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**Human Technology Research Synopsis**

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## Scientists cure color blindness in monkeys

GAINESVILLE, Fla. — Researchers from the University of Washington and the University of Florida used gene therapy to cure two squirrel monkeys of color blindness — the most common genetic disorder in people.

Writing online Wednesday in the journal *Nature*, scientists cast a rosy light on the potential for gene therapy to treat adult vision disorders involving cone cells — the most important cells for vision in people.

"We've added red sensitivity to cone cells in animals that are born with a condition that is exactly like human color blindness," said William W. Hauswirth, Ph.D., a professor of ophthalmic molecular genetics at the UF College of Medicine and a member of the UF Genetics Institute and the Powell Gene Therapy Center. "Although color blindness is only moderately life-altering, we've shown we can cure a cone disease in a primate, and that it can be done very safely. That's extremely encouraging for the development of therapies for human cone diseases that really are blinding."

The finding is also likely to intrigue millions of people around the world who are colorblind, including about 3.5 million people in the United States, more than 13 million in India and more than 16 million in China. The problem mostly affects men, leaving about 8 percent of Caucasian men in the United States incapable of discerning red and green hues that are important for everyday things like recognizing traffic lights.

"People who are colorblind feel that they are missing out," said Jay Neitz, Ph.D., a professor of ophthalmology at the University of Washington. "If we could find a way to do this with complete safety in human eyes, as we did with monkeys, I think there would be a lot of people who would want it. Beyond that, we hope this technology will be useful in correcting lots of different vision disorders."

The discovery comes about 10 years after Neitz and his wife Maureen Neitz, Ph.D., a professor of ophthalmology at the University of Washington and senior author of the study, began training two squirrel monkeys named Dalton and Sam.

In addition to teaching the animals, the Neitz research group worked with the makers of a standard vision-testing technique called the Cambridge Colour Test to perfect a way the monkeys could "tell" them which colors they were seeing.

The tests are similar to ones given to elementary children the world over, in which students are asked to identify a specific pattern of colored dots among a field of dots that vary in size, color and intensity. The researchers devised a computer touch screen the monkeys could use to trace the color patterns. When the animals chose correctly, they received a reward of grape juice.

Likewise, decades were spent by Hauswirth and colleagues at the University of Florida to develop the gene-transfer technique that uses a harmless adeno-associated virus to deliver corrective genes to produce a desired protein.

In this case, researchers wanted to produce a substance called long-wavelength opsin in the retinas of the monkeys. This particular form of opsin is a colorless protein that works in the retina to make pigments that are sensitive to red and green.

"We used human DNAs, so we won't have to switch to human genes as we move toward clinical treatments," said Hauswirth, who is also involved in a clinical trial with human patients to test gene therapy for the treatment of Leber congenital amaurosis, a form of blindness that strikes children.

About five weeks after the treatment, the monkeys began to acquire color vision, almost as if it occurred overnight.

"Nothing happened for the first 20 weeks," Neitz said. "But we knew right away when it began to work. It was if they woke up and saw these new colors. The treated animals unquestionably responded to colors that had been invisible to them."

It took more than a year and a half to test the monkeys' ability to discern 16 hues, with some of the hues varying as much as 11-fold in intensity.

Dalton is named for John Dalton, an English chemist who realized he was colorblind and published the first paper about the condition in 1798.

"We've had Dalton and Sam for 10 years. They are like our children," Neitz said. "This species are friendly, docile monkeys that we just love. We think it is useful to continue to follow them — it's been two years now that they've been seeing in color, and continuing to check their vision and allowing them to play with the computer is part of their enrichment."

With the discovery, the researchers are the first to address a vision disorder in primates in which all photoreceptors are intact and healthy, providing a hint of gene therapy's full potential to restore vision.

About 1 in 30,000 Americans have a hereditary form of blindness called achromatopsia, which causes nearly complete color blindness and extremely poor central vision. "Those patients would be targets for almost exactly the same treatment," Hauswirth said.

