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New research sheds light on end of Snowball Earth period

Second Cryogenian ice age ended with regular advances and retreats of the ice

The second ice age during the Cryogenian period was not followed by the sudden and chaotic melting-back of the ice as previously thought, but ended with regular advances and retreats of the ice, according to research published by scientists from the University of Birmingham in the journal Nature Geoscience today (24 August 2015). The researchers also found that the constant advance and retreat of ice during this period was caused by the Earth wobbling on its axis.

These ice ages are explained by a theory of Snowball Earth, which says that they represent the most extreme climatic conditions the world has ever known and yet they ended quite abruptly 635 million years ago. Little was known about how they ended - until now.

For the study, the scientists analysed sedimentary rocks from Svalbard, Norway that were laid down in that ice age. The deposits preserved a chemical record which showed high levels of CO2 were present in the atmosphere. Carbon dioxide was low when the ice age started, and built up slowly over millions of years when the whole Earth was very cold - this period is represented only by frost-shattered rubble under the sediments.

Eventually the greenhouse warmth in the atmosphere from carbon dioxide caused enough melting for glaciers to erode, transport and deposit sediment. The sedimentary layers showed ice retreat and advance as well as cold arid conditions. They reveal a time when glacial advances alternated with even more arid, chilly periods and when the glaciers retreated, rivers flowed, lakes formed, and yet simple life survived.

As theory predicts, this icy Earth with a hot atmosphere rich in carbon dioxide had reached a 'Goldilocks' zone - too warm to stay completely frozen, too cold to lose its ice, but just right to record more subtle underlying causes of ancient climate change.

The geological researchers invited a French group of physicists who produce sophisticated climate models to test their theory that the advances and retreats of ice during this period were caused by the Earth wobbling on its axis in 20,000 year periods. The rocks and the models agreed: slight wobbles of the Earth on its spin axis caused differences in the heat received at different places on the Earth's surface. These changes were small, but enough over thousands of years to cause a change in the places where snow accumulated or melted, leading the glaciers to advance and retreat. During this time the whole Earth would have looked like the Dry Valley regions of Antarctica - a very dry landscape, with lots of bare ground, but also containing glaciers up to 3 km thick.

Professor Ian Fairchild, lead investigator from the University of Birmingham's School of Geography, Earth and Environmental Sciences, said: 'We now have a much richer story about what happened at the end of the Snowball Earth period. The sediment analysis has given us a unique window on what happened so many millions of years ago. We know that the Earth's climate is controlled by its orbit, and we can now see the effect of that in this ancient ice age too.'

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Research may solve lunar fire fountain mystery

Tiny beads of volcanic glass found on the lunar surface during the Apollo missions are a sign that fire fountain eruptions took place on the Moon's surface.

PROVIDENCE, R.I. [Brown University] - Now, scientists from Brown University and the Carnegie Institution for Science have identified the volatile gas that drove those eruptions.

Fire fountains, a type of eruption that occurs frequently in Hawaii, require the presence of volatiles mixed in with the erupting lava. Volatile compounds turn into gas as the lavas rise from the depths. That expansion of that gas causes lava to blast into the air once it reaches the surface, a bit like taking the lid of a shaken bottle of soda.

"The question for many years was what gas produced these sorts of eruptions on the Moon," said Alberto Saal, associate professor of earth, environmental, and planetary sciences at Brown and corresponding author of the new research. "The gas is gone, so it hasn't been easy to figure out."

The research, published in Nature Geoscience, suggests that lava associated with lunar fire fountains contained significant amounts of carbon. As it rose from the lunar depths, that carbon combined with oxygen to make substantial amounts carbon monoxide (CO) gas. That CO gas was responsible for the fire fountains that sprayed volcanic glass over parts of the lunar surface.

For many years, the Moon was thought to be devoid of volatiles like hydrogen and carbon. It wasn't until the last decade or so that volatiles were definitively detected in lunar samples. In 2008, Saal and colleagues detected water in lunar volcanic beads. They followed that discovery with detections of sulfur, chlorine and fluorine. While it became apparent that the Moon was not completely depleted of volatiles as was once thought, none of the volatiles that had been detected were consistent with fire fountain eruptions. For example, if water had been the driving force, there should be mineralogical signatures in recovered samples. There are none.

For this research, Saal and his colleagues carefully analyzed glass beads brought back to Earth from the Apollo 15 and 17 missions. In particular, they looked at

samples that contained melt inclusions, tiny dots of molten magma that became trapped within crystals of olivine. The crystals trap gases present in the magma before they can escape.

Although other volatiles were previously detected in the lunar volcanic glasses and melt inclusions, the measurement of carbon remained elusive due to the high detection limits of the available analytical techniques. Erik Hauri from Carnegie Institution for Science developed a state-of-the-art ion probe technique reducing the detection limits of carbon by two orders of magnitude. That allows a measurement of as low as 0.1 part per million.

"This breakthrough depended on the ability of Carnegie's NanoSIMS ion probe to measure incredibly low levels of carbon, on objects that are the diameter of a human hair," said Hauri. "It is really a remarkable achievement both scientifically and technically."

The researchers probed the melt inclusions using secondary ion mass spectroscopy. They calculated that the samples contained initially 44 to 64 parts per million carbon. Having detected carbon, the researchers devised a theoretical model of how gases would escape from lunar magma at various depths and pressures, calibrated from the results of high-pressure lab experiments. The model had long been used for Earth. Saal and colleagues changed several parameters to match the composition and conditions affecting lunar magma.

The model showed that carbon, as it combines with oxygen to form CO gas, would have degassed before other volatiles.

"Most of the carbon would have degassed deep under the surface," Saal said. "Other volatiles like hydrogen degassed later, when the magma was much closer to the surface and after the lava began breaking up into small globules. That suggests carbon was driving the process in its early stages."

In addition to providing a potential answer to longstanding questions surrounding lunar fire fountains, the findings also serve as more evidence that some volatile reservoirs in the Moon's interior share a common origin with reservoirs in the Earth, the researchers say.

The amount of carbon detected in the melt inclusions was found to be very similar to the amount of carbon found in basalts erupted at Earth's mid-ocean ridges. Saal and his colleagues have shown previously that Earth and the Moon have similar concentrations of water and other volatiles. They have also shown that hydrogen isotope ratios from lunar samples are similar to that of Earth.

If volatile reservoirs on the Earth and Moon do indeed share a common source, it has implications for understanding the Moon's origin. Scientists believe the Moon formed when Earth was hit by a Mars-size object very early in its history. Debris from that impact accreted to form the Moon.

"The volatile evidence suggests that either some of Earth's volatiles survived that impact and were included in the accretion of the Moon or that volatiles were delivered to both the Earth and Moon at the same time from a common source -- perhaps a bombardment of primitive meteorites," Saal said.

Other authors on the paper were Diane Wetzel, a graduate student at Brown, and Malcolm Rutherford, professor of geological sciences. The study was supported by NASA's LASER program (NNX08AY97G and NNX11AB27G), NASA's Cosmochemistry program (NNX12AH62G), the Deep Carbon Observatory, and the Carnegie Institution of Washington.

http://www.eurekalert.org/pub_releases/2015-08/tjnj-ppu082015.php

Primary prevention use of statins increases among the oldest old

Statin use for primary prevention in patients without vascular disease older than 79 increased between 1999 and 2012

The use of statins for primary prevention in patients without vascular disease older than 79 increased between 1999 and 2012, although there is little randomized evidence to guide the use of these cholesterol-lowering medications in this patient population, according to a research letter published online by JAMA Internal Medicine.

Michael E. Johansen, M.D., M.S., of Ohio State University, Columbus, and Lee A. Green, M.D., M.P.H., of the University of Alberta, Canada, investigated the use of statins among this population by vascular disease because the very elderly have the highest rate of statin use in the United States, according to the study.

The authors analyzed data from the 1999-2012 Medical Expenditure Panel Survey, which is nationally representative of the general population each year. The analysis included all individuals older than 79. Primary prevention was defined as individuals without vascular disease (coronary heart disease [CHD], stroke or peripheral vascular disease). Secondary prevention was defined as individuals with vascular disease, which increased in 2007 after questions regarding CHD and stroke were asked more frequently. The study sample included 13,099 individuals.

The authors found rates of vascular disease in the population increased from 27.6 percent in 1999-2000 to 43.7 percent in 2011-2012. The rate of statin use among individuals taking them for primary prevention increased from 8.8 percent in 1999-2000 to 34.1 percent in 2011-2012, according to the results.

The authors note the proportion of patients using atorvastatin peaked in 2005-2006 and then steadily declined, while the proportion using simvastatin was steady until 2007-2008 when it started to rise. The percentage of statin users taking rosuvastatin steadily increased after its introduction, the author report.

"Although the medical community has embraced the use of statins for primary prevention in the very elderly, caution should be exercised given the potential

dangers of expanding marginally effective treatments to untested populations," the authors conclude.

(JAMA Intern Med. Published online August 24, 2015. doi:10.1001/jamainternmed.2015.4302. 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

http://www.eurekalert.org/pub_releases/2015-08/asfm-ima082415.php

Is MERS another SARS: The facts behind Middle East Respiratory Syndrome

While MERS infects fewer people, it has higher mortality and is more specific

Atlanta, GA - Experts show that while Middle East Respiratory Syndrome (MERS-CoV), a viral respiratory illness, is infecting less people, it has a higher mortality rate and affects a specific target population when compared to Severe Acute Respiratory Syndrome (SARS-CoV). This research is being presented at the International Conference on Emerging and Infectious Diseases in Atlanta, Georgia.

"The research conducted in this study focuses on understanding what population of individuals are most likely to become infected by MERS-CoV, compared to the population infected by SARS-CoV," said Charis Royal from Arizona State University. Understanding the population dynamics of the infected cases in both diseases can lead to understanding how the new disease will spread and if it can be compared to the SARS-CoV.

"An unusually high number of MERS-CoV cases are males with a median age of 50 years old, who have multiple chronic conditions," said Royal. " SARS-CoV, on the other hand, infects males and females nearly equally and both healthy and unhealthy individuals can be infected" she added. Both diseases spread rapidly in hospitals and hospital workers account for around 21% of infections in both SARS-CoV and MERS-CoV.

In 2003, multi-country outbreak of Severe Acute Respiratory Syndrome (SARS-CoV) left over 8000 people infected and had a death toll of over 700. In 2012, the novel coronavirus, MERS-CoV, which is related to SARS-CoV3, was first reported in Saudi Arabia. Over the last three years, MERS-CoV has spread to 14 different countries and infected more than 1300 individuals.

Data from the research was gathered through the World Health Organization summary reports for MERS-CoV and the cumulative data reports for the 2003 SARS-CoV outbreak.

This research was presented as part of the 2015 International Conference on Emerging and Infectious Diseases held August 24 - 26 in Atlanta, Georgia.

http://nyti.ms/1EnQxK1

No, You Do Not Have to Drink 8 Glasses of Water a Day

If there is one health myth that will not die, it is this: You should drink eight glasses of water a day.

Aaron E. Carroll

It's just not true. There is no science behind it.

And yet every summer we are inundated with news media reports warning that dehydration is dangerous and also ubiquitous.

These reports work up a fear that otherwise healthy adults and children are walking around dehydrated, even that dehydration has reached epidemic proportions.

Let's put these claims under scrutiny.

I was a co-author of a paper back in 2007 in the BMJ on medical myths. The first myth was that people should drink at least eight 8-ounce glasses of water a day. This paper got more media attention (even in The Times) than pretty much any other research I've ever done.

It made no difference. When, two years later, we published a book on medical myths that once again debunked the idea that we need eight glasses of water a day, I thought it would persuade people to stop worrying. I was wrong again.

Many people believe that the source of this myth was a 1945 Food and Nutrition Board recommendation that said people need about 2.5 liters of water a day. But they ignored the sentence that followed closely behind. It read, "Most of this quantity is contained in prepared foods."

Water is present in fruits and vegetables. It's in juice, it's in beer, it's even in tea and coffee. Before anyone writes me to tell me that coffee is going to dehydrate you, research shows that's not true either.

Although I recommended water as the best beverage to consume, it's certainly not your only source of hydration. You don't have to consume all the water you need through drinks. You also don't need to worry so much about never feeling thirsty. The human body is finely tuned to signal you to drink long before you are actually dehydrated.

Contrary to many stories you may hear, there's no real scientific proof that, for otherwise healthy people, drinking extra water has any health benefits. For instance, reviews have failed to find that there's any evidence that drinking more water keeps skin hydrated and makes it look healthier or wrinkle free. It is true that some retrospective cohort studies have found increased water to be associated with better outcomes, but these are subject to the usual epidemiologic problems, such as an inability to prove causation. Moreover, they defined "high" water consumption at far fewer than eight glasses.

Prospective studies fail to find benefits in kidney function or all-cause mortality when healthy people increase their fluid intake. Randomized controlled trials fail to find benefits as well, with the exception of specific cases — for example, preventing the recurrence of some kinds of kidney stones. Real dehydration, when your body has lost a significant amount of water because of illness, excessive exercise or sweating, or an inability to drink, is a serious issue. But people with clinical dehydration almost always have symptoms of some sort.

A significant number of advertisers and news media reports are trying to convince you otherwise. The number of people who carry around water each day seems to be larger every year. Bottled water sales continue to increase.

This summer's rash of stories was inspired by a recent study in the American Journal of Public Health. Researchers used data from the National Health and Nutrition Examination Survey from 2009 to 2012 to examine 4,134 children ages 6 to 19. Specifically, they calculated their mean urine osmolality, which is a measure of urine concentration. The higher the value, the more concentrated the urine.

They found that more than half of children had a urine osmolality of 800 mOsm/kg or higher. They also found that children who drank eight ounces or more of water a day had, on average, a urine osmolality about 8 mOsm less than those who didn't. So if you define "dehydration" as a urine osmolality of 800 mOsm/kg or higher, the findings of this study are really concerning. This article did. The problem is that most clinicians don't.

I'm a pediatrician, and I can tell you that I have rarely, if ever, used urine osmolality as the means by which I decide if a child is dehydrated. When I asked colleagues, none thought 800 mOsm/kg was the value at which they'd be concerned. And in a web search, most sources I found thought values up to 1,200 mOsm/kg were still in the physiologically normal range and that children varied more than adults. None declared that 800 mOsm/kg was where we'd consider children to be dehydrated.

In other words, there's very little reason to believe that children who have a spot urine measurement of 800 mOsm/kg should be worried. In fact, back in 2002, a study was published in the Journal of Pediatrics, one that was more exploratory in nature than a look for dehydration, and it found that boys in Germany had an average urine osmolality of 844 mOsm/kg. The third-to-last paragraph in the paper recounted a huge number of studies from all over the world finding average urine mOsm/kg in children ranging from 392 mOsm/kg in Kenya to 964 in Sweden.

That hasn't stopped more recent studies from continuing to use the 800 mOsm/kg standard to declare huge numbers of children to be dehydrated. A 2012 study in the Annals of Nutrition and Metabolism used it to declare that almost two-thirds of French children weren't getting enough water. Another in the journal Public Health Nutrition used it to declare that almost two-thirds of children in Los Angeles and New York City weren't getting enough water. The first study was funded by Nestlé Waters; the second by Nestec, a Nestlé subsidiary.

It's possible that there are children who need to be better hydrated. But at some point, we are at risk of calling an ordinary healthy condition a disease. When two-thirds of healthy children, year after year, are found to have a laboratory value that you are labeling "abnormal," it may be the definition, and not their health, that is off.

None of this has slowed the tidal push for more water. It has even been part of Michelle Obama's "Drink Up" campaign. In 2013, Sam Kass, then a White House nutritional policy adviser, declared "40 percent of Americans drink less than half of the recommended amount of water daily."

There is no formal recommendation for a daily amount of water people need. That amount obviously differs by what people eat, where they live, how big they are and what they are doing. But as people in this country live longer than ever before, and have arguably freer access to beverages than at almost any time in human history, it's just not true that we're all dehydrated.

http://www.bbc.com/news/health-34038808

Universal flu vaccine comes closer, scientists say

Researchers say they are closer to developing a vaccine to give life-long protection against any type of flu, after promising trials in animals.

By Michelle Roberts Health editor, BBC News online

Two separate US teams have found success with an approach that homes in on a stable part of the flu virus. That should remove the problem with current flu vaccines which must be given anew each year because they focus on the mutating part of the virus.

