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UC research examines lung cell turnover as risk factor & target for treatment of influenza pneumonia

Investigating spread of influenza through the lung,s focusing on resistance or susceptibility of respiratory cells to viral infection

CINCINNATI - Influenza is a recurring global health threat that, according to the World Health Organization, is responsible for as many as 500,000 deaths every year, most due to influenza pneumonia, or viral pneumonia. Infection with influenza most typically results in lung manifestations limited to dry cough and fever, and understanding how the transition to pneumonia occurs could shed light on interventions that reduce mortality. Research led by University of Cincinnati (UC) scientists takes a different approach to investigating how influenza spreads through the lungs by focusing on how resistant or susceptible cells lining the airway are to viral infection.

The work published today in the Proceedings of the National Academy of Sciences (PNAS) shows how stimuli that induce cell division in the lung promote spread of influenza from the airway to the gas exchanging units of the lung, known as the alveoli. The UC study also demonstrates that interventions that prevent alveolar cells from dividing reduce influenza mortality in animal models, suggesting a potential prophylactic and/or therapeutic strategy for influenza pneumonia.

"Almost all research into susceptibility or resistance to influenza focuses on host immune responses," says Nikolaos Nikolaidis, PhD, research scientist in the Division of Pulmonary, Critical Care and Sleep Medicine in the Department of Internal Medicine at the UC College of Medicine and lead author on the paper. "Our approach was to examine factors that influence the vulnerability of alveolar cells to influenza infection, separate from how the immune system is dealing with the virus."

"Less than 1 percent of alveolar cells are actively dividing at any given time in the healthy lung, rendering it naturally resistant to influenza infection," says Frank McCormack, MD, Gordon and Helen Hughes Taylor Professor of Internal Medicine and director of the Division of Pulmonary, Critical Care and Sleep Medicine and senior author on the paper. "Recovery from lung injury due to supplemental oxygen therapy, cigarette smoke or scarring lung diseases is associated with expression of growth factors that result in multiplication of lung cells. Our work demonstrated that these mitogenically stimulated cells are rich targets for influenza infection while they are dividing."

The researchers found that when sirolimus, which is FDA-approved for use as an anti-growth agent for the rare lung disease, lymphangioleiomyomatosis (LAM), was given to influenza-infected animal models, it prevented alveolar cells from dividing, and as a result, protected the mice from viral pneumonia and death.

"Although sirolimus also has off target immunosuppressive properties that could potentially pose added risks of side effects in virus-infected patients, trials of inhaled sirolimus could lead to approaches that do not entail systemic exposure," says McCormack.

The McCormack lab expressed optimism that this observation has the potential to ultimately inform understanding of other unexplained risk factors for influenza, including very young age and pregnancy, and perhaps even to change medical management, such as more judicious use of supplemental oxygen in patients admitted with suspected viral pneumonia. Further, the team has hopes that the research could lead to a paradigm shift in the approach to therapy.

Nikolaidis says the next step in this research is to further explore why the multiplying alveolar epithelial cell is a better target for influenza. "Is it because the virus gets into the dividing cell more easily, because multiplying stimuli expand the pool of cellular machinery used by the virus to replicate, or because proliferation is associated with a reduction in innate cellular defenses? We are anxious to explore these and other potential mechanisms of viral susceptibility," he adds.

Other UC investigators assisting Nikolaidis and McCormack include: Jason Gardner, PhD; Yasuaki Uehara, MD, PhD; Huixing Wu; Atsushi Saito, MD, PhD; Kara Lewnard; Huan Liu and Lori Pitstick.

Researchers not affiliated with UC include John (Greg) Noel of Shriners Hospitals for Children, and Mitchell White and Kevan Hartshorn, MD, of Boston Medical Center.

The research was funded by the National Institute of Allergy and Infectious Diseases (P01AI083222), the Center for Environmental Genetics (P30-ES006096), National Heart, Lung, and Blood Institute (HL069031) and the CareSpring Foundation.

McCormack has served as a consultant for LAM Therapeutics.

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Walking the dog may boost older people's physical activity, come rain or shine

And is linked to less daily sitting time; could be part of exercise on prescription, say researchers

Taking the dog out for a walk may boost older people's physical activity levels -- whatever the weather -- and seems to lop an average of 30 minutes off their daily sitting time, suggests research published online in the Journal of Epidemiology & Community Health.

In light of their findings, the researchers suggest that dog ownership or community schemes for dog walking could form part of exercise on prescription for this age group.

As adults age, they tend to become less active: in the UK alone it is estimated that less than half of older adults engage in the recommended weekly quota of at least 150 minutes of moderate intensity physical activity.

To find out if dog walking might motivate older adults to become more active, the researchers used data from participants in the Norfolk arm of the European Prospective Investigation into Cancer and Nutrition (EPIC).

EPIC, which began in 1993, originally aimed to look at the potential links between diet and cancer. But it has since broadened its focus to include the factors associated with long term conditions, disability, and death in middle age and later life.

Between September 2006 and December 2011, a sample of 3123 adults aged between 49 and 91 (average 69.5), were asked to wear a pedometer for seven consecutive days during waking hours, and provide information on regular physical activity.

They were also asked whether they owned a dog, and if so, how often they took it for a walk.

Almost one in five of the sample (18%; 573) said they owned a dog, and two thirds said they walked their dog at least once a day (classified as a regular dog walker); a third said they walked their dogs less than this (classified as a non-regular dog walker).

The entire sample spent an average of around 11 hours (667 minutes) every day sitting down, and tended to be less active when it rained, was cold, and the days were short in length.

Regular dog walkers were less active on rainy than on dry days too, but they were still more active on these days than people who didn't own a dog.

And they clocked up more physical activity when the temperature fell below 10 degrees Celsius than did those who walked their dogs irregularly or who didn't own a dog on the warmest days.

Regular dog walkers were also more active even on the shortest days than either of the other two groups. Their physical activity levels were typically 20% higher, and they spent 30 fewer minutes every day sitting down than did people who didn't own dogs.

All in all, dog owners who regularly walked their pets were more active and less sedentary on the days with the worst weather conditions than were people who didn't own a dog on days with the best weather conditions.

"Our findings hint at the important additional role of extrinsic motivation, in this case the need for the dog to be exercised even in poor weather," the researchers write.

They point out some caveats to their findings: those in good health were more likely to be dog owners and to walk their dogs regularly, so reverse causation-- whereby those who were more active to begin with owned a dog which they walked more--can't be ruled out.

And the climate in the East of England is reasonably temperate so the observed protective effect of dog ownership might not apply in other regions or countries with more extreme weather conditions, they add.

Nevertheless, they suggest that their findings "may have considerable potential to support the maintenance of physical activity in older adults and could form part of exercise on prescription schemes."

They acknowledge that older adults' health or living conditions might limit their opportunities to walk a dog to boost their physical activity levels.

So they suggest: "In cases where dog ownership is not possible but where the functional status allows, dog walking opportunities for older adults who do not own a dog could be organised by local community organisations or charities, and dog walking groups may provide wider wellbeing benefits associated with increased social contact."

Borrow my Doggy, a nationwide UK network, which provides regular group dog walks for people who aren't dog owners, might be one such option, they suggest.

http://bit.ly/2tPGuOx

Alcohol boosts recall of earlier learning

Drinking alcohol improves memory for information learned before the drinking episode began, new research suggests.

In the University of Exeter study, 88 social drinkers were given a word-learning task. Participants were then split in two groups at random and told either to drink as much as they liked (the average was four units) or not to drink at all.

The next day, they all did the same task again -- and those who had drunk alcohol remembered more of what they had learned.

The researchers are keen to stress that this limited positive effect should be considered alongside the well-established negative effects of excessive alcohol on memory and mental and physical health.

"Our research not only showed that those who drank alcohol did better when repeating the word-learning task, but that this effect was stronger among those who drank more," said Professor Celia Morgan, of the University of Exeter.

"The causes of this effect are not fully understood, but the leading explanation is that alcohol blocks the learning of new information and therefore the brain has more resources available to lay down other recently learned information into long-term memory.

"The theory is that the hippocampus -- the brain area really important in memory -- switches to 'consolidating' memories, transferring from short into longer-term memory."

The effect noted by the researchers has been shown under laboratory conditions before, but this is the first study to test it in a natural setting, with people drinking in their homes.

There was also a second task which involved looking at images on a screen. This task was completed once after the drinkers had drunk alcohol and again the following day, and the results did not reveal significant differences in memory performance post-drinking.

The study's participants were 31 males and 57 females, aged 18-53.

The paper, published in Nature journal Scientific Reports, is entitled: "Improved memory for information learnt before alcohol use in social drinkers tested in a naturalistic setting."

http://bit.ly/2w68ESf

Scientists Find Some of Mars's Youngest Volcanoes--and Discover They Could Have Supported Life

Newly identified volcanoes may have provided the perfect environment for microbial life-forms to thrive

By David Rothery, The Conversation US on July 24, 2017

It may seem that Mars was once a much more exciting planet. True, there are dust storms and possible water-seeps occurring today, but billions of years ago it was a dramatic place with huge volcanoes, a giant canyon system and branching river valleys being formed.

But now planetary scientists have identified what looks like more recently formed volcanoes, in geological terms. Excitingly, they may

have once provided the perfect environment for microbial lifeforms to thrive.

Mars' Olympus Mons is the solar system's largest volcano—22km high and more than 500km across its base. It began to grow over 3 billion years ago, but some lava flows high on its flanks appear to be as young as 2m years, judging from the relative lack of overlapping impact craters. Craters caused by asteroid impacts show how old a surface in the solar system is—the more craters the longer it has been around. However, fresh lava from a volcano can bury former craters, resetting this clock.

This is exactly what's happened at Olympus Mons, and indeed several of its neighbours, which means these volcanoes are unlikely to be extinct. They may even be able to squeeze out some lava again in the future, although we might have to wait a few million years to see it happen.

In search of small volcanoes

But are there still volcanoes forming on Mars? Where are the youngest ones, the volcanoes that sprang into life most recently? Researchers have previously spotted various clusters of small and evidently quite young "cones"—symmetrical hills with summit craters—but their origin has always been controversial. They could be true sites of volcanic eruption, but they could equally well be "mud volcanoes" formed by expulsion of mud from below ground or "rootless cones" formed by explosions caused by lava flowing across wet or icy ground.

Now a study by a Czech-German-American team led by Petr Brož presents convincing new evidence that at least some of these are genuine volcanoes. Brož and his team studied cones in Coprates Chasma, the deepest part of Mars's Valles Marineris canyon system. This is far removed from any of Mars's main volcanic provinces, and suggest magma has erupted from the interior through ancient but reactivated fractures in the canyon system.

The researchers are convinced that these are true volcanic cones, similar to common volcanoes on Earth known as scoria cones and tuff cones. They base this on the fine layers visible on the inside of the crater walls on images from the HiRISE (High resolution Imaging Science Experiment) camera of NASA's Mars Reconnaissance Orbiter (MRO) and other evidence. The detail in the images is sufficient to reveal that the cone is built of layers in a similar way as in tuff cones on Earth.

The cones themselves are too small to date by counting impact craters, but crater-dating of the surrounding terrain (which would be similar in age) comes out at about 200 to 400 million**** years—around the time giant amphibians and early dinosaurs roamed the Earth. On our planet, cones like these are built in a single episode of eruption (which may last weeks or months), so this date almost certainly pinpoints the birth of these small volcanoes as well as their demise.

The cones must have been built by explosive eruption of clots of lava, from the size of a grain to that of a brick, from a central vent, growing the cone layer by layer until reaching its final height. Each cone's surface may be "armour-plated" because these clots hit ground still hot enough to partially weld together and protect it. This could account for their fresh appearance, in contrast to mud volcanoes, which would be more vulnerable to erosion.

The findings are exciting for many reasons. Volcanism this young on Mars suggests there's still some volcanic action on the planet—and there could still be volcanoes forming today.

Astrobiological potential

So far, the team have obtained compositional information from just one of the cones using MRO's Compact Reconnaissance Imaging Spectrometer for Mars (CRISM). This reveals the presence of a mineral called opaline silica as well as sulfate minerals, which suggests that the hot rocks, whether before or after eruption, reacted with martian ground water.

If so, there could have been, even if only briefly at each volcano, a suitable mixture of water, warmth and chemical energy to support microbial life of the kind that inhabits hot springs on Earth. Given that the cones in this study are at least 200 million-year-old, they are unlikely to host life today, but they would be good targets to search for fossilised microbes with minimal risk of contaminating an active ecosystem.

http://nyti.ms/2u56d0E

It's High Time for Ticks, Which Are Spreading Diseases Farther

Mammal populations are thriving in expanding suburbs and wooded areas, providing blood meals for ticks so the pests can spread

By Aneri Pattani July 24, 2017

Southampton, N.Y. — This town is under siege from tiny invaders.

A doctor at Southampton Hospital recently pulled a tick off a woman's eyeball. After a 10-minute walk outside, a mother reported finding a tick affixed to her 7-year-old daughter's buttocks.

Another mother called the hospital in a "hysterical state," according to the nurse who answered, because a tick had attached itself to her son's penis.

Like many towns across the country, Southampton is seeing a tick population that is growing both in numbers and variety — at a time when ticks are emerging as a significant public health danger.

"Tick-borne diseases are a very serious problem, and they're on the rise," said Rebecca Eisen, a research biologist at the Centers for Disease Control and Prevention.

