http://www.eurekalert.org/pub_releases/2015-12/oios-scm122515.php

# Seaweed capsules may lead to an injection-free life for diabetic patients

***A microencapsulation method, developed by OIST researchers, can help to overcome major challenges in pancreatic islet transplantation***

***This news release is available in Japanese.***

Diabetes is one of the leading causes of death. Patients with type 1 diabetes have their insulin secreting cells destroyed by the immune system and require daily insulin injections. Pancreatic islet transplantation is an effective treatment that can dramatically reduce daily doses or even eliminate dependence on external insulin. Insulin producing cells are injected into a recipient liver. After an adaptation period they start to produce sufficient hormone needed by diabetic patients.

However, while the transplantation procedure itself has been greatly improved in recent years, collection, preservation, and transportation of these cells are still very challenging. Research published in Advanced Healthcare Materials by the scientists from the Okinawa Institute of Technology and Science Graduate University (OIST) in collaboration with the University of Washington and Wuhan University of Technology offers a solution for some of these problems.

Production and secretion of insulin occur in the pancreas -- an endocrine gland in the digestive system. Cells secreting insulin are clustered in pancreatic islets. Despite their crucial role in organismal wellbeing these islets comprise only a few percent of the pancreatic tissue. The islet transplantation does not require major surgical intervention and is often done under local anaesthesia. It is also cheaper and might be safer than transplantation of the entire pancreas. Unfortunately, so far, only human islets can be transplanted and their supply is but a trickle.

Cryopreservation, or deep freezing, is the method commonly used for the islet preservation and transportation. But it is not completely safe. One might think that storage at temperatures below -190°C is the most dangerous phase. However, the cells are very good at enduring it. It is the freezing process (-15 to -60°C) itself that poses the most challenges. As the cells are cooled, water in and around them freezes. Ice crystals have sharp edges that can pierce membranes and compromise cell viability. This also becomes problematic during thawing.

A multidisciplinary group of researchers led by Prof. Amy Shen, head of the Micro/Bio/Nanofluidics Unit at OIST, developed a novel cryopreservation method that not only helps to protect pancreatic islets from ice damage, but also facilitates real-time assessments of cell viability. Moreover, this method may reduce transplant rejection and, in turn, decrease use of immunosuppressant drugs, which can be harmful to patient health.

The novel technique employs a droplet microfluidic device to encapsulate pancreatic islets in hydrogel made of alginate, a natural polymer extracted from seaweed. These capsules have a unique microstructure: a porous network and considerable amount of non-freezable water. There are three types of water in the hydrogel: free water, freezable bound water, and non-freezable bound water. Free water is regular water: it freezes at 0°C, producing ice crystals. Freezable bound water also crystallises, but the freezing point is lower. Non-freezable bound water does not form ice due to the strong association between water molecules and the hydrogel networks. Hydrogel capsules with large amounts of non-freezable bound water protect the cells from the ice damage and reduce the need for cryoprotectants -- special substances that minimise or prevent freezing damage and can be toxic in high concentrations.

Another innovation, proposed by the group, is the use of a fluorescent oxygen-sensitive dye in hydrogel capsules. The porous structure of the capsules does not impede oxygen flow to the cells. And this dye functions as a real-time single-islet oxygen sensor. Fluorescence indicates whether cells are consuming oxygen and, therefore, are alive and healthy. It is a simple, time-efficient, and cheap method of assessing viability, both of individual islets or populations thereof.

Islet encapsulation reduces the risk of rejection of transplanted cells by the recipient. The hydrogel capsule allows small molecules, e.g. nutrients and islet secretions, to pass through the membrane easily, but prevents direct contact between implanted islets and host cells. Encapsulation also may prevent an attack on transplants by the autoimmune response that destroyed the patient's own islets in the first place.

The microencapsulation method can help to overcome some major challenges in pancreatic islet transplantation, including the scarcity of available islets and the lack of simple and reliable control methods, especially for individual islet assessment. It offers hope to patients suffering from type 1 diabetes to return to a 'normal' life, free of insulin injections.

http://www.eurekalert.org/pub_releases/2015-12/wkh-hmp122815.php

# Hypnosis may provide new option for 'awake surgery' for brain cancer

***Could hypnosis help to reduce the psychological trauma associated with "awake craniotomy" for brain cancers?***

A new "hypnosedation" technique offers a new alternative for patients undergoing awake surgery for gliomas, suggests a study in the January issue of Neurosurgery, official journal of the Congress of Neurological Surgeons, published by Wolters Kluwer.

Initial evaluation shows a high rate of successful hypnosis in patients undergoing "awake craniotomy" for brain cancer (glioma), report Dr. Ilyess Zemmoura of Centre Hospitalier Universitaire de Tours, France, and colleagues. They believe that hypnosedation might be especially valuable in patients with more advanced brain cancers.

Hypnosis Provides Sedation and Relaxation during 'Awake' Brain Surgery

Dr. Zemmoura and colleagues evaluated their hypnosis technique in 37 patients undergoing awake craniotomy, mainly for low-grade gliomas, between 2011 and 2015. In awake craniotomy, the patient is sedated but conscious so as to be able to communicate during the operation. This helps the surgeon navigate safely to the tumor without damaging the "eloquent cortex"--critical areas of the brain involved in language or movement.

Preparation for hypnosis began a few weeks before surgery. The anesthesiologist/hypnotist met with the patient to carry out a short hypnosis session and teach the patient how to create a "safe place"--an imaginary place where they can feel safe and effective.

In the operating room, patients were placed in a hypnotic trance; for example, they were instructed to "let go" and to "separate the mind and body." The hypnotic experience was progressively enhanced during the first steps of surgery, including specific instructions and imagery for each potentially unpleasant or painful step of the surgery. (The online version of the article includes a detailed description and video of the hypnosedation procedure.)

The 37 patients underwent a total of 43 surgeries with hypnosedation (including repeat surgeries in patients with recurrent gliomas). Hypnosis failed in six patients, who underwent standard "asleep-awake-asleep" anesthesia. Another two patients decided not to undergo hypnosis.

When successful, hypnosis was a reliable and reproducible method for awake surgery, with questionnaire assessments showing little or no negative psychological impact. Rather than any measure of individual "hypnotizability," the success of hypnosis seemed to be most strongly related to the patients' motivation and determination.

Hypnosedation seemed to reduce the impact of unpleasant events during surgery. Some patients reported high stress levels, but this did not appear to affect their subjective experience of hypnosis. The one patient who showed signs of posttraumatic stress disorder after surgery had a particularly good experience with hypnosis.

For patients, the most unpleasant parts of surgery were steps involving noise and vibration. Pain seemed to decrease as the level of hypnosis deepened. Only two patients said they would not choose to undergo hypnosedation if they had to undergo a second awake craniotomy.

An important advantage of hypnosedation is that it allows the patient to remain awake throughout surgery. This avoids the need to awaken the patient in the middle of standard "asleep-awake-asleep" anesthesia--which can be especially challenging in patients with high-grade gliomas. The authors note that their experience included successful hypnosedation in two patients with high-grade gliomas.

While the initial evaluation is encouraging, Dr. Zemmoura and colleagues note that it provides no evidence that hypnosedation is superior to standard anesthesia. They also emphasize the considerable investment of time and commitment needed to prepare for and carry out their hypnosis technique: "It requires intense involvement and long training of the whole team, including the patient."

*Article: "Hypnosis for Awake Surgery of Low-grade Gliomas: Description of the Method and Psychological Assessment" (doi: 10.1227/NEU.0000000000000993)*

***http://bit.ly/1YVrVwz***

## Human Research Loopholes: Alive and Well

***Proposed Common Rule regulation is lousy with loopholes, including ones that could exempt tracking online behavior and experiments related to intelligence activities***

In one of the darkest chapters in medical ethics, the United States government ran an experiment from the 1930s to the 1970s in which it withheld treatment and medical information from rural African-American men suffering from syphilis. The public uproar generated by the Tuskegee Syphilis Study eventually resulted in regulations restricting government-supported research testing on humans. These regulations are called the "Common Rule," and they are right now up for their first full update.

The Common Rule, also known as the "Federal Policy for the Protection of Human Subjects," is supposed to affirmatively protect us from the abuses of the future. However, the proposed regulation is lousy with loopholes, including ones that could exempt tracking online behavior and experiments related to intelligence activities.

**What is the Common Rule**

The Common Rule was created in 1991 as an outgrowth of the Belmont Report, a series of ethical and principles and guidelines created by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research to address issues raised by the Tuskegee experiment. The Common Rule claims to strike a balance between the three goals identified in the Belmont

Report: 1) respecting persons, 2) 'beneficence' (*i.e.*, maximizing the social value of science and research), and 3) justice.

This federal policy purportedly binds the Department of Health and Human Services (HHS) and numerous other agencies, including the CIA and Department of Homeland Security (per Executive Order 12333). But as we've seen, these agencies are adept at honing in on small loopholes, so the proposed language needs a serious edit if it is going to provide any real protection.

EFF filed a comment when HHS first proposed this update in 2011, and we are drafting a new comment laying out our biggest concerns to file by January 6, 2016.

**The Biospecimen Consent Loophole**

Perhaps the most glaring problem in the proposed rule is its weak update of the ethical practices around biospecimens or biological samples—such as blood, toenails, or DNA—taken from human beings. The proposed rule requires only "broad consent" before researchers can exempt secondary research (research done on leftover biospecimen after the initial purpose for the draw is complete) from review by independent ethics boards. This kind of 'consent' is almost no consent at all: it doesn't let human subjects know what the future biospecimen research entails, how it will affect them, or how the biospecimen or research data will be shared.

These specimens contain DNA that are more likely to be identifiable given the rise of genetic databases. While genomic-related research and technology is of great potential benefit, its rapid evolution also presents significant risk and uncertainty to privacy and social control, especially given the increasing use by law enforcement and government of genetic identification.

**The "Public" Behavior Loophole**

We are also concerned that the rule proposes an ethics-review exemption for all studies collecting "public behavior" as long as that information is "uninfluenced by the investigators" and properly anonymized.

In the first place, this places too much trust in the benefits of what currently qualifies as "anonymization." Traditional de-identification techniques are often no match for modern data analytics.

Second, the Common Rule cannot be considered a modern ethical standard if it potentially leaves sensitive Internet traffic beyond protection merely because it is not occurring in a single "private" physical place in one person's home. Knowing what we know about the impact of tracking who gathers where, and with whom they communicate—it is inexcusable to ignore the danger of creating language flexible enough to risk entirely exempting this subject matter from review.

**The Intelligence Surveillance Activities Loophole**

Lastly, HHS proposes absolute ethics-review exemptions for "intelligence surveillance activities." This would exempt actions "conducted to fulfill a department or agency's legal mandate to ensure the safety and protection of the United States, its people, and its national security interests." The government is professing to fence DHS and the CIA in through E.O. 12333, but they're actually building in a gaping breach for them to stroll right back out through.

Existing law under the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule already includes a national security exception that permits doctors, hospitals, and any other "covered entity" to disclose individual health information "to authorized federal officials for the conduct of lawful intelligence, counter-intelligence, and other national security activities authorized by the National Security Act." But this is an exemption that needs to be patched over, not replicated.

***Deadline Approaches***

*These loopholes discussed above are just a sample of many we hope to force HHS to reckon with when we file our comments by January 6, 2016. Please join us in respecting the memories of those abused by human subject research in the past by filing a comment of your own.*

***http://www.eurekalert.org/pub_releases/2015-12/ws-lsd122815.php***

## Liquid salts deliver drugs through the skin with enhanced efficacy and reduced toxicity

***Formulating drugs as liquid salts may provide a safe and efficient strategy for topical delivery of drugs that cause skin toxicity.***

A team of researchers from the University of California, Santa Barbara (UCSB) in Santa Barbara, CA has demonstrated a novel formulation of propranolol as a liquid salt which enables delivery through skin with reduced toxicity. The report appears in the December 2015 issue of the journal TECHNOLOGY.

Skin toxicity remains a major challenge in the design and use of new topical drug formulations. Many drugs must be dissolved in organic solvents which are typically toxic to the skin. In addition, many drugs such as propranolol itself show dose-dependent skin toxicity. Formulating drugs as liquid salt mitigates both sources of toxicity. Given their fluid nature, liquid salts eliminate the necessity of organic solvents. In addition, counter ions used to form the liquid salts shield the drug charge, which further reduces drug-induced toxicity.

