Multi-drug 'polypill' finally to tackle heart problems

*** 05 October 2008**

Tests of a single, cheap tablet combining a range of drugs that protect against heart disease and stroke have begun.

The "polypill" was mooted years ago as a cheap way to slash deaths from the big killer diseases, but pharmaceutical companies were reluctant to take on the project as the inexpensive drugs involved provided no financial incentive.

Now a team funded by the Wellcome Trust in London, UK, and the British Heart Foundation, and led by Anthony Rodgers at the University of Auckland, New Zealand, has begun recruiting 700 volunteers in six countries for a pilot trial of a polypill manufactured by Dr Reddy's of Hyderabad, India.

Their Red Heart Pill, which costs just $1 for a month's supply, blends blood-thinning aspirin, a cholesterol-lowering statin, and an ACE inhibitor and a thiazide to lower blood pressure. Trials in thousands of people could start next year.

The polypill is aimed at reducing the risk of heart disease and stroke in poor and rich countries alike. However, its use will vary around the world, says Simon Thom of Imperial College London, who is running the UK trials.

In the developing world, he advocates distributing the pill "almost blind" to everyone over 55. But countries where people have better access to doctors and drugs are unlikely to adopt the one-size-fits-all approach. Instead, over-55s could be put on one of several different polypills containing varying doses of the drugs, depending on their health needs.

Crick was right about 'vision filter' in the brain

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* NewScientist.com news service

*** Devin Powell**

As you read this sentence, your mind homes in on each word and blots out the rest of the page. This roving spot of attention tames the flood of visual information that hundreds of thousand of nerves attached to the back of your eye's retina stream into the brain.

So far, most scientists held that the brain's outermost layer and main site of consciousness, the cortex, is responsible for housing the attention steering mechanisms that sort out all this sensory input.

But back in 1984, the co-discoverer of the structure of DNA Francis Crick suggested that a simpler structure called the thalamus may also play a part in this process. Once thought to be only a highway that connects the eyes to the cortex, it could contain a mental searchlight that filters what we pay attention to, Crick proposed.

To test this theory, Kerry McAlonan and colleagues at the National Eye Institute in Bethesda, Maryland, trained three macaque monkeys to pay attention to rectangular spots of light, each about the size of a thumb held up at arm's length.

Unconscious control

Their results show a quick surge of activity in the part of the thalamus that relays information to the cortex and, a split second later, a drop in activity in the thalamic reticular nucleus (TRN), a satellite structure known to turn off this superhighway of sensory information during sleep.

The team believes that when we pay attention, the TRN glances at the "images" coming through the thalamus and selectively turns on and off relays to pass on only the bits that deserve attention. "If the thalamus is the gateway to the cortex, the TRN is the gatekeeper," says McAlonan's colleague Robert Wurtz, co-author on the paper.

This feedback loop emancipates the thalamus from its slavery to the conscious cortex, says Sabine Kastner of Princeton University, who has studied the structure in humans. "We're going to have to rewrite all of the textbooks," she says. *Journal reference: Nature, DOI: 10.1038/nature07382)*

Pneumococcal vaccine associated with 50% lower risk of heart attacks

Pneumococcal (pneumonia) vaccination was associated with a 50% lower risk of heart attacks 2 years after vaccination, suggests a large hospital-based case-control study published in CMAJ.

In a population of patients at high risk of heart attack, the study compared the rates of pneumococcal vaccine between patients having a heart attack and patients without such an event.

“After a number of confounding and modifying variables were taken into account, the odds of having received a vaccination against S. pneumonia in the group who had experienced myocardial infarction was about half that in the control group,” write Dr. Danielle Pilon and coauthors from the University of Sherbrooke and

McMaster University. “Moreover, this association appeared stronger and the benefit appeared to increase with time since exposure to the vaccine.”

In a related commentary, Dr. Mohammad Madjid from the Texas Heart Institute hypothesizes that the pneumonia vaccine protects against heart attacks because it prevents pneumonia which has been shown to trigger heart attacks. Other studies suggest that respiratory (especially influenza) and urinary tract infections are associated with heart attacks. He suggests that physicians should focus on increasing vaccination rates against pneumonia and influenza in high risk patients as rates in the US and other countries are well below target goals.

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C. difficile infection not always associated with antibiotic use

Community-acquired Clostridium difficile (C. difficile) infection occurred in a significant proportion of people with no recent exposure to antibiotics, with 53% having no exposure in the 45 days preceding hospitalization and 46% having no exposure in the preceding 90 days, according to a new study published in CMAJ. While C. difficile is mainly known as a hospital-acquired infection, the study participants, aged 65 and over, had not been hospitalized for at least 90 days before being admitted for C. difficile.

Dr. Sandra Dial and the team of McGill University-based authors conclude “testing for C. difficile should be considered in community patients with diarrhea in whom a history of antibiotic exposure cannot be elicited.”

In a related commentary, Dr. Ed Kuijper and Prof. Jaap van Disselof Leiden University in the Netherlands write that while the lack of antibiotic exposure in people admitted to hospital with C. difficile is interesting, it needs to be determined whether C. difficile is occurring in younger people without risk factors. Several studies suggest this may be the case. The authors state “there is an urgent need to identify and better characterize potential risk factors for community-acquired C. difficile infection to explain the large proportion of cases not linked to recent antibiotic therapy or hospital stays.”

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Contact for commentary: Dr. Ed Kuijper, 31-06-11113104, e.j.kuijper@lumc.nl or Prof. Jaap van Dissel, j.t.van_dissel@lumc.nl, Centre for Infectious Diseases, Leiden University Medical Centre, the Netherlands. Please note the time zone is 6 hours ahead of EDST.

Traumatic brain injury common amongst homeless people

Traumatic brain injury is common amongst homeless people and is associated with poorer health, found a study of more than 900 homeless men and women in Toronto. Health problems include an increased risk of seizures, mental health problems, drug problems, and poorer physical and mental health status.

In this study of people in Toronto’s shelter system or who use meal programs, 58% of homeless men and 42% of homeless women had a history of traumatic brain injury. All participants had valid provincial health insurance. For many people, the first incidence of traumatic brain injury often occurred at a young age and “suggests that, in some cases, traumatic brain injury may be a causal factor that contributes to the onset of homelessness, possibly through cognitive or behavioural sequelae of traumatic brain injury,” state Dr. Stephen Hwang, a physician and research scientist at St. Michael's Hospital, and coauthors. Traumatic brain injury can result from falls, physical abuse, motor vehicle accidents and assaults.

These findings have implications in providing health care to homeless people, as some difficult behaviours in patients may be due to the results of brain injury. Appropriate supports may help mitigate the effects of these behaviours, suggest the authors.

There have only been 2 previous studies of this kind, both of which had small sample sizes.

Health care professionals need to ask homeless people if they have had traumatic brain injuries when providing health care. Neuropsychological screening, referral to rehabilitation programs and other community supports should be considered for the individual, write the authors.

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Guidelines for the diagnosis and treatment of dementia

People with mild to moderate dementia are cared for largely by family physicians as well as the patient’s own family, and management of care can be complex and challenging. A team of clinicians, teachers and researchers from the University of Calgary, Dalhousie University, McGill University, Sunnybrook Health Sciences and the University of Toronto, University of Ottawa, University of Western Ontario, Universite de Montreal, University of Saskatchewan and affiliated institutions have created comprehensive guidelines for family physicians on how to manage dementia once a diagnosis has been made. This approach focuses on supporting both the patient and the primary caregiver.

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Free drug samples carry risks for children

First of its kind study finds safety concerns in frequently distributed samples

Cambridge, MA...Free prescription drug samples distributed to children may be unsafe, according to a study by physicians from Cambridge Health Alliance and Hasbro Children's Hospital. The national study, the first to look at free drug sample use among children, appears in the October 2008 issue of Pediatrics.

The authors, who also serve as researchers at Harvard Medical School and the Warren Alpert Medical School of Brown University, found that children commonly receive free drug samples from their doctors. One out of every 20 American children received free drug samples in 2004. Among children who took at least one prescription drug in that year, nearly one in 10 got free samples.

The U.S. Food and Drug Administration identified significant new safety concerns for four of the top 15 most frequently distributed samples in 2004. These four medications acquired new black box warnings or had significant revisions to existing black box warnings issued since 2004. In addition, two of the top 15 sample medications given to children were schedule II controlled substances (drugs controlled and monitored by the Drug Enforcement Agency due to high potential for abuse). Distribution of these medications, Strattera (atomoxetine) and Adderall (amphetamine/dextroamphetamine), carries risk, especially when drug sample closets in physician's offices (or home medicine cabinets) are not strictly monitored.

Although some physicians support the use of free drug samples as a way of getting medications to indigent patients, lead author Dr. Sarah Cutrona and colleagues found that few free samples in their study go to needy children. More than 80 percent of children receiving samples were insured all year. Conversely, approximately 16 percent were uninsured for all or part of 2004, and less than one-third had low family incomes (under $38,000 for a family of four). Minority children were less likely to receive free samples than white non-Hispanic children, and free sample receipt was positively associated with markers reflecting access to health care. The authors concluded that free sample distribution does not equalize medication access for needy children.

Dr. Cutrona, a physician at Cambridge Health Alliance and an instructor of medicine at Harvard Medical School, commented, "New medications are frequently released before their safety profile is fully understood, and samples tend to be newer medications. Free samples encourage the casual use of medications in our children before enough is known about potential harm. As a mother of young children, I find that very concerning."

Senior author Dr. Neal LeLeiko, director of pediatric gastroenterology and nutrition at Hasbro Children's Hospital, and a professor of pediatrics at the Warren Alpert Medical School of Brown University, added, "Previous findings in adults strongly suggest that free drug samples serve as a marketing tool. Our study shows that samples can pose a serious and unappreciated risk to our children."

The study used data on 10,295 US children and adolescents from the 2004 Medical Expenditure Panel Survey (MEPS), an annual federal survey. Dr. Cutrona's work was supported under a National Research Service Award to Harvard Medical School.

Sarah L. Cutrona, MD, MPH, is a hospitalist at Cambridge Health Alliance. She also serves as an instructor of medicine at Harvard Medical School. Dr. Cutrona conducts research on access to health care and medications. She earned her medical degree at Columbia College of Physicians and Surgeons and completed her training at Rhode Island Hospital and Harvard Medical School.

"Free Drug Samples in the United States: Characteristics of Pediatric Recipients and Safety Concerns" published by Pediatrics. October 2008; 122 (4). Authors: Cutrona, SL, Woolhandler, SJ, Lasser, KE, Bor, DH, Himmelstein, DU, Shrank, WH, LeLeiko, NS.

Using a fan during sleep may reduce infants' SIDS risk, Kaiser Permanente study shows

Fan lowers SIDS risk by 72 percent

October 6, 2008 (Oakland, Calif.) – Infants who slept in a bedroom with a fan ventilating the air had a 72 percent lower risk of Sudden Infant Death Syndrome compared to infants who slept in a bedroom without a fan, according to a new study by the Kaiser Permanente Division of Research. The study appears in the October issue of the Archives of Pediatric & Adolescent Medicine.

This is the first study to examine an association between better air ventilation in infants' bedrooms and reduced SIDS risk.

The finding is consistent with previous research that showed factors influencing a baby's sleep environment may change SIDS risk. Among those factors are sleeping on the stomach and soft bedding, both of which may limit air ventilation around an infant's breathing pathway and thus increase the chance of re-breathing exhaled carbon dioxide, said the researchers

They explained that fan use is no substitute for practices known to reduce the risk for sudden infant death syndrome, which include: always placing infants to sleep on their backs, putting infants to sleep on firm

mattresses and avoiding soft bedding materials like comforters and quilts, providing a separate sleep environment, preventing infants from overheating, and not smoking around infants.

"Although this is the first finding linking fan use to SIDS, concerned parents can take measures to improve ventilation of infants sleep environment, by adding fans in rooms or opening windows. Other studies have found that parents can also reduce the chance of re-breathing carbon dioxide by putting infants to sleep on their back, avoiding soft bedding and overheating, and by using a pacifier," said study author Dr. De-Kun Li, a reproductive and perinatal epidemiologist at Kaiser Permanente's Division of Research in Oakland.

The study also found that opening a window in infant's room reduced the risk of SIDS by 36 percent compared to babies who slept in a room with closed windows, though this connection was not statistically significant according to the researchers.

"More studies need to be done to determine the exact relationship between the types of ventilation and the risks of SIDS," said Li, who also authored a 2006 study in the British Medical Journal that found that using a pacifier can reduce SIDS risk by 90 percent.

Funded by the National Institutes of Health, this latest study looked at 185 babies who died from SIDS in 10 Northern California counties and Los Angeles County from 1997 to 2000. They were compared to 312 infants of a similar age and from similar socio-economic and ethnic backgrounds in the same counties. Researchers identified SIDS cases through records from the California Department of Health Services and the Los Angeles County coroner's office and interviewed participating mothers by trained interviewers in English and Spanish with an average of 3.8 months after the baby's death.

The study found that if an infant was in a high-risk sleep environment such as sleeping on their stomach or without a pacifier, or sharing a bed with someone other than parents or in an overheated room, using a fan to improve room ventilation was particularly beneficial.

SIDS is the leading cause of death among infants aged 1 to 12 months, and the third leading cause of overall infant mortality in the United States. SIDS is defined as sudden death of an infant under the age of 1, which remains unexplained after a thorough case investigation, including an autopsy, examination of the death scene and a review of clinical history.

"Though this needs to be studied further before we can make clinical recommendations, this finding is consistent with the other factors that we know impact the SIDS risk by influencing sleeping environment, such as prone sleep position, soft bedding, and use of a pacifier," said Dr. Fern Hauck of the University of Virginia Health Systems, who is a SIDS researcher and an American Academy of Pediatrics SIDS Task Force member. Hauck was not involved with the Kaiser Permanente study.

"The finding that better ventilation had a greater reduced risk of SIDS in the presence of other risk factors affecting sleep environment (prone sleep position, bed sharing – other than parents -- , high temperature, and not using pacifiers) further supports the hypothesis that environmental factors play a major role in SIDS risk," Hauck said.

Because of the difficult nature of the study (interviewing mothers whose babies had died suddenly), participation was relatively low. Also, in a case-control study, recall bias is always a potential concern.

The study involved infants and their mothers from Alameda, Contra Costa, Fresno, Marin, Monterey, Sacramento, San Francisco, San Joaquin, San Mateo, Santa Clara and Los Angeles counties.

Other authors on the study included: Kimberly Coleman-Phox, MPH, of the Kaiser Permanente Division of Research and the University of California, Berkeley, School of Public Health; and Roxana Odouli, MSPH, of the Kaiser Permanente Division of Research.

More information on reducing the risk of SIDS is available from National Institutes of Health's Back to Sleep Campaign, http://www.nichd.nih.gov/sids/.

New test could help catch serious infections in babies

Blood test may spare infants invasive diagnostic tests and antibiotics

Boston, MA--A simple blood test may help detect serious bacterial infections (SBIs) like urinary tract infections and blood stream infections in young infants who come to the emergency department (ED) with fevers that have no clear cause. Researchers at Children's Hospital Boston, collaborating with investigators at George Washington University, show that a new diagnostic marker called procalcitonin can help identify infants at high risk for SBIs while potentially reducing unnecessary and aggressive testing, medication and hospitalization in low risk infants. The study, published in the October Pediatrics, is the first to examine procalcitonin as a tool for evaluating infant fever in an emergency situation.

The researchers used a novel procalcitonin test, recently approved by the FDA, in 234 feverish babies under 3 months of age, of whom 18 percent had definite or possible SBIs confirmed by independent clinical criteria. The results showed that procalcitonin not only detected all cases of SBIs in feverous infants but proved

sensitive enough to establish a threshold value that would identify infants at low risk for serious infections. Indeed, its overall performance as a single clinical marker of infection approached that of current strategies that involve a variety of laboratory tests and clinical evaluations.

In the United States, infant fever accounts for a vast majority of pediatric visits to the ED, of which up to 20 percent of cases have no identifiable cause of infection. While most turn out to be minor and self-limiting illnesses, a proportion of infants have SBIs such as bacteremia, meningitis, pneumonia or urinary tract infections. The risk is most significant in infants under 3 months of age.

"About 12 percent of those whom we consider 'well appearing' end up having serious infections when we do an evaluation," said Richard Bachur, MD, acting chief of emergency medicine at Children's.

Because clinicians cannot reliably determine which children with fever have more serious infections, many babies end up undergoing extensive evaluations. Routine evaluation of infants less than 3 months of age includes blood tests, urine tests, and often a lumbar puncture for spinal fluid, followed by treatment in the hospital with antibiotics.

Prompted by the inefficiency of current fever management in young infants, Bachur and colleagues have sought a rapid diagnostic test that will determine which children have serious infections at the first visit to the ED. "We hope to identify those infants that are at very low risk of serious infection and tailor their evaluation so as to minimize invasive testing and exposure to unnecessary antibiotics," said Bachur.

The high sensitivity of the new procalcitonin test has allowed Bachur and colleagues to establish realistic cut-off values to help guide clinicians in identifying children who are at low risk for SBIs.

The researchers are now looking to do a multi-center study to evaluate the use of procalcitonin on a larger scale. If it proves to be valuable, Bachur hopes it will become a standard tool for the evaluation of young infants with fever.

The study was supported by the Frederick H. Lovejoy, Jr, MD Resident Research Fund and the American Academy of Pediatrics Resident Research Grant. The biomarker assay, procalcitonin (PCT), is available to clinicians and manufactured by Brahms Diagnostica.

New prenatal test for down syndrome less risky than amniocentesis, Stanford/Packard scientists say

STANFORD, Calif. — Pregnant women worried about their babies' genetic health face a tough decision: get prenatal gene testing and risk miscarriage, or skip the tests and miss the chance to learn of genetic defects before birth.

But a new prenatal test could make this dilemma obsolete. The new method, developed by scientists at Stanford University, the Howard Hughes Medical Institute and Lucile Packard Children's Hospital, requires only a maternal blood sample to spot chromosomal disorders such as Down syndrome.

"Right now, people are risking their pregnancies to get this information," said Yair Blumenfeld, MD, a postdoctoral medical fellow in obstetrics and gynecology and co-author of a paper describing the technique. Current prenatal gene tests, such as amniocentesis and chorionic villus sampling, require inserting a needle in the uterus and carry a miscarriage risk of around half a percent.

"Non-invasive testing will be much safer than current approaches," said Stephen Quake, PhD, professor of bioengineering and the study's senior author. The new technique, which takes advantage of fragments of fetal DNA in the woman's blood, will be published online the week of Oct. 6 in the Proceedings of the National Academy of Sciences. Safety may not be the only gain. Quake hopes the test will spot genetic problems much earlier in gestation than the other methods.