"Even though you may live in an area where you didn't have ticks in the past or your parents don't remember having ticks, the distribution is changing," she added. "More and more people are at risk."

With the expansion of the suburbs and a push to conserve wooded areas, deer and mice populations are thriving. They provide ample blood meals for ticks and help spread the pests to new regions.

Originally from the Southeast, the lone star tick, for example, is heading north; it can now be found in 1,300 counties in 39 states. The blacklegged tick, also called the deer tick, is expanding its territory, too. In a recent study, Dr. Eisen reported a nearly 45 percent increase since 1998 in the number of counties with blacklegged ticks.

Thomas Mather, director of the University of Rhode Island's TickEncounter Resource Center, said it used to get reports of three or four lone star ticks in the greater Chicago area each year. Now, it is receiving up to 15.

When a tick species marches into a new region, it poses a double-barreled threat, said Jerome Goddard, extension professor of medical and veterinary entomology at Mississippi State University.

First, the species brings diseases from its original location. Second, the ticks pick up new pathogens from animals in their new ecosystem.

Physicians and patients in a tick's new home may be less familiar with the diseases it carries. They can overlook symptoms or attribute them to a different cause, delaying effective treatment.

The best known threat is Lyme disease. Cases in the United States increased from about 12,000 annually in 1995 to nearly 40,000 in 2015. Experts say the real number of infections is likely closer to 300,000.

But scientists are finding ticks carry more than just Lyme: At least a third of known tick-borne pathogens were found in the last 20 years. Heartland virus and Bourbon virus, which can prove fatal, were discovered in just the last five years.

Powassan virus, a rare but dangerous pathogen that can cause permanent brain damage or death, can be passed from tick to human in just 15 minutes. It was discovered in 1958, and an average of seven cases are reported each year. Earlier this month, a resident of Saratoga County, N.Y., who had Powassan disease died.

Dr. Gary Wormser, founder of the Lyme Disease Diagnostic Center at New York Medical College, said the most worrisome tick-borne contagion he sees is babesiosis, which can cause malaria-like

symptoms and require hospitalization. A few of his patients have died from it; several required intensive care.

Before 2001, babesiosis was not found in Westchester, N.Y. But Westchester Medical Center has diagnosed at least 21 cases in the past year. A study of babesiosis in Wisconsin found a 26-fold increase in the number of cases between 2001 to 2003, and 2012 to 2015.

In places where the lone star tick is gaining prevalence, doctors also are seeing an increase in cases of alpha-gal syndrome, a strange allergy to red meat induced by tick bites.

Alpha-gal is a sugar molecule carried by the lone star tick. When the tick bites a human, it activates the immune system, which starts producing alpha-gal antibodies.

The body becomes wired to fight alpha-gal sugar molecules, which are abundant in red meat. Eating meat can trigger allergic reactions, from an itchy rash to anaphylactic shock.

Dr. Erin McGintee, an allergist and immunologist at ENT and Allergy Associates in Southampton, sees two to three cases of alpha-gal syndrome per week during tick season. Since diagnosing her first case in October 2010, she has seen more than 380 patients.

“The cases are definitely increasing over time,” she said.

That is no surprise to Karen Wulffraat, administrative director of Southampton Hospital’s Tick-Borne Disease Resource Center.

“The calls about lone star tick bites are increasing in number, even overtaking the blacklegged tick,” which is native to the Northeast, she said.

Cathy Ward and her husband bought a summer home in Southampton in 1984, and moved there permanently eight years ago.

Ms. Ward remembers taking her son Bill to the nearby wildlife refuge as a child, where he would fill his hands with birdseed and stand with his arms outstretched until birds came and perched on them.

Now when Bill Ward visits with his young daughter, Taylor, his mother tells them the refuge is off limits — it is a breeding ground for ticks. “It wasn’t a concern when Bill was young,” Ms. Ward said. “Now you have to protect yourself all the time. You don’t know where you’re going to pick up a tick.”

She will not garden in the yard anymore, and has it sprayed for ticks annually. Despite that, her granddaughter got a tick while visiting during the Fourth of July weekend. The family found it before it had bitten her, but it was a shock nonetheless. “It’s scary, because we don’t know which diseases they carry,” said Mr. Ward.

Brian Kelly, owner of East End Tick and Mosquito Control, has noticed the change, too. His company now sprays people’s lawns instead of just their bushes because lone star ticks are more aggressive than the native blacklegged ticks, and tend to venture further from the woods. “People can walk across their lawn barefoot to get the newspaper and get a tick,” he said.

As human exposure to ticks continues to increase, it’s likely that even the rarest infections they carry will become more common, Dr. Goddard said. “This really has a human toll that a lot of people don’t recognize,” he said.

http://bit.ly/2uFby2h

Nanoparticles loaded with component of common spice kill cancer cells

Curcumin formula shows promise against treatment-resistant childhood cancer

Attaching curcumin, a component of the common spice turmeric, to nanoparticles can be used to target and destroy treatment-resistant neuroblastoma tumor cells, according to a new study published in Nanoscale.

The study, conducted in partnership by researchers at Nemours Children's Hospital and the University of Central Florida, demonstrates a potentially novel treatment for neuroblastoma, the most common cancer in infants.

"High-risk neuroblastoma can be resistant to traditional therapy, and survival can be poor. This research demonstrates a novel method of treating this tumor without the toxicity of aggressive therapy that can

also have late effects on the patient's health," said Tamarah J. Westmoreland, MD, PhD, a pediatric surgeon at Nemours Children's Health System and senior author of the study. "Unique approaches to target tumor cells with nanoparticle delivery systems hold promise for treatment of resistant tumors, such as the high risk neuroblastoma. We are hopeful that in the future, nanoparticles can be utilized to personalize care to patients and reduce the late effects of therapy."

Neuroblastomas are cancers that start in early nerve cells and commonly form in the tissue of the adrenal glands, near the kidneys. About 700 new cases of neuroblastoma are diagnosed each year in the United States and most cases appear in children younger than 5 years old. High-risk neuroblastoma is hard to cure and is more likely to become resistant to standard therapies or recur. These cancers are also associated with late effects after treatments have ended, including developmental delays, hearing loss, or other disabilities.

Curcumin has been shown to have substantial anti-cancer ability, but its low solubility and poor stability have made its use in medicinal applications challenging. Researchers from Nemours and UCF found that nanoparticles can be used to deliver curcumin to tumor sites.

"This shows that nanoparticles can be an effective delivery vehicle for cancer drugs," said Professor Sudipta Seal, who directs of UCF's NanoScience Technology Center and Advanced Materials Processing Analysis Center, and is a collaborator on the study. "More research is needed, but we are hopeful it could lead to more effective treatment of this devastating disease in the future."

In the study, researchers loaded Cerium oxide nanoparticles with curcumin and coated them with dextran to test in cell lines of a high-risk form of neuroblastoma, known as MYCN-amplified, as well as non-amplified neuroblastoma. This formulation induced substantial cell death in neuroblastoma cells while producing no or only minor toxicity in healthy cells. Overall, the nano-therapeutic treatments showed a more pronounced effect in MYCN-amplified cells, which are traditionally more resistant to drug therapies.

Nanoscience research, which explores the unusual properties of materials at the nanoscale, has led to advancements in medicine, energy, information storage, computing and other fields. At no more than 100 nanometers, nanoparticles are exceedingly small. By comparison, a sheet of paper is about 75,000 nanometers thick.

This study was conducted in a laboratory setting in Orlando, Fla., at Nemours Children's Hospital and the University of Central Florida in cells from children with neuroblastoma, but researchers hope to begin to use these curcumin nanoparticles with micro RNA in animal models to direct the molecule to a tumor site. This research is an excellent example of the collaboration between Nemours Children's Hospital and the University of Central Florida. Funding of this work was supported by the Nemours Foundation along with the regional economic development initiative of the Florida High Tech Corridor.

http://bit.ly/2v6zxrL

Lutein may counter cognitive aging, study finds

Lutein may play a protective role against age-related cognitive decline

CHAMPAIGN, Ill. -- Spinach and kale are favorites of those looking to stay physically fit, but they also could keep consumers cognitively fit, according to a new study from University of Illinois researchers.

The study, which included 60 adults aged 25 to 45, found that middle-aged participants with higher levels of lutein - a nutrient found in green leafy vegetables such as spinach and kale, as well as avocados and eggs -- had neural responses that were more on par with younger individuals than with their peers. The findings were published in the journal Frontiers in Aging Neuroscience.

"Now there's an additional reason to eat nutrient-rich foods such as green leafy vegetables, eggs and avocados," said Naiman Khan, a professor of kinesiology and community health at Illinois. "We know these foods are related to other health benefits, but these data indicate that there may be cognitive benefits as well."

Most other studies have focused on older adults, after there has already been a period of decline. The Illinois researchers chose to focus on young to middle-aged adults to see whether there was a notable difference between those with higher and lower lutein levels.

"As people get older, they experience typical decline. However, research has shown that this process can start earlier than expected. You can even start to see some differences in the 30s," said Anne Walk, a postdoctoral scholar and first author of the paper. "We want to understand how diet impacts cognition throughout the lifespan. If lutein can protect against decline, we should encourage people to consume lutein-rich foods at a point in their lives when it has maximum benefit."

Lutein is a nutrient that the body can't make on its own, so it must be acquired through diet. Lutein accumulates in brain tissues, but also accumulates in the eye, which allows researchers to measure levels without relying on invasive techniques.

The Illinois researchers measured lutein in the study participants' eyes by having participants look into a scope and respond to a flickering light. Then, using electrodes on the scalp, the researchers measured neural activity in the brain while the participants performed a task that tested attention.

"The neuro-electrical signature of older participants with higher levels of lutein looked much more like their younger counterparts than their peers with less lutein," Walk said. "Lutein appears to have some protective role, since the data suggest that those with more lutein were able to engage more cognitive resources to complete the task."

Next, Khan's group is running intervention trials, aiming to understand how increased dietary consumption of lutein may increase lutein in the eye, and how closely the levels relate to changes in cognitive performance.

"In this study we focused on attention, but we also would like to understand the effects of lutein on learning and memory. There's a lot we are very curious about," Khan said.

This work was supported by the department of kinesiology and community health at the University of Illinois and the Hass Avocado Board.

The paper "The role of retinal carotenoids and age on neuroelectric indices of attentional control among early to middle-aged adults" is available online. DOI: 10.3389/fnagi.2017.00183

http://bit.ly/2uFidtb

Elevated cholesterol's link with canine cancer includes a better prognosis

Dogs that develop bone cancer such as this Australian shepherd often have high cholesterol, and the ones that do have a better prognosis.

Usually thought of as a health detriment, elevated cholesterol may play a role in longer survival times for dogs with a common form of bone cancer.

In addition to their veterinary significance, the findings by Oregon State University researchers advance the understanding of a type of malignant tumor, osteosarcoma, that's often diagnosed in humans as well, typically afflicting teenagers and young adults.

"This is one of the first steps into identifying cholesterol as a potential biomarker for canine osteosarcoma," said Haley Leeper, a veterinary oncology resident at the OSU College of Veterinary Medicine. "We don't have answers as to why high cholesterol is associated with this disease and with a better prognosis, but we're hoping to advance these findings in future research."

Leeper and collaborators at OSU and Iowa State University compared 64 dogs with osteosarcoma against two control groups: 30 dogs that had suffered traumatic bone fractures and 31 healthy dogs similar in age and weight to the animals with cancer.

Researchers found nearly half of the dogs with cancer—29 of the 64—had elevated levels of total serum cholesterol, a dramatically higher rate than occurred in either control population; just three of the 30 dogs with broken bones, and only two of the 31 healthy animals, showed high cholesterol.

Of the dogs stricken with osteosarcoma, 35 had the cancer in a leg which was subsequently amputated, followed by chemotherapy, which is the standard-of-care treatment; the dogs with elevated total cholesterol had a median survival time of 455 days, more than 200

days greater than the median survival time for dogs with normal cholesterol.

"When people think of cholesterol they think of cheeseburgers and heart attacks," Leeper said. "However, cholesterol is involved with many key processes and structures in the body like cell membranes, bone health and the immune system."

Future studies that follow dogs long term and look at specific lipid content in the blood may shed light on the mechanisms behind cholesterol's role in enhanced survival, Leeper said.

"There are a lot of things we plan on investigating," she said. "This is exciting and fascinating, partly due to the comparative medical aspects between human research and our research."

Collaborators included Craig Ruaux and Shay Bracha, colleagues of Leeper in the Department of Veterinary Clinical Sciences, and Austin Viall of the Department of Veterinary Pathology at the Iowa State University College of Veterinary Medicine.

Findings produced by this retrospective study were published in the Journal of Small Animal Practice.

More information: H. Leeper et al, Preliminary evaluation of serum total cholesterol concentrations in dogs with osteosarcoma, Journal of Small Animal Practice (2017). DOI: 10.1111/jsap.12702

http://bit.ly/2uJ7JaU

Lasers reactivate 'lost' memories in mice with Alzheimer's

A good memory aid – but lasers might be better

By Alice Klein

A chance to remember? Forgotten memories have been reawakened in mice with Alzheimer's disease, suggesting that the condition may not actually destroy our memories, but instead impair our ability to recall them.

It has long been assumed that Alzheimer's disease completely erases memories. The condition involves clumps of proteins known as amyloid plaques and tau tangles accumulating in the brain, where they are thought to destroy the neurons that store our memories.

