust which extends offshore to the east.

Professor Nick Kusznir, from the University's School of Environmental Sciences, who produced the satellite data, said: "The established theory is that geological features such as Iceland, known as oceanic plateaux, are generated by the interaction of ocean-ridge sea-floor spreading with a hot mantle upwelling.

"Our results suggest that there is another critical ingredient which is the presence of fragments of continental crust. This discovery has important implications for how mantle plumes interact with plate tectonics."

Satellite mapping

Crustal thickness mapping shows thick crust under south east Iceland of up to 30 km, which is more 'typical' of continental crust in comparison to much thinner crust in the surrounding ocean basins and under the rest of Iceland.

The thick crust of south east Iceland extends eastwards offshore and is interpreted as being a sliver of continental crust originally part of, but now separated from, the Jan Mayan micro-continent to the north from which it has rifted during the formation of the north east Atlantic in the last 55 million years.

Professor Kusznir added: "Global crustal thickness mapping, using gravity inversion, suggests that tectonic features, such as Iceland, formed by the interaction of mantle plumes, sea-floor spreading and micro-continent fragments, are quite common.

"Other examples include Mauritius in the Indian Ocean; the Rio Grande High in the south Atlantic; and the Canary Islands in the Central Atlantic.

"Not only is this discovery important for the science of geo-dynamics, our findings also has important implications for natural resources in these regions. Continental crust has a very different composition and history to oceanic crust and is much richer in natural resources."

Oil and gas exploration

Crustal thickness mapping using the satellite gravity inversion methodology was developed by Professor Kusznir and has been used for locating the transition between continental and oceanic crust and micro-continents for the United Nations Convention on the Law of the Sea (UNCLOS) territorial claims and is used extensively by the hydrocarbon industry in deep water oil and gas exploration.

The research, published in Proceedings of the National Academy of Sciences (PNAS), is in collaboration with the University of Oslo and can be found here: http://www.pnas.org/content/early/2015/03/27/1423099112.full.pdf

http://www.eurekalert.org/pub_releases/2015-04/uoi-wwh041315.php

Why we have chins

University of Iowa researchers contend chin comes from evolution, not mechanical forces

Look at a primate or a Neanderthal skull and compare it with a modern human's. Notice anything missing?

We have one feature that primates, Neanderthals, archaic humans - any species, for that matter - don't possess: a chin.

"In some way, it seems trivial, but a reason why chins are so interesting is we're the only ones who have them," says Nathan Holton, who studies craniofacial features and mechanics at the University of Iowa. "It's unique to us."

New research led by Holton and colleagues at the UI posits that our chins don't come from mechanical forces such as chewing, but instead results from an evolutionary adaptation involving face size and shape - possibly linked to changes in hormone levels as we became more societally domesticated.

The finding, if true, may help settle a debate that's gone on intermittently for more than a century why modern humans have chins and how they came to be.

Using advanced facial and cranial biomechanical analyses with nearly 40 people whose measurements were plotted from toddlers to adults, the UI team concludes mechanical forces, including chewing, appear incapable of producing the resistance needed for new bone to be created in the lower mandible, or jaw area. Rather, they write in a paper published online in the Journal of Anatomy, it appears the chin's emergence in modern humans arose from simple geometry: As our faces became smaller in our evolution from archaic humans to today - in fact, our faces are roughly 15 percent shorter than Neanderthals' - the chin became a bony prominence, the adapted, pointy emblem at the bottom of our face.

"In short, we do not find any evidence that chins are tied to mechanical function and in some cases we find that chins are worse at resisting mechanical forces as we grow," says Holton, assistant professor and anthropologist in the Department of Orthodontics at the UI College of Dentistry. "Overall, this suggests that chins are unlikely related to the need to dissipate stresses and strains and that other explanations are more likely to be correct."

More intriguing, UI anthropologists led by Robert Franciscus think the human chin is a secondary consequence of our lifestyle change, starting about 80,000 years ago and picking up great steam with modern humans' migration from Africa about 20,000 years later. What happened was this: Modern humans evolved from hunter-gatherer groups that were rather isolated from each other to increasingly cooperative groups that formed social networks across the landscape. These more connected groups appear to have enhanced the degree to which they expressed themselves in art and other symbolic mediums.

Males in particular became more tranquil during this period, less likely to fight over territory and belongings, and more willing to make alliances, evidenced by exchanging goods and ideas, that benefited each and all.

The change in attitude was tied to reduced hormone levels, namely testosterone, resulting in noticeable changes to the male craniofacial region: One big shift was the face became smaller - retrenching in effect - a physiological departure that created a natural opportunity for the human chin to emerge.

"What we're arguing is that modern humans had an advantage at some point to have a well-connected social network, they can exchange information, and mates, more readily, there's innovation," says Franciscus, who was on the team that first laid out the theory in a paper published last August in the journal Current Anthropology and is a contributing author on the current paper, "and for that to happen, males have to tolerate each other. There had to be more curiosity and inquisitiveness than aggression, and the evidence of that lies in facial architecture."

The new study buttresses that argument, in that it seems to rule out the chin arose from mechanical exertion, such as chewing.

The researchers examined how the jaw region generally reacted to two forces - vertical bending and wishboning. In wishboning, one side of the jaw is pulled outward, resulting in compression in the outer part of the chin. In vertical bending, the ramus - the posterior more or less vertical part on each side of the lower jaw - splays outward, tensing the chin area. In both instances, the thinking went, the chin area is being mechanically stressed; on a microscopic level, new bone is being created, much like lifting weights creates little tears that allows new muscle to be created. Thus, arose the theory that mechanical forces, such as chewing, led to our chins.

But in examinations from periodic measurements of participants' heads from 3 years of age to more than 20 years old, the UI researchers found no evidence that these imperceptible mechanical forces led to new bone in the chin region. Instead, they found nearly the opposite: Individuals with the most mechanical resistance had chins most similar to a 3 -or 4-year-old - meaning they didn't have much of a chin at all.

What the researchers did notice is chin "growth" has more to do with how each feature in our face adapts as our head size increases, much like you'd fit individual pieces together in an expanding, shape-shifting, three-dimensional puzzle.

Children, for example, have flat, nearly imperceptible chins, much like what's seen in Neanderthals. That bony prominence only becomes visible as our heads and faces grow into adulthood.

"Our study suggests that chin prominence is unrelated to function," Holton says, "and probably has more to do with spatial dynamics during development."

Contributing authors, all from the UI, include: Laura Bonner, Jill Scott, Steven Marshall and Thomas Southard. The study was funded by the Department of Orthodontics, in the UI College of Dentistry.

http://www.eurekalert.org/pub_releases/2015-04/b-nbt040915.php

New breath technology picks up high risk changes heralding stomach cancer

Nanoarray analysis identifies key volatile organic compounds; could be used for screening, say researchers

A new type of technology that senses minute changes in the levels of particular compounds in exhaled breath, accurately identifies high risk changes which herald the development of stomach cancer, reveals research published online in the journal Gut.

The findings prompt the researchers to suggest that the technology - known as nanoarray analysis - could be used not only to test for the presence of stomach cancer, but also to monitor those at high risk of subsequently developing the disease.

Gastric cancer develops in a series of well-defined steps, but there's currently no effective, reliable, and non-invasive screening test for picking up these changes early on. Most people in the developed world are diagnosed when it's too late to save their lives.

Previous research has concluded that nanoarray analysis could be used to detect stomach cancer, but these studies have involved small numbers of people, and none has looked at the technology's ability to pick up pre-cancerous changes.

The researchers therefore collected two breath samples from 484 people, after a 12 hour fast and abstention from smoking for at least three hours.

Ninety nine of the participants had already been diagnosed with stomach cancer, but not yet treated with chemotherapy or radiotherapy.

Participants were asked about their smoking and drinking habits and tested for Helicobacter pylori infection, a known risk factor for stomach cancer.

The first breath sample was analysed using a technique (GCMS) that measures the various volatile organic compounds in exhaled breath. The second sample was subjected to nanoarray analysis combined with pattern recognition.

The GCMS results showed that both patients with cancer and those without the disease had distinctive 'breath prints.'

Out of a total of 130 volatile organic compounds identified by GCMS in exhaled breath, levels of eight differed significantly when samples from the gastric cancer group were compared with those from the groups with pre-cancerous changes.

Furthermore, the nanoarray sensing patterns were able to accurately distinguish between the different pre-cancerous stages, marking out those patients at low and high risk of developing gastric cancer.

The findings held true, irrespective of other influential factors, such as age, alcohol intake, and use of stomach acid suppressant drugs (proton pump inhibitors).

The researchers point out that GCMS technology cannot be used for screening purposes, because it is very expensive and requires lengthy processing times and considerable expertise to operate it.

Nanoarray analysis, on the other hand, is not only accurate and highly sensitive, but offers a much simpler and cheaper alternative, they say.

Being able to accurately differentiate between low and high risk changes would avoid unnecessary endoscopies, and would enable any progression to cancer or signs of disease recurrence to be monitored, they suggest.

A large trial involving thousands of patients, including those with stomach cancer or pre-cancerous changes, is currently under way in Europe to test the technology's suitability as a screening method, they add.

"The attraction of this test lies in its non-invasiveness, ease of use (therefore high compliance would be expected), rapid predictiveness, insensitivity to confounding factors, and potentially low cost," they conclude.

http://www.eurekalert.org/pub_releases/2015-04/ibri-rda041415.php

Researchers discover an inactive tumor suppressor gene in lung cancer

Inactivation of PARD3 gene promotes tumor cell invasion and metastasis

Researchers at Genes and Cancer group at Bellvitge Biomedical Research Institute (IDIBELL), led by Montse Sanchez-Cespedes, have identified the PARD3 gene as a tumor suppressor that is inactivated in lung cancer squamous type. The results of the study have been published in Cancer Research.

Correct polarization (orientation in space) of bronchial epithelial cells is essential for the maintenance and proper development of this tissue under normal conditions.

PARD3 gene encodes a protein that regulates cell polarization and cell junctions. When the gene is inactivated, errors occur in this cell orientation and in contact with neighboring cells. "Any change affecting this structure promotes tumor development," said the researcher Montse Sanchez-Cespedes.

Tumor invasion and metastasis

By restoring protein encoded by PARD3 levels, both, cell lines and animal models of mice, we observed that regulating de novo polarization of cells, significantly reduced the risk of metastasis.

Lung cancer

Lung cancer is one of the tumors having higher mortality rates worldwide. Only in Spain each year about 20,000 people die from this cause. The high mortality rate is mainly due to late diagnosis of the disease, when it is already in an advanced stage.

Late detection and lack of effective therapies make the probability of survival of patients with lung cancer is very low. Overall, only 10% and 15% of patients survive more than five years after detection. The origin of more than 80% of cases is the consumption of snuff. The squamous lung cancer and lung adenocarcinoma type are the two most common types of lung tumor.

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Forsyth study details how gum disease treatment can prevent heart disease

Newly published research underscores the important connection between oral inflammation and heart health

CAMBRIDGE, Mass. - A new study from the Forsyth Institute is helping to shed more light on the important connection between the mouth and heart. According to research recently published online by the American Heart Association, scientists at Forsyth and Boston University have demonstrated that using an oral topical remedy to reduce inflammation associated with periodontitis, more commonly known as gum disease, also results in the prevention of vascular inflammation and can lower the risk of heart attack.

This study is the first time researchers anywhere have demonstrated the ability of an oral treatment for gum disease to also reduce inflammation in the artery wall. The active ingredient is an inflammation resolving molecule, known as Resolvin E1. This discovery further underscores the increasing body of evidence showcasing how problems in the mouth - and how they are treated - can have life changing influences on other key systems in the body, such as the heart in this case.