"Propranolol is positively charged which is a likely source of its toxicity. Shielding of this charge by association with a counter species in the liquid salt reduces its toxicity. These findings are broadly applicable to many charged drugs"

says Professor Samir Mitragotri, Ph.D., of the University of California, Santa Barbara and senior author of the paper.

Previous studies have shown how liquid salts may enhance drug transport through the skin; however, this is the first study that reports the design of liquid salts to minimize skin toxicity. Such formulations can increase the spectrum of drugs that can be safely delivered via a transdermal patch.

"An ideal drug liquid salt would need to permeate through the skin as an associated ion pair. Eventually, however, the drug and the counter ion must dissociate in blood to preserve drug's therapeutic efficacy. We show that these attributes can be balanced through careful selection of counter ions" says Michael Zakrewsky, the co-first author on this paper. "This technology presents an exciting new, patient compliant solution for treating diseases", he added.

*An additional co-author of the study is Kazuhiro Aoyagi from the Department of Chemical Engineering at the University of California, Santa Barbara.*

***http://www.eurekalert.org/pub_releases/2015-12/uops-nbc122915.php***

## New breast cancer drug may be effective against other types of cancer

***Palbociclib, in combination with other therapies, has potentially powerful effect***

PHILADELPHIA--Palbociclib, a new oral drug whose efficacy in combating breast cancer has been demonstrated alone and in combination with endocrine therapy, also has potential to combat other types of cancer, according to a literature review and additional original research conducted by experts at the Abramson Cancer Center (ACC) in the University of Pennsylvania published this month in JAMA Oncology.

Palbociclib targets the rapid division of tumor cells by inhibiting the activity of the enzymes CDK4 and CDK6, which propel cell division and increase in number in most cancers. It is the first CDK4/6 inhibitor to be approved for the treatment of breast cancer.

"All living cells undergo cell division and palbociclib's unique capacity to halt the cell division process (also known as the 'cell cycle') therefore has potentially broad applicability," said the study's lead author Amy S. Clark, MD, MSCE, an assistant professor of Hematology/Oncology at Penn's Perelman School of Medicine and ACC. "Pairing palbociclib with other anti-cancer therapies such as endocrine therapy, chemotherapy, and targeted therapy can create a powerful combinatorial effect with real promise for addressing a variety of cancers."

For example, amplification of CDK4 is reported in a high percentage of melanomas and esophageal cancers. Targeted therapy uses medication and other interventions to more accurately identify and attack cancer cells, usually while doing no or little damage to normal cells.

"This drug has minor effects on normal cells other than neutrophils (white blood cells)," said the study's senior author, Peter J. O'Dwyer, MD, a professor of Hematology/Oncology at Penn and director of the Developmental Therapeutics Program at the ACC. "In tumors, it can cause shrinkage, or more commonly, arrest of growth. As we discover new functions for the CDK4/6 target of this medicine, we are likely to use it in combinations to make other anti-cancer agents work better."

In addition to inhibiting the cell cycle, palbociclib has been shown, for example to alter several recently described non-cell cycle functions of CDK4/6, a finding expected to expand its therapeutic role, O'Dwyer added.

Assessing 130 relevant publications in the literature, as well as interpreting their own continuing studies, the all-Penn team found that in addition to its safety and effectiveness in fighting certain types of breast cancer, early trials of palbociclib have shown promise of effectiveness in cases of lymphoma, sarcoma, and teratoma, tumors that while rare, often afflict younger patients.

A phase 2 trial showed that, among 17 patients with previously treated mantle-cell lymphoma, palbociclib resulted in one complete response and two partial responses. Although, median progression-free survival was four months, five patients had progression-free survival greater than one year. Another phase 2 trial with 29 sarcoma patients treated with palbociclib showed a progression-free survival of 66 percent at 12 weeks.

Also, combining palbociclib with other anti-cancer agents is feasible, and early results in myeloma and some solid tumors have led to more definitive studies.

In both breast and other cancer trials, palbociclib has been shown to be safe with once-daily dosing, and its main adverse effect is reversible neutropenia, an abnormally low count of neutrophils, a type of white blood cell that helps fight infections. The lower their neutrophil count, the more vulnerable patients are to infectious diseases. In such cases the drug is temporarily discontinued and reintroduced at a lower dose. Other side effects included fatigue (33 percent), nausea (30 percent), diarrhea (18 percent), constipation (12 percent), and rash (12 percent).

At the recommended doses, evidence of the desired drug effect in tumors has been obtained using novel PET imaging at Penn. These tools can help to individualize patient therapy going forward.

*Other Penn co-authors are Thomas B. Karasic, MD; Angela DeMichele, MD, MSCE; David J.Vaughn, MD; Mark O'Hara, MD; Rodolfo Perini, MD; Paul Zhang, MD; Priti Lal, MD; Michael Feldman, MD, PhD; and Maryann Gallagher, RN.*

*The study was funded by Pfizer Inc and the National Institutes of Health (5P30 CA16520-25).*

http://www.eurekalert.org/pub_releases/2015-12/oupu-fpl121415.php

## Factors predicting low patient accrual in cancer clinical trials

***Nearly one in four publicly sponsored cancer clinical trials fail to enroll enough participants to draw valid conclusions about treatments or techniques.***

Such trials represent a waste of scarce human and economic resources and contribute little to medical knowledge. Although many studies have investigated the perceived barriers to accrual from the patient or provider perspective, very few have taken a trial-level view and asked why certain trials are able to accrue patients faster than expected while others fail to attract even a fraction of the intended number of participants. According to a study published December 29 in the JNCI: Journal of the National Cancer Institute, a number of measurable trial characteristics are predictive of low patient accrual.

Caroline S. Bennette, M.P.H., Ph.D., of the Pharmaceutical Outcomes Research and Policy Program, University of Washington, Seattle, and colleagues from the University of Washington and the Fred Hutchinson Cancer Research Center analyzed information on 787 phase II/III clinical trials sponsored by the National Clinical Trials Network (NCTN; formerly the Cooperative Group Program) launched between 2000 and 2011. After excluding trials that closed because of toxicity or interim results, Bennette et al. found that 145 (18%) of NCTN trials closed with low accrual or were accruing at less than 50% of target accrual 3 years or more after opening.

The authors identified potential risk factors from the literature and interviews with clinical trial experts and found multiple trial-level factors that were associated with poor accrual to NCTN trials, such as increased competition for patients from currently ongoing trials, planning to enroll a higher proportion of the available patient population, and not evaluating a new investigational agent or targeted therapy. Bennette et al. then developed a multivariable prediction model of low accrual using 12 trial-level risk factors, which they reported had good agreement between predicted and observed risks of low accrual in a preliminary validation using 46 trials opened between 2012 and 2013.

The researchers conclude that "Systematically considering the overall influence of these factors could aid in the design and prioritization of future clinical trials..." and that this research provides a response to the recent directive from the Institute of Medicine to "improve selection, support, and completion of publicly funded cancer clinical trials."

In an accompanying editorial, Derek Raghavan, M.D., Levine Cancer Institute, writes that the focus needs to be on getting more patients involved in trials, saying, "we should strive to improve trial enrollment, giving the associated potential for improved results. Whether the basis is incidental, because of case selection bias, or reflects the support available to trial patients has not been determined, but the fact remains that outcomes are better."

*Article: Caroline S. Bennette, M.P.H., Ph.D., cb11@u.washington.edu*

http://www.bbc.com/news/uk-wales-south-west-wales-35140916

## Cartilage growing to rebuild body parts 'within three years'

***Patients needing surgery to reconstruct body parts such as noses and ears could soon have treatment using cartilage which has been grown in a lab.***

**By David Dulin BBC News**

The process involves growing someone's cells in an incubator and then mixing them with a liquid which is 3D printed into the jelly-like shape needed.

It is then put back in an incubator to grow again until it is ready.

Researchers in Swansea hope to be among the first in the world to start using it on humans within three years.

"In simple terms, we're trying to grow new tissue using human cells," said Prof Iain Whitaker, consultant plastic surgeon at the Welsh Centre for Burns and Plastic Surgery at Morriston Hospital.

"We're trialling using 3D printing which is a very exciting potential modality to make these relatively complex structures.

"Most people have heard a lot about 3D printing and that started with traditional 3D printing using plastics and metals.

"That has now developed so we can consider printing biological tissue called 3D bio-printing, which is very different.

"We're trying to print biological structures using human cells, and provide the right environment and the right timing so it can grow into tissue that we can eventually put into a human.

"It would be to reconstruct lost body parts such as part of the nose or the ear and ultimately large body parts including bone, muscle and vessels."

The team of surgeons are working with scientists and engineers who have built a 3D printer specifically for this work.

Prof Whitaker, who is also the chairman of plastic and reconstructive surgery at Swansea University's medical school, said the project started in 2012 but research in the field has been going on for more than 20 years.

He said the work would have to be tested on animals and go through an ethics process before being used on humans.

"The good news in the future is, if our research is successful, within two months you'd be able to recreate a body part which was not there without having to resort to taking it from another part of the body which would cause another defect or scar elsewhere," he added.

### How the process works

***Cells are taken from a tiny sample of cartilage during the initial operation and grown in an incubator over several weeks***

***The shape of the missing body part is scanned and fed into a computer***

***It is then 3D printed using a special liquid formula combined with the live cells to form the jelly-like structure***

***Reagents are added to strengthen the structure***

***It is put into an incubator with a flow of nutrients to supply the cells with food so they can grow and produce their own cartilage***

***The structure will then be tested to see if it is strong enough to be eventually implanted into patients***


**Image copyright ABMU**

***http://bit.ly/1OANfrL***

## People's Brain Chemistry May Reveal the Hour of Their Death

***The tiny biological clocks ticking away inside the body stop when life ends, leaving a timestamp of sorts***

**By Marissa Fessenden smithsonian.com**

Human bodies know what time it is, even without the aid of a wristwatch. Every cell and every organ ticks and burbles according to our circadian rhythms. Recently, when researchers decided to look at the brain's internal clock they discovered that all that biological activity stops at the moment of death, leaving a timestamp that may tell us the hour of a person's passing.

People who died in the morning have a different mix of active genes and proteins in their brain cells than people who died in the evening or at night, reports Carl Zimmer for The New York Times. The discovery is more than just a morbid oddity. Researchers are trying to understand exactly how internal clocks dictate brain biology and chemistry. Figuring that out could help scientists treat sleep disorders, dementia, depression and more.

"Sleep and activity cycles are a very big part of psychiatric illnesses," says Huda Akil, a neuroscientist based at the University of Michigan.

Akil and her colleagues have hunted through brains kept preserved at the University of California, Irvine, to find the signature that betrays the organs' owners' time of death. The team looked at the brains of 55 people who died suddenly, such as in a car crash, and analyzed the genes that were "turned on" at the time of death in six different brain regions involved in learning, memory, emotion and biological regulation.

They found more than 100 genes that ramp up their activity during certain times of the day. The genes include those that dictate metabolism, lipid synthesis and wakefulness. The researchers could even guess when the person died within an hour of their actual time of death.

Another study by a group at the University of Pittsburgh School of Medicine, inspired by Akil's work, looked at 146 brains in their university collection. "Lo and behold, we got very nice rhythms," Colleen A. McClung, the leader of the effort, tells the Times. "It really seems like a snapshot of where the brain was at the moment of death."

McClung and her colleagues also looked at the patterns of genes turned on or off in the brains of young people and old people. They discovered that some of the genes with strong cycle patterns in young people had more subdued patterns in people older than 60. But other genes seem to became more active as people age. They reported their findings in Proceedings of the National Academy of Sciences last week.

Akil thinks that those changing patterns might mean that one clock winds down as we age and another might start up to compensate. How well the brain is able to keep time might determine whether a person experiences age-related neurodegeneration.

If that idea turns out to true, it will be more evidence that it might be a good idea not to mess with the natural rhythms of the circadian clock as much as modern humans tend to do.

***http://www.medscape.com/viewarticle/856346***

## Prescribing Red Wine: An Rx for the End of Life

***Red Wine for Palliative Care***

**John La Puma, MD, FACP**

Prescribing wine might seem like anathema to some physicians, as heavy drinking (more than three drinks per day) is a recognized cause of morbidity and mortality. But there is now good scientific evidence for regular modest red wine consumption as part of a healthy life. There is even more compelling evidence for prescribing wine to patients who are near the end of life. Here, I will focus on the latter.