The new method scans for fetal aneuploidy, an abnormality in the number of fetal chromosomes. Humans typically inherit 46 chromosomes, half from each parent. Errors in chromosome number cause serious problems in physical and mental development. Down syndrome, for example, arises from an extra copy of chromosome 21.

The Stanford/Packard team developed a way to count chromosomes using bits of fetal DNA in a pregnant woman's blood. Other scientists had struggled to tease these tiny genetic clues apart from a mom's DNA, said Quake, who is also an HHMI investigator. His team made an ingenious simplification: their new method has no need to distinguish between maternal and fetal DNA.

First, using samples from 12 women with aneuploid pregnancies and six with normal pregnancies, the researchers separated maternal blood into cells and plasma. They discarded the blood cells, focusing on the liquid plasma's DNA fragments, which come from both the mom and the fetus. They counted the number of DNA fragments and used DNA sequencing to read each one.

"You randomly sequence whatever is there," explained Christina Fan, a doctoral student in bioengineering who was the study's lead author. The DNA fragments are 25-30 base pairs long, she said, long enough to match each fragment to a specific chromosome. The researchers tallied how many gene fragments originated from

each chromosome. Women with Down syndrome pregnancies had more chromosome-21 fragments in their blood than women with normal pregnancies. Other forms of aneuploidy could be detected, too.

Because fetal DNA shows up in maternal blood quite early in pregnancy, the team says their technique could provide a much earlier diagnosis for fetal aneuploidy than is now available.

"The earlier you know you've got a fetus with Down syndrome, the better able you are to prepare," Quake said, noting that the benefit holds both for women who keep and those who terminate such pregnancies.

The next step, the scientists say, is to repeat their study in a larger number of women. If their technique holds up in further research, they expect that it would be simple and inexpensive to use in clinical settings, especially as other forms of genetic testing also become popular. Quake expects it will take the new test two to three years to reach the clinic, assuming that the larger trial is successful.

"This technique is on the leading edge of a flood of different ways that rapid DNA sequencing will be used in medicine," Quake said.

Stanford is filing a patent application for the new technique, and Quake consults for two potential licensees. In addition to Fan and Blumenfeld, Quake's team included Usha Chitkara, MD, professor of obstetrics and gynecology at Stanford and Packard Children's, and Louanne Hudgins, MD, director of perinatal genetics at Packard Children's and professor of pediatrics. The study was funded by the Wallace H. Coulter Foundation and the NIH Director's Pioneer Award.

Space rock found on collision course with Earth

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* NewScientist.com news service
*** Maggie McKee**

For the first time, astronomers have found an object on a certain collision course with Earth. Fortunately, it is so small it is not expected to cause any damage, burning up in the atmosphere somewhere above northern Sudan in the wee hours of Tuesday morning. It may, however, produce a brilliant 'shooting star'.

The space rock, dubbed 2008 TC3, was first spotted on Monday in a survey by the Mt Lemmon Observatory near Tucson, Arizona.

Its brightness suggests it is no more than about 5 metres across – so small it will likely be destroyed in the atmosphere, says Andrea Milani Comparetti of the University of Pisa in Italy.

Rocks of such size are thought to hit the atmosphere every few months, says Steve Chesley, an astronomer at NASA's Jet Propulsion Laboratory.

"The event is not unusual – what is unique is that it's been predicted beforehand," Milani told New Scientist. "This is the first time we see something arriving, compute that it's going to impact, and announce it is going to impact before it happens."

The rock is due to hit the atmosphere above northern Sudan on Tuesday at 0246 GMT. It will be travelling from west to east, and may be visible from a few hundred kilometres away.

Long trail

The meteor it produces is likely to be spectacular. The rock will release about 1 kiloton of energy in the atmosphere – the equivalent of a low-energy nuclear bomb, says Milani. But it's not clear whether it will do so all at once or over a longer period, perhaps lasting a minute or so.

It will hit the atmosphere at an angle of 20°, so "it will make a long trail in the atmosphere", says Milani. "But we cannot honestly predict how long it will be. [The rock] might end up quite far – above the Red Sea or Saudi Arabia – or it might explode and disappear sooner."

If it disintegrates all at once, it would produce a bright flash of light and a loud sonic boom, says Chesley.

This space rock is so small it is unlikely to cause any damage.

"The only concern is that [the explosions] might be interpreted as something else, that is man-made explosions. Thus in this case, the earlier the public worldwide is aware that this is a natural phenomenon, which involves no risk, the better," Milani's team wrote on a popular astronomy listserv.

Impact probability

The object's discovery is a reminder that larger and potentially more dangerous rocks might also be on a collision course with Earth.

Milani and Chesley are members of the only two groups in the world that calculate the probability that a given space rock will hit the Earth. They both say that they are delighted at how quickly this meteorite was determined to be on a collision course with Earth – since it was only discovered at about 0630 GMT on Monday. "For us, [we feel] satisfaction because our computation worked and because this kind of accident – which is without any risk that anybody [would be] hurt – will make people more aware of the fact that something has to be done about asteroids in case a bigger one arrives," Milani told New Scientist.

"The fact that we're able to make this prediction proves the system's working," says Chesley. "These sized objects are not the ones we're most concerned about – there are tens of thousands of much larger objects that could cause real damage on the ground that are still yet to be found."

Despite the advanced warning, there is probably too little time to mount a mission to observe the atmospheric impact from an aeroplane, as sometimes happens during known meteor showers, says Milani. "But now that this is out in the public, anybody who has a telescope is going to be pointing it in that direction," Chesley says.

U of T researchers reveal Epstein-Barr virus protein contributes to cancer

TORONTO, ON - Researchers at the University of Toronto have discovered that the EBNA1 protein of Epstein-Barr virus (EBV) disrupts structures in the nucleus of nasopharyngeal carcinoma (NPC) cells, thereby interfering with cellular processes that normally prevent cancer development.

The study findings are published in the October 3rd edition of the journal PLoS Pathogens and describes a novel mechanism by which viral proteins contribute to carcinogenesis.

EBV is a common herpes virus whose latent infection is strongly associated with several types of cancer including NPC, a tumor that is endemic in several parts of the world. With NPC only a few EBV proteins are expressed, including EBNA1. EBNA1 is required for the persistence of the EBV genomes; however, whether or not EBNA1 directly contributes to the development of tumors has not been clear, until now.

The study conducted by Lori Frappier a professor of molecular genetics and her team at the University of Toronto examined PML nuclear bodies and proteins in EBV-positive and EBV-negative NPC cells. Manipulation of EBNA1 levels in each cell type clearly showed that EBNA1 expression induces the loss of PML proteins and PML nuclear bodies through an association of EBNA1 with the PML bodies. PML nuclear bodies are known to have tumor-suppressive effects due to their roles in regulating DNA repair and programmed cell death, and accordingly, EBNA1 was shown to interfere with these processes.

"The findings support an important role for EBNA1 in the development of NPC, in which EBNA1-mediated disruption of PML nuclear bodies promotes the survival of cells with DNA damage," said Frappier. "Since EBNA1 is expressed in all EBV-associated tumors, including B-cell lymphomas and gastric carcinoma, these findings raise the possibility that EBNA1 could play a similar role in the development of these cancers. The cellular effects of EBNA1 in other EBV-induced cancers will require further investigation."

Pediatric study finds alternatives for radiation of low-grade brain tumors

Chemotherapy may help delay cranial radiation and minimize damaging side effects

HOUSTON - A multi-institutional study led by researchers at The University of Texas M. D. Anderson Cancer Center has found that using chemotherapy alone and delaying or avoiding cranial radiation altogether can be effective in treating pediatric patients with unresectable or progressive low-grade glioma. The study was presented Sunday at the 40th annual International Society of Pediatric Oncology Meeting in Berlin, Germany.

Low-grade glioma is the most common brain tumor in children. If eligible for surgery, overall survival rate for these children is 95 percent. However, for patients with tumors in locations that prevent surgical removal or whose tumor is progressive after surgery, prognosis is worse.

A majority of pediatric oncologists use cranial radiation to treat patients with unresectable or progressive brain tumors. Although radiation is often effective, the long-term effects such as mental impairment, hormonal deficiencies and increased rate of stroke late in life can be detrimental to young patients - causing some physicians and families to decide against treatment.

"This is the first large, multi-institutional study to investigate using chemotherapy as an alternative to cranial radiation," says Joann Ater, M.D., professor of pediatrics at the Children's Cancer Hospital at M. D. Anderson. "The results have confirmed the ability of chemotherapy to control the disease."

Ater is principal investigator for the Children's Oncology Group (COG) study and developed the Phase III trial, which compared two different chemotherapy regimens across three different patient groups. Smaller pilot studies have shown a carboplatin and vincristine (CV) regimen to be effective against low-grade glioma. However, the COG trial with 401 patients enrolled, showed that a thioguanine, procarbazine, lomustine and vincristine (TPCV) regimen was more effective than the CV regimen and resulted in a five-year event-free survival rate of nearly 50 percent.

Patients under 5 years old averaged 2.2 years before the disease progressed on the CV regimen, while patients between 5 to 10 years old, averaged 5.3 years before disease progression. Patients on the TPCV regimen fared better, with those 5 to 10 years old averaging more than eight years without disease progression. The trial also studied chemotherapy for neurofibromatosis patients who had low-grade gliomas. This patient population had the best response to chemotherapy among the three groups.

"If we can delay radiation, then we allow more time for our youngest patients to develop physically, which could decrease some of the long-term effects from treatment," Ater says. "This trial at least gives parents more information and alternative options when making decisions about their child's treatment."

Oral vitamin D may help prevent some skin infections

A study led by researchers at the University of California, San Diego School of Medicine suggests that use of oral Vitamin D supplements bolsters production of a protective chemical normally found in the skin, and may help prevent skin infections that are a common result of atopic dermatitis, the most common form of eczema.

The study – led by Richard Gallo, M.D., Ph.D., professor of medicine and chief of the Division of Dermatology at the UCSD School of Medicine and the Dermatology section of the Veterans Affairs San Diego Healthcare System, and Tissa R. Hata, M.D., associate professor of medicine at UC San Diego – found that use of oral vitamin D appeared to correct a defect in the immune systems in patients with this skin disease. Their findings will be published in the October 3 edition of the Journal of Allergy & Clinical Immunology

The researchers studied a small number of patients with moderate to severe atopic dermatitis, a chronic skin disease that affects 10 to 20 percent of children and one to three percent of adults. Atopic dermatitis is characterized by areas of severe itching, redness and scaling. Over time, chronic changes can occur due to constant scratching and rubbing. The condition puts patients at increased risk for skin infections by Staph aureus and the herpes and small pox viruses.

It had previously been shown that defects in the immune system interfere with the skin's ability to produce a peptide called cathelicidin, which is protective against microbial invasion. In many skin diseases, including eczema, a deficiency of cathelicidin correlates with increased infection.

Study participants (14 with atopic dermatitis and 14 without) were all given 4000 IUs of oral Vitamin D3 (cholecalciferol) per day for 21 days. Skin lesions were biopsied before and after the 21-day period. The researchers found that oral vitamin D use by the patients appeared to correct the skin's defect in cathelicidin.

"These results suggest that supplementation with oral vitamin D dramatically induces cathelicidin production in the skin of patients with atopic dermatitis," said Hata. "It also slightly elevated its production in normal skin in this study."

However, the researchers caution that this was a small study and that further research is needed to evaluate the long-term effects of vitamin D supplementation, and to determine if this may be an adequate way to prevent infections in patients with atopic dermatitis.

In the past several years, vitamin D deficiency has been linked to increased rates of multiple cancers and diabetes, among other diseases, notably in studies published by UC San Diego researcher, Cedric Garland, Dr. P.H., professor with Moores UCSD Cancer Center and the Department of Family and Preventive Medicine at UC San Diego.

Additional contributors to the study include Paul Kotol, B.S., Michelle Jackson, M.D., Meggie Nguyen, B.S., Aimee Paik, M.D., Don Udall, M.D., Kimi Kanada, B.S., Kenshi Yamasaki, M.D., Ph.D., and Doru Alexandrescu, M.D., all from the UC San Diego Division of Dermatology.

Post-term pregnancies risk infant's life and health, UCSF studies show

Infants born more than one week past their due dates have a higher risk of both impaired health and death, according to two new studies by authors from the University of California's San Francisco and Berkeley campuses.

The studies compared more than 2.5 million normal-weight births from healthy pregnancies of 37 to 42 weeks gestation, the range that is considered to be full-term. Findings appear in the October, 2008 issue of the "American Journal of Obstetrics and Gynecology" and also can be found online at www.ajog.org.

The two studies focused on different elements of the risk of progressing beyond 41 weeks of gestation, but held similar conclusions. The first study, which followed 1.8 million normal births in California from 1999 to 2003, reported greater odds of infant death among those born at 41 and 42 weeks. The second study examined 2.5 million low-risk births nationwide in 2003, and reported that the risk of cesarean deliveries and poor health outcomes for both mother and child increased at 40 weeks and beyond.

"Significant research has focused on the risks of premature deliveries, but until now, there have been no large-scale studies documenting the increased risk of delivering at 40 weeks or more," said Aaron Caughey, MD, MPH, PhD, an associate professor in the UCSF Department of Obstetrics, Gynecology and Reproductive Sciences, Division of Maternal-Fetal Medicine, and senior author on both papers. "Combined, these two papers provide very compelling evidence of the importance of closely monitoring pregnancies beyond 40 weeks and possibly intervening to prevent complications to both mother and child."

It is widely accepted that pregnancies that progress beyond 42 weeks gestation are associated with increased risk to both mother and child, said Caughey, who is also affiliated with the UCSF National Center of

Excellence in Women's Health. The American College of Obstetricians and Gynecologists has recommended fetal surveillance or induction of labor at 42 weeks. Previous studies of infant mortality also have reported that the rate of stillbirths is lowest at 37 to 38 weeks and increases six-fold to 2.12 stillbirths per 1,000 pregnancies at 43 weeks.

But Caughey said a growing number of studies have pointed to increased pregnancy complications and stillbirths at 41 weeks or even earlier. Both of these studies confirm that the risk of cesarean deliveries and poor maternal or child outcomes starts to increase as early as 40 weeks.

"These are among the largest studies ever published that examine the complications of full-term pregnancy by week of gestation," explained Yvonne W. Cheng, MD, MPH, from the UCSF Department of Obstetrics, Gynecology and Reproductive Sciences and the UC Berkeley School of Public Health, lead author of the national study and a co-author on the California study. "Both were consistent with prior studies in showing that delivery at 39 weeks seems to be associated with the lowest risk to both mother and child."

Cheng's study used national birth registries through the Centers for Disease Control and Prevention to analyze all low-risk pregnancies resulting in live, full-term deliveries between 37 and 42 weeks gestation in the United States in 2003. The study eliminated births to women with pre-existing medical conditions, such as cardiac disease or gestational diabetes, as well as women who had previously had a child delivered by cesarean section.

The national study found that women who delivered beyond their due date had an increased chance of cesarean section or operative delivery – such as one requiring forceps – versus those who delivered at 39 weeks. Compared with delivery at 39 weeks, women who delivered at 41 weeks had a 40 percent higher chance of having a cesarean delivery. That correlates to a higher risk of hemorrhage and other complications for the mother.

Infants delivered at 41 weeks also had a higher risk of injury during birth, as well as nearly twice the rate of having meconium in the amniotic fluid as infants born at 39 weeks.

The California study also showed an increase in infant mortality in those born after the 40th week. That study analyzed data from 1.8 million newborns born alive statewide from 1999 to 2003, and excluded multiple births and those with congenital abnormalities.

The study found that infants delivered at 41or 42 weeks had an increased chance of death within 28 days, and that the elevated mortality rates persist across the entire range of normal birth weights.

"These findings add to the growing literature that reports an elevated risk of adverse birth outcomes among infants born at 41 weeks of gestation and beyond," said Tim Bruckner, PhD, an epidemiologist in the UC Berkeley School of Public Health who was the lead author on the California study. "In addition, because of the large number of births represented in this study, and the ethnically diverse population in California, we believe these findings are applicable to the overall US population."

Bruckner, Caughey and Cheng were the sole authors on the California paper. Co-authors of the national study included those three, as well as James W. Nicholson, MD, MSCE, of the University of Pennsylvania School of Medicine; and Sanae Nakagawa, MS, and A. Eugene Washington, MD, MSc, from the UCSF School of Medicine.

Funding for these studies came from ongoing research funds for the lead investigators. Bruckner is supported by the Ruth L. Kirschtein National Research Service Award within the Agency for Health Care Research and Quality. Caughey is supported by a National Institute of Child Health and Human Development grant and the Robert Wood Johnson Foundation.

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Olive oil ingredient ups the time between meals

A fatty acid found in abundance in olive oil and other "healthy" unsaturated fats has yet another benefit: it helps keep the body satisfied to prolong the time between meals.

A new study in the October Cell Metabolism, a publication of Cell Press, reveals that once this type of fat, known as oleic acid, reaches the intestine, it is converted into a lipid hormone (oleoylethanolamide, or OEA) that wards off the next round of hunger pangs. The researchers said it may be the first description of an ingredient in food that directly provides the raw materials for a hormone's production.

The findings in rats may yield insight into the precise dietary makeup of fat and protein for optimal hunger control, the researchers said. (Protein plays in important role in limiting hunger as well, but by different means.) The newly discovered signaling pathway might also be tapped into with drugs designed to control appetite by supplementing OEA levels or blocking its breakdown. Similarly, in conditions where people don't eat enough, the researchers speculate that treatments targeting this system might improve the appetite.

Importantly, diets high in processed foods that are riddled with saturated fats might throw a wrench into this system of metabolic control, the researchers said.

" Eating is one of the most important things animals do," said Daniele Piomelli of the University of California, Irvine. "This is just one of many things that control it. That said, a system like this could be forced to inactivation by inappropriate feeding," he said, noting that saturated fats generally lack in oleic acid.

While such diets may lead people to overeat, Piomelli said it will also be of interest to see if this mechanism may be defective in some who tend to eat in excess.

Previous studies had shown that feeding stimulates cells in the intestinal lining to produce OEA, which, when administered as a drug, decreases meal frequency by engaging receptors called peroxisome proliferator-activated receptors a (PPARa).

Piomelli's team now reports that infusion of fat into the small intestine stimulates the release of OEA, whereas infusion of protein or carbohydrate does not. They also demonstrate that OEA production uses dietary oleic acid and is disrupted in mutant mice lacking the membrane fatty-acid transporter CD36. Treatments that disrupt CD36 or PPARa undermine the hunger control otherwise driven by fat.

