# Over 50? You probably prefer negative stories about young people

COLUMBUS, Ohio – When given a choice, older people prefer to read negative news, rather than positive news, about young adults, a new study suggests.

In fact, older readers who chose to read negative stories about young individuals actually get a small boost in their self-esteem, according to the results.

And what about younger people? Well, they just prefer not to read about older people.

These results come from a study of 276 Germans who were asked to read what they thought was a test version of an online magazine featuring carefully selected stories about younger and older people.

"Our results bolster the argument that people use the media to enhance their social identity," said Silvia Knobloch-Westerwick, lead author of the study and associate professor of communication at Ohio State University.

"Older people and younger people have different goals when they use the media, and it shows in what they choose to read."

Younger people, who are less certain about their own identity, prefer to read about other younger people to see how they live their lives, Knobloch-Westerwick said.

Older people, on the other hand, have greater certainty regarding their identity. However, living in a youth-centered culture, they may appreciate a boost in self-esteem. That's why they prefer the negative stories about younger people, who are seen as having a higher status in our society.

Knobloch-Westerwick conducted the study with Matthias Hastall of Zeppelin University Friedrichshafen in Germany. Their results appear in the September 2010 issue of the Journal of Communication.

The study included 178 younger adults (18 to 30 years old) and 98 older adults (50 to 65 years old). All came to a computer laboratory, where they were told they were testing an online magazine that was not yet available to the public.

The experimental magazine was created specifically for the study and contained 10 carefully pre-tested stories. Each story focused on one individual, but there were two different versions: one that had a negative spin and one with a positive spin (each participant was offered just one of the two versions).

For example, one positive article was headlined (translated here from German) "Visitation rights gained after daring protest – Demonstration at 100 feet high a success." The negative version had the headline, "Visitation rights denied despite daring protest – Demonstration at 100 feet high in vain."

The stories included a photo of the person involved: half were clearly an older person and half were clearly a younger person.

Participants in the study were told they would not have time to read all the stories and were asked to click on the stories that they found interesting. Each was given a random mix of positive and negative stories about younger and older people.

The computer secretly logged which stories each participant clicked on and how long they spent reading each article.

All of the stories were extensively pretested by other participants to ensure that the stories were clearly positive or negative, and that the photos were clearly differentiated by age and that the people pictured were similar in how likeable they appeared, Knobloch-Westerwick said.

Results showed that the older participants were more likely to select negative articles about younger people, but they did not show a strong preference for either positive or negative stories about people in their own age group.

Younger people showed low interest in articles about older individuals – regardless of whether the stories were positive or negative. They did choose to read more positive stories about their own age group than they did negative stories, she said.

After participants finished browsing and evaluating the online magazine, they were given a short questionnaire aimed at measuring their self-esteem.

Results showed that younger people showed no differences in self-esteem based on what they had read. However, the more that older people read negative stories about younger individuals, the higher the older people's levels of self-esteem tended to be.

This study came about because a previous study by the same researchers, using this same data, had produced unexpected results, Knobloch-Westerwick said. The original study had hypothesized that people prefer media messages that portray people like themselves – people of the same age and the same gender, in this case.

Overall, the original study found that was indeed true. However, the researchers were puzzled by the fact that older people in that first study seemed as equally interested in stories about younger people as they were in stories about older people like themselves.

"Now we know why older people liked reading about the younger people – they were looking for negative stories about them," she said.

"Our new results go along with other research showing that people's social identity helps shape what media messages we choose. Age is just one type of social identity which may affect our media choices."

## Smoked cannabis reduces chronic pain

### *Randomized controlled trial*

For people suffering chronic pain, smoked cannabis reduces pain, improves mood and helps sleep, according to new research published in CMAJ (Canadian Medical Association Journal) (pre-embargo link only) http://www.cmaj.ca/embargo/cmaj091414.pdf.

People who suffer from chronic neuropathic pain due to damage or dysfunction of the nervous system have few treatment options. These options include opioids, anticonvulsants, antidepressants and local anesthetics, but efficacy varies and all have side effects which limit compliance. Oral cannabinoids have shown success in treating some types of pain but may differ in effect and risks from smoked cannabis.

A team of researchers from McGill University Health Centre (MUHC) and McGill University conducted a randomized controlled trial to investigate the analgesic effect of inhaled cannabis in 21 participants 18 years and older with chronic neuropathic pain. The researchers used three different potencies of active drug (THC levels of 2.5%, 6% and 9.4%) as well as a 0% placebo.

Patients reported better sleep quality as the THC content increased. Anxiety and depression also decreased in the 9.4% THC group compared with the placebo group.

"We found that 25 mg herbal cannabis with 9.4% THC, administered as a single smoked inhalation three times daily for five days, significantly reduces average pain intensity compared with a 0% THC cannabis placebo in adult subjects with chronic post traumatic/post surgical neuropathic pain," reports lead author Dr. Mark Ware, Director of Clinical Research at the Alan Edwards Pain Management Unit of the MUHC. "We found statistically significant improvements in measures of sleep quality and anxiety."

"To our knowledge, this is the first outpatient clinical trial of smoked cannabis ever reported," the authors state. It is one of only a handful of studies on smoked cannabis and neuropathic pain. The authors recommend more studies with higher potencies of THC, longer duration of follow-up and flexible dosing. Long-term safety studies of smoked cannabis for medical purposes are also needed.

In a related commentary http://www.cmaj.ca/embargo/cmaj100799.pdf, Dr. Henry McQuay of Balliol College, Oxford University, UK, writes "the authors should be congratulated for tackling such a worthwhile question as: does cannabis relieve neuropathic pain?, particularly because the trial must have been a major nightmare to get through the various regulatory hurdles. What makes it a worthwhile question is the continuing publicity that patients see, hear and read, suggesting analgesic activity of cannabis in neuropathic pain, and the paucity of robust evidence." He concludes that "this trial adds to the trickle of evidence that cannabis may help some of the patients who are struggling at present."

## Survey says: Genetics affect whether we're willing to take surveys

A new study from North Carolina State University shows that genetics play a key factor in whether someone is willing to take a survey.

"We wanted to know whether people are genetically predisposed to ignore requests for survey participation," says Dr. Lori Foster Thompson, an associate professor of psychology at NC State and lead author of a paper describing the research. "We found that there is a pretty strong genetic predisposition to not reply to surveys."

For the study, the researchers sent out a survey to over 1,000 sets of twins – some fraternal, some identical – and then measured who did and did not respond. The researchers were interested in whether the response behavior of one twin accurately predicted the behavior of the other twin. "We found that the behavior of one identical twin was a good predictor for the other," Foster Thompson says, "but that the same did not hold true for fraternal twins.

"Because all of the sets of twins were raised in the same household, the only distinguishing variable between identical and fraternal twin sets is the fact that identical twins are genetically identical and fraternal twins are not."

Understanding survey response behavior is important because managers and people who study organizational behavior rely on survey data to better understand issues ranging from leadership to job stress. "We need to get representative data in order to form accurate conclusions," Foster Thompson says, "for science and for business practice.

"A lot of research has been done to evaluate how surveys can be written or presented to encourage participation," Foster Thompson adds. "Much less work has been done to evaluate the personal characteristics

of potential respondents – and the role those characteristics play in determining whether someone will actually fill a survey out."

The research raises a number of additional questions, "but basically we want to know why or how genetics affect people's predisposition to take surveys," Foster Thompson says. "Is the linkage between genetics and survey response explained by personality, attitudes toward employers, or something else entirely?"

*The paper, "Genetic underpinnings of survey response," will be published in a forthcoming issue of the Journal of Organizational Behavior. The paper was co-authored by Dr. Zhen Zhang of Arizona State University and Dr. Richard Arvey of the National University of Singapore.*

## Award-winning study: hardening of the arteries doubles the risk of mortality

Most patients don't suspect a thing, and yet they are seriously ill: hardening of the arteries - peripheral arterial disease PAD - doubles the risk of premature death and serious cardiovascular events such as heart attack and stroke. This result of the five-year follow-up to the study getABI (= German epidemiological trial on ankle brachial index, ABI) was published last year by researchers led by Prof. Dr. Hans-Joachim Trampisch (medical informatics, biometry and epidemiology at the RUB). They also pointed out that the disease can be diagnosed and counteracted by means of a simple comparison between arm and ankle blood pressure carried out by a GP. Their highly regarded work has now been conferred the Best PAD Research Award 2010 by the Peripheral Arterial Disease Coalition.

**Simple test must be made standard**

Almost 7,000 patients over 65 were included in the getABI study in 2001. It turned out that one in five of them suffered from hardening of the arteries. It is detected by determining the ankle brachial index (ABI), a comparison between the patient's arterial blood pressure in the arms and ankles when lying. If the difference is large, vessels are blocked, and this mostly applies to the whole body - including the coronary and cerebral vessels. The risk of premature death, a heart attack or stroke is twice as high for the patients affected as for others, and they usually know nothing about it. Because in many cases the disease has no symptoms. The specialists of the getABI study, which is coordinated by Prof. Trampisch in Bochum, therefore strongly urge that the simple ABI examination be introduced as standard for elderly patients at their GP.

***PAD Coalition***

*The PAD Coalition is a non-profit association in which 80 health organisations, professional associations and government organisations have joined forces to reduce the incidence of peripheral arterial disease and the deaths caused by them. The PAD Research Award includes prize money of 1,000 dollars and is to be presented in September.*

*Press information on the study results: http://www.pm.ruhr-uni-bochum.de/pm2009/msg00360.htm*

** Full bibliographic informationDiehm C, Trampisch HJ et al., Mortality and Vascular Morbidity in Older Adults With Asymptomatic Versus Symptomatic Peripheral Artery Disease. Circulation 2009: published online before print November 9, 2009: DOI: 10.1161/CIRCULATIONAHA.109.865600*

## An idle brain may be the self's workshop

***Recent research suggests that mind-wandering may be important and that knowledge of how it works might help treat such conditions as Alzheimer's disease, autism, depression and schizophrenia.***

***Idle brain***

**By Melissa Healy**, Los Angeles Times August 30, 2010

The resting brain is anything but idle - that simple proposition would be clear if you could peer into Mike Mrazek's noggin as he putters around his kitchen preparing his daily morning feast of scrambled eggs, oatmeal and fresh fruit.

As he plods through his quotidian ritual of gathering ingredients, cutting, chopping, bringing the pan to the correct temperature and boiling water for tea, Mrazek's thoughts, too, are something of a scrambled feast, as he later recounts.

Childhood memories jostle against thoughts of his girlfriend's progress on a cross-country journey.



Reflections on the tomatoes in his garden give way to a rehearsal of a meeting he's having later on at the university.

A flashback to his sister teasing him about his breakfast routine turns into an observation he could make while leading a meditation session in the evening.

Until recently, scientists would have found little of interest in the purposeless, mind-wandering spaces between Mrazek's conscious breakfast-making tasks - they were just the brain idling between meaningful activity.

But in the span of a few short years, they have instead come to view mental leisure as important, purposeful work - work that relies on a powerful and far-flung network of brain cells firing in unison.

Neuroscientists call it the "default mode network."

Individually, the brain regions that make up that network have long been recognized as active when people recall their pasts, project themselves into future scenarios, impute motives and feelings to other people, and weigh their personal values.

But when these structures hum in unison - and scientists have found that when we daydream, they do just that - they function as our brain's "neutral" setting. Understanding that setting may do more than lend respectability to the universal practice of zoning out: It may one day help diagnose and treat psychiatric conditions as diverse as Alzheimer's disease, autism, depression and schizophrenia - all of which disrupt operations in the default mode network.

Beyond that lies an even loftier promise. As neuroscientists study the idle brain, some believe they are exploring a central mystery in human psychology: where and how our concept of "self" is created, maintained, altered and renewed.

After all, though our minds may wander when in this mode, they rarely wander far from ourselves, as Mrazek's mealtime introspection makes plain.

That's in sharp contrast to the pattern struck by the brain when hard at work: In this mode, introspection is suppressed while we attend to pressing business - we "lose ourselves" in work. As we do so, scientists see the default mode network go quiet and other networks come alive.

Neuroscientists have long resisted discussions of "self" as either hopelessly woolly-headed or just too difficult to tackle, says Jonathan Schooler, a psychologist at UC Santa Barbara who studies the wandering mind (with the assistance of Mrazek, a graduate student he advises).

But now, he says, research on the default mode network and mind-wandering has helped focus neuroscientists' attention to our rich inner world and raises the prospect that our sense of self, our existence as a separate being, can be observed, measured and discussed with rigor.

