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All of humanity should share in the space mining boom

One solitary asteroid might be worth trillions of dollars in platinum and other metals.

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Exploiting these resources could lead to a global boom in wealth, which could raise living standards worldwide and potentially benefit all of humanity.

There are already companies, such as Planetary Resources, hoping to make mining in space a reality.

Peter Diamondis, co-founder of Planetary Resources and founder of the XPrize Grand Challenges, believes that the benefits to humanity give us a moral imperative to explore and utilise space. He has also declared “there are twenty-trillion-dollar checks up there, waiting to be cashed!” However, behind the utopian rhetoric and dazzling dreams of riches lie some very real problems.

Ownership and the Outer Space Treaty

The framework of international space law is given by the Outer Space Treaty (OST), which entered into force in 1967. Among its main principals, the OST includes these statements:

the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind and,

outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means

Because the OST is generally interpreted as preventing anything like private fee-simple ownership, it is sometimes claimed to be an obstacle to commercial ventures in space. But such claims simply do not hold water.

There are numerous terrestrial examples where resources are profitably exploited in the absence of fee-simple ownership. Governments routinely licence companies to engage in timber extraction, mining, offshore oil exploration and other activities, receiving royalties payments on production.

In the United States, revenues from such royalties totalled some US\$13.5 billion dollars in 2014 from federally owned or managed lands alone. Nevertheless, some proponents of mining in outer space argue for serious modification or an end to the Outer Space Treaty and claim, against the evidence, that without fee-simple ownership, there is no incentive for commercial exploitation.

The Unites States' Space Act of 2015 was just one volley – and a deliberately vague one at that – in this ongoing international debate.

A balanced approach?

The riches exist, but how will humanity benefit from mining in outer space, or for that matter, other global commons such as the deep sea floor?

Behind the lofty rhetoric of benefits to humanity, there is a dark shadow of voodoo economics, the shambling, walking dead figure of trickle-down economics– and the possibility of a world where a few trillionaires enjoy the view from space while others barely eke a living on its surface.

Yet we do suggest that commercial interests and profit seeking can be a healthy part of the exploration of outer space. Yet outer space is not the Wild West frontier of Frederick Jackson Turner, nor do we live in the Gold Rush days of Jack London’s tale of greed and death.

In the common heritage of space, with multiple state and private actors engaging in exploration and potentially exploitation, international cooperation and oversight will benefit all.

The Alaskan model

There is a balanced, pragmatic approach that will promote commercial and profit driven activities, while also producing tangible benefits to all of humanity.

Importantly, this pragmatic approach has a well established precedent that has existed for nearly 40 years. And this comes not from a social democracy or left-wing ideology, but was the brainchild of a libertarian, Republican governor of Alaska, Jay Hammond. That model is the Alaska Permanent Fund Corporation (APFC) created in 1976, and its unique “citizen’s dividend”. The APF is a resource wealth fund, which derives its revenue primarily from leases on oil fields. In 1977, Hammond suggested that “rather than permitting government to spend all public monies earned through the exploitation of the public’s resources for what government thinks best, let’s grant shares to Alaskans.” The first dividend payment was made in 1982, and in 2015 that payment amounted to US\$2,072.

Linking a citizen’s dividend to a sovereign wealth fund was unique, but the idea of a citizen’s dividend has a long and venerable tradition. One of the earliest advocates was no less than the political theorist and American Revolutionary, Thomas Paine.

International body

How would this work for outer space?

We need an international body similar to the International Seabed Authority, which was established by the United Nations Convention on the Law of the Sea, or the International Telecommunications Union, which allocates satellite orbits.

This would provide the stable business and investment environment that entrepreneurs seek by ensuring international law and obligations are met. This body could license outer space resources and levy a royalty on production, which

is part of standard business practice between petroleum and other mining companies and governments here on Earth.

In turn, these revenues, or a significant portion thereof, would be deposited in a Space Resource Fund, possibly under the aegis of the World Bank. And every single citizen on Earth, say aged 18 or above, would receive a dividend on a yearly basis as their rightful share as owners of the common province of humankind.

Crucially, we are not suggesting redistribution, which has been an obstacle to the International Seabed Authority and the Moon Treaty in the past, but a fair share dividend of wealth that truly belongs to everyone. Our model doesn't provide a handout, or a welfare cheque, or charity from a trillionaire philanthropist; it pays every owner in a global commons a share of what is rightfully theirs.

Even tiny dividends by the standards of the world's wealthy nations would make a difference for some developing world farmers. If there truly are trillions of dollars out there, then this might be something fundamentally world changing.

We accept that Larry Page and Sir Richard Branson – founding investors and advisors in Planetary Resources – and its founders Eric Anderson and Peter Diamandis, truly want humanity to benefit from outer space, and that they truly believe in corporate social responsibility and a sustainable future. We would encourage them to embrace the idea that the sky really does belong to all of us, as the common “province of all mankind”.

By paying rent for the right to exploit resources in space and royalties on production, the same way oil companies pay to exploit oil in the Gulf of Mexico, they'll be engaging in business as usual. They will have bought the right to make a potentially enormous profit and prove they really are responsible global citizens. And they'd get a citizen's dividend cheque too.

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Pressure on Exxon Over Climate Change Intensifies With New Documents

Pressure the energy industry increased on Wednesday with the release of decades-old industry documents about climate change

By JOHN SCHWARTZ APRIL 14, 2016

Pressure on Exxon Mobil and the energy industry increased on Wednesday with the release of a new cache of decades-old industry documents about climate change, even as Exxon pushed back against efforts to investigate the company over its climate claims through the years.

The new documents were released by an activist research organization, the Center for International Environmental Law, which published the project on its website.

The documents, according to the environmental law center's director, Carroll Muffett, suggest that the industry had the underlying knowledge of climate change even 60 years ago.

“From 1957 onward, there is no doubt that Humble Oil, which is now Exxon, was clearly on notice” about rising CO2 in the atmosphere and the prospect that it was likely to cause global warming, he said.

What's more, he said, the documents show the industry was beginning to organize against regulation of air pollution.

The American Petroleum Institute, energy companies and other organizations had created a group, the Smoke and Fumes Committee, to monitor and conduct pollution research, and to “use science and public skepticism to prevent environmental regulations they deemed hasty, costly and unnecessary,” according to the center's description of the documents on its website.

Those actions, Mr. Muffett suggested, would be echoed in later efforts to undermine climate science.

The center's work was first reported by Inside Climate News, which has published stories, as did The Los Angeles Times, suggesting that Exxon Mobil understood the risks of climate change from its own research, which it used to plan activities such as drilling in the Arctic, while it funded groups into the mid-2000s that denied serious climate risks.

Those earlier investigations led to a surge in activism against the company and the energy industry, using the hashtag #exxonknew. The investigations also have been cited by attorneys general, including Eric T. Schneiderman of New York, who have demanded information from Exxon about its internal research and its funding of climate denial.

Inside Climate News announced that Wednesday's article is the first of a series based on the work of the environmental law center and documents it has amassed on its own.

Alan Jeffers, a spokesman for Exxon Mobil, called the new allegations absurd.

“To suggest that we had definitive knowledge about human-induced climate change before the world's scientists is not a credible thesis,” he said.

Four attorneys general are investigating Exxon Mobil's public statements and private scientific knowledge over the years, and the company struck back on Wednesday in a filing in Texas against Claude Earl Walker, the attorney general of the United States Virgin Islands, and a private law firm working with his office on the investigation.

The filing called Mr. Walker's actions a “flagrant misuse of law enforcement power” that “violate Exxon Mobil's constitutionally protected rights of freedom

of speech, freedom from unreasonable searches and seizures, and due process of law and constitute the common law tort of abuse of process.”

The company, it noted, has no “physical presence” in the Virgin Islands, and its courts have no jurisdiction over the company.

In addition, the company stated, it has “widely and publicly confirmed” that it recognizes “that the risk of climate change and its potential impacts on society and ecosystems may prove to be significant.”

Kert Davies, the director of the Climate Investigations Center, a group funded by foundations seeking to limit the risks of climate change, said Mr. Muffett’s project “has pulled back the curtain on any plausible deniability that Big Oil might have pretended they had on the dangers of climate change.” And, he added, “the naked truth is pretty ugly.”

But Michael B. Gerrard, the director of the Sabin Center for Climate Change Law at Columbia Law School, said that the early stirrings of climate science have already been well documented. “It has been known for years that scientists in that era were talking about climate change,” he said.

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Brain scans link physical changes to cognitive risks of widely used class of drugs

Older adults should avoid a using class of drugs used in OTC products such as nighttime cold medicines because of links to cognitive impairment

INDIANAPOLIS -- Older adults might want to avoid a using class of drugs commonly used in over-the-counter products such as nighttime cold medicines due to their links to cognitive impairment, a research team led by scientists at Indiana University School of Medicine has recommended.