"Our research is helping to underscore the very real link between oral health and heart disease," said Lead Investigator Hatice Hasturk, DDS, PhD, an associate member of Forsyth's Department of Applied Oral Sciences and director of Forsyth's Center for Clinical and Translational Research. "The general public understands the connection between heart health and overall wellness, and often takes appropriate steps to prevent heart disease. More education is needed to elevate oral wellness into the same category in light of proven connections to major health conditions."

According to the CDC, heart disease accounts for one in four deaths in the United States, and the rate continues to rise. Forsyth's findings suggest a need to expand the public's understanding of risk factors beyond cholesterol, smoking, hypertension and diabetes to include a focus on oral health. With support from the scientific community, Forsyth aims to generate greater awareness of gum disease (affecting 64.7 million American adults according to the CDC) as a critical risk factor for heart disease, independent from diet and lifestyle.

The study, titled, "Resolvin E1 Prevents Atheromatous Plaque Formation," will be published in print in the May issue of Arteriosclerosis, Thrombosis, and Vascular Biology (ATVB), a journal of the American Heart Association. It is the first paper to show a rabbit model of accelerated heart disease, demonstrating a range of atherosclerotic plaque stages that more closely resemble those in humans without genetic modification of the animal. This research is authored by Hatice Hasturk, Rima Abdallah, Alpdogan Kantarci, Daniel Nguyen, Nicholas Giordano, James Hamilton and Thomas E. Van Dyke.

http://www.eurekalert.org/pub_releases/2015-04/mali-ath041415.php

Antimalarial tea - from herbal remedy to licensed phytomedicine

Herbal medication derived from N'Dribala licensed and sold as an antimalarial phytomedicine

New Rochelle, NY - Malaria is a critical health problem in West Africa, where traditional medicine is commonly used alongside modern healthcare practices.

An herbal remedy derived from the roots of a weed, which was traditionally used to alleviate malarial symptoms, was combined with leaves and aerial portions from two other plants with antimalarial activity, formulated as a tea, and eventually licensed and sold as an antimalarial phytomedicine.

The fascinating story and challenges behind the development of this plant-based treatment are presented in The Journal of Alternative and Complementary Medicine, a peer-reviewed publication from Mary Ann Liebert, Inc., publishers. The article is available free on The Journal of Alternative and Complementary Medicine website until May 14, 2015.

Dr. Merlin Willcox (University of Oxford, U.K.), Dr. Zéphirin Dakuyo (Phytofla, Banfora, Burkina Faso), and coauthors discuss the antimalarial and pharmacological properties of the herbal medication derived from Cochlospermum planchonii (a shrubby weed known as N'Dribala), Phyllanthus amarus, and Cassia alata.

Cochlospermum planchonii. The shape of the leaves is characteristic. The related species, C. tinctorium, has similar flowers, but these appear on the ground before the development of any leaves. **Photo [a] Merlin Willcox.**

The authors provide a unique historical perspective in describing the early evaluation, development, and production of this phytomedicine. They present the ongoing research and challenges in scaling up cultivation and harvesting of the plants and in production of the final product. The article also describes other traditional uses of the medication, such as to treat hepatitis.

http://www.eurekalert.org/pub_releases/2015-04/uocm-aht041315.php

Ancient herbal therapy can prevent - and reverse - cardiac hypertrophy in mice

A natural compound derived from the bark of the magnolia tree, can protect the heart from hypertrophy

A natural compound derived from the bark of the magnolia tree, can protect the heart from hypertrophy, a thickening of cardiac muscle often caused by chronic high blood pressure that can lead to heart failure, researchers report in the April 14 issue of the online journal Nature Communications.

When injected into mice, honokiol (hoh-NOH'-kee-ohl) reduced the excess growth of individual cardiac muscle cells, decreased ventricular wall thickness and prevented the accumulation of interstitial fibrosis, a stiffening of cardiac muscle cells that reduces their ability to contract. It also protected heart muscle cells from the damage caused by oxidative stress, which can damage DNA.

The researchers, based at the University of Chicago Medicine, also describe how this ancient remedy, widely used in Asia for centuries, protects the heart.

They found the compound activates SIRT3, a protective protein associated with delayed aging, stress resistance and metabolic regulation.

"Honokiol, by increasing SIRT3 levels, effectively blocked both the induction and progression of cardiac hypertrophy in mice," said study author Mahesh Gupta, PhD, director of the Cardiac Cell Biology Research Program at the University of Chicago. "It even mitigated pre-existing cardiac hypertrophy. This has the potential to play a significant role in the prevention and treatment of heart failure." "To the best of our knowledge, this is the first report to describe a pharmacologic activator of SIRT3" he added. "Until now, caloric restriction combined with endurance exercise has been the only way to boost SIRT3 levels. Very few people have been able to follow such a rigorous regimen."

One of a family of sirtuin proteins, SIRT3 is primarily active in the mitochondria, the cell's main source of energy. It plays a central role there in energy metabolism and in preventing acetylation, a process that can alter the function of proteins. In the absence of SIRT3, mitochondrial proteins become hyperacetylated, which can impair function.

Human studies show that sedentary patients over 60 years old have nearly 40 percent less SIRT3. Mice that lack the gene for SIRT3 have 40 percent lower levels of ATP, a primary source of energy, than those with the gene.

The researchers tested multiple compounds in search of one that could activate SIRT3. They found that honokiol reduced mitochondrial protein acetylation. When they tested it in the heart muscle cells from mice, they found that a small amount of honokiol nearly doubled SIRT3 levels within 24 hours.

Additional studies showed that honokiol, acting through SIRT3, could reduce or prevent hypertrophic growth in cardiac muscle cells, prevent mice from developing full blown hypertrophy and even reduce existing damage from established hypertrophy. It also blocked the production of fibroblasts - cells that interfere with heart muscle performance - and reduced production of myofibroblasts, cells that speed wound healing but can impair heart function. The researchers did not detect any appreciable toxicity.

To confirm the mechanism, the researchers performed the same experiments on mice that lacked the SIRT3 gene. In those studies, honokiol had no effect. They also determined that honokiol binds directly to SIRT3. The combination appears to increase SIRT3's activity.

The results, the authors wrote, suggest pharmacological activation of SIRT3 by honokiol could be "a potential therapeutic strategy to prevent adverse cardiac remodeling and other diseases associated with abnormal cellular growth and organ fibrosis." "Although we feel this is extremely promising," Gupta said, "there is still much work to be done."

Honokiol is available as an herbal remedy but the purity of such preparations is undetermined. "We treated the mice with injections into the peritoneal cavity," Gupta emphasized, "rather than by mouth, which is how this compound has traditionally been administered. We are testing to see if oral use will have a similar effect." Despite those caveats, "we are tremendously excited," Gupta said. "We are working to design a clinical trial involving patients with cardiac hypertrophy and potentially other metabolic diseases, such as type 2 diabetes."

The National Institutes of Health, the Rabinowitch-Davis Foundation and the Margolis Foundation funded this study. Additional authors were Vinodkumar Pillai, Sadhana Samant, Nagalingam Sundaresan, Hariharasundaram Raghuraman and Gene Kim of the University of Chicago; Michael Bonner and Jack Arbiser of the Atlanta VA Medical Center; Douglas I. Walker and Dean Jones of the Emory University School of Medicine; and David Gius of Northwestern University.

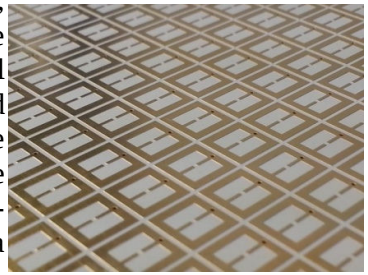
http://www.eurekalert.org/pub_releases/2015-04/aiop-hef041015.php

Harvesting energy from electromagnetic waves

In the future, clean alternatives such as harvesting energy from electromagnetic waves may help ease the world's energy shortage

WASHINGTON D.C. - For our modern, technologically-advanced society, in which technology has become the solution to a myriad of challenges, energy is critical not only for growth but also, more importantly, survival. The sun is an abundant and practically infinite source of energy, so researchers around the world are racing to create novel approaches to "harvest" clean energy from the sun or transfer that energy to other sources.

This week in the journal Applied Physics Letters, from AIP Publishing, researchers from the University of Waterloo in Canada report a novel design for electromagnetic energy harvesting based on the "full absorption concept." This involves the use of metamaterials that can be tailored to produce media that neither reflects nor transmits any power - enabling full absorption of incident waves at a specific range of frequencies and polarizations.



The metasurface used for collecting electromagnetic energy is shown.
O.Ramahi/U.Waterloo

"The growing demand for electrical energy around the globe is the main factor driving our research," said Thamer Almoneef, a Ph.D. student. "More than 80 percent of our energy today comes from burning fossil fuels, which is both harmful to our environment and unsustainable as well. In our group, we're trying to help solve the energy crisis by improving the efficiency of electromagnetic energy-harvesting systems."

Since the inception of collecting and harvesting electromagnetic energy, classical dipole patch antennas have been used. "Now, our technology introduces 'metasurfaces' that are much better energy collectors than classical antennas," explained Omar M. Ramahi, professor of electrical and computer engineering.

Metasurfaces are formed by etching the surface of a material with an elegant pattern of periodic shapes. The particular dimensions of these patterns and their proximity to each other can be tuned to provide "near-unity" energy absorption. This energy is then channeled to a load through a conducting path that connects the metasurface to a ground plane. The key significance of the researchers' work is that it demonstrates for the first time that it's possible to collect essentially all of the electromagnetic energy that falls onto a surface.

"Conventional antennas can channel electromagnetic energy to a load - but at much lower energy absorption efficiency levels," said Ramahi. "We can also channel the absorbed energy into a load, rather than having the energy dissipate in the material as was done in previous works."

As you can imagine, this work has a broad range of applications. Among the most important is space solar power, an emerging critical technology that can significantly help to address energy shortages. It converts solar rays into microwaves - using conventional photovoltaic solar panels - and then beams the microwave's energy to microwave collector farms at designated locations on Earth. Japan is way out in front of rest of the world in this realm, with plans to begin harvesting solar power from space by 2030.

"Our research enables significantly higher energy absorption than classical antennas," Ramahi said. "This results in a significant reduction of the energy harvesting surface footprint. Real estate is a precious commodity for energy absorption - whether it's wind, hydro, solar or electromagnetic energy."

Other key applications include "wireless power transfer - directly adaptable to power remote devices such as RFID devices and tags or even remote devices in general," Ramahi noted. The technology can also be extended to the infrared and visible spectra. "We've already extended our work into the infrared frequency regime and we hope to report very soon about near-unity absorption in those higher-frequency regimes," added Ramahi.

The article, "Metamaterial electromagnetic energy harvester with near unity efficiency," is authored by Thamer S. Almoneef and Omar M. Ramahi. It will appear in the journal Applied Physics Letters on April 14, 2015 (DOI: 10.1063/1.4916232). After that date it can be accessed at: http://scitation.aip.org/content/aip/journal/apl/106/15/10.1063/1.4916232

The authors of this paper are affiliated with the University of Waterloo.

http://nyti.ms/1Ip3T6i

Chimps That Hunt Offer a New View on Evolution

Study shows females playing an unexpectedly big role in hunting

By JAMES GORMAN APRIL 14, 2015

Studies of hunters and gatherers - and of chimpanzees, which are often used as stand-ins for human ancestors - have cast bigger, faster and more powerful males in the hunter role. Now, a 10-year study of chimpanzees in Senegal shows females playing an unexpectedly big role in hunting and males, surprisingly, letting smaller and weaker hunters keep their prey.

The results do not overturn the idea of dominant male hunters, said Jill D. Pruetz of Iowa State University, who led the study. But they may offer a new frame of reference on hunting, tools and human evolution. “We need to broaden our perspective,” she said.