The proof-of-concept work is published in Science journal and Nature Medicine.

Studies are now needed in humans to confirm that the method will work in man.

In the meantime, experts say people should continue to receive an annual flu jab because vaccination is still the best way to protect yourself against infection.

Universal jab

Conventional flu jabs target molecules on the surface of the flu virus, but these are constantly changing. Imagine the flu virus as a ball with lots of lollipops on stems sticking out. The lollipops change year to year, but the stems remain the same.

It is the stems that scientists are now focusing on as a target for a universal flu jab.

Many different research teams have been testing potential candidates, but it has

been a technical challenge to make something that can be used in a vaccine without involving the lollipop 'head' of the hemagglutinin molecule.

This latest work seems particularly promising, according to Prof John Oxford, a flu expert at the University of London.

He called the results a "red letter day" for science. "This is a leap forward compared to anything done recently. They have good animal data, not just in mice but in ferrets and monkeys too. And they've done it with the bird flu virus H5N1," he said. "It's a very good stepping stone. Ultimately, the hope is to get a vaccine that will cover a pandemic virus."

Prof Sarah Gilbert, Professor of Vaccinology at University of Oxford, said: "This is an exciting development, but the new vaccines now need to be tested in clinical trials to see how well they work in humans." "This will be the next stage of research, which will take several years. So we are still some way from having better flu vaccines for humans," she added.

http://bit.ly/1hm61Ux

Fossilized Poop is Rare, Fossilized Poop Inside a Fossilized Dinosaur is Even Rarer

Fossilized feces are always interesting, and researchers may have just found an extra special example

By Marissa Fessenden smithsonian.com

Paleontologists get really excited when they find poop - or at least, fossilized feces, called coprolites. They are not alone in the research world in this regard. Finding coprolites still within the animal that created it is rare indeed, but that may be exactly what a newly discovered specimen of *Rhamphorhynchus*, a winged reptile, contains.

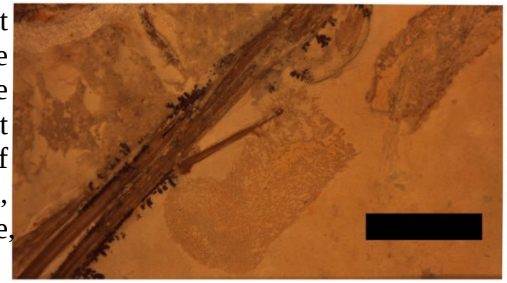
Soft things like tissue and stomach contents don't preserve in the fossil record well, explains Shaena Montanari for *Forbes*.

The full Rhamphorhynchus specimen **(Hone et al., PeerJ DOI: 10.7717/peerj.1191/fig-1 (CC-BY 4.0))**

As a result, it is "often difficult for paleontologists to fully understand the diet and ecology of extinct creatures. While there are ways of analyzing tooth shape and also chemical signatures in fossils to determine diet, an easier way to see direct feeding behavior is fossilized gut contents," she writes.

The pterosaur specimen dates back to the Late Jurassic, about 161 to 146 million years ago. Paleontologists originally found this *Rhamphorhynchus* the Schernfeld quarry from Bavaria, Southern Germany in 1965. Now, the fossil is held by the Royal Tyrrell Museum of Palenotology in Alberta, Canada. There, a research team recently got the chance to analyze the fossil in depth.

The team notes in their paper, published in *PeerJ*, that the specimen is in good condition — some soft tissues such as wing membranes and the skin that stretch from the hindlimbs to the tail are visible. In addition, lying amongst the specimen's guts are the bones of what may be fish. There's also a mass of something below the creature's sacrum, a triangular bone at the base of the spine, close to where the cloaca would be.



Detail showing the possible coprolite (to the right of the darker-colored fossilized bone) **(Hone et al., PeerJ DOI: 10.7717/peerj.1191/fig-9 (CC-BY 4.0))**

The possible coprolite has structures in it that look like hooks. These structures, the team hypothesizes, may be the remains of spines from some kind of marine invertebrate (perhaps a sponge or relative of a starfish). If the suspiciously-located mass really is a coprolite then it will be the first found for any kind of pterosaur.

http://bit.ly/1hK4mc1

Hormones boost placebo effect by making you want to cooperate

A placebo can make you feel a little better – and now we know how to boost the effect.

Drugs based on hormones that make us more cooperative seem to enhance the placebo effect. The finding could lead to changes in the way some trials are performed.

Sometimes a sugar pill can be all you need, even when you know it doesn't contain any medicine. We're still not entirely sure why. The brain's natural painkillers, such as dopamine and opioids, seem to be involved, but other factors may be at work too. Evidence that a compassionate, trustworthy carer can speed recovery suggests that there is also a social dimension to the placebo effect.

"This interaction between the patient and care provider seems to be based on a more complex system," says Luana Colloca at the University of Maryland in Baltimore.

Hormones that modulate our social behaviour might play a role. Last year, a team led by Ulrike Bingel of the University Duisburg-Essen in Germany, found that oxytocin – the so-called "cuddle chemical" that is thought to help us trust, bond and form relationships – seems to boost the placebo effect, at least in men.

In the study, Bingel's team applied an inert ointment to the arms of male volunteers. Half of them were told that the cream would reduce the degree of pain caused by the painfully hot stimulus subsequently applied. Men who were told that they were receiving pain relief said that the heat was less painful than those who knew that the cream was inert. When oxytocin was squirted up volunteers' noses, the men reported being in even less pain. The team didn't test oxytocin in women.

Trust issues

Colloca wondered if another hormone – vasopressin – might have a similar effect. Vasopressin has also been linked to trust and commitment to relationships. "We know that receptors for oxytocin and vasopressin are in very similar areas of the brain," says Colloca. To find out, her team administered moderately painful electric shocks to the fingers of 109 men and women.

The intensity of the shock was tailored to each individual so that they all reported the same, moderate level of pain. The participants were also told that each time they saw a green light, the electric shock would be reduced, but that it would be kept at the same level when a red light was displayed. In reality, the level of intensity never changed. In addition, each participant was given a sniff of either vasopressin, a placebo of salt water, a very low dose of oxytocin or nothing at all.

Colloca's team compared the pain ratings of the volunteers when they were shown a red light to the scores given when they saw a green light. Any difference represents a placebo effect, says Colloca. All of the volunteers experienced the placebo effect, but it was more significant in women given vasopressin.

This makes sense, says Colloca. Previous research suggests that while vasopressin seems to promote aggression and rivalry between men, it encourages "tend-and-befriend" tendencies among women. Colloca administered the treatments herself, and although the women didn't outwardly behave any differently, , she thinks that the women given vasopressin probably felt more at ease, and were cooperative and trusting of her as a care provider.

"It is remarkable," says Rene Hurlemann at the University of Bonn in Germany. He thinks that hormones like vasopressin may be responsible for the placebo effects seen in some clinical trials.

Trial and improvement

"Many clinical trials for drugs for depression have struggled to produce results that are better than placebo," he says. "Some say that antidepressants don't work, but I think that's nonsense." Instead, hormone systems may be altered in some diseases like depression. "This has been completely overlooked in medical trials," says Hurlemann.

In future, researchers might be able to find ways to block the effects of hormones like oxytocin and vasopressin in clinical trials, or at least factor them in, and put a stop to the potential skewing of trial results.

As drugs, the hormones could also be used to enhance the effects of other medicines – but it might be easier to work on improving the environment a person is in when they are receiving medical treatment, says Tor Wager at the University of Colorado at Boulder. "We like to think that a drug does one thing, but the context in which it is given can modify its effects," he says.

The social aspects of medical treatment appear to be especially important, says Wager. In his own research, Wager says he has found that providing people with positive or negative information about others changes their perception of pain – to a greater degree than the typical measures of placebo effect. "There seems to be something special about social feedback," he says.

Colloca hopes the hormones can be applied in treatments for chronic pain. "We know the best care providers interact well with their patients," she says. "It might be possible to help a person control their pain by enhancing this cooperation response." *Journal reference: Biological Psychiatry, doi.org/6zq*

http://www.eurekalert.org/pub_releases/2015-08/gwu-ris082115.php

Researchers identify signature of microbiomes associated with schizophrenia

Studying microbiomes in throat may help identify causes and treatments of brain disorder

WASHINGTON - In the most comprehensive study to date, researchers at the George Washington University have identified a potential link between microbes (viruses, bacteria and fungi) in the throat and schizophrenia. This link may offer a way to identify causes and develop treatments of the disease and lead to new diagnostic tests.

"The oropharynx of schizophrenics seems to harbor different proportions of oral bacteria than healthy individuals," said Eduardo Castro-Nallar, a Ph.D. candidate at GW's Computational Biology Institute (CBI) and lead author of the study. "Specifically, our analyses revealed an association between microbes such as lactic-acid bacteria and schizophrenics."

Recent studies have shown that microbiomes--the communities of microbes living within our bodies--can affect the immune system and may be connected to mental health. Research linking immune disorders and schizophrenia has also been published, and this study furthers the possibility that shifts in oral communities are associated with schizophrenia.

Mr. Castro-Nallar's research sought to identify microbes associated with schizophrenia, as well as components that may be associated with or contribute to changes in the immune state of the person. In this study, the group found a significant difference in the microbiomes of healthy and schizophrenic patients.

"Our results suggesting a link between microbiome diversity and schizophrenia require replication and expansion to a broader number of individuals for further validation," said Keith Crandall, director of the CBI and contributing author of the study. "But the results are quite intriguing and suggest potential applications of biomarkers for diagnosis of schizophrenia and important metabolic pathways associated with the disease."

The study helps to identify possible contributing factors to schizophrenia. With additional studies, researchers may be able to determine if microbiome changes are a contributing factor to schizophrenia, are a result of schizophrenia or do not have a connection to the disorder.

The results of the study were recently published in the article, "Composition, Taxonomy and Functional Diversity of the Oropharynx Microbiome in Individuals With Diversity of the Oropharynx Microbiome in Individuals With Schizophrenia and Controls," which appeared in Peer J.

http://www.eurekalert.org/pub_releases/2015-08/nei-nss082115.php

NIH study shows no benefit of omega-3 supplements for cognitive decline

NIH study raises doubt about any benefits omega-3 and dietary supplements like these may have for cognitive decline

While some research suggests that a diet high in omega-3 fatty acids can protect brain health, a large clinical trial by researchers at the National Institutes of Health found that omega-3 supplements did not slow cognitive decline in older persons. With 4,000 patients followed over a five-year period, the study is one of the largest and longest of its kind. It was published today in the Journal of the American Medical Association.

"Contrary to popular belief, we didn't see any benefit of omega-3 supplements for stopping cognitive decline," said Emily Chew, M.D., deputy director of the Division of Epidemiology and Clinical Applications and deputy clinical director at the National Eye Institute (NEI), part of NIH.

Dr. Chew leads the Age-Related Eye Disease Study (AREDS), which was designed to investigate a combination of nutritional supplements for slowing age-related macular degeneration (AMD), a major cause of vision loss among older Americans. That study established that daily high doses of certain antioxidants and minerals--called the AREDS formulation--can help slow the progression to advanced AMD.

A later study, called AREDS2, tested the addition of omega-3 fatty acids to the AREDS formula. But the omega-3's made no difference. Omega-3 fatty acids are made by marine algae and are concentrated in fish oils; they are believed to be responsible for the health benefits associated with regularly eating fish, such as salmon, tuna, and halibut.* Where studies have surveyed people on their dietary habits and health, they've found that regular consumption of fish is associated with lower rates of AMD, cardiovascular disease, and possibly dementia. "We've seen data that eating foods with omega-3 may have a benefit for eye, brain, and heart health," Dr. Chew explained.

Omega-3 supplements are available over the counter and often labeled as supporting brain health. A large 2011 study found that omega-3 supplements did not improve the brain health of older patients with preexisting heart disease.

With AREDS2, Dr. Chew and her team saw another opportunity to investigate the possible cognitive benefits of omega-3 supplements, she said. All participants had early or intermediate AMD. They were 72 years old on average and 58 percent were female. They were randomly assigned to one of the following groups:

1) Placebo (an inert pill)
2) Omega-3 [specifically docosahexaenoic acid (DHA, 350 mg) and eicosapentaenoic acid (650 mg)]
3) Lutein and zeaxanthin (nutrients found in large amounts in green leafy vegetables)
4) Omega-3 and Lutein/zeaxanthin

Because all participants were at risk for worsening of their AMD, they were also offered the original or a modified version of the AREDS formulation (without omega-3 or lutein/zeaxanthin).

Participants were given cognitive function tests at the beginning of the study to establish a baseline, then at two and four years later. The tests, all validated and used in previous cognitive function studies, included eight parts designed to test immediate and delayed recall, attention and memory, and processing speed. The cognition scores of each subgroup decreased to a similar extent over time, indicating that no combination of nutritional supplements made a difference.

Alzheimer's disease, which is the most common cause of dementia and affects as many as 5.1 million Americans age 65 and older in the U.S., may triple in the next 40 years. Some research has examined the potential benefits of DHA for

Alzheimer's. Studies in mice specially bred to have features of the disease found that DHA reduces beta-amyloid plaques, abnormal protein deposits in the brain that are a hallmark of Alzheimer's, although a clinical trial of DHA showed no impact on people with mild to moderate Alzheimer's disease.

"The AREDS2 data add to our efforts to understand the relationship between dietary components and Alzheimer's disease and cognitive decline," said Lenore Launer, Ph.D. senior investigator in the Laboratory of Epidemiology and Population Science at the National Institute on Aging. "It may be, for example, that the timing of nutrients, or consuming them in a certain dietary pattern, has an impact. More research would be needed to see if dietary patterns or taking the supplements earlier in the development of diseases like Alzheimer's would make a difference."

For more information about AMD and AREDS2, visit https://nei.nih.gov/areds2/.

** Other omega-3 fatty acids are found in plant foods such as flaxseed, walnuts, soy products, and canola and soybean oils. Specific omega-3 fatty acids from these sources were not studied.*

The cognitive function component of AREDS2 was supported by the NEI Intramural Research Program and contracts HHS-N-260-2005-00007-C. Additional research funds were provided by the NIH Office of Dietary Supplements; the National Center for Complementary and Integrative Health; the National Institute on Aging; the National Heart, Lung, and Blood Institute; and the National Institute of Neurological Disorders and Stroke.

The AREDS trial is registered at http://www.ClinicalTrials.gov as NCT00594672. AREDS2 is registered as NCT00345176.

Age-Related Eye Disease Study 2 (AREDS2) Research Group. "Effect of Omega-3 Fatty Acids, Lutein/Zeaxanthin, or other Nutrient Supplementation on Cognitive Function: The AREDS2 Randomized Clinical Trial." JAMA, published online August 25, 2015.

http://www.eurekalert.org/pub_releases/2015-08/uosc-mam082515.php

Making a mistake can be rewarding, study finds

MRI study shows failure is a rewarding experience when the brain has a chance to learn from its mistakes

Many political leaders, scientists, educators and parents believe that failure is the best teacher. Scientists have long understood that the brain has two ways of learning. One is avoidance learning, which is a punishing, negative experience that trains the brain to avoid repeating mistakes. The other is reward-based learning, a positive, reinforcing experience in which the brain feels rewarded for reaching the right answer.

A new MRI study by USC and a group of international researchers has found that having the opportunity to learn from failure can turn it into a positive experience - if the brain has a chance to learn from its mistakes.

"We show that, in certain circumstances, when we get enough information to contextualize the choices, then our brain essentially reaches towards the reinforcement mechanism, instead of turning toward avoidance," said Giorgio Coricelli, a USC Dornsife associate professor of economics and psychology.

For the study, researchers engaged 28 subjects, each around 26 years old, in a series of questions that challenged them to maximize their gains by providing the right answers. If they chose a wrong answer, they lost money, while right answers helped them earn money.

One trial prompted their brains to respond to getting the wrong answer with avoidance learning. A second trial prompted a reward-based learning reaction, and a third but separate trial tested whether participants had learned from their mistakes, allowing them to review and understand what they got wrong.

In that third round, the participants responded positively, activating areas in their brains that some scientists call the "reward circuit" - or the "ventral striatum." This experience mimicked the brain's reward-based learning response - as opposed to an avoidance-learning response, an experience that involves different parts of the brain that together comprise the "anterior insula."