There are thousands of studies of the risks and benefits of wine and its effect on health; nearly 200 recent ones are listed on the Boston University Scientific Forum site, with expert commentary. While some experts believe that the health benefits of red wine are related to the presence of alcohol, most of the evidence shows that the polyphenols in red wine confer additional cardiovascular and longevity benefits. Modest daily consumption of red wine is an integral part of the Mediterranean diet, which is likely effective for secondary prevention after myocardial infarction[1] and for primary prevention of cardiovascular disease.[2]

Red wine becomes red only after crushed red grapes bathe for a day or two in their own juice. Anthocyanins leak out from the grape skins to color the pressed juice, which is otherwise nearly colorless. Grape and wine phenolics, including anthocyanins, resveratrol, tannins, and other compounds, are complicated, fascinating molecules.[3] The concentration of phenolics in a finished wine varies by grape type and by how the wine is grown, made, and cellared. Even white wine, with little grape skin exposure, may have health benefits.[4]

A glass of wine is 5 oz (150 mL) of 12% alcohol wine, one fifth of a standard 750-mL bottle. Lower alcohol levels—under 14%—characterize Mediterranean-style wines. In some parts of the Mediterranean, it is traditional to drink water alongside wine. A sip of one and then the other serves both to dilute the alcohol level and to allow the glass of wine to last the length of the meal. Wine drunk slowly improves the enjoyment of the meal.

Wine by prescription means taking the right amount: not too much but not too little. For whom might an as-needed wine prescription be appropriate? One group: people who are near the end of life and who would like to have a glass.

The Clermont-Ferrand University Hospital in France offers a wine bar to palliative care patients and families "to help them relax and speak freely...in an attempt to restore longing, taste, desire and even pleasure."[5] The palliative care center director who proposed the bar, Dr Virginie Guastella, is quoted as saying, "It's a way of rethinking the care of others, taking into account their feelings and emotions that make them a human being."[6] The wine is reportedly donated and is served according to an institutional protocol. A wine-benefits training program helps staff identify ways in which wine enhances well-being.

Well-being is an underestimated goal of medicine: Some, like Atul Gawande, argue that it is the primary goal.[7] The notion of "healthy life expectancy", or life expectancy in a healthy state, is a measure of population health. In the United states, healthy life expectancy is lower than average life expectancy by between 7 and 19 years.[8]

"Medically supervised" wine tasting with patients near the end of life is currently illicit in most healthcare institutions. A review of websites from The Joint Commission, the American Heart Association, the Centers for Medicare & Medicaid Services, and the National Hospice and Palliative Care Organization finds no mention of it. Physicians can prescribe alcohol as a competitive inhibitor for methanol poisoning and ethylene glycol poisoning. Alcohol has previously been prescribed for the treatment of delirium tremens and, during Prohibition, for "medicinal reasons."

Reports of physicians who have provided access to wine, beer, and spirits to patients near the end of life show that such care is viewed as heroic and caring.[9]

Small things make a big difference in life when little life time remains, and sensual pleasures are among the most rich. Although alcohol right before bed promotes sleepiness, it interferes with sleep later in the night: People who want to sleep soundly should stop drinking at least 2 hours before bed. People near the end of life should eat and drink what they like and be free of others' fears of potential harm to themselves. As the dying often lose interest in food, it seems especially cruel to withhold wine from any person near the end of life who may want it.

Inpatient centers and home hospice programs are good candidates for prescribed-wine-as-desired programs, which may be considered part of comfort care and, indeed, comfort food. Such programs and prescriptions honor the humanity that medicine strives to offer, at its most compassionate.

So a model prescription might be:

**Rx: Red wine of choice**

***Drink one 5-oz glass slowly, at night, no less than 2 hours before bed, preferably with food and at meal time, and with at least 10 oz of water, most nights prn.***

***Do not exceed or combine with other alcoholic beverages. May repeat x1.***

Physicians should suggest that patients drink the wine they like, no matter what its score, pedigree, or terroir. If they're unsure what they like, they might try a scratch-and-sniff wine book or buy inexpensive local wines first. The pure pleasure of smelling and tasting liquid magic with your meals is hard to beat.

Doctor's orders.

***Editor's Note:***

*John La Puma, MD, practices medicine, writes, and makes a little wine for family and friends in Santa Barbara, California. His most recent book is Refuel: A 24-Day Eating Plan to Shed Fat, Boost Testosterone, and Pump Up Strength and Stamina (Harmony, 2014).*

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***http://wb.md/22Dz1ux***

# 9 spices that just might save your life one day

***Not only is cinnamon a powerful antioxidant, it may be able to prevent blood clots and even cardiovascular disease***

**Larry Schwartz, AlterNet**

AlterNet If salt and pepper are all you are using to put some zip in your food, you are not only missing out on adding flavor to your meals, but maybe opportunities for a healthier, longer life. While spices may have begun as a way to enhance the taste of otherwise bland meats and vegetables (boiled mutton only went so far, we're guessing), the ancients in China and the Far East used many of the spices medicinally for centuries. And it seems they were on to something.

"There have been many recent studies validating the historic habit of using spices for health benefits," Donna Tainter, author of Spices and Seasonings: A Food Technology Handbook, told the website SixWise.com. Modern science has indeed shown that many of the spices in your kitchen are beneficial to your health and potent disease fighters. A study released this past summer in BMJ, which studied almost 500,000 people in China over a four-year period, concluded that people who spiced up their food reduced their risk of premature death by 14% versus those who ate non-spicy food.

Here are nine ingredients in your kitchen cabinet that can improve your health.

**1. Oregano.**

Oregano is good for a lot more than sprinkling on your slice of pizza. Rich in phytonutrients, it packs more antioxidant power per gram than oranges, apples or blueberries. Oregano also contains two compounds, thymol and carvacrol, that have strong antibacterial activity. A study in Mexico found oregano to be more effective against an intestinal parasite than the commonly prescribed drug tinidazol. Other studies have shown oregano to have effective anti-inflammatory properties, and ointments made from oregano decrease bacterial infection and help post-surgical wounds heal faster.

**2. Red hot chili peppers (including cayenne pepper).**

Hot peppers contain the ingredient capsaicin, a powerful anti-inflammatory that helps reduce pain. The hotter the pepper, the more the capsaicin. In addition to pain relief, hot peppers have been shown to help clear nose and lungs of excess mucus, making them an effective treatment for colds and other respiratory illnesses. Interestingly, while consuming hot peppers might be thought to worsen the condition of anyone suffering from stomach ulcers, the opposite is true. Because of their anti-bacterial properties and mucus thinning abilities, hot peppers actually help heal gastric ulcers (which are actually caused by a bacteria the peppers help eradicate). For anyone looking to lose a little weight, a research study at Purdue University found that when capsaicin reaches the gut level, it curbs the appetite and increases the core temperature, resulting in calories being burned faster.

**3. Cinnamon.**

Not only is cinnamon a powerful antioxidant, its anti-microbial activity can also stop the proliferation of bacteria, fungi and yeast. This tasty spice can prevent blood clots and maybe even cardiovascular disease. A 2003 study showed that one to six grams of cinnamon a day can help control blood sugar in type 2 diabetes sufferers, while also lowering LDL (bad) cholesterol and overall cholesterol levels. A 2004 study indicated that cinnamon might also prevent insulin resistance, even in a high-fructose diet.

**4. Ginger.**

The next time you're feeling nauseated, you might want to reach for some ginger. Its active compound, gingerol, in addition to relieving motion sickness, morning sickness from pregnancy and nausea, also relaxes blood vessels, stimulates blood flow and relieves pain. In use for over 2000 years as a medicinal, ginger is a potent anti-inflammatory and high in antioxidant activity.

**5. Turmeric.**

If there is a "super" spice in this group, turmeric might take the title. The active ingredient in the spice, curcumin, which gives it its bright yellow color, has been found to be as effective an anti-inflammatory as drugs like hydrocortisone or Motrin. Turmeric can be helpful in battling Crohn's disease, ulcerative colitis, rheumatoid arthritis, and maybe even cancer, heart disease and Alzheimer's disease.

**6. Sage.**

Sage is not just for turkey stuffing anymore. It is a potent antioxidant and anti-inflammatory, and may be effective in battling rheumatoid arthritis, bronchial asthma and other inflammatory diseases. Further, in a 2003 study, subjects given sage oil had improved memory versus placebo subjects.



**7. Parsley.**

Another powerful antioxidant, parsley also appears to have anti-cancer properties, due to a compound in it called myristicin. In animal studies, parsley has been shown to inhibit the formation of cancerous tumors, particularly lung tumors. It also appears to be effective in neutralizing the effects of cigarette smoke and smoke from charcoal grills. Throw in vital nutrients like vitamin C, vitamin A and folic acid, and it is clear that parsley is useful for much more than plate decoration. And if that's not enough, the chlorophyll in parsley will deodorize bad breath.

**8. Coriander.**

People with type 2 diabetes might consider adding coriander to their spice rack. A study in 2011 showed that the spice may help regulate blood sugar and cholesterol. Coriander has additionally been shown to have anti-anxiety properties, making it an excellent sleep aid for anxiety sufferers.

**9. Garlic.**

What a fortunate coincidence that one of most loved spices also happens to be one of our healthiest. Perhaps the most popular medicinal spice in the world, garlic and its main active ingredient, allicin, has been shown to be an effective combatant against heart disease, high cholesterol and high blood pressure. Not only that, its antimicrobial properties make it nature's antibiotic. To top it all off, garlic may be effective in warding off dementia and Alzheimer's disease.

***http://bit.ly/1RWyRum***

## Halting march of Zika virus is health priority for 2016

***New year, new threat. A virus suspected of triggering fetal brain damage is likely to spread further in 2016.***

Zika virus was discovered in the Zika forest in Uganda in 1947. For the next 50 years, the virus, which is carried by mosquitoes, caused small, sporadic outbreaks in parts of Africa and South-East Asia. In the last 10 years, there have been outbreaks on many Pacific islands – it infected 75 per cent of the population on the island of Yap in 2007, for example. In May last year, it made landfall in Brazil and has since spread to nine more countries, as far north as Mexico.

Zika is spreading so fast that health agencies are ramping up resources to track and contain it. "Detecting circulation of the virus in new geographic areas is most important, to strengthen the responses of health services and step up surveillance for serious cases or complications," says Sylvain Aldighieri of the Pan American Health Organization and World Health Organization's regional office for the Americas.

**Is it Zika?**

As well as learning more about the virus and the illness it causes, anti-Zika programmes for 2016 include measures to reduce mosquito breeding sites and increase the capacity of labs to detect the virus quickly.

There have been a few cases in Europe and the US when visitors to infected countries have returned with the virus. "Clinicians need to be aware that this virus is rampant in South America, so it should be in their minds when they see possible cases," says Abraham Goorhuis of the Center for Tropical and Travel Medicine at the University of Amsterdam, the Netherlands, who diagnosed three people returning from Suriname in December. "It's probably being under-diagnosed."

Although the virus causes a painful but temporary rash in adults, it is seldom lethal, but it may cause brain damage in unborn children. In Brazil and French Polynesia, brain defects increased dramatically wherever the virus emerged. "The link is not proven yet, but it's a cause for concern," says Goorhuis, adding that pregnant women need to take all possible steps to avoid being bitten by mosquitoes if they visit infected countries.

Clinicians are still debating whether people infected with Zika attending the 2014 World Cup brought the virus to Brazil. If they were bitten by mosquitos, they could have seeded the current South American outbreak. Another theory from researchers in French Polynesia is that the virus arrived in Rio de Janeiro during a canoeing competition in August 2014.

***http://bit.ly/1RWyRum***

## First Dengue Fever Vaccine Gets Green Light in Three Countries

***Mosquito-borne disease affecting millions has had no approved vaccine until now***

**By Dina Fine Maron on December 30, 2015**

When female Aedes Aegypti mosquito sups on the blood of its human victims it too often deposits the virus that causes dengue, causing as many as 400 million

infections per year worldwide. Severe forms of the painful, flu-like disease can be fatal, especially among children. And until recently there has been no truly effective prevention except avoiding getting bit.