Even in common types of blindness such as age-related macular degeneration and diabetic retinopathy, vision could potentially be rescued by targeting cone cells, he said.

"The major thrust of the study is you can ameliorate if not cure color blindness with gene therapy," said Gerald H. Jacobs, Ph.D., a research professor of psychology at the University of California, Santa Barbara, who was not involved in the research. "There are still questions about safety, but in these monkeys at least, there were no untoward effects. Those who are motivated to ameliorate their color defect might take some hope from the findings.

"This is also another example of how utterly plastic the visual system is to change," Jacobs said. "The nervous system can extract information from alterations to photopigments and make use of it almost instantaneously."

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## **Rich people don't need friends**

In a paper evaluated by f1000 Medicine, six studies tested relationships between reminders of money, social exclusion and physical pain.

In The symbolic power of money: reminders of money alter social distress and physical pain published in the journal Psychological Science, Xinyue Zhou, Kathleen Vohs and Roy Baumeister explored how money could reduce a person's feeling of pain and also negate their need for social popularity.

Harriet de Wit, Faculty Member for f1000 Medicine, said: "This research extends our understanding of relationships between social pain and physical pain, and remarkably, shows how acquired symbolic value of money, perhaps because of associations with power or control, can influence responses to both emotional and physical pain."

She also noted: "These findings have great importance for a social system such as ours that is characterized by wide disparities in financial wellbeing."

Zhou, Vohs and Baumeister determined that interpersonal rejection and physical pain caused desire for money to increase. They said: "Money can possibly substitute for social acceptance in conferring the ability to obtain benefits from the social system. Moreover, past work has suggested that responses to physical pain and social distress share common underlying mechanisms."

"Handling money (compared with handling paper) reduced distress over social exclusion and diminished the physical pain of immersion in hot water. Being reminded of having spent money, however, intensified both social distress and physical pain," the authors said.

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## **New evidence that green tea may help improve bone health**

Researchers in Hong Kong are reporting new evidence that green tea — one of the most popular beverages consumed worldwide and now available as a dietary supplement — may help improve bone health. They found that the tea contains a group of chemicals that can stimulate bone formation and help slow its breakdown. Their findings are in ACS' Journal of Agricultural and Food Chemistry, a bi-weekly publication. The beverage has the potential to help in the prevention and treatment of osteoporosis and other bone diseases that affect million worldwide, the researchers suggest.

In the new study, Ping Chung Leung and colleagues note that many scientific studies have linked tea to beneficial effects in preventing cancer, heart disease, and other conditions. Recent studies in humans and cell cultures suggest that tea may also benefit bone health. But few scientific studies have explored the exact chemicals in tea that might be responsible for this effect.

The scientists exposed a group of cultured bone-forming cells (osteoblasts) to three major green tea components — epigallocatechin (EGC), gallic acid (GC), and gallic acid gallate (GCG) — for several days. They found that one in particular, EGC, boosted the activity of a key enzyme that promotes bone growth by up to 79 percent. EGC also significantly boosted levels of bone mineralization in the cells, which strengthens bones. The scientists also showed that high concentrations of EGC blocked the activity of a type of cell (osteoclast) that breaks down or weakens bones. The green tea components did not cause any toxic effects to the bone cells, they note.

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## **Zero tolerance, zero effect**

### **Stats show laws 'inert'**

HUNTSVILLE, TX -- As college administrators, social scientists and law enforcement officials across the country continue to debate whether the drinking age should be 18 instead of 21, a Sam Houston State University economist challenges a related law: the "zero tolerance" policy.

Darren Grant says zero tolerance laws have zero effect.

In a paper forthcoming in the journal Economic Inquiry, he analyzed data from 30,000 fatalities in nighttime accidents involving drivers under 21.

"Both in terms of the number of accidents and the blood alcohol of the drivers in those accidents, the research consistently showed that zero tolerance laws had no effect," Grant said. "Other factors matter, but not these laws."

Zero tolerance laws became prevalent during the 1990s, when the U.S. Congress threatened to withhold highway funding from states that didn't comply.