Coricelli said this process is similar to what the brain experiences when feeling regret: "With regret, for instance, if you have done something wrong, then you might change your behavior in the future," he said.

Coricelli conducted the study with scientists from the University College London, the French Institute for Robotics and Intelligent Systems, the French Institute of Health and Medical Research, and the French National Center for Scientific Research. The findings were published on Aug. 25 in the journal Nature Communications.

http://www.eurekalert.org/pub_releases/2015-08/s-iib082515.php

Is incense bad for your health?

Comparison between indoor use of cigarettes and incense provides surprising results

The burning of incense might need to come with a health warning. This follows the first study evaluating the health risks associated with its indoor use. The effects of incense and cigarette smoke were also compared, and made for some surprising results. The research was led by Rong Zhou of the South China University of Technology and the China Tobacco Guangdong Industrial Company in China, and is published in Springer's journal Environmental Chemistry Letters.

Incense burning is a traditional and common practice in many families and in most temples in Asia. It is not only used for religious purposes, but also because of its pleasant smell. During the burning process, particle matter is released into the air. This can be breathed in and trapped in the lungs, and is known to cause an inflammatory reaction. Not much research has been done on incense as a source

of air pollution, although it has been linked to the development of lung cancer, childhood leukemia and brain tumors.

Zhou's team therefore assessed the health hazards associated with using incense smoke in the home. They went one step further by comparing these results for the first time with mainstream studies of cigarette smoke. Two types of incense were tested. Both contained agarwood and sandalwood, which are among the most common ingredients used to make this product. Tests were run, among others, to gauge the effects of incense and cigarette smoke on Salmonella tester strains and on the ovary cells of Chinese hamsters.

Incense smoke was found to be mutagenic, meaning that it contains chemical properties that could potentially change genetic material such as DNA, and therefore cause mutations. It was also more cytotoxic and genotoxic than the cigarette used in the study. This means that incense smoke is potentially more toxic to a cell, and especially to its genetic contents. Mutagenics, genotoxins and cytotoxins have all been linked to the development of cancers.

Smoke from the sampled incense was found to consist almost exclusively (99 percent) of ultrafine and fine particles, and is therefore likely to have adverse health effects. Taken together, the four incense smoke samples contained 64 compounds. While some of these are irritants or are only slightly harmful (hypotoxic), ingredients in two of the samples are known to be highly toxic.

"Clearly, there needs to be greater awareness and management of the health risks associated with burning incense in indoor environments," says Zhou, who hopes the results will lead to an evaluation of incense products and help to introduce measures to reduce smoke exposure.

However, he warns that one should not simply conclude that incense smoke is more toxic than cigarette smoke. The small sample size, the huge variety of incense sticks on the market and differences in how it is used compared to cigarettes must be taken into account.

Reference: Zhou, R. et al (2015). Higher cytotoxicity and genotoxicity of burning incense than cigarette, Environmental Chemistry Letters. DOI 10.1007/s10311-015-0521-7

http://www.eurekalert.org/pub_releases/2015-08/nu-pww082515.php

Predicting who will murder his wife or his family

New understanding of men who kill intimate partners could prevent these murders

CHICAGO - Murderers who kill intimate partners and family members have a significantly different psychological and forensic profile from murderers who kill people they don't know, reports a new Northwestern Medicine study that examined the demographics, psychiatric history and neuropsychology of these individuals.

The new knowledge about murderers who commit what is called spontaneous domestic homicide -- emotionally driven crimes that are not premeditated -- could enable early intervention to prevent the homicide, the authors said. Domestic homicide is one of the most common and frequent types of murder in the U.S.

One-third of all women murdered in the U.S. are killed by their male partners including husbands, ex-husbands, boyfriends and ex-boyfriends. An estimated 25 percent of women will be victims of severe domestic violence by an intimate partner in their lifetimes.

"The findings provide important information that may help prevent future domestic homicides, because they help identify individuals at risk of committing domestic murders," said lead author Robert Hanlon, director of the forensic psychology research lab at Northwestern University Feinberg School of Medicine. "The killers in this group are very similar to each other and different from men who commit nondomestic murders, which are often premeditated."

Hanlon also is an associate professor of psychiatry and behavioral sciences at Feinberg and a neuropsychologist at Northwestern Memorial Hospital.

The study on spontaneous domestic homicides found these killers have more severe mental illness (particularly psychotic disorders), few previous felony convictions, are less intelligent and have more cognitive impairment. The paper was published Aug. 21 in the early view online edition of the Journal of Forensic Sciences.

"These crimes are often preventable if family members are more informed about the potential danger from having someone who is severely mentally ill in the home and who may have shown violent tendencies in the past," Hanlon said. "Family members may lull themselves into a state of false beliefs thinking 'my son would never hurt me' or 'my husband may have a short fuse but he would never seriously harm me.'" "The fact is the husband or son may very well harm the wife or mother," Hanlon said.

These murders are not a premeditated, strategic type of killing, noted Hanlon, who testified in the James Holmes Colorado theater mass murder trial in Denver in July.

"These murders are in the heat of passion and generally involve drugs or alcohol and often are driven by jealousy or revenge following a separation or a split," Hanlon said. "This is grabbing the kitchen knife out of the drawer in a fit of anger and stabbing her 42 times."

Another scenario is a murder committed by a mentally ill son or another family member who is psychotic and thinks the victim is plotting against him.

Intimate partners and family members need to notify the authorities that they are concerned about potential harm and remove themselves from the situation,

Hanlon recommended. "You can stay with relatives, call domestic violence hotlines and say, 'I'm scared something is going to happen to me,'" Hanlon said. "Start the wheels turning and get assistance."

For the study, Hanlon interviewed and personally evaluated 153 murderers for more than 1500 hours. Participants were men and women charged with and/or convicted of first-degree murder in Illinois, Missouri, Indiana, Colorado and Arizona. "You learn a lot about them in that amount of time," Hanlon said. "I saw the same patterns and trends over and over again."

Hanlon is the author of "Survived by One: The Life and Mind of a Family Mass Murderer (2013)."

http://www.eurekalert.org/pub_releases/2015-08/lhri-sfp082515.php

Study finds paramedic care delivered on-scene for 10-35 minutes leads to better outcomes

Less than 10 per cent of paediatric patients who suffer a cardiac arrest outside of the hospital survive. There are many factors which can influence survival rates; paramedic care is one of them.

Thanks to the advanced training of paramedics, today, they can spend more time on the scene doing CPR or providing medical care including administering intravenous fluids and medications. However until now, it has not been known if the length of time spent on the scene and onsite medical interventions by paramedics are associated with improved survival for paediatric patients.

In the largest paediatric cardiac arrest study to date, a team of researchers led by The Hospital for Sick Children (SickKids) and Lawson Health Research Institute found that survival was the highest, especially among teens, with 10 to 35 minutes on the scene in the care and under the treatment of paramedics. The study also found that improved survival was associated with intravenous access and fluid administration, whereas advanced airway attempts (endotracheal intubation) and resuscitation drugs were not. The study is published in Resuscitation.

"Our initial hypothesis was that more time spent on the scene doing quality CPR with advanced medical interventions would mean better patient outcomes. We found that there is an optimal time between 10 and 35 minutes, and after 35 minutes, the outcomes do not improve and actually get worse," says Dr. Jamie Hutchison, senior author on the study, Staff Physician and Research Director in Critical Care Medicine at SickKids. "Interestingly, we found that while longer on-scene time (more than 35 minutes) was associated with higher rates of resuscitation, it had lower rates of survival [compared to 10 to 35 minutes on the scene]. This paradox is valuable information for paramedics as they weigh the potential benefits of spending more time on the scene while considering how to achieve the best possible outcome for the patient."

This was an observational study looking at data from the Resuscitation Outcomes Consortium (ROC) cardiac arrest database from 11 North American regions, including Vancouver, Hamilton, Toronto and Ottawa between 2005 and 2012. The team studied 2,244 patients ranging from three days old to 19 years old with non-traumatic out-of-hospital cardiac arrest, and evaluated survival to the time of hospital discharge.

"Our findings show that scene time is significantly associated with survival to hospital discharge, and that only some interventions are associated with survival," says Dr. Janice Tijssen, principal author on the study, Researcher at Lawson and Paediatric Intensivist at Children's Hospital, London Health Sciences Centre. "For example, placement of intravenous or interosseous needles was associated with improved survival, likely because it allowed fluid administration that was also associated with better outcomes. We hope the findings will help inform paramedics as they make decisions on the best way to treat patients."

Adolescents had the highest rate of survival followed by children and then infants. Infants had the shortest scene time, fewest interventions and lowest rate of witnessed events (meaning the cause of the arrest was unknown). It is possible that there may be a large number of infants who had sudden infant death syndrome.

The study also revealed that more than 10 minutes on the scene was associated with more interventions, suggesting that a 'scoop and run' approach of less than 10 minutes does not allow enough time to apply interventions like IV fluids that may benefit the patient. "But the good news is that in the majority of patients (68.7 per cent) had a scene time between 10 and 35 minutes," adds Tijssen.

Toronto Paramedic Services, Deputy Chief of Program Development and Service Quality, Cindy Nicholson says, "The findings of this study as well as those of other recent research confirms that early intervention and care from Paramedics in the prehospital setting makes a significant difference in quality of life and outcomes for our patients. This study's findings are not only exciting for Toronto Paramedic Services but for the profession in general and most importantly for the patients in our community who benefit from our evidence-based care."

Quick facts

2,244 patients studied (1017 infants, 594 children, 633 teens)

Infants had the lowest average rate of survival over the whole study period (3.7 per cent) compared to children (9.8 per cent) and teens (16.3 per cent)

Survival was highest in the 10-35 minutes on scene time group (10.2 per cent) compared to the over 35 minute group (6.9 per cent) and the under 10 minute group (5.3 per cent)

The ROC is funded by the National Institutes of Health - National Heart, Lung and Blood Institute and the National Institute of Neurological Disorders and Stroke, the Canadian Institutes of Health Research (CIHR) - Institute of Circulatory and Respiratory Health, the U.S. Army Medical Research & Material Command, Defence Research and Development Canada, the Heart, Stroke Foundation of Canada, the American Heart Association and SickKids Foundation.

http://www.eurekalert.org/pub_releases/2015-08/hhmi-ndc082415.php

Neurodegenerative disease clogs nuclear pores

Howard Hughes Medical Institute (HHMI) scientists have discovered how the most common genetic defect in amyotrophic lateral sclerosis kills nerve cells.

Their study suggests that the pores that allow molecules into and out of a cell's nucleus get jammed, a finding that could speed the search for other genes that promote this fatal illness.

In people who have amyotrophic lateral sclerosis (ALS), the motor neurons that operate the muscles deteriorate. Over time, the disease deprives patients of the ability to walk, swallow, and breathe, and they usually die within three to five years.

About 10 percent of ALS cases are hereditary, and researchers have pinpointed about 20 defective genes that can cause the disease. The most common gene variant by far is C9ORF72. The faulty version of this gene contains too many copies of a short DNA segment, known as a repeat. Healthy people usually have 23 or fewer copies of this segment, whereas people who develop ALS can carry hundreds or thousands of duplicates. Extra repeats in the gene also cause frontotemporal dementia (FTD), a disease closely related to ALS.

Researchers haven't discovered how the faulty version C9ORF72 induces nerve cell deterioration. "We want to know what is the primary biological defect that is leading to ALS and FTD," says HHMI Investigator J. Paul Taylor of St. Jude Children's Research Hospital, who led the new study with Fen-Biao Gao of the University of Massachusetts Medical School. The research was published August 26, 2015 in the journal Nature.

To gauge the effects of the repeats, Taylor and Gao's teams turned to fruit flies, which researchers often use to study neurodegenerative diseases such as ALS and FTD. The scientists inserted different numbers of repeats into the insects' chromosomes. When the flies received eight copies of the repeat, they appeared normal. That made sense, Taylor says, since people with that number of repeats don't develop ALS or FTD. But when the flies carried 58 copies of the DNA repeat, they showed signs that cells were damaged and dying.

For example, in one experiment the researchers inserted the repeats only into the animals' eyes. In these insects, the normally smooth surface of the eye was ragged, a condition known as rough eye that indicates nerve cells have perished.

Those results showed that the extra repeats poisoned cells in the flies, but they didn't explain how. To try to answer that question, Taylor and colleagues performed a genetic screen. They bred flies that carried 58 repeats in their eyes with many different strains of flies that were missing certain genes. The offspring of these crosses lacked the same genes as their parents, allowing the researchers to determine if a gene's absence affected the insects' eyes.

"We looked for something that made the original phenotype better or worse," says Taylor. If the flies had rougher eyes when one of the genes was missing, for example, that gene likely helps prevent the death of neurons. In total, the researchers evaluated the roles of 9,000 different fly genes.

Eighteen of the genes that Taylor and colleagues identified through this procedure were involved in the same cellular function: ferrying molecules into and out of the nucleus through nuclear pores. A membrane encloses the cell's nucleus, and nuclear pores are structures in the membrane that allow certain molecules to pass through. Transportation through the pores is crucial for a cell's survival.

One type of molecule that departs the nucleus through nuclear pores is RNA, which carries the instructions for making proteins and performs other functions outside of the nucleus. The researchers asked whether RNA passed through the pores normally in fly cells with eight or 58 repeats. They discovered that RNA failed to exit appropriately and built up in the nuclei of cells with 58 repeats, suggesting that the nuclear pores weren't working properly in these cells.

The team also measured RNA levels in neurons derived from five people with ALS or FTD who have faulty versions of C9ORF72. Compared with cells from four healthy people, neurons from the patients accumulated about 35 percent more RNA inside the nucleus than outside of it. That finding shows that fly and human cells share the same abnormality, Taylor says.

"This study does not reveal a new drug target, but it does reveal the underlying molecular defect" behind many inherited cases of ALS and FTD, he says. A companion paper in the same issue of Nature supports the conclusion that the extra repeats in C9ORF72 disrupt nuclear pores, Taylor says.

Researchers describe about 90 percent of ALS cases as sporadic because they haven't identified which genes are responsible for the illness. "This finding empowers the search for the genetic causes of sporadic ALS," says Taylor. Now, researchers know what to look for: genes that alter transportation through nuclear pores.

http://www.eurekalert.org/pub_releases/2015-08/ps-cpm082615.php

Colorful potatoes may pack powerful cancer prevention punch

Compounds found in purple potatoes may help kill colon cancer stem cells and limit the spread of the cancer, according to a team of researchers.

Image Source: www.wikimedia.org

Baked purple-fleshed potatoes suppressed the growth of colon cancer tumors in petri dishes and in mice by targeting the cancer's stem cells. Colon cancer is the second leading cause of cancer-related deaths in the U.S. and responsible for more than 50,000 deaths annually, according to the American Cancer Society. Attacking stem cells is an effective way to counter cancer, according to Jairam K.P. Vanamala, associate professor of food sciences, Penn State and faculty member, at the Penn State Hershey Cancer Institute.

"You might want to compare cancer stem cells to roots of the weeds," Vanamala said. "You may cut the weed, but as long as the roots are still there, the weeds will keep growing back and, likewise, if the cancer stem cells are still present, the cancer can still grow and spread."

The researchers, who released their findings in the Journal of Nutritional Biochemistry, currently online, used a baked purple potato because potatoes are widely consumed and typically baked before they are consumed, especially in western countries. They wanted to make sure the vegetables maintained their anti-cancer properties even after cooking.

In the initial laboratory study, the researchers found that the baked potato extract suppressed the spread of colon cancer stem cells while increasing their deaths. Researchers then tested the effect of whole baked purple potatoes on mice with colon cancer and found similar results. The portion size for a human would be about the same as eating a medium size purple-fleshed potato for lunch and dinner, or one large purple-fleshed potato per day.

According to the researchers, there may be several substances in purple potatoes that work simultaneously on multiple pathways to help kill the colon cancer stem cells, including anthocyanins and chlorogenic acid, and resistant starch.

"Our earlier work and other research studies suggest that potatoes, including purple potatoes, contain resistant starch, which serves as a food for the gut bacteria, that the bacteria can covert to beneficial short-chain fatty acids such as butyric acid," Vanamala said. "The butyric acid regulates immune function in the gut, suppresses chronic inflammation and may also help to cause cancer cells to self-destruct." In addition to resistant starch, the same color compounds that give potatoes, as well as other fruits and vegetables, a rainbow of vibrant colors may be effective in suppressing cancer growth, he added.