Overall, the results suggest that activation of small-intestinal OEA release, enabled by CD36-mediated uptake of oleic acid from the diet, serves as a molecular sensor linking fat consumption to satiety. (Piomelli said satiety is perhaps best described as the opposite of hunger.)

" In conclusion," the researchers wrote, "our studies identify OEA as a key physiological signal that specifically links dietary fat ingestion to across-meal satiety. Nutritional and pharmacological strategies aimed at magnifying this lipid-sensing mechanism, such as inhibitors of OEA degradation, might be useful in the treatment of obesity and other eating disorders."

The researchers include Gary J. Schwartz, Albert Einstein College of Medicine of Yeshiva University, Bronx, NY; Jin Fu, University of California, Irvine, CA; Giuseppe Astarita, University of California, Irvine, CA; Xiaosong Li, Albert Einstein College of Medicine of Yeshiva University, Bronx, NY; Silvana Gaetani, Sapienza University of Rome, Italy; Patrizia Campolongo, Sapienza University of Rome, Italy; Vincenzo Cuomo, Sapienza University of Rome, Italy; and Daniele Piomelli, University of California, Irvine, CA, Italian Institute of Technology, Genoa, Italy.

St. John's wort relieves symptoms of major depression

New research provides support for the use of St. John's wort extracts in treating major depression. A Cochrane Systematic Review backs up previous research that showed the plant extract is effective in treating mild to moderate depressive disorders.

"Overall, we found that the St. John's wort extracts tested in the trials were superior to placebos and as effective as standard antidepressants, with fewer side effects," says lead researcher, Klaus Linde of the Centre for Complementary Medicine in Munich, Germany.

Extracts of the plant Hypericum perforatum, commonly known as St. John's wort, have long been used in folk medicine to treat depression and sleep disorders. The plant produces a number of different substances that may have anti-depressive properties, but the whole extract is considered to be more effective.

Cochrane Researchers reviewed 29 trials which together included 5,489 patients with symptoms of major depression. All trials employed the commonly used Hamilton Rating Scale for Depression to assess the severity of depression. In trials comparing St. John's wort to other remedies, not only were the plant extracts considered to be equally effective, but fewer patients dropped out of trials due to adverse effects. The overall picture is complicated, however, by the fact that the results were more favourable in trials conducted in German speaking countries, where St. John's extracts have a long tradition and are often prescribed by doctors.

Despite the favourable findings for St. John's wort, researchers are anxious not to make generalisations about the plant's use as an anti-depressant and recommend consulting a doctor in the first instance, especially as the extracts can sometimes affect the actions of other beneficial drugs.

"Using a St. Johns wort extract might be justified, but products on the market vary considerably, so these results only apply to the preparations tested," says Linde.

Honey helps to heal wounds

Honey may reduce healing times in patients suffering mild to moderate burn wounds. A systematic review by Cochrane Researchers concluded that honey might be useful as an alternative to traditional wound dressings in treating burns.

"We're treating these results with caution, but it looks like honey can help speed up healing in some burns," says lead researcher Dr Andrew Jull, of the Clinical Trials Research Unit at the University of Auckland, New Zealand.

Honey has been used in wound treatment since ancient times. The mechanism of action is unclear. While honey may help the body remove dead tissue and provide a favourable environment for the growth of new, healthy tissue, current interest in medicinal honey focuses largely on its antibacterial effects.

The review brings together data from 19 clinical trials involving 2554 patients with a range of different wounds. Honey was more effective in reducing healing time compared to some gauze and film dressings that are often used to treat moderate burns. However, the researchers were unable to show any clear benefits for the healing of grazes, lacerations, surgical wounds and leg ulcers.

The researchers don't advise using honey to treat other types of wounds. "Health services should invest in treatments that have been shown to work," says Dr Jull. "But, we will keep monitoring new research to try and establish the effect of honey."

Circumcision not associated with reduced risk of HIV for men who have sex with men

An analysis of previous research indicates there is a lack of sufficient evidence that circumcision reduces the risk of human immunodeficiency virus (HIV) infection or other sexually transmitted infections among men who have sex with men, according to an article in the October 8 issue of JAMA.

Randomized controlled trials (RCTs) conducted with men in Africa have shown that male circumcision reduces the likelihood of female-to-male transmission of HIV infection by 50 percent to 60 percent. Studies also suggest that male circumcision may protect heterosexual men against other sexually transmitted infections (STI), such as syphilis or chlamydial infection, according to background information in the article. Less is known about whether circumcision provides protection against HIV infection among men who have sex with men (MSM).

Gregorio A. Millett, M.P.H., of the Centers for Disease Control and Prevention, Atlanta, and colleagues performed a meta-analysis of 15 studies to examine the association of circumcision status with HIV infection and other STIs among MSM. The studies included a total of 53,567 MSM participants (52 percent of whom were circumcised).

The researchers found that the odds of being HIV-positive were nonsignificantly lower among MSM who were circumcised than uncircumcised. In contrast, a statistically significant protective association of circumcision with HIV infection was found for MSM studies conducted prior to the introduction of highly active antiretroviral therapy (HAART) in 1996. Of studies conducted after HAART, the association of circumcision and HIV infection was not statistically significant.

"A possible explanation for [these differences] may be related to an increase in the sexual risk behaviors of MSM after HAART. It has been well documented that beliefs that HAART limits HIV transmissibility are associated with increases in sexual risk behavior among MSM, and that the era since the advent of HAART has been defined by higher rates of sexual risk behaviors among MSM, outbreaks of STIs, and increasing rates of HIV infection," the authors write.

Among MSM who primarily engaged in insertive anal sex, the association between male circumcision and HIV was protective but not statistically significant. The STI analyses similarly revealed no statistically significant association by circumcision status among MSM.

"Taken together, these findings indicate insufficient evidence among available observational studies conducted with MSM of an association between circumcision and HIV infection or other STIs," the researchers write. "Additional studies are necessary to elucidate further the relationship between circumcision status and HIV infection or STIs among MSM."

(JAMA. 2008;300[14]:1674-1684. Available pre-embargo to the media at www.jamamedia.org)

Editor's Note: Please see the article for additional information, including other authors, author contributions and affiliations, financial disclosures, funding and support, etc.

Editorial: Circumcision and HIV Prevention Among Men Who Have Sex With Men - No Final Word

In an accompanying editorial, Sten H. Vermund, M.D., Ph.D., and Han-Zhu Qian, M.D., Ph.D., of Vanderbilt University School of Medicine, Nashville, Tenn., write that only future research can answer whether MSM should be circumcised to reduce their HIV risk.

"The meta-analysis by Millett et al is likely to be used by both advocates and detractors of clinical trial investment; some will argue the benefit is likely to be too modest to justify a multimillion dollar clinical trial while others will argue that only a clinical trial will answer this important HIV prevention question. Barriers to circumcision among heterosexual men include human rights issues, ethical and legal issues, high cost, fear of pain, safety concerns, availability of surgery services, and sexual risk compensation if men overrate their degree of protection and ongoing risk. As in other HIV prevention trials, circumcision would likely be insufficiently efficient to be universally effective in reducing HIV risk, and will have to be combined with other prevention modalities to have a substantial and sustained prevention effect."

(JAMA. 2008;300[14]:1698-1700. Available pre-embargo to the media at www.jamamedia.org)

Withdrawal of life support often an imperfect compromise

Intensive Care Unit (ICU) doctors seeking to balance the complex needs of their patients and the patients' families may make an imperfect compromise, withdrawing life support systems over a prolonged period of time. This practice is much more common than previously believed, and is also surprisingly associated with higher satisfaction with care-at least among surviving family members.

"We found that sequential withdrawal of life support is not as rare a phenomenon as previously believed," wrote J. Randall Curtis, M.D., M.P.H., section chief for pulmonary and critical care medicine at the Harborview Medical Center and the University of Washington, in Seattle. "It occurred in nearly half of the patients we studied."

The findings will be published in the second issue for October of the American Journal of Respiratory and Critical Care Medicine, published by the American Thoracic Society. The study was funded by the National Institute of Nursing Research.

Dr. Curtis and colleagues examined medical charts and family questionnaires for more than 500 patients who had died at the ICU or within 24 hours of discharge out of a pool of 2,003 consecutive patients in 15 Seattle or Tacoma hospitals. During their final days, the patients studied were on a median of four life-support systems, from mechanical ventilation to tube feeding.

Interestingly, among patients whose stays at the ICU were more prolonged, families seemed to be more satisfied when the withdrawal process was longer. "This finding is in the opposite direction to our original hypothesis," wrote Dr. Curtis, noting that "a longer duration of withdrawal of life support seems unlikely to be beneficial for the patient because it represents the prolongation of non-beneficial and sometimes painful therapies in a situation in which life-sustaining therapies are being withdrawn in anticipation of death."

A possible explanation for the higher rate of satisfaction among the families of patients who were removed from life support over time is that poor communication between physicians and families impedes decision making and delays the families' emotional readiness.

"Families need time and support to move from a situation of focusing on hoping for the patient's survival, to a situation in which they have accepted that death is inevitable and they are preparing for the best death possible. If families are not adequately prepared for such a transition, withholding all therapies the same day, followed by a quick death, could be experienced as abandonment," said Dr. Curtis.

Dr. Curtis and colleagues believe that, while sequential withdrawal of life support may be experienced more positively by some families, it is nonetheless a result of "incomplete decision making [that] serves as a way to compensate for the existing gap between physicians' decisions and family expectations."

The study also found if patients were extubated prior to death, family satisfaction tended to be higher, suggesting that extubation may be the best approach for many patients undergoing withdrawal of life support.

"The take home message" says Dr. Curtis "is not to prolong the withdrawal of life-sustaining therapies to the possible detriment of the patient, but to facilitate better communication between ICU clinicians and patients' families. When physicians make a decision to withdraw support, they have often not prepared the family sufficiently and physicians may consequently embark on 'stuttering' withdrawal of life support in order to have more time to prepare the family."

Dr. Curtis concluded: "A better solution for improving family experience while also providing the best possible care to patients is to prepare the family for the possibility of the patient's death earlier in the ICU stay rather than waiting until the physicians have decided that withdrawal of life support is indicated."

UCI study shows how fatty foods curb hunger

Results point to natural approaches for fighting obesity, eating disorders

Irvine, Calif. – Fatty foods may not be the healthiest diet choice, but those rich in unsaturated fats – such as avocados, nuts and olive oil – have been found to play a pivotal role in sending this important message to your brain: stop eating, you're full.

A new study by UC Irvine pharmacologists shows that these fats trigger production of a compound in the small intestine that curbs hunger pangs. This discovery, the researchers say, points toward new approaches to treating obesity and other eating disorders.

Daniele Piomelli, the Louise Turner Arnold Chair in Neurosciences, and his colleagues have studied how a fat-derived compound called oleoylethanolamide regulates hunger and body weight. In their current work, which appears in the Oct. 8 issue of Cell Metabolism, they found that an unsaturated fatty acid called oleic acid stimulates production of OEA, which in turn decreases appetite.

Oleic acid is transformed into OEA by cells in the upper region of the small intestine. OEA then finds its way to nerve endings that carry the hunger-curbing message to the brain. There, it activates a brain circuit that

increases feelings of fullness. In previous studies, Piomelli found that increasing OEA levels can reduce appetite, produce weight loss and lower blood cholesterol and triglyceride levels.

Piomelli believes OEA could be used in a variety of drugs because it is a key to the way the body naturally handles fatty foods and regulates eating and body weight.

"We are excited to find that OEA activates cell receptors that already have been the focus of successful drug development," he said. "This gives us hope for a new class of anti-obesity drugs based on the savvy use of natural appetite-controlling mechanisms."

Nearly 30 percent of Americans are obese, according to the Centers for Disease Control and Prevention, which has declared obesity an epidemic disease. The occurrence of obesity has risen by almost 60 percent since 1991, and it greatly increases the risk of premature death, diabetes, heart disease, stroke and some cancers.

Piomelli's study colleagues include Jin Fu and Giuseppe Astarita of UCI; Gary Schwartz and Xiaosong Li of Yeshiva University; and Silvana Gaetani, Patrizia Campolongo and Vincenzo Cuomo of the University of Rome. The National Institutes of Health, New York Obesity Research Center, the Skirball Institute of Biomolecular Medicine and the Italian Ministry of Research supported the study.

'Deadly dozen' reports diseases worsened by climate change

Barcelona (EMBARGOED UNTIL 11:30 Central European Time: October 7, 2008)—Health experts from the Wildlife Conservation Society today released a report that lists 12 pathogens that could spread into new regions as a result of climate change, with potential impacts to both human and wildlife health and global economies. Called The Deadly Dozen: Wildlife Diseases in the Age of Climate Change, the new report provides examples of diseases that could spread as a result of changes in temperatures and precipitation levels. The best defense, according to the report's authors, is a good offense in the form of wildlife monitoring to detect how these diseases are moving so health professionals can learn and prepare to mitigate their impact.

The report was released at the IUCN World Conservation Congress, held in Barcelona, Spain.

"The term 'climate change' conjures images of melting ice caps and rising sea levels that threaten coastal cities and nations, but just as important is how increasing temperatures and fluctuating precipitation levels will change the distribution of dangerous pathogens," said Dr. Steven E. Sanderson, President and CEO of the Wildlife Conservation Society. "The health of wild animals is tightly linked to the ecosystems in which they live and influenced by the environment surrounding them, and even minor disturbances can have far reaching consequences on what diseases they might encounter and transmit as climate changes. Monitoring wildlife health will help us predict where those trouble spots will occur and plan how to prepare."

The "Deadly Dozen" list—including such diseases as avian influenza, Ebola, cholera, and tuberculosis—is illustrative only of the broad range of infectious diseases that threaten humans and animals. It builds upon the recommendations included in a recently published paper titled "Wildlife Health as an Indicator of Climate Change," which appears in a newly released book, Global Climate Change and Extreme Weather Events: Understanding the Contributions to Infectious Disease Emergence, published by the National Academy of Sciences/Institute of Medicine. The study examines the nuts and bolts of deleterious impacts of climate change on the health of wild animals and the cascading effects on human populations.

In addition to the health threats that diseases pose to human and wildlife populations, the pathogens that originate from or move through wildlife populations have already destabilized trade to a large extent and caused significant economic damage. For instance, several livestock diseases that have reemerged since the mid-1990s (including avian influenza) have caused an estimated $100 billion in losses to the global economy.

WCS's Global Health Programs currently leads an international consortium that helps to monitor the movements of avian influenza through wild bird populations around the world. The GAINS program (Global Avian Influenza Network for Surveillance) was created in 2006 with support from the United States Agency for International Development (USAID) and now involves dozens of private and public partners that monitor wild bird populations for avian influenza around the world.

"Emerging infectious diseases are a major threat to the health and economic stability of the world," said Congresswoman Rosa L. DeLauro (D-CT3), a champion for the GAINS Program "What we've learned from WCS and the GAINS Program is that monitoring wildlife populations for potential health threats is essential in our preparedness and prevention strategy and expanding monitoring beyond bird flu to other deadly diseases must be our immediate next step."

"The monitoring of wildlife health provides us with a sensitive and quantitative means of detecting changes in the environment," said Dr. William Karesh, Vice President and Director of WCS's Global Health Programs. Wildlife health monitoring provides a new lens to see what is changing around us and will help governments, agencies, and communities detect and mitigate threats before they become disasters."

THE DEADLY DOZEN

Many wildlife pathogens have been the focus of monitoring efforts, but few data exist on how diseases will spread in response to climate change. The following list includes those pathogens that may spread as a result of changing temperatures and precipitation levels. Monitoring efforts for these diseases need to be examined in tandem with meteorological data to uncover climate-related trends. The list is not a comprehensive one, and subsequent studies may eliminate pathogens from the list of those enabled by climatic factors.

* **Avian influenza:** Like human influenza, avian influenza viruses occur naturally in wild birds, though often with no dire consequences. The virus is shed by infected birds via secretions and feces. Poultry may contract the virus from other domestic birds or wild birds. A highly pathogenic strain of the disease—H5N1—is currently a major concern for the world's governments and health organizations, specifically because it has proven deadly to domestic and wild birds, as well as humans, and has the potential to evolve into a strain that can spread from human to human. Current data indicate that the movement of H5N1 from region to region is largely driven by the trade in poultry, but changes in climate such as severe winter storms and droughts can disrupt normal movements of wild birds and can bring both wild and domestic bird populations into greater contact at remaining water sources.

* **Babesiosis:** Babesia species are examples of tick-borne diseases that affect domestic animals and wildlife, and Babesiosis is an emerging disease in humans. In some instances, Babesia may not always cause severe problems by themselves but when infections are severe due to large numbers of ticks, the host becomes more susceptible to other infectious diseases. This has been seen in large die-offs of lions in East Africa due to canine distemper. Climate factors fostered heavy infestations of ticks on wild buffalo and subsequent spill-over infection of lions. The lions then became more susceptible to infections with the distemper virus. In Europe and North America, the disease is becoming more common in humans, also linked with tick distributions. Diseases that have previously been thought to have limited impact, such as babesiosis, must be watched closely in a changing climate to assess how environmental conditions may tip the scale and cause more significant impacts on ecosystems, animals, and people.

* **Cholera:** Cholera is a water-borne diarrheal disease affecting humans mainly in the developing world. It is caused by a bacterium, Vibrio cholerae, which survives in small organisms in contaminated water sources and may also be present in raw shellfish such as oysters. Once contracted, cholera quickly becomes deadly. It is highly temperature dependent, and increases in water temperature are directly correlated with occurrence of the disease. Rising global temperatures due to climate change are expected to increase incidence of this disease.

* **Ebola:** Ebola hemorrhagic fever virus and its closely related cousin—the Marburg fever virus—easily kill humans, gorillas, and chimpanzees, and there is currently no known cure. Scientists continue to work on finding the source of the disease and to develop vaccines for protection. There is significant evidence that outbreaks of both diseases are related to unusual variations in rainfall/dry season patterns. As climate change disrupts and exaggerates seasonal patterns, we may expect to see outbreaks of these deadly diseases occurring in new locations and with more frequency. WCS's work on Ebola in Central Africa has been supported by the US Fish and Wildlife Service.

* **Intestinal and external parasites:** Parasites are widespread throughout terrestrial and aquatic environments. As temperatures and precipitation levels shift, survival of parasites in the environment will increase in many places, infecting an increasing number of humans and animals. Many species of parasites are zoonotic, spread between wildlife and humans. The nematode, Baylisascaris procyonis, is spread by the common raccoon and is deadly to many other species of wildlife and humans. A close relative, Baylisascaris schroederi, causes death in its natural host—the critically endangered giant panda. Monitoring of parasite species and loads in wildlife and livestock help us identify transmission of these infections between domestic and wild animals and humans.