Grant says the logic behind zero tolerance laws is suspect.

"The idea was, since drivers under 21 are not supposed to be drinking, you should be guilty of drunk driving if you are caught driving with any amount of alcohol in your system," Grant said.

"Because you must sacrifice more to comply with the law, we should expect some people will just give up trying to satisfy the law and drink more," he said.

But Grant found this did not happen.

"Instead, among drivers involved in traffic accidents, there is the same fraction of heavy drinkers, the same fraction of mild drinkers, the same fraction of nondrinkers," he said. "It's just not changing."

Grant also compared the blood alcohol distributions of involved drivers in the two years before zero tolerance laws were established in each state, and again in the two years after. The two distributions were also virtually identical.

"That's a sign that this law is essentially inert; if it's affecting the amount of drinking that people do, these distributions should look different," he said. Grant's colleague at Sam Houston State and fellow economist, Donald Freeman, completed a similar study in 2007 that yielded similar results regarding a related law that lowered the allowable blood alcohol limit for adult drivers. That paper was published in the journal *Contemporary Economic Policy*.

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## **Chemobrain – the flip side of surviving cancer**

Study shows deterioration in brain function following breast cancer therapy has negative effects on quality of life

One of the most problematic side effects of cancer treatment, chemobrain – a range of symptoms including memory loss, inability to concentrate, difficulty thinking and other subtle cognitive changes following chemotherapy – seriously diminishes women's quality of life and daily functioning. As a result, they have to adopt a range of coping strategies to manage their restricted social and professional lives.

Breast cancer survivors tell their story in a descriptive study<sup>1</sup> of the effects that cognitive impairment has on women's work, social networks and dealings with the health care profession. Dr. Saskia Subramanian from the UCLA Center for Culture and Health in the US and her colleagues have just published their work online in Springer's *Journal of Cancer Survivorship*.

An increasing number of women survive breast cancer, yet survival comes at a price. Mild cognitive impairment following chemotherapy, known as "chemobrain" or "chemofog" is one of the most commonly reported post-treatment symptoms by breast cancer survivors. Dr. Subramanian and colleagues' work shows that this deterioration in brain function has devastating effects on breast cancer survivors' quality of life.

Through a combination of focus groups and in-depth interviews among 74 women who had completed their course of cancer treatment at least a year earlier, the researchers gathered data on patients' medical background, treatment experience, post-treatment symptoms, reactions from medical staff and from family and friends, self-management, strength of social networks and their perceptions of themselves.

The women described a variety of cognitive changes which they found both frustrating and upsetting. Some were less able to retain material or to digest new information and recognized that they were not functioning as they once did. Others faced reduced independence, becoming limited in their ability to manage certain responsibilities or get around. These changes made women feel scared, dependent and emotionally drained. For some, coping meant having to cut back on work and social activities. Others had more or less accepted the limitations put on their lives and resigned themselves to a diminished cognitive capacity.

The majority of women complained about the lack of acknowledgement from the medical community when they mentioned their chemobrain symptoms. Many women wished they had received some warning and only a few got answers from their physicians. Some women felt that chemobrain confused their families and friends, and young children in particular.

Chemobrain also affected women's performance at work. Because they were less able to focus, duties became more difficult and often took longer. This affected their efficiency and reduced their chances of promotion or assignment to projects.

The authors conclude: "These data underscore the very serious ways in which chemobrain can affect the life experiences of cancer survivors – emotionally, psychologically and economically. A clear understanding of the cognitive impairments experienced by survivors will aid researchers in developing targeted therapies and interventions aimed at improving or mitigating these post-treatment side effects."

**Public release date: 17-Sep-2009**

## **New vitamin K analysis supports the triage theory**

Modest vitamin/mineral deficiencies increase age-related disease  
September 16, 2009 - Oakland, CA – An important analysis conducted by Children's Hospital Oakland Research Institute scientists suggests the importance of ensuring optimal dietary intakes of vitamin K to prevent age-related conditions such as bone fragility, arterial and kidney calcification, cardiovascular disease, and possibly cancer (1). Vitamin K is concentrated in dark green plants such as spinach or Swiss chard, and is either not present or present in only small amounts in most multivitamin pills.