"When you eat from the rainbow, instead of one compound, you have thousands of compounds, working on different pathways to suppress the growth of cancer stem cells," said Vanamala. "Because cancer is such a complex disease, a silver bullet approach is just not possible for most cancers."

The next step would be to test the whole food approach using purple potatoes in humans for disease prevention and treatment strategies. The researchers also plan to test the purple potatoes on other forms of cancer.

Using evidenced-based foods as a proper cancer prevention strategy could complement current and future anti-cancer drug therapies. Vanamala said that foods could actually offer a healthier way to prevent cancer because they often have limited side effects compared to drug treatments.

"Indeed, we have seen that the animals that consumed purple potatoes are healthier compared to animals that received drug treatment," said Vanamala.

Purple potatoes could be potentially used in both primary and secondary prevention strategies for cancer, Vanamala suggested. Primary prevention is aimed at stopping the initial attack of cancer, while secondary prevention refers to helping patients in remission remain cancer-free.

Most of the funding in cancer research currently goes to cancer cures but not to prevention, Vanamala said. However, as cancer incidences are predicted to surge in the next two decades, an equal emphasis on both food-based cancer prevention and therapeutic drug approaches should be used to counter the growing epidemic of cancer in the U.S. and around the world.

Vanamala worked with Venkata Charepalli, a doctoral student; Sridhar Radhakrishnan, a post-doctoral scholar; Ramakrishna Vadde, a visiting scientist from India, all in food science and Lavanaya Reddivari, assistant professor of plant science, all from Penn State and Rajesh Agarwal, professor of pharmaceutical science, University of Colorado. The United States Department of Agriculture supported this work.

http://www.wdr.de/wdrlive/media/mp3/funkhaus-europa.m3u

Clinical trials of dogs with cancer could lead to better treatments for humans

Dogs get cancer, too.

And they have even fewer treatment options than their human owners do. But an article in Chemical & Engineering News (C&EN), the weekly newsmagazine of the American Chemical Society, offers a glimmer of hope. It explores how clinical trials on man's best friend could be a win-win for both dogs and people.

Judith Lavelle, an intern at C&EN, notes that only a small percentage of potential human cancer drugs get approved by the U.S. Food and Drug Administration. Many of them fail when tested in people in clinical trials. A major reason for this late failure is that animal models -- typically mice with tumors grafted onto them -- don't adequately reflect what happens when humans develop tumors spontaneously. Research with pet dogs that develop cancer out of the blue, however, could lead to better treatments. Such studies also could provide more relevant information about cancer's genetic basis since canines are more closely related to humans than mice are.

Because of these potential benefits, the Comparative Oncology Trials Consortium (COTC) was formed. COTC is a collaboration between the National Institutes of Health and 22 veterinary hospitals in the U.S., and it is currently testing promising drug candidates in dogs that have naturally developed cancer. The notion of "animal testing" still raises red flags for some people, but veterinarians and researchers see this new field of comparative oncology as a way to humanely treat sick animals while gaining valuable insight into new treatments for people with cancer.

http://www.eurekalert.org/pub_releases/2015-08/bu-wbb082515.php

Where bread began: Ancient tools used to reconstruct -- and taste -- prehistoric cuisine

Team including researchers from Bar-Ilan University and Harvard University unravel the mystery of 12,500-year-old rock-cut mortars found throughout Southwestern Asia

A group of intrepid Israeli researchers recently went back to the dawn of the Stone Age to make lunch. Using 12,500-year-old conical mortars carved into bedrock, they reconstructed how their ancient ancestors processed wild barley to produce groat meals, as well as a delicacy that might be termed "proto-pita" - small loaves of coal-baked, unleavened bread. In so doing, they re-enacted a critical moment in the rise of civilization: the emergence of wild-grain-based nutrition, some 2,000 to 3,000 years before our hunter-gatherer forebears would establish the sedentary farming communities which were the hallmark of the "Neolithic Revolution".

The research team, consisting of independent researchers as well as faculty members from Bar-Ilan and Harvard Universities, conducted their study in the Late Natufian site of Huzuq Musa, located in Israel's Jordan Valley. Their findings were published in the journal Plos One on July 31, 2015.

When Did Agriculture Begin?

Most investigators agree that cereal domestication was achieved about 10,500 years ago. The current work demonstrates how groat meals and fine flour were produced from wild barley, two to three millennia before the appearance of domesticated grains.

According to Prof. Mordechai Kislev, an expert in archaeo-botony who is a member of Bar-Ilan University's Mina and Everard Goodman Faculty of Life Sciences, the team's field work resolved a long-standing mystery about thousands of cone-shaped hollows carved into the bedrock throughout the Southern Levant.

"The conical, human-made hollows, found all over Southeast Asia, were noticed by archaeologists decades ago, but there was no agreement about their function," Prof. Kislev says. "Assuming they were mortars used for the processing of plant food, my colleagues - under the direction of archaeologist Dr. David Eitam - decided to use these ancient stone tools, along with period-appropriate items such wooden pestles, sticks and sieves, to reconstruct how the work was done."

Along with Eitam and Kislev, additional members of the team were physicist Adiel Karty and Prof. Ofer Bar-Yosef, a member of Harvard University's Department of Anthropology.

From Field to Food Ingredient

The experiment began by collecting spikelets - the coated grains of a cereal ear - from wild barley, the most common wild cereal in the Levant both in prehistory and today. After ripening on the ground to prevent them from scattering in the wind, the grains were then separated from the stalks, first by beating against the threshing floor with a curved stick, and subsequently, by sifting them through a large-holed sieve.

"At this point, the conical mortars were used to complete the transformation of wild grain into groats and flour that could be used for food," says team member Adiel Karty, explaining that the different-sized mortars served specific agricultural purposes. "Filled with a measure of the raw grain and beaten with a wooden pestle, the wider cones were used for hummeling - removal of the bristle that extends from the edge of the seed," he explains. "The narrower cones came into play during the next stage, when the same wooden pestle was used to remove the grain husk; the Natufians invented a peeling-milling machine long before the invention of machinery!"

After de-husking, the grain was scooped out of the conical mortar by hand then placed into a small cup cut in the adjacent bedrock. From there, it was transferred for filtering in a small-gauge sieve.

"We found that de-husking - and the later milling into flour - was significantly aided by the presence of these cup-like depressions, which could be used to deposit material produced in the mortar by repeated hand-scooping from its bottom," says Dr. Eitam. "This was a kind of labor-saving device, making it easier to transfer the grain and waste material to a sieve or other vessel."

Evolution and Contribution

Prof. Ofer Bar-Yosef, an emeritus faculty member at Harvard who is a world-renowned expert on the origin of modern humans and early farming societies in the ancient Near East, says that the current study complements nearly 80 years of investigations suggesting that the Natufians - although subsisting as a hunter-gatherer society - used sickles to harvest wild, almost-ripe cereals, and were capable of producing large quantities of groat meals from roasted, "half green" barley grain. Moreover, the technological advance from wide-to narrow-cone mortars represented a major dietary change, because de-husked flour made it possible to produce the fine flour needed for what has become the Western world's most widespread staple food: bread.

"With the development of a new agro-technological system, including threshing floors, peeling utensils and milling devices, the Natufians bequeathed to their Neolithic successors a technical advancement that contributed to the establishment of agricultural societies," Prof. Bar-Yosef says.

Bon Appetite! Barley Bread for (Nearly) All

Prof. Kislev points out that the barley-processing "facilities" found at the site indicate that stone-utensil-produced flour could have been a significant part of the local Natufian diet.

"Huzuq Musa is estimated to have had a population of about a hundred people," he says. "If we assume that the historical 35 liters of grain given to a Roman worker during the winter corresponds to a reasonable level of nutrition, the four large threshing floors discovered near the site - and its accompanying tools - could have produced a sufficient quantity of processed barley for its estimated inhabitants."

"Producing food from wild barley grain was not easy, but the biggest challenge may have been the challenge of not harvesting all the wild grain in the field, and ensuring that there would be something left to eat the following year," he says. "This Natufian advance was a bridge to the Neolithic revolution, when sedentary farmers developed the discipline needed to plan for the successful planting - and reaping - of domesticated grains."

According to Dr. Eitam, the majority of scholars agree that Natufian culture was characterized by the first communities that inhabited permanent settlements. "Our discovery of this sophisticated agro-technological system indicates that Natufian society made the shift from hunting-gathering to an agriculture-based economy, which was possibly extant 3,000 years before the domestication of cereal," he says.

http://www.eurekalert.org/pub_releases/2015-08/wsu-eep082515.php

Earth's extremes point the way to extraterrestrial life

Exploring the limits of life in the universe

PULLMAN, Wash. - Bizarre creatures that go years without water. Others that can survive the vacuum of open space. Some of the most unusual organisms found on Earth provide insights for Washington State University planetary scientist Dirk Schulze-Makuch to predict what life could be like elsewhere in the universe.

NASA's discovery last month of 500 new planets near the constellations Lyra and Cygnus, in the Milky Way Galaxy, touched off a storm of speculation about alien life. In a recent article in the journal Life, Schulze-Makuch draws upon what is known about Earth's most extreme lifeforms and the environments of Mars and Titan, Saturn's moon, to paint a clearer picture of what life on other planets could be like. His work was supported by the European Research Council.

"If you don't explore the various options of what life may be like in the universe, you won't know what to look for when you go out to find it," said Schulze-Makuch, a professor in the WSU School of the Environment. "We do not propose that these organisms exist but like to point out that their existence would be consistent with physical and chemical laws, as well as biology," he said.

For example, on Earth, a species of beetle called bombardier excretes an explosive mix of hydrogen peroxide and other chemicals to ward off predators. "On other planets, under gravity conditions similar to those present on Mars, a bombardier beetle-like alien could excrete a similar reaction to propel itself as much as 300 meters into the air," Schulze-Makuch said.

While explorers to Mars might find creatures similar to those on Earth, life on a Titan-like planet would require a completely novel biochemistry. Such a discovery would be a landmark scientific achievement with profound implications.

Life on Mars

Earth life, with its unique biochemical toolset, could feasibly survive on a Mars-like planet with a few novel adaptations. First, organisms would need a way to get water in an environment that is akin to a drier and much colder version of Chile's Atacama Desert. A possible adaptation would be to use a water-hydrogen peroxide mixture rather than water as an intracellular liquid, Schulze-Makuch said. Hydrogen peroxide is a natural antifreeze that would help microorganisms survive frigid Martian winters. It is also hygroscopic, meaning it naturally attracts water molecules from the atmosphere.

During the daytime, plant-like microorganisms on a Martian-like surface could photosynthesize hydrogen peroxide. At night, when the atmosphere is relatively humid, they could use their stored hydrogen peroxide to scavenge water from the

atmosphere, similar to how microbial communities in the Atacama use the moisture that salt brine extracts from the air to stay alive.

Schulze-Makuch speculates that a larger, more complex alien creature, maybe resembling Earth's bombardier beetle, could use these microorganisms as a source of food and water. To move from one isolated patch of life-sustaining microorganisms to another, it could use rocket propulsion.

Life on Titan

Due to its greater distance from the Sun, Titan is much colder than Earth. Its surface temperature is on average -290 degrees F. Additionally, there is no liquid water on the surface nor carbon dioxide in the atmosphere. The two chemical components are essential for life as we know it.

If life does exist on Titan or a Titan-like planet elsewhere in the universe, it uses something other than water as an intracellular liquid. One possibility is a liquid hydrocarbon like methane or ethane. Non-water based lifeforms could feasibly live in the liquid methane and ethane lakes and seas that make up a large portion of Titan's surface, just as organisms on Earth live in water, Schulze-Makuch said.

Such hypothetical creatures would take in hydrogen in place of oxygen and react it with high energy acetylene in the atmosphere to produce methane instead of carbon dioxide.

Due to their frigid environment, these organisms would have huge (by Earth standards) and very slowly metabolizing cells. The slow rate of metabolism would mean evolution and aging would occur much slower than on Earth, possibly raising the life span of individual organisms significantly.

"On Earth, we have only scratched the surface of the physiological options various organisms have. But what we do know is astounding," Schulze-Makuch said. "The possibilities of life elsewhere in the universe are even more staggering.

"Only the discovery of extraterrestrial life and a second biosphere will allow us to test these hypotheses," he said, "which would be one of the grandest achievements of our species."

http://www.eurekalert.org/pub_releases/2015-08/aaon-aom082015.php

Awareness of memory loss may decline 2-3 years before dementia onset

People may begin losing awareness of memory problems 2-3 years before onset of dementia

MINNEAPOLIS - People who will develop dementia may begin to lose awareness of their memory problems two to three years before the actual onset of the disease, according to a new study published in the August 26, 2015, online issue of Neurology®, the medical journal of the American Academy of Neurology. The study also found that several dementia-related brain changes, or pathologies, are associated with the decline in memory awareness.

"Our findings suggest that unawareness of one's memory problems is an inevitable feature of late-life dementia, driven by a buildup of dementia-related changes in the brain," said study author Robert S. Wilson, PhD, with Rush University Medical Center in Chicago. "Lack of awareness of memory loss is common in dementia, but we haven't known much about how common it is, when it develops or why some people seem more affected than others. "Most studies of memory unawareness in dementia have focused on people who have already been diagnosed. In contrast, this new study began following older adults before they showed signs of dementia."

The analysis included 2,092 participants from three ongoing studies that have each followed older adults for more than 10 years. At the beginning of the study, the participants were an average of 76 years old and showed no signs of memory or cognitive impairments. They were given yearly tests of memory and thinking abilities. Participants were also asked how often they had trouble remembering things, and how they would rate their memory compared to 10 years earlier.

For the 239 people diagnosed with dementia during the study, memory awareness was stable and then began to drop sharply an average of 2.6 years before the onset of dementia. This followed several years of memory decline. "Although there were individual differences in when the unawareness started and how fast it progressed, virtually everyone had a lack of awareness of their memory problems at some point in the disease," Wilson said.

Unexpectedly, memory unawareness began earlier in younger people than in older people. That may be because older people were more likely to expect memory loss as a normal part of aging, the researchers suggest.

The researchers also examined the brains of 385 participants who died during the course of the study, assessing them for seven types of brain changes common to dementia. They found three dementia-related pathologies were associated with the rapid decline in memory awareness: tau proteins or tangles; infarcts, or areas of brain damage; and changes in the protein TDP-43. As those brain changes build up, affected people lose awareness that their memory is failing.

"This study underscores the importance of family members looking for help from doctors and doctors getting information from friends or family when making decisions about whether a person has dementia, since people may be unable to give reliable reports about the history of their own memory and thinking abilities," Wilson said.

The study was supported by the National Institute on Aging and the Illinois Department of Public Health.

http://bit.ly/1X0BcWc

A Blood Test and App May Help Identify Patients at Risk of Suicide

With blood biomarkers and a questionnaire, researchers at Indiana University claim they can pinpoint patients who will have suicidal thoughts within a year

One person dies by suicide every 13 minutes in America, resulting in about 38,000 deaths each year.

While most people who commit suicide suffer from depression or other mental illnesses, the vast majority of depressed people will never attempt to kill themselves. This leaves psychiatrists and other health professionals with the difficult task of figuring out which patients are most at risk.

Now, new research suggests that certain blood biomarkers, in conjunction with a questionnaire, can identify with more than 90 percent accuracy patients who will suffer suicidal ideation (thoughts about how to kill oneself) in the following year. Building on previous research identifying blood biomarkers for psychiatric illness, it holds promise for both patients and doctors.

"We want to identify people who are at risk early on, when simple interventions, lifestyle innovations—reducing stress, getting more sleep, treatment, medications—can change the trajectory for the positive before it spirals into a tragedy," says Alexander Niculescu of Indiana University School of Medicine, the lead researcher on the study, recently published in the journal *Molecular Psychiatry*.

The study began with a cohort of 217 male patients currently receiving psychiatric treatment. The researchers took multiple blood samples from each patient over time, attempting to "catch" samples during times when patients were not feeling suicidal at all and when they were feeling very suicidal. They then compared the blood samples from reported suicidal-feeling times and non-suicidal-feeling times, identifying changes in gene expression.

They compared these markers with markers present in the blood of 26 suicide victims from the coroner's office in Indianapolis and markers identified in prior studies as being present in suicidal patients. They then narrowed the markers to the 11 most significant.