But experiments by Christine Denny at Columbia University and her colleagues suggest that memories may not be wiped by Alzheimer's disease, but instead become harder to access. What's more, these memories can be reawakened by artificially activating the neurons

The finding could be revolutionary, says Ralph Martins at Edith Cowan University in Australia. "It has the potential to lead to novel drug development to help with regaining memories," he says.

Wrong memories

To examine how memory is affected by Alzheimer's disease, the researchers developed a way of visualising individual memories in mouse brains. They genetically engineered mice with neurons that glow yellow when activated during memory storage, and red when activated during memory recall. Two sets of these mice were created – one set that was healthy, and one with a condition resembling human Alzheimer's disease.

Both sets of mice took a memory test. First, they were exposed to a lemon scent and given an electric shock. Then, a week later, they were exposed to the same lemon scent. The healthy mice immediately froze in anticipation of being shocked again. But the mice with Alzheimer's disease froze almost half as much as the healthy mice, suggesting they did not remember the link between the smell and shock so strongly.

This behaviour matched what the team saw in the hippocampi of the mice – the brain regions that record memories. In healthy mice, the red and yellow neurons overlapped, showing that the mice were retrieving the lemon-shock memory from the same place it had been stored. But in the Alzheimer's mice, different cells glowed red during recall, suggesting that they were calling up the wrong memories.

This might help explain why people with Alzheimer's disease commonly experience false memories, says Denny. For example, many people with the condition incorrectly remember where they were during the 9/11 attacks. The mouse experiments suggest this may be because they are retrieving information from the wrong brain cells.

Pressing reboot

Using a genetic engineering technique called optogenetics, Denny's team went on to reactivate the lemon-shock memory in the Alzheimer's mice. By shining a blue laser down a fibre optic cable into the brain, they were able to stimulate the yellow memory-storing neurons, prompting the mice to freeze when they smelled the lemon scent.

This shows that "lost" memories may still exist in the brain, and can be recovered. Optogenetics is not a technique that can be used in people yet, because it isn't yet safe or practical to tinker with our neurons or stick lasers in our brains. But in the future, targeted drugs or techniques like deep-brain stimulation may help people with Alzheimer's access their forgotten memories, says Denny.

The next step will be to confirm that the same memory storage and retrieval mechanisms exist in people with Alzheimer's disease, because mouse models do not perfectly reflect the condition in humans, says Martins. In particular, the number of neurons that die in mouse models of Alzheimer's disease is far lower than in humans, he says.

But there are already clues that long-lost memories can be reawakened in people with Alzheimer's disease, Martins says. "Music is the best example, which has attracted a lot of attention as a way for retrieving memories of the past in these patients – so it makes sense."

If Denny's techniques do work in people, they could have wider applications, such as helping witnesses better remember crime scenes, or students recall their study notes. We may even be able to tap into forgotten memories from our early childhoods.

However, it's unlikely we could select specific memories to bring back, because we wouldn't know exactly which neurons they were stored in, and some neurons might hold multiple memories, says Denny. "You would not want to bring back bad memories too."

Journal reference: Hippocampus, DOI: 10.1002/hipo.22756

http://bit.ly/2uEO2T2

Dogs can get a Lyme disease vaccine, why can't you?

There are no good reasons, and a lot of bad ones, that your dog can be vaccinated for Lyme disease but you can not.

Jason Weisberger / 10:09 am Tue Jul 25, 2017

Profiteering and vaccination fears have teamed up to leave humans defenseless from a terrible malady. WBUR shares the story:

For Dr. Stanley Plotkin, a prominent vaccine scientist, Lyme disease is personal. His son, Alec, collapsed from a slow heart rate when he was 39, brought down by a rare heart complication from Lyme.

His son survived, but the incident helped cement Plotkin's resolve to pursue a human vaccine against Lyme disease. Using his bully pulpit as an emeritus professor of infectious diseases at the University of Pennsylvania, he's taken his case from The New York Times to the New England Journal of Medicine, in which he called the lack of Lyme protection "the worst recent failure to use an effective vaccine."

That's because we used to have a vaccine for Lyme, called LYMErix, but it was pulled from the market. Now, the only family member who can get a Lyme vaccine is your dog.

LYMErix had some problems. It required three doses at $50 each, and they were not covered by insurance - involved some inconvenience and out-of-pocket money. Despite a good safety record in clinical trials, some people experienced what they thought were side effects and sued SmithKline Beecham, the manufacturer. In 2002, SmithKline pulled the vaccine, after only four years on the market. (More on the history of the Lyme vaccine here.)

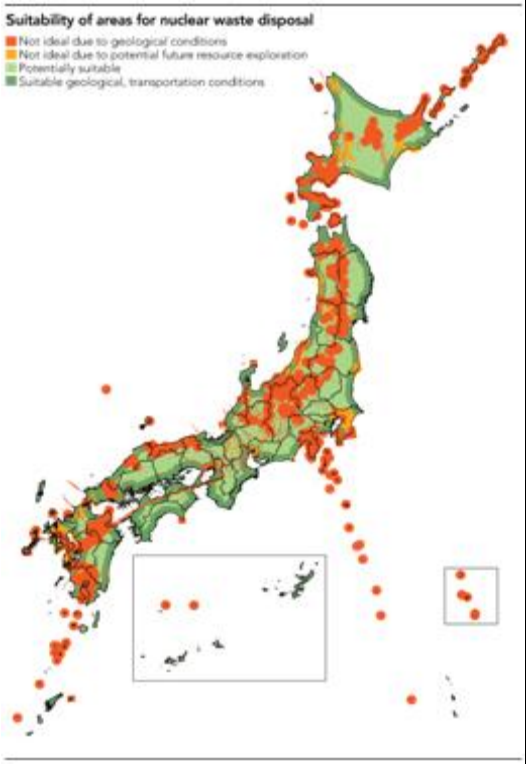
While the official line is that poor sales led the vaccine's maker to pull it, most experts think the specter of lawsuits was a key factor. Though an FDA panel ultimately found no link between the vaccine and arthritis, SmithKline settled lawsuits making that claim. And by then, the vaccine was already dead.

That cautionary tale still reverberates at companies developing new potential Lyme vaccines. "When I talk to manufacturers, they essentially ask me: 'Will it happen again?' " Plotkin said.

http://s.nikkei.com/2w6zHN2

Japan map shows possible permanent sites for nuclear waste

Volcano and fault zones ruled out, but people near potential dumps may resist



TOKYO -- Japan's Ministry of Economy, Trade and Industry on Friday unveiled a map identifying areas that might serve as a permanent site for highly radioactive waste from the country's nuclear power plants.

Among Japan's 1,750 or so municipalities, around 900 fit its criteria for safe long-term storage some 300 meters underground. Taken together, these municipalities account for about 30% of Japan's landmass. Publication of the map is a first step toward finding a permanent site for the disposal of radioactive waste, some types of which take tens of thousands of years to decay.

After a cabinet meeting on Friday morning, the government notified the municipalities being considered for long-term nuclear disposal. Starting in September, the trade ministry will hold briefings with the municipalities highlighted on the map and start narrowing down potential sites.

But choosing a final disposal site and getting local approval will be difficult. The government will make its decision over the next 20 years or so based on test bores and assessments of the impact on surrounding areas. But many of the technical details remain unclear and the process is expected to face many hurdles.

Hiroshige Seko, the trade minister, described the publication of the map as "an important step toward disposing of nuclear waste, but also the first step on a long road."

The map excluded areas with volcanoes, active seismic faults and underground resources, among others. Of the remaining sites, areas within 20km of the coast were selected because it is easier to transport nuclear waste by sea from current storage sites.

The estimated cost of the project is 3.7 trillion yen ($33 billion), including construction of facilities on the final storage site. *(Nikkei)*

http://wb.md/2wahtud

Don't Tell John McCain to Fight His Cancer

Cancer Doesn't Care If You're a Fighter

Arthur L. Caplan, PhD

It is very common when learning that someone has been newly diagnosed with a life-threatening cancer that well-meaning family and friends weigh in with encouragement to fight. It is also unfortunate.

Cancer could not care less whether you are a fighter or not. What evidence there is does not show that adopting a fighting stance helps in terms of survival. I have seen many fighters die of cancer, and some who chose not to be seen as fighters live longer than others who did.

And there is an implication that if you are not a fighter, then you must be a coward or worse. This suggests that the only option available to anyone who is courageous is to choose to fight—to utilize every surgery, complementary medicine, chemotherapy, and experimental option. This is unfortunate as well, because it takes courage to decide not to battle fatal cancers, but rather to enjoy a better quality of life in the time that remains.

The latest example of this "you must be a fighter" ethic is John McCain.

The senator from Arizona just found out he has a glioblastoma, a very nasty form of brain cancer. Upon announcing his diagnosis, McCain was greeted by a chorus of friends and admirers urging him to fight and calling on him to be courageous in taking on the cancer. This is advice McCain does not need.

People Mean Well, But It's the Wrong Tactic

Here is a sample from Twitter. Barack Obama said, "John McCain is an American hero, and one of the bravest fighters I've ever known. Cancer doesn't know what it's up against. Give it hell, John." Joe Biden: "He is strong, and he will beat this."

Gabrielle Giffords: "You're tough! You can beat this. Fight, fight, fight!" Mike Pence: "Cancer picked on the wrong guy. John McCain is a fighter, and he'll win this fight too." A bunch of editorials in many newspapers across the nation echoed similar thoughts.

This is advice McCain does not need.

The odds of beating this cancer are long. Whether he does or doesn't has nothing to do with his character or courage. That is not, despite some incredibly disrespectful comments President Trump made about him in the run-up to the presidential election, up for dispute.

McCain is a military hero. The genuine article. The former Navy pilot spent five and a half years in a notorious North Vietnamese prison known as the "Hanoi Hilton," where he spent 2 years in solitary confinement and was brutally tortured despite being severely injured when he bailed out of his plane. Concerned about his fellow prisoners, he would not accept an early release.

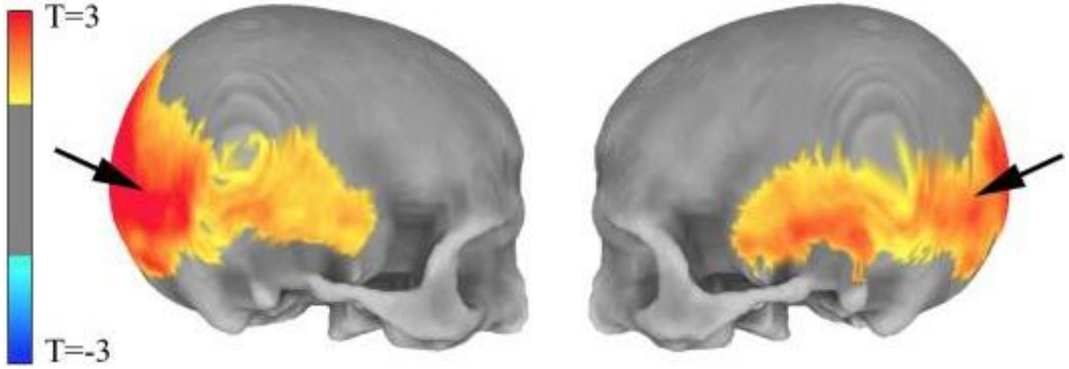
Whatever cancer does to John McCain and however he chooses to treat it or not, he is a brave man who is certainly a fighter. As with anyone, he will find his own best path to dealing with a grim diagnosis. Whatever that is, he will remain a hero and a fighter.

http://bit.ly/2hd6Fso

'Residual echo' of ancient humans in scans may hold clues to mental disorders

First direct evidence that parts of our brains implicated in mental disorders may be shaped by a "residual echo" from our ancient past

Researchers at the National Institute of Mental Health (NIMH) have produced the first direct evidence that parts of our brains implicated in mental disorders may be shaped by a "residual echo" from our ancient past. The more a person's genome carries genetic vestiges of Neanderthals, the more certain parts of his or her brain and skull resemble those of humans' evolutionary cousins that went extinct 40,000 years ago, says NIMH's Karen Berman, M.D. NIMH is part of the National Institutes of Health.



MRI data shows areas of the skull preferentially affected by the amount of Neanderthal-derived DNA. **Michael Gregory, M.D., NIMH Section on Integrative Neuroimaging**

In particular, the parts of our brains that enable us to use tools and visualize and locate objects owe some of their lineage to Neanderthal-derived gene variants that are part of our genomes and affect the shape of those structures -- to the extent that an individual harbors the ancient variants. But this may involve trade-offs with our social brain. The evidence from MRI scans suggests that such Neanderthal-derived genetic variation may affect the way our brains work today -- and may

hold clues to understanding deficits seen in schizophrenia and autism-related disorders, say the researchers.

Dr. Berman, Michael Gregory, M.D., of the NIMH Section on Integrative Neuroimaging, and colleagues, report on their magnetic resonance imaging (MRI) study published online, July 24, 2017 in the journal Scientific Reports.

During their primordial migration out of Africa, ancestors of present-day humans are thought to have interbred with Neanderthals, whose brain characteristics can be inferred from their fossilized skulls. For example, these indicate that Neanderthals had more prominent visual systems than modern humans.

"It's been proposed that Neanderthals depended on visual-spatial abilities and toolmaking, for survival, more so than on the social affiliation and group activities that typify the success of modern humans -- and that Neanderthal brains evolved to preferentially support these visuospatial functions," Berman explained. "Now we have direct neuroimaging evidence that such trade-offs may still be operative in our brains."