Among the 30 or so chimps Dr. Pruetz and her colleagues observed, called the Fongoli band, males caught 70 percent of the prey, mostly by chasing and running it down. But these chimps are very unusual in one respect. They are the only apes that regularly hunt other animals with tools - broken tree branches. And females do the majority of that hunting for small primates called bush babies.

Craig Stanford, an anthropologist at the University of Southern California who has written extensively on chimp hunting and human evolution, said the research was “really important” because it solidified the evidence for chimps hunting with tools, which Dr. Pruetz had reported in earlier papers.

It also clearly shows “the females are more involved than in other places,” he said, adding that it provides new evidence to already documented observations that female chimps are “much more avid tool users than males are.”

All chimpanzees eat a variety of plant and animal foods, including insects like termites. And all chimpanzees eat some other animals. The most familiar examples of chimpanzee hunting are bands of the apes chasing red colobus monkeys through the trees in the rain forests of East Africa.

In this kind of pursuit, the largest, strongest, fastest chimps dominate - and those are adult males. When females and smaller chimps do catch an animal, an adult male may simply take it away, although the meat is eventually shared. The theft rate in other groups of chimps is around 25 percent, Dr. Pruetz said. Those other chimps do not hunt with tools.

The Fongoli chimpanzees live in a mix of savanna and woodlands where prey is not as abundant as in rain forests. There are no red colobus monkeys, and although the chimps do hunt young vervet monkeys and baboons, the much smaller bush babies are their main prey.

Dr. Pruetz argues that less food may have prompted both technological and social innovation, resulting in new ways to hunt and new social interactions as well. Humans evolved in a similar environment, and, as she and her colleagues write in Royal Society Open Science, “tool-assisted hunting could have similarly been important for early hominins.”

The tools in question are broken branches that Dr. Pruetz calls jabbing tools. The season for bush baby hunting is June, when the temperature may be well over 100 and the humidity is suffocating. The Fongoli chimps find the bush babies in their dens in trees. Chimps will stab and poke one of the small animals, sometimes wounding but not impaling it, until it comes out of its hiding place. The chimps will grab it, Dr. Pruetz said, and immediately “bite the head off.”

Females, even those with infants, and juvenile chimps can do this kind of hunting. The process does not put a premium on speed and strength as the chase does, so big males do not have an advantage. But there is more than technique and technology involved. There is social change.

By and large, said Dr. Pruetz, the adult males, which could take away a kill, show a “respect of ownership.” Theft rates are only about 5 percent. The chimps she studies also have more mixed-sex social groups than chimp bands in East Africa.

Travis Pickering, an anthropologist at the University of Wisconsin, said that with less food available it seems that the Fongoli chimps, “have to be more inventive” and that “these hunting weapons even the playing field for non-adults and females.”

Early hominins may have been in a similar situation, he said. Hunting among human ancestors “very quickly became a male-dominated activity,” he said, but “female hominins could very well have been the inventors of weapons.”

When it comes to getting food, deciding who does what depends on definitions. Collecting insects, for example, is defined as gathering, not hunting. In the case of the bush babies, however, though they are small, they struggle and flee, and will bite. Any bite, no matter how small, can pose the danger of infection, so the pursuit of bush babies qualifies as hunting, Dr. Pruetz says, and Dr. Stanford and Dr. Pickering agree.

http://www.eurekalert.org/pub_releases/2015-04/jhm-psm041315.php

Paternal sperm may hold clues to autism

Tags on DNA from fathers' sperm linked to children's autism symptoms

In a small study, Johns Hopkins researchers found that DNA from the sperm of men whose children had early signs of autism shows distinct patterns of regulatory tags that could contribute to the condition. A detailed report of their findings will be published online in the International Journal of Epidemiology on April 15.

Autism spectrum disorder (autism) affects one in 68 children in the U.S. Although studies have identified some culprit genes, most cases remain unexplained. But most experts agree that autism is usually inherited, since the condition tends to run in families. In this study, investigators looked for possible causes for the condition not in genes themselves, but in the "epigenetic tags" that help regulate genes' activity.

"We wondered if we could learn what happens before someone gets autism," says Andrew Feinberg, M.D., M.P.H., the King Fahd Professor of Molecular Medicine and director of the Center for Epigenetics at the Johns Hopkins University School

of Medicine. "If epigenetic changes are being passed from fathers to their children, we should be able to detect them in sperm," adds co-lead investigator Daniele Fallin, Ph.D., professor and chair of the Department of Mental Health in the Bloomberg School of Public Health and director of the Wendy Klag Center for Autism and Developmental Disabilities.

In addition to being easier to sample than egg cells from women, sperm are more susceptible to environmental influences that could alter the epigenetic tags on their DNA. Feinberg, Fallin and their team assessed the epigenetic tags on DNA from sperm from 44 dads. The men were part of an ongoing study to assess the factors that influence a child early on, before he or she is diagnosed with autism. The study enrolls pregnant mothers who already have a child with autism and collects information and biological samples from these mothers, the new baby's father and the babies themselves after birth. Early in the pregnancy, a sperm sample was collected from fathers enrolled in the study. One year after the child was born, he or she was assessed for early signs of autism using the Autism Observation Scale for Infants (AOSI).

The researchers collected DNA from each sperm sample and looked for epigenetic tags at 450,000 different positions throughout the genome. They then compared the likelihood of a tag being in a particular site with the AOSI scores of each child. They found 193 different sites where the presence or absence of a tag was statistically related to the AOSI scores.

When they looked at which genes were near the identified sites, they found that many of them were close to genes involved in developmental processes, especially neural development. Of particular interest was that four of the 10 sites most strongly linked to the AOSI scores were located near genes linked to Prader-Willi syndrome, a genetic disorder that shares some behavioral symptoms with autism. Several of the altered epigenetic patterns were also found in the brains of individuals with autism, giving credence to the idea that they might be related to autism.

The team plans to confirm its results in a study of more families and to look at the occupations and environmental exposures of the dads involved. There is currently no genetic or epigenetic test available to assess autism risk.

Other authors of the report include Jason Feinberg, Kelly Bakulski and Shannon Brown of the Johns Hopkins Bloomberg School of Public Health; Rakel Trygvadottir of The Johns Hopkins University; Andrew Jaffe of the Lieber Institute for Brain Development; Lynn Goldman of The George Washington University; Lisa Croen of Kaiser Permanente; Irva Hertz-Picciotto of the University of California, Davis; and Craig Newschaffer of Drexel University.

This work was supported by grants from the National Institute of Environmental Health Sciences (R01 ES017646, R01 ES16443) and Autism Speaks.

http://www.bbc.com/news/health-32315763

Dementia 'halted in mice brains'

Tweaking the brain's immune system with a drug has prevented mice developing dementia, a study shows.

By James Gallagher Health editor, BBC News website

The team at Duke University, in the US, showed immune cells which start attacking nutrients in the brain may be a trigger for the disease. They say their findings could open up new avenues of research for a field that has not developed a single drug to slow the progression of the disease.

Experts said the findings offered new hope of a treatment.

The researchers indentified microglia - normally the first line of defence against infection in the brain - as major players in the development of dementia.

They found some microglia changed to become exceptionally adept at breaking down a component of protein, an amino acid called arginine, in the early stages of the disease. As arginine levels plummeted, the immune cells appeared to dampened the immune system in the brain.

Stopping dementia

In mouse experiments, a chemical was used to block the enzymes that break down arginine. They showed fewer of the characteristics of dementia such as damaged proteins collecting in the brain and the animals performed better in memory tests.

One of the researchers, Dr Matthew Kan, said: "All of this suggests to us that if you can block this local process of amino acid deprivation, then you can protect the mouse, at least from Alzheimer's disease.

"We see this study opening the doors to thinking about Alzheimer's in a completely different way, to break the stalemate of ideas in Alzheimer's disease."

However, the findings do not suggest that arginine supplements could combat dementia as the boosted levels would still be broken down.

'Hope'

Dr James Pickett, from the Alzheimer's Society said the study was "offering hope that these findings could lead to new treatments for dementia". He added: "This study in animals joins some of the dots in our incomplete understanding of the processes that cause Alzheimer's disease, in particular around the role played by the immune system."

Dr Laura Phipps, from Alzheimer's Research UK, said the study was "interesting" and shed "more light on the mechanisms of immune system involvement in Alzheimer's".

But she cautioned clinical trials in people were still needed and that "the findings do not suggest that supplementation of the amino acid could mirror the benefits seen in these mice".

http://bit.ly/1DSCKZA

Archaeologists Take Wrong Turn, Find World's Oldest Stone Tools

Archaeologists working in the Kenyan Rift Valley have discovered the oldest known stone tools in the world.

By Kate Wong

SAN FRANCISCO – Dated to around 3.3 million years ago, the implements are some 700,000 years older than stone tools from Ethiopia that previously held this distinction. They are so old, in fact, that they predate the earliest fossils representing our genus, *Homo,* by half a million years. As such they suggest that stone tool manufacture began not with *Homo,* but with a more primitive member of the human family.

A happy accident led to the discovery of the ancient tools. Sonia Harmand of Stony Brook University and her team had been en route to a known fossil site on the western shore of Lake Turkana one morning in July 2011 when the group took a wrong turn and ended up in a previously unexplored area. The researchers decided to survey it and by teatime they had found stone artifacts. They named the site Lomekwi 3, and went on to recover dozens of tools - including flakes, cores and anvils–from both the surface and below ground. Harmand described the findings April 14 in a talk given at the annual meeting of the Paleoanthropology Society in San Francisco.

"The cores and flakes we recovered are clearly knapped and are not the result of accidental or natural rock fracture," Harmand said. "The Lomekwi 3 knappers were able to deliver sufficient intentional force to detach repeatedly series of adjacent and superposed flakes and then to continue knapping by rotating the cores." The team determined the age of the tools based on their stratigraphic position relative to two layers of volcanic ash and a magnetic reversal of known ages.

The tools from Lomekwi 3 are quite large - larger than the stone tools from the site of Gona in Ethiopia that were previously the oldest on record and larger than the rocks that chimpanzees use to crack open nuts. According to Harmand, preliminary observations suggest that the Lomekwi toolmakers intentionally selected big, heavy blocks of very hard raw material from nearby sources even though smaller blocks were available. They used various knapping techniques to remove the sharp-edged flakes from the cores.

Exactly what the Lomekwi knappers used their tools for is not yet clear. Animal bones recovered thus far at the site do not show any signs of human activity. But evidence from another site does suggest that hominins (the group that includes *H. sapiens* and its extinct relatives) were butchering animals back then. In 2010 scientists working at the site of Dikika in Ethiopia, where fossils belonging to Lucy's species, *Australopithecus afarensis*, had previously turned up, announced that they had recovered 3.4 million-year-old animal bones bearing distinctive marks. They argued that hominins had made the marks in the course of slicing meat off the bones with stone tools. The claim sparked heated debate. Some skeptics countered that the alleged cut marks were instead the result of the bones having been trampled by passing animals; others suggested that they were bite marks from crocodiles. The discovery of the Lomekwi tools does not prove that hominins made the Dikika marks, but it shows that near contemporaries of the Dikika hominins made implements capable of leaving behind such marks.

The identity of the Lomekwi knappers is unknown. If stone tool manufacture is the exclusive purview of *Homo,* then *Homo* must have evolved far earlier than the fossil record currently indicates. A more plausible scenario, Harmand said, is that *Australopithecus* or another hominin, *Kenyanthropus* (found nearby) - both of which are known to have been around 3.3 million years ago–made the Lomekwi tools. Whether *Kenyanthropus* is in fact a distinct hominin lineage or part of *Australopithecus* is a matter of debate, however.