The researchers then developed a questionnaire assessing suicide risk, which they made into an app. The app didn't directly ask patients if they were considering suicide. "People who are truly suicidal often choose not to share that information with their clinician because they don't want to be stopped," Niculescu says. Instead, the app identified various known social, cultural, mental and environmental risk factors for suicide, such as a family history of suicide, a history of abuse, serious physical illness, recent loss of a loved one and addiction.

The team gave the app questionnaire and the biomarker tests to a new group of 108 psychiatric patients. These patients had previously been diagnosed with major depressive disorder, bipolar disorder, schizophrenia or schizoaffective disorder. The researchers followed them over a period of a year to see if they developed suicidal thoughts or were hospitalized for suicide attempts.

The results were fairly dramatic. The biomarker-app combination was able to predict suicidal ideation with 92 percent accuracy. For patients with bipolar disorder, the combo's predictive powers were even stronger: it predicted suicidal ideation with 98 percent accuracy and hospitalization with 94 percent.

Separately, the app and the blood test were much less effective for predicting the likelihood of suicidal thoughts: about 80 percent and 70 percent, respectively.

"The app assesses the context in which the biomarkers are elevated," Niculescu says. "If you have the biomarkers in the context of having these other risk factors, then you're at very high risk—that's what our study is showing."

It's not entirely clear why gene expression changes along with mental state. Researchers theorize that these are responses to stress and anxiety, themselves predictors of suicide.

Niculescu sees these biomarkers as part of a building movement to make psychiatry more biologically based. "[The research] in all likelihood will translate to clinical applications over the next five years, which will bring psychiatry more on par with other medical specialties," he says. "You'll have a risk test, just like in cardiology, just a little bit more indirect."

In the short term, Niculescu sees the biomarkers and the app as being useful in an acute care setting, like an emergency room, where a doctor needs to make a decision about who to admit and who to allow to go home in cases of injuries and overdoses that may or may not have been intentional.

In the longer term, he hopes the test could be used to prevent these crises before they start.

One limitation to the study is that all the test subjects were men. However, a second study looking at women has already been done. Though it is yet unpublished, Niculescu says the results are "promising."

It's also unclear if the biomarker and app combo will be useful for people without severe mental health diagnoses; it's not just people with major depression or schizophrenia who kill themselves.

While some psychiatrists say the risks of false positives in the general population are too high, Niculescu says he's "cautiously optimistic" it will work.

http://www.eurekalert.org/pub_releases/2015-08/bu-pop082515.php

Pigments, organelles persist in fossil feathers

A study provides multiple lines of new evidence that pigments and the microbodies that produce them can remain evident in a dinosaur fossil.

PROVIDENCE, R.I. [Brown University] -- In the journal Scientific Reports, an international team of paleontologists correlates the distinct chemical signature of animal pigment with physical evidence of melanosome organelles in the fossilized feathers of Anchiornis huxleyi, a bird-like dinosaur that died about 150 million years ago in China.

The idea that melanosomes, which produce melanin pigment, are preserved in fossils has been hotly debated among scientists during the last several years. Microscopic traces that to some scientists seem to resemble melanosomes, appear to skeptics to instead be similar-looking bacteria. The new study resolves the debate, said co-author Ryan Carney, a graduate student at Brown University, by adding a powerful second line of evidence: chemistry.

"We have integrated structural and molecular evidence that demonstrates that melanosomes do persist in the fossil record," said Carney, who helped design and write the study. "This evidence of animal-specific melanin in fossil feathers is the final nail in the coffin that shows that these microbodies are indeed melanosomes and not microbes."

A fossilized Anchiornis huxleyi, a bird-lke dinosaur, carries evidence of pigment and the subcellular organelles that made it. **Thierry Hubin/RBINS**

The finding has important implications for the interpretation of both past and future studies on fossil color, Carney said, and substantiates prior proposals that Anchiornis had some dark black feathers.

Signatures of animal pigment

In the new study, led by Johan Lindgren of Lund University in Sweden, the team used electron microscopes to observe what appear to be rod-like melanosome structures and imprints within the barbules of feathers all over the body.

That morphological evidence alone, however, would not advance the debate, so in addition the team performed two different kinds of chemical analyses to see if they could detect animal eumelanin pigment. They used both time-of-flight secondary ion mass spectrometry and infrared reflectance spectroscopy to discern the molecular signature of melanin in the samples. They compared those observed signatures with the signatures of modern-day animal eumelanin. The melanins were virtually identical, except for minor contributions from sulfur in the fossil, Carney said.

Credit: By Michael DiGiorgio/Courtesy Yale

The researchers also analyzed the observed spectral signatures to compare them with melanins produced by various microbes, just to make sure that the pigments were not from any other source. The closest spectral agreement remained with an animal source, however.

"This is animal melanin, not microbial melanin, and it is associated with these melanosome-like structures in the fossil feathers," Carney said.

Furthermore, no other types of molecules from potential microbes were detected.

In addition to Lindgren and Carney, the paper's other authors are Peter Sjövall, Aude Cincotta, Per Uvdal, Steven Hutcheson, Ola Gustafsson, Ulysse Lefèvre, François Escuillié, Jimmy Heimdal, Anders Engdahl, Johan Gren, Benjamin Kear, Kazumasa Wakamatsu, Johan Yans and Pascal Godefroit.

The Swedish Research Council, the Crafoord Foundation and the National Geographic Society funded the research.

http://www.eurekalert.org/pub_releases/2015-08/e-etd082715.php

Exploding the drug deadlock: Repurposing nitroglycerin for anti-cancer treatments

Using nitroglycerin -- a medicine used for chest pain -- to fight cancer? That's dynamite!

For over a century, nitroglycerin has been used medically - particularly in the treatment of angina, or chest pain. It is a safe, cheap and effective treatment. Now, according to the latest study in ecancermedicalscience, researchers find that nitroglycerin is the latest in a series of medicines that could be repurposed to treat cancer. The Repurposing Drugs in Oncology (ReDO) project, an international collaboration between the Anticancer Fund, Belgium, and US based GlobalCures, finds that existing and widely-used non-cancer drugs may represent a relatively untapped source of novel therapies for cancer.

Treatment failures for many cancers have been attributed to tumour hypoxia, or the lack of oxygen inside the tumour environment, explains study author Vidula Sukhatme, founder of GlobalCures. The stifling conditions make it difficult to penetrate the tumour with treatments.

"Any intervention that improves tumour oxygenation could improve radiation and chemotherapy outcomes," Sukhatme says. "Nitroglycerin is one such agent," she

explains. "It's immediately available, inexpensive and relatively non-toxic. It would be a shame to ignore its potential for patient benefit just because it is an old drug and has multiple mechanisms of action."

"In addition to tackling tumour hypoxia, nitroglycerin has excellent potential for improving the delivery of anticancer drugs," adds study author Pan Pantziarka, PhD, member of the ReDO project and the Anticancer Fund.

"One of the nicest things about nitroglycerin is the method of delivery - transdermal patches, which mean that patients may be able to get additional benefit from their existing treatments without having to take more tablets or intravenous medicines."

Nitroglycerin has had a long history of being put to unusual uses. Over a hundred years ago, the scientist who invented dynamite - an explosive based on nitroglycerin - regretted the destruction his creation had wreaked. Thus, Alfred Nobel sought to balance the history books by repurposing his fortune, and founded the Nobel Prize to reward humanity's highest achievements.

The ReDO researchers see a clear call to action: support and interest is needed to help nitroglycerin gain ground as an anti-cancer agent. But one thing is already sure - Alfred Nobel would be deeply proud of nitroglycerin's latest noble cause.

Sukhatme Vidula, Bouche Gauthier, Meheus Lydie, Sukhatme Vikas P and Pantziarka Pan (2015) Repurposing Drugs in Oncology (ReDO)--nitroglycerin as an anti-cancer agent ecancer 9 568 DOI: 10.3332/ecancer.2015.568

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Parkinson's disease brain cells at risk of burnout, like an overheating motor

Researchers find that the brain cells most at risk in the disease consume unusually high amounts of energy, gradually exhausting and killing themselves

The death of brain cells in Parkinson's disease may be caused by a form of cellular energy crisis in neurons that require unusually high quantities of energy to carry out their job of regulating movement, researchers at the University of Montreal reported today. The neurodegenerative disorder affects over 100,000 Canadians and over 1,000,000 Americans. "Like a motor constantly running at high speed, these neurons need to produce an incredible amount of energy to function. They appear to exhaust themselves and die prematurely," said lead researcher Louis-Éric Trudeau, a professor at the university's Departments of Phamacology and Neurosciences. The research article, published today in Current Biology, includes contributions from Consiglia Pacelli, Nicolas Giguère and Marie-Josée Bourque, also of the University of Montreal, and Martin Lévesque and Ruth Slack, of Laval and Ottawa universities, respectively.

The findings are in some ways a culmination of Trudeau's 17 years of studying the part of the brain that causes Parkinson's disease, schizophrenia and drug addiction. His findings could open the door to the creation of better animal models of Parkinson's disease and the identification of new treatment strategies. "For some unknown reason, it has been incredibly difficult to reproduce the symptoms of Parkinson's in mice, even when introducing in the genome of these animals the same mutations found in humans afflicted by familial forms of the disease. Our discovery provides a new lead to potentially overcome such difficulties" Trudeau explained.

Improved animal models open a variety of new avenues of research. "It's possible that new medications could be developed to help the neurons in question reduce their energy consumption or produce energy more efficiently, which would reduce accumulated damage over the years," Trudeau said. His team is already looking at the possible next steps with Professor Slack and her colleague Professor David Park.

Targeting the dark side

Unlike Alzheimer's, which has a wider-ranging impact on billions of brain neurons, the primary symptoms or Parkinson's are caused by the death of tens or hundreds of thousands of neurons in a few more restricted areas of the brain, including regions called the substantia nigra (literally "the black substance"), the locus ceruleus and the dorsal nucleus of the vagus nerve.

Key to the mystery may be mitochondria, the powerhouses that allow cells to grow and neurons to conduct electrical signals and release their chemical messengers such as dopamine, noradrenaline and acetylcholine. For the past three years, the research team carried out numerous experiments in order to identify why mitochondria in neurons of the substantia nigra work so hard and apparently lead neurons to "overheat".

They discovered that this overheating could be caused by the fact that these neurons have an amazingly complex structure with a large number of extensions and neurotransmitter release sites, much like a tree with numerous branches. Providing energy to these numerous branches may make the neurons particularly vulnerable, leading, in the context of aging, to malfunction and cell death, thus triggering Parkinson's, with the onset of symptoms generally at around age sixty. "Our work supports the theory that very complex neurons like those found in the substantia nigra force the mitochondria to constantly work at burnout rates to produce energy. This would explain the accelerated cell deterioration," Trudeau

explained. "To use the analogy of a motor, a car that overheats will burn significantly more fuel, and, not surprisingly, end up at the garage more often."

Professor Trudeau notes that the most common neurodegenerative diseases are particularly challenging for researchers, because in a way, their increasing prevalence is the result of increased life expectancy. "From an evolutionary standpoint, some of our neurons are perhaps just not programmed to last 80, 90 or 100 years, as we are seeing more and more. It's to be expected that certain parts of our body are less able to withstand the effects of time," he said. However, given the more localized nature of Parkinson's disease (compared to other afflictions), an effective treatment may be discovered in the not-too-distant future. Nevertheless, Trudeau points out that his primary goal is to develop a fundamental understanding of the mechanisms of the brain in order to shed new light on neurological disorders.

Professor Louis-Éric Trudeau and his team are affiliated with the University of Montreal's Groupe de Recherche sur le Système Nerveux Central, Department of Pharmacology and Department of Neurosciences. Trudeau and his colleagues published ""Elevated mitochondrial bioenergetics and axonal arborization size are key contributors to the vulnerability of dopamine neurons" in Current Biology on August 27, 2015.

The research team received support for this project from Brain Canada in partnership with the Krembil Foundation, as well as from Parkinson Society Canada.

http://www.eurekalert.org/pub_releases/2015-08/isoa-ato082715.php

At the origin of language structure

Natural languages aim to be efficient, but are also limited by cognitive load

Subject, verb, object: a triad that in spoken discourse (as well as written) can be arranged in different positions (six, in principle) although in the overwhelming majority of world languages, 86%, they occur in two forms: SVO ("Johnny eats the banana") and SOV ("Johnny the banana eats"). In particular, the latter is the most common and scientific literature supports the hypothesis that it is a basic form, perhaps the first to emerge when a new language or communication system is born. To back this up is the fact that over the course of history many languages have passed from SOV to SVO, but never the other way around.

What specifically determines the preference for SVO in a language over SOV? That was the question posed by Hanna Marno, a researcher at the International School for Advanced Studies in Trieste (SISSA).

The study by Marno and other SISSA colleagues (Alan Langus and professor Marina Nespor), as well as colleagues from the Medical University of Tehran and the Institute for Research in Fundamental Sciences of Tehran has been published in the journal Frontiers of Psychology.

More in detail...

"We started from the hypothesis that as languages change, they move towards greater efficiency of expression and along the way tend to grammaticalize more and more, that is, sentences can contain more complex structures. However, there is an element that opposes this growth: the limit of computational load that our cognitive system is able to withstand," explains Marno. "It is the balance between these two opposing 'forces' which makes SOV languages less palatable when grammar becomes more complex."

In languages that use the SOV order, it is necessary to use "marks", i.e. small particles attached to nouns to clarify their function within the sentence. These particles add to the computational load, however, favoring transition to the SVO form, which does not use these marks.

Based on this hypothesis, and beginning with a series of experiments previously conducted at SISSA in 2010, Marno and colleagues prepared a series of new tests. In the original experiments (performed by Alan Langus and Marina Nespor), two groups of subjects (one speaking Italian, an SVO language, and another speaking Turkish, an SOV language) had to communicate messages using gestural language they invented. A clear preference for the SOV form emerged, regardless of the language of origin.

"We hypothesized that if we made the participants' task easier by lightening the cognitive load of the linguistic task, we would observe a preference for the SVO form." To do this, Marno and colleauges, rather than having the subjects invent their own gestures, taught them instead during a training period before the actual experiment (also using two groups, one speaking Italian, the other, Farsi). "Relieved of the job of having to invent their lexicon, the subjects were able to concentrate on spontaneous language expression and, as we expected, they chose the SVO order." "This is a strong result" concludes Marno. "It explains an important aspect of the mechanisms of language change."

http://www.eurekalert.org/pub_releases/2015-08/p-aps082015.php

A patient shedding poliovirus for 28 years -- possible challenges for polio eradication

With all but two countries worldwide, Pakistan and Afghanistan, declared polio-free, the eradication of the devastating viral disease in the near future is a real possibility.

A study published on August 27th in PLOS Pathogens reports results from an individual in the UK with an immune disease whose stool samples have contained large amounts of live polio virus for over 20 years. Patients like this one, the authors suggest, could start new polio outbreaks and complicate polio eradication as currently planned.

There are three strains of wild polio virus (1, 2, and 3) and two different types of polio vaccine. Inactivated polio vaccine (IPV) is safe and effective in inducing neutralizing antibodies that protect against paralytic polio. It does not, however, induce substantial mucosal immunity and so prevent excretion of virus. Oral polio vaccine (OPV; which contains weakened, or "attenuated" live virus) is effective, and besides neutralizing antibodies induces mucosal immunity, thereby killing viruses in the gastro-intestinal tract and reducing excretion. OPV is less safe than IPV; on extremely rare occasions, it causes vaccine-associated paralytic polio, and because some shedding into the stool still occurs, it can also lead to circulating vaccine-derived polioviruses (cVDPV).

Over 90% of such cVDPV are due to the strain 2 component, which has not been seen in the "wild" since 1999 and thus appears eradicated. As strain 2 OPV is also responsible for up to 38% of vaccine-associated paralytic polio cases, WHO plans to implement shortly a switch from trivalent OPV (containing strains 1,2,3) to bivalent OPV (containing only strains 1 and 3) in routine immunization programs. Following eradication, the plan is to stop use of all OPV in routine immunizations, while IPV immunizations are likely to continue for some time.

In this study, Javier Martin, from the National Institute for Biological Standards and Control, Potters Bar, UK, and colleagues, analyzed more than 100 stool samples collected between 1995 and 2015 from a white male. The individual received a full course of childhood immunizations, including OPV at 5, 7, and 12 months, with a booster at about 7 years of age. He was later diagnosed with an immunodeficiency, which can affect the ability of the immune system to kill viruses in the digestive tract.