Using brain imaging techniques, the researchers found lower metabolism and reduced brain sizes among study participants taking the drugs known to have an anticholinergic effect, meaning they block acetylcholine, a nervous system neurotransmitter.

Previous research found a link between between the anticholinergic drugs and cognitive impairment and increased risk of dementia. The new paper published in the journal JAMA Neurology, is believed to be the first to study the potential underlying biology of those clinical links using neuroimaging measurements of brain metabolism and atrophy.

"These findings provide us with a much better understanding of how this class of drugs may act upon the brain in ways that might raise the risk of cognitive impairment and dementia," said Shannon Risacher, Ph.D., assistant professor of radiology and imaging sciences, first author of the paper, "Association Between

Anticholinergic Medication Use and Cognition, Brain Metabolism, and Brain Atrophy in Cognitively Normal Older Adults." "Given all the research evidence, physicians might want to consider alternatives to anticholinergic medications if available when working with their older patients," Dr. Risacher said.

Drugs with anticholinergic effects are sold over the counter and by prescription as sleep aids and for many chronic diseases including hypertension, cardiovascular disease, and chronic obstructive pulmonary disease. A list of anticholinergic drugs and their potential impact is at

http://www.agingbraincare.org/uploads/products/ACB_scale_-_legal_size.pdf.

Scientists have linked anticholinergic drugs cognitive problems among older adults for at least 10 years. A 2013 study by scientists at the IU Center for Aging Research and the Regenstrief Institute found that drugs with a strong anticholinergic effect cause cognitive problems when taken continuously for as few as 60 days. Drugs with a weaker effect could cause impairment within 90 days.

The current research project involved 451 participants, 60 of whom were taking at least one medication with medium or high anticholinergic activity. The participants were drawn from a national Alzheimer's research project -- the Alzheimer's Disease Neuroimaging Initiative -- and the Indiana Memory and Aging Study.

To identify possible physical and physiological changes that could be associated with the reported effects, researchers assessed the results of memory and other cognitive tests, positron emission tests (PET) measuring brain metabolism, and magnetic resonance imaging (MRI) scans for brain structure.

The cognitive tests revealed that patients taking anticholinergic drugs performed worse than older adults not taking the drugs on short-term memory and some tests of executive function, which cover a range of activities such as verbal reasoning, planning, and problem solving.

Anticholinergic drug users also showed lower levels of glucose metabolism -- a biomarker for brain activity -- in both the overall brain and in the hippocampus, a region of the brain associated with memory and which has been identified as affected early by Alzheimer's disease.

The researchers also found significant links between brain structure revealed by the MRI scans and anticholinergic drug use, with the participants using anticholinergic drugs having reduced brain volume and larger ventricles, the cavities inside the brain.

"These findings might give us clues to the biological basis for the cognitive problems associated with anticholinergic drugs, but additional studies are needed if we are to truly understand the mechanisms involved," Dr. Risacher said.

Additional investigators contributing to this research were Brenna C. McDonald, Eileen F. Tallman, John D. West, Martin R. Farlow, Fredrick W. Unverzagt, and Sujuan Gao, IU School of Medicine; Malaz Boustani, IU School of Medicine, Regenstrief Institute and Eskenazi Health; Paul K. Crane, University of Washington; Ronald C. Petersen and Clifford R. Jack Jr., Mayo Clinic; William J. Jagust, University of California-Berkeley; Paul S. Aisen, University of Southern California, San Diego; Michael W. Weiner, University of California-San Francisco; Andrew J. Saykin, IU School of Medicine for the Alzheimer's Disease Neuroimaging Initiative.

Data collection and sharing for this project was funded by the Alzheimer's Disease Neuroimaging Initiative (ADNI) (National Institutes of Health Grant U01 AG024904) and DOD ADNI (Department of Defense award number W81XWH-12-2-0012).

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Most Americans pray for healing; more than one-fourth have practiced 'laying on of hands'

People pray for others' health more than for their own, Baylor study finds

Nearly nine of 10 Americans have relied upon healing prayer at some point in their lives, praying for others even more than for themselves, according to a study by a Baylor University epidemiologist.

"The most surprising finding is that more than a quarter of all Americans have practiced laying on of hands -- and nearly one in five has done so on multiple occasions," said Jeff Levin, Ph.D., M.P.H., University Professor of Epidemiology and Population Health and director of the Program on Religion and Population Health at Baylor's Institute for Studies of Religion.

"Outside of belief in God, there may be no more ubiquitous religious expression in the U.S. than use of healing prayer," Levin said.

The findings also suggest that prayer may be among them most widely used forms of treatment for medical problems, rather than a "fringe activity" as many people might believe, he said.

The study is published in the *Journal of Religion and Health*. Findings are based on analyses of data from the third round of the Baylor Religion Survey, a nationally representative population survey conducted in partnership with the Gallup Organization in 2010.

More than three-fourths of Americans have prayed for their own healing, and nearly a third do so often, Levin said. Nearly 90 percent have prayed for the

healing of others, and more than half report doing so often. More than half of Americans have asked for healing prayer and have taken part in prayer groups.

"Interestingly, most people who use prayer for healing do so alongside regular medical care, rather than as a substitution, as has been presumed up to now," Levin said. "Healing prayer is being used more as a complementary treatment rather than as an alternative one."

The practice of laying on of hands is found in the Bible and has long been used by Christians and Jews as a means to ordain clergy and to bless people, but also to transmit physical healing, Levin said. "For many of us, the image that might come to mind is the faith healer. But these findings show that the practice is much more widespread, as is healing prayer in general," he said.

Statistical analysis of the survey of 1,714 U.S. adults showed that:

78.8 percent of participants have prayed for healing for themselves at some point in their lives, and 32.4 percent do so often

87.4 percent have prayed for healing for others, and 51.1 percent do so often

54.1 percent have asked for prayers for their health

26.1 percent have given a "laying on of hands" for healing

53 percent have participated in a prayer group, prayer circle or prayer chain

While certain factors, such as frequent religious attendance, reading Scripture or meditation, were predictive of at least one form of healing prayer, the one most consistent predictor was a loving relationship with God, the study found.

"People who feel a close connection to God, who love God and feel loved by God, are the very people most likely to pray for healing: for themselves or others, alone or in a group, and verbally or through laying on of hands," Levin said.

"These people are taking to heart the biblical call to 'love your neighbor as yourself,' something found in both the Old and New Testaments."

Whether the prayers work is beyond the scope of his research, Levin said.

"So much has been written in the medical literature in the past several years about the possibility that prayer heals," he said. "There have even been a series of controversial and inconclusive clinical trials.

"But with so much attention paid to the efficacy of prayer -- something science may not ever be capable of proving one way or another to everyone's satisfaction - almost no attention has been given to simply documenting the practice. How many people pray for healing? How often? Who are these folks? That's why this study was done."

The next step will be to investigate whether there are differences in rates of healing prayer across religions and denominations, Levin said. But "preliminary analysis suggests that the practice is widespread, regardless of one's religious background or beliefs."

http://www.eurekalert.org/pub_releases/2016-04/thuo-viw041816.php

Vegetables irrigated with treated wastewater expose consumers to drugs

Hebrew University and Hadassah Medical Center researchers show the link between exposure to pharmaceutical contaminants and consumption of fresh produce grown in reclaimed wastewater-irrigated soil

A new study by a multidisciplinary team of researchers from the Hebrew University of Jerusalem and Hadassah Medical Center shows that eating vegetables and fruits grown in soils irrigated with reclaimed wastewater exposes consumers to minute quantities of carbamazepine, an anti-epileptic drug commonly detected in wastewater effluents.

Fresh water scarcity worldwide has led to increased use of reclaimed wastewater, as an alternative source for crop irrigation. But the ubiquity of pharmaceuticals in treated effluents has raised concerns over the potential exposure for consumers to drug contaminants via treated wastewater.

"Israel is a pioneer and world leader in reuse of reclaimed wastewater in the agriculture sector, providing an excellent platform to conduct such a unique study," said research co-author Prof. Benny Chefetz from the Faculty of Agriculture, Food and Environment at the Hebrew University and the Director of the Hebrew University Center of Excellence in Agriculture and Environmental Health. The study is the first to directly address exposure to such pharmaceutical contaminants in healthy humans. It was recently published in Environmental Science and Technology.

"In a randomized controlled trial we have demonstrated that healthy individuals consuming reclaimed wastewater-irrigated produce excreted carbamazepine and its metabolites in their urine, while subjects consuming fresh water-irrigated produce excreted undetectable or significantly lower levels of carbamazepine," said Prof. Ora Paltiel, Director of the Hebrew University-Hadassah Braun School of Public Health and Community Medicine, who led the research.

The study followed 34 men and women divided into two groups. The first group was given reclaimed wastewater-irrigated produce for the first week, and freshwater-irrigated vegetables in the following week. The second group consumed the produce in reverse order.