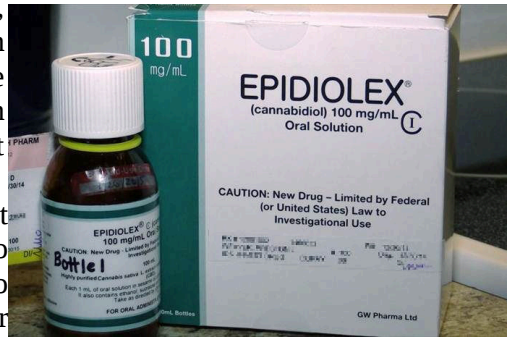
Up to this point, the earliest stone tools have been considered part of the so-called Oldowan toolmaking tradition. Louis Leakey coined the term to describe tools found at Olduvai Gorge in the 1930s. But Harmand says the newly discovered tools are different enough from the early Oldowan implements to warrant a new name: the Lomekwian.

http://bloom.bg/1bcEZMW

Marijuana Plant Extract Reduces Epileptic Seizures by Half

Cannabidiol, made from the non-psychoactive portion of a marijuana plant, cut by half the seizures suffered by epilepsy patients

by Michelle Fay Cortez and Caroline Chen



GW Pharmaceuticals Plc's cannabidiol, made from the non-psychoactive portion of a marijuana plant, cut by half the seizures suffered by epilepsy patients in an expanded access program that didn't use a placebo.

The experience of 213 hard-to-treat patients age 2 to 42, including some who were already taking a dozen drugs to fend off seizures, is a promising start for the strawberry-flavored liquid extract, which may be a potent new therapy for the condition, said lead researcher Orrin

Devinsky, director of the New York University Langone Comprehensive Epilepsy Center.

The findings released Monday are scheduled to be presented at the American Academy of Neurology's annual meeting on April 22 in Washington.

GW Pharma is seeking regulatory approval for the therapy to treat patients with severe forms of epilepsy and expects to present results from mandated studies by early 2016, said Chief Executive Officer Justin Gover. Epidiolex, as the oil is known, is being compared with a placebo to affirm its safety and effectiveness.

"For this group that has failed multiple medications, the response is quite positive," Devinsky said. "Over time it's certainly the hope that this would replace other therapies," if studies that use comparison groups are successful.

The results were consistent across different types of epilepsy, including Dravet syndrome, a rare and intractable form with few treatment options, and Lennox-Gastaut syndrome, marked by a brief loss of muscle tone that triggers "drop" seizures. Overall, the number of seizures fell by an average of 54 percent for the 137 patients who were on the medication for three months.

GW Pharma's American depository receipts gained 1.9 percent to $98 in late trading.

Side Effects

GW Pharma has two final-stage trials for each disease already under way.

Side effects included drowsiness, diarrhea and decreased appetite. Six percent of the patients stopped taking the medicine because of side effects or complications.

More than 5 million Americans have been diagnosed with epilepsy, a disorder marked by abnormal electrical activity in the brain.

Symptoms can include convulsions, muscle spasms, loss of consciousness and different types of seizures. While there are numerous drugs approved to treat seizures, up to one -third of patients struggle to control the condition with those medications.

The program was the result of good timing, Devinsky said. GW Pharma was working on marijuana-based products to treat conditions including diabetes and ulcerative colitis when reports began to surface on social media about success families were having by treating their epileptic children with marijuana.

Unproven products were starting to emerge to meet the demand, he said.

'Community Effort'

Academic researchers were also seeing benefits in early tests involving animals. Devinsky and other investigators approached the company to see if it was interested in studying their compounds for hard-to-treat epileptics. The company agreed, and some patients have already been using the oil for more than a year with good results, he said.

"It was really a community effort by parents, physicians and industry coming together," Devinsky said.

If approved, Epidiolex would be the first cannabis plant-derived therapeutic accepted by the U.S. Food and Drug Administration and covered by health insurance. It differs from marijuana-based herbal products because it is pure cannabidiol, with no psychoactive molecules, and is made under strict manufacturing methods, Gover said.

GW Pharma already has a cannabis-based medicine approved outside the U.S. called Sativex for spasticity due to multiple sclerosis. It is also being tested for pain due to advanced cancer, Gover said.

http://www.eurekalert.org/pub_releases/2015-04/p-kou040915.php

Knuckle-cracking observed using MRI

Team observes cavity forming inside cracking joints for first time

A cavity forming rapidly inside our finger joints may cause the popping sound heard when cracking knuckles, according to a real-time, MRI based study published April 15, 2015 in the open-access journal PLOS ONE by Gregory Kawchuk from University of Alberta, Canada and colleagues.

Scientists have debated the cause of joint cracking for decades and to get to the root of what happens, the authors of this study used MRI video to observe for the first time what happens inside a joint when it cracks. The authors visualized ten finger joints from one participant by inserting them one at a time into a tube connected to a cable that was slowly pulled until the knuckle joint cracked.

MRI video captured each crack in real time - occurring in less than 310 milliseconds.

In every instance, the cracking and joint separation were associated with rapid creation of a gas-filled cavity within the synovial fluid, a slippery substance that lubricates the joints. "It's a little bit like forming a vacuum," Kawchuk said. "As the joint surfaces suddenly separate, there is no more fluid available to fill the increasing joint volume, so a cavity is created and that event is what's associated with the sound."

The team also observed the presence of a white flash that appears just before cracking. "No one has observed it before," says Kawchuk, an occurrence he believes is water suddenly being drawn together just before the joint cracks. Kawchuk said he'd like to use even more advanced MRI technology to understand what happens in the joint after the pop, and what it all could mean for health. The authors suggest the findings may pave the way for new research into the potential therapeutic benefits or harms of joint cracking.

http://www.eurekalert.org/pub_releases/2015-04/wkh-hro041515.php

High rate of healthcare visits before suicide attempts

Most people who attempt suicide make some type of healthcare visit in the weeks or months before the attempt, reports a study in the May issue of Medical Care, published by Wolters Kluwer.

The study also identifies racial/ethnic differences that may help to target suicide prevention efforts in the doctor's office and other health care settings. The lead author was Brian K. Ahmedani, PhD, LMSW, of Henry Ford Health System, Detroit, Mich.

Health Visits May Provide Chances for Suicide Prevention

Using data from the NIMH-funded Mental Health Research Network, the researchers identified nearly 22,400 individuals who made suicide attempts between 2009 and 2011. They analyzed healthcare visits before the attempt, with an eye on the possibilities for identifying people at risk for suicide.

The study focused on racial/ethnic differences in the types and timing of visits, including any documented mental health issues or substance abuse. Information on race/ethnicity was available for 78 percent of patients.

Overall, 38 percent of patients made some type of healthcare visit within a week before attempting suicide. The visit came within a month before the suicide attempt in 64 percent of patients, and within a year in nearly 95 percent. The percentage of visits with mental health or substance abuse diagnoses was about 25 percent within a week, 44 percent within a month, and 73 percent within a year before the attempt.

The study found significant racial/ethnic differences: 41 percent of white patients made any type of health visit within a week before the suicide attempt, compared to 35 percent for those in other groups. Nearly 27 percent of white patients made a mental health visit in the preceding week, compared to less than 20 percent for most other racial/ethnic groups.

Asian-Americans were the least likely to make any type of visit within a year before attempting suicide. Hawaiian/Pacific Islanders had the highest rate of hospital admissions and emergency department visits before a suicide attempt, but the lowest rate of mental health or substance abuse diagnoses.

"Overall, visits were most common in primary care and outpatient general medical settings," Dr. Ahmedani and coauthors write. Rates of visits for mental health specialty care ranged from nearly 60 percent for white to 40 percent for Asian patients.

More than one million people attempt suicide each year in the United States. The recently published National Strategy for Suicide Prevention concluded that healthcare is one of the best places to prevent suicide.

"This research provides essential information to aid suicide prevention efforts in health care systems," according to Dr. Ahmedani and coauthors. They discuss the implications for targeting suicide prevention efforts by race/ethnicity - including the need for "culturally competent mental illness detection and treatment" in minority groups.

Most previous prevention efforts have focused on emergency and mental health settings, rather than doctor's offices and other primary care settings, the researchers note. They conclude, "This study supports the promotion of suicide prevention within general outpatient settings, where most people visit before suicide attempt."

Article: "Racial/Ethnic Differences in Health Care Visits Made Before Suicide Attempt Across the United States" (doi: 10.1097/MLR.0000000000000335)

http://www.eurekalert.org/pub_releases/2015-04/ru-cfa041515.php

Cobalt film a clean-fuel find

Rice University discovery is efficient, robust at drawing hydrogen and oxygen from water

HOUSTON - A cobalt-based thin film serves double duty as a new catalyst that produces both hydrogen and oxygen from water to feed fuel cells, according to scientists at Rice University.

The inexpensive, highly porous material invented by the Rice lab of chemist James Tour may have advantages as a catalyst for the production of hydrogen via water electrolysis. A single film far thinner than a hair can be used as both the anode and cathode in an electrolysis device.

The researchers led by Rice postdoctoral researcher Yang Yang reported their discovery today in Advanced Materials.

They determined their cobalt film is much better at producing hydrogen than most state-of-the-art materials and is competitive with (and much cheaper than) commercial platinum catalysts. They reported the catalyst also produced an oxygen evolution reaction comparable to current materials.

"It is amazing that in water-splitting, the same material can make both hydrogen and oxygen," Tour said. "Usually materials make one or the other, but not both."

The researchers suggested applying alternating current from wind or solar energy sources to cobalt-based electrolysis could be an environmentally friendly source of hydrogen and oxygen.

"Here we can just alternate the current from positive to negative and back again, and hydrogen and oxygen are made with the same material," Tour said. "And the material itself is very easy to make." He said manufacturing the film is inexpensive and scalable.

The lab fabricated the 500-nanometer films by anodyzing a cobalt film electrodeposited on a substrate. The assembly was then baked for two hours in a phosphorus vapor that converted it to a cobalt/phosphide/phosphate thin film without damaging its porous structure. The material proved to be robust in both durability tests and in acidic and alkaline conditions, Tour said.

Graduate students Huilong Fei and Gedeng Ruan are co-authors of the paper.

Tour is the T.T. and W.F. Chao Chair in Chemistry as well as a professor of materials science and nanoengineering and of computer science and a member of Rice's Richard E. Smalley Institute for Nanoscale Science and Technology.

The Air Force Office of Scientific Research and its Multidisciplinary University Research Initiative supported the research.

Read the abstract at http://onlinelibrary.wiley.com/doi/10.1002/adma.201500894/abstract

This news release can be found online at http://news.rice.edu/2015/04/15/cobalt-film-a-clean-fuel-find/

http://bit.ly/1cH6sqn

Neanderthal chefs may have spiced up menus with wild herbs

THE image of a Stone-Age man grasping the bony end of a bloody mammoth leg and chomping down on it with powerful gnashers is taking a bit of a battering.

15 April 2015 by Catherine Brahic

We already know that Neanderthals were partial to delicacies such as fish and small birds, with a healthy helping of plants. Now some are saying they might have flavoured their meaty feasts with wild herbs, too. Without a time machine to take us back 40,000 to 50,000 years, the suggestion remains highly speculative. But our long-lost cousins were clearly not the carnivorous beasts we once assumed them to be.

The idea that they were partial to a handful of herbs comes from the hardened plaque – or dental calculus – chipped off the teeth of a 50,000-year-old Neanderthal from El Sidrón in Spain.

A few years ago, Karen Hardy of the University of Barcelona and colleagues found traces of camomile and yarrow in the calculus – both plants with strong flavours but no nutritional value (*Naturwissenschaften*, doi.org/h33). They argued that the plants were eaten for medicinal purposes. Self-medication is common in the animal world, says Hardy, and it's very likely Neanderthals did the same.

Sabrina Krief of the French natural history museum in Paris, thinks differently, based on her observations of wild chimpanzees in Kibale National Park in Uganda. After a hunt, these chimps can eat up to three different types of leaf with their prey (*Antiquity*, doi.org/3mk). Chimps are thought to self-medicate with leaves, but Krief says some scoff leaves to spice up their food.