The researchers found high levels of strain 2 polio virus in all stool samples analyzed. Analysis of the RNA of these iVDPV strains (i.e. strains of vaccine-derived polio virus from immune-deficient individuals) showed that the excreted viruses were different from the weakened vaccine strain, and that they had started to diverge from it an estimated 28 years ago, around the time of this individual's last known vaccination with OPV. All iVDPV strains had mutations that reversed the attenuating features of the vaccine strain, and over time they also acquired a range of other mutations, many affecting the antigenic structure of the virus. All tested iVDPV samples were able to cause paralysis in transgenic mice that had a human poliovirus receptor.

Despite the extensive changes found in the iVDPV strains compared with the vaccine strain, the researchers found that human sera readily neutralized even the most divergent strain--reassuring results, they say, "in that they indicate that vaccinated humans are well protected against infection with these highly drifted iVDPV strains". However, they also state that "because the sera tested correspond to a selected group of UK healthy adults between 28-65 years of age who had been vaccinated with a full course of four OPV doses plus at least one dose of IPV, whereas the UK switched from OPV to IPV for polio immunization in 2004, it would be helpful to test sera from cohorts that have only received IPV".

Putting the research into context of other studies on iVDPV, they emphasize that "of the total of 73 iVDPV cases that have been described between 1962 and 2014, only seven involved infections lasting more than five years. The case described here represents by far the longest period of excretion described from such a patient and the only identified individual known to be excreting highly evolved vaccine-derived poliovirus at present". However, the researchers also mention that several highly mutated VDPV strains that showed molecular properties typical of iVDPVs have recently been isolated from sewage samples in Slovakia, Finland, Estonia, and Israel, suggesting that an unknown number of chronic excreters exist elsewhere.

The researchers conclude that "enhanced surveillance including sewage sampling and stool surveys to search for the presence of iVDPV strains and the development of efficient anti-viral treatments to interrupt virus replication in immune-deficient individuals are needed to be able to identify and manage the possible risks of iVDPV strains spreading and causing disease in patients and the general population, particularly in the light of changes in vaccination strategies as part of the polio eradication endgame and the absence of an established outbreak response strategy". They add that "new polio vaccines such as those based on non-infectious virus-like particles or even new genetically designed stable live-attenuated versions with no associated risk of producing VDPVs, might be required to complete polio eradication".

http://www.eurekalert.org/pub_releases/2015-08/uov-msr082115.php

Massive study reports challenges in reproducing published psychology findings

A study that sought to replicate 100 findings published in three prominent psychology journals has found that, across multiple criteria, independent researchers could replicate less than half of the original findings.

In some cases this may call into question the validity of some scientific findings, but it may also point to the difficulty of conducting effective replications and achieving reproducible results. The results of this review study, conducted by more than 270 researchers on five continents, are published in the Aug. 28 issue of the journal Science. Twenty-two students and faculty from the University of Virginia were among the co-authors.

"For years there has been concern about the reproducibility of scientific findings, but little direct, systematic evidence. This project is the first of its kind and adds substantial evidence that the concerns are real and addressable," said Brian Nosek, a U.Va. psychology professor and coordinator of the study.

Nosek is the co-founder and executive director of the Center for Open Science, which coordinated the Reproducibility Project: Psychology. The project has produced the most comprehensive, open investigation ever about the rate and predictors of reproducibility in a field of science.

Reproducibility means that the results recur when the same data are analyzed again, or when new data are collected using the same methods.

"With this project we established an initial estimate of the rate of reproducibility in psychology, and identified some evidence of possible influences on reproducibility," said Anup Gampa, a Reproducibility Project team member and Ph.D. candidate at U.Va. "This sets the stage for new research to examine how to improve reproducibility."

Science is unique from other ways of gaining knowledge, Gampa said, because it relies on reproducibility to gain confidence in ideas and evidence.

"Scientific evidence does not rely on trusting the authority of the person who made the discovery," said Reproducibility Project team member Angela Attwood, a psychology professor at the University of Bristol. "Rather, credibility accumulates through independent replication and elaboration of the ideas and evidence."

However, Elizabeth Gilbert, a Reproducibility Project team member and Ph.D. candidate at U.Va., noted that a failure to reproduce does not necessarily mean the original report was incorrect.

"A replication team must have a complete understanding of the methodology used for the original research, and shifts in the context or conditions of the research could be unrecognized but important for observing the result," she said.

Nosek pointed out that a problem for psychology, as well as in other disciplines, is that incentives for scientists are not consistently aligned with reproducibility.

"Scientists aim to contribute reliable knowledge, but also need to produce results that help them keep their job as a researcher," he said. "To thrive in science, researchers need to earn publications, and some kinds of results are easier to publish than others, particularly ones that are novel and show unexpected or exciting new directions." As a consequence, according to Nosek and his co-authors, many scientists pursue innovative research in the interest of their careers, even at the cost of reproducibility of the findings. The authors say that research with new, surprising findings is more likely to be published than research examining when, why or how existing findings can be reproduced.

Overall, the Reproducibility Project team successfully replicated fewer than half of the original findings. Investigators suggested this could be due to three basic reasons:

1. ***Though most replication teams worked with the original authors to use the same materials and methods, small differences in when, where or how the replication was carried out might have influenced the results.***
2. ***The replication might have failed, by chance, to detect the original result.***
3. ***The original result might have been a false positive.***

"The findings demonstrate that reproducing original results may be more difficult than is presently assumed, and interventions may be needed to improve reproducibility," said Johanna Cohoon, a project coordinator with the Charlottesville-based Center for Open Science.

In keeping with the goals of openness and reproducibility, each replication project team posted its methods and results on a public website.

Many organizations, funders, journals and publishers are working to improve reproducibility. The journal Psychological Science, one of the publications included in this study, last year implemented practices to make study materials and data readily and openly available to other researchers.

"Efforts include increasing transparency of original research materials, code and data so that other teams can more accurately assess, replicate and extend the original research, and pre-registration of research designs to increase the robustness of the inferences drawn from the statistical analyses applied to research results," said Denny Borsboom, a project team member from the University of Amsterdam who was involved in the creation of the Transparency and Openness Promotion Guidelines, recently published in Science.

http://www.eurekalert.org/pub_releases/2015-08/uoc--dnr082715.php

Degenerating neurons respond to gene therapy treatment for Alzheimer's disease

Postmortem brain studies suggest nerve growth factor safely triggered functional cell growth

Degenerating neurons in patients with Alzheimer's disease (AD) measurably responded to an experimental gene therapy in which nerve growth factor (NGF) was injected into their brains, report researchers at University of California, San Diego School of Medicine in the current issue of JAMA Neurology.

The affected neurons displayed heightened growth, axonal sprouting and activation of functional markers, said lead author Mark H. Tuszynski, MD, PhD, professor in the Department of Neurosciences, director of the UC San Diego Translational Neuroscience Institute and a neurologist at VA Medical Center, San Diego.

The findings are derived from postmortem analyses of 10 patients who participated in phase I clinical trials launched in 2001 to assess whether injected NGF - a protein essential to cellular growth, maintenance and survival - might safely slow or prevent neuronal degeneration in patients with AD.

Administering NGF directly into the brain - a first for treating of an adult neurodegenerative disorder - was done for two reasons. The NGF protein is too large pass through the blood-brain barrier, making it impossible to inject elsewhere. And freely circulating NGF causes adverse effects, such as pain and weight loss. By precisely injecting NGF into targeted regions of the brain, researchers could introduce the protein only to surrounding degenerating neurons.

The gene therapy approach has since progressed to phase II trials at multiple test sites. Results have not yet been released. The published findings come from AD patients who participated in safety trials from March 2001 to October 2012 at UC San Diego Medical Center. The participants lived one to 10 years after treatment.

"All of the Alzheimer's disease brains showed anatomical evidence of a growth response to the growth factor," said Tuszynski, who has been principal investigator for the trials from the beginning. "This means that growth factors as a class consistently result in activation of dying cells in human neurodegenerative disorders."

Tuszynski said the findings indicate NGF is safe over extended periods and that it merits continued testing as a potential AD treatment. Currently, there is no effective treatment or cure for AD.

Co-authors include Jennifer H. Yang, Mary M. Pay, Eliezer Masliah, David Barba, Hoi-Sang U, James M. Conner, Peter Kobalka, Subhojit Roy, and Alan H. Nagahara, all at UC San Diego; and Roy A. E. Bakay, Rush University Medical Center.

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Disclosure: Mark Tuszynski is scientific founder of Ceregene, Inc., but has no present financial interest in the company.

http://www.eurekalert.org/pub_releases/2015-08/uom-adt082715.php

Alzheimer's disease thought to be accelerated by an abnormal build-up of fat in the brain

First identification of accumulations of fat droplets in the brain of patients who died from Alzheimer's disease

People with Alzheimer's disease have fat deposits in the brain. For the first time since the disease was described 109 years ago, researchers affiliated with the University of Montreal Hospital Research Centre (CRCHUM) have discovered accumulations of fat droplets in the brain of patients who died from the disease and have identified the nature of the fat.

This breakthrough, published today in the journal Cell Stem Cell, opens up a new avenue in the search for a medication to cure or slow the progression of Alzheimer's disease. "We found fatty acid deposits in the brain of patients who died from the disease and in mice that were genetically modified to develop Alzheimer's disease. Our experiments suggest that these abnormal fat deposits could be a trigger for the disease", said Karl Fernandes, a researcher at the CRCHUM and a professor at University of Montreal.

Over 47.5 million people worldwide have Alzheimer's disease or some other type of dementia, according to the World Health Organization. Despite decades of research, the only medications currently available treat the symptoms alone.

This study highlights what might prove to be a missing link in the field. Researchers initially tried to understand why the brain's stem cells, which normally help repair brain damage, are unresponsive in Alzheimer's disease. Doctoral student Laura Hamilton was astonished to find fat droplets near the stem cells, on the inner surface of the brain in mice predisposed to develop the disease. "We realized that Dr. Alois Alzheimer himself had noted the presence of lipid accumulations in patients' brains after their death when he first described the disease in 1906. But this observation was dismissed and largely forgotten due to the complexity of lipid biochemistry", said Laura Hamilton.

The researchers examined the brains of nine patients who died from Alzheimer's disease and found significantly more fat droplets compared with five healthy brains. A team of chemists from University of Montreal led by Pierre Chaurand then used an advanced mass spectrometry technique to identify these fat deposits as triglycerides enriched with specific fatty acids, which can also be found in animal fats and vegetable oils.

"We discovered that these fatty acids are produced by the brain, that they build up slowly with normal aging, but that the process is accelerated significantly in the presence of genes that predispose to Alzheimer's disease", explained Karl Fernandes. In mice predisposed to the disease, we showed that these fatty acids accumulate very early on, at two months of age, which corresponds to the early twenties in humans. Therefore, we think that the build-up of fatty acids is not a consequence but rather a cause or accelerator of the disease."

Fortunately, there are pharmacological inhibitors of the enzyme that produces these fatty acids. These molecules, which are currently being tested for metabolic diseases such as obesity, could be effective in treating Alzheimer's disease. "We succeeded in preventing these fatty acids from building up in the brains of mice predisposed to the disease. The impact of this treatment on all the aspects of the

disease is not yet known, but it significantly increased stem cell activity," explained Karl Fernandes. "This is very promising because stem cells play an important role in learning, memory and regeneration."

This discovery lends support to the argument that Alzheimer's disease is a metabolic brain disease, rather like obesity or diabetes are peripheral metabolic diseases. Karl Fernandes' team is continuing its experiments to verify whether this new approach can prevent or delay the problems with memory, learning and depression associated with the disease.

Source: University of Montreal Hospital Research Centre (CRCHUM (CRCHUM).

About the study

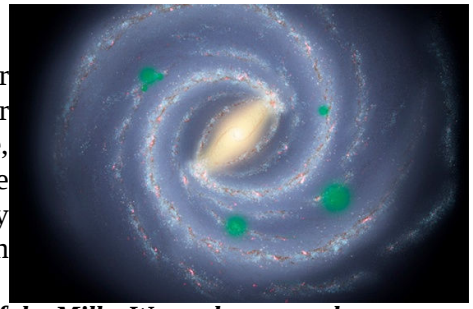
This study is the result of a multidisciplinary collaboration between Karl Fernandes' team at the CRCHUM, Pierre Chaurand's team at Université de Montréal's Department of Chemistry and Martin Parent's team at Université Laval's Centre de recherche de l'Institut universitaire en santé mentale de Québec Brain Bank. The study was funded by the Canadian Institutes of Health Research (CIHR). Karl Fernandes holds the Canada Research Chair in Neural Stem Cell Biology. Laura Hamilton is funded by an award from the Alzheimer Society of Canada and the Fonds de recherche du Québec - Santé (FRQS). The other authors are: Martin Dufresne, Sandra E. Joppé, Sarah Petrysyn, Anne Aumont, Frederic Calon, Fanie Barnabé-Heider, Alexandra Furtos and Martin Parent. To find out more, see the study: http://www.cell.com/cell-stem-cell/abstract/S1934-5909(15)00356-2

http://bit.ly/1N2DW1Z

Life May Have Spread Through the Galaxy Like a Plague

If alien life is distributed in a pattern that mirrors epidemics, it could be strong support for the theory of panspermia

By Jesse Emspak



In this theoretical artist's conception of the Milky Way galaxy, translucent green "bubbles" mark areas where life has spread beyond its home system to create cosmic oases, a process called panspermia. New research suggests that we could detect the pattern of panspermia, if it occurs. **NASA/JPL/R. Hurt (Harvard-Smithsonian CfA)**

Finding alien life, be it microbes or Vulcans, would revolutionize our understanding of our place in the universe, not only because we would no longer be alone in the galaxy, but also because it may help us figure out the origins of life on Earth.

Panspermia is the theory that the seeds of life somehow came to our planet from another world. The idea is controversial at best—most biologists would tell you that it just pushes the problem back a step, because we still wouldn't know what sparked life in the first place. And so far, there's little reason to think life on other planets should be anything like what we see on Earth.

Now Henry Lin and Abraham Loeb of Harvard University say that if we do see evidence of alien life, the distribution of inhabited planets would be a "smoking gun" for panspermia. According to their model, if life arises on a few planets and spreads through space to others, inhabited planets ought to form a clumpy pattern around the galaxy, with voids between roughly spherical regions. This bubble pattern appears no matter how the distribution happens, whether its aliens traveling by spaceship or comets carrying life's building blocks.

"It's not that different from an epidemic," says Lin, an undergraduate with the Harvard-Smithsonian Center for Astrophysics and lead author of the study, which was accepted by the Astrophysical Journal. "If there's a virus, you have a good idea that one of your neighbors will have a virus too. If the Earth is seeding life, or vice versa, there's a good chance immediate neighbors will also have signs of life."

We've already found almost 2,000 exoplanets, and the next generation of planet-hunting telescopes should be able to search their atmospheres for telltale signs of life. That's when Lin and Loeb's model would come into play.

In an ideal case, Earth is sitting near the edge of a bubble of inhabited worlds. Astronomers looking at life-bearing planets from Earth should then see the nearest living worlds concentrated on one side of the sky. It wouldn't take that many exoplanets to confirm the distribution—only about 25 will do, Lin and Loeb say.

One of the more popular ways to check whether panspermia is valid has been to look for the building blocks of life—or something actually living—on comets. But the sheer number of comets in our solar system alone means that life-bearing ones could be lost in the crowd, making it hard to definitively test the notion. With this new model, if inhabited planets are randomly distributed, then scientists can be far more confident that panspermia doesn't work, Lin says.

But while the statistical argument is an elegant one, the visibility of the bubbles depends in part on how fast life spreads. Our Milky Way galaxy is billions of years old, and stars have had a lot of time to move around. The sun, for example, takes a quarter of a billion years to complete an orbit around the galactic center, and it's made some 20 such orbits over the last five billion years. If it was surrounded by a cluster of other star systems when life started here, they've long since scattered.

If panspermia happens relatively fast, on time scales of 100 million years or so, then the bubbles would grow quickly and be dispersed as the stars on the outer edges fell behind those closer to the galactic center. The broken-up bubbles would form new ones, and while they'd be smaller, they would still be detectable, Lin and Loeb write. If life spreads very slowly, then the bubbles will be much harder to see.