* **Lyme disease:** This disease is caused by a bacterium and is transmitted to humans through tick bites. Tick distributions will shift as a result of climate change, bringing Lyme disease into new regions to infect more animals and people. Although effects of the disease on wildlife have not been documented, human-induced changes in the environment and on population patterns of species such as white-tailed deer that can carry infective ticks greatly affect the distribution of this disease. Monitoring of tick distributions will be necessary to assess the impacts of climate change on this disease.

* **Plague:** Plague, Yersinia pestis—one of the oldest infectious diseases known—still causes significant death rates in wildlife, domestic animals, and humans in certain locations. Plague is spread by rodents and their fleas. Alterations in temperatures and rainfall are expected to change the distribution of rodent populations around the globe, which would impact the range of rodent-born diseases such as plague.

* **"Red tides":** Harmful algal blooms off global coasts create toxins that are deadly to both humans and wildlife. These occurrences—commonly called "red tides"—cause mass fish kills, marine mammal strandings, penguin and seabird mortality, and human illness and death from brevetoxins, domoic acid, and saxitoxins (the cause of "paralytic shellfish poisoning"). Similar events in freshwater are caused by a species of Cyanobacteria and have resulted in animal die-offs in Africa. Altered temperatures or food-web dynamics resulting from climate change will have unpredictable impacts on the occurrences of this worldwide phenomenon. Effects of harmful algal blooms on sea life are often the first indicators that such an event is taking place.

* **Rift Valley Fever:** Rift Valley fever virus (RVFV) is an emerging zoonotic disease of significant public health, food security, and overall economic importance, particularly in Africa and the Middle East. In infected livestock such as cattle, sheep, goats and camels, abortions and high death rates are common. In people (who can get the virus from butchering infected animals), the disease can be fatal. Given the role of mosquitoes in transmission of the virus, changes in climate continue to be associated with concerns over the spread of RVFV.

* **Sleeping sickness:** Also known as trypanosomiasis, this disease affects people and animals. It is caused by the protozoan, Trypanosoma brucei, and transmitted by the tsetse fly. The disease is endemic in certain regions of Sub-Saharan Africa, affecting 36 countries, with estimates of 300,000 new cases every year and more than 40,000 human deaths each year in eastern Africa. Domestic cattle are a major source of the disease, but wildlife can be infected and maintain the disease in an area. Direct and indirect effects (such as human land-use patterns) of climate change on tsetse fly distributions could play a role in the distribution of this deadly disease.

* **Tuberculosis:** As humans have moved cattle around the world, bovine tuberculosis has also spread. It now has a global distribution and is especially problematic in Africa, where it was introduced by European livestock in the 1800s. The disease infects vital wildlife populations, such as buffalo and lions in Kruger National Park in South Africa, where tourism is an integral part of local economies. The disease also infects humans in southern Africa through the consumption of un-pasteurized milk. Human forms of tuberculosis can also infect wild animals. Climate change impacts on water availability due to drought are likely to increase the contact of wildlife and livestock at limited water sources, resulting in increased transmission of the disease between livestock and wildlife and livestock and humans.

* **Yellow fever:** Found in the tropical regions of Africa and parts of Central and South America, this virus is carried by mosquitoes, which will spread into new areas as changes in temperatures and precipitation levels permit. One type of the virus—jungle yellow fever—can be spread from primates to humans and vice-versa via mosquitoes that feed on both hosts. Recent outbreaks in Brazil and Argentina have had devastating impacts on wild primate populations. In some countries in South America, monitoring of wild primates has resulted in early detection of disease activity and allowed vaccination programs to be rapidly implemented to protect humans.

Narcissistic People Most Likely To Emerge As Leaders

COLUMBUS, Ohio – When a group is without a leader, you can often count on a narcissist to take charge, a new study suggests.

Researchers found that people who score high in narcissism tend to take control of leaderless groups. Narcissism is a trait in which people are self-centered, exaggerate their talents and abilities, and lack empathy for others.

"Not only did narcissists rate themselves as leaders, which you would expect, but other group members also saw them as the people who really run the group," said Amy Brunell, lead author of the study and assistant professor of psychology at Ohio State University at Newark.

"It's not surprising that narcissists become leaders. They like power, they are egotistical, and they are usually charming and extraverted. But the problem is, they don't necessarily make better leaders."

Narcissists, by definition, are self-centered and overconfident in their own abilities.

The researchers found similar results in two separate studies involving college students, and one involving business managers in an MBA program.

And while narcissists are more likely to become leaders, results of one of the studies suggests that, once in power, narcissists don't perform any better than others in that leadership role.

"It's not surprising that narcissists become leaders," Brunell said.

"They like power, they are egotistical, and they are usually charming and extraverted. But the problem is, they don't necessarily make better leaders."

The study will appear in an upcoming print issue of the journal Personality and Social Psychology Bulletin. It is currently available to subscribers online.

The first study involved 432 undergraduate students. They all completed assessments which measured various personality traits, including narcissism. They were then put in groups of four, and told to assume they were a committee of senior officers of the student union, and their task was to elect next year's director. Each person in a group was given a profile of a different candidate for the position, and each was to argue for their particular candidate.

Following the discussion, they voted on the director, and then completed a questionnaire evaluating the leadership of themselves and the other group members.

Results showed that students who scored higher on one dimension of narcissism – the desire for power - were more likely to say they wanted to lead the group, were more likely to say they did lead the group discussion, and were more likely to be viewed as leaders by the other group members.

The other dimension of narcissism – the desire for attention – was not as strongly related to leadership roles in the groups. "It's not surprising, but the desire for power is what really drives narcissists to seek leadership positions," she said.

In a second study, 408 students were placed in groups of four and given a scenario in which they imagined they were shipwrecked on an uninhabited island and had to choose which 15 salvageable items that the group should take ashore which will best help them survive.

After a group discussion, those who scored highest on the power dimension of narcissism again showed the most desire to lead the group discussion, rated themselves as leaders, and were viewed by other group members as the leaders.

his study went further, though, by seeing how well the narcissists performed as leaders. Researchers looked at the lists, prepared by each individual and group, of the 15 items that they thought would help them survive. They compared their lists to one prepared by an expert who has taught survival skills to the U.S military.

Results showed that narcissists did no better than others on selecting the items that would best help them survive. In addition, groups that overall scored highest on narcissism did no better than other groups on the task.

A third study involved 153 business managers enrolled in an executive MBA program at a large southeastern university. The managers were also put in groups of four and told to assume the role of a school board deciding how to allocate a large financial contribution from a fictional company.

Two trained observers – professors or doctoral students in industrial/organizational psychology – observed the groups and rated how much of a leadership role each participant assumed in their groups.

Results showed that the MBA students rated highest in narcissism were most likely to be identified as emerging leaders by the expert observers.

"Even trained observers saw narcissistic people as the natural leaders," Brunell said. "In addition, this study showed that narcissism plays a role in leadership among real-world managers."

Brunell said the studies took into account other factors – such as gender and personality traits like high self-esteem and extraversion – that may relate to leadership development. But even when these factors were taken into account, narcissism still played a key role.

It is important not to confuse narcissism with high self-esteem, she said.

"A person with high self-esteem is confident and charming, but they also have a caring component and they want to develop intimacy with others," Brunell explained. "Narcissists have an inflated view of their talents and abilities and are all about themselves. They don't care as much about others."

Brunell said she believes the results apply to many parts of life, from the politics of the presidential race to Wall Street. "Many people have observed that it takes a narcissistic person to run for president of the United States," she said. "I would be surprised if any of the candidates who have run weren't higher than average in narcissism."

The same is true for the leaders of Wall Street firms that have made and lost millions of dollars in the past few years.

"There have been a lot of studies that have found narcissistic leaders tend to have volatile and risky decision-making performance and can be ineffective and potentially destructive leaders," she said.
However, that doesn't mean all the troubles in Washington or Wall Street can be blamed on narcissistic leaders.

"I'm sure some of these leaders had to be overconfident and too sure of their abilities. But there's a lot more behind the troubles of government and business than the personalities of their leaders."

Brunell's co-authors on the study were William Gentry, W. Keith Campbell, Brian Hoffman and Karl Kuhnert from the University of Georgia, and Kenneth DeMarree, a graduate student at Ohio State.

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VIP stalkers prone to mental illness

*** 08 October 2008**

FAR from being hapless eccentrics, the majority of people who stalk royalty have a serious psychotic disorder. The discovery has been key to reducing the risk of attacks on the British royal family, and British and European politicians.

Paul Mullen, a forensic psychiatrist at Monash University in Melbourne, Australia, and his colleagues looked at records held by the Metropolitan Police in London on 250 people who had stalked members of the royal family between 1988 and 2003.

Of these, the team reckons about 80 per cent show symptoms such as hallucinations and delusions that are typical of people with schizophrenia.

The findings, known for two years, were made public this week at a forensic science meeting in Melbourne. They show that royal stalkers are clearly different from those who stalk ordinary people, who tend to be depressed, socially inept rejected lovers.

In the past, royal stalkers who were causing a nuisance were merely removed from the scene. Now mental health professionals from the Fixated Threat Assessment Centre (FTAC), which was quietly set up two years ago by the UK Home Office, assess the stalkers and refer them for treatment if necessary.

In the past, stalking behaviour was typically repeated. "Now that they are treated it is not," says David James, clinical director of the FTAC. Few VIP-stalkers go on to commit an attack, but when they do, the attacks tend to be serious.

Some coma patients 'feel pain'

* 18:15 07 October 2008

* NewScientist.com news service

*** Andy Coghlan**

Brain scans show that coma patients most aware of their environment react to pain the same as healthy people.

Researchers who did the scans in Belgium say it justifies giving pain relief to all patients in this "minimally conscious state" (MCS).

"These findings might be objective evidence of a potential pain perception capacity in patients with MCS, which supports the idea that these patients need painkilling treatment," write Steven Laureys and his colleagues at the Coma Science Group of the Cyclotron Research Centre at the University of Liege in The Lancet Neurology. But they found much less evidence that "brain-dead" coma patients in a so called persistent vegetative state (PVS) react to pain.

Laureys and his colleagues discovered after taking brain scans of patients and healthy volunteers as they received mild electric shocks. They performed the procedure on five MCS patients, 15 healthy controls and 15 "brain-dead" patients.

'Pain matrix'

Patterns of brain activity were the same MCS patients and the healthy controls, who rated the pain they received as "highly unpleasant to painful". Blood flow increased to parts of the brain that form the so-called "pain matrix", incorporating the thalamus and various parts of the cortex activated when we feel pain.

"I think it definitely means they feel pain because they activate the whole pain matrix," Laureys told New Scientist. "But what they feel is still an open question, whether they feel it the same way we do," he says.

Conversely the activity was much reduced in the PVS patients. "The difference between patients with MCS and PVS was very striking," says Laureys.

Stuart Derbyshire, who studies the connections between neural activity and pain at the University of Birmingham in England, cautions that the brain activation patterns don't necessarily mean the patients actually experienced pain. "We cannot read subjectivity from activation patterns any more than we can read it from changes in breathing, heart rate or blood pressure," he says.

"Patients undergoing procedures with sedation might also activate cortical regions during noxious intervention, but one might hesitate before calling that pain," says Derbyshire.

He points out that patients under general anaesthetic regularly grimace, wince and flinch, and these are probably indications of reflex signals from the much more primitive brain stem that can’t reach the level of conscious experience. "Having said that, this study provides good evidence that whatever is happening in MCS patients during noxious stimulation is clearly more than a brain stem response," says Derbyshire.

Reacting to environment

John Whyte of the Moss Rehabilitation Research Institute in Elkins Park, Pennsylvania, comments in the same issue of The Lancet Neurology that the study "supports the conclusion that patients in MCS have the essential neural systems required to experience pain subjectively and that patients in VS might not".

But the difficulty for nurses and doctors, he says, is identifying patients who are MCS. "They're patients who react with their environment in a way that can't be purely reflexive," says Whyte. Examples might include patients following a moving object with their eyes, or somehow responding to a spoken command.

In the absence of a definitive test, Whyte says that doctors should assume that patients might sometimes be conscious even though they can't show it, so pain relief should be given as a precautionary measure, even to PVS patients. He says that most doctors in the US do this anyway, but the Belgian results provide further justification for it. "To not give it is to assume that patients are unconscious all the time, and I don't think the data fits with that."

Whyte says that coma patients who recover seldom complain of painful events or treatment during their comatose state, but this shouldn't be taken as evidence they never felt pain, because their memories are so impaired during this time that they wouldn't remember anyway even if they did feel pain. "They often don't report having felt pain, but it doesn't mean they didn't," he says.

Derbyshire says that an experiment that could resolve some of the issues would be to take scans while patients undergo procedures under general anaesthetic. These would show whether the same "pain matrix" regions of the brain light up even thought they are spared experience of pain by the anaesthetic.

Laureys says that it will be difficult for doctors to decide how much analgesia to give patients with MCS, because too much would sedate the patients, "decreasing the chance of seeing signs of consciousness and recovery".

Journal references: The Lancet Neurology: (DOI: 10.1016/S1474-4422(08)70219-9, DOI: 10.1016/S1474-4422(08)70220-5)

Vital Signs

Children: Acetaminophen in Babies May Raise Risks

By NICHOLAS BAKALAR

The use of acetaminophen in the first year of life is associated with an increased risk for asthma, eczema and allergic runny nose later in childhood, a New Zealand study reports. Acetaminophen is sold in the United States under the brand name Tylenol and as an ingredient in many other pain relievers.

The study, published in the Sept. 20 issue of The Lancet, included data from more than 190,000 6- and 7-year-old children in 28 countries whose parents had responded to questionnaires about various health and diet practices.

After controlling for numerous factors, including breast-feeding, antibiotic use and parental smoking, they found that children given acetaminophen before age 1 had an almost 50 percent increased risk for asthma, eczema and allergy compared with those given none.

"We can't be certain that acetaminophen is a cause," said a co-author, Tadd Clayton of the University of Auckland. "We can only say that it is associated. People should continue to follow the recommendation of the W.H.O., which is that acetaminophen should be reserved for children with a high fever, 101.3 degrees or more."

The study is large, but the medical information was obtained from parents after the fact, and children with asthma and related illnesses may be more likely to be treated with acetaminophen in the first place.

Observatory

Diversification of Cacao Is Traced to the Amazon

By HENRY FOUNTAIN

The production of cocoa, chocolate and related products is a huge worldwide industry, with many companies and some economies (Ivory Coast's, for one) dependent on the health of the cacao tree, Theobroma cacao.

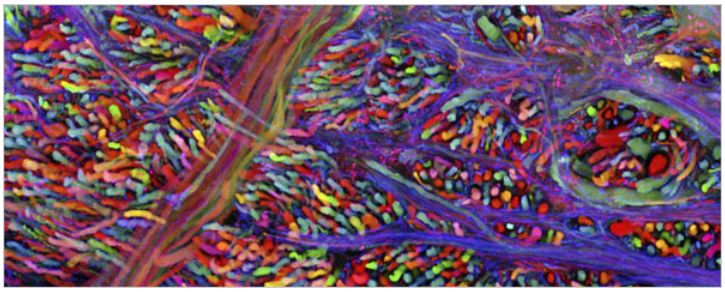
With so much riding on one species, you'd think plant scientists would know all there is to know about it. But certain aspects of cacao, notably its genetic diversity, have been poorly understood. For decades, scientists have thought populations could be classified into one of three genetic groups.

A new study in the online open-access journal PLoS ONE changes this thinking. A team led by Juan C. Motomayor of the candymaker Mars and the United States Department of Agriculture looked at genetic markers in more than 1,200 cacao samples representing geographic regions around the world, and discovered there are 10 genetic clusters, not 3.

The findings suggest that the diversification of cacao occurred in the Amazon as populations became separated by ancient ridges called paleoarches. But the study is far from an academic exercise: the new classification will help in managing cacao cultivation and fighting diseases that can harm the trees.

Three Chemists Win Nobel Prize

By KENNETH CHANG



One Japanese and two American scientists have won this year's Nobel Prize in Chemistry for taking the ability of some jellyfish to glow and transforming it into a ubiquitous tool of molecular biology for watching the dance of living cells and the proteins within them.

The fluorescent proteins are now routinely used for observing the growth and fate of specific cells like nerve cells damaged during Alzheimer's disease.

The winners are Osamu Shimomura, 80, an emeritus professor at the Marine Biological Laboratory in Woods Hole, Mass., and Boston University Medical School; Martin Chalfie, 61, a professor of biological sciences at Columbia University; and Roger Y. Tsien, 56, a professor of pharmacology at the University of California, San Diego. Each will receive a third of the 10 million krona prize (about $1.4 million) awarded by the Royal Swedish Academy of Sciences.

Dr. Shimomura said he received a 5 a.m. phone call informing him he was a Nobelist. "The reaction was just surprise," he said.

Dr. Tsien was not caught completely unaware. Last week, the Thomson Reuters news service listed him among its predictions for this year's Nobel Prize winners. "I didn't want to put any credence in it," Dr. Tsien said, noting that the predictions for the physics and medicine prizes this week were wrong.

Dr. Tsien (pronounced chen) added that his work was "only one little piece" amid the work of many. "It wasn't necessarily the case they had to give it to me," he said. "Obviously, it's pretty nice to hear."

Dr. Chalfie never received the phone call from Sweden. "I slept through it," he acknowledged at a news conference at Columbia. He said he had inadvertently turned down the ringer on his telephone a couple of days ago. He woke up at 6:10 in the morning and thought the soft ring was coming from a neighboring apartment.

"I was a little bit annoyed that they weren't answering their phone," he said. "I then realized because it was after 6, that they must have announced the Nobel Prize in Chemistry. I decided to find out who the schnook was that won it this year. So I opened up my laptop and found out I was the schnook."

Biologists have long observed that some sea creatures glow in the dark. In 1962, Dr. Shimomura, then a researcher at Princeton, and Frank Johnson, a Princeton biology professor, isolated a specific glowing protein in the Aequorea victoria, a jellyfish that drifts in the ocean currents off the west coast of North America.

The protein looked greenish under sunlight, yellowish under a light bulb and fluorescent green under ultraviolet light. Dr. Shimomura and Dr. Johnson called it the green protein, but now it is known as green fluorescent protein, or G.F.P. for short.

The green fluorescent protein consists of a chain of 238 amino acids bent into a beer can-like cylindrical shape, and for two and a half decades it remained a little-known biological curiosity.