This finding comes from Associate Staff Scientist, Joyce McCann, PhD, and Senior Scientist, Bruce Ames, PhD, who analyzed data from hundreds of published articles

dating back to the 1970's. Their review was designed to test Dr. Ames' "triage" theory that provides a new basis for determining the optimum intake of individual vitamins and minerals (also called micronutrients), and has major implications for preventive medicine. The analysis, which strongly supports his theory, will be published in the October 2009 issue of the American Journal of Clinical Nutrition.

Dr. Ames proposed the triage theory in 2006 (2,3) to explain numerous observations from his own lab and the scientific literature. The theory explains why diseases associated with aging like cancer, heart disease, and dementia (and the pace of aging itself) may be unintended consequences of mechanisms developed during evolution to protect against episodic vitamin/mineral shortages. If correct, the triage theory has widespread implications for public health because modest vitamin/mineral deficiencies are quite common. The theory also suggests a new scientifically based and consistent strategy for establishing optimal vitamin/mineral intake standards, and it provides a research strategy to uncover early biomarkers of chronic disease.

Vitamin K is known as the "Koagulation" vitamin because about half of the 16 known proteins that depend on vitK are necessary for blood coagulation. The other vitK-dependent proteins are involved in a variety of different functions involving the skeletal, arterial, and immune systems.

Average intakes of vitamin K in the United States and the United Kingdom are less even than currently recommended intakes, which are primarily based on levels to ensure adequate coagulation. McCann & Ames' analysis supports recommendations by some experts that non-clotting functions requiring vitamin K may need higher intakes than are currently recommended.

McCann says, "Encouraging support for the triage theory from our vitamin K analysis suggests that experts aiming to set micronutrient intake recommendations for optimal function and scientists seeking mechanistic triggers leading to diseases of aging may find it productive to focus on micronutrient-dependent functions that have escaped evolutionary protection from deficiency."

This vitamin K analysis is the first in a series of literature-based studies conducted by Drs. Joyce McCann and Ames to test the basic premises of the triage theory. As a reviewer of the manuscript notes, "...this review provides a unique perspective of consequences of vitamin K insufficiency and may serve as an important future reference, as new vitamin K dependent proteins are identified and new (non-clotting) functions of vitamin K are elucidated. More broadly, an assessment of micronutrient sufficiency from the perspective of triage theory may provide a valuable point of view, as current recommendations for nutrient intakes are reconsidered."

**Public release date: 17-Sep-2009**

**ANTIOXIDANT CONTROLS SPINAL CORD DEVELOPMENT**

September 17, 2009- Researchers at the Johns Hopkins School of Medicine have discovered how one antioxidant protein controls the activity of another protein, critical for the development of spinal cord neurons. The research, publishing this week in *Cell*, describes a never-before known mechanism of protein control.

“This is the first time we’ve seen this type of chemical reaction control neuronal differentiation,” says Shanthini Sockanathan, Ph.D., an associate professor at the Johns Hopkins Solomon H. Snyder Department of Neuroscience. “And it’s probably not specific for motor neurons that we study, but also for development of a wide variety of neurons.”

Previous research had shown that the GDE2 protein can cause immature cells in the spinal cord to differentiate into motor neurons, the nerve cells that connect to and control muscle contraction. Too little GDE2 causes motor neurons to not develop, while too much GDE2 causes them to develop too quickly, depleting progenitor pools.

“We reasoned that there must be tight control of GDE2 so we set out to look for the regulator by looking for other proteins that can bind to GDE2,” says Sockanathan.

Using biochemical approaches to isolate all proteins that normally bind to GDE2 in the developing spinal cord, followed by proteomic analysis to identify all binding proteins, the research team found a few hundred proteins. One, Prdx1, had been reported by others to have tumor-suppressing abilities, which caught Sockanathan’s eye for further investigation.