But the outlook against the disease is looking better.

During the past month Dengvaxia, developed by the French pharmaceutical company Sanofi, has been approved for use in three countries: Mexico and the Philippines approved the vaccine earlier this month. This week, the company also announced the drug has received the green light in Brazil, which has seen more than 1.4 million cases of the disease in 2015. Exactly when the inoculations will be deployed—and at what price—remains unclear as terms of the vaccine are being negotiated between the company and the countries.

Sanofi's vaccine, which is designed to coax the body's immune system into making antibodies against all four forms of dengue, is a live virus comprised of an attenuated yellow fever virus. (Yellow fever virus and dengue virus have the same genus.) For the vaccine, however, the virus is genetically engineered to include genes encoding for dengue proteins. Other dengue vaccines are also in development but none have received approval.

The need for an effective vaccine is evident. The mosquito-borne disease has a massive and growing reach. Dengue has become an increasing threat around the world as both the range of the disease-carrying mosquitoes has grown and people travel to dengue-endemic locations. Health officials have also become better at diagnosing the disease. Dengue has been reported in Japan after a lapse of about 70 years. The number of cases has grown in Brazil and its neighbors. Meanwhile, in the United States, there was an outbreak this year in Hawaii and the disease is already endemic in Puerto Rico.

That's not to say Dengvaxia is a perfect vaccine. In clinical trials it only reduced the chances of developing the disease by about 60 percent. Also, it is only approved for use in people nine to 45 years old who live in dengue-endemic areas —not young children or the elderly. In fact, the vaccine seems to be least effective in children younger than nine years old, particularly among kids under 6, whose immune systems are especially vulnerable and might be part of the group who need the vaccines most. There are also unanswered questions regarding vaccinated individuals who could potentially have more severe cases of the disease if they contract it later in life.

Even as Brazil and other tropical countries attempt to tamp down dengue with mosquito control and public health campaigns, they are also facing other mosquito-borne threats including chikungunya and, increasingly, zika. The latter disease, which also causes dengue-like symptoms, has recently been linked with babies of infected pregnant mothers being born with abnormally small heads, or microcephaly, in Brazil. Researchers have detected an alarming, inexplicable uptick in such cases in the northeast part of the country. That's in addition to earlier reports, documented by Scientific American, linking zika to another condition that can cause paralysis.

From the U.S. perspective it remains unclear how a vaccine would be used domestically, whether it would be used in areas that already have seen dengue including Hawaii or Florida or perhaps among those traveling to dengue-endemic countries. By law, the U.S. Food and Drug Administration cannot comment about if they are reviewing an application for the vaccine to be used in the U.S. But Harold Margolis, chief of the dengue branch at the U.S. Centers for Disease Control and Prevention, says the vaccine does appear to be safe and well-tolerated in clinical trials. Still, he has some reservations. "The vaccine has significantly lower efficacy with dengue 1 and 2 than dengue 3 and 4," he says, referring to the distinct but closely related strains of the virus. The vaccine may also perform differently in larger settings and communities than it did in clinical trials, he says. In April 2016, World Health Organization immunization advisers will examine the vaccine and provide recommendations for its use. Ultimately, Margolis says, "the U.S. is interested in having a vaccine that prevents disease."

***http://bit.ly/1RWzkg4***

## What Should People Do With Food Waste? Make Beer

***Craft beers are getting creative***

**By Marissa Fessenden**

Breweries across America are trying to make their beers stand out against the competition—lobster beer, brewmaster's beard yeast beer, laundry whitener beer and more. But the latest brew to join this fad might not just be a gimmick. It could also be good for the environment.

Chef Mario Batali is teaming up with Dogfish Head's Sam Calagione to make an experimental beer out of food scraps, reports Cat Wolinksi for *Civil Eats*.

Apparently the beer is inspired by "pruno," or prison wine. Innovative prisoners make this alcoholic concoction by throwing together bread, fruit, ketchup and what ever else is available to ferment. The beer version has a more specific list of ingredients, Wolinksi writes.

The brew is modeled after a *hefeweizen*—a German beer that typically has citrus-y aromas and flavors—and comes from overripe tomatoes, stale bread, Demerara sugar, grapefruit and another citrus called the Ugli fruit. A slightly more upscale version of pruno, perhaps. At its public debut, drinkers called the drink "light, crisp, a little effervescent" and even "delicious," Wolinkski writes.

The chef-brewer duo call their concoction "WasteNot," which is already offered on tap at a restaurant with locations in Chicago and New York. The idea

for the brew came out of chef Dan Barber's wastED, a pop-up restaurant that created menus out of the "ignored or un-coveted," the waste products of the food system, according to the project's website.

Americans waste nearly one-third of the country's food supply—discarding produce because it carries a blemish, tossing food because it isn't quite fresh. And the U.S. is not the only country with a food waste problem.

Imperfect food that still has nutritional value can be used, however. Faced with some shameful statistics, innovators are making a point to sell the odd-looking bits of produce or make energy out of the leftovers, among other efforts.

Excessive food waste costs money, contributes to methane emissions and takes up space in landfills. The U.S. Department of Agriculture and Environmental Protection Agency has called for a 50 percent reduction of the country's food waste by 2030. If making artisanal pruno is part of that effort, so be it.

***http://bit.ly/1UmiJQt***

## 3 billion-year-old fossils show early microbes lived in cavities

***SOME don't like it hot. Early microbes looked for shade when the sun was strong, just like we do.***

We think life first emerged on Earth in the Archean aeon or earlier, when the planet was scorched by deadly UV radiation and had no ozone layer to protect it – a bit like Mars is today. So life at the surface would have found survival a challenge.

Now bacteria fossils dating back 3.2 billion years have been found in cavities in tidal sediments in South Africa (*Geology, doi.org/96n*). This shows that life was possible very close to the surface back then, says Alessandro Airo at the Free University of Berlin, Germany, whose colleague Martin Homann analysed the fossils. This bodes well for the history of life on Mars. "It could well be that microbes thrived even on the surface of Mars and not necessarily only in deep water or the subsurface," Airo says.

***http://bit.ly/1R6pAQA***

## Two missions face off to seek life in icy seas of Enceladus

***DOES anything live in the seas of Enceladus?***

Despite 10 years orbiting Saturn's icy moon and sampling the material gushing from its plumes, NASA's Cassini spacecraft is far from an answer. Now two proposed missions hope to search for life more directly.

One, called the Enceladus Life Finder (ELF), would bring more sensitive mass spectrometers than Cassini's flying through the plumes to detect and identify amino acids, the building blocks of life. Another, dubbed LIFE (Life Investigation For Enceladus), hopes to collect samples from the plumes and return them to Earth. Both missions await funding. Cassini, meanwhile, made its last flight through the plumes on 19 December.

***http://bit.ly/1UmiJQt***

## Controversial sleeping pill helps mice recover from strokes

***TIME to wake up. Mice that have had a stroke recover more quickly if given small doses of a sleeping pill than if given a placebo.***

A stroke cuts off the blood supply to part of the brain, leading to the death of oxygen-starved tissue. Some tissue repair takes place naturally, but most people never fully recover.

One repair mechanism may be an increase in signalling by the GABA neurotransmitter in parts of the brain that are able to rewire themselves. As the sleeping pill Ambien acts on GABA receptors, Gary Steinberg of Stanford University School of Medicine and his team wondered whether they could use it to improve recovery.

They induced two types of stroke in mice: one group received one that damaged sensory abilities, the other, one that impaired movement. In both, mice given Ambien – in a lower quantity than required to put them to sleep – recovered the ability to notice a piece of tape stuck to their paw and remove it faster than those given a placebo (*Brain, DOI: 10.1093/brain/awv360*).

Ambien is the best-known incarnation of the drug zolpidem, which was prescribed 40 million times in the US in 2011. The fact that Ambien is already approved by the US Food and Drug Administration (FDA) means human studies could start relatively soon, says Steinberg.

The use of Ambien isn't without controversy: thousands of people have had adverse reactions to it. But there have also been reports that it can wake people from a minimally conscious state in some rare cases.

***http://nyti.ms/1RWBNXK***

## Climate Chaos, Across the Map

***What is going on with the weather?***

**By JUSTIN GILLIS DEC. 30, 2015**

With tornado outbreaks in the South, Christmas temperatures that sent trees into bloom in Central Park, drought in parts of Africa and historic floods drowning the old industrial cities of England, 2015 is closing with a string of weather anomalies all over the world.

The year, expected to be the hottest on record, may be over at midnight Thursday, but the trouble will not be. Rain in the central United States has been so heavy that major floods are beginning along the Mississippi River and are likely to intensify in coming weeks. California may lurch from drought to flood by late

winter. Most serious, millions of people could be threatened by a developing food shortage in southern Africa.

Scientists say the most obvious suspect in the turmoil is the climate pattern called El Niño, in which the Pacific Ocean for the last few months has been dumping immense amounts of heat into the atmosphere. Because atmospheric waves can travel thousands of miles, the added heat and accompanying moisture have been playing havoc with the weather in many parts of the world.

But that natural pattern of variability is not the whole story. This El Niño, one of the strongest on record, comes atop a long-term heating of the planet caused by mankind's emissions of greenhouse gases. A large body of scientific evidence says those emissions are making certain kinds of extremes, such as heavy rainstorms and intense heat waves, more frequent.

Coincidence or not, every kind of trouble that the experts have been warning about for years seems to be occurring at once.

"As scientists, it's a little humbling that we've kind of been saying this for 20 years now, and it's not until people notice daffodils coming out in December that they start to say, 'Maybe they're right,' " said Myles R. Allen, a climate scientist at Oxford University in Britain.

Dr. Allen's group, in collaboration with American and Dutch researchers, recently completed a report calculating that extreme rainstorms in the British Isles in December had become about 40 percent more likely as a consequence of human emissions. That document — inspired by a storm in early December that dumped stupendous rains, including 13 inches on one town in 24 hours — was barely finished when the skies opened up again. The issue can be overwhelming. The science is complicated. We get it. This is your cheat sheet.

Emergency crews have since been scrambling to rescue people from flooded homes in Leeds, York and other cities. A dispute has erupted in Parliament about whether Britain is doing enough to prepare for a changing climate.

Dr. Allen does not believe that El Niño had much to do with the British flooding, based on historical evidence that the influence of the Pacific Ocean anomaly is fairly weak in that part of the world. In the Western Hemisphere, the strong El Niño is likely a bigger part of the explanation for the strange winter weather.

The northern tier of the United States is often warm during El Niño years, and indeed, weather forecasters months ago predicted such a pattern for this winter. But they did not go so far as to forecast that the temperature in Central Park on the day before Christmas would hit 72 degrees.

Likewise, past evidence suggests that an El Niño can cause the fall tornado season in the Gulf Coast states to extend into December, as happened this year, with deadly consequences in states like Texas and Mississippi.

Matthew Rosencrans, head of forecast operations for the federal government's Climate Prediction Center in College Park, Md., said that the El Niño was not the only natural factor at work. This winter, a climate pattern called the Arctic Oscillation is also keeping cold air bottled up in the high north, allowing heat and moisture to accumulate in the middle latitudes. That may be a factor in the recent heavy rains in states like Georgia and South Carolina, as well as in some of the other weather extremes, he said.

Scientists do not quite understand the connections, if any, between El Niño and variations in the Arctic Oscillation. They also do not fully understand how the combined effects of El Niño and human-induced warming are likely to play out over the coming decades.

Although El Niños occur every three to seven years, most of them are of moderate intensity. They form when the westward trade winds in the Pacific weaken, or even reverse direction. That shift leads to a dramatic warming of the surface waters in the eastern Pacific.

"Clouds and storms follow the warm water, pumping heat and moisture high into the overlying atmosphere," as NASA recently explained. "These changes alter jet stream paths and affect storm tracks all over the world."

The current El Niño is only the third powerful El Niño to have occurred in the era of satellites and other sophisticated weather observations. It is a small data set from which to try to draw broad conclusions, and experts said they would likely be working for months or years to understand what role El Niño and other factors played in the weather extremes of 2015.

It is already clear, though, that the year will be the hottest ever recorded at the surface of the planet, surpassing 2014 by a considerable margin. That is a function both of the short-term heat from the El Niño and the long-term warming from human emissions. In both the Atlantic and Pacific, the unusually warm ocean surface is throwing extra moisture into the air, said Kevin Trenberth, a climate scientist at the National Center for Atmospheric Research in Boulder, Colo.