The volunteers consumed the produce, which included tomatoes, cucumbers, peppers and lettuce, according to their normal diet and drank bottled water throughout the study to neutralize water contamination.

The researchers measured carbamazepine levels in the fresh produce and in the participants' urine. To begin with, the urinary levels of carbamazepine differed in

their quantifiable concentration, with some participants having undetectable levels. Following seven days of consuming reclaimed water-irrigated produce, all members of the first group exhibited quantifiable levels of carbamazepine, while in the second group the distribution remained unchanged from baseline. Levels of carbamazepine excretion were markedly higher in the first group versus the second.

"Treated wastewater-irrigated produce exhibited substantially higher carbamazepine levels than fresh water-irrigated produce," said Prof. Paltiel.

"It is evident that those who consume produce grown in soil irrigated with treated wastewater increase their exposure to the drug. Though the levels detected were much lower than in patients who consume the drug, it is important to assess the exposure in commercially available produce," Prof. Paltiel said.

"This study demonstrates 'proof of concept' that human exposure to pharmaceuticals occurs through ingestion of commercially available produce irrigated with treated wastewater, providing data which could guide policy and risk assessments," said Prof. Chefetz.

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Vocal signals reveal intent to dominate or submit, study finds ***Changes in vocal pitch coincided with dominance, but not prestige, in small groups working together on a task***

CHAMPAIGN, Ill. -- You may not win friends, but a new study finds that you can influence people simply by lowering the pitch of your voice in the first moments of a conversation.

The study, reported in the *Journal of Experimental Psychology: General*, found that people whose voices went down in pitch early on in an interaction were more likely to be seen as dominant and influential than those whose vocal pitch went up early in conversation. Those viewed as dominant also were more likely to convince others to go along with their ideas than those seen as less dominant.

In another report based on the same data, the researchers found that dominant participants were not considered more prestigious, esteemed or admirable by their peers, however. Those judged to be admirable - but not dominant - also tended to excel at influencing others, the researchers found.

"What excites me about this research is that we now know a little bit more about how humans use their voices to signal status," said University of Illinois psychology professor Joey Cheng, who led the research with colleagues at the University of British Columbia and Harvard University. "In the past, we focused a lot on posture and tended to neglect things like the voice. But this study clearly shows that there's something about the voice that's very interesting and very effective as a channel of dynamically communicating status."

In the first of two experiments, 191 participants (ages 17 to 52) individually ranked the importance of 15 items they were told they might need to survive a disaster on the moon. They then worked in small groups on the same task. The researchers videotaped these interactions and used phonetic analysis software to measure the fundamental frequency of each utterance. They also looked at "how one person's answers converged with the group's final answer" as another way to measure influence, Cheng said.

The study participants and outsiders viewing their interactions tended to rate those whose voices deepened between their first and third utterances as more dominant and influential than participants whose voices went up in pitch. None of the subjects or the outside observers was aware that the study focused on the relationship between vocal cues and status.

Those viewed as dominant and those viewed as prestigious were most influential in the group interactions, Cheng said.

"In fact, what we've found previously is that both of these strategies - prestige and dominance - positively correlate with behavioral influence," she said. "Both are effective pathways to getting there. But only dominance is about fear and intimidation, and only dominance is related in this study to changes in the pitch of one's voice. How you change your voice does not appear to be related to how much respect you win."

In a second experiment, researchers asked 274 participants (ages 15 to 61) to listen to a pair of audio recordings of a person making three statements. The recording was manipulated to either increase or decrease the pitch of the voice between the first and third statements. Each participant listened to both recordings, which varied only in the trajectory of their vocal pitch.

"They don't get to see anything or anyone, and they just make judgments about the person in the recordings," Cheng said. "And we found that when the voice in the recording goes down in pitch, people judge the person as wanting to be more influential, more powerful, more intimidating or more domineering. But they don't think the person is interested in gaining more respect.

"What's really fascinating about status is that regardless of which groups you look at and what culture and in what context, what inevitably happens is that people divide themselves into leaders and followers, and there's a hierarchy that's involved," Cheng said. "Our study adds to the evidence that humans, like many other animals, use their voices to signal and assert dominance over others."

The paper "Listen, follow me: Dynamic vocal signals of dominance predict emergent social rank in humans" is available online or from the U. of I. News Bureau. doi: 10.1037/xge0000166

http://www.eurekalert.org/pub_releases/2016-04/usmc-usr041816.php

UT Southwestern research shows 98 percent cure rate for prostate cancer using SBRT

Study shows that Stereotactic Body Radiation Therapy to treat prostate cancer offers a higher cure rate than traditional approaches

DALLAS - A five-year study shows that Stereotactic Body Radiation Therapy (SBRT) to treat prostate cancer offers a higher cure rate than more traditional approaches, according to researchers at UT Southwestern Medical Center Harold C. Simmons Comprehensive Cancer Center.

The study - the first trial to publish five-year results from SBRT treatment for prostate cancer - found a 98.6 percent cure rate with SBRT, a noninvasive form of radiation treatment that involves high-dose radiation beams entering the body through various angles and intersecting at the desired target. It is a state-of-the-art technology that allows for a concentrated dose to reach the tumor while limiting the radiation dose to surrounding healthy tissue.

"The high cure rate is striking when compared to the reported five-year cure rates from other approaches like surgery or conventional radiation, which range between 80 to 90 percent, while the side effects of this treatment are comparable to other types of treatment," said Dr. Raquibul Hannan, Assistant Professor of Radiation Oncology and lead author for the study. "What we now have is a more potent and effective form of completely noninvasive treatment for prostate cancer, conveniently completed in five treatments."

Conventional treatment options for early stage prostate cancer include:

Prostatectomy, the surgical removal of the prostate gland, which can be done with minimally invasive techniques and robotic assistance;

Brachytherapy, in which doctors implant numerous small radioactive seeds about the size of a grain of rice into the prostate gland using multiple large needles inserted through the skin in the operating room. Once implanted, the seeds release their radioactivity directly into the prostate gland; and

External beam radiation, which involves 42 to 45 treatments administered over two or more months, five days a week.

"The current form of radiation is 44 treatments given over nine weeks. In contrast, the SBRT therapy we used allows the delivery of highly focused radiation in only five treatments, allowing patients to return to their normal lives more quickly," said senior author Dr. Robert Timmerman, Director of the Annette Simmons Stereotactic Treatment Center at UT Southwestern, and Professor and Vice Chairman of the Department of Radiation Oncology. "SBRT is both more convenient and has increased potency."

UT Southwestern served as the lead site for the multi-institutional clinical trial, which involved first-time prostate cancer patients diagnosed with stage I or stage II (low and intermediate risk) prostate cancer. A total of 91 patients were treated prospectively and followed for five years, with only one patient experiencing a recurrence of his cancer. The findings are published in the European Journal of Cancer.

Terry Martin of McKinney, Texas, - about an hour outside Dallas - said the fewer number of treatments was a compelling advantage when he was evaluating treatment options. "I live 45 minutes away from UT Southwestern. The difference between being treated five times versus 44 times is enormous," said Mr. Martin, a retired airline pilot. "I felt that I was back to normal just 10 days after finishing treatment."

In addition to shorter treatment times, researchers found that side effects were not necessarily different compared to other forms of prostate cancer treatment. In the short term, the side effects of SBRT can include urinary issues (urgency, frequency and burning) and rectal irritation, which are often temporary and reverse within four weeks of treatment. Researchers found a small risk of longer-term urinary and rectal complications, which is also comparable to conventional treatments. Decrease in erectile function was seen in 25 percent of patients, fewer than with conventional radiation or surgery, said Dr. Hannan.

To reduce the side effects associated with SBRT, current clinical trials at UTSW are using a unique and biodegradable rectal spacer gel to protect the rectum. UTSW is currently the only accredited site in Texas at which this spacer gel can be used.

Other clinical trials at the UTSW Department of Radiation Oncology are seeking to expand the application of SBRT to high-risk (Stage III) prostate cancer patients. "Our hope is that the high potency of this form of treatment will significantly improve treatment of these patients," says Dr. Hannan, the principal investigator of the high-risk prostate SBRT trial.

UT Southwestern has been a leader in pioneering use of SBRT. Dr. Timmerman, Director of Image-Guided Stereotactic Radiation Therapy, Medical Director of Radiation Oncology, and holder of the Effie Marie Cain Distinguished Chair in Cancer Therapy Research, has served as the lead investigator in several national trials designed to evaluate the efficacy and safety of SBRT to treat other types of cancer, including cancer in the lung, liver, and spine. A range of clinical trials of SBRT therapy are under way at Simmons Cancer Center, including new investigations evaluating use of SBRT for cancers in the breast and larynx.