Might some of us, more than others, harbor Neanderthal-derived gene variants that may bias our brains toward trading sociability for visuospatial prowess -- or vice versa? The new study adds support to this possibility by showing how these gene variants influence the structure of brain regions underlying those abilities.

To test this possibility, Gregory and Berman measured the impact of Neanderthal variants on MRI measures of brain structure in a sample of 221 participants of European ancestry, drawn from the NIMH Genetic Study of Schizophrenia.

The new MRI evidence points to a a gene variant shared by modern-day humans and Neanderthals that is likely involved in development of the brain's visual system. Similarly, Neanderthal variants impacting development of a particular suspect brain area may help to inform cognitive disability seen in certain brain disorders, say the researchers.

For example, in 2012, Berman and colleagues reported on how genetic variation shapes the structure and function of a brain area called the Insula in the autism-related disorder Williams Syndrome. People with this rare genetic disorder are overly sociable and visuo-spatially impaired - conspicuously opposite to the hypothesized Neanderthal propensities and more typical cases on the autism spectrum. Mice in which a gene affected by Williams syndrome is experimentally deleted show increased separation anxiety. And just last week, researchers showed that the same genetic variability also appears to explain why dogs are friendlier than wolves.

Gregory MD, Kippenhan JS, Eisenberg DP, Kohn PD, Dickenson D, Mattay VS, Chen Q, Weinberger DR, Saad ZS, Berman KF. Neanderthal-derived genetic variation shapes modern human cranium and brain. Scientific Reports, July 24, 2017, DOI:10.1038/s41598-017-06587-0

http://bit.ly/2vk0yc3

Time to drop 'complete the course' message for antibiotics

Message not backed by evidence and should be replaced, say experts

The deeply embedded message that patients should "complete the course" of antibiotics to avoid antibiotic resistance is not backed by evidence and should be dropped, argue experts in The BMJ today.

In fact, patients are put at unnecessary risk from antibiotic resistance when treatment is given for longer than necessary, not when it is stopped early, say Professor Martin Llewelyn at Brighton and Sussex Medical School and colleagues.

They say it's time for policy makers, educators, and doctors to drop this message and state that this was not evidence-based and is incorrect.

Antibiotics are vital to modern medicine and antibiotic resistance is a global, urgent threat to human health. Public communication about antibiotics often emphasises that patients who fail to complete prescribed antibiotic courses put themselves and others at risk of antibiotic resistance.

However, the idea that stopping antibiotic treatment early encourages antibiotic resistance is not supported by evidence, while taking antibiotics for longer than necessary increases the risk of resistance, explain the authors.

One reason it may be so resilient is that it is simple and unambiguous, and the behaviour it advocates is clearly defined and easy to carry out, they suggest. Nevertheless, there is evidence that, in many situations, stopping antibiotics sooner is a safe and effective way to reduce antibiotic overuse. There are notable exceptions for some types of antibiotic, such as those used to treat tuberculosis.

Completing the course also goes against one of the most fundamental and widespread medication beliefs people have, which is that we should take as little medication as necessary, they add.

They call for research to determine the most appropriate simple alternative messages, such as stop when you feel better. The public should also be encouraged to recognise that antibiotics are a precious and finite natural resource that should be conserved by tailoring treatment duration for individual patients.

Finally, they say, clinical trials are required to determine the most effective strategies for optimising duration of antibiotic treatment.

http://bit.ly/2vk3QvZ

Brain cells found to control aging

Stem cells in the brain's hypothalamus govern how fast aging occurs in the body

BRONX, NY - Scientists at Albert Einstein College of Medicine have found that stem cells in the brain's hypothalamus govern how fast aging occurs in the body. The finding, made in mice, could lead to new strategies for warding off age-related diseases and extending lifespan. The paper was published online today in Nature.

The hypothalamus was known to regulate important processes including growth, development, reproduction and metabolism. In a 2013 Nature paper, Einstein researchers made the surprising finding that the hypothalamus also regulates aging throughout the body. Now, the scientists have pinpointed the cells in the hypothalamus that control aging: a tiny population of adult neural stem cells, which were known to be responsible for forming new brain neurons.

"Our research shows that the number of hypothalamic neural stem cells naturally declines over the life of the animal, and this decline accelerates aging," says senior author Dongsheng Cai, M.D., Ph.D., (professor of molecular pharmacology at Einstein. "But we also found that the effects of this loss are not irreversible. By replenishing these stem cells or the molecules they produce, it's possible to slow and even reverse various aspects of aging throughout the body."

In studying whether stem cells in the hypothalamus held the key to aging, the researchers first looked at the fate of those cells as healthy mice got older. The number of hypothalamic stem cells began to diminish when the animals reached about 10 months, which is several months before the usual signs of aging start appearing. "By old age--about two years of age in mice -- most of those cells were gone," says Dr. Cai.

The researchers next wanted to learn whether this progressive loss of stem cells was actually causing aging and was not just associated with it. So they observed what happened when they selectively disrupted the hypothalamic stem cells in middle-aged mice. "This disruption greatly accelerated aging compared with control mice, and those animals with disrupted stem cells died earlier than normal," says Dr. Cai.

Could adding stem cells to the hypothalamus counteract aging? To answer that question, the researchers injected hypothalamic stem cells into the brains of middle-aged mice whose stem cells had been destroyed as well as into the brains of normal old mice. In both groups of animals, the treatment slowed or reversed various measures of aging.

Dr. Cai and his colleagues found that the hypothalamic stem cells appear to exert their anti-aging effects by releasing molecules called microRNAs (miRNAs). They are not involved in protein synthesis but

instead play key roles in regulating gene expression. miRNAs are packaged inside tiny particles called exosomes, which hypothalamic stem cells release into the cerebrospinal fluid of mice.

The researchers extracted miRNA-containing exosomes from hypothalamic stem cells and injected them into the cerebrospinal fluid of two groups of mice: middle-aged mice whose hypothalamic stem cells had been destroyed and normal middle-aged mice. This treatment significantly slowed aging in both groups of animals as measured by tissue analysis and behavioral testing that involved assessing changes in the animals' muscle endurance, coordination, social behavior and cognitive ability.

The researchers are now trying to identify the particular populations of microRNAs and perhaps other factors secreted by these stem cells that are responsible for these anti-aging effects--a first step toward possibly slowing the aging process and treating age-related diseases.

The article is titled, "Hypothalamic stem cells control ageing speed partly through exosomal miRNAs." The other authors are Yalin Zhang. Ph.D., Min Soo Kim, Ph.D., Baosen Jia, Ph.D., Jingqi Yan, Ph.D., Juan Pablo Zuniga-Hertz, Ph.D., and Cheng Han, Ph.D., all at Einstein.

The study was supported by grants from the National Institutes of Health (DK078750, AG031774 , HL113180, and DK099136).

The authors state that they have no competing financial interests.

http://bit.ly/2uPyYk6

Do we need separate his and hers medicine cabinets?

Pharmacists from the Friedrich Schiller University Jena (Germany) together with international research team uncover sex-specific effects of anti-inflammatory drugs

Jena, Germany - Perhaps you have come across the titles 'Men are from Mars, women are from Venus' or 'Why men don't listen and women can't read maps': just two of the many books and articles -- some enlightening or amusing and others irritating -- that theorise about fundamental differences between men and women.

Inflammatory diseases occur more frequently in women than in men

One difference between the sexes that should definitely be taken seriously, however, has been of increasing interest to doctors and pharmacists for a number of years. This is the difference between the sexes as regards susceptibility to certain diseases. "We know, for example, that inflammatory diseases such as asthma, psoriasis or rheumatoid arthritis occur much more frequently in women than in men," says Prof. Oliver Werz of the Friedrich Schiller University Jena. The german pharmacist and his team, together with colleagues from Italy, Denmark and Sweden, have uncovered a significant cause for these sex differences at the molecular level. In two high-profile publications in the 'Journal of Clinical Investigation' and 'Scientific Reports', they show how the male sex hormone testosterone interferes with the biosynthesis of inflammatory substances, and additionally reduces the effectiveness of anti-inflammatory drugs. (DOI: 10.1172/JCI92885 and DOI: 10.1038/s41598-017-03696-8).

To this end, the researchers comprehensively analysed and compared inflamematory processes in diverse animal models, but also in isolated immune cells from the blood of male and female human donors. This was made possible by a cell system developed in Prof. Werz's laboratory, in which the biochemical processes can be observed with high precision through time-resolved microscopy. "We investigated the formation of inflammatory substances, such as leukotrienes and prostaglandins, and looked at whether the effect of anti-inflammatory drugs differs in male and female cells," explains Werz.

Testosterone can protect against inflammatory reactions

As expected, the effect of the drugs under investigation was significantly stronger in the female samples than in the male samples - after all, the inflammatory process is much more pronounced in women. "However, these differences are completely abolished by the administration of testosterone," says Dr Simona Pace, first author of both papers. Previous studies - including work by Prof. Werz's team in Jena - have already shown that testosterone can protect against inflammatory reactions. "However, now we have been able to throw light on the molecular mode of action and show that testosterone also influences the therapeutic effect of drugs," notes the postdoc from the

Department for Pharmaceutical and Medical Chemistry of the University of Jena.

The researchers found, firstly, that the sex hormone directly interferes with leukotriene biosynthesis by blocking the necessary interaction between the "5-Lipoxygenase" and "FLAP" proteins. Secondly, they were able to prove that the reduced leukotriene synthesis leads to increased amounts of prostaglandins, which further promote inflammatory reactions. This means that testosterone plays a key role in the inflammatory process and in modulating the immune response.

With this work, the researchers have once again provided specific evidence supporting the need for gender-specific medicine. "Anti-inflammatory substances that are suitable for women may have only a limited effect in men, and the opposite might also be true," concludes Prof. Werz. Treatment using a single product from the medicine cabinet could therefore lead to very different levels of success. This is a fact that should clearly be considered much more carefully in future in developing new drugs -- especially for treating inflammatory diseases. In future, this could even lead to separate 'his' and 'hers' medicine cabinets.

Original publications:

Pace S et al.: Androgen-mediated sex bias in the efficiency of leukotriene biosynthesis inhibitors, Journal of Clinical Investigation 2017, DOI: 10.1172/JCI92885

Pace S et al.: Sex differences in prostaglandin biosynthesis in neutrophils during acute inflammation, Scientific Reports 2017, Jun 19;7(1):3759. DOI: 10.1038/s41598-017-03696-8

http://bit.ly/2vdr5a2

Study uncovers potential 'silver bullet' for preventing and treating colon cancer

New way in which colon cancer develops discovered, as well as a potential method for preventing and treating it

In preclinical experiments, researchers at VCU Massey Cancer Center have uncovered a new way in which colon cancer develops, as well as a potential "silver bullet" for preventing and treating it. The findings may extend to ovarian, breast, lung, prostate and potentially other cancers that depend on the same mechanism for growth.

Led by Massey's Deputy Director Steven Grossman, M.D., Ph.D., a team of scientists targeted the gene CtBP with a drug known as HIPP (2-hydroxy-imino phenylpyruvic acid) and were able to reduce the development of pre-cancerous polyps by half and return a normal lifespan to mice born with a predisposition to intestinal polyps. In humans, this condition is known as familial adenomatous polyposis, a devastating inherited disease that causes pre-cancerous polyps to grow in the intestine at a young age, often leading to the removal of portions of the colon to prevent cancer.

"This work opens up a whole new avenue for anti-cancer therapeutic development, as it shows that CtBP drives the actions of what are known as cancer stem cells, which are keys to cancer metastasis and resistance to chemotherapy," says Grossman, who is also the Dianne Nunnally Hoppes Endowed Chair in Cancer Research and co-leader of the Developmental Therapeutics research program at Massey as well as professor and chair of the Division of Hematology, Oncology and Palliative Care in the Department of Internal Medicine at the VCU School of Medicine.

In contrast to other cancer-promoting genes, CtBP is not mutated in colon cancer; instead, it is overexpressed to the point where the cancer depends on it for growth. CtBP works to reprogram cells by repressing the expression of genes that typically prevent cancer through a form of cell suicide known as apoptosis while simultaneously promoting the expression of other genes that lead to cancer growth and metastasis.

The researchers found that CtBP can cause normal human cells to become cancerous when inserted into the cell's DNA. In mouse models of familial adenomatous, treatment with HIPP significantly reduced intestinal polyps and increased survival while mice bred without the CtBP gene lived twice as long as those with it.

"In our experiments, HIPP acted almost as a chemical 'silver bullet' to prevent polyp formation, thereby reducing the risk of colon cancer," says Grossman. "Also, we believe that anti-CtBP therapies such as

HIPP may be able to complement current therapies to counter drug resistance and decrease metastasis, ultimately increasing our ability to control and cure colon cancer."

This study is the latest in a line of research investigating CtBP by Grossman and his colleagues that began in 2010. Moving forward, they plan to continue testing derivatives of HIPP for the treatment of colon cancer and also see if their findings extend to breast, lung, ovarian and prostate cancers.

Grossman collaborated on this research with Keith Ellis, Ph.D., member of the Developmental Therapeutics Research Program at Massey and assistant professor in the Department of Medicinal Chemistry at the VCU School of Pharmacy; Jennifer Koblinski, Ph.D., member of the Cancer Molecular Genetics research program at Massey and assistant professor in the Department of Pathology at the VCU School of Medicine; Evan Sumner from the Department of Pharmacology and Toxicology in the VCU School of Medicine; Sudha Korwar, graduate student in the Department of Medicinal Chemistry at the VCU School of Pharmacy; Barbara Szomju, Agnes D. Cororaton and Ian Love, Ph.D., all from the Department of Internal Medicine at the VCU School of Medicine; Ayesha Chawla, M.S., from the C. Kenneth and Dianne Wright Center for Clinical and Translational Research at VCU; and Ramesh C. Kovi, Ph.D., from the Cellular and Molecular Pathology Branch at the National Institute of Environmental Health Sciences in Research Triangle Park, NC.