The team first asked if the Prdx1 protein can affect motor neuron development by removing it from developing spinal cords of chick embryos. Embryos lacking Prdx1 showed loss of motor neurons similar to that seen in embryos lacking GDE2, suggesting that indeed Prdx1 is somehow involved in motor neuron development.

To figure out how Prdx1 and GDE2 interact to cause immature cells to develop into motor neurons, the team mutated the proteins and examined how the mutations affect the cells. Mutations that prevent the two proteins from binding resulted in no motor neurons. Similarly, mutations that disrupt the enzyme abilities of GDE2 and Prdx1 also resulted in no motor neurons. In fact, only when GDE2 and Prdx1 can bind each other and work as enzymes do motor neurons develop.

“So we thought maybe the antioxidant enzyme activity of Prdx1 is doing something to regulate GDE2 function,” says Sockanathan. Her team then looked into what already was known about Prdx1’s enzyme activity. They found that bacteria and yeast versions of Prdx1 are able to help alter certain chemical bonds in proteins that form between specific amino acids that contain so-called sulfhydryl or “-SH” groups.

That led them to reexamine the GDE2 protein for sulfhydryl groups. As it turns out, they found 4 in GDE2: Three are close together and one is clear on the other end of the protein. They first performed some biochemistry experiments to determine whether these

sulfhydryl groups can form disulfide bonds—they can. Then, two at a time, the researchers engineered mutations to replace each -SH-containing amino acid in GDE2 and asked if the mutated protein could still bind to Prx1. They found one combination of mutations that did not behave the same as the unmutated control, leading them to conclude that Prx1 must break the chemical bond between those two specific amino acids.

“We think that Prx1 breaks this bond in GDE2, activating it to promote motor neuron differentiation,” says Sockanathan. “This suggests a new general control mechanism that regulates when cells divide and when they differentiate. We’re excited to see how widespread it might be.”

This study was funded by the National Institute of Neurological Disorders and Stroke at the National Institutes of Health, and the Muscular Dystrophy Association.

Authors on the paper are Ye Yan, Priyanka Sabharwal and Sockanathan, all of Johns Hopkins, and Meenakshi Rao, formerly of Hopkins and currently at Children’s Hospital Boston.

**Public release date: 20-Sep-2009**

## **Scientists find that individuals in vegetative states can learn**

Research gives insight into possible rehabilitation of some patients

Scientists have found that some individuals in the vegetative and minimally conscious states, despite lacking the means of reporting awareness themselves, can learn and thereby demonstrate at least a partial consciousness. Their findings are reported in today's (20 September) online edition of Nature Neuroscience.

It is the first time that scientists have tested whether patients in vegetative and minimally conscious states can learn. By establishing that they can, it is believed that this simple test will enable practitioners to assess the patient's consciousness without the need of imaging.

This study was done as a collaborative effort between the University of Buenos Aires (Argentina), the University of Cambridge (UK) and the Institute of Cognitive Neurology (Argentina). By using classical Pavlovian conditioning, the researchers played a tone immediately prior to blowing air into a patient's eye. After some time training, the patients would start to blink when the tone played but before the air puff to the eye.

This learning requires conscious awareness of the relation between stimuli - the tone precedes and predicts the puff of air to the eye. This type of learning was not seen in the control subjects, volunteers who had been under anaesthesia.

The researchers believe that the fact that these patients can learn associations shows that

they can form memories and that they may benefit from rehabilitation.

Lead author Dr Tristan Bekinschtein, from the University of Cambridge's Wolfson Brain Imaging Unit, said: "This test will hopefully become a useful, simple tool to test for consciousness without the need for imaging or instructions. Additionally, this research suggests that if the patient shows learning, then they are likely to recover to some degree."

In 2006, the Cambridge Impaired Consciousness Group at the Wolfson Brain Imaging Unit showed, using functional imaging, showed that patients in vegetative states (as defined by behavioural assessment in the clinic) can in fact be conscious despite being unable to show consistent voluntary movements.