Her rationale is that all the chimps in a group ate them at the same time, and it's unlikely that every chimp needed the same remedy. Also, different chimp tribes opt for different leaves. If chimps flavour their food, why not Neanderthals?

The palaeontologists contacted by *New Scientist* say this is possible but highly theoretical. What is clear is that Neanderthals were not simple carnivores. All hominins must eat carbohydrates to survive, says Hardy. Meat just doesn't provide enough energy. There's also a limit to the amount of animal protein we should have in our diet – too much meat is not good for us, says Hardy.

So at the very least, we know that Neanderthals liked some veg with their steak – though what kind of veg is still up for debate. Remains at a site in Gibraltar suggest they also liked nuts and wild olives.

And they clearly liked a variety of meats. Geoff Smith of the Monrepos archaeological research centre in Germany says they were more likely to eat bovids, horses and deer than larger game – mammoth and rhino were occasional treats. Signs that they broke up the bones of their game suggest that they sucked out the rich, fatty marrow, says Smith, who presented evidence for this at the Paleoanthropology Society meeting in San Francisco this week.

And what of their cooking techniques? Some Neanderthal sites have hearths, and Hardy's study showed signs of smoke from a wood fire and desiccated starches. They were probably well versed in the art of roasting.

Perhaps Neanderthals even boiled their food, boiling bones to extract the juices and nutrients, a bit like making a stew. "They may have done," says Wil Roebroeks of Leiden University in the Netherlands."Who knows?" The trouble, says Hardy, is we've never found a Neanderthal pot.

Palaeo toothpicks and grassy floss

CANDY floss it's not, but the Neanderthals' starchy, vegetable-rich diet was not quite what the palaeo dentist ordered. It came with a healthy helping of glucose – a fabulous source of energy to power both your brain and the bacteria that live in your mouth.

Dental plaque has always been a nuisance for hominins, says Karen Hardy of the University of Barcelona in Spain. That plaque is now allowing Hardy and other researchers to study the diets of early humans in some detail. What might Neanderthal dental hygiene have been like?

It turns out early humans were probably no strangers to the toothpick. Chimps, bonobos, orangutans, long-tailed macaques and Japanese macaques have all been seen using twigs for this purpose.

And in 2013, a team wrote that grooves in the teeth of a 1.77 million year old hominin found in Georgia were probably made by a lifetime of wielding toothpicks (*PNAS*, doi.org/3mm).

Hardy says early humans are thought to have used bits of wood, bone, sinew and grass to pick and even floss between their teeth.

Their risk of tooth decay might also have been offset by a diet of wild plants. Farmed cereal grains tend to stick to the teeth more easily than wild foods, which can be very abrasive, says Amanda Henry of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. This suggests the palaeo diet came with its very own in-built toothbrush.

http://bit.ly/1DuXGVh

Smart drones that think and learn like us to launch this year

Mini drones with neural hardware that works like a brain could be in the skies within months – and carry out door-to-door deliveries or monitor crops

15 April 2015 by David Hambling

THAT drone buzzing round your head might be smarter than you think. Small drones with neural hardware resembling brains will soon share airspace with other aircraft, seeing and avoiding potential hazards autonomously. The ability will help drones take on a host of new roles.

Big firms like Amazon, DHL and Google are developing their own drone fleets for rapid delivery of consumer goods, fast food and pharmaceuticals. However, current rules restrict drones to flying within visual range of a human operator because of the risk of collision. Drones need an automatic "sense-and-avoid" capacity before they will be able to make deliveries on their own.

Computers capable of recognising objects in video and responding in real time are too big and too power-hungry for small drones. That means drones have to rely on short-range sensors like radar, which may not give enough warning to avoid a collision.

The key may be to mimic how animal brains work; our brains are poor at number-crunching but can process complex sensory input faster than digital systems.

Bio Inspired Technologies of Boise, Idaho, is doing just that. It is building a sense-and-avoid system using a memristor, a resistor with a memory. Like the synapse in a biological brain, the memristor changes when impulses pass through it. Crucially, it is able to remember the impulse after it has stopped.

This capability forms the basis of a learning system that mimics neurons and the connections between them. A chip-sized neural system linked to the drone's existing camera can be trained to recognise aircraft and other hazards at long range. Bio Inspired's drone should be ready for its first flight later this year.

The system can also recognise objects like clouds, birds, buildings and radio towers, and uses visual cues to estimate how far away the objects are.

"Objects like other aircraft can be catalogued in a vague sense, meaning 'I see an aircraft', or in an exact sense: 'I see another drone'," says Terry Gafron, CEO of **Bio Inspired.**

Equipped with this information, the drone plots a new flight path to avoid a hazard, updating it in real time as the threat moves.

"Nature seems to use this approach very effectively," says David Warne of Queensland University of Technology in Australia, who has worked with artificial neural networks that let drones recognise vegetation.

Like others in this area, much of Bio Inspired's research has been funded by the military. But it is likely that it will benefit the wider market. Sense-and-avoid will make it possible for fleets of small drones to criss-cross cities delivering packages. Like a bird or insect, a neural-enabled drone could fly to the trickiest landing place – even balconies.

Being able to recognise objects autonomously will enable a range of applications for small drones. Some of these are in the area of precision agriculture.

"The crop drone is on everyone's short list," says Gafron. Drones could survey a farm, recognise areas where crops aren't thriving and move in for a closer view to establish whether the field needs water, fertiliser or fungicide.

In the industrial field, neural drones could patrol pipelines looking for leaks, or identify electrical faults on power lines.

Closer to home, smart drones could clean windows, pick up litter, clear gutters or weed your garden, or send information to your car about which parking spaces are open. "It simply flies around town monitoring parking spaces," says Gafron.

Smart drones could even track animal populations, flying along livestock boundaries to track wolf populations for example. "Not only could the system fly autonomously, but it could conceivably tell the difference between a deer and a wolf from the air," Gafron says.

Memristor-inspired drones are not the only approach. Last year, US agency DARPA unveiled the TrueNorth neural chip developed in conjunction with IBM. This is a simulation of a neural network using digital hardware with enough neurons to match agile flyers like bees.

http://www.eurekalert.org/pub_releases/2015-04/osu-ssh041615.php

Survey shows half of older adults in US now taking aspirin

Over half of older adults in the United States are now taking a daily aspirin

CORVALLIS, Ore. - A national survey suggests that slightly more than half of the older adults in the United States are now taking a daily dose of aspirin, even though its use is not recommended by the Food and Drug Administration for most people who have not yet had a heart attack or stroke.

The analysis was published today in the American Journal of Preventive Medicine. It observed that aspirin use is continuing to surge, especially among adults who are using it for "primary prevention," meaning in order to prevent an initial cardiovascular event, and in some cases to prevent cancer.

In this survey of more than 2,500 respondents aged 45-75, 52 percent reported current aspirin use, and another 21 percent had used it at some point in the past. The average age of respondents in the survey was 60. A different report found that aspirin use increased 57 percent between 2005 and 2010.

Aspirin is a blood thinner and can cause bleeding events, which is a primary reason some medical experts recommend caution in its use, even at the "baby aspirin" dose of 81 milligrams often used for disease prevention. The FDA has determined that in primary use to prevent a first heart attack or stroke, for every such event that's prevented, there's approximately one major bleeding event that's caused, such as gastrointestinal bleeding.

Largely on that basis, they have concluded physicians should routinely recommend its use only to patients that have already had a heart attack or stroke. But this study found that 81 percent of older adults who are now using aspirin have not had a heart attack or stroke, and are taking it for primary prevention.

"The use of aspirin is still a very contentious issue among medical experts," said Craig Williams, a pharmacotherapy specialist with the College of Pharmacy at Oregon State University, and lead author of the new report.

"There's no doubt that aspirin use can have value for people who have experienced a first heart attack, stroke or angina," said Williams, a professor in the Oregon State University/Oregon Health & Science University College of Pharmacy. "The data to support that is very strong. The support of its use in primary prevention is more of a mixed bag.

"But this survey clearly shows that more and more people who have not experienced those events and are not technically considered at high risk by the FDA are also deciding to use aspirin, usually in consultation with their doctors."

Aside from cardiovascular events, some studies have suggested a role for aspirin in preventing cancer, Williams said, especially colon cancer. That has further increased interest in its use, he said.

While the FDA takes a more cautious stance, Williams said, some other professional organizations, such as the U.S. Preventative Services Task Force, says aspirin use may be appropriate for primary prevention in people with serious risk factors for cardiovascular disease, such as high blood pressure, high cholesterol, smoking or diabetes. Objective criteria for aspirin use in those patients are based on the number of the risk factors, the age and gender of the patient.

Surveys such as this are needed to help determine how people are managing their own health, Williams said, since aspirin is an over-the-counter medication and its use cannot be determined solely by medical records. And the findings suggest that tens of millions of Americans have reviewed the issues involved, often discussed it with their doctors, say they know what they are doing - and decided to use aspirin.

Among the findings of the report:

Several markers of healthy lifestyle choices were also associated with aspirin use.

The strongest predictor of regular aspirin use was a patient having discussed aspirin therapy with a health care provider.

About 35 percent of people who don't objectively have risk factors that might merit aspirin therapy still use it.

About 20 percent of people who have already had a heart attack or stroke, and should be on aspirin therapy, do not use it.

A majority of both current and previous aspirin users rated themselves as being somewhat or very knowledgeable about it.

Among aspirin users, the reasons cited for its use by respondents was for heart attack prevention, 84 percent; stroke prevention, 66 percent; cancer prevention, 18 percent; and prevention of Alzheimer's disease, 11 percent.

Significant predictors of aspirin use included people who were physically active, ate healthy foods, had achieved a healthy weight, managed their stress, tried to quit smoking, and/or had undergone health screenings.

This study was sponsored by the Partnership for Prevention and the Council on Aspirin for Health and Prevention. This council receives financial support from Bayer HealthCare, which has no influence over its programs or activities, and played no role in the decision to conduct this research or publish the results.

Collaborators with Oregon State University on the research were from Harvard/Brigham and Women's Hospital; the Partnership for Prevention; The Ohio State University; the University of North Carolina; and Stanford University.

http://www.eurekalert.org/pub_releases/2015-04/afps-aso041515.php

A sniff of happiness: Chemicals in sweat may convey positive emotion

Humans may be able to communicate positive emotions like happiness through the smell of our sweat

Humans may be able to communicate positive emotions like happiness through the smell of our sweat, according to new research published in Psychological Science, a journal of the Association for Psychological Science.

The research indicates that we produce chemical compounds, or chemosignals, when we experience happiness that are detectable by others who smell our sweat.

While previous research has shown that negative emotions related to fear and disgust are communicated via detectable regularities in the chemical composition

of sweat, few studies have examined whether the same communicative function holds for positive emotions.

"Our study shows that being exposed to sweat produced under happiness induces a simulacrum of happiness in receivers, and induces a contagion of the emotional state," explains psychological scientist Gün Semin of Utrecht University in the Netherlands, senior researcher on the study. "This suggests that somebody who is happy will infuse others in their vicinity with happiness. In a way, happiness sweat is somewhat like smiling - it is infectious."

To determine whether this emotional chemosignaling extends to positive emotions, Semin and colleagues examined whether sweat taken from people in a happy state would influence the behavior, perception, and emotional state of people exposed to the sweat.

The researchers recruited 12 Caucasian males to provide the sweat samples for the study. The participants did not smoke or take any medications, and had no diagnosed psychological disorders. They were prohibited from engaging in alcohol use, sexual activity, consumption of smelly food, or excessive exercise during the study.