Storms over land can draw moisture from as far as 2,000 miles away, he said, so the warm ocean is likely influencing such events as the heavy rain in the Southeast, as well as the record number of strong hurricanes and typhoons that occurred this year in the Pacific basin, with devastating consequences for island nations like Vanuatu. "The warmth means there is more fuel for these weather systems to feed upon," Dr. Trenberth said. "This is the sort of thing we will see more as we go decades into the future."

***Correction: December 31, 2015*** *A caption with a photograph on an earlier version of this article misstated the month that flooding occurred in Horry County, S.C. The flooding occurred in October 2015, not December.*

http://bit.ly/1Tvs9ZV

# What If the Causes of Violent Crime Are Blowing in the Wind?

***Serious crimes are more likely to occur in neighborhoods downwind of air pollution, according to a new study.***

Madeleine Thomas

The key to predicting where violent crime occurs may be to see which way the wind blows.

Neighborhoods downwind from tailpipe exhaust or industrial activity are more likely to experience higher rates of violent crime like homicide, rape, or assault, argue a team of researchers from the Harvard University Center for the Environment and the University of California–Davis in a new study published by the National Bureau of Economic Research.

Using data from more than two million serious crimes reported to the Chicago Police Department between 2001 and 2012, the researchers compared crimes on opposite sides of five major interstates throughout the city, taking note of which way the wind was blowing at the time of the delinquency. For each crime, they also noted temperature, precipitation, wind speed, and wind direction using the National Climatic Data Center, and measured ambient pollution levels using data from the Environmental Protection Agency.

While property crimes—burglary, larceny, arson, and grand theft auto—seemed unaffected by pollution, violent crimes—homicide, rape, robbery, assault, battery—were 2.2 percent higher in neighborhoods downwind of any air pollution. The researchers claim their work provides the "first quasi-experimental evidence that air pollution causally affects violent criminal activity." The external costs of air pollution may be much higher than previously thought, they note, suggesting that the costs of pollution-related crime may reach as high as $100-200 million each year. If the relationship between violence and pollution is a causal one, as the study suggests, their findings offer a powerful incentive to clean up air pollution throughout major cities nationwide.

The researchers found that crime was often driven by the presence of nitrous oxides, a group of chemical compounds and air pollutants emitted primarily by cars, industrial power plant boilers, iron and steel mills, and petroleum refineries. When particulate matter containing pollutants like ozone reaches the brain, these pollutants can interact with the body's brain chemistry directly by reacting with the body to create toxins that affect the central nervous system. Psychologically speaking, air pollution can also trigger pain and discomfort, which can in turn lead to aggressive behavior.

This isn't the first study to link pollution with crime:

- ***Violent criminals may have been exposed to heavy amounts of lead as children, and could in turn have higher levels of lead in their blood, according to a 2007 working paper published by the National Bureau of Economic Research. Childhood lead exposure is often associated with behavioral and cognitive traits linked to criminal tendencies, like low IQ; brain damage; ADHD; and aggressive, hyperactive, and impulsive behaviors. Lead exposure can also cause irreversible effects on the central nervous system and developing brain. Before lead was removed from gasoline in the late 1970s thanks to the Clean Air Act, gasoline was responsible for most of the lead found in the air, dust, and dirt around cities. Children who were born or who grew up in the '70s and '80s with unleaded gasoline, however, are responsible for a 56 percent drop in violent crime between 1992 and 2002. According to the study, crime rates should continue to fall by 2020, the year in which all adults in their 20s and 30s will have grown up without any exposure to lead in gasoline at all.***
- ***In the inner city, access to nature's spoils may be the best way to reduce crime. According to a new study published in* BioScience*, urban neighborhoods in closer proximity to nature feel more cohesive as a community. Being able to view some sort of natural landscape from the comforts of the home, the quality of the natural landscape within a city, and the amount of time spent in nature all create the perceptions of a more united neighborhood. When residents feel more tight-knit as a whole, the study states, they become less likely to engage in criminal behavior.***
- ***Sufferers of chronic psychosocial stress—a sense of continual distress resulting from repeated exposure to a social stressor like poverty or abuse—may be more vulnerable to environmental chemicals. According to a 2014 study of social stressors and air pollution from neighborhoods across New York City, the tolls of psychosocial stress—including its wear and tear on the body's immune, endocrine, and metabolic systems—render the body more sensitive to pollutants like lead.***
- ***High ozone levels—an indication of smog—correlates with increased rates of family disturbances, according to a 1985 study of air pollution, weather, and violent crime published in the* Journal of Personality and Social Psychology*. The most violent altercations, according to the study, occurred on warmer days versus cooler ones. When studying air pollution, the social and psychological costs of violent crime also should be taken into account, the study's authors argue.***

*"Catastrophic Consequences of Climate Change" is* Pacific Standard*'s year-long investigation into the devastating effects of climate change—and how scholars, legislators, and citizen-activists can help stave off its most dire consequences.*

http://www.eurekalert.org/pub_releases/2015-12/bsp-scp123115.php

# Saffron-based crocin prevents liver cancer: Preclinical studies and beyond!!

***Biomolecule of the golden spice is good for your liver***

Liver cancer remains among the leading causes of cancer-related death worldwide. New study lead by UAE University Prof. Amr Amin unravels mechanisms by

which saffron-based 'crocin' protects against liver cancer. The study entitled 'Saffron-Based Crocin Prevents Early Lesions of Liver Cancer: In Vivo, In Vitro and Network Analyses' is funded by Al-Jalila Foundation & Terry Fox Foundation and is published in Recent Patents on Anticancer Drug Discovery. Using murine model, human liver cancer cells, gene expression profiling and computer-assisted modeling analyses, Amin's study identifies NF-kB as a regulatory hub and a candidate therapeutic drug target for liver cancer.

***http://bit.ly/1mWsPNJ***

## Did This Extinct Human Species Commit Homicide?

***Did Homo naledi behave more like H. homicidensis?***

**By Michael Shermer on January 1, 2016**

"Fossil First: Ancient Human Relative May Have Buried Its Dead" (Reuters). "Why Did *Homo naledi* Bury Its Dead?" (NOVA Next). These are just two of the many hyped headlines that appeared last September in response to a paper purporting the discovery, in a cave in South Africa, of a new species by paleoanthropologist Lee R. Berger of the University of the Witwatersrand, Johannesburg. There were reasons for skepticism from the get-go.

The age of the fossils is undetermined, so it is impossible to conclude where in the hominin lineage the fossils fit. Their hands, wrists and feet are similar to small modern humans, and their brain volume is closer to that of the small-brained australopithecines, like Lucy, so it is not clear whether this combination constitutes a new species or a variation on an existing species. Instead of publishing in *Science* or *Nature*, the prestigious journals in which major new fossil human finds are typically announced, the authors unveiled their discovery in eLIFE (elifesciences.org/content/4/e09561), an open-access online journal that fast-tracks the peer-review process. And instead of meticulously sorting through the 1,550 fossils (belonging to at least 15 individuals) for many years, as is common in paleoanthropology, the analysis was published a mere year and a half after their discovery in November 2013 and March 2014.

What triggered my skepticism, however, was the scientists' conjecture that the site represents an example of "deliberate body disposal," which, as the media read between the lines, implies an intentional burial procedure. This, they concluded was the likeliest explanation compared with four other hypotheses.

*Occupation*. There is no debris in the chamber, which is so dark that habitation would have required artificial light, for which there is no evidence, and the cave is nearly inaccessible and appears never to have had easy access. *Water transport*. Caves that have been inundated show sedimentological layers of coarse-grained material, which is lacking in the Dinaledi Chamber, where the specimens were uncovered. *Predators*. There are no signs of predation on the skeletal remains and no fossils from predators. *Death trap*. The sedimentary remains indicate that the fossils were deposited over a span of time, so that rules out a single calamitous event, and the near unreachability of the chamber makes attritional individual entry and death unlikely.

Finally, the ages of the 13 individuals so identified—three infants, three young juveniles, one old juvenile, one subadult, four young adults and one old adult—are unlike those of other cave deposits for which cause of death and deposition have been determined. It's a riddle, wrapped in sediment, inside a grotto.

I believe the authors are downplaying an all too common cause of death in our ancestors—homicide in the form of war, murder or sacrifice. Lawrence H. Keeley, in *War Before Civilization* (1996), and Steven A. LeBlanc, in *Constant Battles* (2003), review hundreds of archaeological studies showing that significant percentages of ancestral people died violently. In his 2011 book *The Better Angels of Our Nature*, Steven Pinker aggregates a data set of 21 archaeological sites to show a violent death rate of about 15 percent. In a 2013 paper in the journal *Science*, Douglas P. Fry and Patrik Söderberg dispute the theory that war was prevalent in ancient humans by claiming that of the 148 episodes of violence in 21 mobile foraging bands, more than half "were perpetrated by lone individuals, and almost two-thirds resulted from accidents, interfamilial disputes, within-group executions, or interpersonal motives such as competition over a particular woman." Whatever you call it—war or murder—it is violent death nonetheless, and further examination of the *Homo naledi* fossils should consider violence (war or murder for the adults, sacrifice for the juveniles) as a plausible cause of death and deposition in the cave. Recall that after 5,000-year-old Ötzi the Iceman was discovered in a melting glacier in the Ötztal Alps in the Tyrol in 1991, it took a decade before archaeologists determined that he died violently, after he killed at least two other people in what appears to have been a clash between hunting parties. It's a side of our nature we are reluctant to admit, but consider it we must when confronted with dead bodies in dark places.

***http://www.bbc.com/news/health-35199882***

## Dementia loved ones 'benefit from visits'

***Spending time with loved ones with dementia is important even after they fail to recognise the faces of friends and family, a dementia charity says.***

A survey found that 42% of the public think there is no point in keeping up contact at this stage. But the Alzheimer's Society said family visits stimulated feelings of happiness, comfort and security. Even as the condition progresses, it said people with dementia can still hold an "emotional memory". This means they continue to feel happy long after a visit or experience that they may have forgotten.

The charity is calling on people to visit friends and relatives with dementia regularly and help them take part in activities they enjoy.

In a separate survey by the charity of 300 people affected by dementia, more than half said they were no longer taking part in any, or hardly any, social activities.

And 64% said they felt isolated following their diagnosis.

**'Bleak and lonely'**

Jeremy Hughes, chief executive of Alzheimer's Society, said: "After spending time with friends and family over the festive period, New Year can be a bleak and lonely time for people with dementia and their carers. It's so important for people with dementia to feel connected throughout the year.

"Spending time with loved ones and taking part in meaningful activities can have a powerful and positive impact, even if they don't remember the event itself. We're urging people to get in touch with us and find out how we can help you stay connected."

A survey of more than 4,000 members of the public indicated that 68% would still visit someone with dementia who no longer recognised them. However the charity says that people's busy lives often mean they don't manage to follow up on these good intentions, leaving many living with dementia feeling isolated.

There are around 850,000 people with dementia in the UK.

***http://www.bbc.com/news/uk-35209597***

## Drinking limits guidance set to be changed after review

***New advice on how much people in the UK should limit their drinking is to be issued following the first review of official alcohol guidance in 20 years.***

Reports suggest the chief medical officer for England, Dame Sally Davies, will recommend abstaining from alcohol for at least two days a week.

The daily maximum intake for men could also be cut to the same as for women.

Currently, women are advised to drink no more than 2-3 units a day and men no more than 3-4.

According to newspaper reports, the review will stress there is no "safe" alcohol intake and even drinking small amounts could cause diseases such as cancer.

Scottish guidelines already advise people to abstain for at least two days a week.

The advice to be issued by Dame Sally will also be adopted by the chief medical officers for Northern Ireland, Scotland and Wales.

**'Better choices'**

Dame Sally's review was launched in 2013 after the Department of Health said it had heard "sufficient concerns" from experts to suggest a thorough examination of the evidence on alcohol and health risks was needed.

Updated guidelines on drinking in pregnancy and for young people were published in 2007 and 2009 respectively, but the last review of the advice as a whole was done in 1995.

The current guidance states that by sticking within recommended limits, there is "only a low risk of causing harm in most circumstances".