Since 2009, UT Southwestern has trained more than 300 physicians and peers interested in implementing SBRT in their clinical practice. Simmons Cancer

Center's arsenal of stereotactic radiotherapy technology includes the cutting-edge Gamma Knife, CyberKnife, Agility, Vero SBRT and TrueBeam technologies.

The SBRT study for prostate cancer was supported by a grant from the U.S. Department of Defense. Additional UTSW researchers involved in the study include Dr. Yair Lotan, Professor of Urology and holder of the Helen J. and Robert S. Strauss Professorship in Urology, and Dr. Xian-Jin Xie, Professor of Clinical Science.

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Immunotherapy is first to show survival benefit in head and neck cancer

The immunotherapy drug nivolumab has become the first to show a survival benefit in head and neck cancer, after a major international trial found that it was more effective than standard chemotherapy.

Patients taking nivolumab were more than twice as likely to be alive after one year of the trial as those treated with chemotherapy, according to data presented at the American Association of Cancer Research annual meeting in New Orleans. The phase III trial has opened up a new treatment option for head and neck cancer - which is notoriously difficult to treatment - and is the first to demonstrate the effectiveness of an immunotherapy for the disease.

The ongoing international trial is led in the UK by Professor Kevin Harrington of The Institute of Cancer Research, London, and The Royal Marsden NHS Foundation Trust, and involves 361 patients and 20 research organisations. It is funded by Bristol Myers Squibb.

Interim results presented today (Tuesday) show patients taking nivolumab lived significantly longer than those on chemotherapy - particularly those testing positive for human papillomavirus (HPV), which is linked to the development of some head and neck cancers.

Head and neck cancer affects areas including the nasal and oral cavities, and is relatively common - with around 11,000 new cases and 3,300 deaths in the UK each year.

In the trial, 240 patients with relapsed or metastatic head and neck cancer were allocated to receive nivolumab, and 121 to one of three different chemotherapies. UK patients - the majority of whom were treated at The Royal Marsden - received the chemotherapy drug docetaxel, which is the only treatment approved for advanced head and neck cancer by NICE.

Researchers from Ohio State University presented results of the planned interim analysis at the conference.

After one year of the study, 36 per cent of patients treated with nivolumab were still alive at one year compared with 17 per cent for the comparator arm.

Median survival for patients on nivolumab was 7.5 months, compared with 5.1 months for chemotherapy.

Nivolumab was particularly effective in patients who had tested positive for the HPV virus. In the 179 patients known to be HPV positive, median survival was 9.1 months with nivolumab and 4.4 months with chemotherapy.

In HPV negative patients, median survival was 7.5 months with nivolumab and 5.8 with chemotherapy.

Some 59 per cent of patients on nivolumab had side effects, compared with 77.5 per cent of patients on chemotherapy. Some 13 and 35 per cent had severe side-effects with nivolumab and chemotherapy respectively.

UK trial leader Professor Kevin Harrington, Professor of Biological Cancer Therapies at The Institute of Cancer Research, London, and Consultant at The Royal Marsden NHS Foundation Trust, said:

"This new trial is a potential game changer for head and neck cancer, introducing a new drug treatment into our armoury that at last is better than standard chemotherapy. Nivolumab is one of a new wave of immunotherapies that are beginning to have an impact across cancer treatment, and which will offer even greater promise in the future as we understand how best to use them.

"Once it has relapsed or spread, head and neck cancer is extremely difficult to treat, with surgery and radiotherapy often impossible. So it's very good news for patients that these interim results indicate we now have a new treatment that works, and can significantly extend life."

http://www.eurekalert.org/pub_releases/2016-04/b-net041516.php

No evidence to suggest lasers pointed at cockpits damage pilots' eyes

But at critical moments the dazzle and distraction could prove disastrous

There is no evidence to suggest that lasers pointed at airplane cockpits damage pilots' eyesight. But obviously if directed at critical moments, the dazzle from the beam and ensuing distraction could prove disastrous for crew and passengers, say leading eye specialists in an editorial published online in the British Journal of Ophthalmology.

In a bid to disentangle the hype, amid the rising number of cases of laser pointers directed at aircraft--more than 1500 over the past 12 months in the UK alone--the specialists set out in which circumstances eyesight can be damaged.

There has only been one case of alleged retinal damage in a pilot as a result of laser targeting of aircraft, they say, and that is highly questionable because of the distances involved, which, crucially, would have reduced the energy entering the eye.

The nature and supply of current hand-held lasers have changed substantially in the past decade due to advances in technology and poor quality controls, so that the devices are considerably more powerful, write the authors. But they can only damage eyes at relatively short range up to several metres, they say.

Between half and one million laser pointers, pens, and key rings are thought to have been in circulation over the past decade.

But while these class 2 pointers on sale to the public predominantly used to produce red laser beams, with an upper limit of 1 milliwatt (mW) of energy--insufficient to damage the eyes--they now produce energy of up to 300 mW. These should be more appropriately classified as class 3B and prohibited from sale to the public, say the authors.

Furthermore, it is very easy to buy cheap laser pointers online with energy outputs of 1000 mW, while devices of up to 6000 mW are available for commercial use, they add.

These class 4 devices are capable of causing irreversible eye damage if directed into the eye from a distance of up to several metres. And some 150 children in the UK are thought to have lost their central field vision as a result.

But when directed to aircraft and helicopters over a long range--typically hundreds to thousands of metres--the beam has to pass through the atmosphere and the cockpit canopy or windshield.

"These are usually pitted or scratched and will serve to scatter the primary beam and may result in the generation of secondary and tertiary beams," write the authors.

"In these situations, pilots tend to self focus on a sudden bright light in the cockpit environment and may be dazzled, resulting in an after-image and almost certainly will be distracted," they write.

"Obviously, if such a distraction occurs at a critical time, such as during landing, the result could be devastating. Fortunately, these exposures are at irradiances that are incapable of producing irreversible retinal damage even at distances of 100 metres," they continue.

Contrary to popular belief the current safety limits don't need to be changed, say the authors. But the European Commission has asked the relevant European bodies to set a standard for consumer laser products.

"This should allow enforcing authorities to remove unsafe products from the market," they write. But they warn: "However, compliance by manufacturers will remain an issue, as will direct imports by the public purchasing unsafe laser products over the internet."

http://www.eurekalert.org/pub_releases/2016-04/cp-tub041216.php

The unique biology of human breast milk

Humans may have the most complex breast milk of all mammals.

Milk from a human mother contains more than 200 different sugar molecules, way above the average 30-50 found in, for example, mouse or cow milk. The role of each of these sugars and why their composition changes during breastfeeding is still a scientific puzzle, but it's likely connected to the infant immune system and developing gut microbiome. A Review of what's known and the different jobs of human breast milk appears April 19 in Trends in Biochemical Sciences.

Breast milk is often an infant's first meal, but many of the sugar molecules in the milk are not meant to feed the baby. Infants are born sterile of any bacteria in their guts, but within a few days they have millions, and after a week there are billions. The sugars that come from mother's milk are usually the first compounds that these bacteria have to chew on, a free lunch that is intended to culture specific bacterial species.

"The first impact breast milk has is favoring the colonization of the gut by specific bacterial groups that can digest these sugar molecules," says Review co-author Thierry Hennet, from the Institute of Physiology at the University of Zurich. "Infants don't have the machinery to digest these sugars so they are literally for the bacteria--it's like a seeding ground, and breast milk is the fertilizer."

Human breast milk also helps lay the foundation for the new baby's immune system. After birth, milk is rich in antibodies and molecules that slow the growth of harmful bacteria and coordinate white blood cell activity.

After one month, when the infant begins developing an adaptive immune system of his or her own, the composition of breast milk transitions so that levels of maternal antibodies drop by more than 90 percent. There is also a sharp decrease in the diversity of breast milk sugars, indicating less selection for bacterial species. Instead, mature human breast milk has an increased number of fat and other nutrients that support infant growth.

Despite the many functions of breast milk, children can grow up healthy with limited supplies or without ever being exposed, raising controversial questions about what is normal when it comes to breastfeeding. Breast milk clearly reduces infant mortality and significantly decreases a newborn's risk for gut and airway infections, but there's little support for longer-term benefits.

"We have to be careful about giving any recommendations," says Hennet, who co-wrote the Review with Lubor Borsig, also a physiologist at the University of Zurich. "On the one hand, breast milk is the product of millions of years of evolution and certainly possesses the optimal nutrients for a newborn, but the

question is how long does the newborn really need this supply? We feel families should make that decision, and not scientists."

What researchers can do is continue to work on understanding the role of all of the different molecules in breast milk, something that has become much easier with advances in gene sequencing technologies. The next few years are likely to yield new understanding of the hormones within human breast milk and the exact role of the bacterial populations that it cultures in the infant gut.

This paper was supported by the Zurich Center for Integrative Human Physiology and the Swiss National Science Foundation.