Lin also acknowledges that alien life doesn't need to resemble anything like that on Earth, and that could be another strike against panspermia. We only have one example of a biosphere, and our bias is to look for creatures that also breathe oxygen, for example, and live in the habitable zones of stars. But scientists can think of possible life-forms based on radically different chemistries.

For his part, Lin says astrobiology is an exciting field precisely because it allows for this kind of speculation. "Most of the papers like this are going to be wrong," he says.

http://nyti.ms/1N2EHbk

Buzz Aldrin Joins University, Forming 'Master Plan' for Mars

Buzz Aldrin is teaming up with Florida Institute of Technology to develop "a master plan" for colonizing Mars within 25 years.

By THE ASSOCIATED PRESS AUG. 27, 2015, 6:04 P.M. E.D.T.

MELBOURNE, Fla. - The second man to walk on the moon took part in a signing ceremony Thursday at the university, less than an hour's drive from NASA's Kennedy Space Center. The Buzz Aldrin Space Institute is set to open this fall.

The 85-year-old Aldrin, who followed Neil Armstrong onto the moon's surface on July 20, 1969, will serve as a research professor of aeronautics as well as a senior faculty adviser for the institute. He said he hopes his "master plan" is accepted by NASA and the country, with international input. NASA already is working on the spacecraft and rockets to get astronauts to Mars by the mid-2030s.

Aldrin is pushing for a Mars settlement by approximately 2040. More specifically, he's shooting for 2039, the 70th anniversary of his own Apollo 11 moon landing, although he admits the schedule is "adjustable." He envisions using Mars' moons, Phobos and Deimos, as preliminary stepping stones for astronauts. He said he dislikes the label "one-way" and imagines tours of duty lasting 10 years.

"The Pilgrims on the Mayflower came here to live and stay. They didn't wait around Plymouth Rock for the return trip, and neither will people building up a population and a settlement" on Mars. As for Aldrin, he's recently settled in nearby Satellite Beach, right on the Atlantic Ocean, after moving from California. He told reporters he considers it "a terminal assignment," using Air Force jargon.

"I've traded earthquakes and fires for hurricanes by coming to Florida," he said.

The press conference made reference to Aldrin's recent celebrity pursuits.

Florida Tech's executive vice president, T. Dwayne McCay, greeted Aldrin by noting, "Everyone knows what Buzz Aldrin is most famous for, and that is being a contestant on 'Dancing with the Stars.'" "Big Bang Theory," Aldrin corrected.

Aldrin — who has a doctorate in science from Massachusetts Institute of Technology — joins two other space fliers on the faculty: former shuttle astronauts Winston Scott and Sam Durrance.

http://www.eurekalert.org/pub_releases/2015-08/uosc-cin082815.php

CPR: It's not always a lifesaver, but it plays one on TV

Popular medical dramas make resuscitation look twice as effective as in real life -- and it may influence real patient decisions, according to a USC study

If you think that performing CPR on a person whose heart has stopped is a surefire way to save their life, you may be watching too much TV.

The truth is more depressing than fiction, according to a new study by University of Southern California Davis School of Gerontology researchers. While medical dramas Grey's Anatomy and House show cardiopulmonary resuscitation saving a patient's life nearly 70 percent of the time, the real immediate survival rate is nearly half that - around 37 percent.

Researchers also found another discrepancy between reality and TV: Half of the characters who received CPR made enough of a recovery to eventually leave the hospital, but in reality, only 13 percent of patients given CPR survive in the long-term, said senior author and Davis School Associate Professor Susan Enguidanos, an expert in end-of-life care.

"Most people have no knowledge of actual CPR survival and thus make medical care decisions for themselves and family members based on inaccurate assumptions," Enguidanos said.

Some people think it's a no-brainer that fiction sometimes distorts the truth, but research has shown that 42 percent of older adults report that their health knowledge comes from TV. Many are likely basing their care preferences on inaccurate ideas of what risks they face and how survivable a heart attack is, Enguidanos said.

For the study, the research team watched episodes of both shows that aired during 2010 and 2011, and found 46 separate depictions of CPR--involving either chest compressions or defibrillation. Investigators recorded not only whether the patients lived or died but also the cause of cardiac arrest and the apparent backgrounds and ages of those receiving CPR. In addition to inaccurate survival rates, researchers found a number of other discrepancies.

The depictions show CPR mostly being performed on adults age 18 to 65, when in reality more than 60 percent of CPR recipients are older adults over 65, Enguidanos said. Also, trauma was behind nearly 40 percent of the CPR instances in the shows, even though traumatic injury cases only account for 2 percent of all CPR usage in real life.

When comparing these results to a similar study conducted in 1996, accuracy rates of television CPR depictions appear to not be improving. And though they seem like harmless entertainment, widespread inaccuracies in medical dramas could have real-life consequences.

Compounding the issue is the fact that the shows also largely fail to depict advance care planning and conversations about end-of-life choices. Among 91 episodes analyzed, only five patients and/or their families discussed care preferences with their doctors.

"The findings from this study emphasize the need for improved physician-patient communication and discussions around advance care planning decisions, such as CPR," said Jaclyn Portanova, Davis School Ph.D. in Gerontology student and first author of the study. "Without these discussions, patients may rely on misinformation from TV in their decision-making."

The study was co-authored by Bachelor of Science in Human Development and Aging student Krystle Irvine and Master of Science in Gerontology Jae Yoon Yi. It appeared online in the journal Resuscitation on August 18, 2015. The full article is available at http://dx.doi.org/10.1016/j.resuscitation.2015.08.002.

http://www.eurekalert.org/pub_releases/2015-08/esoc-rca082815.php

Refractory cardiac arrest patients brought to hospital with ongoing CPR can recover

Refractory cardiac arrest patients brought to hospital with ongoing cardiopulmonary resuscitation can survive with good brain function

London, UK - Refractory cardiac arrest patients brought to hospital with ongoing cardiopulmonary resuscitation (CPR) can survive with good brain function, according to research in nearly 4 000 patients presented at ESC Congress today by Dr Helle Søholm, a cardiologist at Copenhagen University Hospital Righospitalet in Denmark. "The faster a patient with cardiac arrest is resuscitated and brought back to life the better," said Dr Søholm.

"The prognosis for patients with refractory cardiac arrest with long resuscitation attempts has previously been shown to be poor. The use of extracorporeal life systems, which have an artificial pump to help the blood circulate the body, are currently being investigated to improve survival in these patients."

She added: "However, we found in our study that patients with refractory cardiac arrest treated without the support of extracorporeal life systems do not have such a dismal prognosis as one might think, which encourages longer resuscitation attempts."

Nearly 60 out of 100 000 people suffer cardiac arrest outside the hospital each year and only one in ten survive. Survival and outcome greatly depend on immediate response with early call for help, bystander resuscitation attempt and fast use of defibrillators.

In patients with refractory cardiac arrest, pre-hospital physicians in the emergency medical services may terminate CPR outside the hospital or continue CPR while bringing patients to the hospital.

The current study investigated the survival and, just as importantly, the functional status in patients with refractory cardiac arrest brought to the hospital with ongoing CPR and treated conservatively without the support of extracorporeal life systems.

The study included 3 992 patients who had a cardiac arrest outside hospital in a large urban area and were treated by physician-based emergency medical services between 2002 and 2011. Of these, 1 285 (32%) were successfully resuscitated outside hospital and 108 (3%) were brought to the hospital with refractory cardiac arrest.

Approximately half of the patients brought to the hospital with ongoing CPR were successfully resuscitated and were admitted to a hospital ward. In the other half the resuscitation attempt was terminated in the emergency department after more than one hour of CPR on average.

Of the successfully resuscitated patients with refractory cardiac arrest about a third were suffering from cardiac arrest due to acute myocardial infarction.

The rate of survival in patients with refractory cardiac arrest who received ongoing CPR was 20% compared to 42% in those who were resuscitated before arrival at the hospital ($p<0.001$).

Sufficient function for carrying out independent daily activities was found in approximately nine out of ten in both patient groups discharged from hospital with a high functional status (86% in the ongoing CPR group and 84% in those with successful pre-hospital resuscitation, $p=0.7$).

"Even though the survival rate in patients with refractory cardiac arrest is lower the prognosis is not dismal and importantly the functional status at hospital discharge is similar to patients resuscitated before arrival at the hospital," said Dr Søholm.

"Our results indicate that maybe resuscitation attempts should be extended as the prognosis for patients with refractory cardiac arrest is not as poor as we previously thought. In general we recommend that cardiac arrest patients are given post-resuscitation care in dedicated cardiac arrest centres with highly specialised treatment options and experienced physicians."

She concluded: "Our study shows that it is worth bringing patients with refractory cardiac arrest to the hospital with ongoing CPR. Patients with refractory cardiac arrest have a higher survival than expected - even without the use of extracorporeal life systems."

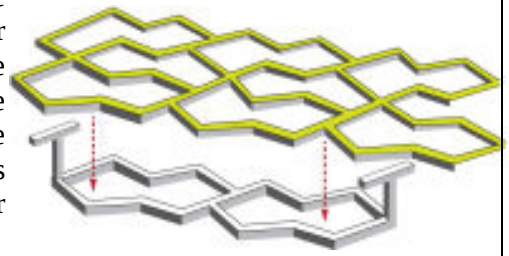
http://www.eurekalert.org/pub_releases/2015-08/uotf-nv082815.php

New 'Tissue Velcro' could help repair damaged hearts

Engineers at the University of Toronto just made assembling functional heart tissue as easy as fastening your shoes.

The team has created a biocompatible scaffold that allows sheets of beating heart cells to snap together just like Velcro™.

"One of the main advantages is the ease of use," says biomedical engineer Professor Milica Radisic, who led the project. "We can build larger tissue structures immediately before they are needed, and disassemble them just as easily. I don't know of any other technique that gives this ability."



This diagram shows how the T-shaped posts on one layer of the tissue scaffold pass through the holes in a second layer. The mechanism is similar to the hooks and loops used to fasten Velcro™. **Credit: Raymond Cheah/ University of Toronto Engineering**

Growing heart muscle cells in the lab is nothing new. The problem is that too often, these cells don't resemble those found in the body. Real heart cells grow in an environment replete with protein scaffolds and support cells that help shape them into long, lean beating machines. In contrast, lab-grown cells often lack these supports, and tend to be amorphous and weak. Radisic and her team focus on engineering artificial environments that more closely imitate what cells see in the body, resulting in tougher, more robust cells.

Two years ago, Radisic and her team invented the Biowire, in which heart cells grew around a silk suture, imitating the way real muscle fibres grow in the heart. "If you think of single fibre as a 1D structure, then the next step is to create a 2D structure and then assemble those into a 3D structure," says Boyang Zhang a PhD candidate in Radisic's lab. Zhang and Miles Montgomery, another PhD student in the lab, were co-lead authors on the current work, published today in Science Advances.

Zhang and his colleagues used a special polymer called POMaC to create a 2D mesh for the cells to grow around. It somewhat resembles a honeycomb in shape, except that the holes are not symmetrical, but rather wider in one direction than in another. Critically, this provides a template that causes the cells to line up together. When stimulated with an electrical current, the heart muscle cells contract together, causing the flexible polymer to bend.

Next the team bonded T-shaped posts on top of the honeycomb. When a second sheet is placed above, these posts act like tiny hooks, poking through the holes of honeycomb and clicking into place. The concept the same as the plastic hooks and loops of Velcro™, which itself is based on the burrs that plants use to hitch their seeds to passing animals.

Amazingly, the assembled sheets start to function almost immediately. "As soon as you click them together, they start beating, and when we apply electrical field stimulation, we see that they beat in synchrony," says Radisic. The team has created layered tissues up to three sheets thick in a variety of configurations, including tiny checkerboards.

The ultimate goal of the project is to create artificial tissue that could be used to repair damaged hearts. The modular nature of the technology should make it easier to customize the graft to each patient. "If you had these little building blocks, you could build the tissue right at the surgery time to be whatever size that you require," says Radisic. The polymer scaffold itself is biodegradable; within a few months it will gradually break down and be absorbed by the body.

Best of all, the technique is not limited to heart cells. "We use three different cell types in this paper; cardiomyocytes, fibroblasts and endothelial cells, but conceptually there is really no limitation," says Radisic. That means that other researchers could use the scaffold to build layered structures that imitate a variety of tissues, livers to lungs. These artificial tissues could be used to test out new drugs in a realistic environment.

Moreover, the ability to assemble and disassemble them at will could enable scientists to get much more detailed information on cell response than is currently possible. "You could take middle layer out, to see what the cells look like," says Radisic. "Then you could apply a molecule that will cause differentiation or proliferation or whatever you want, to just that layer. Then you could put it back into the tissue, to see how it interacts with the remaining layers."

The next step is to test how well the system functions in vivo. Radisic and her team are collaborating with medical researchers in order to design implantation experiments that will take the project one step closer to the clinic.

An animated graphic of the honeycomb mesh can be seen here

http://www.eurekalert.org/pub_releases/2015-08/ciot-alh082815.php

Artificial leaf harnesses sunlight for efficient fuel production

A fully integrated photoelectrochemical device performs unassisted solar water splitting for the production of hydrogen fuel

Generating and storing renewable energy, such as solar or wind power, is a key barrier to a clean-energy economy. When the Joint Center for Artificial Photosynthesis (JCAP) was established at Caltech and its partnering institutions in 2010, the U.S. Department of Energy (DOE) Energy Innovation Hub had one main goal: a cost-effective method of producing fuels using only sunlight, water,

and carbon dioxide, mimicking the natural process of photosynthesis in plants and storing energy in the form of chemical fuels for use on demand. Over the past five years, researchers at JCAP have made major advances toward this goal, and they now report the development of the first complete, efficient, safe, integrated solar-driven system for splitting water to create hydrogen fuels.

"This result was a stretch project milestone for the entire five years of JCAP as a whole, and not only have we achieved this goal, we also achieved it on time and on budget," says Caltech's Nate Lewis, George L. Argyros Professor and professor of chemistry, and the JCAP scientific director.

The new solar fuel generation system, or artificial leaf, is described in the August 24 online issue of the journal Energy and Environmental Science. The work was done by researchers in the laboratories of Lewis and Harry Atwater, director of JCAP and Howard Hughes Professor of Applied Physics and Materials Science.

"This accomplishment drew on the knowledge, insights and capabilities of JCAP, which illustrates what can be achieved in a Hub-scale effort by an integrated team," Atwater says. "The device reported here grew out of a multi-year, large-scale effort to define the design and materials components needed for an integrated solar fuels generator."

The new system consists of three main components: two electrodes--one photoanode and one photocathode--and a membrane. The photoanode uses sunlight to oxidize water molecules, generating protons and electrons as well as oxygen gas. The photocathode recombines the protons and electrons to form hydrogen gas. A key part of the JCAP design is the plastic membrane, which keeps the oxygen and hydrogen gases separate. If the two gases are allowed to mix and are accidentally ignited, an explosion can occur; the membrane lets the hydrogen fuel be separately collected under pressure and safely pushed into a pipeline.

Semiconductors such as silicon or gallium arsenide absorb light efficiently and are therefore used in solar panels. However, these materials also oxidize (or rust) on the surface when exposed to water, so cannot be used to directly generate fuel. A major advance that allowed the integrated system to be developed was previous work in Lewis's laboratory, which showed that adding a nanometers-thick layer of titanium dioxide (TiO2)--a material found in white paint and many toothpastes and sunscreens--onto the electrodes could prevent them from corroding while still allowing light and electrons to pass through. The new complete solar fuel generation system developed by Lewis and colleagues uses such a 62.5-nanometer-thick TiO2 layer to effectively prevent corrosion and improve the stability of a gallium arsenide-based photoelectrode.

Another key advance is the use of active, inexpensive catalysts for fuel production. The photoanode requires a catalyst to drive the essential water-splitting reaction. Rare and expensive metals such as platinum can serve as effective catalysts, but in its work the team discovered that it could create a much cheaper, active catalyst by adding a 2-nanometer-thick layer of nickel to the surface of the TiO2. This catalyst is among the most active known catalysts for splitting water molecules into oxygen, protons, and electrons and is a key to the high efficiency displayed by the device.

The photoanode was grown onto a photocathode, which also contains a highly active, inexpensive, nickel-molybdenum catalyst, to create a fully integrated single material that serves as a complete solar-driven water-splitting system.