This study was supported by a Research Scholar Grant from the American Cancer Society and, in part, by VCU Massey Cancer Center's NCI Cancer Center Support Grant P30CA016059. The full manuscript of the study is available at:
https://www.nature.com/onc/journal/vaop/ncurrent/full/onc2017106a.html

http://bit.ly/2eZz6JZ

Gulls' Love of Baby Seal Poop Leads to Gouged Butts

Hungry birds are snapping up seal pup poop laced with parasitic hookworms to the detriment of the seals

By Mindy Weisberger, Senior Writer | July 26, 2017 11:15am ET

For gulls in Chilean Patagonia, seal pup poop laced with parasitic hookworms is a tasty treat. But the eager birds are snapping up their meals just a little too near to the pups, to the detriment of the seals' tender rear ends, scientists discovered.

During routine exams of the South American fur seal pups (Arctocephalus australis) living on Guafo Island, researchers were puzzled by unusual wounds they found in the young animals' perineal area — around the anus.

Observations later revealed that gulls feeding on the pups' poo approached too close for comfort, jabbing their sharp beaks into the seals' bottoms, and creating gouges that sometimes led to serious infections, according to a new study.

Initially, the scientists wondered if the lesions on the pups' rears were caused by a viral or bacterial disease, the study's lead author, Mauricio Seguel, a doctoral candidate with the College of Veterinary Medicine at the University of Georgia, told Live Science. But when the study authors couldn't pinpoint a microbial cause, they considered whether the wounds might be traumatic injuries, Seguel said.

Kelp gulls (Larus dominicanus) and dolphin gulls (Leucophaeus scoresbii) live alongside the seals on Guafo Island, and feed on seal feces produced by both adults and pups. The seal population in this area is known to be infested with hookworms, a common parasite in fur seals, and while adult seals mostly harbor hookworm larvae, the pups play host to hookworms in their adult forms, which they often expel in their feces.

The researchers discovered that the gulls were eating the parasites, along with the pup poop, and were so avid about it that they accidentally jabbed their beaks into the pups as they ate, according to the study.

In fact, the gulls became quite irate with the researchers when they visited the rookery to collect feces samples for analysis, Seguel told Live Science. "We were basically stealing their food," he said.

If the gulls had been targeting the seal pups themselves as a food source, the damage to their rear ends would have been much more severe, and more pups would have been affected, Seguel explained.

When gulls attack

However, in other parts of the world, gulls do inflict harm on baby seals deliberately, targeting the small and vulnerable young mammals as prey. In a 15-year study of kelp gulls and Cape fur seals (Arctocephalus pusillus pusillus), researchers recorded about 500 instances of gulls attacking baby seals' eyes. Approximately half of

those attempts ended with the gull gouging and devouring the eyeballs, then shifting its attack to the seal's soft underbelly.

Kelp gulls are also known to prey on southern right whales and their calves swimming off the Argentinian coast, pecking and stripping flesh and blubber from the whales' backs when they surface to breathe, researchers reported in 2015. The tissue damage from these gull attacks can be so extensive that it covers 50 to 60 percent of a whale's body, Seguel told Live Science.

Incidences of gulls regularly attacking whales skyrocketed in the 1990s and 2000s, when an influx of fisheries in coastal regions inhabited by whales attracted growing numbers of seagulls, bringing a lot of hungry mouths to the area, Seguel said. "As the populations of seagulls increased, it created the problem we're seeing now in Argentina," he said.

Typically, the Patagonia gulls do not prey on seal pups. But shifting conditions — such as rising ocean temperatures due to climate change — could alter the gulls' behavior, which could spell trouble for the animals that share their habitat, Seguel said.

"If there are any changes in the environment that could affect seagull populations in the future, it could also affect the other species that are interacting with the seagulls - like fur seals," Seguel told Live Science. "We would like to keep this issue monitored, so we can try to figure out these things before they actually happen," he said.

The findings were published online yesterday (July 25) in the journal Royal Society Open Science.

http://bit.ly/2ubqXun

Should we be worried about hepatitis E?

World Hepatitis Day is commemorated on July 28

Hepatitis E gets little press compared to its better-known cousins A, B and C, but Stellenbosch University virologists say we should wake up to how transmission of this virus is changing. World Hepatitis Day is commemorated on 28 July.

Hepatitis E virus infection (HEV) is the most common cause of acute viral hepatitis worldwide. The infection usually resolves within weeks, but sometimes it causes acute liver failure, which may be fatal. It is mostly spread through the faecal-oral route, and until recently was viewed as an infection primarily affecting people in undeveloped areas who lack access to clean water and good sanitation.

That picture is starting to change, however. Scientists have begun noticing a shift from hepatitis E as only a disease of the poor, to one that can also affect affluent people in developed world settings. The transmission mechanism appears to be changing: HEV is re-emerging as a zoonotic virus. In developed countries, doctors used to see HEV in travellers returning from endemic areas. Now, however, people are acquiring the infection from pigs and pork products (via ingesting the meat or faecal contamination) in countries like the United Kingdom and France.

Dr Tongai Maponga, a post-doctoral fellow in the Division of Medical Virology at Stellenbosch University (SU), has a particular interest in viral hepatitis, and belongs to a group of researchers at SU that described the first case of chronic HEV infection in an HIV-infected patient in South Africa.

He says: "HEV has the potential to become a chronic infection, especially in immunosuppressed patients. This is a risk in South Africa, where there are many HIV-infected patients.

"We described the first HIV patient with chronic HEV in 2012. After starting antiretroviral therapy, he had elevated liver enzymes (which indicates liver disease). More obvious potential causes for this were considered; it was only after about a year that we thought to test for HEV.

"Also interesting was the HEV genotype (genetic variant) present. Hepatitis E as a disease of the poor is normally associated with genotypes 1 and 2, but this patient was infected with genotype 3, which is also the genotype that circulates in pigs, thus indicating zoonotic transmission.

"We've subsequently seen about four more cases of HEV infection. This may seem a small number but it could mean the problem is becoming more prevalent in the larger community."

Transplant patients are also at risk for chronic infection, as they receive immunosuppressive therapy to minimise graft rejection. In 2015 the SU researchers described the first case of HEV infection with genotype 3 in a kidney transplant patient, some months after transplantation.

Says Maponga: "Before transplant operations, patients are screened for the obvious hepatitis viruses like B and C, but people tend not to consider HEV, so it can go undiagnosed and unsuspected. There are now several other cases described in the literature. In one study in Asia, a liver transplant patient with continuously elevated liver enzymes was found to have picked up HEV from a camel."

Another study published in early 2017 investigated HEV infection among blood donors in the Western Cape.

"We found antibodies that showed some donors had been exposed to HEV," says Maponga, "but thankfully we didn't see the actual viral nucleic acids or the antigen that would indicate they are infected."

This study showed a difference in seroprevalence between the hepatitis A virus and HEV. Hepatitis A is spread through the faecal-oral route; if HEV is spread predominantly through the same mechanism, their prevalences would be expected to mirror each other. However, this was not found to be so - HEV prevalence was lower. Also, HEV seroprevalence differed according to race group: it was highest in mixed race donors and lowest in black donors. This may reflect that groups with higher socio-economic status and meat consumption levels have higher HEV prevalence.

Collaborative work with the University of Cape Town, which involved testing 16 commercial pig herds that supply pork to Cape Town, found evidence that animals on all these farms had been exposed to or infected with HEV.

"If some of our pigs have HEV there's the risk pork consumers might get infected. We're not saying people shouldn't eat pork, but farmers must look after the pigs and ensure these viruses don't end up in the food supply. They must also prevent environmental contamination: you don't want sewage runoff from piggeries entering water sources. This would be a worry in poorer areas, where people might get drinking water from the river."

Complicating the picture further is the fact that HEV is not limited to pigs as hosts. Meat from wild boar and other game animals may also be tainted with the virus, as may seafood items. However, the range of possible hosts has not been fully described; identifying these is an important area of ongoing HEV research.

http://bit.ly/2eZGEfF

Hostage situation or harmony? Researchers rethink symbiosis

When it comes to certain microorganisms, symbiotic partners are actually being held "hostage"

Relationships where two organisms depend on each other, known as symbiosis, evoke images of partnership and cooperation. But a new study in Nature Ecology and Evolution shows that, when it comes to certain microorganisms, symbiotic partners are actually being held "hostage".

The international research team, led by biologists from the University of British Columbia, studied a freshwater bacterium called Polynucleobacter that often lives inside the single-celled protozoan, Euplotes, to better understand the relationship between symbionts, or organisms in symbiotic relationships.

"Most people think symbiosis means there is an evolution toward harmony, a perfect balance of the two partners," says Vittorio Boscaro, a biologist at UBC and lead author of the study. "But although the host needs the bacterium to survive, the bacterium doesn't gain any advantage in this relationship."

In fact, the researchers were able to determine that Euplotes hosts constantly "snatch up" useful bacteria like Polynucleobacter from the environment, and then later discard and replace them with "fresh" symbionts.

"They're being replaced, just like you change your clothes," said Patrick Keeling, a UBC microbiologist and senior author of the study. "You take advantage of your symbiont until it's no longer useful, and then you get a new one."

The team examined what was happening between the microbes by analyzing the genome of Polynucleobacter. Once it is snatched up by Euplotes, it leads to major changes to the Polynucleobacter genome.

While these changes are not unexpected, the researchers were surprised to learn how the genome changes over time. Typically, we think of evolution in terms of adaptation to survive. In the case of symbiotic Polynucleobacter, they found that the genome was changing and losing genes at random and ultimately ceasing to be useful to their host.

"I like to think of the relationship being more like death row than cooperation--sure the symbiont is kept safe and well-fed in the short term, but ultimately it's not a good place to be," said Keeling.

The researchers believe such insight may lead to a conceptual change of evolutionary processes and their complexity.

The paper was published in Nature Ecology & Evolution: https://www.nature.com/articles/s41559-017-0237-0.

http://bit.ly/2vafc5

Sticky when wet: Strong adhesive for wound healing

Slug-inspired, flexible medical bio-glue sticks to wet surfaces without toxicity

CAMBRIDGE, Mass. - Anyone who has ever tried to put on a Band-Aid when their skin is damp knows that it can be frustrating. Wet skin isn't the only challenge for medical adhesives - the human body is full of blood, serum, and other fluids that complicate the repair of numerous internal injuries. Many of the adhesive products used today are toxic to cells, inflexible when they dry, and do not bind strongly to biological tissue. A team of researchers from the Wyss Institute for Biologically Inspired Engineering and the John A. Paulson School of Engineering and Applied Sciences (SEAS) at Harvard University has created a super-strong "tough adhesive" that is biocompatible and binds to tissues with a strength comparable to the body's own resilient cartilage, even when they're wet. "The key feature of our material is the combination of a very strong adhesive force and the ability to transfer and dissipate stress, which have historically not been integrated into a single adhesive," says corresponding author Dave Mooney, Ph.D., who is a founding Core Faculty member at the Wyss Institute and the Robert P. Pinkas Family Professor of Bioengineering at SEAS. The research is reported in this week's issue of Science.

When first author Jianyu Li, Ph.D. (former Postdoctoral Fellow at the Wyss Institute and now an Assistant Professor at McGill University) started thinking about how to improve medical adhesives, he found a solution in an unlikely place: a slug. The Dusky Arion (Arion subfuscus), common in Europe and parts of the United States, secretes a special kind of mucus when threatened that glues it in place, making it difficult for a predator to pry it off its surface. This glue was previously determined to be composed of a tough matrix peppered with positively charged proteins, which inspired Li and his colleagues to create a double-layered hydrogel consisting of an alginate-polyacrylamide matrix supporting an adhesive layer that has positively-charged polymers protruding from its surface.

The polymers bond to biological tissues via three mechanisms - electrostatic attraction to negatively charged cell surfaces, covalent bonds between neighboring atoms, and physical interpenetration - making the adhesive extremely strong. But the matrix layer is equally important, says Li: "Most prior material designs have focused only on the interface between the tissue and the adhesive. Our adhesive is able to dissipate energy through its matrix layer, which enables it to deform much more before it breaks." The team's design for the matrix layer

includes calcium ions that are bound to the alginate hydrogel via ionic bonds. When stress is applied to the adhesive, those "sacrificial" ionic bonds break first, allowing the matrix to absorb a large amount of energy before its structure becomes compromised. In experimental tests, more than three times the energy was needed to disrupt the tough adhesive's bonding compared with other medical-grade adhesives and, when it did break, what failed was the hydrogel itself, not the bond between the adhesive and the tissue, demonstrating an unprecedented level of simultaneous high adhesion strength and matrix toughness.

The researchers tested their adhesive on a variety of both dry and wet pig tissues including skin, cartilage, heart, artery, and liver, and found that it bound to all of them with significantly greater strength than other medical adhesives. The tough adhesive also maintained its stability and bonding when implanted into rats for two weeks, or when used to seal a hole in a pig heart that was mechanically inflated and deflated and then subjected to tens of thousands of cycles of stretching. Additionally, it caused no tissue damage or adhesions to surrounding tissues when applied to a liver hemorrhage in mice - side effects that were observed with both super glue and a commercial thrombin-based adhesive.