The sweat donors came to the lab, rinsed and dried their armpits, and had absorbent pads attached to each armpit. They donned a prewashed T-shirt and sat down to complete the study tasks

They watched a video clip intended to induce a particular emotional state (fear, happiness, neutral) and they also completed a measure of implicit emotion, in which they were asked to view Chinese symbols and rate how pleasant or unpleasant each one was. The sweat pads were then removed and stored in vials.

For the second part of the study, the researchers recruited 36 Caucasian females, with no psychological disorder, respiratory disease, or other illness.

The researchers note that only females were included in this part of the study as women generally have both a better sense of smell and a greater sensitivity to emotional signals than men do.

The study was double-blind, such that neither the researcher nor the participant knew which sweat sample the participant would be exposed to at the time of the experiment.

The women were seated in a chair and placed their chins on a chin rest. The vial containing the sweat sample was placed in a holder attached to the chin rest and was opened immediately prior to the target task. The women were exposed to a sweat sample of each type (fear, happiness, neutral), with a 5-minute break in between samples.

Initial data analyses confirmed that the videos did influence the emotional states of the male participants - men who watched the fear video showed predominantly negative emotion afterward and men who watched the happiness video showed predominantly positive emotion. But were these emotions conveyed to the female participants? Some behavioral results suggest the answer is 'yes.'

Facial expression data revealed that women who were exposed to "fear sweat" showed greater activity in the medial frontalis muscle, a common feature of fear expressions. And women who were exposed to "happy sweat" showed more facial muscle activity indicative of a Duchenne smile, a common component of happiness expressions. There was no observable association, however, between the women's facial responses and their explicit ratings of how pleasant and intense the sweat was.

These findings, the researchers say, suggest a "behavioral synchronization" between the sender (the sweat donor) and receiver (the sweat smeller).

Additional data indicated that women exposed to happy sweat showed a more global focus in perceptual processing tasks, in line with previous research showing that participants induced to experience positive mood tended to show more global processing styles. But the sweat samples did not seem to impact the women's ratings on the Chinese symbols task, suggesting that the sweat-based chemosignals did not bias their implicit emotional states.

These findings, while preliminary, suggest that we communicate our positive and negative emotional states via distinct chemosignals, such that the receiver produces a simulacrum of the sender's emotional state.

The researchers note that the fact that some measures indicated emotional contagion, while others did not, may highlight the difference between measures of emotion that draw on language versus those that don't.

The findings have broad relevance - emotion and sweat are two core features of the human experience, after all. But the fact that happiness may be communicated chemically could be of particular interest to the "odor industry," says Semin, due to its potential commercial applications.

"This is another step in our general model on the communicative function of human sweat, and we are continuing to refine it to understand the neurological effects that human sweat has on recipients of these chemical compounds," Semin concludes.

Study co-authors include Jasper H.B. de Groot of Utrecht University; Monique A.M. Smeets of Utrecht University and Unilever Research and Development; and Matt J. Rowson, Patricia Bulsin, Cor G. Blonk, and Joy E. Wilkinson of Unilever Research and Development.

The research was supported by Unilever Research & Development (AGR 01049/OIV120260).

http://pss.sagepub.com/content/early/2015/04/10/0956797614566318.abstract

For a copy of the article "A Sniff of Happiness" and access to other Psychological Science research findings, please contact Anna Mikulak at 202-293-9300 or amikulak@psychologicalscience.org

http://bit.ly/1cHjcxi

Scientists Are Trying to Figure Out If Humans Can Hibernate

Studies of hibernators and experiments inducing short-term torpor in humans may answer whether human hibernation is possible

By Marissa Fessenden

Dive into a science fiction story that sends humans exploring the reaches of space, and you'll likely find the crew waking from some kind of suspended animation. But the idea is also bandied about in science fact: human hibernation would be a boon to astronauts traveling for months or years. So far, research in this area remains fairly speculative, though, in experiments, surgeons have cooled people down to extend surgeries.

The problem is, hibernation isn't just a deep, months-long sleep. And even if it was, humans aren't built to survive such inactivity.

What we do know about hibernation comes from studying bears, squirrels, lemurs and dormice. All hibernators wake up occasionally - to stretch and perhaps urinate or defecate. Some snack on stored food; others fast and live off of internal fat reserves. The information scientists are gleaning from these habits is now helping to inform study of potential human hibernation, reports Eric Niiler for the Washington Post.

"We see the science has advanced enough to put some of the science fiction into the realm of science reality," Leopold Summerer, head of advanced concepts team of the European Space Agency, told Niiler. "It doesn't mean we will have hibernating astronauts anytime soon, but we are learning from nature how to understand some of the things that happen to animals during hibernation, such as preventing bone loss or preventing muscle loss. This is already something that would be a great benefit for long-distance spaceflight."

The ESA, NASA and other space agencies are interested not only because humans in space would skip months of boredom if they could hibernate, but because they would need less food, produce less waste and require less space. But they would need a hibernaculum, or suitable space in which to hibernate, reports Tariq Malik for Space.com. He writes:

As envisioned by ESA researchers, such a shelter would provide the proper environment for hibernation - such as the proper temperature - and also serve as a bed in the waking part of the mission. It would also have to protect crewmembers from solar flares, monitor life functions and serve the physiological needs of the hibernator, [Mark Ayre, with ESA] said.

Some clues as to what humans will need to survive long-term in space will likely come from astronaut Scott Kelly's year in space. (However, privacy concerns may keep the data from that twin study from becoming public.) So for now, our best clues are coming from animals.

Kelly Drew, of the University of Alaska at Fairbanks, is one researcher looking at hibernation in animals, Niiler reports.

Kelly and her colleagues at the university's Institute of Arctic Biology are looking at how the Arctic ground squirrel can get so cold without dying. She believes she has found the molecule that does the job, the A1 adenosine receptor. While she has learned that stimulating this receptor makes the animal get cold, she hasn't found what triggers it.

"We don't know what the natural signal is for torpor," she said. "We don't know where the signal occurs in the brain - it could be in the brain stem or the hypothalamus."

Still, humans will face challenges that hibernating animals don't have. Hibernating bears are able to recycle the urea waste generated by metabolizing their fat reserves. Instead of excreting urea, they can actually break it down and use it to build up muscle and organ tissues while they sleep, reports Forrest Wickman for Slate. Humans can't do that. This fact gives some researchers doubts that human hibernation will ever be a thing.

"I think it's probably not doable," H. Craig Heller, of Stanford University told Niiler. "The hibernator [animal] has evolved so that all the enzymes and biochemical systems are adapted to run at low temperature. That is not true of animals that don't experience it. We can lower body temperature and survive that for a short period of time; it's unlikely we can allow all of our systems to go to a much lower temperature and continue to function."

More research will offer a definitive answer, either way. However, we don't need studies to predict that no hibernating human will be as cute as this snoring dormouse: Snoring dormouse with sound - **Listen**

http://bit.ly/1FUYBwt

Is the Gaze from Those Big Puppy Eyes the Look of Your Doggie's Love?

Research finds that sustained eye contact between a dog and its owner causes oxytocin to spike in both - but not so in wolves. What it means remains to be seen

April 16, 2015 |By Julie Hecht

Unlike porcupines, dogs are a relatively hands-on (actually, paws-on) species, both with one another and with us. YouTube has numerous videos of dogs essentially saying, "Just keep petting me, please. Yes, that's it…more."

But this relationship is not one-sided. Many studies find that positive interactions between people and dogs can be beneficial for both species. Increases in β-

endorphin (beta-endorphin), oxytocin and dopamine - neurochemicals associated with positive feelings and bonding - have been observed in both dogs and people after enjoyable interactions like petting, play and talking. Essentially, interacting with a dog, particularly a known dog, can have some of the same psychophysiological markers as when two emotionally attached people spend time together.

But do certain types of interactions have an outsized impact? Dogs are incredibly attentive to human faces and, in some cases, even specific facial expressions. This seemingly routine, benign behavior - your dog turning to gaze on your beautiful face as you do his or hers - could actually hold a very important piece of the puzzle in our relationship with dogs, suggests a study published this week in Science.

The new study, by Miho Nagasawa of Azabu University in Japan and colleagues, builds on Nagasawa's previous work, published in Hormones and Behavior in 2009, that found owners and dogs sharing a long mutual gaze had higher levels of oxytocin in their urine than owners of dogs giving a shorter gaze. (Oxytocin, a humble peptide of nine amino acids that is sometimes called the "cuddle hormone," has been implicated in social bonding and is instrumental to the cascade of hormonal changes leading up to and following birth.) Nagasawa and her colleagues concluded that their finding was "a manifestation of attachment behavior." By describing it in this context, the researchers postulated that gaze between a dog and human (particularly a known human), will share similar properties to mother–infant relationships.

Nagasawa's new study investigates whether a dog's gazing behavior affected not just the owner's oxytocin concentrations but the dog's as well. In the first experiment the researchers collected urine from 30 dog-and-owner pairs before and after a 30-minute interaction. As in the earlier study, owners whose dogs showed the most gazing behavior had a notable increase in oxytocin concentration. But this time the researchers also found a similar increase in the neurochemical in the dogs.

A second experiment aimed to disentangle whether a causal relationship could be observed between mutual gaze and the release of oxytocin. Another set of 30 dogs was given an intranasal spray of either oxytocin or saline prior to interacting with people. They found that female dogs that sniffed oxytocin gazed longer at their owners than when given saline. As expected, this gazing also stimulated oxytocin secretion in the owner recipients of the gaze. The mutual effects were not seen between dogs and unfamiliar humans - and for reasons that require further investigation, they were not seen in male dogs and their owners. These sex differences were not observed in the first part of the experiment.

A story emerges - and probably one that will make dog lovers cheer: Mutual gaze between dogs and the people who care for them produces a very similar physiological profile to what's observed between mothers and infants. This overlap could both contribute to and facilitate our intense and deep-seated relationship with dogs.

Reflecting on her findings in an interview conducted via Skype, Nagasawa recommends that "dog owners not just say commands at their dogs, but to build up the relationship [and] consider the potentially beneficial role that mutual gaze can hold."

The paper feeds into an ongoing discussion among researchers about whether the biological synchronization observed between dogs and humans indicates "coevolution of human–dog bonds," as the title of the Science study suggests. Nagasawa and colleagues also investigated whether the increased oxytocin observed in dogs appears in hand-raised wolves that have interacted with a known human. The wolves, however, rarely held a gaze with the humans for more than a few moments. This divergence led the researchers to postulate that "dog-to-owner gaze as a form of social communications probably evolved during domestication" with humans.

Testing evolutionary theories (particularly coevolution) is notoriously tricky. Whereas it is exciting to include socialized wolves in these studies, differences between dogs and wolves should not necessarily be immediately followed by the tooting of a coevolutionary horn. Zsófia Virányi, a senior research scientist at the University of Veterinary Medicine, Vienna's Messerli Research Institute and a co-founder of the Wolf Science Center asks, "how much the differences we see are explained by evolutionary factors or differences in raising conditions."

Researchers are finding more examples of areas where wolves perform successfully in sociocognitive tasks with humans, including attending to our social cues. For example, in a recent study Virányi found that both dogs and wolves learned from human demonstrators. In a chapter in the edited volume, The Social Dog: Behavior and Cognition, by Juliane Kaminski and Sarah Marshall-Pescini, Virányi and her colleague Friederike Range reflect on the numerous hypotheses attempting to understand dog domestication. They suggest "dog–wolf differences do not mean, however, that domestication is either necessary or sufficient to explain humanlike behavior in dogs."

And then there's also the numbers game. Although 60 dogs contributed to the current investigation, the coevolution question was ultimately tackled with just five human-reared wolves. The study began with 11 wolves - but guess what?: It's hard to collect urine from a wolf. In one case a wolf's urine was collected two

hours after the desired time because the subject fell asleep - which is another way of saying the researchers maybe did not want to wake a sleeping wolf.