Trends in Biochemical Sciences, Hennet and Borsig: "Breastfed at Tiffany's"

[http://www.cell.com/trends/biochemical-sciences/fulltext/S0968-0004\(16\)00045-1](http://www.cell.com/trends/biochemical-sciences/fulltext/S0968-0004(16)00045-1)

http://www.eurekalert.org/pub_releases/2016-04/b-rsu040716.php

Report: Stagnant US funding for tools against disease threats leaves world at serious risk

Analysis from Global Health Technologies Coalition points way for Congress and US agencies to catalyze and carry American-led research innovations over the finish line

WASHINGTON, DC - Even as Congress grapples with the White House on how to fund an emergency response to fight Zika virus, a new report warns that overall underfunding for development of lifesaving tools against neglected global diseases is putting the United States and the world at risk, and that emergency funding can't be allowed to substitute for sustained US investment in research and development (R&D) of global health technologies.

"Current levels of US global health R&D financing do not match the scale of health challenges the world faces," said Erin Will Morton, director of the Global Health Technologies Coalition (GHTC)--27 nonprofit groups focused on accelerating the creation of new drugs, vaccines, diagnostics, and other health tools. "Political inaction in Washington could undermine two decades of landmark gains in global health and leave the world unprepared and unprotected against emerging health problems like Zika virus infection or antimicrobial resistance."

The GHTC report, *Achieving a bold vision for global health: Policy solutions to advance global health R&D*, was released today at a Capitol Hill briefing. In it, GHTC urges Congress and the Administration to recognize the United States' crucial role in accelerating R&D that both saves lives around the world and protects the health of Americans at home.

The report urges Congress to provide robust and sustained public financing for US agencies engaged in global health R&D, from the US Department of State and Department of Defense to the US Agency for International Development, National Institutes of Health, Centers for Disease Control, and Food and Drug

Administration (FDA). It also calls for those agencies to then set a percentage of program budgets to be directed to global health R&D and for greater cross-agency coordination to accelerate health product development.

"The Ebola and Zika virus outbreaks have exposed the perils of waiting for an emergency to trigger investment in R&D for neglected diseases. Sustained, predictable funding is not only more cost-effective, it's a down payment to save lives from the diseases we'll face tomorrow," said Morton.

A recent study that examined the risk of infectious disease outbreaks projected that large-scale global disease pandemics could cost the global economy more than US\$60 billion a year, while investing in the interventions needed to protect against these outbreaks, including R&D, would cost only a fraction of that--\$4.5 billion--each year.

The GHTC report documents how past US support has led to breakthrough health solutions, like the first blood test for HIV/AIDS, a vaccine to prevent meningitis A in Africa, and new diagnostic tests to target drug resistant tuberculosis (TB), which have contributed significantly to major milestones in global health--since 1990, there has been a 53 percent drop in childhood deaths and a 45 percent decrease in maternal deaths.

US investment have also helped nurture a growing global pipeline which contains nearly 500 promising tools under development for neglected global diseases, including:

For malaria, new drug candidates in the pipeline; second-generation vaccines, and a new class of insecticides;

For TB, shorter treatments for drug-resistant strains, easier-to-use, more rapid diagnostic tests, and efforts underway to develop a new vaccine;

For Ebola, new vaccine and drug candidates moving through clinical trials;

For drug-resistant superbugs, an entire new class of antibiotics;

For HIV/AIDS, a new microbicide ring that has advanced through clinical trials and new hopes for a vaccine; and

For neglected tropical diseases such as sleeping sickness, visceral leishmaniasis and Chagas disease, new drug cures and vaccines.

GHTC credits much of this progress to the catalyzing effect from the near-doubling of US funding for global health R&D between 2000 and 2010. Since peaking in 2009, however, funding has been largely stagnant or declining. With Ebola emergency funding removed, US investments in neglected disease R&D in 2014 actually fell 2 percent from the year before and fell nearly 13 percent, or \$221 million, from the 2009 peak.

Despite uncertain year-over-year funding from the United States, the report says, developers around the world have contributed to a global health R&D pipeline today with nearly 500 products, up from 365 in 2012. The United States is the

lead funder of this R&D, contributing around 70 percent of public investment and 45 percent of all global investment, including private and philanthropic funding. More specifically, the United States is the lead funder of R&D for 26 of the 30 most neglected diseases.

"It is critical not to pull back US investments now and put this arc of progress at risk," said Morton. "As promising global health products move from laboratory testing through clinical trials, costs escalate. So with great promise and success also comes a more pronounced need for funding to see these products to the finish line."

The GHTC report offers an example of cuts in US funding for Ebola R&D in 2012 that permanently stalled development of a promising vaccine, leaving the world empty-handed when an epidemic flared in West Africa. Policymakers could once again stall Ebola R&D if they redirect emergency funds allocated for Ebola R&D to fight Zika before we've completed development of Ebola diagnostics, vaccines, and other tools to curb future outbreaks.

"We're missing a generation of biomedical interventions against neglected and emerging infections, and it's becoming increasingly clear that to solve this problem we'll need new partnerships and new strategic plans," said Dr. Peter Hotez, dean of the National School of Tropical Medicine at Baylor College of Medicine, president of the Sabin Vaccine Institute, and a US Science Envoy. "The partnerships must include industry, developing country manufacturers, and nonprofit product development partnerships, with increasing financial and strategic support from the G20 nations, including the US government."

Recognizing that many of the diseases in question are ones of poverty, the GHTC report not only calls for robust public investment in global health R&D, but also suggests adoption of policies to incentivize the private sector to act in the absence of viable commercial markets. For example, prizes, small business innovation awards, priority review vouchers, advance market commitments, and tax credits could help leverage US investments. New financing mechanisms like social impact bonds or pooled funds could attract diverse and non-traditional funding partners. Investing in strengthening the R&D sector of fast-developing countries so they can address their own health challenges could also lessen US share of funding over time.

Right now, however, the GHTC report insists the US cannot fall behind on its investments.

Working together to get to the finish line faster

Beyond funding, the report's second goal is to direct greater cooperation and coordination across US agencies, which could close gaps and accelerate development of drugs, vaccines, diagnostics, and other tools. To achieve such

coordination, the report recommends that Congress establish a whole-of-government R&D strategy, which could include a designated coordinator appointed to oversee it. It also calls for existing cross-government global health initiatives like the Global Health Security Agenda (GHSA) to adopt R&D as a core goal in dealing with future health crises.

The third and final US goal recommended by the report is to deploy US expertise and resources to strengthen regulatory pathways to help get global health products into the hands of the people who need them more quickly. Regulatory capacity is often weak in the countries where new drugs, vaccines, and devices are meant to be deployed. The report recommends that Congress direct the FDA to establish a mechanism to offer a formal scientific opinion on medical products intended for markets outside the US, which would give authorities in countries lacking resources the trusted scientific guidance needed to make regulatory decisions. It also calls for greater support for programs to strengthen regulatory capacity in low- and middle-income countries and harmonize regulatory requirements.

"When the US government and R&D sector strategically unleash their ingenuity and resources, there is no global health goal out of our reach," said the GHSC's Morton.

http://www.eurekalert.org/pub_releases/2016-04/cp-alm041216.php

Are lab mice too cold? Why it matters for science

Evidence is mounting that even mild chronic cold stress is skewing results in studies of cancer, inflammation, and more

A typical mouse laboratory is kept between 20 and 26 degrees C, but if the mice had it their way, it would be a warm 30 degrees C. While the mice are still considered healthy at cooler temperatures, they expend more energy to maintain their core temperature, and evidence is mounting that even mild chronic cold stress is skewing results in studies of cancer, inflammation, and more. Researchers review the evidence April 19 in Trends in Cancer.

"Most people only look at results from experiments at standard lab temperatures," says Bonnie Hylander, an immunologist at the Roswell Park Cancer Institute. "They're not necessarily aware that if you repeat the experiments with mice at a different temperature, you might get a different outcome."

There are multiple reasons to keep a mouse lab cool. Researchers don gowns, gloves, and masks to work with the animals, which makes the lower temperature more comfortable and also cuts down on the smell. The National Research Council, which publishes guidelines for housing mice, gives the 20-26 degrees C range and recommends that the animals have nesting material. But when mice are constantly trying to generate enough heat to stay warm, the chill causes their heart rate and metabolism to change, and they eat more food to make up the energy.

A few years ago, Hylander and Elizabeth Repasky, an immunologist at the Roswell Park Cancer Institute, along with their colleagues, began investigating the effects of cold stress on the mouse immune system's ability to fight tumors. As the team revealed in 2013, lab mice do a better job of fighting cancer naturally when they're nice and warm.

Tumors grew slower and were less likely to metastasize compared to mice kept at standard lab temperatures. The warmer mice also responded better to chemotherapies.

Concerned about the implications for drug research and selection, Hylander and Repasky started digging into a growing body of research on mouse housing temperature in other fields. Now, they're sounding the alarm.