Such a high-performance material has numerous potential applications in the medical field, either as a patch that can be cut to desired sizes and applied to tissue surfaces or as an injectable solution for deeper injuries. It can also be used to attach medical devices to their target structures, such as an actuator to support heart function. "This family of tough adhesives has wide-ranging applications," says co-author Adam Celiz, Ph.D., who is now a Lecturer at the Department of Bioengineering, Imperial College London. "We can make these adhesives out of biodegradable materials, so they decompose once they've served their purpose. We could even combine this technology with soft robotics to make sticky robots, or with pharmaceuticals to make a new vehicle for drug delivery."

"Nature has frequently already found elegant solutions to common problems; it's a matter of knowing where to look and recognizing a good idea when you see one," says Wyss Founding Director Donald Ingber, who is also the Judah Folkman Professor of Vascular Biology at Harvard Medical School and the Vascular Biology Program at Boston Children's Hospital, as well as a Professor of Bioengineering at Harvard's School of Engineering and Applied Sciences. "We are excited to see how this technology, inspired by a humble slug, might develop into a new technology for surgical repair and wound healing."

Additional contributors to this work include co-first author Jiawei Yang, Ph.D., Research Assistant at SEAS; Qing Yang, Ph.D., Associate Professor of Environmental Science and Engineering at Huazhong University of Science and Technology; Isaac Wamala, M.D., Research Fellow at Massachusetts General Hospital; William Whyte, Research Fellow at the Wyss Institute and SEAS; Bo Ri Seo, Ph.D., Postdoctoral Fellow at the Wyss Institute and SEAS; Nikolay V. Vasilyev, M.D., Assistant Professor of Surgery and Research Scientist at Boston Children's Hospital; Joost J. Vlassak. Ph.D., Abbott and James Lawrence Professor of Materials Engineering at SEAS; and Zhigang Suo, Ph.D., Allen E. and Marilyn M. Puckett Professor of Mechanics and Materials at SEAS.

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Cancer-death button gets jammed by gut bacterium

Fusobacterium nucleatum promotes resistance to chemotherapy in colon cancer patients by turning off the push button for cancer cell suicide

ANN ARBOR, Michigan -- Researchers at Michigan Medicine and in China showed that a type of bacterium is associated with the recurrence of colorectal cancer and poor outcomes. They found that Fusobacterium nucleatum in the gut can stop chemotherapy from causing a type of cancer cell death called apoptosis.

Colorectal cancer is the third most common cancer and the second leading cause of cancer-related death worldwide. The two most widely used drugs to treat colorectal cancer act to either inhibit enzyme activity of cancer cells or arrest tumor cell growth. But a bacterium can make them ineffective.

"We treat patients with chemotherapy so that it will ultimately induce tumor cell apoptosis. But some cancer cells have a way to avoid apoptosis that is induced by chemotherapy. Those cells escape from the apoptosis process by activating a cell-survival mechanism called autophagy. That mechanism protects cancer cells from destructing," says Weiping Zou, M.D., Ph.D., professor of surgery at Michigan Medicine.

This collaborative study between Michigan Medicine and China is published in Cell. The research was led by two teams, Weiping Zou, M.D., Ph.D., at Michigan Medicine, and Jing-Yuan Fang, M.D., Ph.D., in Shanghai. Fang is a professor in Renji Hospital, Shanghai Jiao Tong University School of Medicine.

"Once autophagy is active, the cancer becomes resistant to chemotherapy. Then Fusobacterium nucleatum keeps autophagy turned on. That's how the tumor cells may be able to avoid the induced apoptosis," says Zou. "Typically, autophagy can be turned on or off. However, the bacterium prevents the expression of two microRNAs so that autophagy doesn't turn off. The loss of these microRNAs keeps the autophagy turned in the 'on' position," says Zou.

The idea to check the role of the bacterium associated with innate immune signaling in chemotherapy resistance was linked to earlier work done by this researcher team. Their study was published in Cell in 2016. In the previous research, they studied adaptive immunity, specifically the impact of T cells on chemoresistance. They found that adaptive immunity is reversely associated with resistance of cisplatin, the drug used for ovarian cancer. This means if you have a strong T cell immunity, then the cancer cells are more sensitive to chemotherapy.

In the current study in Cell, they researched whether bacterium-mediated innate immune signaling regulates chemotherapy resistance in colon cancer. The innate immune system refers to the front-line defenders--the cells and molecular mechanisms that attack pathogens. The adaptive immune system refers to the body's response to specific antigens, such as foreign substances from bacteria or tumor-associated antigens from tumor cells.

Adaptive immunity is mediated by T cell signaling. Innate immunity is mediated by innate signaling including proteins called Toll-like receptors (TLR). "We knew that the body uses both systems, adaptive and innate, to fight cancer and infectious pathogens. That gave us the inspiration to look further at bacterium associated with innate immune signaling.

"The results of the research were a surprise. We did not expect bacterium to contribute to chemoresistance," says Zou. There are other factors that are unknown about F. nucleatum. For example, what would happen if the bacterium were reduced or blocked? Would other prevalent bacterium create a similar problem with chemoresistance?

"Right now, we don't have a specific approach to selectively treat or control Fusobacterium nucleatum. Also, we don't know if an abundance of this bacterium is found in any other types of cancer chemoresistance," says Zou. "Still, based on our studies, we think that if we deal with this bacterium, we may be able to delay and prevent chemoresistance in colorectal cancer."

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http://bit.ly/2vkqlHV

Researchers crack the smile, describing 3 types by muscle movement

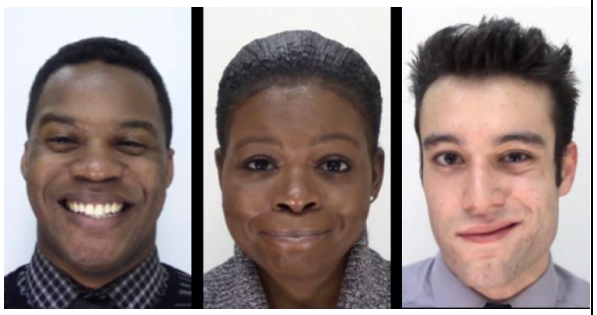
Set of experiments that seek expands our understanding of the human smile

MADISON, Wis. -- The smile may be the most common and flexible expression, used to reveal some emotions, cover others and manage

social interactions that have kept communities secure and organized for millennia. But how do we tell one kind of smile from another?

"When distinguishing among smiles, both scientists and laypeople have tended to focus on true and false smiles. The belief is that if you smile when you're not happy, the smile is false," says Paula Niedenthal, a psychology professor at the University of Wisconsin-Madison.

"But people smile in many different circumstances and during many emotional states. So asserting that only smiles that result from states of happiness are 'true' smiles limits our understanding of this important facial expression."



This image shows from left to right the reward smile, affiliative smile and dominance smile. **Courtesy of Paula Niedenthal**

Niedenthal and colleagues from Cardiff University and the University of Glasgow published a set of experiments that seek to expand our understanding of the human smile this week in the journal Psychological Science, showing three distinct, reliably recognized expressions -- smiles of reward, affiliation and dominance -- and describing the facial muscle combinations that make them.

Each smile hinges on an anatomical feature known as the zygomaticus major, straps of facial muscle below the cheekbones that pull up the corners of the mouth. But it's not the only muscle at work.

Participants in the study looked at thousands of computer-generated expressions with random combinations of facial muscles activated -- with one exception.

"We varied everything that could be varied in an expression, but our stimuli included some action from the smile muscle, the zygomaticus," says Magdalena Rychlowska, a postdoctoral researcher at Cardiff. "We asked participants to tell us when they see a reward or affiliative or a dominance smile, and when the expression is not a smile."

The researchers turned their participant-sorted smiles back on two more sets of observers, checking recognition and social messages until they had recipes for each smile.

For example, a reward smile -- "probably the most intuitive," Niedenthal says, "the kind of smile you would use with a baby, so he will smile back or do things you like" -- is a symmetrical hoist of zygomaticus muscles plus a dash of eyebrow lift and some sharp lip pulling.

Affiliative smiles -- used to communicate tolerance, acknowledgment, or a bond, and show that you're not a threat -- come with a similar symmetrical upturn to the mouth, but spread wider and thinner with pressed lips and no exposed teeth.

Dominance smiles are used to signify status and manage social hierarchies. They dispense with the symmetry, pairing a bit of lopsided sneer with the raised brows and lifted cheeks typically associated with expressing enjoyment.

"This facial expression has evolved to solve basic tasks of human living in social groups: Thanks, I like this. Don't worry, I'm not going to hurt you. Hey, I'm in charge here," Niedenthal says. "There are so many words people use to describe different smiles, but we see them as describing subtypes of a reward situation or an affiliative situation or a situation of negotiating hierarchy and having disdain for someone else."

With precise physical descriptions of smile types, researchers can better classify subtypes and study the use and effects of smiles in pivotal human interactions.

"We now know which movements we should look for when we describe smiles from real life," says Rychlowska. "We can treat smiles as a set of mathematical parameters, create models of people using different types of smiles, and use them in new studies."

Rychlowska and collaborators are already digging into the way affiliative and dominance smiles can shift the outcome of games and negotiations. Niedenthal is working with surgeons who repair and reconstruct facial bones and muscles.

"They may have to make choices that will affect a patient's expression for the rest of their life," Niedenthal says. "It's useful for them to know how different kinds of smiles are used in the world, and which muscles are involved in making them."

Better definitions of smile types should also help people navigate intercultural communication. Previous research has shown Niedenthal that while the types of smiles used vary from country to country, there is plenty of variation in how often they are used.

"Americans smile so much that people from other countries are taught to smile more when they interact with us," she says. "The problem is, they're almost always taught one kind of smile, and that can cause confusion. "Simply teaching people about the existence of different types of 'true' smiles can help people pay more attention and avoid some of those misunderstandings."

The research was supported by the National Institutes of Health (grant T32-MH018931-26), the National Science Foundation (grant BVS-1251101), the Wellcome Trust, Multidisciplinary University Research Initiative/Engineering and Physical Sciences Research Council (grant EP/N019261/1) and the United States-Israel Binational Science Foundation (grant 2013205). Chris Barncard, 608-890-0465, barncard@wisc.edu

http://bit.ly/2eZmG4Q

People who drink 3 to 4 times per week less likely to develop diabetes than those who never drink

Frequent alcohol consumption is associated with a reduced risk of diabetes in both men and women

Frequent alcohol consumption is associated with a reduced risk of diabetes in both men and women, according to a new study published in Diabetologia (the journal of the European Association for the Study of Diabetes), with alcohol consumption over 3-4 week days giving the lowest risks of diabetes.

Previous studies have consistently suggested that light to moderate alcohol consumption - in terms of amount consumed - is associated with a lower risk of diabetes compared with abstention in men and women, whilst heavy consumption is associated with a risk greater than or equal to that of abstainers. However previous studies examining the role of drinking patterns (number of days drinking per week rather than volume) in relation to diabetes risk have given inconsistent findings, and studies on the effects of particular types of beverage are likewise inconclusive.

The present study, by Professor Janne Tolstrup and colleagues from the National Institute of Public Health of the University of Southern Denmark, examined the effects of drinking frequency on diabetes risk, and also considered association with specific beverage types.

The study used data from the Danish Health Examination Survey (DAHNES) from 2007-2008, in which Danish citizens aged 18 and over completed a self-reporting questionnaire including items on lifestyle and health. Those who already had diagnosed diabetes were excluded, as were women who were pregnant or had recently given birth (likely to result in a change in drinking habits). The study comprised 70,551 DAHNES participants who had given details of alcohol consumption. Follow up information, continued until 2012 with a median follow up of 4.9 years, was gathered via linking to Danish nationwide registries.

Drinking patterns from the questionnaires were established as follows: abstainers -- lifetime and current -- distinguished to reduce the risk of bias in the results as a consequence of current abstinence being chosen because of health issues; and individuals drinking alcohol -- at frequencies of less than 1 day per week; 1-2 days/ week; 3-4 days/ week and 5-7 days/ week. Frequency of binge drinking (of 5 or more beverages on one occasion) was reported as never; less than one day per week; and once or more per week.

Consumption of specific beverage types -- wine, beer and spirits - was coded as less than one drink per week, 1-6 drinks per week and 7 or

more drinks per week for women and 7-13 and 14 or more drinks per week for men. Beverage specific and overall average weekly alcohol amounts were calculated. Participants were also asked whether their alcohol consumption had increased, decreased or remained stable over the previous 5 years. Information on incident diabetes was obtained from the Danish National Diabetes Register.

The data was adjusted for various confounders: age, sex, level of education, body mass index, smoking status, diet (frequent or infrequent intake of fibre rich bread or grain, vegetables, salad, fruit and fish), leisure time activity, current or previous hypertension and family history of diabetes.

During follow up, 859 men and 887 women developed diabetes. In terms of weekly alcohol amount, the current findings mirrored those of previous studies -- the lowest risk of developing diabetes being found in individuals consuming moderate amounts of alcohol. Men consuming 14 drinks per week were found to have a 43% lower risk of diabetes relative to no alcohol intake, and women consuming 9 drinks per week had a 58% lower risk compared with women who did not drink at all.

In terms of frequency, the data revealed that consumption of alcohol 3-4 days a week gave the lowest risk of diabetes -- a 27% lower risk in men and a 32% lower risk in women - when compared to individuals drinking less than one day per week.