Dr. Chalfie first heard about the protein at a seminar in 1988, and thought he might be able to use it in his studies of Caenorhabditis elegans, a transparent roundworm.

"It didn't take much to realize that if I put that fluorescent protein inside this transparent animal, I would be able to see the cells that were making it," he said. "And that's what we set out to do."

He thought that the fluorescent protein could be made to serve as a biological marker by splicing the gene that makes the protein into an organism's DNA next to a gene switch or another gene. "That serves as a lantern," Dr. Chalfie said, and biologists would be able to see when specific genes turn on or off and where different proteins are produced.

He was not able to pursue the idea until Douglas C. Prasher, a scientist then at the Woods Hole Oceanographic Institution in Massachusetts, found the G.F.P. gene and shared it with Dr. Chalfie in 1992. Dr. Chalfie said that within a month his group was able to insert the gene into E. coli bacteria.

In 1994, Dr. Chalfie and his collaborators reported that they had inserted the protein into six cells of the C. elegans worm. When placed under ultraviolet light, those cells shined green, revealing their location.

For many biologists, it was a surprise that inserting the G.F.P. gene was all that was needed; many had thought that other jellyfish proteins would be needed to help G.F.P. fold into its light-emitting shape.

Dr. Tsien was thinking along similar lines as Dr. Chalfie, also contacting Dr. Prasher. But for the biology experiment he wanted to conduct, he needed two colors of fluorescent proteins. Dr. Tsien started mutating the G.F.P gene and looking at the resulting proteins. Some, he found, glowed blue instead of green.

“That was the first evidence you could change the color,” Dr. Tsien said.

Other scientists have since expanded the palette, enlisting similar proteins from corals to produce fluorescent reds. The multiple colors allow biologists to track different processes simultaneously. In one experiment, the brain of a mouse was transformed into a kaleidoscope of color by tagging different nerve cells with different fluorescent proteins.

The protein has even entered the world of art. In 2000, Eduardo Kac, an artist, displayed a green glowing rabbit named Alba, which he had commissioned a French laboratory to modify genetically with the G.F.P gene.

Scientists have also made green-glowing pigs and zebra fish, which they hope will aid research on stem cells and cancer.

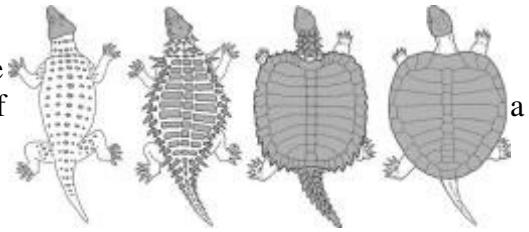
Fossil reveals how the turtle got its shell

* 11:22 08 October 2008
* NewScientist.com news service
*** Ewen Callaway**

A newly identified fossil could explain one of evolution's biggest mysteries – the origin of the turtle's shell.

Bone fragments from a 210-million year-old, land-dwelling reptile from New Mexico suggest that the earliest turtles didn't have much of a shell at all.

Over millions of years, rows of protective armour plates gradually fused together and to the reptile's vertebrae, eventually creating a complete shell.



The gradual origin of the turtle shell with two hypothetical ancestors, from an animal with isolated lumps of armour, to one with a complete shell **(Image: Royal Society)**

"Turtles ultimately originated from something that looked like an armadillo," says lead author Walter Joyce, a palaeontologist at the Peabody Museum of Natural History in New Haven, Connecticut.

His colleague Spencer Lucas, of the New Mexico Museum of Natural History and Science in Albuquerque, discovered a neck-bone fragment of the new reptile more than a decade ago, but its provenance remained debatable because the skeleton was so small, Joyce says.

However, recent erosion revealed enough pieces of Chinlechelys tenertesta – Latin for thin-shelled turtle – to remove any doubt.

Unlike turtle fossils dating from the later Jurassic era – "they're so common people stopped collecting them," Joyce says – Triassic turtles are few and far between. That's probably because they lived on land, where fossilisation is far less likely to happen, he says.

The new animal is about 30 centimetres long, with a shell only a millimetre wide. "This one's by far the thinnest ever found," Joyce says.

More importantly, the reptile's dorsal ribs aren't fully fused to its shell – or carapace – as is the case in later fossils and in modern turtles.

"This is a crucial new discovery," says Guillermo Rougier, at the University of Louisville in Kentucky, who uncovered the first Triassic turtles in northwest Argentina. These and other early turtles had already gained their carapaces and offered few clues as to its origin.

C. tenertesta, on the other hand, points to the body form that must have given rise to the shell. "This new guy is an animal that belong to the lineage of turtles, it's a proto-turtle in a way," he says.

Exactly why turtles evolved their shell remains a mystery, Joyce says. A full shell might offer added protection and stability. And the proof could be in the pudding – their body plan is the world's oldest, changing little over 200 million years. "For some reason just being a turtle is an idea that came along and just really works," he says.

Journal reference: Proceedings of the Royal Society B (DOI: 10.1098/rspb.2008.1196)

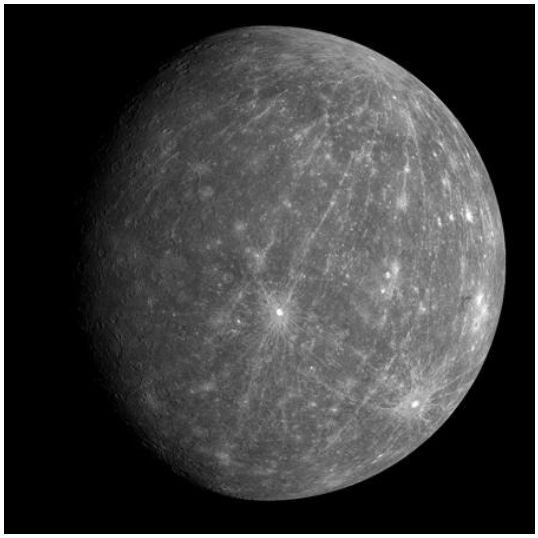
Messenger finds web of debris on Mercury

* 11:43 08 October 2008
* NewScientist.com news service
*** Rachel Courtland**

NASA's Messenger probe returned images of new regions of Mercury on Tuesday, after a flyby that took the spacecraft within 200 kilometers of the planet's surface.

Team members are now converting raw data from the 6 October flyby into images. The pictures will cover 30% of the planet that has not yet been seen by spacecraft. Until now, astronomers had only blurry images of these regions obtained with telescopes on Earth.

"It's a little bit like Christmas-time, and we're still in the process of opening a lot of the presents," says Messenger project scientist Ralph McNutt of the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland.



Young crater

The first images released reveal scarps, lava flows, and a vast web of lines emanating from a crater near the planet's north pole.

NASA's Mariner 10 probe, which flew close past the planet in 1974 and 1975, spotted some of these debris rays. "But it wasn't clear where they were radiating from," McNutt told New Scientist.

The crater had been imaged from the Earth with radar, but the new images are the first to show the extent of the collision. Some of the rays seem to extend 2000 km, says Messenger science team member Mark Robinson of Arizona State University in Tempe, Arizona. Mercury is 4880 km in diameter.

Much of the image to the right of the Kuiper crater (in the centre here) had never been imaged by a spacecraft before. Researchers were surprised to see long rays that extend thousands of kilometers from a crater at the planet's north pole **(Image: NASA/JHU APL/CIW)**

Given the fairly small size of the impact crater, the rays are probably very tenuous, wispy deposits of material, Robinson says. And as they have not been erased by other impacts, the crater may be fairly young, perhaps only a few million years old.

Atlas in progress

The pass was the probe's second close look at the scarred, rocky planet. On 14 January, Messenger's first close pass of the planet captured detailed images including about 20% of the planet's surface that had not been seen by a spacecraft before.

Team members plan to create nine image mosaics from more than 1200 pictures taken during this second flyby. Combined with photographs taken in 1974 and 1975 with NASA's Mariner 10 probe, the resulting images should cover 95% of the planet.

A global view of features like the long rays could eventually shed more light on the frequency of collisions in the inner solar system and the strength of Mercury's crust, says McNutt.

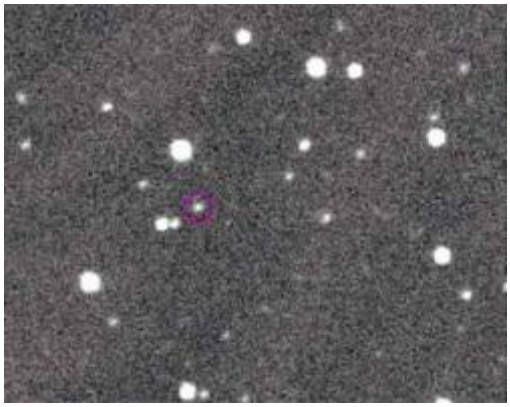
Messenger will need only one more flyby of Mercury – in September 2009 – to prepare it to enter orbit around the planet in March 2011.

Space rock collides with Earth right on time

* 14:30 08 October 2008
* NewScientist.com news service

*** Stephen Battersby**

An asteroid exploded over Africa yesterday morning, creating a fireball with the energy of about one kiloton of TNT. Although space rocks of this size collide with Earth about once a month, this was the first to be seen before it hit.



Despite only being a few metres across, the object was spotted a day before impact by the Mount Lemmon Observatory near Tucson, Arizona (see Space rock found on collision course with Earth).

Astronomers then calculated that the asteroid, called 2008 TC3, should hit Earth's atmosphere above northern Sudan at 0246 on Tuesday 7 October.

It turned up right on time. NASA's Near Earth Object Program now report that the fireball was seen at 0245 and 45 seconds. Details of this observation are yet to emerge.

The dot circled in purple is asteroid 2008 TC3, spotted here for the first time en route to a fiery end in the Earth's atmosphere **(Image: NASA)**

See the asteroid approaching: the moving dot in this NASA image is 2008 TC3

The flash is also reported to have been seen from a KLM airliner more than 1000 kilometres from the predicted impact site. More evidence comes from an infrasound detector in Kenya, which picked up a signal two and a half hours after the impact. The intensity of the infrasound wave implies an explosive energy of 1 to 2 kilotons of TNT.

High-speed crash

The asteroid was travelling at 12.8 kilometres per second. If its kinetic energy was indeed equal to one kiloton of TNT, it must have had a mass of about 50 tonnes.

At that size, 2008 TC3 was always likely to be destroyed in the atmosphere – although some fragments may have survived to fall as meteorites – but the collision may help to highlight the risks posed by larger bodies.

So far, surveys have discovered several thousand near-Earth objects, but astronomers estimate that as many as a million have diameters greater than 50 metres, big enough to be dangerous in a collision with Earth (see UN urged to coordinate killer asteroid defences).

Cell protein suppresses pain 8 times more effectively than morphine

CHAPEL HILL – More people suffer from pain than from heart disease, diabetes and cancer combined, but many of the drugs used to relieve suffering are not completely effective or have harmful side effects.

Now researchers at the University of North Carolina at Chapel Hill School of Medicine and the University of Helsinki have discovered a new therapeutic target for pain control, one that appears to be eight times more effective at suppressing pain than morphine.

The scientists pinpointed the identity and role of a particular protein that acts in pain-sensing neurons, or nerve cells, to convert the chemical messengers that cause pain into ones that suppress it.

"This protein has the potential to be a groundbreaking treatment for pain and has previously not been studied in pain-sensing neurons," said lead study author Mark J. Zylka, Ph.D., assistant professor of cell and molecular physiology at UNC. The results of the study will be published online in the journal Neuron, on Wednesday (Oct. 8) and in the print edition the following day.

The biological basis of pain is complex. To study the transmission of painful signals throughout the body, many researchers use "marker" proteins that label pain-sensing neurons. One such marker, FRAP (fluoride-resistant acid phosphatase), has been employed for this purpose for nearly 50 years, but the gene that codes for its production was never identified. That is, until researchers at UNC found that FRAP is identical to PAP (prostatic acid phosphatase), a protein routinely used to diagnose prostate cancer whose levels increase in the blood of patients with metastatic prostate cancer.

Previous research hinted that FRAP and PAP may have a shared identity. To determine whether or not this was the case, Zylka teamed up with Dr. Pirkko Vihko, a professor from the University of Helsinki who had genetically engineered mice that were missing the gene for PAP. When Zylka and his colleagues studied tissues from these mutant mice, they were happy to see that FRAP activity was missing. This revealed that the two proteins were in fact identical.

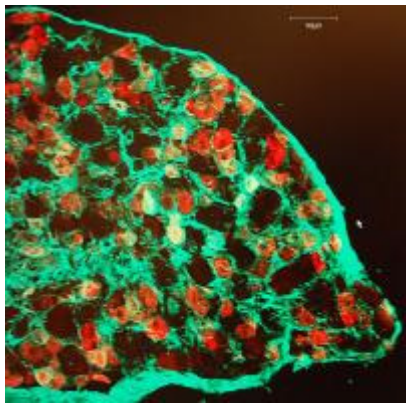


Image shows PAP (in red) in pain-sensing neurons. **Mark Zylka, Ph.D.**

Further, the mutant mice proved more sensitive than normal mice to inflammatory pain and neuropathic pain, two common forms of chronic pain in humans. These increased sensitivities diminished when researchers injected excess amounts of PAP into the spinal cords of the mutant mice.

"We were really blown away that a simple injection could have such a potent effect on pain," Zylka said. "Not only that, but it appeared to work much better than the commonly used drug morphine."

The new protein suppressed pain as effectively as morphine but for substantially longer. One dose of PAP lasted for up to three days, much longer than the five hours gained with a single dose of morphine.

The next question for the researchers was how PAP suppressed pain. It is already known that when pain-sensing neurons are stimulated, they release chemicals known as nucleotides, specifically adenosine triphosphate (ATP). This in turn sets off the events that invoke a painful sensation. But if ATP degrades to adenosine, that inhibits the neurons that transmit pain signals, thus relieving pain. Through a series of experiments, the UNC researchers showed that PAP removes the phosphate group, generating adenosine. Their study is the first to identify and characterize the role of such a protein in pain-sensing neurons.

Zylka and his colleagues are now searching for additional proteins that degrade nucleotides in these neurons. They are also working to develop small molecules that interact with PAP to enhance or mimic its activity.

"It is entirely possible that PAP itself could be used as a treatment for pain, through an injection just like morphine," Zylka said. "But we would like to modify it to be taken in pill form. By taking this field in a new direction, we are encouraged and hopeful that we will be able to devise new treatments for pain."

The research undertaken at UNC was supported by grants from the Sloan Foundation, the Searle Scholars Program, the Klingenstein Foundation, the Whitehall Foundation, the Rita Allen Foundation and the National Institute of Neurological Disorders and Stroke, part of the National Institutes of Health. The research undertaken at the University of Helsinki was

supported by grants from the Sigrid Juselius Foundation, the Finnish Cancer Foundation and the Research Council for Medicine of the Academy of Finland.
Study co-authors include graduate student Nathaniel A. Sowa, research analyst Bonnie Taylor-Blake and research technician Margaret A. Twomey from UNC; and postdoctoral researchers Annakaisa Herrala and Vootele Voikar from the University of Helsinki.

New study determines double flu jab needed against bird flu pandemic

Scientists recommend stockpiling influenza vaccine

An international study led by University of Leicester researchers has determined that vaccination will be the best way to protect people in the event of the next influenza pandemic – but that each person would need two doses. In an article in the New England Journal of Medicine published on October 9, researchers from the University of Leicester and University Hospitals of Leicester report on a study carried out at the Leicester Royal Infirmary.

Dr Iain Stephenson, Consultant in Infectious Diseases at the Infirmary and a Clinical Senior Lecturer at the University of Leicester carried out the research with Professor Karl Nicholson, Professor of Infectious Diseases at the University of Leicester and Consultant Physician at the Leicester Royal Infirmary.

The research was carried out in collaboration with Katja Hoschler, and Maria C. Zambon of the Health Protection Agency, Kathy Hancock, Joshua DeVos, Jacqueline M. Katz, from the Centers for Disease Control and Prevention, Atlanta, Michaela Praus and Angelika Banzhoff, from Novartis Vaccine, Germany. It is published in a letter to the NEJM.

An influenza pandemic occurs when a new influenza strain emerges (one to which humans have no immunity), mutates and spreads globally as a virus. Although it is not possible to predict the actual pandemic influenza strain, global health authorities have identified H5N1 avian influenza as a strain with the greatest pandemic potential in humans. H5N1 is currently circulating in birds and has caused serious illness in more than 380 people worldwide with a mortality rate, among people known to have been infected, of greater than 60 percent.

Dr Stephenson said: "In the event of the next influenza pandemic, vaccination will be the best way to protect people. Because of manufacturing capacity constraints, vaccines ideally need to be as a low dose as possible so that limited antigen material can be optimally used.

"In addition, it generally takes two doses of vaccine to give a good response, so if a pandemic occurred it would take some time to produce vaccine and then administer 2 doses to protect people. Therefore stockpiling of vaccines has been suggested to overcome some of these difficulties. However, subjects will still require 2 doses to generate protection and if the pandemic spreads rapidly this could be challenging to deliver."

The Leicester study looks at boosting those people who were vaccinated up to 7 years ago in the first H5 vaccine trials conducted in Leicester with a new updated H5 vaccine, in comparison to vaccinating subjects for the first time.

"We have found that a single low dose booster vaccine, given 7 years later, generated a very rapid response and within 1 week of vaccination, over 80% subjects had an excellent response to all strains of the H5 virus. In comparison, the unprimed subjects who were vaccinated for the first time needed two doses of vaccine and achieved protective levels of antibody after 6 weeks as expected.

The results indicate that regardless of which avian strain individuals are originally primed with, they are quickly protected against a broad range of avian strains following their booster vaccine, even strains they were not initially inoculated against. These results potentially provide a rationale to prevent pandemic influenza by proactively immunizing the public with stockpiled pre-pandemic vaccines.

"Therefore the importance of this study is to help policy makers decide how to use the stockpiled vaccine. We find that proactively priming subjects (such as key personnel and first responders) to generate long lived memory immune responses that could be boosted rapidly many years later could be used as a potential vaccination strategy."

One Dose of EPO May Halt Cell Suicide Following a Heart Attack

Molecular imaging agent reveals beneficial effects of tissue-protecting hormone, according to article in The Journal of Nuclear Medicine

Reston, Va.—Two things happen following a heart attack—necrosis (normal cell death) and apoptosis (programmed cell death)—and both are bad. Now researchers in Japan have found that a single intravenous dose of the hormone erythropoietin (EPO) immediately after myocardial infarction (heart attack) can drastically reduce or eliminate apoptosis and thereby limit the amount of damage to the heart, according to an article in the October issue of The Journal of Nuclear Medicine.