Studies in fields ranging from obesity research to neurobiology have shown that housing temperature can alter study results in mice. "While animal physiologists have recognized the potential of this problem for some time, we were surprised that essentially no work was done on cancer models. We thought it was very important to highlight how many other areas of biomedical research, some related to cancer, are influenced by standard housing temperatures," says Repasky. "We're concerned that too many publications in which results differ, either between labs in various countries or within the same lab, may be due to environmental conditions."

But the answer isn't necessarily just turning up the thermostats. "Working at a thermoneutral temperature for mice isn't very pleasant for people," Hylander says. "It's hot, and it's hard for people to work very long when they're overheated."

As a first step, Hylander and Repasky recommend that researchers report the ambient temperature used in their colonies and simply be aware that the cage positions, the number of mice per cage, and the type of disease being modeled can influence the degree of cold stress.

For a more direct approach, Hylander suggests that researchers try pilot experiments at warmer temperatures to see how the difference affects experimental outcomes. This could be accomplished by either keeping mice in incubators or giving the animals more nesting material (in the wild, mice ward off cold temperatures by building nests).

"We're not saying one housing temperature is better than another," Repasky emphasizes. "The different temperatures are simply resulting in differences in experimental outcomes, which could be important. I think a lot more research is needed to optimize the use of mice for testing therapies that will be useful in people."

Trends in Cancer, Hylander and Repasky: "Thermoneutrality, Mice and Cancer: A Heated Opinion" [http://www.cell.com/trends/cancer/fulltext/S2405-8033\(16\)00054-6](http://www.cell.com/trends/cancer/fulltext/S2405-8033(16)00054-6)

<http://www.bbc.com/news/health-36082872>

Dementia threat 'may be less severe' than predicted

The predicted explosion of dementia cases may be less severe than previously thought, a study in Nature Communications suggests.

By Smitha Mundas Health reporter

Researchers looked at three areas of England, 20 years apart, and found new rates of dementia were lower than past trends would suggest. They say improvements in men's health is the most likely explanation. But charities warn against complacency, with more than 200,000 dementia cases diagnosed each year in the UK.

'Cautious optimism'

Researchers, funded by the Medical Research Council and dementia charities, interviewed about 7,500 people aged 65 and over living in Cambridgeshire, Nottingham and Newcastle in the early 1990s.

The whole process, which included detailed questionnaires about cognition and lifestyle, was repeated in the same way two decades later. They found rates of new cases of dementia had been fairly steady in women over this time, but had fallen in men. Extrapolating their findings to apply to the rest of the UK, they say there would be 40,000 fewer cases of the disease than estimates put forward two decades ago would suggest.

Scientists admit they are unsure exactly what lies behind this trend but say it could be that men have become better at looking after themselves. For example, better heart and brain health - with fewer men smoking, less salt used in food, and a greater emphasis on exercise and blood pressure medication may have helped, they say.

They acknowledge it is hard to decipher why the same trends are not apparent in women, but speculate men may be catching up on health gains that women already experience. Despite this, they warn that other factors - such as rising levels of obesity and diabetes - may reverse this trend in years to come.

Prof Carol Brayne, at the University of Cambridge, and part of the research team, said: "I'm pretty optimistic that it's stabilising, but if we don't further improve health, then we would expect the numbers to go up with further ageing of the population, so it's a sort of cautious optimism."

Scientists say the most important finding is that a rise in dementia is not inevitable and can be fought. And they call for a better balance of funds so more money is put into prevention in mid-life.

Meanwhile, Dr James Pickett, head of research at the charity Alzheimer's Society, said the research was encouraging. But he added: "People are living for longer, and with other risk factors such as diabetes and obesity on the rise, there will still

be over 200,000 new cases of dementia each year. "That's still an enormous number of people who require better information and health and social care support."

Other experts point out the way dementia is diagnosed has changed over time and initiatives focusing on spotting the signs of dementia earlier may offset any reductions seen.

<http://bit.ly/1T75Vf6>

Coffee Linked to Reduced Risk of Endometrial Cancer

Women who love their coffee, take note: The brewed beverage is associated with a reduced risk of endometrial cancer, a new study finds.

by Sara G. Miller, Staff Writer

NEW ORLEANS - In the study, researchers found that women who drank more than four cups of joe a day had a 22 percent lower risk of developing endometrial cancer, which is cancer of the lining of the uterus, than non-coffee drinkers.

Endometrial cancer is the most common gynecological cancer, according to the study, presented here yesterday (April 18) at the American Association for Cancer Research's annual meeting. Other gynecological cancers include cervical cancer and ovarian cancer.

The results show that there is an association between coffee intake and endometrial cancer risk, said Marta Crous-Bou, a research fellow in medicine at Harvard Medical School in Boston and the lead author on the study.

In particular, the researchers found that drinking coffee is a protective factor for this type of cancer, Crous-Bou told Live Science.

To determine the effects of coffee on a woman's risk of developing endometrial cancer, the researchers looked at data from 19 previous studies. About 40,000 women were included in the studies, including about 12,000 who had been diagnosed with endometrial cancer, and about 28,000 who had not, to serve as controls.

While drinking more than four cups of coffee a day was associated with the greatest benefit, drinking two to three cups was also associated with a reduced risk of the cancer, Crous-Bou said. Women who drank two to three cups a day had a 7 percent lower risk than those who didn't drink any coffee, according to the study.

After factoring in a woman's body mass index (BMI), the researchers found that coffee's protective effects were only seen in women whose BMI indicated they were overweight or obese, Crous-Bou said. Women with a normal-weight BMI didn't benefit from drinking coffee, she said. (A higher BMI is a strong risk factor for endometrial cancer, she added.)

As for the caffeine question, the answer is yes — caffeine appears to count. Not all of the studies asked the women to specify whether they drank caffeinated

coffee or decaf, but when the researchers looked at those that did, they found that only caffeinated coffee was associated with a statistically significant decrease in risk.

While this study didn't specifically look at the mechanism that might explain the association, researchers think that certain compounds in coffee may decrease levels of estrogen and insulin, Crous-Bou said. Both estrogen and insulin have been shown to play a role in the development of endometrial cancer, she said.

Coffee was not the only beverage included in the study — the researchers also looked at how tea intake may affect endometrial cancer risk. However, they found no association for tea, Crous-Bou said.

The findings have not been published in a peer-reviewed journal.

http://www.eurekalert.org/pub_releases/2016-04/cu-tac041816.php

Taking aspirin could increase cancer survival by 20 percent *Study prompts call for more research into aspirin as an additional cancer treatment*

Patients receiving cancer treatment could increase their chance of survival by up to 20% and help stop their cancer from spreading by taking a low-dose of aspirin, new research suggests. In a systematic review of the available scientific literature a team from Cardiff University's School of Medicine found a significant reduction in mortality and cancer spread by patients who took a low-level dose of aspirin in addition to their cancer treatment (average study follow-up length over 5 years).

"There is a growing body of evidence that taking aspirin is of significant benefit in reducing some cancers," said Professor Peter Elwood who led the research published in the journal PLOS ONE.

"Whilst we know a low-dose of aspirin has been shown to reduce the incidence of cancer, its role in the treatment of cancer remains uncertain. As a result, we set out to conduct a systematic search of all the scientific literature."

The team's review looked at all of the available data including five randomised trials and forty two observational studies of colorectal, breast and prostate cancers. Professor Elwood said: "Our review, based on the available evidence, suggests that low-dose aspirin taken by patients with bowel, breast or prostate cancer, in addition to other treatments, is associated with a reduction in deaths of about 15-20%, together with a reduction in the spread of the cancer.

"The results from six studies of other cancers also suggest a reduction, but the numbers of patients were too few to enable confident interpretation. A mutation - known as PIK3CA - was present in about 20% of patients, and appeared to explain much of the reduction in colon cancer mortality by aspirin.

"One of the concerns about taking aspirin remains the potential for intestinal bleeding. That's why we specifically looked at the available evidence of bleeding

and we wrote to all authors asking for further data. In no study was serious or life-threatening bleeding reported."

As a result of the review, the team say their study highlights the need for randomised trials to establish the evidence needed to support low-dose aspirin as an effective additional treatment of cancer.

Professor Elwood added: "While there is a desperate need for more detailed research to verify our review and to obtain evidence on less common cancers, we'd urge patients diagnosed with cancer to speak to their doctor about our findings so they can make an informed decision as to whether or not they should take a low-dose aspirin as part of their cancer treatment."

This is not the only significant study Professor Elwood led research examining ways to improve peoples' health. In 1974 Elwood's team reported the very first randomised trial of aspirin in the prevention of vascular mortality in the British Medical Journal. Professor Elwood also led a major study which monitored the health habits of 2,235 men over a 35-year period and found that exercise significantly reduces the risk of dementia. The study was the longest of its kind to probe the influence of environmental factors in chronic disease.