The idea that there may be a physical structure in the brain in which we unconsciously define who we are "would warm Freud's heart," says Dr. Marcus E. Raichle, a neurologist at Washington University in St. Louis who has pioneered work in this fledgling field. Sigmund Freud, the Austrian father of modern psychiatry, spoke exhaustively of the power of the unconscious mind in shaping our behavior and often surmised that the workings of that force would someday be revealed by scientists.

"People talk about the self and ask how it achieves some realization in the brain," Raichle says. The default mode network, he adds, "seems to be a critical element of that organization. It captures many of the features of how we think of ourselves as the self."

**Changing thinking**

In the last two decades, neuroscientists have identified many regions of the brain that are activated during purposeful tasks - when we count, navigate our environment, process input from our senses or perform complex motor skills.

But until very recently, the ebb and flow of thoughts - the stream of consciousness that makes Mrazek human and whose content is unique to him among humans - was the dead zone. Like geneticists who for years dismissed genetic material with no known function as "junk DNA," neuroscientists spent years dismissing the "idle" brain as just that: idle, its content just so much meaningless filler.

But in 2001, Raichle and his team began publishing neuroimaging studies that suggest different.

During tasks requiring focused attention, regions specialized to the tasks at hand became active in the subjects whose brains were being scanned. But as those men and women mentally relaxed between tasks inside the scanners, Raichle saw that the specialized regions went quiet - and a large and different cluster of brain structures consistently lighted up.

Raichle was particularly interested in a portion of the brain called the medial parietal cortex as a sort of central hub of this activity. He knew the area tended to become active when a person recalled his past.

And his work uncovered another key node in this curious circuit: the medial prefrontal cortex, a uniquely human structure that comes alive when we try to imagine what others are thinking.

Each region, Raichle realized, had a feature in common - it was focused on the self, and on the personal history and relationships by which we define ourselves as individuals.

As studies continued, scientists noticed some interesting facts.

They saw that the brain parts constituting the default mode network are uniquely vulnerable to the tangles, plaques and metabolic disturbances of Alzheimer's disease - an illness that starts by stealing one's memory and eventually robs its victims of their sense of self.

This, Raichle and colleagues would argue, suggests how important the default mode network is in making us who we are. They saw that when operating, this network guzzles fuel at least as voraciously as do the networks that are at work when we engage in hard mental labor. That, along with other evidence, suggests to Raichle that when the default mode network is engaged, there's more than a mental vacation taking place.

So what is it doing?

**Working vacation**

Raichle suspects that during these moments of errant thought, the brain is forming a set of mental rules about our world, particularly our social world, that help us navigate human interactions and quickly make sense of and react to information - about a stranger's intentions, a child's next move, a choice before us - without having to run a complex and conscious calculation of all our values, expectations and beliefs.

Raichle says such mental shortcuts are necessary because the brain cannot possibly take in all the detail available to our senses at any given moment. The default mode network, he proposes, keeps a template handy that lets us assume a lot about ourselves and the people and environment we interact with.

Raichle points to another odd distinction of the default mode network - one that suggests it plays a central role in our functioning. Its central hub has two separate sources of blood supply, making it far less vulnerable than most other regions of the brain to damage from a stroke.

"That's an insurance policy: This area is critically important," he says.

Neuroscientists suspect that the default mode network may speak volumes about our mental health, based on studies in the last three years that suggest it is working slightly differently in people with depression, autism and other disorders. (See related story.)

That fact underscores a point: Just as sleep appears to play an important role in learning, memory consolidation and maintaining the body's metabolic function, some scientists wonder whether unstructured mental time - time to zone out and daydream - might also play a key role in our mental well-being. If so, that's a cautionary tale for a society that prizes productivity and takes a dim view of mind-wandering.

Such social pressure, Schooler says, overlooks the lessons from studies on the resting brain - that zoning out and daydreaming, indulged in at appropriate times, might serve a larger purpose in keeping us healthy and happy.

"People have this fear of being inadequately engaged, and as a consequence they overlook how engaging their own minds can be," Schooler says. "Each one of us can be pretty good company to ourselves if we allow our minds to go there."

## Nasca Lines may be giant map of underground water sources

Lima (ANDINA). American researcher David Johnson has advanced a theory that Nasca Lines may be related to water. He thinks that the geoglyphs may be a giant map of the underground water sources traced on the land.

*Nazca Lines in Ica, south of Lima.*

The Nasca Lines are located in the Peruvian desert, about 200 miles south of Lima. The assortment of perfectly-straight lines lies in an area measuring 37 miles long and 1-mile wide.

The Nasca plain is one of the driest places on Earth, getting less than one inch of rain a year. So, when Johnson started his research in 1995, he became aware of the scarcity of water in the region and the effect that this had on agricultural production and the quality of life.

While looking for sources of water, he noticed that ancient aqueducts, called puquios, seemed to be connected with some of the lines. The expert said that a high percentage of potable water of the mountain chain moves through underground filtrations and that the pre-Hispanic population knew perfectly the cartography of water. He said that lines like the ones in Nasca would be “a language to communicate where underground wells and aqueducts are located”.

Johnson gave each figure a meaning: the trapezoids always point to a well. The circles to a place where the fountain is located. And the complex figures as well. For example, the hummingbird points to a giant well with its beak.

Field works along 1,700 kilometers of the Peruvian and Chilean coast, including very ancient civilizations such as Caral and Arica, support the theory that "way to communicate" would be a common practice among all pre-Hispanic cultures.

The Nasca Lines, which have been the focus of debate for over 70 years, consist of giant geometric forms (triangles, trapezoids, parallel lines) as well as biomorphs (birds, plants, and mammals) etched into the surface of the desert of southern Peru, especially in the drainage of the Rio Grande de Nasca.

Johnson has been researching these ground drawings since the 1990s, publishing some books about his theory. Some of them are: "The Relationship Between the Lines of Nasca and Water Resources," 1997. "The water lines of Nasca," 1998, "The Correlation Between the Lines of Nasca and Subterranean Water Resources," 1999. In 2002, together with Donald Proulx and Stephen Mabee, he wrote "The Correlation Between Geoglyphs and Subterranean Water Resources in the Río Grande de Nazca Drainage."

## First clear evidence of feasting in early humans

***Communal feasting, a social behavior unique and ubiquitous among humans, has been found to begin before the advent of agriculture in human societies***

Community feasting is one of the most universal and important social behaviors found among humans. Now, scientists have found the earliest clear evidence of organized feasting, from a burial site dated about 12,000 years ago. These remains represent the first archaeological verification that human feasting began before the advent of agriculture.

"Scientists have speculated that feasting began before the Neolithic period, which starts about 11.5 thousand years ago," says Natalie Munro of the University of Connecticut, and author of a research article released yesterday in the Proceedings of the National Academy of Sciences. "This is the first solid evidence that supports the idea that communal feasts were already occurring – perhaps with some frequency – at the beginnings of the transition to agriculture."

At a burial cave in the Galilee region of northern Israel, Munro and her colleague Leore Grosman of Hebrew University in Jerusalem uncovered the remains of at least 71 tortoises and three wild cattle in two specifically crafted hollows, an unusually high density for the period. The tortoise shells and cattle bones exhibited evidence of being cooked and torn apart, indicating that the animals had been butchered for human consumption.

Each of the two hollows, says Munro, was manufactured for the purpose of a ritual human burial and related feasting activities. The tortoise shells were situated under, around and on top of the remains of a ritually-buried shaman, which suggests that the feast occurred concurrently with the ritual burial. On their own, the meat from the discarded tortoise shells could probably have fed about 35 people, says Munro, but it's possible that many more than that attended this feast.

"We don't know exactly how many people attended this particular feast, or what the average attendance was at similar events, since we don't know how much meat was actually available in the cave," says Munro. "The best we can do is give a minimum estimate based on the bones that are present."

A major reason why humans began feasting – and later began to cultivate their own foods – is because faster human population growth had begun to crowd their landscape. In earlier periods of the Stone Age, says Munro, small family groups were often on the move to find new sources of food. But around the time of this feast, she says, that lifestyle had become much more difficult.

"People were coming into contact with each other a lot, and that can create friction," she says. "Before, they could get up and leave when they had problems with the neighbors. Now, these public events served as community-building opportunities, which helped to relieve tensions and solidify social relationships."

But when a once-nomadic group of humans settles down, that can put tremendous pressure on the local resources. Munro notes that humans around the time of this feast were intensively using the plants and animals that their descendants later domesticated. "The appearance of these feasts at the beginnings of agriculture is particularly interesting because people are starting to experiment with domestication and cultivation," she notes.

This combination of increased social interaction and changes in resources, says Munro, is what eventually led to the beginnings of agriculture. “Taken together, this community integration and the changes in economics were happening at the very beginning when incipient cultivation was getting going," she says. "These kinds of social changes are the beginnings of significant changes in human social complexity that lead into the beginning of the agricultural transition."

## Attractive Therapy: Magnetic Brain Stimulation Gaining Favor as Treatment for Depression

***More doctors are turning to repetitive transcranial magnetic stimulation (rTMS) of their patient's brains, but fears of possible seizures may be limiting its growth as a therapeutic tool***

**By Jim Nash**

Treatment of severe depression with magnetic stimulation is moving beyond large mental health centers and into private practices nationwide, following more than two decades of research on the treatment. Yet even as concern about its efficacy fades, one potential side effect - seizures - continues to shadow the technology.

Called repetitive transcranial magnetic stimulation (rTMS), the noninvasive technique uses electromagnets to create localized electrical currents in the brain. The gentle jolts activate certain neurons, reducing symptoms

in some patients. Eight psychiatrists contacted for this article, all of whom use rTMS to treat depression, say it is the most significant development in the field since the advent of antidepressant medications. The prevailing theory is that people with depression do not produce enough of certain neurotransmitters, which include serotonin and dopamine. Electricity (administered in combination with antidepressants) stimulates production of those neurotransmitters.

**Scope of the problem**

A National Institute of Mental Health (NIMH) study released this spring shows that 14 percent of patients with drug-resistant major depressive disorder experience a remission of symptoms after rTMS treatment compared with a control group, which reported a 5 percent rate of remission. Physicians and researchers say those results are similar to the success rate of antidepressants. No notable side effects occurred during the study, according to its authors, who include Mark George, an early rTMS researcher and a professor of psychiatry, radiology and neurosciences at the Medical University of South Carolina in Charleston. They have suggested that higher levels of electrical stimulation might attain better results.

At the heart of this interest in rTMS treatment is the only such device cleared by the U.S. Food and Drug Administration (FDA). In October 2008 the government specified that Neuronetics, Inc.'s NeuroStar could be used to treat major depressive disorder that is resistant to at least one antidepressant medication. Since then, about 200 centers and clinics in the U.S. have purchased the $60,000 system, which resembles a contemporary dentist's chair with an electronics console.

The treatment joins talk, pharmaceutical and electroconvulsive therapies (the latter of which rTMS is an offshoot) as the only known methods of alleviating the debilitating symptoms of depression. Nearly 7 percent of U.S. adults, or 14.8 million people (predominantly women), are afflicted by major depressive disorder each year, according to the NIMH. In fact, the NIMH says the disorder is the leading cause of disability in the U.S. for people aged 15 to 44. George says that about half of all patients suffering from serious depression resist at least one antidepressant.

**Changing brain chemistry**

Unlike with electroconvulsive, or electroshock, therapy, where patients must be unconscious and administered muscle relaxants in order to prevent seizures, patients receiving rTMS (which involves trains of pulses during each session, hence the "repetitive" modifier) remain conscious and seated in outpatient settings. Highly focused magnetic pulses of up to 1.5 teslas induce an electrical current two to three centimeters deep in the left prefrontal section of the cerebral cortex. That region, which acts as an emotion modulator, appears to be underproducing neurotransmitters in depression sufferers. The rTMS pulses directly stimulate an area about the size of a quarter, although scientists are examining whether they affect other parts of the brain, too.

As with antidepressants, the electricity likely is changing the brain's chemistry, says rTMS pioneer Eric Wassermann, chief of the Brain Stimulation Unit at the National Institute of Neurological Disorders and Stroke in Bethesda, Md. He was among the first U.S. researchers to investigate rTMS as a way to alter mood.

Treatments typically occur five days a week for four to six weeks. FDA guidelines for first-time NeuroStar treatments call for 3,000 magnetic pulses delivered over 37.5 minutes (a rate considered low-frequency) by a figure 8–shaped magnetic coil held to the patient's scalp.