"The study's concept is very novel. We wanted to see if the area of cell death following acute coronary occlusion could be reduced by a single dose of EPO," said H William. Strauss, M.D., attending physician in the

Nuclear Medicine Service at Memorial Sloan Kettering Cancer Center, professor of radiology at Weill Cornell School of Medicine and a co-author of the manuscript. "Cells deprived of blood quickly begin to die. By administering 99mTc-annexin V, a radiotracer with a high affinity for apoptotic cells, we were able to view the effects of EPO on heart cells immediately following the restriction of blood flow that occurs during MI."

In the study, 18 Wistar rats were randomized into two groups. In both groups, arteries were blocked to induce a heart attack; 20 minutes later, they were unblocked. Immediately afterward, one group (treatment) received an injection of EPO and the other group of saline (non-treatment). Both groups were then injected with 99mTc-annexin V, and their hearts were examined using autoradiography to evaluate the distribution of the radiotracer. In the treatment group, EPO therapy caused a 2.7-fold reduction of tracer accumulation, indicating a reduction in apoptosis and, therefore, less damage to heart tissue. The reduction in damage to the heart was also demonstrated by measurement of regional cardiac function, which was significantly better in the EPO-treated group. These findings suggest that EPO may be useful to prevent long-term heart damage and dysfunction after a heart attack.

"Although other drugs to inhibit apoptosis have been studied, none appears nearly as effective as a single dose of EPO," Strauss said.

EPO is a naturally occurring hormone that promotes the formation of red blood cells in the bone marrow. It was first produced artificially to aid in the treatment of anemia. More recently, scientists discovered its cardioprotective capability in minimizing apoptosis.

Apoptosis is sometimes referred to as "cell suicide," because the biochemically programmed mechanism triggers damaged cells to self-destruct, albeit in an orderly way. Researchers have found that cells can die by several pathways, only one of which is apoptosis. Because cell death is central to normal physiology and numerous disease states, research into apoptosis is ongoing in a variety of medical areas, including oncology and cardiology.

"In cardiovascular medicine, imaging of apoptosis could be highly useful in managing myocardial infarction, atherosclerotic plaques [hardening of the arteries] and cardiac allograft rejection [heart transplant rejection].

Because molecular probes such as 99mTc-annexin V are capable of imaging apoptosis in living patients, they are vital to this research," said Robert W. Atcher, Ph.D., president of SNM, an international scientific and medical association dedicated to advancing molecular imaging and therapy.

"More translational research is needed to evaluate cell death pathways and their significance for imaging in the diagnosis or monitoring of disease. SNM is currently working with molecular imaging practitioners, government agencies and pharmaceutical manufacturers to streamline the process to progress promising molecular imaging agents from the laboratory into the clinical setting, " Atcher added.

Coauthors of "Cardioprotective Effects of Erythropoietin in Rats Subjected to Ischemia-Reperfusion Injury: Assessment of Infarct Size with 99mTc-Annexin V" include Katsuichi Ohtsuki and Tomoki Doue, Department of Cardiology and Nephrology, Kyoto Prefectural University of Medicine, Kyoto, Department of Medicine, Kyoto, and Meiji University of Integrative Medicine, Nantan; Akihiro Azuma and Hiroaki Matsubara, Department of Cardiology and Nephrology, Kyoto Prefectural University of Medicine, Kyoto; Kazuma Ogawa, Division of Tracer Kinetics, Advanced Science Research Center, Kanazawa University, Kanazawa; Masashi Ueda, Radioisotopes Research Laboratory, Kyoto University Hospital Faculty of Medicine, Kyoto University, Kyoto; Hideo Saji, Department of Patho-Functional Bioanalysis, Graduate School of Pharmaceutical Sciences, Kyoto University, Kyoto, all of Japan; and H. William Strauss, Division of Nuclear Medicine, Department of Radiology, Memorial Sloan-Kettering Hospital, New York, N.Y.

RNA molecules, delivery system improve vaccine responses, effectiveness

By Daniel J. Vargas October 7, 2008

AUSTIN, Texas – A novel delivery system that could lead to more efficient and more disease-specific vaccines against infectious diseases has been developed by biomedical engineers at The University of Texas at Austin.

The findings use specific ribonucleic acid (RNA) molecules to significantly bolster a vaccine's effectiveness while tailoring it based on the type of immune response that is most desirable for a particular disease, says Krishnendu Roy, associate professor of biomedical engineering and lead investigator on the study.

Roy and his team, which included his graduate student Ankur Singh and collaborators at M.D. Anderson Cancer Center in Houston, achieved their results during a two-year study primarily working with a DNA-based hepatitis B vaccine. Their work was recently published in Molecular Therapy, the official journal of the American Society of Gene Therapy.

In their studies using mice, immune responses were five to 50 times stronger than with traditional vaccine delivery. The stronger the immune response to a vaccine, the better protection the vaccinated person should have. Their research uses a novel polymer-based delivery system that consists of micron-sized particles carrying both the vaccine and the RNA to immune cells.

"What we've achieved is a delivery system that provides DNA-based vaccines along with RNA which allows us to significantly enhance the immune response and drive them into a certain direction that is effective against the disease," Roy says. The team worked with what are called "silencing RNA," which shut down specific proteins in the body.

"By silencing certain proteins in the cells that process your vaccine, we can direct the immune response one way or the other," says Roy, who holds the General Dynamics Endowed Faculty Fellowship.

Physicians want to tailor the immune response because, Singh says, vaccines for parasitic infections may need more of an antibody response, while vaccines for viral infections need more of a cellular response, one that kills the infected cells.

The team's delivery system would work for a wide range of diseases, making it a broad platform for infectious disease vaccines, Roy says. Roy says mice studies will continue for the next four to five years. If the tests continue to prove successful, testing could begin on primates and eventually humans within six to 10 years.

"Eventually, we want to try it with (vaccines for) cancer and other auto-immune diseases," Singh says.

Other collaborators include research fellow Hui Nie and graduate student Bilal Ghosn of the university, and Hong Qin and Dr. Larry W. Kwak of M.D. Anderson Cancer Center.

Funding was provided by the National Institute for Allergy and Infectious Diseases and the Coulter Foundation.

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Scripps research team solves structure of 'beneficial' virus

Researchers seek to understand, and improve, virus that can infect lung cancer cells

The 3-D structure of the virus, known as Seneca Valley Virus-001, reveals that it is unlike any other known member of the Picornaviridae viral family, and confirms its recent designation as a separate genus "Senecavirus." The new study reveals that the virus's outer protein shell looks like a craggy golf ball¬—one with uneven divets and raised spikes—and the RNA strand beneath it is arranged in a round mesh rather like a whiffleball. "It is not at all like other known picornaviruses that we are familiar with, including poliovirus and rhinoviruses, which cause the common cold," says the study's senior author, Associate Professor Vijay S. Reddy, Ph.D., of The Scripps Research Institute. "This crystal structure will now help us understand how Senecavirus works, and how we can take advantage of it."

The Senecavirus is a "new" virus, discovered several years ago by Neotropix Inc., a biotech company in Malvern, Pennsylvania. It was at first thought to be a laboratory contaminant, but researchers found it was a pathogen, now believed to originate from cows or pigs. Further investigation found that the virus was harmless to normal human cells, but could infect certain solid tumors, such as small cell lung cancer, the most common form of lung cancer.

Scientists at Neotrophix say that, in laboratory and animal studies, the virus demonstrates cancer-killing specificity that is 10,000 times higher than that seen in traditional chemotherapeutics, with no overt toxicity. The company has developed the "oncolytic" virus as an anti-cancer agent and is already conducting early phase clinical trials in patients with lung cancer.

But the researchers still did not know how the virus worked, so they turned to Reddy. He and his Scripps Research team, especially Sangita Venkataraman, Ph.D., a postdoctoral researcher, determined the Senecavirus crystal structure.

Reddy describes the differences they found between other picornaviruses and the Senecavirus as like variations among car models of the same manufacturer. "The chassis is the same, but the body style is different," he says. "How the body of a virus is shaped determines how it infects cells." The structure of the Senecavirus is also depicted at http://viperdb.scripps.edu/, the "Virus Particle Explorer" developed at Scripps Research by Reddy and his colleagues. The online database is a worldwide resource for information on the structure of viral particles; it contains details of 253 viruses to date.

Once the structure of Seneca Valley Virus-001 was solved, researchers went on to identify several areas on the viral protein coat that they think might hook onto receptors on cancer cells in the process of infecting them. The researchers are now conducting further investigations on this process. "It will be critically important to find out what region of its structure the virus is using to bind to tumor cells, and what those cancer cell receptors are," Reddy says. "Then we can, hopefully, improve Senecavirus enough to become a potent agent that can be used with many different cancers."

In addition to Reddy and Venkataraman , authors of the study, "Structure of Seneca Valley Virus-001, an oncolytic picornavirus representing a new genus," are Seshidhar P. Reddy, Neeraja Idamakanti, and Paul L. Hallenbeck of Neotropix Inc. and Jackie Loo of Scripps Research. For more information, see http://www.structure.org/ . The research was supported by grants from the National Institutes of Health.

Newly discovered fungus strips pollutants from oil

* 17:45 08 October 2008
* NewScientist.com news service
*** Colin Barras**

A humble fungus could help oil companies clean up their fuel to meet tightening emissions standards. The fungus, recently discovered in Iran, grows naturally in crude oil and removes the sulphur and nitrogen compounds that lead to acid rain and air pollution.

Worldwide, government are imposing increasingly severe limits on how much of those compounds fuels can contain. Oil producers are searching for more efficient ways to strip sulphur and nitrogen from their products.

The standard way to "desulphurise" crude oil involves reacting it with hydrogen at temperatures of 455 °C and up to 204 times atmospheric pressure (roughly 21 million pascals or 3000 psi). It achieves less than perfect results. Micro-organisms able to metabolise sulphur and nitrogen have the potential to achieve the same endpoint under more normal conditions. In recent years a number of researchers have isolated desulphurising bacteria.

But Jalal Shayegan and his team at the Sharif University of Technology in Tehran, Iran, have now discovered and isolated a fungus that appears able to remove sulphur from oil with greater efficiency.

Fungus hunting

Shayegan's team went looking for fungus in oil-contaminated soil from Tehran oil refinery and the Kuhemond oil field in Iran, and isolated a number of new desulphurising micro-organisms.

Tests revealed that one strain of Stachybotrys fungus was particularly efficient at sulphur removal – the first fungus found to have this ability. Shayegan's team pitted their new find against several known desulphurising bacteria. They grew them all for 6 days on heavy crude oil samples from the Kuhemond and Soroush oil fields, mixed with a water-based growth medium.

Clear winner

The fungus achieved the best results by far. In one sample it removed 76% of sulphur compounds in just 3 days, a figure only one bacteria could match over the full 6 days.

Robin van Leerdam at Wageningen University in Bomenweg, Netherlands, says biodesulphurisation holds promise as a method to refine oil and that the new contender is a welcome addition. But he says rematches are required to properly test it against the known bacteria. "The sulphur removal efficiency of the fungus is higher than of the bacterium, but the comparison is not completely fair," he told New Scientist.

The desulphurising bacteria pitted against the fungus were previously grown on Dibenzothiophene, commonly used to simulate the sulphur compounds in crude oil. But they had not been grown before on crude oil itself. Leerdam thinks bacteria more used to crude oil would run the fungus closer for efficiency.

A better bet?

Other researchers are still advancing non-biological approaches to stripping sulphur from oil.

"If you want to invest in desulphurisation technologies then put your money on the chemical route," Michiel Makkee at Delft University of Technology in Julianalaan, Netherlands told New Scientist.

His team recently designed a simple ester capable of removing sulphur from diesel. It works 10 or 20 times faster than a fungus or bacteria, and could be squeezed into much more compact reactors than a biological process, Makkee says. But he concedes that his new method still requires heat – working at 140 °C compared to the fungus' room temperature.

Journal references: Industrial & Engineering Chemistry Research (DOI: 10.1021/ie800494p); ChemSusChem (DOI: 10.1002/cssc.200800109)

Small intestine can sense and react to bitter toxins in food

Discovery has potential to improve cancer, diabetes treatments

Irvine, Calif. — Toxins in food often have a bad, bitter taste that makes people want to spit them out. New UC Irvine research finds that bitterness also slows the digestive process, keeping bad food in the stomach longer and increasing the chances that it will be expelled.

This second line of defense in the gut against dietary toxins also triggers the production of a hormone that makes people feel full, presumably to keep them from eating more of the toxic food.

This discovery has the potential to help scientists develop better therapies for ailments ranging from cancer to diabetes, and it may explain why certain isolated populations around the world have adapted to eat and enjoy local foods that taste bad to outsiders and make them sick.

The study, appearing online Oct. 9 in the Journal of Clinical Investigation, was performed with mice, and the results probably translate to humans, said Timothy Osborne, molecular biology and biochemistry professor and study senior author.

"We have evolved mechanisms to combat the ingestion of toxins in our food," Osborne said. "This provides a framework for an entirely new area of research on how our bodies respond to what is present in our diets."

Mammals have evolved to dislike the bitter taste of toxins in food. This response is particularly important when they eat a lot of plant material, which tends to contain more bitter-tasting, potentially toxic ingredients than meat.

Examples of bitter-tasting toxins include phenylthiourea, a compound that destroys the thyroid gland, and quinine, found in tonic water, which can be deadly in large doses.

If toxins are swallowed, bitter-taste receptors in the gut sense them and trigger the production of a hormone called cholecystokinin that both suppresses appetite and slows the movement of food from the stomach to the small intestine.

Interestingly, the UCI scientists found that cholesterol regulates the activity of bitter-taste receptors in the intestine, and diets high in plant material and potential toxins naturally are low in cholesterol, compared to low-toxin, high-cholesterol, meat-based diets.

In small intestine cell cultures, low levels of cholesterol triggered a stronger receptor response – meaning they worked better – while high levels caused a weaker response.

The same response was observed in mice that were given drugs to stop the production and absorption of cholesterol. Not only were their receptors more active, their small intestine cells produced two to three times the amount of the appetite-suppressing hormone in the presence of bitter food, compared to normal mice.

Scientists say that regulation of taste receptors by dietary constituents likely explains why groups of people taste certain foods differently.

"One group of people may think something tastes great and can metabolize it just fine, but a group from the outside may think it tastes horrible and get sick," Osborne said. "The first group likely adapted to the food through a change in the expression and pattern of their dietary sensing molecules."

With this knowledge, scientists could make medicines less bitter, which in turn would allow for increased palatability and quicker absorption. Drugs used to treat cancer sometimes include molecules that taste bitter. Also, changing the patient's eating habits could improve the effectiveness of such drugs.

In addition to the appetite-suppressing hormone, bitter-taste receptors in the gut activate the production of glucagon-like peptide 1, a protein that stimulates insulin secretion in the pancreas. Drugs currently are on the market that attempt to stabilize this protein in people with diabetes, and therapies aimed at increased production are attractive therapeutic targets.

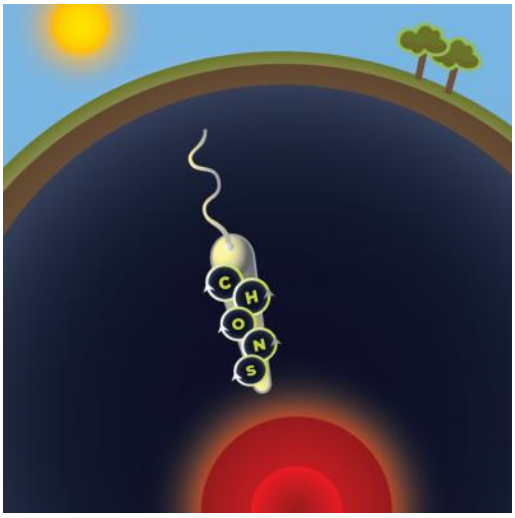
"Because bitter-taste receptors are expressed in the gut, a new avenue exists to identify ways to stimulate production of GLP-1," Osborne said. "It could be very beneficial for the treatment of diabetes and possibly other diseases."

UCI scientists Tae-Il Jeon, Bing Zhu and Jarrod Larson also worked on this study, which was funded by the National Institutes of Health.

Bold traveler's journey toward the center of the Earth

At 2.8 km down, a 1-of-a-kind microorganism lives all alone

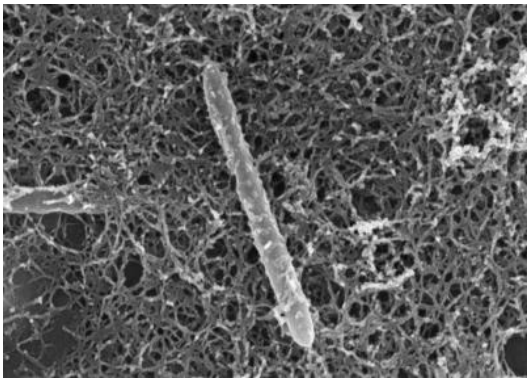
BERKELEY, CA – The first ecosystem ever found having only a single biological species has been discovered 2.8 kilometers (1.74 miles) beneath the surface of the earth in the Mponeng gold mine near Johannesburg, South Africa. There the rod-shaped bacterium Desulforudis audaxviator exists in complete isolation, total darkness, a lack of oxygen, and 60-degree-Celsius heat (140 degrees Fahrenheit).



D. audaxviator survives in a habitat where it gets its energy not from the sun but from hydrogen and sulfate produced by the radioactive decay of uranium. Living alone, D. audaxviator must build its organic molecules by itself out of water, inorganic carbon, and nitrogen from ammonia in the surrounding rocks and fluid. During its long journey to the extreme depths, evolution has equipped the versatile spelunker with genes – many of them shared with archaea, members of a separate domain of life unrelated to bacteria – that allow it to cope with a range of different conditions, including the ability to fix nitrogen directly from elemental nitrogen in the environment.

Desulforudis audaxviator is an organism that lives independently in total darkness and at high temperature by reducing sulfate and fixing carbon and nitrogen from its environment, deep within the Earth. It constitutes the first known single-species ecosystem. **Illustration © 2008 Thanya Suwansawad**

D. audaxviator was captured and its unusual genome sequenced and analyzed using the techniques of environmental genomics, also called metagenomics, by scientists from the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab), Joint Genome Institute (JGI), and Pacific Northwest National Laboratory (PNNL), working with colleagues from Princeton University, Indiana University, National Taiwan University, Massachusetts Institute of Technology (MIT), Florida State University, the Desert Research Institute, and the University of Western Ontario. The work was a project of the Virtual Institute for Microbial Stress and Survival (VIMSS), supported by DOE and directed by Berkeley Lab's Adam Arkin and Terry Hazen, and the Indiana Princeton Tennessee Astrobiology Initiative (IPTAI) of NASA's Astrobiology Institute, directed by Tullis Onstott of Princeton University and Lisa Pratt of Indiana University. The researchers report their results in the 10 October, 2008 issue of the journal Science.