The study found no clear evidence of an association between binge drinking and diabetes risk, which the authors suggest may be due to low statistical power since few participants reported binge drinking.

Regarding beverage type, moderate to high intake of wine was associated with a lower risk of diabetes, in line with previous studies. The authors suggest that this might be due to a beneficial effect that polyphenols in wine have on management of blood sugar, giving red wine in particular a potential protective impact. Men and women who consumed 7 or more drinks of wine per week had a 25-30% lower risk of diabetes compared with those having less than 1 drink of wine per week.

Consuming between 1 and 6 beers per week gave a 21% lower risk of diabetes in men compared with men drinking less than 1 beer per week, while beer was not associated with diabetes risk in women. The authors found no statistically significant association between average weekly alcohol amount of spirits and diabetes in men. In women, however, having 7 or more drinks of spirits per week was associated with an 83% increased risk of diabetes when compared with women consuming less than 1 drink of spirits per week.

The authors conclude: "Our findings suggest that alcohol drinking frequency is associated with the risk of diabetes and that consumption of alcohol over 3-4 weekdays is associated with the lowest risks of diabetes, even after taking average weekly alcohol consumption into account."

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China and India File Rival Claims Over Tibetan Medicine

***Two counties struggle to claim patrimony of* sowa rigpa**

By MIKE IVES JULY 27, 2017

HONG KONG — China and India have jockeyed for centuries over the Himalayas. The Chinese military invaded Tibet in 1950. India granted asylum to the Dalai Lama, the Tibetan spiritual leader, in 1959. Three years later, the two countries fought a border war. Now they are in a standoff over an area disputed by China and Bhutan, the Himalayan kingdom whose claim is supported by India.

On the Tibetan Plateau near Zadoi, in the Chinese province of Qinghai, a Tibetan nomad searching for caterpillar fungus, a prized ingredient in Tibetan and Chinese traditional medicine. **Kevin Frayer/Getty Images**

The two countries' latest struggle is over which one will be able to formally tie the ancient practice of Tibetan medicine to its national patrimony. The prize: international cachet and the possibility of significant commercial rewards.

In March, China filed paperwork asking the United Nations Educational, Scientific and Cultural Organization to recognize medicinal bathing, one of many practices of sowa rigpa, the Tibetan name for this type of medicine, as part of its "intangible cultural heritage." Unesco's website indicates that the request will be considered next year. India filed its own bid — for the entire sowa rigpa tradition — around the same time.

"If China is applying, of course India can also apply," said Geshe Ngawang Samten, the vice chancellor of the Central University of Tibetan Studies in Sarnath, India. "This is Indian culture as well."

Tibetans who live in exile and Western anthropologists who study Tibetan medicine said that it was difficult to predict what tangible effects Unesco recognition might have on the field.

Recognition could be beneficial, they said, if it led to greater access to medical care for rural Tibetans, recruitment of more Tibetan medical practitioners for high-level advisory roles or laws to regulate the production of pharmaceuticals.

The worry, however, is that Unesco recognition could lift the industry's commercial development without addressing some of its underlying problems, such as the watering-down of traditional medicinal formulas and the over-harvesting of medicinal ingredients in the wild.

The founding text of Tibetan medicine is "for the whole world to enjoy," said Tashi Tsering Phuri, the director of the Tibetan Medical and Astro-Science Institute in Dharamsala, the Indian city that serves as the seat of the Tibetan government in exile and the residence of the Dalai Lama. "It should not be a bone of contention between two big nations."

Sowa rigpa is practiced in China, India and neighboring countries including Bhutan, Mongolia and Nepal. The name is often translated into English as "the science of healing," and the present form of the discipline's founding text, "The Four Tantras," is attributed by many Western scholars to a 12th-century Tibetan physician, with antecedents stretching to the eighth century or earlier.

The Dalai Lama at a celebration for the Tibetan Medical and Astro-Science Institute in Dharamsala, India, in 2016. **Tsering Topgyal/Associated Press**

As late as the early 1990s, there was no discernible competition between China and India to claim Tibetan medicine as cultural patrimony, Western scholars say. But about 20 years ago, they say, people began to recognize its potential commercial value.

Stephan Kloos, a medical anthropologist at the Austrian Academy of Sciences in Vienna, said his preliminary calculations suggested that the industry's value could be approaching $1 billion. Even non-Tibetans in India were beginning to see sowa rigpa as a business opportunity, he said.

But this same economic potential concerns experts who say the industry, which has traditionally relied on the gathering of wild plants and animals in mountainous areas, is not really built for large economies of scale.

Sienna Radha Craig, an associate professor of anthropology at Dartmouth College and an expert on Tibetan medicine, said one possibility was that Unesco recognition could stimulate the industry's growth without the proper environmental safeguards. In India, China and Nepal, the effort to expand the industry far outstrips "serious cultivation and conservation," Ms. Craig said, adding, "At a certain point that becomes completely untenable."

In 2010, India officially recognized sowa rigpa as an Indian medicinal system. India notes on a government website that while "there are various schools of thought about the origin of this medical tradition," most of its theory and practice is similar to that of ayurveda, an Indian tradition that India says first came to Tibet in the third century.

Western scholars say there are clear historical links between ayurvedic and Tibetan medical traditions. But India's recent application for Unesco recognition prompted ripostes from Chinese experts.

In April, the state-run newspaper Global Times quoted Qin Yongzhang, an ethnologist at the Chinese Academy of Social Sciences, as saying, "The truth is that Tibetan medicine not only originated but has developed in China."

China's recent Unesco application said that Tibetan hot-spring and herbal-bath therapies — known as lum medicinal bathing — were "developed by the Tibetan people" and are popular across much of western China, including the Tibet Autonomous Region.

A Unesco designation would raise awareness of the bathing tradition "among the Chinese population, while encouraging dialogue on health and respect for nature among different ethnic groups," the application said.

Traditional Tibetan herbal medicine being packed at a clinic in Dharamsala to be sent to patients by courier. **Prakash Singh/Agence France-Presse - Getty Images**

Robert Thurman, a professor of Indo-Tibetan Buddhist studies at Columbia University, said that because China "forcibly" owned most of the Tibetan Plateau, an area that he said had many mineral springs, its Unesco application made some sense.

"But to claim that somehow China has been the origin of the tradition is, frankly, just silly," Mr. Thurman wrote in an email.

A woman who answered the phone at the office of China's Unesco commission, who would not give her name, said that the government was working on its Unesco paperwork and that all related information was confidential.

Unesco said it could not comment on files it was processing. A spokesman in Bangkok, Noel Boivin, said in an email that the agency encouraged multinational intangible cultural heritage nominations.

In interviews, two prominent Tibetans took a mixed view of the Unesco process and said Tibetans had no easy options to safeguard their cultural heritage.

Of China's Unesco bid, Tsering Woeser, a Tibetan writer who lives in Beijing, said it was "a shame to see that Tibetan people are once again represented without our consent." However, she said, "if you do not take advantage of funds and opportunities, Tibetan medicine, together with much of traditional Tibetan culture, will gradually disappear."

Dr. Tashi Rabten, a Tibetan physician in Nyack, N.Y., said that the overall effect could be positive, regardless of which country filed the application, but only if the Unesco designation clearly recognized that the tradition belonged to Tibetans — and no one else.

Mr. Kloos, the medical anthropologist in Vienna, said that countries where sowa rigpa was practiced should work together if their goal was to have it recognized internationally. "But politics creep in," he said, "even though it should really only be about medical considerations."

Ayesha Venkataraman contributed reporting from Mumbai, India, and Karoline Kan contributed research from Beijing.

http://bit.ly/2uPi1WJ

Saturn's moon Titan may harbour simple life forms – and reveal how organisms first formed on Earth

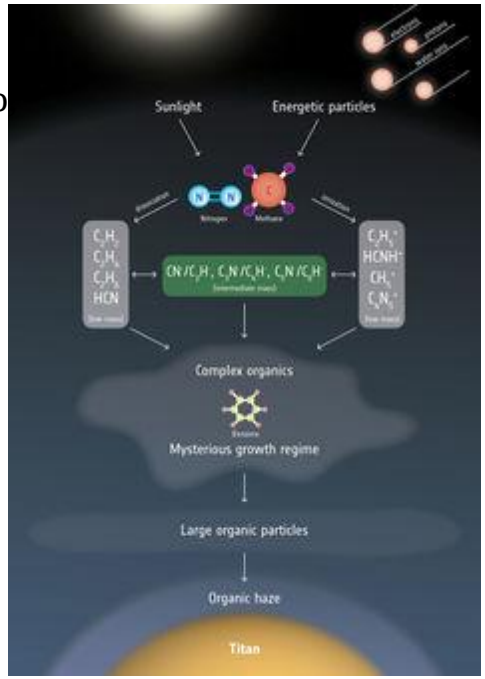
How chemical reactions on a lifeless planet floating around in the cold darkness of space can suddenly give rise to living organisms is one of the biggest questions in science.

Ravi Desai

We don't even know whether the molecular building blocks of life on Earth were created here or whether they were brought here by comets and meteorites.

Using data from the NASA/ESA Cassini mission, we have now discovered molecules on Saturn's largest moon Titan which we think drive the production of complex organic compounds. These are molecules that have never been seen in our solar system before. The discovery not only makes Titan a great contender for hosting some sort of primitive life, it also makes it the ideal place to study how life may have arisen from chemical reactions on our own planet.

The molecular building blocks of life are organic compounds including amino acids that can be assembled into proteins, RNA and DNA in living cells. To date, scientists have found these compounds in meteorites, comets and interstellar dust. But the problem is that these materials formed millions of years ago which means we have no way of knowing how they were created. Excitingly, it seems these compounds are being created on Titan today. Sunlight and energetic particles from Saturn's magnetosphere drive reactions in the moon's upper atmosphere, which is dominated by nitrogen, methane and hydrogen. These lead to larger organic compounds which drift downwards to form the moon's characteristic "haze" and the extensive dunes – eventually reaching the surface.



The chemical reactions in Titan's atmosphere. The carbon chain anions are in the green box. **ESA, CC BY-SA**

To make these surprising discoveries, published in the Astrophysical Journal Letters, the Cassini spacecraft dipped through Titan's upper atmosphere. Using data beamed back to Earth, we identified the presence of negatively charged molecules called "carbon chain anions". These appear to "seed" the larger organic compounds observed at the moon – such as polyaromatic hydrocarbons and cyanopolynnes – which could serve as key ingredients for early forms of life. Laboratory experiments have also shown that amino acids could exist there, but the instruments on Cassini are not equipped to detect them.

Negatively charged molecules like these are rare in space environments as they want to react and combine with other molecules – meaning they can be quickly lost. When present, however, they appear to be a crucial "missing link" between simple molecules and complex organic compounds.

So could life currently exist on Titan? It's not impossible. Water plumes erupting from another of Saturn's moons, Enceladus, provides a key source of oxygen, which rains down onto Titan's upper atmosphere. Titan has even been judged the most likely place beyond the Earth to host life by the Planetary habitability index. But life there would likely be quite primitive due to the cold conditions. The presence of liquid methane and ethane seas also means potential organisms would have to function quite differently to those on Earth.

Tracing life on Earth

Remarkably, similar processes are observed in vast molecular clouds beyond our solar system, where stars are born. After the first stars in the universe entered their death throes and fused together heavier elements, rich organic chemistry took place. In these environments, negatively charged molecules have been shown to act as a catalyst for the formation of larger organics, which could then be transferred to solar systems and comets forming from the cloud.

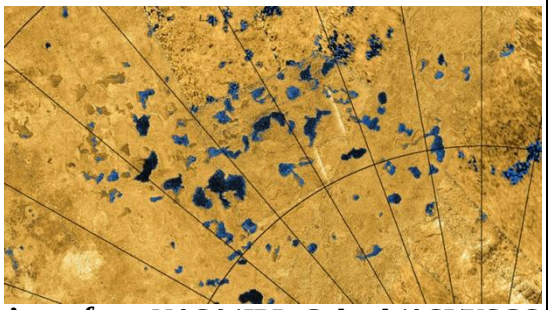
Complex interstellar chemistry has led to the theory that the building blocks of life could have been delivered to Earth from comets which once formed in these molecular clouds. ESA's Rosetta mission detected the amino acid glycine when visiting Comet 67P/Churymov-Gerasimenko. However, the new discovery makes it entirely possible

that the process of creating life from simple molecules took place on Earth instead.

Titan's dense nitrogen and methane atmosphere is similar to the early Earth's, some 2.5-4 billion years ago. At this time, before the build-up of oxygen occurred, large quantities of methane resulted in organic chemistry similar to that observed at Titan today. The moon is therefore a high priority target in the search for the beginnings of life.

By making long-term, detailed observations of Titan, we may one day be able to trace the journey from small to large chemical species in order to understand how complex organic molecules are produced.

Perhaps we may even be able catch the sudden change from complex organic molecules to living organisms. Follow-up observations of Titan's atmosphere are already underway using powerful ground-based telescopes such as ALMA. Further missions to explore Titan are also in the works – it is crucial that these are equipped to detect the signatures of life.



Radar images reveal lakes on Titan's surface. **NASA/JPL-Caltech/ASI/USGS**

Universal driver

The fact that we now see the same chemistry occurring at Titan as in molecular clouds is fascinating, as it indicates the universal nature of these processes. The question now is, could this also be happening within other atmospheres rich in nitrogen and methane, such as at Pluto or Neptune's moon Triton? What about the thousands of exoplanets discovered in recent years, circling nearby stars?