The recommended daily maximum for women of 2-3 units equates to no more than a standard 175ml glass of wine. Men are told not to consume more than 3-4, not much more than a pint of strong lager, beer or cider.

Elaine Hindal, chief executive of alcohol education charity Drinkaware, said the updated advice would "help people make better choices" about their drinking.

"Our research suggests that aside from the well-known impacts on the liver, broader alcohol-related health risks such as hypertension, heart disease and some types of cancer, are not commonly understood by many people," she added.

Dr Sally Marlow, from King's College London, told the BBC a break from alcohol for several days had various positive effects.

"Alcohol, when you metabolise it in your liver, turns into a poison... and while it's a poison, it's in your system and messing your system up physically.

"But also psychologically. If you are drinking every day it becomes a habit and habits are really difficult to break."

**What is a unit of alcohol?**

***One unit of alcohol is about half a pint of lower-strength lager, beer or cider (ABV 3.6%), or a single measure of spirits (25ml, ABV 40%)***

***A 175ml glass of wine (ABV 12%) is 2.1 units and a pint of strong beer (ABV 5.2%) is three units***

***A 330ml bottle of lager (ABV 5%) is 1.7 units***

***To work out how many units there are in any drink, multiply the total volume of a drink (in ml) by its ABV (which is measured as a percentage) and divide the result by 1,000***

***Source:*** **NHS Choices**

Dr Marlow said the new guidelines were likely to take into account the idea of an "acceptable risk". "We drive cars knowing that we might have an accident, so are we prepared to accept the same level of risk when we have a drink?

"We accept that there is some risk associated with that, but the benefit in our own internal calculation is worth it."

In 2012, a report by the House of Commons Science and Technology Committee recommended advising the public take at least two alcohol-free days a week.

Dame Sally led the review in consultation with government officials in Scotland, Wales and Northern Ireland, and considered whether there could be merit in producing bespoke guidelines for certain groups, like older people, who may be particularly susceptible to alcohol harms.

Commenting on the reports, a Department of Health spokesman said: "The chief medical officer, with advice from a group of independent experts, has reviewed current drinking guidelines.

"The proposals will be published in the New Year."

***http://www.wired.com/2014/05/hangover-cure/***

## Everything Science Knows About Hangovers—And How to Cure Them

***Good morning, sunshine! You are so screwed.***

The light coming in through the window is so … there. You'd kill for a glass of water but die if it came with food. Your guts are in full rebellion; whatever happens next is going to happen in the bathroom. You have at least a couple of the following symptoms: headache, malaise, diarrhea, loss of appetite, fatigue, nausea, the shakes. You might also be dehydrated and feel generally slow—a little stupider, a little less coordinated.

You, my friend, have a hangover. And you can take heart in the fact that you're not alone. Some 77 percent of all drinkers report suffering from them. (The scientific term for the other 23 percent is "jerks.") But here's the amazing part: The underlying cause of your suffering remains a mystery. "What causes a hangover? Nobody really knows," says epidemiologist Jonathan Howland. "And what can you do about it? Nobody knows."

Alcohol has long been the only recreational drug for which scientists could not articulate a mechanism of action—which is to say, no one knew how it got you drunk, and no one knew how it got you hungover. And that's weird. Because hangovers are a problem of vast proportions. By one estimate, hangovers cost $160 billion in lost revenue every year in the US alone. Yet for decades, even as scientists have written hundreds of thousands of articles about alcohol, only a tiny fraction of that attention—just a few hundred papers—have focused on the hangover. In fact, it wasn't until the past decade or so that researchers even agreed to define hangover with a common group of symptoms.

Now, though, that's all beginning to change. In the past five or six years, a small group of researchers have dedicated themselves to the hangover, peering into both its causes and the truth behind all the purported cures. They've even made some progress on a few cures of their own. Thanks to science, the morning after is finally starting to look a little less bleak.

In the mid-2000s, Howland, then a professor of community health services at the Boston University School of Public Health, partnered with Damaris Rohsenow, an alcohol and drug abuse researcher at Brown University, to look at how hangovers relate to the ability to perform a job. "We were interested not so much in hangover as a cluster of symptoms but in impairment the day after heavy drinking," Howland says.

It wasn't until 2009, though, that a Dutch researcher named Joris Verster got the world's hangover researchers together for an informal meeting. They dubbed themselves the Alcohol Hangover Research Group and adopted a whimsical logo: a red and white crest with a tipped-over wineglass in the foreground and a pint of beer in the background. (Look closely and you'll see the beer glass is decorated with the AHRG logo in miniature—just the sort of infinite recursion that would, if you had a hangover, make you vomit.)

Over the past five years, AHRG has put out research to reveal that pretty much everything anyone has ever told you about the causes of hangover is wrong—or at least unproven.

Take dehydration. Sure, it makes sense: Alcohol suppresses the antidiuretic hormone vasopressin, which ordinarily keeps you from peeing too much. Plus, if you're drinking booze, you're probably not drinking water. But in dehydrated people with hangovers, levels of electrolytes don't differ too much from baseline controls—and when they do, they don't correlate with hangover severity.

Over the past five years, researchers have revealed that pretty much everything anyone has ever told you about the causes of hangover is wrong.

Some scientists have pointed to acetaldehyde, a demonstrably toxic byproduct of ethanol breakdown in the body. It's a nice theory—but it turns out that hangover symptoms are at their worst when acetaldehyde levels are low.

Low blood sugar is another common explanation, and it has some intuitive power behind it. Dehydration itself may not cause hangovers, but it does cause glucose levels to drop, and the body compensates by turning to other sources of energy, which can cause hangover-like symptoms. But if low blood sugar were the problem, administering glucose and fructose ought to be the solution. And it's not—sugar doesn't help the morning after. A more likely culprit is actually high blood sugar. Consuming ethanol with glucose turns out to elevate lactate levels, and one study shows that the presence of lactate makes hangovers worse. (So those warnings about sweet drinks might have something to them.)

Despite the cloud of misinformation, the AHRG has been able to pin down some basics. Get your blood alcohol concentration above 0.10 percent and odds are you'll be hungover the next day; symptoms will peak about 12 to 14 hours later, when your BAC is back at or near zero. There does also seem to be some truth to the notion that vodka delivers less of a hangover than red wine or whiskey. A comparison of people who drank enough bourbon or vodka to get to between 0.1 and 0.15 BAC—which is superdrunk, by the way—showed that all of them got hangovers, but the bourbon drinkers reported theirs as significantly worse.

Best of all, AHRG's researchers have begun to converge on a promising -theory about what really causes hangovers: namely, that they're an inflammatory response, like what happens when we get an infection. A team in Korea noticed that hangovers are accompanied by elevated levels of molecules called cytokines, which are used as communication signals by the immune system. If you inject those into a healthy subject, that person will start to have all kinds of familiar-sounding symptoms, including nausea, gastrointestinal distress, headache, chills, and fatigue. Potentially even more interesting, higher-than-normal cytokine levels also interfere with memory formation—which might account for ethanol--related lapses in recall as well.

If it's correct that cytokines are the key to hangovers, then that would suggest a simple and profound approach to treatment. That is, if the mechanism of hangover is an inflammatory response—as to a wound or illness—then maybe anti--inflammatories are the way to dispel it. (I myself now take a couple of ibuprofen before bed after a long night.)

Nobody really knows how booze works in the brain, but Richard Olsen, a neuro-scientist at UCLA who studies alcohol use, is pretty far along in figuring that out. He studies the range of blood alcohol concentrations you get from zero to a couple of drinks. In that range, he says, the neural mechanisms that respond to alcohol are very specific and present very interesting targets for treatment—of both drunkenness and hangover.

Olsen thinks the key is a neurotransmitter, a molecule that neurons use to talk to each other. Specifically, he's looking at one called gamma aminobutyric acid, or GABA. In particular, Olsen is looking at a subtype of the receptors that GABA sticks to, one that is exquisitely sensitive to ethanol. It is, Olsen says, "a unique ethanol receptor that responds to low concentrations of ethanol, as produced by one glass of wine, in the brain."

Now, GABA is an inhibitory neurotransmitter—i.e., it slows things down—so ethanol, in sparking these same receptors, would have a similar effect. That's why at lower doses it mellows you out. If Olsen's right, this could be the chemical mechanism that has eluded scientists until now. And he has some evidence: A drug that blocks those specific GABA receptors also blocks the effects of ethanol in rats. (Unfortunately that drug is in a family called the benzodiazepines—cousins of Valium—and taking it knocks you on your ass as surely as a stiff drink.) Another piece of favorable evidence: After repeated exposure to ethanol, neurons start to make a different kind of receptor, one that's more resistant to the stuff. (This has its own downside—the new receptors are also less sensitive to GABA, which means all those neurons are more difficult to inhibit generally. Parts of the brain become overexcitable, leading to tremors, almost a pre-seizure condition, and symptoms that look a lot like a hangover.)

Knowing that she was looking for a drug that would bind to that specific receptor—and nothing else—one of Olsen's postdoctoral students, a researcher named Jing Liang, started experimenting with herbs from her native China, beginning with the ones that traditional medicine claimed had an effect on alcohol. And she found one. "Hovenia," she says. (ケンポナシ) "It's been used in Asia for 500 years. I found it in a grocery store."

The lab purified the plant until Olsen and his team had an ingredient that acted on the right receptor. It turned out to be a flavonoid, a common molecular family. It already had a name—ampelopsin—but they started talking about it according to the naming conventions of organic chemistry: dihydromyricetin.

"Jing gave a talk at a meeting about our results, and we invited our friends to the bar afterward to try it out," Olsen says. "Now, this is not publishable, and you can't use it for evidence for the FDA, but it's good for us to know what kind of dose we should be using in our clinical trial—and that it doesn't hurt anybody and does something to us that we want."

The people who took the pill all reported feeling less intoxicated than they would ordinarily, he says. And they felt less hungover the next day. (Scientific research conferences are famous for active bar scenes, but I assume that the ones at alcohol research meetings rage the hardest and result in the most guilt afterward.) One of Liang and Olsen's funders now sells dihydromyricetin over the counter as BluCetin. It joins an elite club of hard-to-find substances—a prickly pear extract called Opuntia ficus indica, a vitamin B6 analog called pyritinol, and a migraine drug called Clotam—that have been reliably shown to help the symptoms of a hangover.

Olsen's line of research also suggests a more radical approach to eliminating the hangover. What if our cocktails used something other than alcohol to get us tipsy? Given the seemingly analogous chemical effects of alcohol and some synthetic drugs, it's hypothetically possible to find a chemical with almost the same effects as alcohol but that's better understood and better controlled. Alcohol researchers have been looking for something like this for decades, and now a British psychiatrist named David Nutt claims to have figured it out.

For a couple of years, Nutt—who was one of the British government's top drug policy advisers until he pointed out, quite rationally, that it made no sense to regulate pot heavily and booze barely at all—has been reporting experiments on chemical analogs to ethanol that deliver the same glorious buzz but with a crucial difference: There are antidotes that instantly restore sobriety. In a paper in 2006, Nutt showed how his very Star Trek-ish synthohol would work on a particular

subtype of receptors for GABA, one not entirely understood. Like the receptor that Olsen was studying, Nutt's receptors also handle benzo-diazepines, so they clearly have an impact on alertness.

Now, Nutt says, he has no less than five candidate chemicals ready to go. "After exploring one possible compound, I was quite relaxed and sleepily inebriated for an hour or so," Nutt wrote in a commentary for the Guardian in late 2013. "Then, within minutes of taking the antidote, I was up giving a lecture with no impairment whatsoever." All he needs, he says, is funding for more tests. If Nutt is right, his discovery would shed light not just on how ethanol affects the brain but how the brain works more broadly. And existence of antidotes means that all you'll need is a pill or a swig to avoid a hangover entirely. Remember to take it the night before and there will never again be a morning after. Or so we can hope.

***http://s.nikkei.com/1kAjlpB***

## Japanese recognized for discovering element 113

***A Japanese team has received official credit for the discovery of element 113, making the group the first in Asia to have its accomplishments enshrined in the periodic table.***

TOKYO - The International Union of Pure and Applied Chemistry certified Thursday that a team led by Kosuke Morita at government-affiliated research institute Riken discovered the element. The group first managed to synthesize it in July 2004 but could not conclusively demonstrate its existence until 2012.