The rod-shaped D. audaxviator was recovered from thousands of liters of water collected deep in the Mponeng Mine in South Africa. **Micrograph by Greg Wanger, J. Craig Venter Institute, and Gordon Southam, University of Western Ontario, used with permission**

"The great thing about environmental genomics is that it has made it possible to form a much more complete picture of microscopic life everywhere on Earth, instead of being limited to the very small proportion of bugs" – microorganisms, that is – "that can be cultured in the lab," says Dylan Chivian of Berkeley Lab's Physical Biosciences Division (PBD), lead author of the Science paper. "Almost all organisms live in communities with subdivided roles within their ecosystems. By extracting DNA from environmental samples, the various players in these microbial communities and the abilities of their dominant members can be identified, even if complete genomes of most of them are impossible to sort out."

It was such a collection of organisms that the researchers expected to find when they painstakingly filtered some 5,600 liters of fluid collected by Onstott and coworkers from fractures in the rock of the site tagged MP104, a newly opened section of the Mponeng Mine's level 104. Presence of the species later to be named D. audaxviator was a safe bet; although its genome had never been sequenced, the organism had been identified at MP104 by Onstott, Li-Hung Lin of National Taiwan University, and their coworkers in 2006, and it was known to be the most common microbe found living more than 1.5 kilometers deep in South Africa's Witwatersrand mining district.

"We knew from previous work in these mines, using molecular biology techniques, that there seemed to be very simple communities living down there," says Fred Brockman of the Biology Department of PNNL in Washington state, where the DNA was extracted from the filtered cells. "We expected we'd have a good chance of assembling one entire genome of the most dominant species, or perhaps 70 to 80 percent of several species."

Says Chivian, "What we instead discovered was that there was only one organism present in the sample. More than 99.9 percent of the DNA came from that single organism, and the tiny remainder appeared to be trace contamination from the mine and the laboratory."

The sequencing effort at DOE's JGI was led by Alla Lapidus of Berkeley Lab's Genomics Division; even before the analysis was complete it was evident that the lone species's genome was remarkable. The genome was not as streamlined as might be expected of an organism living in what is presumably a very stable environment. Such streamlined bacteria typically have about 1,500 genes, whereas D. audaxviator has 2,157 protein-coding genes – slim, but hardly stripped.

What this not-quite-minimal gene package can do was revealed by the genome analysis done by Chivian, Arkin, and Paramvir Dehal of PBD, and Eric Alm of MIT: the genome contained everything needed for the organism to sustain an independent existence and reproduce, including the ability to incorporate the elements necessary for life from inorganic sources, move freely, and protect itself from viruses, harsh conditions, and nutrient-poor periods by becoming a spore.

"One question that has arisen when considering the capacity of other planets to support life is whether organisms can exist independently, without access even to the sun," says Chivian. "The answer is yes, and here's the proof. It's sort of philosophically exciting to know that everything necessary for life can be packed into a single genome."

Previous work had identified sulfates as the most readily available energy source in D. audaxviator 's environment. D. audaxviator not only has the equipment to reduce sulfates, this capacity is backed up by additional genes that appear to have been borrowed from archaea by horizontal gene transfer, the incorporation

of genetic material from an unrelated species. Archaea, a domain distinct from bacteria, first attracted attention as extremophiles, although many other kinds of archaea have been found since. Some 280 types of bacteria and 44 types of archaea have been found in microbial communities in the South African mines.

D. audaxviator can get its carbon from a number of sources, depending on the local surroundings. It can digest sugars and amino acids, suggesting that one source of carbon might be the dead cells of other microbes in locations where the concentration of cells permits. But in the fluid from level 104, where biodensity is low, D. audaxviator is able to survive because its genome also contains genes equipping the organism to get carbon from carbon monoxide, carbon dioxide, bicarbonate, formate, and other nonbiological sources.

Its nitrogen comes from ammonia released from rocks and dissolved in the fluid at level 104, but D. audaxviator also has a gene for a nitrogenase that could, if necessary, extract nitrogen from its surroundings after first converting it to ammonia – a gene that also appears to be shared with high-temperature archaea.

Other genes shared with archaea confer such traits as defense against viruses, but one system of self-protection is unique to D. audaxviator 's bacterial phylum, Firmicutes: the ability to form endospores, tough structures that shield DNA and RNA from drying out, and from heat, starvation, and chemical attack. Like many bacteria, D. audaxviator is equipped with a flagellum, a whiplike structure that allows it to swim toward sources of nourishment such as might be found in pores in the rock and other mineral surfaces.

About the only thing D. audaxviator can't do is resist oxygen, which suggests it hasn't been exposed to pure oxygen for a very long time. For D. audaxviator to have evolved its remarkably versatile genome, key parts of which are shared with archaea, it must have been on its deep journey for many generations, perhaps as long as the water in the fracture from which it was captured, which has not seen the surface for millions of years.

"Part of the strength of comparative genomics comes from the fact that we now have the genomes of over a thousand bacteria and archaea and we know what many of these genes can do," says Chivian. "At a simple level, it allows us to look at a new genome and put Humpty Dumpty's metabolism back together again, based on the similarity to genes in the genomes of these more well-studied microorganisms. This is particularly powerful for understanding novel bugs from the environment that are otherwise not well characterized."

D. audaxviator 's remarkable capabilities gave rise to its remarkable name. The genus name Desulforudis was coined by Tullis Onstott from the Latin for "from sulfur" and "rod," noting its shape and its ability to get energy from sulfates. And audaxviator? Dylan Chivian found the clue in Jules Verne's Journey to the Center of the Earth, in a message – "Conveniently in Latin," says Chivian -- deciphered by Verne's protagonist, Professor Lidenbrock, which reads in part, "descende, Audax viator, et terrestre centrum attinges." It means "descend, Bold traveler, and attain the center of the Earth."

"Environmental genomics reveals a single-species ecosystem deep within the Earth," by Dylan Chivian, Eoin L. Brodie, Eric J. Alm, David E. Culley, Paramvir S. Dehal, Todd Z. DeSantis, Thomas M. Gihring, Alla Lapidus, Li-Hung Lin, Stephen R. Lowry, Duane P. Moser, Paul Richardson, Gordon Southam, Greg Wanger, Lisa M. Pratt, Gary L. Andersen, Terry C. Hazen, Fred J. Brockman, Adam P. Arkin, and Tullis C. Onstott, appears in the 10 October issue of Science, and is available online to subscribers at http://dx.doi.org/10.1126/science.1155495.

This work was supported by the U.S. Department of Energy's Office of Science through the Virtual Institute for Microbial Stress and Survival and by the National Aeronautics and Space Administration through the Indiana Princeton Tennessee Astrobiology Initiative (IPTAI) of NASA's Astrobiology Institute.

Mouse studies suggest daily dose of ginkgo may prevent brain cell damage after a stroke

Working with genetically engineered mice, researchers at Johns Hopkins have shown that daily doses of a standardized extract from the leaves of the ginkgo tree can prevent or reduce brain damage after an induced stroke.

The scientists, in a report published in Stroke, say their work lends support to other evidence that ginkgo biloba triggers a cascade of events that neutralizes free radicals known to cause cell death.

"It's still a large leap from rodent brains to human brains but these results strongly suggest that further research into the protective effects of ginkgo is warranted," says lead researcher Sylvain Doré, Ph.D., an associate professor in the Department of Anesthesiology and Critical Care Medicine. "If further work confirms what we've seen, we could theoretically recommend a daily regimen of ginkgo to people at high risk of stroke as a preventive measure against brain damage."

In the study, researchers gave ginkgo biloba EGb 761 - a lab-quality form of the extract - to normal mice and HO-1 knockout mice, mice lacking the gene that produces the enzyme heme oxygenase-1(HO-1). HO-1 breaks down heme, a common iron molecule found in blood, into carbon monoxide, iron and biliverdin. HO-1 has been shown to act as an antioxidant and have a protective effect against inflammation in animal models.

Doré and his team gave 100 milligrams per kilogram of EGb 761 extract orally once daily for seven days before inducing stroke in the mice by briefly blocking an artery to one side of the brain.

After stroke induction, the mice were tested for brain function and brain damage. One such test, for example, involves running patterns, another tests reaction to an external stimulus. Similar tests were conducted on mice that did not receive the ginkgo extract.

Neurobehavioral function was evaluated before the study and at 1, 2 and 22 hours after stroke using a four-point scale: (1) no deficit, (2) forelimb weakness, (3) inability to bear weight on the affected side, (4) no spontaneous motor activity.

Results showed that normal mice that were pretreated had 50.9 percent less neurological dysfunction and 48.2 percent smaller areas of brain damage than untreated mice. These positive effects did not exist in the HO-1 knockout mice.

"Our results suggest that some element or elements in ginkgo actually protect brain cells during stroke," says Doré.

Roughly 700,000 people experience a stroke in the United States annually. Of those, 87 percent have an ischemic stroke, which is caused by a blocked artery in the brain. Some brain damage occurs simply from the lack of blood getting to brain cells; however, it is known that an increase in the presence of free radicals at the site of an ischemic stroke - once the clot is cleared and the blood supply returns - is also a major cause of resulting brain cell damage. Free radicals are toxic oxygen molecules that are produced when cells die. According to Doré and his team, ginkgo increases HO-1 levels, and the antioxidant properties of this enzyme eliminate free radicals at the surrounding regions of the stroke site.

The only current treatment for ischemic stroke is to clear the clot with tissue plasminogen activator (tPA) or other means. This, however, offers no real protection against the cell damage that occurs when blood flow is restored.

"Ginkgo has long been touted for its positive effects on the brain and is even prescribed in Europe and Asia for memory loss," says Doré. "Now we have a possible understanding for how ginkgo actually works to protect neurons from damage."

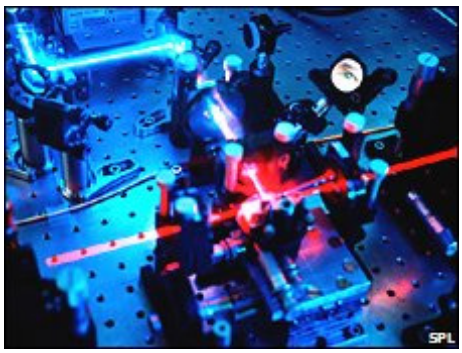
Native to China, the ginkgo tree is grown as an ornamental shade tree in Australia, Southeast Asia, Europe, Japan and North America. It is commercially cultivated in France and the United States. It has a grey bark, reaches a height of 35 meters and a diameter of 3 to 4 meters. It has deciduous, fan-like leaves that are green, grey-yellow, brown or blackish.

Additional researchers include Sofiyan Saleem, Ph.D., and Hean Zhuang, M.D., of the Department of Anesthesiology and Critical Care Medicine, and Shyam Biswal, Ph.D., of the Department of Environmental Health Sciences, from Johns Hopkins.

'Unbreakable' encryption unveiled

By Roland Pease BBC Radio Science Unit

Perfect secrecy has come a step closer with the launch of the world's first computer network protected by unbreakable quantum encryption at a scientific conference in Vienna.



Quantum cryptography is inherently unbreakable

The network connects six locations across Vienna and in the nearby town of St Poelten, using 200 km of standard commercial fibre optic cables.

Quantum cryptography is completely different from the kinds of security schemes used on computer networks today. These are typically based on complex mathematical procedures which are extremely hard for outsiders to crack but not impossible given sufficient computing resources or time.

But quantum systems use the laws of quantum theory, which have been shown to be inherently unbreakable.

The basic idea of quantum cryptography was worked out 25 years ago by Charles Bennett of IBM and Gilles Brassard of Montreal University, who was in Vienna to see the network in action.

"All quantum security schemes are based on the Heisenberg Uncertainty Principle, on the fact that you cannot measure quantum information without disturbing it," he explained.

"Because of that, one can have a communications channel between two users on which it's impossible to eavesdrop without creating a disturbance. An eavesdropper would create a mark on it. That was the key idea."

In practice this means using the ultimate quantum objects: photons, the "atoms of light". Incredibly faint beams of light equating to single photons fired a million times a second raced between the nodes in the Vienna network. Each node, housed in a different Siemens office (Siemens has provided the fibre links), contains a small rack of electronics - boxes about the size of a PC - and a handful of sensitive light detectors.

Numerical key

From the detected photons, a totally secret numerical key can be distilled, which encodes the users' data much like the keys used in normal computer networks do.

The advantage is that no-one else can know the key without revealing themselves. As we saw in the demonstration, when an intruder did try to listen in on the quantum exchange, photons became scrambled, and a rise in the error rate at the node detectors signalled the attack. The system automatically shut down without being compromised.

More importantly, the demonstration also showed that the network is robust. If one quantum link breaks down, the connections can be re-routed via other nodes, much as phone calls get re-routed automatically through a telecoms network, so that any two users on the network can remain in continuous secure contact.

Dr Hannes Huebel of Vienna University, operating one of the nodes, explained how robustness was now as important as security in the development of quantum encryption systems.

"We are constantly in touch with insurance companies and banks, and they say it's nearly better that they lose 10m euros than if the system is down for two hours, because that might be more damaging for the bank," said Dr Huebel. "So that's what we have to prove, that we have a reliable system that delivers quantum keys for several weeks without interruption, and then they might be more interested."

Polarised light

The final element of the EU-sponsored project (called SECO-QC) was the interconnection of different realisations of quantum cryptography.

There are many ways photons of light can encode a numerical key: through the direction they're polarised (like Polaroid glasses) for example, or the precise timing of their arrival. Different schemes have different strengths and weaknesses, and a viable network would have to handle whatever individual users choose to use, explained the project's director, Christian Monyk - just as a mobile phone network has to handle handsets from many manufacturers.

Quantum cryptography is a surprising outgrowth of recondite arguments that bounced around for decades about the meaning of quantum mechanics. Albert Einstein, who discovered the quantum properties of photons of light - indeed, discovered the very concept of the photon - always resisted quantum theory's spooky behaviour, "God does not play dice", being among his oft-quoted objections.

But experiments eventually proved that he apparently does, and also laid the technical foundations for today's quantum information revolution - cryptography, teleportation, and computation.

One of the grandees of quantum science, Vienna University's Anton Zeilinger, used the occasion to argue for continued funding of fundamental science in these increasingly application-focused days.

"Real breakthroughs are not found because you want to develop some new technology, but because you are curious and want to find out how the world is," Dr Zeilinger said.

"It may not have surprised the founding fathers of quantum science that technology has advanced so that you can play with individual quantum systems, in great detail. "Maybe this would not surprise, but what could surprise them is that people are thinking and doing practical applications."

Steroid Treatment Offers No Benefit In Preemies, Hopkins Children's Study Suggests

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Results of a multicenter study led by Johns Hopkins Children's Center challenge the longstanding practice of treating premature babies with hydrocortisone, a steroid believed to fight inflammation and prevent lung disease. The researchers found that such treatment offers little or no benefit and that low cortisol levels are not even necessarily harmful. High cortisol levels, on the other hand, appeared to increase the risk of dangerous bleeding in the brain and require that babies be monitored aggressively to ward off life-threatening complications, according to the study published in the October issue of Pediatrics.

Premature babies and adults with a condition known as relative adrenal insufficiency have abnormally low levels of the stress hormone cortisol. The standard treatment for this condition in newborns has been hydrocortisone therapy. These findings, however, shed new light on the clinical meaning of low cortisol levels in preemies, showing that contrary to common belief, low blood concentrations of this hormone do not put extremely low-birth-weight babies (those born weighing less than 2.2 pounds) at higher risk for retinopathy of prematurity — a potentially blinding eye condition — inflammation and lung disease.

Researchers also found no difference in health outcomes between babies with low cortisol levels who were treated with hydrocortisone and those given a placebo. While hydrocortisone had no adverse effects on a baby's health, it also did nothing to prevent or reduce respiratory diseases, infections, hemorrhages or retinopathy.

"We were intrigued and somewhat surprised, but contrary to what we expected, low cortisol levels do not appear to be dangerous and may actually be the norm in premature babies," said study lead investigator Susan Aucott, M.D., a neonatologist at Hopkins Children's. "What this means is we should really think twice before rushing to treatment with hydrocortisone in our effort to 'correct' these low levels."

While surprising, the findings are not entirely counterintuitive, investigators say, because in utero babies have naturally low cortisol levels. “This may mean that, in a way, low cortisol levels are normal, and premature babies maintain them low, as they would have been in the womb,” Aucott said.

Comparing the cortisol levels of 311 extremely low-birth-weight preemies immediately after birth and one week after birth, researchers found low cortisol levels did not increase the risk for adverse short-term outcomes or death. For example, bronchopulmonary dysplasia occurred in 58 percent of infants with low cortisol levels, in 58 percent of infants with midrange cortisol levels and in 62 percent of those with moderately elevated cortisol levels. Brain hemorrhages occurred in 24 percent of infants with low cortisol levels, in 36 percent of those with midrange cortisol levels and in 49 percent of those with mildly elevated cortisol levels.

Babies with moderately to severely elevated cortisol levels at birth and shortly after birth had a higher risk for life-threatening brain bleeds, dangerous gastrointestinal perforations and severe retinopathy, researchers found. Researchers have yet to pinpoint the exact mechanism leading to these dangerous spikes in cortisol, but past studies have suggested that severe pain may drive up production of this stress hormone. Regardless of the trigger, investigators say, neonatologists should aggressively monitor infants with elevated cortisol levels because of their vulnerability to hemorrhages and other life-threatening complications.

Elevated cortisol concentrations, especially values higher than 31 micrograms per deciliter of blood at 12 to 48 hours after birth, and more than 18 micrograms per deciliter at five to seven days after birth, appeared to make babies more prone to serious bleeding in the brain, although researchers caution a cause-effect relationship could not be established from this study because elevated cortisol concentration could be a consequence of the hemorrhage but not necessarily a trigger of it. Very high cortisol levels, above 62 micrograms per deciliter, appeared to heighten a baby’s risk for severe brain hemorrhages, gastrointestinal perforation and death. For example, death occurred in 12 percent of infants who had low cortisol levels 48 hours after birth and in 13 percent of infants with midrange levels of cortisol, but in nearly 30 percent of infants with severely elevated cortisol levels at 48 hours of birth. Gastrointestinal bleeds occurred in 3 percent of infants with low cortisol levels at 48 hours of birth, in 9 percent of infants with cortisol levels in the mid-range, but in 24 percent of those with significantly elevated cortisol levels.