**Worries over seizures**

The most common side effects of rTMS include transient headache, scalp discomfort and the sensation that something is tapping on the patient's head in time with pulses during sessions. (In contrast, electroshock, which even Neuronetics says is more effective than rTMS, could cause memory problems and diminished mental acuity.)

The side effect that draws the most concern is rare but serious: grand mal seizures. They trigger loss of consciousness and violent muscle contractions. "Seizures do occur, and they should not be brushed off," George says. The rate of seizures is on par with medication therapy, but hard data is difficult to find, he says, adding that no organization tallies these events globally. A show-of-hands survey during an rTMS conference in Italy this year indicated that some are underreporting seizures, according to George, a vocal proponent of rTMS. Still, he estimates that there have been fewer than 50 rTMS-initiated seizures worldwide since the mid-1980s.

Risks can be reduced by carefully vetting rTMS candidates according to the FDA-approved guidelines, says Jon Nilsen, who operates a NeuroStar at the McGrath Clinic in Orland Park, Ill. Nilsen also acknowledges that patients on antidepressants, which themselves carry a risk of seizure, as well as those with a history of seizures are more likely to have an rTMS-related event.

Wassermann says that overly cautious doctors and entrepreneurs are holding back the development of rTMS for depression. He was among the researchers who created laboratory guidelines in 1998 for applying rTMS -

guidelines that he says were "cautious" in regard to minimizing the chance of seizures. Those protocols, he says have gone largely unexamined.

"It's asking a lot of a box that you plug into the wall to change your brain and your life" without hobbling its further development with timidity, Wassermann says.

**Insuring treatment**

It also asks a lot of people's pocketbooks. The McGrath Clinic charges a discounted rate of $265 per single-day session without insurance, Nilsen says, but it charges $300 to $350 per session if health insurance firms reimburse for treatments. Because insurance coverage for rTMS is spotty, some psychiatrists say they sometimes treat severely impacted patients for free.

As of August 3 Aetna health insurance refused to reimburse for rTMS, which it considers "experimental and investigational". Michigan's Priority Health Insurance Co. covers the initial six-week treatment. Priority, however, does not cover "maintenance" sessions used to prolong remissions and treat relapses, saying the efficacy of these regimens has not been proved.

Psychiatrist Denise Lin says the benefits she has seen in some of her severely depressed patients outweigh the risk of seizure. Lin, founder of Advanced Psychiatric Care of Santa Barbara, Calif., bought a NeuroStar in January.

All five people she has treated with rTMS have reported at least some improvement, Lin says. One patient had been assessed before trying rTMS as very severely depressed based on the widely used Hamilton Depression Rating Scale (HAM-D), a series of multiple-choice questionnaires that clinicians use to rate depression severity. After a six-week course the patient was judged to be in remission and rated "normal" on the HAM-D scale, Lin says.

## People at 'Intermediate Risk' of Heart Disease With Elevated hsCRP Benefit from Statin Therapy, Study Suggests

ScienceDaily (Aug. 30, 2010) - People at intermediate risk of cardiovascular disease who have high levels of high sensitivity C-reactive protein (hsCRP), a blood marker for inflammation, could benefit from cholesterol-lowering therapy even if their cholesterol is already at desirable levels. Data indicates that people with only a 5 percent to 20 percent risk of having heart disease in the next ten years, but who have high levels of hsCRP could reduce the risk of heart attack and stroke by more than 40 percent.

Women and men with a 10-year cardiovascular disease risk of 5 percent or more and normal cholesterol levels but high levels of hsCRP, a protein associated with inflammation, could reduce their risk substantially with statin therapy, according to new research.

The study, published in Circulation: Cardiovascular Quality and Outcomes, an American Heart Association journal, is a new analysis of data from the randomized, placebo-controlled, double blind Justification for Use of statins in Prevention: an Intervention Trial Evaluating Rosuvastatin (JUPITER). The study included men age 50 yrs or older and women age 60 yrs or older.

For patients with elevated high sensitivity C-reactive protein (hsCRP) -- a protein associated with systemic inflammation -- the study found that taking cholesterol-lowering statin drugs could:

* reduce the relative risk of cardiovascular disease (CVD) by 45 percent for people estimated to have a 10-year CVD risk of 5 percent to 10 percent ; and
* reduce the relative risk by 49 percent among those with an estimated 11 percent to 20 percent 10-year risk.

"These data demonstrate that women and men with elevated hsCRP who are otherwise at 5 percent to 20 percent 10-year risk had substantive risk reductions with statin therapy even though they are currently outside United States treatment guidelines," said Paul Ridker, M.D., lead study author and director of the Center for Cardiovascular Disease Prevention at Brigham and Women's Hospital, Boston, Mass. Ridker is also principal investigator of JUPITER.

People with a 10-year risk of less than 5 percent did not have a statistically significant reduction in events with statins.

He said recent changes in Canadian prevention guidelines prompted a need to better define CVD risk. The new Canadian recommendations call for statin therapy for patients who have "intermediate risk" -- defined as 10 percent to 19 percent 10-year risk -- and elevated hsCRP, even if their cholesterol levels are in the normal range (i.e. LDL-cholesterol below 130 mg/dL).

"The new Canadian guidelines are a major step forward for prevention and incorporate hsCRP in a thoughtful manner" Ridker said. "However, intermediate risk was defined in the Canadian guidelines as 10 to 20 percent 10-year risk, yet we observed major benefits of statin therapy for those with risks of 5 to 10 percent as well." He added that many physicians incorrectly consider a 5 percent to 10 percent risk score to be "low-

risk," especially in woman who tend to develop CVD at least a decade later than men, although heart and blood vessel disease remains the number one killer of women and men.

Risk is calculated with screening tools, such as the Framingham Risk Score, which predicts CVD risk based on traditional risk factors such as age, gender, smoking, blood pressure and cholesterol; or the Reynolds Risk Score which also considers hsCRP and parental history of premature heart disease.

The current study finds that although men and women in the 5 percent to 10 percent Framingham 10-year risk group get equal benefit from statin therapy, more women tend to be in the 5 percent to 10 percent risk group while men tend to be in the 11 to 20 percent group.

"The current U.S. recommendations label individuals with a greater than 20 percent 10-year Framingham risk as high risk and advise statin therapy for them. Statin treatment for individuals with Framingham risk under 20 percent has until now been less clear-cut."

These data also support the current position taken by the American Heart Association and the U.S. Centers for Disease Control that hsCRP testing is best used in people with intermediate risk to help doctors in their treatment decisions. Statins are known to reduce levels of both cholesterol and hsCRP. In addition, he said statin therapy is no substitute for a healthy diet, smoking cessation and exercise.

"This analysis of the JUPITER study provides important information indicating the groups of men and women who have high CRP and normal LDL-cholesterol that could benefit from statin treatment," said Pamela Ouyang, M.D, professor of medicine at Johns Hopkins University and an American Heart Association volunteer. "The statin used in the JUPITER study was rosuvastatin at a dose of 20 mg. The degree of lowering in risk that would be obtained using lower doses or less potent statin therapy is not known."

*Co-authors are Jean G. MacFadyen, B.A.; Børge G. Nordestgaard, M.D.; Wolfgang Koenig, M.D.; John J.P. Kastelein, M.D.; Jacques Genest, M.D.; and Robert J Glynn, Sc.D.*

*The above story is reprinted (with editorial adaptations by ScienceDaily staff) from materials provided by American Heart Association.*

***Journal Reference:***

*1. Paul M Ridker, Jean G. MacFadyen, Børge G. Nordestgaard, Wolfgang Koenig, John J.P. Kastelein, Jacques Genest, and Robert J. Glynn. Rosuvastatin for Primary Prevention Among Individuals With Elevated High-Sensitivity C-Reactive Protein and 5% to 10% and 10% to 20% 10-Year Risk: Implications of the Justification for Use of Statins in Prevention: An Intervention Trial Evaluating Rosuvas. Circ Cardiovasc Qual Outcomes, Aug 24, 2010 DOI: 10.1161/CIRCOUTCOMES.110.938118*

## Why Americans believe Obama is a Muslim

EAST LANSING, Mich. - There's something beyond plain old ignorance that motivates Americans to believe President Obama is a Muslim, according to a first-of-its-kind study of smear campaigns led by a Michigan State University psychologist.

The research by Spee Kosloff and colleagues suggests people are most likely to accept such falsehoods, both consciously and unconsciously, when subtle clues remind them of ways in which Obama is different from them, whether because of race, social class or other ideological differences.

These judgments, Kosloff argues, are illogical. He also suggests they are fueled by an "irresponsible" media culture that allows political pundits and "talking heads" to perpetuate the lies.

"Careless or biased media outlets are largely responsible for the propagation of these falsehoods, which catch on like wildfire," said Kosloff, visiting professor of psychology. "And then social differences can motivate acceptance of these lies."

A Pew Research Center poll in August 2010 found that 18 percent of Americans believe Obama is a Muslim – up from 11 percent in March 2009 – even though he's a practicing Christian. Kosloff noted that the poll was conducted before Obama's recent comments supporting the right for Muslims to build a mosque near New York's Ground Zero.

Kosloff and colleagues launched their study prior to the 2008 U.S. presidential election, as the candidates were being bombarded with smear campaigns. It's the first comprehensive experimental study of the psychological factors that motivate Americans to believe the lies. The findings are published in the American Psychological Association's Journal of Experimental Psychology: General.

In four separate experiments (three before the election and one after), the researchers looked at both conscious and unconscious acceptance of political smears by mostly white, non-Muslim college students. For the conscious trials the participants were shown a false blog report arguing that Obama is a Muslim or a socialist or that John McCain is senile. The unconscious trials involved gauging how rapidly subjects could identify smear-relevant words such as "Muslim" or "turban" after Obama's name was presented subliminally. Among the results:

* On average, participants who supported McCain said there is a 56 percent likelihood Obama is a Muslim. But when they were asked to fill out a demographic card asking for their own race, the likelihood jumped to 77 percent. Kosloff said this shows that simply thinking about a social category that differentiated participants from Obama was enough to get them to believe the smear.

* Participants undecided about the candidates said there is a 43 percent chance McCain is senile – a number that increased to 73 percent when they simply listed their own age on a card.

* Undecided participants said there is a 25 percent chance Obama is a socialist – a number that jumped to 62 percent when they considered race. "Even though being a socialist has nothing to do with race," Kosloff said, "irrationally they tied the two together."

Kosloff said the increase in belief that Obama is Muslim likely reflects a growing disenchantment with his presidency – a sense that people feel Obama is not on their side.

"When people are unsatisfied with the president – whether it's the way he's handling the economy, health care of Afghanistan – our research suggests that this only fuels their readiness to accept untrue rumors," Kosloff said.

"As his job rating goes down, suggesting that people feel like he's not ideologically on their side, we see an increase in this irrational belief that he's a Muslim," he added. "Unfortunately, in America, many people dislike Muslims so they'll label Obama as Muslim when they feel different from him."

*The study was done with researchers from the University of Arizona, the University of British Columbia and Leiden University in the Netherlands.*

## They Crawl, They Bite, They Baffle Scientists

**By DONALD G. McNEIL Jr.**

Don't be too quick to dismiss the common bedbug as merely a pestiferous six-legged blood-sucker.

Think of it, rather, as Cimex lectularius, international arthropod of mystery.

In comparison to other insects that bite man, or even only walk across man's food, nibble man's crops or bite man's farm animals, very little is known about the creature whose Latin name means - go figure - "bug of the bed." Only a handful of entomologists specialize in it, and until recently it has been low on the government's research agenda because it does not transmit disease. Most study grants come from the pesticide industry and ask only one question: What kills it?

But now that it's The Bug That Ate New York, Not to Mention Other Shocked American Cities, that may change.

This month, the Environmental Protection Agency and the Centers for Disease Control and Prevention issued a joint statement on bedbug control. It was not, however, a declaration of war nor a plan of action. It was an acknowledgment that the problem is big, a reminder that federal agencies mostly give advice, plus some advice: try a mix of vacuuming, crevice-sealing, heat and chemicals to kill the things.

It also noted, twice, that bedbug research "has been very limited over the past several decades."

Ask any expert why the bugs disappeared for 40 years, why they came roaring back in the late 1990s, even why they do not spread disease, and you hear one answer: "Good question."