The study identified five healthy behaviours as being integral to having the best chance of leading a disease-free lifestyle: taking regular exercise, non-smoking, a healthy bodyweight, a healthy diet and a low alcohol intake.

http://www.eurekalert.org/pub_releases/2016-04/uow-ntr042116.php

Need to remember something? Better draw it, study finds

Drawing pictures of information that needs to be remembered is a strong and reliable strategy to enhance memory

Researchers at the University of Waterloo have found that drawing pictures of information that needs to be remembered is a strong and reliable strategy to enhance memory.

"We pitted drawing against a number of other known encoding strategies, but drawing always came out on top," said the study's lead author, Jeffrey Wammes, PhD candidate in the Department of Psychology. "We believe that the benefit arises because drawing helps to create a more cohesive memory trace that better integrates visual, motor and semantic information."

The study, by Wammes, along with fellow PhD candidate Melissa Meade and Professor Myra Fernandes, presented student participants with a list of simple, easily drawn words, such as "apple." The students were given 40 seconds to either draw the word, or write it out repeatedly. They were then given a filler task of classifying musical tones to facilitate the retention process. Finally, the researchers asked students to freely recall as many words as possible from the initial list in just 60 seconds.

The study appeared in the the Quarterly Journal of Experimental Psychology.

"We discovered a significant recall advantage for words that were drawn as compared to those that were written," said Wammes. "Participants often recalled more than twice as many drawn than written words. We labelled this benefit 'the drawing effect,' which refers to this distinct advantage of drawing words relative to writing them out."

In variations of the experiment in which students drew the words repeatedly, or added visual details to the written letters, such as shading or other doodles, the results remained unchanged. Memory for drawn words was superior to all other alternatives. Drawing led to better later memory performance than listing physical characteristics, creating mental images, and viewing pictures of the objects depicted by the words.

"Importantly, the quality of the drawings people made did not seem to matter, suggesting that everyone could benefit from this memory strategy, regardless of their artistic talent. In line with this, we showed that people still gained a huge advantage in later memory, even when they had just 4 seconds to draw their picture," said Wammes.

While the drawing effect proved reliable in testing, the experiments were conducted with single words only. Wammes and his team are currently trying to determine why this memory benefit is so potent, and how widely it can be applied to other types of information.

<http://bit.ly/1Ss0cke>

We Need More Space Probes to Venus

Space agencies have paid too little attention to the most Earth-like planet in our solar system

By Alexander Rodin on May 1, 2016

Both Mars and Venus have been objects of scientific and popular speculation since at least the beginning of the 20th century, and since the 1960s spacefaring nations have been sending robotic probes to explore both worlds. Mars has gotten far more attention, however. Since 2002 no fewer than two Mars probes have been actively gathering data during any given year. Last year there were seven.

This is understandable. Mars is far more hospitable than Venus, where surface temperatures reach nearly 480 degrees Celsius, surface pressure is 92 times that of Earth and the planet is permanently shrouded by thick clouds of sulfuric acid. We have direct evidence that water once flowed and pooled on Mars. It cannot be ruled out that life once existed there and may conceivably exist still.

Venus is far more Earth-like than Mars in its size (it is only 5 percent smaller than Earth), composition and surface gravity, but its harsh environment leaves little

hope that the planet could ever host life. Yet it is still worth studying Venus to learn why it is the way it is—and how Earth could avoid a similar fate.

Venus could also help us understand newly discovered extrasolar planets. A surprising number of these planets lie very close to their stars, with revolution periods as short as a few days. So far most of these are massive “hot Jupiters” or “hot Neptunes,” but improving instruments should one day allow astronomers to find “hot Venuses.” If that happens, our sister planet would serve as an invaluable reference point for interpreting observations of distant worlds.

Venus is also an intriguing world in its own right. Although it is Earth-like in size and composition, there is no evidence of the kind of plate tectonics that continuously recycles our planet's crust. Nevertheless, Venus's surface is rich in volcanoes, lava flows and other geologic evidence of past tectonic activity. If tectonic activity is still going on, which might well be the case, studying it could give us important information about the planet's inner structure and dynamics.

The dynamics of the Venusian atmosphere are equally fascinating. The planet rotates on its axis once every 224 days—in a direction opposite to Venus's motion around the sun, unlike every other planet. But its clouds take just four days to circulate, in a phenomenon known as superrotation, and this superrotation involves virtually the entire atmosphere, up to an altitude of 80 to 90 kilometers. The only exception is the poles, where spectacular, continuously changing vortices develop. Venus's atmospheric motion thus resembles a great, planetary-scale hurricane with two “eyes” residing on both poles. Scientists hope that studying Venus's atmospheric dynamics could help them understand how to predict terrestrial hurricanes and even control them.

For the general public, the search for extraterrestrial life is probably the most important reason to do planetary exploration. Does Venus's hellish climate mean that any type of biology is strictly impossible there? Surprisingly, some experts say no. They argue that the abundant aerosol particles in Venus's atmosphere could in principle host some form of life. All the necessary components are there: a moderate thermal regime at 50 to 70 kilometers above the surface, liquid water and rich chemistry. Only future studies will show if this hypothesis, which seems fantastic, is true or not.

Yet despite all this scientific promise and Venus's proximity to Earth, the planet has been relatively poorly studied. Indeed, when the Venus Express mission was launched in 2005, it had been 20 years since the previous Venus probe. Only a tiny handful of probes have been launched since then. For all these reasons, planetary scientists around the world believe that we need a new campaign to investigate Venus, complete with orbiters, landing probes and flying platforms. We hope that funding agencies will agree.

<http://bit.ly/1Nsw2Ar>

Why super-gonorrhoea is spreading and may soon be untreatable *England's public health agency has launched an "incident response" after discovering more cases of gonorrhoea that are resistant to nearly all antibiotics.*

By Debora MacKenzie

Doctors across England have been asked to double-check that people they treat for gonorrhoea have been cured, to report any treatment failures, and to treat their sexual contacts in hope of containing the bacteria. But fewer than half of such contacts are being traced.

Gonorrhoea, also known as "the clap", was largely controlled by antibiotics after the second world war. But the bacteria readily acquire genes for resisting drugs, and by 2012, the World Health Organization warned that strains of the infection were appearing that resisted nearly all classes of antibiotics.

In 2012, the UK mandated treatment with two antibiotics at once – azithromycin pills plus an injection of ceftriaxone – so if bacteria acquired resistance to one, they would be killed by the other. Gonorrhoea that resists azithromycin was detected in Japan in 2013, and in 2015 clinics in northern England reported 16 people with similarly resistant infections.

That means the infections are only killed by ceftriaxone – and if any of the bacteria acquire resistance to it, there is no backup antibiotic to kill them off – so resistance to this last treatment could develop quickly, says Mark Lawton, a doctor in Liverpool and a spokesman for the British Association for Sexual Health and HIV.

Secret treatment

Resistance to azithromycin is emerging, Lawton says, partly because people who test positive for gonorrhoea have been buying treatments confidentially from internet pharmacies. You cannot buy a drug that must be injected, like ceftriaxone, on the internet, so people have bought the related oral drug cefixime instead. But that doesn't penetrate rectal and other tissues that harbour the bacteria as readily as the injected drug, leaving azithromycin on its own. Any bacteria that resisted it could therefore thrive.

Now Public Health England reports that 34 more cases have been found across England since November 2014, including in London. The initial cases were in heterosexuals, but some of the new ones are in men who have sex with men, who spread the infection faster.

In 2012, David Fisman at the University of Toronto in Canada used epidemiological models to show that the only way to stop transmission of gonorrhoea in a population was to target treatment at people who change sex

partners frequently, especially sex workers and men who have sex with men. The model also showed resistance to antibiotics also spreads fastest in these groups.

Shifting responsibility

And the spread can be hard to track. Public Health England says that of the 50 sex partners that the people with the newly discovered cases report having, only 22 could be contacted, and just 18 were tested – but 17 of those tested positive for gonorrhoea. The bacteria's genomes showed they were related to the previously discovered cases, and recently transmitted.

"We stress that people should get tested if they think they might be at risk," says Lawton, because two-thirds or more of infections can be symptom-free. But responsibility for sexual health in the UK has been shifted from the National Health Service to local governments over the past few years, and some sexual health clinics have had their budgets slashed, says Lawton.

Otherwise new drugs are needed – but there has been little interest in developing them for gonorrhoea, an apparently defeated disease, and little is in the pipeline, says Fisman.

One option may be to increase the doses of the existing drugs, or perhaps to go back to old drugs that might work against gonorrhoea. Research has started that is aimed at finding out if a vaccine against meningitis B, caused by related bacteria, might cause some cross-immunity to gonorrhoea.

<http://www.medscape.com/viewarticle/861546>

Do Benzodiazepines Increase the Risk for Dementia?