Pamela Donahue, Sc.D., of Hopkins, was a co-investigator on the study.
Other institutions participating in the study: University of New Mexico, University of Pennsylvania, Tufts University, University of Colorado, Children’s Hospital and Clinics at University of Minnesota, Medical College of Wisconsin, Virginia Commonwealth University, State University of New York, Buffalo and Pennsylvania State University.

Hand transplant shows lost limbs are never forgotten

* 17:36 09 October 2008
* NewScientist.com news service

*** Ewen Callaway**

Decades after David Savage lost his right hand in a machine press accident, the 57-year old has received a hand transplant and recovered some feeling, despite spending 35 years with a prosthetic hook.

Now a brain imaging study explains why. When gently poked in the palm by researchers, Savage activated roughly the same brain region as normal test subjects. The area, called the sensory cortex, maintains a physical map of the body with different portions registering sensations in the face, arms and other body parts.

After losing a hand, the brain slowly cedes real estate in this region to the face, says Scott Frey, a cognitive neuroscientist at the University of Oregon in Eugene. But Savage's transplanted hand quickly commandeered this area back.

David Savage received a hand transplant after decades as an amputee; now his new hand has regained some feeling
(Image: Jewish Hospital/Kleinert Kutz/University of Louisville.)

"The brain may be much more capable than we thought of at least getting back some organisation in these maps, even after being deprived after a very long time," Frey says.

His team tested Savage in a functional-MRI brain scanner four months after he became the third American to successfully receive a grafted hand.

When the researchers stroked a coarse sponge across his right palm, Savage's sensory cortex lit up in the same spot as four other men.

Prosthetic feedback

Frey's team isn't sure how Savage's brain managed to re-map the transplanted hand long after it had stopped receiving any signal from his original hand. One possibility is that Savage's brain never really lost the connection to his right hand, instead his brain merely dialled down the neurons that map it.

Angela Sirigu, a neuroscientist at the Institute of Cognitive Neuroscience in Lyon, France says this reorganisation happens gradually.

Her team recently tested a hand transplant patient at two time points. "Just after the transplantation there was competition between the face representation and the hand," she says. "Three months later, this competition disappeared."

Understanding this process could help develop a next generation of prosthetic limbs, Frey says. Scientists are beginning to connect prostheses to nerves that control limb movement, and sending sensory information from the prosthetic to the brain would make replacement limbs even more useful.

Journal reference: Current Biology (DOI: 10.1016/j.cub.2008.08.051)

Stonehenge 'was a cremation cemetery, not healing centre'

By Louise Gray Environment Correspondent
Last Updated: 12:01am BST 09/10/2008

Stonehenge was used as a cremation cemetery throughout its history, according to new evidence that divides archaeologists over whether England's most famous ancient monument was about celebrating life or death.

The origins and purposes of Stonehenge have eluded academics and historians for centuries and been the subject of much debate.

The circle of standing stones was originally through to have been erected in 2,600 BC, to replace an earlier wood and earth structure where cremation was carried out.

The origins and purposes of Stonehenge have eluded academics and historians for centuries

Recently a BBC documentary suggested that the standing stones were not erected until 2,300BC, when the site became a centre of healing.

Now a team behind the latest dig suggest the standing stones were erected much earlier than previously thought, in 3,000 BC, and used for cremation burial throughout their history and not for healing.

The latest evidence is from a team of archaeologists from a number of British universities who have been carrying out excavations over the past five summers.

The Stonehenge Riverside Project looked at remains found in an "Aubrey Hole", one of the pits where it was originally thought the wooden posts that predated the standing stones stood.

Crushed chalk was discovered leading the team to conclude that in fact standing stones had been erected in the holes much earlier than previously thought.

The report said: "We propose that very early in Stonehenge's history, 56 Welsh bluestones stood in a ring 285 feet 6 inches across. This has sweeping implications for our understanding of Stonehenge."

The second significant finding was from radiocarbon dating of human remains found on the site from between 2,300 and 3,000 BC. Researchers concluded that this meant cremation burial was going on long after the standing stones had been erected.

The report said: "Contrary to claims made in the recent BBC Time watch film, which promoted a theory of Stonehenge as a healing centre built after the practice of cremation burial had ceased, standing stones and burial may have been prominent aspects of Stonehenge's meaning and purpose for a millennium."

Mike Pitts, one of the authors of the study and editor of British Archaeology, said that the study overturned previous theory over Stonehenge.

"This means there were earlier connections with Wales, where the standing stones came from, than previously thought and that Stonehenge was always about death and ancestors and burial and not healing," he said.

Geoffrey Wainwright, one of the archaeologists behind the BBC film, maintained that healing was one of the uses of the site.

"We do not claim Stonehenge was a single use monument," he said. "We think it was a multifunctional monument and part of its purpose was for healing."

Fossilised shrimp show earliest group behaviour

* 19:00 09 October 2008
* NewScientist.com news service

*** Ewen Callaway**

The conga was the world's first dance, it seems. A newly discovered caravan of crustaceans from half a billion years ago shows that group behaviour evolved not long after animals themselves.

Palaeontologists led by Hou Xian-Guang, of Yunnan University, China, discovered fossilised chains of up to 20 crustaceans linked head-to-toe, the earliest record of any collective animal behaviour and perhaps an adaptation to a migratory ocean lifestyle.

The fossilised chains of up to 20 crustaceans linked head-to-toe is the earliest record of any collective animal behaviour **(Image: Science)**

"It's showing that, 525 million years ago, we've got really quite sophisticated and potentially complex interaction between different animals," says Derek Siveter, of the University of Oxford, who analysed the fossil along with colleagues at the University of Leicester, UK.

They concluded that the undulating procession of ancient arthropods, each about 2 centimetres long, represents more than a quirk of fossilisation. Though none of their arms, legs or antennae survived a half billion years in stone, the animals probably interlocked appendages to stay together.

"We hypothesise that the chain was in the water column and it met its demise by whatever reason or forces, then it sunk to the bottom," he says.

Modern creatures called tunicates, or sea squirts, form long chains to boost mating opportunities, but Siveter doubts that his crustaceans engaged in a carnal dance because no modern crustaceans show this behaviour. Group feeding is off the table, too, because each animal's mouth appears blocked by its neighbour's tail.

"The simplest explanation for this is that it is some kind of collective behaviour coming together for migration, perhaps associated with defence in numbers," he says.

Nigel Hughes, a palaeobiologist at the University of California, Riverside, agrees that the parade represents more than the death throes of ancient arthropods. Rather, the fossils provide "snapshot scenes of 'normal' life" in the Cambrian, he says.

"Finding an example of collective behaviour so long ago is really eye opening to us," says Iain Couzin, a biologist at Princeton University. He and colleagues are now creating computer models to understand the evolution of group action, which seems to arise often and with little individual complexity needed.

"Collective behaviour is all around us and it's also within us, the function of cells within in the body is a form of collective behaviour." *Journal reference: Science (DOI: 10.1126/science.1162794)*

Only some Web sites provide patients with reliable information before having an operation

New study shows professional society Web sites free of commercial sponsorship provide highest quality information

CHICAGO (October 10, 2008) – New research published in the Journal of the American College of Surgeons shows unsponsored and professional society Web sites provide significantly higher quality information about common elective surgical procedures compared with commercially sponsored Web sites. In addition, the study authors say that providing patients with technical search terms may increase the likelihood of obtaining reliable surgical information on the Web.

Although the Internet is a powerful resource that may help patients make better-informed treatment decisions, the quality of content on health-related Web sites is not rigorously monitored and studies have shown that some Web sites present inaccurate information. More than 110 million adults in the United States have searched online for health information, and two-thirds of these patients seek information through a search engine rather than directly accessing a specific Web site.

"Empowering patients with a trusted source of information will lead to better informed patients and, in turn, improved expectations of surgery outcomes," said Clifford Ko, MD, FACS, Professor of Surgery at the University of California, Los Angeles. "Surgeons should steer patients to high-quality medical Web sites until an accepted, widely used seal of credibility is established."

A panel of surgeons evaluated 145 Web sites using a validated, qualitative rating system. The evaluation was based on 16 clinical and nonclinical criteria specific to patients undergoing elective surgical procedures, including risks of the operation and the amount of advertising present on the Web site. Searches were

conducted for 10 common elective general surgical procedures using technical, descriptive and layperson search terms (for example, "Roux-en-Y gastric bypass," "gastric bypass," and "stomach stapling").

Univariate analyses showed unsponsored sites had higher mean composite scores, indicating higher quality, than sites sponsored by commercial organizations such as law firms and representing advertisements (50.6 percent versus 25.0 percent, $p<0.0001$). In particular, composite scores of professional society Web sites were significantly higher than those of the remaining Web site types (66.3 percent versus 38.3 percent, $p<0.0001$). In addition, 8.3 percent of the evaluated Web sites were determined to have poor quality information, with sponsored Web sites more likely to contain false statements and conflicts of interest.

Searches performed with a technical search term had significantly higher mean composite scores than searches using a layperson term (47.5 percent versus 36.9 percent, $p<0.02$).

Researchers concluded that although the quality of health-related information varies on the Internet, surgeons can give their patients suggested search terms for procedure-related Internet browsing to increase their investment in their own care. The authors added that surgeons should continue to ask their patients about Web sites they use in order to correct potential inaccuracies in the information available on those sites.

Research shows link between bisphenol A and disease in adults

A research team from the Peninsula Medical School, the University of Exeter, the University of Plymouth and the University of Iowa, have found evidence linking bisphenol A to diabetes and heart disease in adults

A research team from the Peninsula Medical School, the University of Exeter, the University of Plymouth and the University of Iowa, have found evidence linking Bisphenol A (BPA) to diabetes and heart disease in adults. Their research paper is to be published in the Journal of the American Medical Association on Wednesday 17 September and it is the first time that evidence has emerged of the association between higher BPA levels and disease in adults.

BPA is a controversial chemical commonly used in food and drink containers. It has previously caused concerns over health risks to babies, as it is present in some baby's bottles.

BPA is used in polycarbonate plastic products such as refillable drinks containers, compact disks, some plastic eating utensils and many other products in everyday use. It is one of the world's highest production volume chemicals, with over 2.2 million tonnes (6.4 billion pounds) produced in 2003, with an annual growth in demand of between six and 10 per cent each year.

Many previous studies in laboratory animals have suggested that BPA is safe, but some laboratory studies have raised doubts. Experiments in which mice and rats were exposed to BPA have shown that higher doses of the chemical can lead to liver damage, insulin resistance, diabetes and obesity. The laboratory animal evidence is complicated and controversial. Some scientists believe that BPA can disrupt the work done by hormones, especially oestrogen, but the full biological effects of BPA in humans is far from clear.

The research team analysed information from the US government's National Health and Nutrition Examination Survey (NHANES) 2003-2004, the only large-scale data available on BPA concentrations excreted in urine. The research team analysed the results for the 1455 adults aged between 18 and 74 years old for whom measures were available. This study group is representative of the general population of the USA.

The analysis found that the 25 per cent of the population with the highest BPA levels were more than twice as likely to have heart disease and/or diabetes, compared to the 25 per cent with the lowest BPA levels. Higher BPA levels were also associated with clinically abnormal liver enzyme concentrations.

While this study has identified a statistical association between BPA and adult diseases for the first time, much more research is needed. Future work needs to exclude the small possibility that the association is due to some other unstudied factor, or that people with these diseases somehow become more exposed to BPA. It is also unclear whether the liver enzyme changes are linked to liver damage.

Professor David Melzer, Professor of Epidemiology and Public Health at the Peninsula Medical School (Exeter, UK), who led the team commented: "Our study has revealed, for the first time, an association between raised BPA loads and two common diseases in adults. At the moment we can't be absolutely sure that BPA is the direct cause of the extra cases of heart disease and diabetes: if it is, some cases of these serious conditions could be prevented by reducing BPA exposure. This is therefore an exciting finding, but it is also just the first step in understanding the role of BPA."

He emphasised that this new possible link does not detract from the existing health advice to people on how to prevent heart disease and diabetes. Professor Melzer also praised the NHANES study and the US Division of Environmental Health Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention, who released these data for analysis by researchers.

Tamara Galloway, Professor of eco-toxicology from the School of Biosciences, the University of Exeter, added: "Our results illustrate how important human bio-monitoring programmes such as NHANES are in providing high quality information on the extent of human exposure to common chemicals such as BPA, allowing us to explore the relationship between exposure and health outcomes more fully."

Statins may prevent miscarriages

Hospital for Special Surgery finds common drug could help some women have a healthy pregnancy

Hospital for Special Surgery researchers have found that statins may be able to prevent miscarriages in women who are suffering from pregnancy complications caused by antiphospholipid syndrome (APS), according to a study in mice. In this autoimmune syndrome, the body produces antibodies directed at phospholipids, the main components of cell membranes.

This news comes from a study published in the October issue of the Journal of Clinical Investigation that is currently online in advance of print.

In low risk pregnancies, APS is associated with a nine-fold increase in miscarriage. In high-risk pregnancies (women who have had at least three prior losses), APS is associated with a 90 percent risk of miscarriage.

"Statins may work as a treatment for women with APS-induced pregnancy complications," said Guillermina Girardi, Ph.D., associate scientist at Hospital for Special Surgery in New York, who is lead author of the study. "They are drugs that have been shown to be very safe. There are a lot of women who continue to take statins through pregnancy and the drugs have not been shown to produce birth defects." Statins do not increase the risk of bleeding like anticoagulants, the current treatment for patients with APS.

In previous studies, Dr. Girardi and colleagues showed that antiphospholipid (aPL) antibodies in female mice caused inflammation that injured the placentas and induced abortions. These antibodies activate a protein, C5a, that activates another protein, tissue factor, that is expressed on the surface of certain white blood cells called neutrophils. This spurs the neutrophils into action, they attack the placenta, and the fetus dies. While investigators had unveiled this basic chain of events, they didn't know any further details about the mechanism.

To find out, Dr. Girardi and colleagues examined the white blood cells from mice that had APS and discovered that these cells expressed certain receptors called PAR2 (protease-activated receptor 2). Stimulating this receptor led to the activation of white blood cells that attacked the placenta and hurt the fetus. Using an antibody that blocks tissue factor interaction with PAR-2, they inhibited white blood cell activation.

In another experiment, investigators tested a possible treatment.

Previous studies had shown that statins, commonly used to regulate cholesterol levels, could downregulate tissue factor (diminish the number of molecules expressed on the surface of the cell). Dr. Girardi and colleagues found that statins not only downregulate tissue factor, but they also downregulate PAR-2 on white blood cells, making the cells less sensitive. So, the researchers injected statins into mice with APS and found that these drugs could prevent white blood cell activation and protect pregnancies.

Women are advised to discontinue most medications, including statins, during pregnancy, but Dr. Girardi says that no fetal defects have been reported in women who have continued to use statins while pregnant. The researchers say that careful studies should be conducted to confirm the safety of statins in pregnancy in humans. "Women that are antiphospholipid antibody positive and have a history of previous miscarriages are a good group to perform a clinical trial," Dr. Girardi said.

On average, 50 percent to 70 percent of all conceptions fail. There is an association between circulating aPL and pregnancy loss, and between 3 percent and 7 percent of pregnant women have these antibodies.

This study could also have implications for other conditions. "The study reveals a relationship between tissue factor and PAR2 in inflammation that could have implications for understanding chronic inflammatory conditions such as rheumatoid arthritis," said Dr. Girardi.

Tissue factor expression on cells that line the circulatory system and certain immune cells is a characteristic feature of acute and chronic inflammation in conditions such as sepsis, atherosclerosis, Crohn's disease, and lupus. Finding a way to manipulate tissue factor and PAR2 could lead to treatments for these diseases.

Other investigators involved in the study are Patricia Redecha and Claus-Werner Franzke from Hospital of Special Surgery, Wolfram Ruf from the Scripps Research Institute, and Nigel Mackman from the University of North Carolina. The research was supported by grants from the Mary Kirkland Center for Lupus Research at Hospital for Special Surgery and the National Institutes of Health.

Dr. Girardi's paper was selected for recognition by the Faculty of 1000 Medicine. This large group of scientists identifies and highlights the most important contributions made in science today.

Is anybody listening out there?

Messages have been sent to a planet 20 light years from Earth in the hope they will reach intelligent alien life.

The beamed messages will be sent 120 trillion miles into space

Some 501 photos, drawings and text messages were transmitted on Thursday by a giant radio-telescope in Ukraine normally used to track asteroids.

The target planet was chosen as it is thought capable of supporting life.

Any reply to the messages - collated through a competition by the social networking website Bebo - would not reach Earth for 40 years.

The competition - A Message From Earth - invited Bebo's 12m users to send in missives they would like extra-terrestrials to receive.

Topics submitted ranged from the environment, politics and world peace to family relationships and the sender's first kiss.

Having been translated into a binary format, the 500 selected will travel 120 trillion miles into space after being sent via high-powered radio waves from the National Space Agency of Ukraine's RT-70 radar telescope in Evpatoria.

Here we are

After being launched at 0600 GMT Bebo's mission commander Oli Madgett said the message "passed the Moon in 1.7 seconds, Mars in just four minutes and will leave our Solar System before breakfast tomorrow".

Organisers hope the hi-tech package will reach its target - the planet Gliese 581C - in early 2029.

Bebo spokesman Mark Charkin said: "A Message From Earth presents an opportunity for the digital natives of today... to reconnect with science and the wider universe in a simple, fun and immersive way."

Seth Shostak, a senior astronomer from the Search for Extra Terrestrial Intelligence Institute in California, said whether aliens who might receive the messages would understand them was beside the point.

"The point might simply be: well, here we are; we're clever enough to build a radio transmitter," he told the BBC.

"So if anybody's out there and they find that signal, they at least know it that, in the direction of that star system over there, there must be a planet with some pretty clever things on it."

Gates declares war on farm animal disease

*** 11 October 2008**

A GRANT of $28 million to combat disease in African farm animals aims to save the livelihoods of some of the world's poorest farmers. Currently, an estimated one-quarter of all livestock in the developing world die from preventable diseases each year.

The grant was given to the Global Alliance for Livestock Veterinary Medicines (GALVmed), a non-profit UK agency, by the Bill and Melinda Gates Foundation and the UK Department for International Development.

The first disease to be tackled is East Coast fever, which costs Africa $200 million every year. "African governments used to make a vaccine," says Steve Sloan of GALVmed, but this stopped when many state veterinary services were dismantled during the 1990s debt crisis.

GALVmed hopes to launch vaccines or drugs for six major livestock diseases by 2015. The list includes Rift Valley fever, which killed thousands of animals and hundreds of people in an outbreak in 2007, and is now spreading out of Africa.