"The first time I saw one that wasn't dated 1957 and mounted on a microscope slide was in 2001," said Dini M. Miller, a Virginia Tech cockroach expert who has added bedbugs to her repertoire.

The bugs have probably been biting our ancestors since they moved from trees to caves. The bugs are "nest parasites" that fed on bats and cave birds like swallows before man moved in.

That makes their disease-free status even more baffling.

(The bites itch, and can cause anaphylactic shock in rare cases, and dust containing feces and molted shells has triggered asthma attacks, but these are all allergic reactions, not disease.)

Bats are sources of rabies, Ebola, SARS and Nipah virus. And other biting bugs are disease carriers - mosquitoes for malaria and West Nile, ticks for Lyme and babesiosis, lice for typhus, fleas for plague, tsetse flies for sleeping sickness, kissing bugs for Chagas. Even nonbiting bugs like houseflies and cockroaches transmit disease by carrying bacteria on their feet or in their feces or vomit.

But bedbugs, despite the ick factor, are clean. Actually it is safer to say that no one has proved they aren't, said Jerome Goddard, a Mississippi State entomologist.

But not for lack of trying. South African researchers have fed them blood with the AIDS virus, but the virus died. They have shown that bugs can retain hepatitis B virus for weeks, but when they bite chimpanzees, the infection does not take. Brazilian researchers have come closest, getting bedbugs to transfer the Chagas parasite from a wild mouse to lab mice. "Someday, somebody may come along with a better experiment," Dr. Goddard said.

That lingering uncertainty has led to one change in lab practice. The classic bedbug strain that all newly caught bugs are compared against is a colony originally from Fort Dix, N.J., that a researcher kept alive for 30 years by letting it feed on him.

But Stephen A. Kells, a University of Minnesota entomologist, said he "prefers not to play with that risk."

He feeds his bugs expired blood-bank blood through parafilm, which he describes as "waxy Saran Wrap."

Coby Schal of North Carolina State said he formerly used condoms filled with rabbit blood, but switched to parafilm because his condom budget raised eyebrows with university auditors.

Why the bugs disappeared for so long and exploded so fast after they reappeared is another question. The conventional answer - that DDT was banned - is inadequate. After all, mosquitoes, roaches and other insects rebounded long ago.

Much has to do with the bugs' habits. Before central heating arrived in the early 1900s, they died back in winter. People who frequently restuffed their mattresses or dismantled their beds to pour on boiling water - easier for those with servants - suffered less, said the bedbug historian Michael F. Potter of the University of Kentucky.

Early remedies were risky: igniting gunpowder on mattresses or soaking them with gasoline, fumigating buildings with burning sulfur or cyanide gas. (The best-known brand was Zyklon B, which later became infamous at Auschwitz.)

Success finally arrived in the 1950s as the bugs were hit first with DDT and then with malathion, diazinon, lindane, chlordane and dichlorovos, as resistance to each developed. In those days, mattresses were sprayed, DDT dust was sprinkled into the sheets, nurseries were lined with DDT-impregnated wallpaper.

In North America and Western Europe, "the slate was virtually wiped clean," said Dr. Potter, who has surveyed pest-control experts in 43 countries. In South America, the Middle East and Africa, populations fell but never vanished. The bugs also persisted on domestic poultry farms and in a few human habitations.

One theory is that domestic bedbugs surged after pest control companies stopped spraying for cockroaches in the 1980s and switched to poisoned baits, which bedbugs do not eat.

But the prevailing theory is that new bugs were introduced from overseas, because the ones found in cities now are resistant to different insecticides from those used on poultry or cockroaches.

Exactly where they came from is a mystery. Dr. Schal is now building a "world bedbug collection" and hopes to produce a global map of variations in their genes, which might answer the question.

Experts say they've heard blame pinned on many foreign ethnic groups and on historic events from the fall of the Berlin Wall to the Persian Gulf war to the spread of mosquito nets in Africa. Every theory has holes, and many are simply racist.

(For example, Dr. Potter said, he has heard Mexicans blamed, but Mexican pest control companies he contacted said they rarely see the bugs except in the homes of people returning from the United States, often with scavenged furniture.)

Pest-control companies say hotels, especially airport business hotels and resorts attracting foreign tourists, had the first outbreaks, said both Dr. Potter and Richard Cooper, a pest-control specialist.

Whatever the source, the future is grim, experts agreed. Many pesticides don't work, and some that do are banned - though whether people should fear the bug or the bug-killer more is open to debate.

"I'd like to take some of these groups and lock them in an apartment building full of bugs and see what they say then," Dr. Potter said of environmentalists.

Treatment, including dismantling furniture and ripping up rugs, is expensive. Rather than actively hunting for bugs, hotels and landlords often deny having them.

Many people are not alert enough. (Both Mr. Cooper and Dr. Goddard said they routinely pull apart beds and even headboards when they check into hotels. Dr. Goddard keeps his luggage in the bathroom. Mr. Cooper heat-treats his when he gets home.)

Some people overreact, even developing delusional parasitosis, the illusion that bugs are crawling on them.

"People call me all the time, losing their minds, like it's a curse from God," Dr. Miller said.

The reasonable course, Dr. Goddard said, is to recognize that we are, in effect, back in the 1920s "Sleep tight, don't let the bedbugs bite" era. People should be aware, but not panicky.

However, he added, "I don't even know what to say about them being in theaters. That's kind of spooky."

Well, he was asked - can you feel them bite?

"No," he said. "If I put them on my arm and close my eyes, I never feel them. But I once got my children to put them on my face, and I did. Maybe there are more nerve endings."

Why in the world, he was asked, would he ask kids to do that?

"Oh, you know," he said. "Bug people are crazy."

## Pivotal Study Finds Link between PTSD and Dementia

### *More Study Needed to Determine Why Veterans with PTSD Are More at Risk Than Others*

31 August 2010 Wiley – Blackwell - Results of a study reported in the September issue of the Journal of the American Geriatrics Society suggest that Veterans with post-traumatic stress disorder (PTSD) have a greater risk for dementia than Veterans without PTSD, even those who suffered traumatic injuries during combat.

Exposure to life threatening events, like war, can cause PTSD, and there are high rates among veterans. PSTD includes symptoms such as avoiding things or people that remind a person of the trauma, nightmares, difficulty with sleep, and mood problems.

"We found Veterans with PTSD had twice the chance for later being diagnosed with dementia than Veterans without PTSD," said Mark Kunik, M.D., M.P.H., a psychiatrist at the Michael E. DeBakey VA Medical Center, Texas, USA, and senior author of the article. "Although we cannot at this time determine the cause for this increased risk, it is essential to determine whether the risk of dementia can be reduced by effectively treating PTSD. This could have enormous implications for Veterans now returning from Iraq and Afghanistan."

The study included 10,481 Veterans at least 65 years of age who had been seen at the VA Medical Centre at least twice between 1997 and 1999. Outpatient data were gathered for all identified patients until 2008. Subjects who had been wounded during combat (with and without a PTSD diagnosis) were also identified to provide a group with confirmed injuries and combat experience. A group with two visits, but no PTSD or combat related injuries, was identified for purposes of comparison.

36.4% of the Veterans in this study had PTSD. 11.1% of those with PTSD but not injured, and 7.2% of those with PTSD and injured, had dementia, compared to 4.5% and 5.9% respectively in the non-PTSD groups. These results remained significant after other risk factors of dementia were taken into account like diabetes, hypertension, heart disease, stroke, etc.

"Despite the increased risk for those with PTSD, it is noteworthy that most Veterans with PTSD did not develop dementia during the period we studied," said Salah Qureshi, M.D., a staff psychiatrist and investigator with the Houston VA Center of Excellence and first author of the article."It will be important to determine which Veterans with PTSD are at greatest risk and to determine whether PTSD induced by situations other than war injury is also associated with greater risk."

The authors note there could be several explanations for their findings. It could be that cognitive impairment in PTSD is an early marker of dementia, having PTSD makes one more likely to get dementia, or PTSD and dementia have some characteristics in common. They emphasize the need for further study with a broader sample in the civilian population.

In an editorial accompanying this paper, Dr. Soo Borson of the University of Washington Medical Centre, Washington, highlights the need for further research to explain the association and also the wider significance of these findings, "Confirmation of a causal link between PTSD and cognitive impairment in late life would have enormous global implications in a world facing a rising societal burden of dementia, a shrinking workforce to sustain its economies, and the difficulties of containing human violence. Soldiers and other U.S. war veterans are just one of many groups exposed to deeply traumatizing experiences with lifetime effect."

** Full bibliographic informationFull citation: Qureshi SU et al; Greater Prevalence and Incidence of Dementia in Older Veterans with Posttraumatic Stress Disorder; Journal of the American Geriatrics Society, 2010; DOI: 10.1111/j.1532-5415.2010.02977.x*

*Editorial: Borson S; Posttraumatic Stress Disorder and Dementia: A Lifelong Cost of War?; Journal of the American Geriatrics Society, 2010; DOI: 10.1111/j.1532-5415.2010.03050.x*

## Drinking a glass of milk can stop garlic breath

### *If you are worried about garlic breath, drink a glass of milk, say scientists who claim it can stop the lingering odour.*

In tests with raw and cooked cloves, milk "significantly reduced" levels of the sulphur compounds that give garlic its flavour and pungent smell. The authors told the Journal of Food Science it is the water and fat in milk that deodorises the breath.

Mixing milk with garlic in the mouth before swallowing had a higher odour neutralising effect than drinking milk after eating the garlic in the trial. And full-fat milk provided better results than skimmed milk or just water, according to breath samples taken from a volunteer.

One of the compounds milk counteracts is allyl methyl sulphide or AMS. This cannot be broken down in the gut during digestion, and so it is released from the body in the breath and sweat.

Although garlic is good for you - containing several vitamins and minerals - once eaten, it can cause bad breath and body odour lasting hours or even days.

Plain water, and some foods, such as mushrooms and basil, may also help neutralise garlic smells, the study authors Sheryl Barringer and Areerat Hansanugrum say.
But it is the mixture of fat and water together that works best, the Ohio State University team say. "The results suggest that drinking beverages or foods with higher water and/or fat content such as milk may help reduce the malodorous odour in breath after consumption of garlic and mask the garlic flavour during eating," they say.

## Why Older People Repeat Stories

**By LiveScience Staff**

There may be a reason grandparents repeat the same stories over and over again. According to a new study, older people are more likely than younger people to forget with whom they've shared information.

The study investigated two types of memory: source memory, or your recollection of who told you a piece of information; and destination memory, which is your recollection of which people you've informed. Not only were older people bad at remembering to whom they'd told information, they were very confident in their mistaken memories.

"Older adults are additionally highly confident, compared to younger adults, that they have never told people particular things when they actually had," study co-author Nigel Gopie, a cognitive scientist at the Rotman Research Institute in Toronto, said in a statement. "This over-confidence presumably causes older adults to repeat information to people."
To investigate the effects of aging on destination and source memory, researchers recruited 40 college students between the ages of 18 to 30, and 40 older adults between the ages of 60 to 83. In one experiment, participants read 50 facts aloud to the images of 50 celebrities on a computer screen. Next, they were asked to remember which fact they told to which person. For example, they might have told a picture of Oprah Winfrey that "A dime has 118 ridges around it." This experiment measured destination memory: Whom did you tell what?

In the second study, the "celebrities" read the facts to the participants, who then had to remember which celebrity told them each fact. This experiment measured source memory: Who told you what?

The results suggested that aging has little effect on source memory. Young people scored about 60 percent when recalling who told them what, while old people scored 50 percent. However, in the destination-memory experiment, older adults scored 21 percentage points lower than younger adults.

The researchers suspect that older adults are more prone to destination-memory failure because they lose the ability to focus and pay attention with age. In other words, older adults use so much of their attention sharing the information, they forget to take notice of whom they were talking to when they shared it.

But lack of focus can also boost memory: A study published in January in the journal Psychological Science showed older people have the unique ability to "hyper-bind" the irrelevant information gleaned when they get distracted, essentially tying it to other information that is appearing at the same time.

## Homeopathy Shake-Up Goes Global

**By Christopher Wanjek,** LiveScience's Bad Medicine Columnist posted: 01 September 2010 08:54 am ET

When is a sugar pill deadly? When it is substituted for real medicine, the Japanese public has come to understand.

The Japanese government is investigating numerous deaths that occurred over the past year resulting from the practice of homeopathy, which has been growing in popularity, particularly among midwives. Several lawsuits are pending.