This is the Medscape Neurology Minute. I'm Dr Alan Jacobs.

Alan R. Jacobs, MD|April 22, 2016

Researchers at the University of Washington in Seattle have published a longitudinal observational study examining whether higher cumulative use of benzodiazepines is associated with increased risk for dementia or rate of cognitive decline.[1]

They studied 3434 participants, age 65 or older, who were dementia-free at study onset, and followed them for 7 years. Cognitive screening was carried out every 2 years, and benzodiazepine use was assessed via computerized pharmacy data over a 10-year period.

During follow-up, 797 participants (23%) developed dementia, and 637 (80%) of these developed Alzheimer disease.

The researchers found no association between the highest level of benzodiazepine use and dementia or cognitive decline. They did find a small increased risk for dementia in subjects with low (up to 1 month) or moderate (between 1 and 4 months) use, which the researchers attributed to treating prodromal or early symptoms of Alzheimer disease.

They concluded that these results do not support a causal association between benzodiazepine use and dementia. However, they still emphasize that benzodiazepine use in older adults carries risks of adverse health outcomes, withdrawal, and dependence.

This has been the Medscape Neurology Minute, I'm Dr Alan Jacobs.

Gray SL, Dublin S, Yu O, et al. Benzodiazepine use and risk of incident dementia or cognitive decline: prospective population based study. *BMJ*. 2016 Feb 2;352:i90.

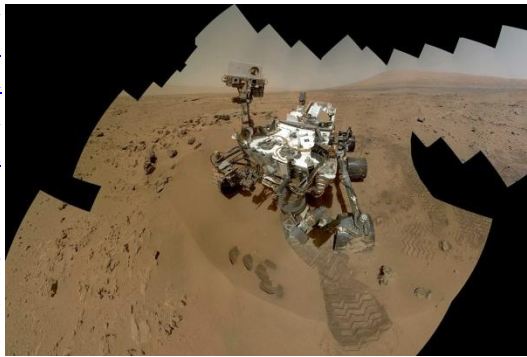
<http://bit.ly/1YPN3p7>

First direct evidence of ancient Mars's oxygen-rich atmosphere *Rocks on the surface of Mars have yielded the best clue yet that the planet once had an atmosphere rich in oxygen.*

By Andy Coghlan

Mars owes its sobriquet “the Red Planet” to the abundance of iron oxide, otherwise known as rust, on its surface. But in addition to all that iron, NASA's [Curiosity rover](#) has now found substantial amounts of manganese oxide in rocks in Mars's Gale crater.

“We found 3 per cent of rocks have high manganese oxide content,” [Agnès Cousin](#) of the [Research Institute in Astrophysics and Planetology](#) in Toulouse, France, told the [European Geophysical Union meeting](#) in Vienna, Austria, earlier this week. “That requires abundant water and strongly oxidising conditions, so the atmosphere may have contained much more oxygen than we thought.”



Curiosity at Gale crater JPL-Caltech/MSSS/NASA

Mars's current atmosphere is 95 per cent carbon dioxide and contains only trace amounts of oxygen. Nevertheless, many researchers have argued that [Mars must once have been rich in atmospheric oxygen](#). This is the [most direct evidence](#) to date, the Curiosity team claim.

The rover identified the manganese oxide with the help of its [ChemCam](#), an instrument which zaps rocks with a laser and analyses the resulting dust cloud to identify chemicals and minerals. The researchers haven't yet pinned down the exact age of the manganese oxide, but hope to do so with future data from the rover.

Because many of the manganese oxide deposits are close to where [a lake once existed](#) in the crater, Cousin says that flowing liquid with dissolved oxygen in it

may have played a part in its formation. “It's a real possibility that there was oxygen in the atmosphere, and possibly water available locally that was oxidising,” she says.

If there was too much oxygen, though, it might not have been a good thing for early life, says Damien Loizeau of the University of Lyon, France. On Earth, oxidation breaks up biological molecules. The appearance of oxygen on Earth was linked to organisms that produced it, but was a disaster for those organisms' neighbours.

“O₂ is bad for life as we know it, but we only know life to be able to create large amounts of O₂,” he says.

<http://bit.ly/1SHysqT>

We are closing in on possible whereabouts of Planet Nine *The search zone is growing smaller.*

By Shannon Hall

Astronomers have further constrained the likely whereabouts of Planet Nine: the planet that, if it exists, is more massive than the Earth and roams the outer reaches of the solar system.

In January, Konstantin Batygin and Mike Brown, two planetary scientists at the California Institute of Technology, speculated on the existence of a ninth planet based on an odd alignment of six distant icy bodies. Excitement rippled through the world of astronomers and many immediately joined the hunt.

A month later, Agnès Fienga at the Côte d'Azur Observatory in France and her colleagues found evidence that slight perturbations in Saturn's orbit as observed by the Cassini spacecraft could be better explained by the missing planet. They were even able to suggest where Planet Nine might be along the most likely orbit proposed by Batygin and Brown.

Now Matthew Holman and Matthew Payne, two astronomers from the Harvard-Smithsonian Center for Astrophysics, have taken the idea a step further by analysing the Cassini data for multiple possible orbits instead of just one.

Stripes in the sky

“We put Planet Nine at a whole different slew of locations – all different possibilities on the sky, different distances, different masses – and tried to find out whether that constrains things even more,” says Payne. They were able to confine Planet Nine's location to two stripes in the sky, which they then overlapped with Batygin and Brown's favoured orbit to narrow the search further.

“When you put those together it's kind of like X marks the spot,” says Payne. The latest data suggest that Planet Nine could be found towards the constellation Cetus, which is next door to Aries and Pisces, in a patch of sky that's just 20 degrees in

radius. That's a region thousands of times larger than the full moon, but still much smaller than the one given by Fienga.

By coincidence, this small zone is already being scoured by the Dark Energy Survey, a southern hemisphere project designed to probe the acceleration of the universe. "This certainly gives us more motivation to expedite the search," says David Gerdes, a cosmologist at the University of Michigan who is working on the survey.

Gerdes was already planning to search Fienga's region, but a smaller region could mean a faster answer. Although he never expected to be joining the hunt for Planet Nine, he's been pulled along by the excitement. "I'm just dropping everything to work my hardest to do this search in our data," he says.

Reference: arxiv.org/abs/1604.03180

<http://wapo.st/1rbWXGP>

A new discovery sheds light on ancient Egypt's most successful female pharaoh

Hatshepsut was no ordinary Egyptian ruler.

By Elahe Izadi April 23 at 7:23 PM

After her husband died, Hatshepsut didn't just keep the "throne" warm for her stepson to come of age. She became a pharaoh in her own right, and in doing so, became one of ancient Egypt's first female rulers. While there were likely two or three female pharaohs during the "dynastic" period, Hatshepsut is considered to be the most successful; she ruled for at least 15 years and was a prolific builder.

After her death, her stepson assumed full kingship and most mentions of Hatshepsut's name and likeness were destroyed, erased and replaced. Over the past several decades, researchers have uncovered and described more and more evidence of her reign as a female ruler during the 1400s B.C.

Last week, Egypt's Ministry of Antiquities announced a discovery connected to Hatshepsut that provides greater insight into the life story of this remarkable female pharaoh. The German Archaeological Institute uncovered blocks that likely belonged to one of her buildings.

Early in her career, Hatshepsut was depicted as a woman, but later on her likeness was of a powerful, muscular ruler who the same false beard that male pharaohs would wear. The blocks found by archaeologists on Egypt's Elephantine Island are different. Believed to have been part of a waystation for the deity, Khnum, several of the blocks show Hatshepsut as a woman.

"The building must therefore have been erected during the early years of her reign, before she began to be represented as a male king," the antiquities ministry said in a release. "Only very few buildings from this early stage of her career have been discovered so far."

Hatshepsut's husband, Thutmose II, died in 1479 B.C. His infant son, Thutmose III, was designated as the next ruler and Hatshepsut became the boy's co-regent.

From a 2009 National Geographic feature:

As Thutmose III grew up, Hatshepsut's depiction changed. As Smithsonian Magazine noted, "the formerly slim, graceful queen appears as a full-blown, flail-and-crook-wielding king, with the broad, bare chest of a man and the pharaonic false beard."

Hatshepsut was quite the builder; her mortuary temple at Deir el-Bahri is considered an ancient architectural marvel. And her reign was characterized by peace and advances in art and culture.

But for many years, many of her marks on Egyptian culture and society had been scrubbed.

"In the reign of Thutmosis III, all mentions of her name were erased and all representations of her female figure were replaced by images of a male king, her deceased husband Thutmosis II," Egypt's antiquities ministry said in a release, using an alternative spelling for Thutmose III. "The newly discovered building thus adds to our knowledge of the early years of Queen Hatshepsut and her engagement in the region of Aswan."