It would be useful to know more about the in-study behaviors of these five wolves. For example, were they exploring the novel environment where the testing took place or trying to get out, and could those factors contribute to why they did not orient toward their handlers? Virányi even wonders whether gaze would be the crucial factor in oxytocin effects between wolves and handlers. If other social exchanges besides gaze were tested, would a positive hormonal loop between wolves and humans appear? "It may not be fair to suggest the complete absence of an oxytocin-mediated positive loop in wolves as a species from these results," says Monique Udell, an assistant professor at Oregon State University who has investigated human–wolf interactions at the research and conservation organization, Wolf Park. "We know that maternal–offspring attachment is important to this species and many other nondomesticated animals and that humans and wolves can show attachment bonds." Additionally, wolf oxytocin levels, even before interacting with their handlers, are notably higher than that of all dogs tested. Maybe we simply haven't discovered all the details of wolf oxytocin mechanisms yet.

In other words, don't count wolves, or other species, out just yet. "I'm not convinced that this is something dog-specific," Virányi adds. "The oxytocin system is so ancient that if socialization is there, then you can easily put a member of another species into these contexts."

http://nyti.ms/1Ipzl4o

Generic Version of Copaxone, Multiple Sclerosis Drug, Is Approved

The Food and Drug Administration on Thursday approved the first generic substitute for Copaxone, a widely used drug for multiple sclerosis and the biggest-selling product for Teva Pharmaceutical Industries.

By ANDREW POLLACK APRIL 16, 2015

The approval of the generic, which was developed by the team of Sandoz and Momenta Pharmaceuticals - could bring some price competition to the market for multiple sclerosis drugs. Prices for those drugs have tripled in the last several years, to over $60,000 a year, even as more products have come to market.

"It's the inverse of what you normally expect when there is competition," said Dr. Dennis N. Bourdette, chairman of neurology at Oregon Health and Science University. "There's no apparent reason for the skyrocketing prices of those drugs, aside from that we have no cost controls in this country."

Dr. Bourdette welcomed the generic, but said its impact would depend on its price. Citing competitive reasons, Momenta and Sandoz declined to say when the generic version would go on sale and how much it would cost.

When there are many generic competitors, prices can drop as much as 90 percent. But when there is only one generic, as is the case so far with Copaxone, the discount to the brand-name product is typically much smaller.

Even though about 10 drugs are now approved to treat multiple sclerosis, none of them has had a generic equivalent with the exception of mitoxantrone, which is not widely used. It is possible that the introduction of generic Copaxone could help keep prices of all the drugs in check.

Multiple sclerosis is a nerve disease that can cause problems like blurred vision and difficulty walking.

Teva is the largest manufacturer of generic drugs in the world and has often challenged the tactics used by brand-name drug companies to stave off generic competition.

But with Copaxone, which is a brand-name product, Teva has resorted to many of those same tactics. That is because Copaxone had sales of $4.2 billion last year, accounting for 21 percent of Teva's revenue and nearly half its profit.

About $3.1 billion of those sales were in the United States, where Copaxone is the most widely used multiple sclerosis drug, accounting for about 30 percent of prescriptions.

Teva began selling a more concentrated formulation of Copaxone that requires an injection only three times a week instead of once a day and has a longer patent life. It began an aggressive campaign to get patients to switch, calling them and treating them to dinners. It also priced the new version lower than the old one.

About two-thirds of patients using Copaxone have already switched to the new version and might be reluctant to switch to the generic, which is a copy of the original Copaxone and would require them to inject themselves every day again.

Teva has also filed eight petitions with the F.D.A. arguing that Copaxone, known generically as glatiramer acetate, has such a complex composition that it is impossible to copy exactly, and that subtle differences might harm patients. Copaxone is made of four different amino acids linked in chains of various size and sequence. It is not exactly clear how the drug works.

The F.D.A. on Thursday posted a detailed response to Teva's arguments and sought to assuage any such concerns.

"Before approving this generic product, given its complexity, we reviewed additional information to make sure that the generic product is as safe and effective as the brand-name product," Dr. Janet Woodcock, the director of the agency's drug division, said in a statement.

Copaxone was first approved in 1996 and sold for about $9,000 a year. Momenta and Sandoz, which is the generic division of Novartis, first applied for approval at the end of 2007 and had hoped to have it before now.

Craig A. Wheeler, the chief executive of Momenta, said the delay, which gave Teva more time to switch patients to the newer version of drug, "certainly gives us a higher hill to climb to bring this product up to what we had hoped for originally."

He said he did not expect many patients taking Teva's three-times-a-week version to switch back to the once-a-day version, though some insurers might try to bring that about. However, he said, insurers might insist new patients try the generic first instead of any other drug.

"We think there is really substantial demand across the board for getting a lower-cost generic product into the marketplace here," he said.

Teva has a patent on Copaxone that lasts until Sept. 1. It was invalidated last year by a federal appeals court. But in January the Supreme Court sent the case back to the appellate court to reconsider.

It seems likely that Sandoz and Momenta will wait until that decision before starting to sell their drug, or wait until September if the appeals court upholds the patent.

In an unusual move, Sandoz and Momenta gave their generic drug a brand name, Glatopa, suggesting they might actively market the drug, in addition to relying on substitution at the pharmacy, which is how most generic drugs are sold.

Mylan, a leading generic manufacturer, and Synthon, a Dutch company, are also trying to win approval for generic versions of Copaxone.

Correction: April 18, 2015

An article on Friday about approval of a generic version of a drug to treat multiple sclerosis misstated the availability of generic versions of drugs to treat that disease. Generic versions are available for mitoxantrone, which is approved for treatment of multiple sclerosis but is not widely used; it is not the case that there are no generic versions of multiple sclerosis drugs.

http://www.eurekalert.org/pub_releases/2015-04/uoc-eo041615.php

Effectiveness of new stroke treatment confirmed

Endovascular therapy (ET) for ischemic stroke is the best treatment option for many patients

A research paper published in the New England Journal of Medicine (NEJM) today confirms earlier findings that a procedure called endovascular therapy (ET) for ischemic stroke is the best treatment option for many patients by reducing the incidents of disability. This is the fourth research paper published this year that confirms the efficacy of the treatment.

"Endovascular treatment using stent retrievers will become the standard of care for patients with acute ischemic stroke" says Dr. Mayank Goyal, University of Calgary, Cumming School of Medicine, Hotchkiss Brain Institute (HBI) and Department of Radiology.

The paper was co-authored by Goyal and Dr. Jeffrey Saver, Professor of Neurology, Geffen School of Medicine at UCLA and Director, UCLA Comprehensive Stroke Center.

Overall, positive outcomes for patients increased from 35 per cent to 60 per cent.

The clinical trial is known by the acronym SWIFT-PRIME. (Solitaire with the Intention for Thrombectomy as Primary Endovascular Treatment) randomized 196 patients to receive either t-PA, a clot busting drug or tPA plus ET.

The study had 39 participating sites in the United States and Western Europe.

ET is performed by inserting a thin tube into the artery in the groin, through the body, and into the brain vessels to the clot.

This is done under image-guided care using an X-ray.

The clot is then removed by a retrievable stent and pulled out, restoring blood flow to the brain.

This is the second NEJM publication for Goyal this year.

In February Goyal, along with HBI and Department of Clinical Neuroscience members Drs. Michael Hill and Andrew Demchuk, led an international stroke trial showing that ET for ischemic stroke victims dramatically improved outcome.

The trial known as ESCAPE (Endovascular treatment for Small Core and Anterior circulation Proximal occlusion with Emphasis on minimizing CT to recanalization times), showed positive outcomes for patients increased from 30 per cent to 55 per cent.

In many cases, instead of suffering major neurological disability, patients went home to resume their lives. The overall mortality rate was reduced from two in 10 patients for standard treatment of care to one in 10 patients - a 50 per cent reduction with ET.

ESCAPE was led by the HBI along with the departments of clinical neurosciences and radiology at the Cumming School of Medicine. ESCAPE had 316 patients, at 22 sites in five countries.

Eleven of these sites were in Canada.

As a result of all four publications, policy makers are now in the process of rewriting international clinical care guidelines for stroke care.

The study was sponsored by Medtronic - who produce the Solitaire clot retrieving device.

http://www.eurekalert.org/pub_releases/2015-04/esfm-egt041415.php

Evidence grows that melanoma drugs benefit some lung cancer patients

Many patients with BRAF-mutant cancers benefit from treatment with BRAF inhibitors, European researchers report at ELCC

Geneva, Switzerland, 17 April 2015 - A subset of lung cancer patients can derive important clinical benefits from drugs that are more commonly used to treat melanoma, the authors of a new academic clinical trial in Europe have reported at the European Lung Cancer Conference (ELCC) in Geneva, Switzerland.

Dr. Oliver Gautschi, a medical oncologist from Lucern Cantonal Hospital in Switzerland, presented the results of the retrospective EURAF cohort study, which included lung cancer patients whose tumours carried specific mutations in the BRAF gene. The study was conducted by a network of European oncologists, without company involvement.

BRAF mutations are commonly seen in melanoma patients, and are found in about 2% of lung adenocarcinomas, Gautschi explains. Several inhibitors of the B-Raf protein, including vemurafenib and dabrafenib, have been developed for use in melanoma patients, however there is currently no approved drug for BRAF-mutant lung cancer.

As a result, experience with B-Raf inhibitors in lung cancer remains limited. "In the current study, we wanted to find out how many patients in Europe received B-Raf inhibitors outside of a clinical trial, and what their outcomes were," Gautschi says.

The EURAF study gathered information on 35 lung cancer patients who had been identified as carrying BRAF mutations, who were treated with B-Raf inhibitors between 2012 and 2014. Most of those patients received vemurafenib,, some dabrafenib, and one sorafenib. Overall response rate was 53% as measured by the widely used Response Evaluation Criteria In Solid Tumors (RECIST) guidelines. Overall, progression-free survival time in this group was 5 months.

Most patients were pretreated, and not eligible for enrolment in a clinical trial, which means these results are encouraging, the researchers say, although the study's small size and retrospective nature mean the analysis of the magnitude of benefit should be treated cautiously.

"The bottom line is that clinicians should be sure to test patients for so-called 'rare' driver mutations in lung cancer, because individual patients may derive substantial benefit from targeted therapy," says Gautschi.

Commenting on the findings, Dr David Planchard, pulmonary oncologist at Gustave Roussy in Villejuif, France, said that the results of the trial confirm the benefit of B-Raf inhibitors in BRAF-mutant non-small cell lung cancer. The current trial also confirmed the good tolerance of the drugs with no new side-effects, he said. Planchard and colleagues have presented a separate phase II study in this area with dabrafenib.

"This trial is important because due to the low frequency of this mutation in non-small cell lung cancer we will have few trials on this population," Planchard commented. "The more data we have, the better we understand how important it is to test for the mutation, especially in adenocarcinomas, and to expose mutation-positive patients to a specific B-Raf inhibitor."

The results also add to growing support for the approval of B-Raf inhibitors for use in lung cancer, Planchard added. This is important because the rarity of this mutation means that performing the kind of randomized phase III trials usually required for licensing approval will be extremely difficult, he noted.

Looking ahead, it will also be important to see results of combination therapy with inhibitors of B-Raf and a related protein, Mek, in non-small cell lung cancer carrying BRAF-V600E mutations, the researchers note, as this combination has shown a higher clinical benefit in BRAF-mutant melanoma.

http://www.eurekalert.org/pub_releases/2015-04/uocf-kwa041715.php

Kids with ADHD must squirm to learn, study says

Research links hyperactivity to working memory

For decades, frustrated parents and teachers have barked at fidgety children with ADHD to "Sit still and concentrate!"

But new research shows that if you want ADHD kids to learn, you have to let them squirm. The foot-tapping, leg-swinging and chair-scooting movements of children with attention-deficit/hyperactivity disorder are actually vital to how they remember information and work out complex cognitive tasks, according to a study published in an early online release of the Journal of Abnormal Child Psychology.