Deaths include a 2-month-old baby girl born with a vitamin K deficiency, whose mother's midwife administered a homeopathic treatment instead of the much-needed vitamin K injection, well-known to prevent hemorrhaging. The infant died from bleeding in the skull.

As more cases surface, the nation's top science group, the Science Council of Japan, has weighed in, with its president, Ichiro Kanazawa, stating at a press conference on Aug. 24 that "homeopathy's therapeutic value has been scientifically and utterly disproved." Homeopathy treatments are nothing more than sugar pills, he said.

Japan may soon join Switzerland and Germany, where governments have concluded that homeopathy is ineffective; national health insurance no longer reimburses for homeopathic treatments there. (Ironically, homeopathy originated in Germany 200 years ago.)

Other European nations might follow suit, too. After a scathing report on homeopathy by the U.K. House of Commons Science and Technology Committee in February 2010, the British Medical Association this August called upon the U.K. National Health Service to refuse payments for homeopathy, to eliminate funding for homeopathic hospitals, and to otherwise instruct doctors to not prescribe, refer, or recommend homeopathy to patients.

**Natural or supernatural**

Is this big medicine beating up the little herbal practitioner? Not at all. The biggest misconception is that homeopathy is herbal medicine. Herbs have therapeutic value. Homeopathy, however, is devoid of herbs or anything medicinal.

Homeopathic medicines might start with an herb or mineral. Oscillococcinum, the top homeopathic flu remedy, starts with duck liver. Remedies are diluted in 10- or 100-parts water over and over again, based on centuries' old recipes, until there is no longer any original ingredient.

So, the second biggest misconception is that homeopathic pills contain minute concentrations of medicine. Often the news media use the words "highly diluted" when in fact homeopathy is just highly delusional.

Oscillococcinum, for example, has a 200C concentration: One part duck offal was mixed with 100 ("C") parts water; this dilution was added to more water at a 1-to-100 ratio; and the process was repeated another 199 times. In the end, there is one part duck in 100 to the 200th power (or 1 followed by 400 zeroes) parts water.

You are left with simply water. Even the more "concentrated" homeopathic medicines - 24X, or 10 to the 24th parts water - amount to a pinch of medicine sprinkled in the Atlantic Ocean.

Homeopathic practitioners don't deny this little discord with physics. Homeopathy was developed before the troublesome concepts of atoms and molecules. The argument now is that the homeopathic solutions coated upon sugar pills remember the shape of the medicine they once contained.

Alas, this too violates reality. A water molecule's shape is distorted by other molecules for mere picoseconds before settling back to normal; there's no water memory. If this were the case, all water on the planet would be a homeopathic treatment for every ailment, because it once touched every herb, mineral, or animal liver in the homeopathy canon.

You have a homeopathic treatment for food poisoning (arsenic at 24X) coming out of your faucet, provided you cut it a few times with pure water.

**Proof or placebo**

Plenty of studies show how homeopathy can work; many show how prayer or psychic distance healing can work, too. Homeopathy is rather effective for ailments that go away on their own, such as diarrhea and colds. As documented in the February House of Commons report, homeopathy is shown to be less and less effective as studies get better and better. This same sentiment has been supported by thorough analyses by doctors in Switzerland and Germany and, for that matter, by the U.S. National Center for Complementary and Alternative Medicine, once led by a homeopath, which concludes there's little evidence to support homeopathy for anything.

Unlike many other fields of alternative medicine, dominated by quacks and frauds, homeopathy tends to attract intelligent health practitioners who truly believe in the efficacy of the treatments. Maybe homeopathy is an effective placebo. In that case, if you want the sugar pills to work, forget you read this article.

But please, don't trust homeopathy for your baby.

## Psychoactive drugs: From recreation to medication

*** 01 September 2010 by Catherine de Lange**

FROM the relaxing effects of cannabis to the highs of LSD and ecstasy, illegal drugs are not generally associated with the lab bench. Now, for the first time in decades, that is starting to change.

For almost 40 years, mainstream research has shied away from investigating the therapeutic benefits of drugs whose recreational use is prohibited by law. But a better understanding of how these drugs work in animal studies, and the advancement of brain-imaging techniques, has sparked a swathe of new research. What's more, clinical trials of MDMA (ecstasy), LSD and other psychoactive drugs are starting to yield some positive results. This could lead to a call for governments to take a new approach to the funding and regulation of research into the potential benefits of such chemicals.

LSD was developed in the 1940s (see "The highs and lows of LSD") but by the 1970s it and many other drugs became classed as schedule 1 in many countries - described as "abuse" drugs with no accepted medical use. "Research on psychedelics was severely restricted and interest in the therapeutic use of these drugs faded," says Franz Vollenweider of the neuropsychopharmacology and brain-imaging unit at the Zurich University Hospital of Psychiatry, Switzerland.

The classification of LSD as schedule 1 was a mistake born of "ignorance and taboo", says Amanda Feilding, director of the Beckley Foundation, a charitable trust that promotes investigation into consciousness and its modulation, based in Oxford, UK.

These kinds of decisions are political not scientific, says Michael Mithoefer, a psychiatrist in Mount Pleasant, California. "When the US Drug Enforcement Agency held hearings about MDMA, the judge ruled it

did not meet criteria for schedule 1 and should be schedule 3, so it could be used by physicians but not sold in bars. The DEA administrator put it in schedule 1 despite it not meeting the criteria."

Despite these hurdles, a number of trials are now under way in the US and Switzerland to investigate the potential of LSD and psilocybin - the psychoactive component of magic mushrooms - in helping terminal cancer patients deal with anxiety and depression.

Feilding is also working with David Nutt of Imperial College London on the first UK study using psychedelics for 40 years. Among other things, they are researching how psilocybin can help in recalling distant memories, which they say could help with psychotherapy following trauma.

Meanwhile, in a study at Johns Hopkins University in Baltimore, Maryland, funded by the Beckley Foundation, Roland Griffiths and colleagues have seen positive results in their study into the use of psilocybin as an aid to psychotherapy to treat tobacco addiction. At Hanover Medical School in Germany, a team led by Matthias Karst has been investigating whether bromo-LSD - a non-psychoactive form of the drug - can be used to treat painful cluster headaches.

Cannabis is already known to have a soothing effect on the symptoms of multiple sclerosis. Canada recently approved the use of Sativex - derived from cannabis plant extracts - for relief of spasticity in adults with MS. This week saw the publication of the first study suggesting that smoking cannabis can also reduce neuropathic pain, caused by damage to the nervous system.

Mark Ware and colleagues at McGill University in Montreal, Canada, gave patients suffering from chronic pain one of three different doses of cannabis, or a placebo. On average, patients reported lower pain intensity and a better quality of sleep when they smoked the highest dose of cannabis compared with the placebo, and the reported side effects were minimal (Canadian Medical Association Journal, DOI: 10.1503/cmaj.091414).

"Previous studies have looked at cannabis and pain, but this is the first one I've seen looking at smoked cannabis," says Tony Dickinson, a pharmacologist at University College London. Although there were only 21 participants, and smoking of course raises health issues, the study is nevertheless important, Dickinson says, because neuropathic pain is notoriously resistant to other forms of treatment.

While many drugs could have medical uses, don't their psychoactive effects limit their use? Feilding doesn't think so. LSD, psilocybin and MDMA are neither addictive nor dangerous in controlled doses, she argues. Others disagree. "The psychiatric risks of these substances are well known," says Ken Checinski, who studies addictive behaviour at St George's, University of London. "There may be a narrow therapeutic window between potential benefits and significant adverse events."

However, this problem isn't unique to psychoactive drugs. "We use many things in medicine that can be misused and be very dangerous in the wrong doses," says Mithoefer. Feilding thinks governments need to see past the stigma of schedule 1 drugs and fund medical research that could be "very valuable".

Some funding organisations already exist, including the Beckley Foundation, and the Multidisciplinary Association for Psychedelic Studies in the US. Their funds are limited, though. "As research progresses, larger studies will get more expensive and it would be most helpful to have government funding," Mithoefer says.

His latest study investigated whether MDMA could help people suffering from post-traumatic stress disorder (PTSD). MDMA decreases the fear response, so he reasoned it might help people undergo therapy "without being overwhelmed by anxiety while revisiting traumatic experiences".

Of the 12 patients who received the drug, 10 saw such an improvement in their symptoms that they were no longer categorised as suffering from PTSD, compared with two out of the eight patients who received a placebo (Journal of Psychopharmacology, DOI: 10.1177/0269881110378371).

Government funding may still be some way off, though. For one thing, it is hard to design an effective double-blind trial when the secondary effects of the drug are so well known, says Dickinson. In Mithoefer's study, for example, all but one of the patients correctly guessed whether they were receiving the placebo or MDMA.

"There is much to be learned and we're still in the early stages," Mithoefer says, "but it's important that the research moves forward so we can establish whether or not [psychoactive drugs] can be safe and effective therapeutic tools."

**The highs and lows of LSD**

"With a remarkable restlessness and slight dizziness, I sank into a not unpleasant intoxicated-like condition. In a dreamlike state, I perceived an uninterrupted stream of fantastic pictures, extraordinary shapes with intense, kaleidoscopic colours."

This is the description of the first LSD trip taken by Albert Hofmann, the inventor of the drug, in 1943.

He initially developed LSD in 1938 on the premise that it may act as a circulatory and respiratory stimulant. Working as a chemist at Sandoz Laboratories (now Novartis) in Basel, Switzerland, Hofmann shelved the

compound - known as LSD-25 - after it had no obvious effects in mice. Five years later, while re-synthesising the drug, he was interrupted by the unusual activity described above.

Realising the symptoms must have occurred from inhalation or absorption of LSD-25, Hofmann took an oral dose of the chemical, estimating that 250 micrograms would be the threshold at which effects would occur. In reality, the threshold is closer to 20 micrograms. After 6 hours of positive and negative experiences, which involved thinking his neighbour was "an insidious witch", the effects subsided.

"I was aware that LSD, with such properties, would be of use in pharmacology, in neurology, and especially in psychiatry," Hofmann wrote in his biography.

Over the next 20 years, thousands of papers were published on the drug's effects, including treatment for alcohol addiction and psychosis. Several positive outcomes were also reported for the treatment of autism, such as an increase in social behaviours manifested by increased eye-to-face contact (Behavioral Neuropsychiatry, vol 1, p 44).

Unfortunately many of the studies lacked proper experimental controls and presented largely descriptive data. The lack of long-term follow-up studies and a realistic placebo have been major limitations of the work to date.

The drug quickly leaked into the general population, which led to an investigation by the US Food and Drug Administration, and in 1970, LSD was classified as a drug of abuse with no medical value. Research into any therapeutic effects stopped.

Today, many researchers believe that LSD poses no risk to health when administered in a controlled environment and that the case for medicinal LSD should be reopened (see main story). **Helen Thomson**

## Old star wallows in 'steam bath'

**By Jonathan Amos** Science correspondent, BBC News


Europe's Herschel space telescope has looked on as an old giant star wallows in a "steam bath". CW Leonis, sited some 500 light-years from Earth, has long been known to be surrounded by a shroud of water. But Herschel's exquisite ability to track the molecule in space means it can show the water lies close in to the star and reaches a sweltering 700C. Scientists tell the journal Nature that ultraviolet light from nearby stars is driving the production of water vapour.

"Herschel really is the most amazing water detector," lead researcher Dr Leen Decin from the Katholieke Universiteit Leuven, Belgium, told BBC News.

***CW Leonis may be twice a massive as our Sun but its radius is about 250 times bigger*(ESA/PACS/SPIRE/MESS Consortia)**

The presence of a gigantic cloud of water around CW Leonis was originally detected in 2001 by the Submillimeter Wave Astronomy Satellite (Swas). At first, scientists thought the water could have come from comets, or even planets, that had been obliterated by this puffed up star.

The idea that the water could be being produced around the star itself did not seem plausible because CW Leonis had reached a stage in its life when its ageing nuclear core was churning out colossal quantities of carbon. This "sooty exhaust" would have been expected to take up any free oxygen in the vicinity of the star to make carbon monoxide - a very stable molecule.

But Herschel's PACS and SPIRE instruments have a remarkable sensitivity to water, seeing it in many different states of excitement. These spectrometers were able to confirm that CW Leonis' water was present very close in to the star, all the way down to near its surface - far too close to have come from comets.

"The abundances are high in all the excitation lines," explained co-author Professor Mike Barlow of University College London, UK.