***Kosuke Morita points to element 113, which his team has earned the right to name.***

Gaining recognition "is a revolutionary and historic achievement for Japanese science," said Ryoji Noyori, a Nobel Prize-winning chemist and former Riken president.

Elements past uranium, No. 92 in the periodic table, do not occur in nature and thus must be created in the laboratory. The Japanese team synthesized element 113 by bringing ions of zinc -- No. 30 -- to around 10% the speed of light and smashing them into atoms of bismuth, element 83. That high speed is required to fuse the two atomic nuclei. But using too much force simply makes the atoms break apart and scatter. The speed and path of the particles must be very carefully controlled -- an extremely difficult feat requiring cutting-edge technology.

Each collision reportedly has a chance of only around one in 100 quintillion -- 1 trillion times 100 million -- of producing the new element. "There's nothing to do but keep smashing them together," Morita said. Around 500 trillion collisions were carried out in the course of the experiment.

Unstable heavy elements like 113 also break apart into lighter particles almost as soon as they come into existence. The new element typically decays in two thousandths of a second. So extraordinarily sensitive technology is required to detect a success amid all the other matter present.

Morita's team managed to both sufficiently control the particles and create an effective detector, with help from advanced Japanese technology. Teams from the U.S. and Russia claim to have produced the element through other means, but their experiments could not match the precision of those run by the Riken group. Credit for discovery thus went to the Japanese researchers.

All other elements in the periodic table have been discovered and named by European or American institutions. Many bear the names of countries or noted scientists. The name japonium has been floated for No. 113. An official name could be decided on in 2016.

***http://www.bbc.com/news/uk-35211341***

## Put calorie counts on alcoholic drinks, LGA says

***Makers of alcoholic drinks should display the calorie count on bottles and cans, the Local Government Association says.***

The LGA believes companies should be forced to warn people that drinking alcohol can contribute to weight gain.

The association, which represents nearly 400 councils, says the effect of hidden calories is contributing to an obesity crisis.

The UK currently has one of the highest obesity rates in Western Europe.

The LGA says calories from alcohol are classed as "empty calories", with no nutritional value, and by drinking alcohol, the amount of fat the body burns for energy is reduced.

It also says a pint of cider at 4.5% has 216 calories and is the equivalent to three-quarters of a burger, while a single spirit at 40% is 61 calories or an eighth of a burger.

Over 24 hours, drinking five pints of beer at 4% strength is the equivalent to eating more than three burgers. A bottle of wine - about four small 175 ml glasses - has the same calorie count as more than two burgers, the association says.

Providing 'choice'

Izzi Seccombe, of the LGA, which represents more than 370 councils in England and Wales, said people should be able to make informed choices about the effects of their drinking.

She added: "Most people are aware that excessive alcohol can lead to serious health problems like liver and heart damage, and an increased risk of cancer. However, the amount of calories from an average night's drinking isn't so well-known. "The onus is on the big breweries to do more to provide clear and prominent labelling. Providing people with the right information allows them to make choices about what they eat and drink. "Prevention is the only way we are going to tackle the obesity crisis, which is costing the NHS more than £5bn every year."

The Royal Society for Public Health has previously called for calorie labels to be put in place, giving its own warning that a large glass of wine can contain around 200 calories - the same as a doughnut.

And in 2015, MEPs backed calls for calorie labels to be put on all alcoholic drinks in a vote at the European Parliament, although that vote is not binding. On Friday, it emerged that new advice on how much people in the UK should limit their drinking is to be issued following the first review of official alcohol guidance in 20 years. Reports suggest the chief medical officer for England, Dame Sally Davies, will recommend abstaining from alcohol for at least two days a week.

http://bit.ly/1TxHlFO

## A Starfish-Killing, Artificially Intelligent Robot Is Set to Patrol the Great Barrier Reef

***Crown of thorns starfish are destroying the reef. Bots that wield poison could dampen the invasion***

**By John R. Platt on January 1, 2016**

The Great Barrier Reef will have a robotic protector beginning this winter. The underwater autonomous vehicle is programmed to patrol the massive living structure in search of destructive crown-of-thorns starfish (COTS), which it then kills by lethal injection. These starfish prey on coral polyps, and although they are native to the reef, their population has exploded in the past few years, possibly because of overfishing of their natural predators. The latest report from Australia's Great Barrier Reef Marine Park Authority places the venomous invertebrates alongside climate change and human activity as a significant threat to the reef, which lost half its coral cover between 1985 and 2012.

COTSbot, developed by robotics researchers at Queensland University of Technology in Australia, could help slow the starfish's invasion. Artificially intelligent, it correctly identified its target 99.4 percent of the time in laboratory tests. “It's now so good it even ignores our 3-D-printed decoys and targets only live starfish,” Queensland's Matthew Dunbabin says. A fleet of COTSbots could supplement the efforts of human divers who currently remove or poison the sea stars by hand and could operate during bad weather or high currents. They could also be useful at night when starfish are more active but swimming is prohibited.

**How It Works**

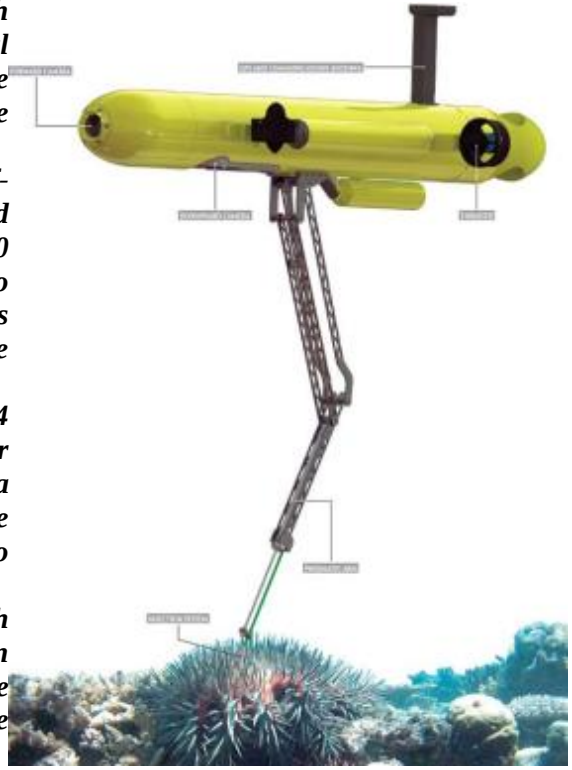
***1. The COTSbot follows a preprogrammed path, moving up and down the Great Barrier Reef with the help of five thrusters. It stays close to the reef—and avoids bumping into the delicate structure—with the aid of sonar and multiple cameras.***

***2. The cameras scan for starfish, distinguished by their purplish colors, arm and thorn shapes, and creeping motion. Starfish often wrap around and hide under coral outcroppings, but the robot's software has been programmed to recognize those positions.***

***3. When the robot spots a crown-of-thorns starfish, its needle-capped pneumatic arm lowers and injects 10 milliliters of poisonous bile salts into the echinoderm. The compounds effectively digest the animal from the inside.***

***4. A poisoned starfish will die within 24 hours, leaving no opportunity for separation and regeneration—a survival tactic that is a boon for the starfish population but maddening to those trying to reduce its numbers.***

***5. The vehicle's tanks carry enough poison to kill more than 200 starfish in one four- to eight-hour mission. The rapid pace is key because even one starfish can spawn millions of young.***



**Credit: Courtesy Of Queensland University Of Technology**

http://nyti.ms/1UoysP3

## Untangling an Accounting Tool and an Ancient Incan Mystery

***In a dry canyon strewn with the ruins of a long-dead city, archaeologists have made a discovery they hope will help unravel one of the most tenacious mysteries of ancient Peru: how to read the knotted string records, known as khipus, kept by the Incas.***

**By WILLIAM NEUMANJAN. 2, 2016**

LIMA, Peru - At the site called Incahuasi, about 100 miles south of Lima, excavators have found, for the first time, several khipus in the place where they were used - in this case, a storage house for agricultural products where they

appear to have been used as accounting books to record the amount of peanuts, chili peppers, beans, corn and other items that went in and out.

In some cases the khipus — the first ones were found at the site in 2013 — were buried under the remnants of centuries-old produce, which was preserved thanks to the extremely dry desert conditions.

That was a blockbuster discovery because archaeologists had previously found khipus only in graves, where they were often buried with the scribes who created and used the devices. Many others are in the possession of collectors or museums, stripped of information relating to their provenance.

Khipus are made of a series of cotton or wool strings hanging from a main cord. Each string may have several knots, with the type and location of the knot conveying meaning. The color of the strands used to make the string and the way the strands are twisted together may also be part of the khipus' system of storing and relaying information.

***Patricia Landa, an archaeological conservator, painstakingly cleans and untangles the khipus at her house in Lima.*** **Credit William Neuman/The New York Times**

Researchers have long had a basic understanding of the numerical system incorporated in the khipus, where knots represent numbers and the relation between knots and strings can represent mathematical operations, like addition and subtraction. But researchers have been unable to identify the meaning of any possible nonnumerical signifiers in khipus, and as a result they cannot read any nonmathematical words or phrases.

Now the Incahuasi researchers hope that by studying the khipus and comparing them with others in a large database, they may find that the khipus discovered with the peanuts contain a color, knot or other signifier for "peanut." The same goes for those found with chili peppers, beans and corn.

"We can look at how the chili pepper khipu differs from the peanut khipu and from the corn khipu in terms of their color and other characteristics and we can build up a kind of sign vocabulary of how they were signifying this or that thing in their world," said Gary Urton, a leading expert on khipus who is studying the new trove with Alejandro Chu, the archaeologist who led the excavation.

"It's not the great Rosetta Stone but it's quite an important new body of data to work with," he said, adding, "It's tremendously exciting."

For now, the 29 khipus from Incahuasi, which are about 500 years old, are kept in an unassuming brick house in a residential neighborhood in Lima, along with a scattering of artifacts from other excavations, including two mummies (of a child and a dog), some bags of human bones, dozens of fragile textiles rolled up between layers of paper, and numerous pots meticulously reassembled from shards.

The house belongs to Patricia Landa, an archaeological conservator, who also keeps a menagerie of cats and dogs, including three hairless Peruvian dogs of the kind once raised by the Incas for food.

It is Ms. Landa who takes the Incahuasi khipus, some of which were found neatly rolled up and others in snarled jumbles, and painstakingly cleans and untangles them and prepares them for researchers to decipher. "You have a very special relationship with the material," Ms. Landa, 59, said. "I talk to them. I say, 'Excuse me for disturbing your rest but you're helping us to understand your ancestors.' "

Incahuasi, which means "house of the Inca emperor," was a city used in the late 15th and early 16th centuries as the base of operations for the Inca invasion of Peru's southern coast, after which it became a thriving administrative center, according to Mr. Chu, the archaeologist. It sat in the arid hills above the green valley of the Cañete River. "There was probably lots of movement, with llama caravans bringing in farm produce," he said.

The storehouse where the khipus were found was probably used to keep food needed to maintain the large number of troops deployed in the invasion.

The Incas, who were highly organized and governed a vast area, would have used khipus to keep track of provisions, and copies of the string records were probably sent to an administrative center, such as Cusco, the Inca capital, where they could be read, checked and perhaps filed. The Incahuasi excavation has even turned up what are essentially duplicate sets of khipus tied together, which the researchers believe could have been made when the same products were counted twice — perhaps to guarantee accurate bookkeeping.

One khipu found at the site had its knots untied, suggesting that the information stored there had been "erased" by the accountants so that the khipu could be reused, Ms. Landa said.

The khipus found at Incahuasi appear to be all about counting beans, literally. But colonial-era documents suggest that khipus had many uses in both the pre-Hispanic and colonial period that went beyond accounting, including to keep calendrical information and to tell historical narratives.

Colonial records show that in some cases, such as land disputes, indigenous litigants would bring khipus to court and use them to explain or justify claims of land ownership, Mr. Chu said. He said that scribes would read the khipus and a court clerk would enter the information into the trial record.

Mr. Urton has created a database of all known khipus, about 870 of them, with detailed information on two-thirds of them, recording their configurations, colors, numerical values and other information.

Because the Incahuasi khipus appear to be relatively simple inventories of agricultural products, it may be easier to decipher them than the more complex khipus that record historical information, Mr. Chu said.