A critical component that contributes to the efficiency and safety of the new system is the special plastic membrane that separates the gases and prevents the possibility of an explosion, while still allowing the ions to flow seamlessly to complete the electrical circuit in the cell. All of the components are stable under the same conditions and work together to produce a high-performance, fully integrated system. The demonstration system is approximately one square centimeter in area, converts 10 percent of the energy in sunlight into stored energy in the chemical fuel, and can operate for more than 40 hours continuously.

"This new system shatters all of the combined safety, performance, and stability records for artificial leaf technology by factors of 5 to 10 or more ," Lewis says.

"Our work shows that it is indeed possible to produce fuels from sunlight safely and efficiently in an integrated system with inexpensive components," Lewis adds, "Of course, we still have work to do to extend the lifetime of the system and to develop methods for cost-effectively manufacturing full systems, both of which are in progress."

Because the work assembled various components that were developed by multiple teams within JCAP, coauthor Chengxiang Xiang, who is co-leader of the JCAP prototyping and scale-up project, says that the successful end result was a collaborative effort. "JCAP's research and development in device design, simulation, and materials discovery and integration all funneled into the demonstration of this new device," Xiang says.

These results are published in a paper titled "A monolithically integrated, intrinsically safe, 10% efficient, solar-driven water-splitting system based on active, stable earth-abundant electrocatalysts in conjunction with tandem III-V light absorbers protected by amorphous TiO2 films." In addition to Lewis, Atwater, and Xiang, other Caltech coauthors include graduate student Erik Verlage, postdoctoral scholars Shu Hu and Ke Sun, material processing and integration research engineer Rui Liu, and JCAP mechanical engineer Ryan Jones. Funding was provided by the Office of Science at the U.S. Department of Energy, and the Gordon and Betty Moore Foundation.

http://bit.ly/1JEzlfr

NASA picks post-Pluto destination for New Horizons spacecraft

Now we know where New Horizons is off to next.

Fresh from July's flyby of Pluto, NASA has chosen a target for the spacecraft to pass on its way out of the solar system.

The object, named 2014 MU69, is estimated to be between 25 and 45 kilometres across. Its actual size depends on how reflective its surface is – right now astronomers can only tell how much sunlight it reflects, so it could either be small and shiny or large and dull.

The team hopes its surface will provide a pristine record of the composition of the outer reaches of the solar system – the Kuiper belt it shares with Pluto and other icy bodies. It is a good candidate for preserving the Kuiper belt's history because it is too small to have been reshaped by geological processes, and far enough from the sun to have maintained its original makeup.

2014 MU69 is about two hundred million times fainter than we can see with our naked eyes, so it took almost two weeks of observation with the Hubble space telescope to find it last June. That search also yielded one other possible destination for New Horizons after Pluto, but 2014 MU69 is easier to reach.

Now that NASA has announced its preference for 2014 MU69, the next leg of New Horizon's journey faces one more hurdle: a formal proposal to NASA that is generally expected to succeed. If the extra trip is approved, the spacecraft will start burning fuel in October and November of this year en route to an expected flyby on 1 January 2019. After that, New Horizons will continue to head out of the solar system until its radioactive power source runs out in the 2030s.

http://www.eurekalert.org/pub_releases/2015-08/esoc-mna082815.php

Midday naps associated with reduced blood pressure and fewer medications

Midday naps associated with lowered BP and fewer antihypertensives

London, UK - Midday naps are associated with reduced blood pressure levels and prescription of fewer antihypertensive medications, according to research presented at ESC Congress today by Dr Manolis Kallistratos, a cardiologist at Asklepieion Voula General Hospital in Athens, Greece.

"Although William Blake affirms that it is better to think in the morning, act at noon, eat in the evening and sleep at night, noon sleep seems to have beneficial effects," said Dr Kallistratos. "Two influential UK Prime Ministers were supporters of the midday nap. Winston Churchill said that we must sleep sometime between lunch and dinner while Margaret Thatcher didn't want to be disturbed at around 3:00 pm. According to our study they were right because midday naps seem to lower blood pressure levels and may probably also decrease the number of required antihypertensive medications."

He added: "Midday sleep is a habit that nowadays is almost a privileged due to a nine to five working culture and intense daily routine. However the real question regarding this habit is: is it only a custom or is it also beneficial?"

The purpose of this prospective study was to assess the effect of midday sleep on blood pressure (BP) levels in hypertensive patients. The study included 386 middle aged patients (200 men and 186 women, average age 61.4 years) with arterial hypertension. The following measurements were performed in all patients: midday sleep time (in minutes), office BP, 24 hour ambulatory BP, pulse wave velocity,2 lifestyle habits, body mass index (BMI) and a complete echocardiographic evaluation including left atrial size.3 BP measurements were reported as diastolic and systolic BP.4

After adjusting for other factors that could influence BP such as age, gender, BMI, smoking status, salt, alcohol, exercise and coffee, the researchers found that midday sleepers had 5% lower average 24 hour ambulatory systolic BP (6 mmHg) compared to patients who did not sleep at all midday. Their average systolic BP readings were 4% lower when they were awake (5 mmHg) and 6% lower while they slept at night (7 mmHg) than non-midday sleepers (Figure 1).

Dr Kallistratos said: "Although the mean BP decrease seems low, it has to be mentioned that reductions as small as 2 mmHg in systolic blood pressure can reduce the risk of cardiovascular events by up to 10%."

The researchers also found that in midday sleepers pulse wave velocity levels were 11% lower and left atrium diameter was 5% smaller. "These findings suggest that midday sleepers have less damage from high blood pressure in their arteries and heart," said Dr Kallistratos. The duration of midday sleep was associated with the burden of arterial hypertension. Patients who slept for 60 minutes midday had 4 mmHg lower average 24 hour systolic BP readings and a 2% higher dipping status5 compared to patients who did not sleep midday. Dippers had an average of 17 minutes more midday sleep than non-dippers.

Dr Kallistratos said: "Our study shows that not only is midday sleep associated with lower blood pressure, but longer sleeps are even more beneficial. Midday sleepers had greater dips in blood pressure while sleeping at night which is associated with better health outcomes. We also found that hypertensive patients who slept at noon were under fewer antihypertensive medications compared to those who didn't sleep midday." He concluded: "We found that midday sleep is associated with lower 24 hour blood pressure, an enhanced fall of BP in night, and less damage to the arteries and the heart. The longer the midday sleep, the lower the systolic BP levels and probably fewer drugs needed to lower BP."

http://www.eurekalert.org/pub_releases/2015-08/econ-hcw082615.php

How can we prevent suicide? Major study shows risk factors associated with depression

A major multi-national study of suicides has identified the behaviour patterns which precede many suicide attempts.

This may lead to changes in clinical practice in the care of patients affected with depression, as it shows the clinical factors which confer major risk of suicide attempts.

The statistics for suicide are frightening. According to the WHO, more than 800,000 people commit suicide every year, with perhaps 20 times that number attempting suicide.

Suicide is one of the leading causes of death in the young (in the UK for example, it is the leading cause of death in men under 35) see notes, below. Effective measures of suicide prevention are urgently needed.

The BRIDGE-II-MIX study is a major international study looking at depression and suicide. The researchers evaluated 2811 patients suffering from depression, of whom 628 had already attempted suicide.

Each patient was interviewed by a psychiatrist as if it were a standard evaluation of a mentally-ill patient. The parameters studied included previous suicide attempts, family history, current and previous treatment, patients' clinical presentation, how they scored on the standard Global Assessment of Functioning scale, and other parameters.

The study looked especially at the characteristics and behaviours of those who had attempted suicide, and compared these to depressed patients who had not attempted suicide. They found that certain patterns recur before suicide attempts.

According to author Dr. Dina Popovic (Barcelona):

'We found that "depressive mixed states" often preceded suicide attempts. A depressive mixed state is where a patient is depressed, but also has symptoms of "excitation", or mania. We found this significantly more in patients who had previously attempted suicide, than those who had not. In fact 40% of all the depressed patients who attempted suicide had a "mixed episode" rather than just depression. All the patients who suffer from mixed depression are at much higher risk of suicide.

We also found that the standard DSM criteria identified 12% of patients at showing mixed states, whereas our methods showed 40% of at-risk patients. This means that the standard methods are missing a lot of patients at risk of suicide".

In a second analysis of the figures, they found that if a depressed patient presents any of the following symptoms:

risky behaviour (e.g. reckless driving, promiscuous behaviour)

psychomotor agitation (pacing around a room, wringing one's hands, pulling off clothing and putting it back on and other similar actions)

impulsivity (acting on a whim, displaying behaviour characterized by little or no forethought, reflection, or consideration of the consequences),

then their risk of attempting suicide is at least 50% higher.

Dr Popovic continued:

"In our opinion, assessing these symptoms in every depressed patient we see is extremely important, and has immense therapeutical implications. Most of these symptoms will not be spontaneously referred by the patient, the clinician needs to inquire directly, and many clinicians may not be aware of the importance of looking at these symptoms before deciding to treat depressed patients.

This is an important message for all clinicians, from the GPs who see depressed patients and may not pay enough attention to these symptoms, which are not always reported spontaneously by the patients, through to secondary and tertiary level clinicians. In highly specialized tertiary centres, clinicians working with bipolar patients are usually more aware of this, but that practice needs to extent to all levels.

The strength of this study is that it's not a clinical trial, with ideal patients - it's a big study, from the real world".

Commenting ECNP President, Professor Guy Goodwin (Oxford) said:

The recognition of increased activation in the context of a severe depression is an important practical challenge. While many psychiatrists recognize that this constitutes an additional risk for suicide, and would welcome better scales for its identification, the question of treatment remains challenging. We need more research to guide us on best practice.

http://www.eurekalert.org/pub_releases/2015-08/esoc-rms082815.php

Rapid, more sensitive test speeds up chest pain triage

Patients arriving at the emergency department with chest pain suggestive of acute myocardial infarction (AMI) can be triaged more quickly and more safely using a new rapid assay with refined cut-offs, German research suggests.

LONDON, England - The Biomarkers in Acute Cardiovascular Care (BACC) study, presented as a Hot Line at ESC Congress 2015, suggests this new algorithm can reduce mortality and cut triage times to one hour, compared to the standard three-hour approach.

"There is an urgent need for fast decision-making for this growing patient population," said principal investigator of the study Dirk Westermann, MD, PhD, from the University Heart Centre Hamburg, and the German Centre for Cardiovascular Research.

"Use of this algorithm in patients with suspected AMI allows for highly accurate and rapid rule-out as well as rule-in, enabling safe discharge or rapid treatment initiation. This rapid algorithm might be applicable to clinical practice without a loss of diagnostic safety."

For patients with suspected AMI, current guidelines recommend analysing cardiac troponin I - a marker of myocyte (cardiac muscle cell) necrosis - directly at admission and then 3 hours later, to determine if the level warrants admission or discharge. This means patients must remain in the hospital for at least 3 hours before receiving a diagnosis, using resources that are increasingly scarce.

In addition, troponin I levels are currently considered abnormal if they are above the 99th percentile from a healthy reference population - in this case 27 ng/L, said Dr. Westermann. But new, highly sensitive troponin I assays can give results more quickly and detect more subtle troponin I elevations that may be important for assessing cardiovascular risk, he explained.

The BACC (Biomarkers in Acute Cardiovascular Care) study included 1,045 patients (mean age 65 years) with acute chest pain suggestive of AMI presenting at the emergency room of the university hospital in Eppendorf, Hamburg, Germany.

Patients were assessed using both the standard 3-hour assay as well as a highly-sensitive 1-hour one. Based on the standard approach, 184 patients were diagnosed with AMI and kept in the hospital, while the rest were discharged home. All patients were then followed for 6 months.

Comparing the results of both assays in the cohort, the researchers calculated the best troponin I cut-off value to rule out AMI was 6 ng/L - "far lower than the currently recommended 27 ng/L," noted Dr. Westermann. They then tested the clinical relevance of this new cut-off for predicting cardiovascular events using data from the BiomarCaRE study - one of the largest studies to include troponin I measurement in more than 75,000 individuals from the general population.

The BiomarCaRE data confirmed that when individuals from the general population had troponin I values higher than 6 ng/L, they were at increased risk of death or cardiovascular disease, whereas patients with levels below this cut-off could be safely discharged home.

"This documents that even slightly elevated troponin I values are important predictors of cardiovascular disease," said Professor Westermann. "At the same time, utilising a very low cut-off for discharge of patients with suggestive AMI is safe, since these patients are at the lowest possible risk for future events.

The researchers then applied the new cut-offs to the BAAC cohort and found that mortality would have been lower if patients had been triaged with the new algorithm compared to the routine 3-hour approach.

"The standard approach underestimated risk for many patients and resulted in high mortality," said Dr. Westermann. "In addition, using the rapid, sensitive assay would have reduced usage of the emergency room and scarce medical resources, enabling a faster diagnosis and better treatment." The algorithm had negative predictive values of 99.7% after 1 hour and 100% after 3 hours.

"Therefore, our algorithm identified all patients at risk, but was not un-necessarily unspecific," said Dr. Westermann. "This suggests that using more sensitive cut-offs than suggested by the guidelines can improve the safety for patients discharged home." The algorithm was then validated in two independent cohorts (ADAPT and APACE trials) that included 4,009 patients with acute chest pain suggestive of AMI.

http://www.eurekalert.org/pub_releases/2015-08/esoc-mrf082815.php

Multiple risk factors cancel impact of atrial fibrillation on ischemic stroke risk

Stroke prevention in the elderly may need to focus on the concomitant effects of multiple risk factors

London, UK - The impact of atrial fibrillation on ischaemic stroke risk in elderly patients is eliminated with multiple risk factors, according to an 11 year study in more than 425 000 patients presented at ESC Congress today. The findings suggest that stroke prevention in the elderly may need to focus on the concomitant effects of multiple risk factors rather than on a specific risk factor such as atrial fibrillation (AF).

" "The incidence of ischaemic stroke increases with greater numbers of cardiovascular risk factors," said principal investigator Dr Yutao Guo, cardiologist at the PLA General Hospital in Beijing, China. "However until now, how atrial fibrillation contributed to the risk of ischaemic stroke with increasing age and multiple cardiovascular risk factors was unclear."

The researchers investigated incident ischaemic stroke rates in relation to age and increasing cardiovascular risk factors (vascular disease, hypertension, diabetes or heart failure), and the incremental impact of AF on these stroke rates. The study population was a 5% random sample of patients without prior ischaemic stroke from a Chinese medical insurance dataset of more than 10 million patients during 2001 to 2012. The rate of ischaemic stroke was calculated in patients with and without AF in relation to age groups (

The study included 425 600 patients who were followed up for 1 864 232 patient-years. Patients were 63.8% male, mean age was 60 years, 880 had AF and 424 720 did not have AF. There were 13 242 (3.1%) ischaemic strokes after 64 834 person-years follow-up. Overall, ischaemic stroke incidence (per 100 person-

years) was 0.35 (95% confidence interval [CI] = 0.34-0.35) in the non-AF population and 1.11 (95%CI = 0.84-1.45) in patients with AF (p

With increasing CHA2DS2-VASc scores, ischaemic stroke incidence per 100 person-years increased in both non-AF and AF populations (both p value for trend,

The non-AF population with ≥2 additional comorbidities had an increased stroke incidence with age (p value for trend,

"The non-AF elderly population (age ≥75 years) had comparable CHA2DS2-VASc scores to the AF population, but a numerically higher stroke incidence," said Dr Guo. "Non-AF patients with multiple additional comorbidities also had high ischaemic stroke rates, especially in the elderly, with the stroke incidence similar to an AF population with CHA2DS2-VASc >4."

"The risk of ischaemic stroke is high in elderly patients with multiple risk factors regardless of the presence of AF, and the excess stroke risk attributable to AF is probably minimal in such 'high risk' patients," Dr Guo added.

She continued: "Prevention strategies for stroke need to adapt to changing risk profiles. It will be important to identify risk factors as they emerge and find ways of identifying those at high risk to prevent developing incident stokes in the 'general' population."

Dr Guo concluded: "Patients without AF or prior stroke appear to have a similar or higher stroke risk than patients with AF, particularly if they are elderly and have multiple risk factors. More research is needed on the effect of multiple risk factors on risk of stroke in patients without AF. It may be that stroke prevention measures in the elderly should focus on numbers of risk factors, rather than on a specific risk factor such as AF. A holistic approach to stroke prevention is required."