"You can call it water vapour and it's everything from cool, to warm, to hot - right up to levels where you need temperatures of 1,000 kelvin or so (725C)."

The scientists working on Herschel propose that a previously unsuspected chemical process is at work, one in which ultraviolet light from nearby bright, hot stars is breaking up the carbon monoxide and releasing its oxygen atoms to join up with hydrogen and form water molecules.

In an aged star like CW Leonis, which is also throwing off a large envelope of gas and dust, such a chemical process ought normally to be blocked - the UV light should be prevented from getting through to the carbon monoxide to work on it. But Herschel and other telescopes have shown the stellar wind billowing away from CW Leonis to be extremely clumpy, allowing the UV light to penetrate deep in towards the star and trigger the production of water.

"This is really exciting, since it is the first time that we have seen a lot of carbon and water molecules co-existing close to a very luminous, but dying, star," said Dr Decin. Carbon and water are two of the major the building blocks for life as we know it on Earth. The same mechanisms triggered by ultraviolet light might have played a crucial role in prebiotic processes on the early Earth."

The European Space Agency's (Esa) Herschel observatory was launched in 2009.

Its quest is to study how stars and galaxies form, and how they evolve through cosmic time.

Herschel carries the largest mirror (3.5m) ever sent into space. Its instruments are sensitive to light at long wavelengths - in the far-infrared and sub-millimetre range. By getting above the Earth's water-filled atmosphere, the telescope is able to study the molecule's prominence elsewhere in the Universe.

## Brain Exercises Can Delay Mental Decline, But Then Watch Out

**By Jeanna Bryner**, LiveScience Managing Editor

Brain exercises may keep cognitive decline at bay longer, but once dementia hits it mysteriously seems to progress faster than if it hadn't been postponed, according to an ongoing study that began in 1993.

"Our results suggest that the benefit of delaying the initial signs of cognitive decline may come at the cost of more rapid dementia progression later on, but the question is: Why does this happen?" said study researcher Robert S. Wilson, of the Rush University Medical Center in Chicago.

Mentally stimulating activities, such as crossword puzzles and reading, seem to keep the brain functioning relatively normally for a while despite the buildup of the plaques and tangles in the brain that are linked with dementia. However, there seems to be a threshold, after which a person's brainy lifestyle can't hold off the outward signs of dementia, the researchers say.

**How often do you read?**

For their study, Wilson and his colleagues enlisted 1,157 people, all at least 65 years old and with no signs of dementia, and then evaluated their mental activities over the years.

At the study's start, participants indicated on a 5-point scale how often they participated in seven activities: viewing television, listening to radio; reading newspapers; reading magazines; reading books; playing games like cards or doing puzzles; and going to museums. (A rating of 5 meant a person did some of these activities about every day; 3 meant several times a month; 1 meant once a year or less.)

About every three years, clinical evaluations were used to determine signs of dementia, mild cognitive impairment and Alzheimer's disease. (Dementia is a decline in mental capabilities, especially memory, which is primarily caused by Alzheimer's disease but also can be the result of Parkinson's disease, stroke, or infections in the brain.)

During the first six years of the study, the researchers determined the number of individuals who had developed mild cognitive impairment, Alzheimer's, or no cognitive impairment. Then, they followed them for another six years and found that the rate of inevitable decline in those people still without cognitive impairment was reduced by 52 percent each subsequent year for each point they scored on the cognitive activity scale.

But, perhaps surprisingly, for people who had developed Alzheimer's disease at the first six-year point (which accounted for about 90 percent of the dementia diagnoses), the average rate of decline per year actually increased by 42 percent for each point they scored on the cognitive activity scale.

"Actually, the person with a cognitively active lifestyle has more severe disease than it appears when dementia is first diagnosed, and they decline more rapidly thereafter," Wilson said.

**Why reading delays brain decline**

"There's been a long debate as to why people with a cognitively active lifestyle are less likely to experience cognitive decline," Wilson told LiveScience.

One idea is that keeping the brain active protects against the decline, while another school of thought proposes that people who are less cognitively active are really showing early signs of the disease (and so decreasing cognitive activity is just a consequence of cognitive decline). In fact, past research has suggested people who have healthier brains are more likely to read and practice other mind-enhancing activities.

The longitudinal study - meaning one in which participants are followed over time - is part of the Chicago Health and Aging Project, focusing on risk factors for Alzheimer's disease in four Chicago neighborhoods.

The latest findings suggest the protective effect may be at work. Essentially, the plaques and tangles are still forming on the brain, but people who stay cognitively active don't show signs of those brain plaques until later.

The researchers aren't sure what's going on in the brain to keep decline at bay for cognitively active people. But past brain-imaging studies offer clues.

One study over a three-year period of German medical students cramming for a sort of final exams found that their brains' hippocampus and neocortex had grown, Wilson said. Another study, focusing on jugglers, revealed corresponding changes in the parts of the brain devoted to juggling.

The size increase in various brain regions means that some people will have an extra buffer for the cognitive decline that inevitably comes with age. Or as Wilson puts it, the beefed-up brain regions give you "a little more mileage out of what you have."

**Keeping your mind sharp**

It's not too late for those who are creeping into old age to ward off the onset of mental deterioration, Wilson said. [Play brain-training games.]

Wilson wouldn't recommend just mindless crossword puzzling; clues from neuro-imaging studies suggest the activities that make a difference in brain-boosting are the ones practiced regularly and intensively.

"They need to be challenging activities and also intriguing or fun to the individual," Wilson said. He added: "Any activity that involves reading is a good place to start."

The study, supported by the National Institute on Aging and the National Institute of Environmental Health Sciences, was published online Sept. 1 in the journal Neurology.

## Multiple Sclerosis Activity Changes With the Seasons, Research Finds

ScienceDaily (Aug. 31, 2010) - New research shows that multiple sclerosis (MS) activity can increase during spring and summer months. The research is published in the August 31, 2010, issue of Neurology®, the medical journal of the American Academy of Neurology.

"Our results showed that the appearance of lesions on brain scans was two to three times higher in the months of March to August, compared to other months of the year," said study author Dominik Meier, PhD, of Brigham and Women's Hospital in Boston and a member of the American Academy of Neurology.

For the study, researchers compared MRI brain scans of 44 people taken from 1991 to 1993 to weather data from the same time period. Participants were between the ages of 25 and 52 with untreated MS. Each person had eight weekly scans, then eight scans every other week followed by six monthly check-ups, for an average of 22 scans per person. Weather information included daily temperature, solar radiation and precipitation measurements for the Boston area.

After one year, 310 new lesions were found in 31 people. Thirteen people had no new lesions during the study. "Not only were more lesions found during the spring and summer seasons, our study also found that warmer temperatures and solar radiation were linked to disease activity," said Meier. There was no link found between precipitation and lesions.

"This is an important study because it analyzes records from the early 1990's, before medications for relapsing MS were approved, so medicines likely could not affect the outcome. A study like this probably won't be able to be repeated," said Anne Cross, MD, with the Washington University School of Medicine in St. Louis, who wrote an editorial about the study. Cross is also a member of the American Academy of Neurology. "Future studies should further explore how and why environmental factors play a role in MS."

One significant aspect of the research is that clinical trials often use MRI to assess the effectiveness of a drug and studies commonly last between 6 and 12 months. If the study ran from spring to winter, it might appear that lesions decreased due to drug effect but the cause might just be change of season. The opposite would occur if a study started in winter and lasted through the spring and summer.

## Study challenges value of oxygen therapy in end-of-life care

DURHAM, N.C. – Millions of patients with advanced disease in palliative care settings receive oxygen therapy to help them breathe more easily. But a new study from Duke University Medical Center says roughly half of them don't benefit from the intervention, and among those who do benefit, it doesn't make a bit of difference whether they get pure oxygen or just plain old room air – both offer equal benefit.

"Offering oxygen when patients begin experiencing shortness of breath has become standard care in many places, but the practice is not based on rigorous scientific investigation," says Dr. Amy Abernethy, an oncologist and palliative care expert in the Duke Comprehensive Cancer Center and the lead author of the study appearing in the Sept. 3 issue of The Lancet. "We needed to do a study like this one to find out if what has become customary is actually meaningful and appropriate."

Abernethy says shortness of breath (also known as dyspnea) is a common symptom in very advanced stages of many diseases and disorders. Researchers say the problem is reported in 65 percent, 70 percent and 90 percent of patients nearing the end of life suffering from heart failure, lung cancer and chronic obstructive pulmonary disease, respectively. Shortness of breath is distressing for patients and their families as well, making normal activities like walking, talking, and socializing difficult. "So it is important to address it," says Abernethy.

The question becomes when and how. Clinical guidelines recommend oxygen when blood oxygen levels fall so low that a patient becomes hypoxic – when there isn't enough oxygen in the blood to keep vital functions going. But there are large numbers of patients whose oxygen levels haven't fallen into the danger zone but who experience difficulty breathing and feel they need help. "In situations like these, physicians tend to use

palliative oxygen treatment out of compassion," says Abernethy. "The decision is not based on clear evidence about what do to because we haven't had any. There's never been a large, meaningful study on the role of oxygen therapy to treat unrelenting shortness of break in this population until now."

Abernethy led a multinational team of scientists in studying 239 patients in outpatient clinics in the U.S., Australia and the U.K. who were randomized to receive either oxygen or room air for one week to see if would help ease their breathing. Most of the participants had advanced chronic obstructive pulmonary disease, but some also had had lung cancer, heart failure, or other disorders.

Participants were given canisters and fitted with nasal tubes that would deliver either oxygen or room air at the nose. Neither the patients nor their caregivers knew who was getting which therapy. Participants were instructed to keep diaries of the experience and to rate any change in their symptoms using a 1 to 10 scale twice daily.

Just over half of the patients in both groups reported that the interventions offered some degree of relief. Both treatments led to equal overall improvement in shortness of breath with corresponding change in quality of life and sleep. And when improvement occurred, it came quickly – for most, within three days.

"Interestingly, for the approximately half of study participants who reported a benefit, we found it didn't make any difference if they got oxygen or just room air," says Abernethy. "The same percentage of patients in both groups reported the same degree of relief from each treatment, so we have to conclude that supplemental oxygen isn't necessary and delivering air by the nose works just as well."

Abernethy says what is clear is that some sort of air rushing near the nose does indeed help some people. But she points out that the same level of relief might be accomplished by using something as simple as a small fan. "It would certainly be less cumbersome and less costly."

"It's important to understand that we are not suggesting that physicians abandon medical gas therapy. It may indeed be helpful. But this study tells us that it is not the oxygen itself that is making the difference, and if treatment is not improving symptoms after a few days, then it's ok to stop treatment and try something else.

The old adage just isn't true that stopping palliative oxygen is akin to removing a sustaining, meaningful treatment when people are most vulnerable."

Abernethy says that when it comes to care toward the end of life, timing matters more than ever. "We need to be smarter at what we do for our patients – and when we do it. As physicians, we only have a very short time to dip into our toolbox to find the right solution. It's studies like this that can help inform our decisions and ultimately give our patients the best care possible."

*The study was funded by grants from the National Institute on Aging of the NIH, the Australian National Health and Medical Research Council, the Duke Institute for Care at the End of Life and the Doris Duke Charitable Foundation.*

*Colleagues who contributed to the study include senior author David Currow, from Flinders University in Australia; James Herndon, James Tulsky, Jane Wheeler and Jennifer Marcello, from Duke; Christine McDonald, Katherine Clark, Iven Young, Peter Frith, and Alan Crockett, from Australia; Janet Bull of Four Seasons, Flat Rock, North Carolina; and Andrew Wilcock and Sara Booth from the U.K*

## Hormel Institute study reveals capsaicin can act as cocarcinogen

***Research links chemical in widely consumed foods to skin cancer***

The September cover story of the nation's leading cancer journal, "Cancer Research," features a new study from The Hormel Institute, University of Minnesota, that links capsaicin, a component of chili peppers, to skin cancer. While the molecular mechanisms of the cancer-promoting effects of capsaicin are not clear and remain controversial, The Hormel Institute has shown a definite connection to formation of skin cancer through various laboratory studies.

Ann Bode, professor in the institute's Cellular and Molecular Biology Research Section, led the research team on this study along with colleagues Mun Kyung Hwang and Zigang Dong.

Capsaicin, widely consumed worldwide in foods that contain chili peppers, is also used in topical creams for pain relief and its role in cancer development is controversial. Capsaicin has been shown to induce apoptosis (cell death) in cancer cells. However, research findings have also shown that it can also act as a carcinogen, especially at the tumor promotion stage.