And a breakthrough in deciphering the Incahuasi khipus could be a first step in reading more complex versions.

"If we can find the connection between the khipu and the product that it was found with we can contribute to the deciphering of the khipus," Mr. Chu said.

Mr. Urton said that the difference between the accounting khipus at Incahuasi and more elaborate khipus, "is the difference between, let's say, your tax form and a novel." But they may also have key similarities: "They both use the same language, they both use the same numbers when they use numbers, and it's in the same writing system."

The excavations at Incahuasi have stopped because of a lack of financing. Much of the vast storeroom complex has yet to be excavated, and Mr. Chu hopes there could be more khipus there.

"It was very exciting to find them," Mr. Chu said. "We started to find the storerooms and we didn't think we would find any khipus. Then we started to clear away the dirt and we saw the knots."

***http://nyti.ms/1YZJWtQ***

## F.D.A. Regulator, Widowed by Cancer, Helps Speed Drug Approval

***In a profound change at the F.D.A.: a speeding up of the drug approval process***

**By GARDINER HARRIS JAN. 2, 2016**

BETHESDA, Md. — Mary Pazdur had exhausted the usual drugs for ovarian cancer, and with her tumors growing and her condition deteriorating, her last hope seemed to be an experimental compound that had yet to be approved by federal regulators.

So she appealed to the Food and Drug Administration, whose oncology chief for the last 16 years, Dr. Richard Pazdur, has been a man denounced by many cancer patient advocates as a slow, obstructionist bureaucrat.

He was also Mary's husband.

In her struggle with cancer and ultimately her death in November, Ms. Pazdur had a part, her husband and a number of cancer specialists now say, in a profound change at the F.D.A.: a speeding up of the drug approval process. Ms. Pazdur's three-year battle with cancer was a factor, they say, in Dr. Pazdur's willingness to swiftly approve risky new treatments and passion to fight the disease that patient advocates thought he lacked.

Others worry that the emotions of a loving husband have short-circuited vital safeguards.

"Rick Pazdur is the most important person in the cancer world," said Ellen Sigal, the founder and chairwoman of Friends of Cancer Research, an advocacy group. Now that he has watched his wife die of the disease, she said, "you can't go through something like this and not be changed by it."

Certainly there has been a change at the powerful agency. Since Ms. Pazdur learned she had ovarian cancer in 2012, approvals for drugs have been faster than at any time in the F.D.A.'s modern history. Although companies go through a yearslong discovery and testing process with new drugs before filing a formal application with the F.D.A., the average decision time on drugs by Dr. Pazdur's oncology group has come down to five months from six months. That is a major acceleration in a pharmaceutical industry where every month's delay can mean thousands of lives lost and sometimes hundreds of millions of dollars in sales that, given limited patent times, can never be recovered.

When asked specifically how his wife's illness had changed his work at the F.D.A., Dr. Pazdur said he was intent on making decisions more quickly.

"I have a much greater sense of urgency these days," Dr. Pazdur, 63, said in an interview. "I have been on a jihad to streamline the review process and get things out the door faster. I have evolved from regulator to regulator-advocate."

Many factors are driving him, he continued. "Was Mary's illness one of them? Yes," he said. But in 2012, he added, Congress also passed a law that gave the F.D.A. more money and a new pathway to work more closely with drug makers when a medicine may save lives. Another important change in the same period, he said, was a surge in advances in genetic research that made some medications more effective and easier to test.

"The drugs simply got better," Dr. Pazdur said.

A year ago, when a clinical trial showed that a skin cancer medicine called Opdivo could also extend survival in lung cancer patients, Dr. Pazdur got the results directly from the trial's overseers weeks before executives at the Bristol-Myers Squibb Company, the maker of Opdivo, saw the numbers. That allowed him to approve the drug for lung cancer patients three months ahead of schedule.

In 2014, Dr. Pazdur approved a drug for widespread use against ovarian cancer that an expert advisory panel had previously voted, 11 to 2, against authorizing. Ms. Pazdur did not take the drug, Dr. Pazdur said, because it was targeted at a form of cancer that was genetically different from hers.

But Ms. Pazdur, who was a longtime oncology nurse at the National Institutes of Health, did take the experimental compound that the F.D.A. authorized for her. Dr. Pazdur said he was not involved personally in that decision, in 2013, because the medicine his wife took was a cancer vaccine, one of the few kinds of cancer therapies Dr. Pazdur does not have authority over.

That decision was made in a separate category of "compassionate use" drug approvals for individual patients. Every year, the F.D.A. receives about 1,000 similar applications from terminally ill people seeking experimental medications, and agency officials say they approve 99 percent of them. The approvals are distinct from those for drugs that have gone through clinical trials and that are for broad distribution.

Despite the sympathy for Dr. Pazdur so soon after the loss of his wife, others say they are uneasy about the F.D.A.'s increasing embrace of what they consider to be soft science and rapid approvals.

"I respect Rick Pazdur enormously," said Fran Visco, the president of the National Breast Cancer Coalition. "But I am worried that the F.D.A. is losing sight of the incredible importance of making sure drugs save lives."

Still others see a windfall for drug makers that are getting their products to market faster.

"The F.D.A. is more beholden to industry now than at any time since I became a close observer of the agency in 1971," said Dr. Sidney Wolfe, who with Ralph Nader founded Public Citizen's Health Research Group. "Too many decisions F.D.A. now makes are driven by industry concerns, and as a result people are getting hurt."

Cancer medicines not only often fail to save patients but can accelerate their deaths and make their last weeks far more painful, and critics, like Public Citizen, argue that the F.D.A. focuses far too much on saving the few at the cost of cutting short the lives of many.

Robert Hazlett, a research analyst with Ladenburg Thalmann, an investment firm, said the F.D.A.'s greater urgency — particularly in cancer drug approvals — had led to a boom in biotechnology shares.

"The improvements at F.D.A. are a big part of biotech's huge success in recent years," Mr. Hazlett said.

Dr. Pazdur eats as sparingly as Gandhi and rises every morning at 4 to attend a spin class, which keeps him greyhound-thin and perhaps helps him ride above the vitriol that has been routinely spewed at him.

Before his wife's death, Dr. Pazdur saw his name plastered on ads on Washington city buses and was shouted at by protesters. He was threatened so often that the F.D.A. posted security guards at some public meetings he attended. Over the years, The Wall Street Journal found fault with him, including in a 2002 editorial titled "F.D.A. to Patients: Drop Dead."

"So what's the F.D.A.'s problem?" the editorial asked. "Quite simply, Richard Pazdur."

The Pazdurs, who met in June 1979 on the first day of his oncology fellowship at Rush-Presbyterian-St. Luke's Medical Center in Chicago, where Ms. Pazdur was then a nurse, knew from the start of her disease how hard it would be. One of their first patients together was a woman who died of ovarian cancer. Today only about 45 percent of ovarian cancer patients are still alive five years after a diagnosis.

"I recall thinking back then, 'I wonder how I would react to this situation?' " Ms. Pazdur said in an interview in October, the month before she died. "So when it happened to me, I sort of knew how I would deal with it."

As it turned out, Ms. Pazdur suffered terribly from taking a second experimental drug in a clinical trial, in which Dr. Pazdur had no role, at the National Institutes of Health. Her heart swelled to near bursting, her blood pressure soared, and she became so tired that she could barely walk to the bathroom. That experience was one of many reasons that Dr. Pazdur has also pushed for better research into drug side effects, an effort the F.D.A. began in earnest last year.

"Instead of having physicians assess drug toxicities, which they do a terrible job of, we're going to start asking patients to assess them," Dr. Pazdur said. "It's a huge issue."

After the experimental drugs failed, Ms. Pazdur decided to stop chemotherapy and enter hospice care.

"I'm a nurse. I've seen this movie before," she said at the time. "I'm going to die from this. And I want to live my last days as best as I can."

On the morning of Nov. 24, Mary Pazdur died holding her husband's hand. She was 63.

**Correction: January 2, 2016**

***Because of an editing error, an earlier version of this article misstated how the decision time on new drugs has changed. It has gone from six months to five months, not from five months to six months.***

http://www.bbc.com/news/health-35150598

# Is breakfast a waste of time?

***Breakfast is the most important meal of the day - it's a great start, it's good for you, it stops you snacking, boosts metabolism and keeps you thin.***

**By James Gallagher Health editor, BBC News website**

Well, that's what we've all been told. But some scientists argue this is all a myth - and that just because we keep repeating it doesn't make it true.

So should we bother with breakfast?

Studies repeatedly show that skipping breakfast is more common in people who are overweight or obese. But this could be a dangerous trap - when the number of ice cream sales goes up so does the number of people getting sunburn. It doesn't mean ice-cream is causing sunburn.

This association might be down to something special about brekkie - or maybe the type of people who eat it are generally more active, have a better overall diet or try to lead healthier lives.

Despite advocating breakfast as part of a healthy lifestyle, a report by the UK's National Obesity Observatory concluded that "it is not clear whether there is a causal relationship with Body Mass Index (weight) or whether breakfast is merely a marker for other lifestyle factors that can contribute to healthy body weight".

**Breakfast on trial**

The few clinical trials that have actively altered people's eating habits also showed no impact on waistlines.The biggest, published in the American Journal of Clinical Nutrition, told 300 overweight or obese people to skip or eat breakfast for four months.

"There was absolutely no difference whatsoever in the amount of weight-loss," said Prof David Allison, who conducted that trial at the University of Alabama.

"With respect to weight, at least in adults, it looks like we're leaning towards it [breakfast] being a myth." He says people who are skipping breakfast are probably just trying to control their own weight. And one danger for skippers who start having breakfast is it could lead to weight gain, if they don't eat less later in the day. So is government advice plain wrong?

In Prof Allison's opinion: "If they are advising it [breakfast] for weight control then at this point it is not a justified recommendation."

Dr Alison Tedstone is from one of the many organisations around the world that tells us breakfast is a good thing, and she points to studies showing people who skip breakfast tend to be bigger, which we already know is an association.

But Dr Tedstone, chief nutritionist at Public Health England, agrees that the "evidence is by no means conclusive on having breakfast".

However, she says it is the easiest meal of the day to get right, that skipping it risks snacking on something unhealthy later on and that it can be a struggle to get the right balance of nutrients without starting the day well.

"It's an easy meal to get a healthy meal, it's an easy meal to get control over."

**What makes a healthy breakfast?**

There is no such thing as a perfect breakfast, but Dr Tedstone advises people to "think fibre" in the mornings. "Overall we're not getting enough fibre in our diet and it's easy to incorporate fibre into breakfast. "Take porridge - it's cheap, it's cheerful," she said. As well as porridge, high fibre breakfasts include fruit, wholegrain toast and some breakfast cereals. But some of the more palatable high-fibre cereals can be loaded with added salt and sugar.

Prof Susan Jebb, a nutrition scientist at the University of Oxford says: "It is very difficult, I think breakfast cereals are very challenging."

She says it's necessary to check the labels as some have less added sugar and that fresh, stewed or dried fruit could be used to make it more palatable.

"I'd encourage people to have a piece of fruit with breakfast - much better to have fruit than fruit juice as then you get the fibre from the intact fruit."

**Brain fuel**

The other big case made for breakfast is that it improves children's performance in school. A study in 2015 by the University of Cardiff was the latest to show an association between a healthy breakfast and educational performance in the classroom. These studies are now coming in for the same criticism as those that found a link between breakfast and weight.

"It seems very plausible that missing breakfast as a kid is just a marker of a poor home background - that family is unable to provide breakfast for a child - which is probably the cause of them not performing well at school," argues Prof David Rogers at the University of Bristol.

So how do we make sense of all this?

Prof Jebb argues: "If you're currently eating breakfast I think you should make it the healthiest breakfast you can. "If you're a breakfast skipper, I'm certainly not going to say you must eat breakfast, but I would encourage you to think about it."

While Prof Allison suggests people who are worried about their weight should give both eating and skipping breakfast a go to see what works best for them - just make sure you're not snacking on sausage rolls by 11:00.

The science behind the benefits of breakfast does not support the absolute vehemence with which it is advocated, at least in adults.

That said I'm still going to have my bowl of breakfast cereal. It is a good start to the day for me personally otherwise I'm distractingly hungry. I might even try chucking in a bit of extra fruit.