The findings show the longtime prevailing methods for helping children with ADHD may be misguided.

"The typical interventions target reducing hyperactivity. It's exactly the opposite of what we should be doing for a majority of children with ADHD," said one of the study's authors, Mark Rapport, head of the Children's Learning Clinic at the University of Central Florida. "The message isn't 'Let them run around the room,' but you need to be able to facilitate their movement so they can maintain the level of alertness necessary for cognitive activities."

The research has major implications for how parents and teachers should deal with ADHD kids, particularly with the increasing weight given to students' performance on standardized testing. The study suggests that a majority of

students with ADHD could perform better on classroom work, tests and homework if they're sitting on activity balls or exercise bikes, for instance.

The study at the UCF clinic included 52 boys ages 8 to 12. Twenty-nine of the children had been diagnosed with ADHD and the other 23 had no clinical disorders and showed normal development.

Each child was asked to perform a series of standardized tasks designed to gauge "working memory," the system for temporarily storing and managing information required to carry out complex cognitive tasks such as learning, reasoning and comprehension.

Children were shown a series of jumbled numbers and a letter that flashed onto a computer screen, then asked to put the numbers in order, followed by the letter. A high-speed camera recorded the kids, and observers recorded their every movement and gauged their attention to the task.

Rapport's previous research had already shown that the excessive movement that's a trademark of hyperactive children - previously thought to be ever-present - is actually apparent only when they need to use the brain's executive brain functions, especially their working memory.

The new study goes an important step further, proving the movement serves a purpose. "What we've found is that when they're moving the most, the majority of them perform better," Rapport said. "They have to move to maintain alertness."

By contrast, the children in the study without ADHD also moved more during the cognitive tests, but it had the opposite effect: They performed worse.

In addition to Rapport, the study was co-authored by Dustin Sarver of the University of Mississippi Medical Center, Michael Kofler of Florida State University, Lauren Friedman of the University of Central Florida, and Joe Raiker of Florida International University.

http://www.eurekalert.org/pub_releases/2015-04/tmsh-mss041715.php

Mount Sinai scientists find unprecedented microbial diversity in isolated Amazonian tribe

The most diverse collection of bacteria yet in humans

Scientists from the Icahn School of Medicine, collaborating with a multicenter team of U.S. and Venezuelan researchers, have discovered the most diverse collection of bacteria yet in humans among an isolated tribe of Yanomami Amerindians in the remote Amazonian jungles of Venezuela.

Bacterial diversity in the Yanomami, previously unexposed to antibiotics or industrialized diets, was found to be nearly double that of people living in industrialized countries, and was also significantly higher than in other remote populations moderately exposed to modern practices.

The team published its findings today in the journal Science Advances.

The results suggest that antibiotic usage or western diet are linked to the reduced bacterial diversity observed in modern societies, and that this loss of diversity happens quickly upon initial exposure to those practices. "There is a gradient of bacterial diversity that appears to be inversely correlated with exposure to modern practices, such as antibiotics, C-section, or processed foods," said Jose C. Clemente, PhD, Assistant Professor of Genetics and Genomics at the Icahn School of Medicine at Mount Sinai and first author of the study. "Even minimal exposure to these practices greatly decreases diversity and removes potentially beneficial bacteria from our microbiome."

To date, the vast majority of studies on the human microbiome - the trillions of bacteria harbored in the body that are essential to our well-being - have focused on Western populations. "Characterizing the bacterial communities of non-Western, unexposed populations is essential to understand how the microbiome changes and adapts to westernization," said Dr. Clemente, "and how those changes might be driving the increased incidence of diseases linked to imbalances in the microbiome."

The Yanomami villagers of this study, who have subsisted as hunters-and-gatherers for hundreds of generations, are believed to have lived in total seclusion from Western civilization until 2009 when they were first contacted by a medical expedition. Among a rare population of people unexposed to modern antibiotics, the villagers offer a unique window onto the human microbiome.

"We have found unprecedented diversity in fecal, skin, and oral samples collected from the Yanomami villagers," said Maria Dominguez-Bello, PhD, Associate Professor of Medicine at NYU Langone Medical Center and the senior author of the study. "Our results bolster a growing body of data suggesting a link between, on the one hand, decreased bacterial diversity, industrialized diets, and modern antibiotics, and on the other, immunological and metabolic diseases - such as obesity, asthma, allergies, and diabetes, which have dramatically increased since the 1970s," said Dr. Dominguez-Bello.

The analysis of gut and oral bacteria also revealed that the Yanomami villagers had bacteria encoding antibiotic resistance genes, despite their lack of previous exposure to antibiotics. Surprisingly, the bacterial genes conferred resistance not only to natural antibiotics, such as those produced by soil microbes, but also to synthetic antibiotics.

"During the 1940s and 1950s, in the heyday of pharmaceutical antibiotic development, most antibiotics were derived from naturally occurring bacteria in the soil," said co-author Gautam Dantas, PhD, Associate Professor of Pathology, Immunology, and Biomedical Engineering at Washington University School of Medicine. "So, we would expect that natural resistance to antibiotics would

emerge over millions of years of evolution," he said. "We didn't expect to find resistance to modern synthetic antibiotics." The presence of resistance genes in microbiota unexposed to antibiotics may help explain the rapid rate at which bacteria develop resistance to new classes of antibiotics, noted Dr. Dantas.

"The results from this study have given us a much better understanding of our microbial past," said Dr. Clemente. "Characterizing now the functions encoded in those bacteria that we are missing will provide further insights into the mechanisms behind these immune and metabolic conditions, and potentially guide us in the development of new therapeutics."

http://www.eurekalert.org/pub_releases/2015-04/esfm-oi4041515.php

One in 4 advanced lung cancer patients started on firstline treatment before EGFR test results available

Lack of test results may impact treatment effectiveness and survival, survey in

Geneva, Switzerland - Almost one in four patients (24%) with advanced lung cancer in Europe, Asia and the US are not receiving EGFR test results before being started on treatment, researchers report at the European Lung Cancer Conference.

Medical Oncologist James Spicer from King's College London at Guy's Hospital, London, and colleagues studied how widely hospitals had implemented testing for mutations in the **e**pidermal **g**rowth **f**actor **r**eceptor gene among lung cancer patients.

Targeted therapies can more effectively treat cancers that are known to carry such mutations, Dr Spicer said. However anecdotal evidence had suggested the tests required to clarify a patient's status were not always been conducted, Dr Spicer said.

"The arrival of a new group of targeted EGFR inhibitors for the treatment of lung cancer driven by mutations in the EGFR gene has brought with it a new requirement for diagnostic laboratories to implement genetic testing," he explained. "For many institutions this has represented a significant departure from traditional pathology, which had previously focused only on microscopic examinations of tumour tissue."

"The new skills and investment required to deliver this new molecular pathology have understandably taken time to become universally available. Furthermore, the new clinical data underlying these developments has mandated a change in clinical practice, particularly the adoption of new treatment approaches in newly diagnosed patients?, and these changes have been adopted with variable speed around the world."

Ideally, all patients with non-small cell lung cancer of non-squamous histology who are fit for treatment of advanced disease should undergo EGFR mutation tests, Dr Spicer explained. This should be done in a timely manner so as not to delay first line treatment choices.

To examine the real-world situation, he and colleagues conducted an online survey of 562 oncologists in 10 countries (Canada, France, Germany, Italy, Japan, South Korea, Spain, Taiwan, UK and USA) between December 2014 and January 2015. "We found that globally almost one in four patients are tested but results are not available at the time the treatment decision is made," Dr Spicer said.

"Not only were some suitable patients not tested at all for tumour EGFR mutations, some patients did undergo testing, but the treatment decision about whether to give an EGFR inhibitor or chemotherapy as first line treatment was taken without reference to the result."

For some patients, not being tested may adversely affect their treatment outcomes, Dr Spicer said. "Indeed, some recent clinical trial evidence suggests that this may even be compromising access to treatment that is associated with an overall survival benefit."

Commenting on the study, Professor Silvia Novello from the Department of Oncology at the University of Turin, Italy, said a particular strength of the study was its international nature. She said it was interesting that the authors were able to show that EGFR mutation testing was requested prior to first line therapy in 81% of patients with stage IIIb/IV non-small cell lung cancer and that results were demonstrated to be available before administration of treatment in 77% of cases. She noted that interpretation of the findings is limited by the fact that it is a survey-based report rather than an observational trial.

Respondents to the survey said a lack of sufficient tissue, a long turn-around time for testing and the poor performance status of the patient were among the reasons for non-testing and non respecting completely the IASLC guidelines. "The first two reasons are partially related to an incomplete integration of multidisciplinary oncology teams, while the third one can be attributed to an imperfect knowledge of data regarding the use of EGFR inhibitors," Professor Novello said.

http://www.bbc.com/news/technology-32353655

'Eternal' camera can take pictures forever

A camera powered by the light it uses to take pictures has been invented by American scientists.

The camera generates power by converting some of the light falling on its sensor into electricity that is then used to take a snap.

Theoretically the self-powered device could take a picture every second, forever.

The camera's creators are now refining the device and are looking into ways to commercialise the technology.

Combined sensor

"We are in the middle of a digital imaging revolution," said Prof Shree Nayar, director of the computer vision laboratory at Columbia University in New York who invented the device. "A camera that can function as an untethered device forever - without any external power supply - would be incredibly useful."

Currently the images taken by the camera are very crude and grainy

Prof Nayar said the route to creating the device opened up when he realised that solar panels and digital cameras use almost the same component, known as a photodiode, to handle light. Working with engineers, Prof Nayar managed to create a photodiode that combined the light-sensing abilities of a camera with the power-converting properties seen in solar panels.

The next step was to use lots of the combined photodiodes to form a grid that both senses the intensity of light falling on it and converts some of that illumination into power that captures an image.

The prototype sensor grid is just 30 by 40 pixels in size and currently takes grainy black and white images. To demonstrate its abilities, Prof Nayar and colleagues used their self-powered camera to shoot a short film.

Prof Nayar told the BBC that the next step in development was to make a self-powered, solid-state image sensor with many more pixels that could then be used to produce a standalone camera that could be used anywhere.

The self-powering sensor could also be used to lower the power consumption needs of smartphones and other gadgets, he said, or, when not being used to take pictures, could also function as an in-built power generator.

http://bit.ly/1FWIxdM

Levitating Train Breaks Speed Record in Japan

Turbo-swift floating trains sound like a thing of the future, but in Japan they're already out there breaking records.

On Thursday, a maglev bullet train hit 366 miles per hour - the fastest train speed ever recorded. The locomotive, made by the company JR Central, is able to move so fast because it radically cuts down on friction with magnetics that lift the train nearly four inches off the tracks. And it's super efficient, too: instead of relying on a fossil fuel-powered engine, the train is propelled forward by electrified coils that create a magnetic field.

But the record might not stand for long. Vox reports:

Company officials say the train can go even faster, and predict it could hit 372 mph during another test next week. It should eventually be used for a new line that will connect Tokyo and Nagoya, with trains routinely traveling as fast as 313 mph, cutting travel time to 40 minutes.

While maglev trains are also being developed in Germany and California has plans in the works for a high-speed rail that will be capable of speeds up to 200 mph, JR Central's train beats out the fastest trans we currently have in the U.S. by a longshot.

From Vox:

By comparison, the fastest currently operating train in the US is Amtrak's Acela, which runs at 150 mph for very brief segments of track in Massachusetts and Rhode Island. However, the majority of the Northeast line runs at 110 mph or slower, and most other parts of Amtrak's network run at decidedly lower speeds.

The Wall Street Journal reports that JR Central wants to help us slow-moving Americans along, by implementing their technology in a rail between New York and Washington. All aboard!