Bode says the possibility that capsaicin induces inflammation and may affect cancer development is a critical result of the study. "Most notably, the results raise concerns that a natural compound found in hot peppers used in over-the-counter topical pain remedies might increase skin cancer risk," Bode says.

The study's key findings include:

* The co-carcinogenic effect of capsaicin appears to be mediated through the epidermal growth factor receptor (EGFR) and not the transient receptor potential vanilloid subfamily member 1 (TRPV1), a known pain receptor.

* Topical application of capsaicin on the dorsal skin of wildtype or TRPV1 knockout mice induced tumors in both types but more and larger skin tumors in the knockout mice.

* A known inflammatory enzyme, cyclooxygenase-2 (COX-2) was highly elevated following treatment with capsaicin.

*Other researchers working with Bode on this study included Sanguine Byun, Nu Ry Song, Hyong Joo Lee and Ki Won Lee. Funding for this research was provided by The Hormel Foundation, National Cancer Institute and the Korean Research Foundation.*

## For some women, preventive mastectomies pay off

### *Study shows women with BRCA1 and BRCA2 genetic mutations significantly reduce their risk of breast and ovarian cancer with preventive surgeries*

SAN ANTONIO, TX (Sept. 3) - A long-term study of women with a genetic predisposition for breast or ovarian cancer showed that those who elected major preventive surgeries had a significantly reduced risk of those cancers.

The study, published Sept. 1 in the Journal of the American Medical Association, confirms the view of one of its researchers, Gail Tomlinson, M.D., Ph.D., interim director of the Greehey Children's Cancer Research Institute at The University of Texas Health Science Center at San Antonio.

Dr. Tomlinson said that for women with certain genetic mutations, risk-reducing mastectomies and removal of the fallopian tubes and ovaries can be worth it for the women and their families. "We have believed this for 15 years," said Dr. Tomlinson, "but it's been so controversial - removing organs for cancer risk."

The idea can be jarring unless one considers that the women with the specific genetic mutations, BRCA1 and BRCA2, are seeing people in their family suffering from these cancers one after another, Dr. Tomlinson said. She noted that often these are women with young families and careers to worry about, and the worry about dying from cancer at an early age because of familial predisposition can be overwhelming.

"This is a compromise women are willing to accept and their husbands are willing to accept, because the whole family worries about whether the women are going to get breast cancer," Dr. Tomlinson said.

The study does not address quality of life issues after such radical surgery, and Dr. Tomlinson said that is a concern that must be weighed by the women and their families. But the relief of having that risk taken away is hard to measure.

The study also supports Dr. Tomlinson's effort to build a genetic program at the Cancer Therapy & Research Center at the UT Health Science Center, she said, noting that the first steps have been taken with the hiring of a genetic counselor to work with families at risk for cancer. It's a program that will have benefits across the generations, she said, helping people identify and deal with hereditary risks associated with more than just those two cancers.

In addition to breast and ovarian cancer, she said, "certain types of thyroid and kidney cancer run in families and early intervention can be lifesaving."

The study followed nearly 2,500 women at higher risk for breast or ovarian cancer because of two genetic mutations between 1974 and 2008 at 22 centers in Europe and North America.

In 247 women who chose risk-reducing mastectomies, no breast cancers were diagnosed, while one in 13 of the 1,372 who did not have the surgery were diagnosed with breast cancer. Women who had their ovaries and fallopian tubes removed had a lower risk of ovarian cancer, including those with prior breast cancer, and a lower risk of dying from either cancer.

*The Cancer Therapy & Research Center (CTRC) at The University of Texas Health Science Center at San Antonio is one of the elite academic cancer centers in the country to be named a National Cancer Institute (NCI) Designated Cancer Center, and is one of only four in Texas. A leader in developing new drugs to treat cancer, the CTRC Institute for Drug Development (IDD) conducts one of the largest oncology Phase I clinical drug programs in the world, and participates in development of cancer drugs approved by the U.S. Food & Drug Administration. For more information, visit www.ctrc.net.*

## Transition metal catalysts could be key to origin of life, scientists report

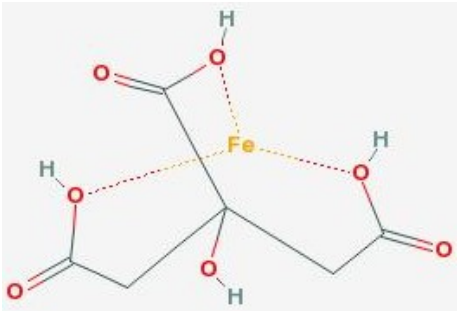
MBL, WOODS HOLE, MA - One of the big, unsolved problems in explaining how life arose on Earth is a chicken-and-egg paradox: How could the basic biochemicals - such as amino acids and nucleotides - have arisen before the biological catalysts (proteins or ribozymes) existed to carry out their formation?

In a paper appearing in the current issue of The Biological Bulletin, scientists propose that a third type of catalyst could have jumpstarted metabolism and life itself, deep in hydrothermal ocean vents.

According to the scientists' model, which is experimentally testable, molecular structures involving transition metal elements (iron, copper, nickel, etc.) and ligands (small organic molecules) could have catalyzed the synthesis of basic biochemicals (monomers) that acted as building blocks for more complex molecules, leading ultimately to the origin of life. The model has been put forth by Harold Morowitz of George Mason University (GMU), Vijayasarathy Srinivasan of GMU, and Eric Smith of the Santa Fe Institute.

"There has been a big problem in the origin of life (theory) for the last 50 years in that you need large protein molecules to be catalysts to make monomers, but you need monomers to make the catalysts," Morowitz says. However, he suggests, "You can start out with these small metal-ligand catalysts, and they'll build up the monomers that can be used to make the (large protein catalysts)."

A transition metal atom can act as the core of a metal-ligand complex, in which it is bound to and surrounded by other ligands. Morowitz and his colleagues propose that simple transition metal-ligand complexes in hydrothermal ocean vents catalyzed reactions that gave rise to more complex molecules. These increasingly complex molecules then acted as ligands in increasingly efficient transition metal-ligand complex catalysts. Gradually, the basic molecular ingredients of metabolism accumulated and were able to self-organize into networks of chemical reactions that laid the foundation for life.




***Ferric citrate is a structure formed from the transition metal iron and citrate, a compound produced by plants, algae, and many bacteria. Morowitz and his colleagues propose that structures like this could have catalyzed the formation of molecular building blocks, leading ultimately to the formation of complex molecules essential for the origin of life.***
**Harold Morowitz, George Mason University**

"We used to think if we could understand what carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur were doing, we would immediately be able to understand biology," Morowitz says, listing elements that constitute a large proportion of Earth's biomass. "But now we're finding that these other fairly rare elements, transition metals, are necessary in biology, so we ask, 'What was their role in the origin of life?'"

The proposal suggests that the rise of life forms is a natural consequence of the unique properties of transition metals and ligand field theory, which describes the characteristics of ligand complexes.

"The idea has emerged from a study of the periodic table. We strongly feel that unless you're able to see how life comes about in some formal chemical way, you're never really going to solve the problem," Morowitz says.

Morowitz and his colleagues are preparing experiments to test the catalytic properties of transition metal-ligand complexes built with different types of ligands. Ligands known to bind tightly to transition metals include molecules produced during the course of the reductive citric acid cycle, a series of biochemical reactions essential for many microorganisms.

"We think life probably began with the reductive citric acid cycle, and there is evidence that under hydrothermal vent conditions some of the cycle's intermediates form," Morowitz says. "We are going to start with these molecules and mix them with various transition metals, cook them at different temperatures for a while, and see what kinds of catalysts we've made."

Such experiments could reveal what kinds of catalytic reactions took place to lay the foundations for life. The hypothesis also allows for the possibility that life could have arisen more than once.

"Life could have originated multiples times, and, if we find life elsewhere in the universe, it could be very similar to the life we know here because it will be based on the same transition metals and ligands," Morowitz says. "It's a conjecture at the moment, but it could become a formal scientific core for the emergence of life."

***Citation:****Morowitz, H. J., Srinivasan, V., Smith, E. (2010) Ligand Field Theory and the Origin of Life as an Emergent Feature of the Periodic Table of Elements. Biol. Bull. 219: 1-6. For a copy of this paper, please contact Carol Schachinger at cschachi@mbl.edu or visit The Biological Bulletin online at www.biolbull.org.*

## Second super-fast flip of Earth's poles found

SOME 16 million years ago, north became south in a matter of years. Such fast flips are impossible, according to models of the Earth's core, but this is now the second time that evidence has been found.

The magnetic poles swap every 300,000 years, a process that normally takes up to 5000 years. In 1995 an ancient lava flow with an unusual magnetic pattern was discovered in Oregon. It suggested that the field at the time was moving by 6 degrees a day - at least 10,000 times faster than usual. "Not many people believed it," says Scott Bogue of Occidental College in Los Angeles.

Now Bogue and his colleague Jonathan Glen of the United States Geological Survey in Menlo Park, California, say they have found a second example in Nevada. The lava rock suggests that in one year, Earth's magnetic field shifted by 53 degrees (Geophysical Research Letters, DOI: 10.1029/2010GL044286). At that rate, a full flip would take less than four years, but there could be another interpretation. "It may have been a burst of rapid acceleration that punctuated the steady movement of the field," says Bogue.

Peter Olson of Johns Hopkins University in Baltimore, Maryland, remains sceptical and points out that the effects could have been local rather than global.

Earth is overdue for a reversal, and rapid shifts would cause widespread chaos - for navigation and migratory birds for instance.

## Humans with monkeypox virus cases rocket

**15:54 03 September 2010 by Debora MacKenzie**

Human cases of an African virus related to smallpox have jumped 20-fold since 1986, far more than anyone suspected. The researchers who discovered the rise are calling for urgent studies to assess whether it could pose a global threat.

Monkeypox mostly infects rodents, and jumps to humans when they eat infected animals. Exposure to smallpox, or smallpox vaccine, immunises people to monkeypox, so there were fears that the virus might establish itself in people after smallpox was eliminated and vaccination stopped.

A detailed study by the World Health Organization (WHO) in 1986, and another in 1999, concluded that monkeypox did not transmit among humans successfully enough to do this.

Now, Anne Rimoin of the University of California, Los Angeles, and colleagues report that people in the Democratic Republic of the Congo are 20 times more likely to catch monkeypox than they were in 1986.

Defences down

"It might be more exposure to animals, but the sheer size of the increase suggests more transmission between humans," says Rimoin. This could be because, unlike in 1986, three-quarters of the people in the region have never been exposed to smallpox or its vaccine, leaving them susceptible.

Or the virus might have changed, she says. "Every infection is a chance for the virus to adapt to humans." Intriguingly, in 1999 and in Rimoin's recent sample, very few cases died, compared with 10 per cent in 1986.

The team wants to do more detailed studies of how monkeypox spreads, and to check for genetic changes since the 1980s.

D. A. Henderson of the University of Pittsburgh, Pennsylvania, who led the campaign that eradicated smallpox, cautions that increased monkeypox infection in people could be due to a surge of infection in animals, not better transmission in people. "There is no evidence that this poses a special threat," says Henderson – but he agrees that better surveillance is needed.

"This has come in under the radar," says Rimoin. "We need to know what is driving it." One risk is that the virus might establish itself in rodents outside Africa: there was a near miss in 2003 when monkeypox jumped from rats from Africa to prairie dogs in US pet shops, then to their human owners.

*Journal reference: Proceedings of the National Academy of Science, DOI: 10.1073/pnas.1005769107*

## Viking Experiment May Have Found Life's Building Blocks on Mars After All

**Posted in: Mars, Missions by Nancy Atkinson**

A new look at data from the Mars Viking landers concludes that the two landers may have found the building blocks of life on the Red Planet after all way back in 1976. The surprise discovery of perchlorates by the Phoenix mission on Mars 32 years later could mean the way the Viking experiment was set up actually would have destroyed any carbon-based chemical building blocks of life – what the experiment set about to try and find.

"This doesn't say anything about the question of whether or not life has existed on Mars, but it could make a big difference in how we look for evidence to answer that question," said Chris McKay of NASA's Ames Research Center. McKay coauthored a study published online by the Journal of Geophysical Research – Planets, reanalyzing results of Viking's tests for organic chemicals in Martian soil.