The concept of a universal pathway towards the building blocks of life has implications for what we need to look for in the onward search for life in the universe. If we detect the molecules just seen on Titan in another environment, we would know that much larger organics and therefore amino acids are likely to exist there.

Future missions, such as NASA's James Webb Space Telescope and ESA's exoplanet mission Plato, are set to further study these processes within our solar system and at planets orbiting nearby stars. The UK is even planning its own exoplanet mission, Twinkle, which will also search for signatures of organic molecules.

Although we haven't detected life itself, the presence of complex organic molecules at Titan, comets and within the interstellar medium means we are certainly coming close to finding its beginnings. And it's all thanks to Cassini's near 20-year exploratory journey. So spare a thought for this magnificent spacecraft as it ends its mission in September with a final death-plunge into Saturn's atmosphere.

http://bit.ly/2vWZo3j

Clinic 'turkey baster' method may be worth trying before IVF

Hoping for a baby: there's more than one way to treat infertility

By Jessica Hamzelou

Putting sperm directly into a woman's uterus is no longer popular as a fertility treatment, but new evidence suggests it's more effective than we thought – as well as being a lot easier and cheaper than IVF.

Infertility is nothing new, and people have been inventing ways to boost their chances of conceiving for centuries. One approach to tackling reduced male fertility, the "turkey baster" method of placing sperm into the vagina, has been around in some form since at least the 1400s.

Improved versions of this procedure, aka intrauterine insemination (IUI), wash the sperm first, to lower the risk of infections, before using a thin tube to deliver the sperm. Sometimes, women are given drugs to increase the number of eggs they release, with the hope of further boosting the chances of success.

But the technique has fallen out of favour in recent years, in part because studies have shown that a single round of IVF is more likely to result in pregnancy than IUI. The UK's National Institute for Health and Care Excellence recommends couples with unexplained infertility

bypass IUI altogether after trying for a year or two, depending on age, the most cost-effective approach is to skip straight to IVF, the guidelines state.

Now Cindy Farquhar of the University of Auckland, New Zealand, and her team have found that IUI is much more likely to lead to pregnancy than we thought. The team compared three rounds of IUI paired with a drug that boosts ovulation against three months of trying to conceive naturally, in 201 couples who were trying to conceive.

No surgery

The team presented results at the European Society of Human Reproduction and Embryology meeting in Geneva, Switzerland, this month that suggest IUI can increase the live birth rate from 9 per cent to 31 per cent in couples who've had unexplained infertility for three to four years. This could be good news because IUI is much easier than IVF and often around a quarter of the price. The sperm is injected into the uterus through a thin tube, with no need for surgery.

In a study of 602 couples, Ben Cohlen of the Fertility Clinic Isala in Zwolle, the Netherlands, and his team has found that, over six rounds of treatment, IUI has similar success rates to drug-free IVF. "For unexplained or mild male infertility, I would do at least three cycles of IUI before trying IVF," says Cohlen.

Roy Homburg at Homerton University Hospital in London agrees IUI is worth a try and describes proceeding directly to IVF as being "like using a sledgehammer to crack a nut". "We are overusing IVF to treat unexplained infertility," says Homburg. With carefully chosen couples, and combined with female fertility drugs, IUI is more cost effective and less invasive, he says.

http://bit.ly/2vXFchJ

Aggressive spiders are quick at making accurate decisions, good at hunting unpredictable prey

Interesting findings about the relationship between personality traits of spiders and their decision making, as well as hunting styles.

Spiders, like humans and many other animals, have distinct personalities. Two studies by scientists from the National University of Singapore (NUS) unveiled interesting findings about the relationship between personality traits of spiders and their decision making, as well as hunting styles.

Decision making styles of spiders

Studies have shown that when humans make decisions in a haste, they tend to make more mistakes. To investigate if the same holds true for spiders, the NUS research team, led by Associate Professor Li Daiqin from the Department of Biological Sciences at the NUS Faculty of Science, conducted studies on Portia labiata, a species of jumping spider. Portia labiata is known for its high cognitive ability and complicated foraging strategies, but its personality is unexplored.

The researchers first tested the aggressiveness of Portia labiata spiders by observing their responses when they are touched by a small soft brush. Spiders that attacked the brush were deemed to be more aggressive than those who ran away from the brush. After determining the personalities of the jumping spiders, researchers assessed how the spiders make decisions. In the experiments, the spiders were given the choice of selecting a large or a small preferred prey. The large prey is associated with being better in quality, but is more dangerous to attack. The small prey is of lower quality, but easier to attack. The researchers studied the time the spiders took to make their decision, and the choices they made.

The results showed that spiders who are aggressive made decisions faster than their docile counterparts. In addition, the choices they made are as accurate as those made by the docile spiders. The findings demonstrated that the personalities of the jumping spiders are related to their cognitive styles. Results of this study were reported in scientific journal Behavioral Ecology in December 2016.

Assoc Prof Li explained, "The outcome is rather surprising, as our team had initially thought that spiders that make quick decisions are more likely to make the wrong choices, similar to humans. This new

knowledge provides us with a better understanding of ecological processes like foraging and predator-prey interactions in the animal kingdom."

Foraging performance of spiders

When predators hunt for food, they will usually consider the prey's size, speed of movement, and strength. While the predator's personality may not be ranked high on the list of factors, it has a significant influence on the predator's hunting strategy, according to another study conducted by a research team led by Assoc Prof Li. The results were reported in scientific journal Scientific Reports in January 2017.

In this study, the NUS research team examined the personalities and behavioural predictabilities of two species of jumping spiders. The spider-eating Portia labiata jumping spider was selected as the predator, while the Cosmophasis umbratica jumping spider, which is common prey of Portia labiata, was selected as the prey.

To test the aggressiveness of the predator, the researchers placed mirrors in front of the Portia labiata spiders, and observed their response to their images. Those that touched the mirror were deemed to be aggressive while those that kept far from the mirror were deemed to be docile. The researchers also assessed the boldness of the prey Cosmophasis umbratica by introducing a mock predator, made of putty and paper clips, into the container it resides, and observing the prey's behaviour. Each test was repeated five times to estimate the predictability of the spiders' behaviours, and to provide personality and predictability profiles of all the individuals studied. To determine the predator and prey interactions, the researchers placed a single predator and a single prey together to record the foraging performance of the predator. The test was conducted on different pairings, and the results were statically analysed.

"The results showed that aggressive predators fared better when catching a prey with unpredictable behaviour while docile predators performed much better when hunting a prey with predictable behaviour," explained Ms Chang Chia-chen, a PhD student from the NUS Department of Biological Sciences who is the first author of both studies.

Assoc Prof Li said, "Understanding personalities of spiders will shed light on how an individual animal with a particular behavioural type can improve its survivorship and reproduction. This has significant implications for evolutionary theories as a better understanding of non-animal personality may be extrapolated to humans, and help to provide a better understanding of the nature and evolution of human personalities. Furthermore, the study and management of animal personalities can play a crucial role in conservation, invasion biology and climate change."

More studies on personalities of spiders

To deepen their understanding on the personalities of spiders, Assoc Prof Li and his team plan to conduct further studies to test the relation between the personality and the decision making styles of spiders by giving spiders tasks of different levels of difficulty. The team will also be studying the gene profiles of spiders to identify the genes responsible for their personalities.

http://bit.ly/2hffwtR

Half the atoms inside your body came from across the universe

Half of the atoms making up everything around you are intergalactic interlopers.

By Aylin Woodward

Large galaxies like our Milky Way amassed half their matter from neighbouring star clusters up to a million light years away, according to a new simulation. “We did not realise how much of the mass in today’s Milky Way-like galaxies was actually ‘stolen’ from the winds of other galaxies,” says corresponding author Claude-André Faucher-Giguère at Northwestern University in Illinois

The theft occurs after a death. When some stars reach the end of their life cycle, they become massive supernovae, spewing high-speed gas

out into the universe. The matter in these ejections is picked up by galactic winds, streams of charged particles powered by the exploding supernovae.

It was previously thought that galactic winds couldn't be the source of much intergalactic matter transfer because they weren't powerful enough to cross the vast distances that separate neighbouring galaxies. Turns out, they're stronger than we thought.

"We assumed that the winds were confined to the galaxies they came from – that they could recycle by falling back onto the galaxy that ejected them, but not transfer much mass from one galaxy to another," says Faucher-Giguère.

Over a galaxy's lifetime, it will swap matter continuously with its neighbours and the journey between one galaxy and another could take anywhere from several hundred million to 2 billion years, he says.

Across the universe

Using 3D models of galaxy evolution, Faucher-Giguère and his co-author Daniel Anglés-Alcázar simulated the path matter inside galaxies would have taken through the universe from the big bang through to today. More accurate simulations of supernovae revealed that the galactic winds were moving matter faster than previously thought.

They found that in galaxies with 100 billion stars or more, the galactic winds actually ferried in about 50 per cent of the matter present today.

"Galactic winds as a mode of transfer has been underappreciated," says Jessica Werk at the University of Washington in Seattle. "Daniel Anglés-Alcázar uses one of the best simulations to do a detailed particle tracking analysis and really laid it all out for us."

Faucher-Giguère and Anglés-Alcázar found that for larger galaxies like our own, this intergalactic Gulf Stream is the primary contributor to their growth, allowing them to snatch away matter from their smaller counterparts.

The intergalactic transfer of matter is less crucial for the growth of smaller galaxies, which rely more on local galactic winds to keep any matter that might be ejected from supernovae within their system. Faucher-Giguère thinks the Milky Way receives its matter from the nearby small and large Magellanic clouds, two dwarf galaxies between 160,000 and 200,000 light years away.

Werk says tracking the flow of matter from the origin of the universe to present day, and understanding where the atoms that make up the air we breathe and water we drink is one of the fundamental problems in astrophysics. "It's one of the holy grails of extra galactic cosmology," she says. "Now, we've found that half these atoms come from outside our galaxy."

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http://bit.ly/2vasfDJ

This Is How a Woman Died from a Tick-Borne Disease Without a Tick Bite

A woman in Japan died last year from a tick-borne disease — but she was never bitten by a tick.

By Sara G. Miller, Staff Writer

Instead, investigators believe the woman became infected with a disease called severe fever with thrombocytopenia syndrome through a bite from a stray cat, according to The Japan Times. (Essentially, the cat was bitten by an infected tick, got infected and then passed that virus on to the woman.)

But what is severe fever with thrombocytopenia syndrome, and is it odd for a tick-borne disease to cut ticks out of the equation?

An Asian virus

Severe fever with thrombocytopenia syndrome is caused by a virus of the same name: severe fever with thrombocytopenia syndrome virus, or SFTSV, according to the Centers for Disease Control and Prevention. The virus is spread primarily through ticks.

If you haven't heard of SFTSV, it may be because no cases of the disease have been reported in the United States; rather, infections have been reported only in Asia.

SFTSV is considered an emerging infectious disease, and researchers are still learning about it, said Dr. Amesh Adalja, an infectious-disease specialist and a senior associate at the Johns Hopkins Center for Health Security, who was not involved in the Japanese woman's case.

Suspected cases of the infection started to emerge in the mid-2000s, and scientists first isolated the virus in a lab in 2010, Adalja told Live Science.

An increase in diagnoses of SFTSV doesn't necessarily mean that the virus is becoming more common, Adalja noted. Rather, doctors may be more aware of the disease and know to look for it, leading to the increase in documented cases.

Fevers and blood problems

The tick-borne virus causes general flu-like symptoms, including fever, headache, and aches and pains, Adalja said. But these common symptoms can be caused by a number of diseases. A cluster of cases in China in 2007, for example, was thought at one point to be caused by a form of typhus spread by mites or a bacterial infection spread by ticks, he said.

As the disease progresses, however, it can cause changes in a person's blood, Adalja said. "Thrombocytopenia," for example, means that a person doesn't have enough platelets in their blood. Platelets help blood clot, so having fewer platelets can lead to bleeding problems. The virus can also lower the levels of white blood cells, which are cells that help the body fight infections, he said.

Eventually, SFTSV can lead to multiple-organ failure, Adalja said, meaning that various organs in the body shut down. Studies suggest that up to 30 percent of people who get the virus die, he noted.

Currently, there are no specific treatments for SFTSV, Adalja said. Instead, doctors treat the patients through supportive care.

Trouble in the heartland?

Because there haven't been any documented cases of SFTSV in the U.S., the disease isn't something a doctor would normally look for, Adalja said. However, he added that the virus is similar to another infection that's emerged stateside in recent years: the Heartland virus.

The Heartland virus is also a tick-borne disease, and studies have found that the two viruses are genetically related, Adalja said. In fact, animals infected with the Heartland virus may make antibodies for SFTSV, he said. A 2013 study, for example, found SFTSV antibodies in animals including sheep, goats and deer in Minnesota; it's possible that the animals made the antibodies in response to the Heartland virus.

Where's the tick?

Mammal-to-mammal transmissions of SFTSV have been reported before, Adalja said. In 2012, researchers reported human-to-human transmission of SFTSV in China, he said. And a review of the virus published in the journal The Lancet in 2014 suggests that human-to-human transmission of SFTSV is possible.

"It's not surprising" that the virus can be spread without a tick, Adalja said. "It's not the main mechanism [of spreading], but it can happen." If a virus is in an animal's blood or body fluid and a person comes into contact with that blood or body fluid, the virus can spread, he said.