The Viking lander scooped up some soil, put it in a tiny oven and heated the sample. The only organic chemicals identified in the Martian soil from that experiment chloromethane and dichloromethane - chlorine compounds interpreted at the time as likely contaminants from cleaning fluids used on the spacecraft before it left Earth. But those chemicals are exactly what the new study found when a little perchlorate - the surprise finding from Phoenix - was added to desert soil from Chile containing organics and analyzed in the manner of the Viking tests.

"Our results suggest that not only organics, but also perchlorate, may have been present in the soil at both Viking landing sites," said the study's lead author, Rafael Navarro-González of the National Autonomous University of Mexico, Mexico City.

The Viking experiment results have been rather controversial over the years. There are some scientists who say the experiment actually did find evidence for life, and others who say the results were inconclusive.

McKay said that organics can come from non-biological or biological sources. Many meteorites raining onto Mars and Earth for the past 5 billion years contain organics. Even if Mars has never had life, scientists before Viking anticipated that Martian soil would contain organics from meteorites.

"The lack of organics was a big surprise from the Vikings," McKay said. "But for 30 years we were looking at a jigsaw puzzle with a piece missing. Phoenix has provided the missing piece: perchlorate. The perchlorate discovery by Phoenix was one of the most important results from Mars since Viking." Perchlorate, an ion of chlorine and oxygen, becomes a strong oxidant when heated. "It could sit there in the Martian soil with organics around it for billions of years and not break them down, but when you heat the soil to check for organics, the perchlorate destroys them rapidly," McKay said.

This interpretation proposed by Navarro-González and his four co-authors challenges the interpretation by Viking scientists that Martian organic compounds were not present in their samples at the detection limit of the Viking experiment. Instead, the Viking scientists interpreted the chlorine compounds as contaminants.

How will we know for sure? The Mars Science Lab mission, with the car-sized rover called Curiosity could help resolve this question.

The Mars Science Lab is going to the Red Planet in 2012, and on board will be the Sample Analysis at Mars (SAM) instrument SAM can check for organics in Martian soil and powdered rocks by baking samples to even higher temperatures than Viking did, and also by using an alternative liquid-extraction method at much lower heat. Combining these methods on a range of samples may enable further testing of the new report's hypothesis that oxidation by heated perchlorates that might have been present in the Viking samples was destroying organics.

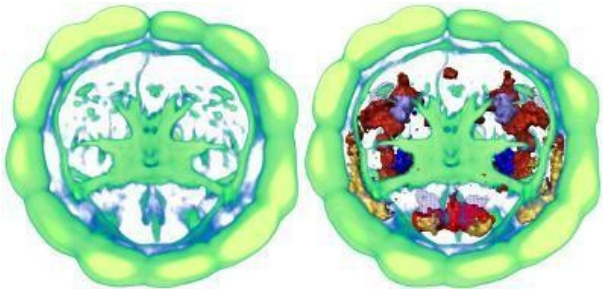
One reason the chlorinated organics found by Viking were interpreted as contaminants from Earth was that the ratio of two isotopes of chlorine in them matched the three-to-one ratio for those isotopes on Earth. The ratio for them on Mars has not been clearly determined yet. If it is found to be much different than Earth's, that would support the 1970s interpretation.

If organic compounds can indeed persist in the surface soil of Mars, contrary to the predominant thinking for three decades, one way to search for evidence of life on Mars could be to check for types of large, complex organic molecules, such as DNA, that are indicators of biological activity. "If organics cannot persist at the surface, that approach would not be wise, but if they can, it's a different story," McKay said.

*Journal of Geophysical Research – Planets. (paper not published online at the time of this writing)*

## Brainy Worms: Scientists Uncover Counterpart of Cerebral Cortex in Marine Worms

ScienceDaily (Sep. 3, 2010) - Our cerebral cortex, or pallium, is a big part of what makes us human: art, literature and science would not exist had this most fascinating part of our brain not emerged in some less intelligent ancestor in prehistoric times. But when did this occur and what were these ancestors? Unexpectedly, scientists at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, have now discovered a true counterpart of the cerebral cortex in an invertebrate, a marine worm.



***A virtual Platynereis brain (left), created by averaging microscopy images of the brains of 36 different individuals, onto which scientists mapped gene activity (right). Perspective shows the brain as viewed from inside a Platynereis larvae, at 48 hours' old.*** **(Credit: EMBL/R.Tomer)**

Their findings are published in Cell, and give an idea of what the most ancient higher brain centres looked like, and what our distant ancestors used them for.

It has long been clear that, in evolutionary terms, we share our pallium with other vertebrates, but beyond that was mystery. This is because even invertebrates that are clearly related to us -- such as the fish-like amphioxus -- appear to have no similar brain structures, nothing that points to a shared evolutionary past. But EMBL scientists have now found brain structures related to the vertebrate pallium in a very distant cousin -- the marine ragworm Platynereis dumerilii, a relative of the earthworm -- which last shared an ancestor with us around 600 million years ago.

"Two stunning conclusions emerge from this finding," explains Detlev Arendt, who headed the study: "First, the pallium is much older than anyone would have assumed, probably as old as higher animals themselves. Second, we learn that it came out of 'the blue' -- as an adaptation to early marine life in Precambrian oceans."

To uncover the evolutionary origins of our brain, EMBL scientist Raju Tomer, who designed and conducted the work, took an unprecedentedly deep look at the regions of Platynereis dumerilii's brain responsible for processing olfactory information -- the mushroom-bodies. He developed a new technique, called cellular profiling by image registration (PrImR), which is the first to enable scientists to investigate a large number of genes in a compact brain and determine which are turned on simultaneously. This technique enabled Tomer to

determine each cell's molecular fingerprint, defining cell types according to the genes they express, rather than just based on their shape and location as was done before.

"Comparing the molecular fingerprints of the developing ragworms' mushroom-bodies to existing information on the vertebrate pallium," Arendt says, " it became clear that they are too similar to be of independent origin and must share a common evolutionary precursor."

This ancestral structure was likely a group of densely packed cells, which received and processed information about smell and directly controlled locomotion. It may have enabled our ancestors crawling over the sea floor to identify food sources, move towards them, and integrate previous experiences into some sort of learning.

"Most people thought that invertebrate mushroom-bodies and vertebrate pallium had arisen independently during the course of evolution, but we have proven this was most probably not the case," says Tomer. Arendt concludes: "The evolutionary history of our cerebral cortex has to be rewritten."

## Fears of a Decline in Bee Pollination Confirmed

ScienceDaily (Sep. 5, 2010) - Widespread reports of a decline in the population of bees and other flower-visiting animals have aroused fear and speculation that pollination is also likely on the decline. A recent University of Toronto study provides the first long-term evidence of a downward trend in pollination, while also pointing to climate change as a possible contributor.

"Bee numbers may have declined at our research site, but we suspect that a climate-driven mismatch between the times when flowers open and when bees emerge from hibernation is a more important factor," says James Thomson, a scientist with U of T's Department of Ecology and Evolutionary Biology.

Thomson's 17-year examination of the wild lily in the Rocky Mountains of Colorado is one of the longest-term studies of pollination ever done. It reveals a progressive decline in pollination over the years, with particularly noteworthy pollination deficits early in the season. The study will be published in Philosophical Transactions of the Royal Society B: Biological Sciences on September 6.

Three times each year, Thomson compared the fruiting rate of unmanipulated flowers to that of flowers that are supplementally pollinated by hand. "Early in the year, when bumble bee queens are still hibernating, the fruiting rates are especially low," he says. "This is sobering because it suggests that pollination is vulnerable even in a relatively pristine environment that is free of pesticides and human disturbance but still subject to climate change."

Thomson began his long-term studies in the late 1980s after purchasing a remote plot of land and building a log cabin in the middle of a meadow full of glacier lilies. His work has been supported by the U.S. National Science Foundation and the Natural Sciences and Engineering Research Council of Canada.

## Scientists Mimic Chloroplasts - Meaning Solar Cells That Fix Themselves

**By News Staff | September 5th 2010 04:20 AM**

It would seem that mimicking nature would be among the easiest things to do for science. After all, it's right there, in front of us, happening for millions of years. Take plants, for instance. Every day they absorb sunlight and turn it into energy but our solar technology is bordering on laughable and, if solar lobbyists get their way and it gets more subsidies and even mandates, criminal.

The issue science has is that the sun's rays are highly destructive to man-made materials and that leads to a gradual degradation of many systems developed to harness it.

Plants don't suffer the same way because they constantly break down their light-capturing molecules and reassemble them from scratch, so the basic structures that capture the sun's energy are, in effect, always brand new. Casual observers might see a leaf as a static photocell but it is recycling its proteins about every 45 minutes.

Maybe we can do it too. A group writing in Nature Chemistry say they have created a set of self-assembling molecules that can turn sunlight into electricity, in that the molecules can be repeatedly broken down and then reassembled quickly, just by adding or removing an additional solution.

What they discovered is that in the molecules used for photosynthesis in plants, the reactive form of oxygen produced by sunlight causes the proteins to fail in a very precise way. As Michael Strano, the Charles and Hilda Roddey Associate Professor of Chemical Engineering at MIT, describes it, the oxygen "unsnaps a tether that keeps the protein together," but the same proteins are quickly reassembled to restart the process.

This action all takes place inside tiny capsules called chloroplasts that reside inside every plant cell - and which is where photosynthesis happens. The chloroplast is "an amazing machine," Strano says. "They are remarkable engines that consume carbon dioxide and use light to produce glucose," a chemical that provides energy for metabolism.

To imitate that process, Strano and his team, supported by grants from the MIT Energy Initiative and the Department of Energy, produced synthetic molecules called phospholipids that form discs; these discs provide

structural support for other molecules that actually respond to light, in structures called reaction centers, which release electrons when struck by particles of light. The discs, carrying the reaction centers, are in a solution where they attach themselves spontaneously to carbon nanotubes - wire-like hollow tubes of carbon atoms that are a few billionths of a meter thick yet stronger than steel and capable of conducting electricity a thousand times better than copper. The nanotubes hold the phospholipid discs in a uniform alignment so that the reaction centers can all be exposed to sunlight at once, and they also act as wires to collect and channel the flow of electrons knocked loose by the reactive molecules.

The system Strano's team produced is made up of seven different compounds, including the carbon nanotubes, the phospholipids, and the proteins that make up the reaction centers, which under the right conditions spontaneously assemble themselves into a light-harvesting structure that produces an electric current. Strano says he believes this sets a record for the complexity of a self-assembling system. When a surfactant - similar in principle to the chemicals that BP has sprayed into the Gulf of Mexico to break apart oil - is added to the mix, the seven components all come apart and form a soupy solution. Then, when the researchers removed the surfactant by pushing the solution through a membrane, the compounds spontaneously assembled once again into a perfectly formed, rejuvenated photocell.

"We're basically imitating tricks that nature has discovered over millions of years" - in particular, "reversibility, the ability to break apart and reassemble," Strano says. The team, which included postdoctoral researcher Moon-Ho Ham and graduate student Ardemis Boghossian, came up with the system based on a theoretical analysis, but then decided to build a prototype cell to test it out. They ran the cell through repeated cycles of assembly and disassembly over a 14-hour period, with no loss of efficiency.

Strano says that in devising novel systems for generating electricity from light, researchers don't often study how the systems change over time. For conventional silicon-based photovoltaic cells, there is little degradation, but with many new systems being developed - either for lower cost, higher efficiency, flexibility or other improved characteristics - the degradation can be very significant. "Often people see, over 60 hours, the efficiency falling to 10 percent of what you initially saw," he says.

The individual reactions of these new molecular structures in converting sunlight are about 40 percent efficient, or about double the efficiency of today's best commercial solar cells. Theoretically, the efficiency of the structures could be close to 100 percent, he says. But in the initial work, the concentration of the structures in the solution was low, so the overall efficiency of the device - the amount of electricity produced for a given surface area - was very low. They are working now to find ways to greatly increase the concentration.

***Citation:*** *Moon-Ho Ham, Jong Hyun Choi, Ardemis A. Boghossian, Esther S. Jeng, Rachel A. Graff, Daniel A. Heller, Alice C. Chang, Aidas Mattis, Timothy H. Bayburt, Yelena V. Grinkova, Adam S. Zeiger, Krystyn J. Van Vliet, Erik K. Hobbie, Stephen G. Sligar, Colin A. Wraight&Michael S. Strano, 'Photoelectrochemical complexes for solar energy conversion that chemically and autonomously regenerate', Nature Chemistry (2010) doi:10.1038/nchem.822*