**Public release date: 21-Sep-2009**

### **Early results: In children, 2009 H1N1 influenza vaccine works like seasonal flu vaccine**

Early results from a trial testing a 2009 H1N1 influenza vaccine in children look promising, according to the trial sponsor, the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health. Preliminary analysis of blood samples from a small group of trial participants shows that a single 15-microgram dose of a non-adjuvanted 2009 H1N1 influenza vaccine – the same dose that is in the seasonal flu vaccine – generates an immune response that is expected to be protective against 2009 H1N1 influenza virus in the majority of 10- to 17- year-olds eight to 10 days following vaccination. These results are similar to those recently reported in clinical trials of healthy adults. Younger children generally had a less robust early response to the vaccine.

"This is very encouraging news," says NIAID Director Anthony S. Fauci, M.D. "As we had hoped, responses to the 2009 H1N1 influenza vaccine are very similar to what we see with routinely used seasonal influenza vaccines made in the same way. It seems likely that the H1N1 flu vaccine will require just one 15-microgram dose for children 10 to 17 years of age. The 2009 H1N1 influenza virus is causing widespread infections among children, so these are welcome results."

The ongoing NIAID-sponsored trial began in mid-August at five sites nationwide. The trial is assessing the safety and immune responses to one and two doses of either 15 micrograms or 30 micrograms of vaccine. Data from the trial is being compared for three age groups: children 6 months to 35 months old; 3 to 9 years old; and 10 to 17 years old.

The preliminary results are based on blood samples taken eight to 10 days after the first vaccination. Immune responses were strongest among the oldest children, those 10 to 17 years old. **In this group of 25 children, a strong immune response was seen in 76 percent who received one 15-microgram dose of vaccine. The immune responses in**

**children nine years old and younger were not as strong. Among 25 volunteers aged 3 to 9 years old, a strong immune response was seen in 36 percent of those given 15 micrograms of vaccine. In the youngest group, 20 children between 6 months to 35 months old, a single 15-microgram dose of vaccine produced a strong immune response in 25 percent of recipients.**

"These results are not unexpected and are both similar to what is seen with seasonal influenza vaccines and consistent with what we and our colleagues at the Food and Drug Administration anticipated," notes Dr. Fauci.

Study investigators are also collecting blood samples from the volunteers approximately three weeks after both the first and second injections. It is anticipated that the immune response to the 2009 H1N1 influenza vaccine will be similar to that of seasonal influenza vaccination and will continue to rise for several weeks following vaccination, says Dr. Fauci. The study is being closely monitored by the trial physicians and staff as well as by an independent safety monitoring committee.

The vaccine being tested in this trial is manufactured by Sanofi Pasteur in Swiftwater, Pa., in the same manner as its licensed seasonal vaccine, which is used every year in millions of children, and is the same formulation recently licensed by the FDA to protect against 2009 H1N1 influenza. Like inactivated seasonal influenza vaccines, the vaccine contains a purified part of a killed virus and cannot cause flu.

Ralph's Note - How long does this immune response hold? What are the chances of having a side effect? How is a Strong Immune Response defined Etc..Etc....Is this the vaccine that will be distributed to the public, As well as How does a 6 to 35 month old Volunteer?

**Public release date: 21-Sep-2009**

## **Insufficient levels of vitamin D puts elderly at increased risk of dying from heart disease**

A new study by researchers at the University of Colorado Denver and Massachusetts General Hospital (MGH) shows vitamin D plays a vital role in reducing the risk of death associated with older age. The research, just published in the Journal of the American Geriatrics Society, evaluated the association between vitamin D levels in the blood and the death rates of those 65 and older. The study found that older adults with insufficient levels of vitamin D die from heart disease at greater rates than those with adequate levels of the vitamin.

"It's likely that more than one-third of older adults now have vitamin D levels associated with higher risks of death and few have levels associated with optimum survival," said Adit Ginde, MD, MPH, an assistant professor at the University of Colorado Denver School of Medicine's Division of Emergency Medicine and lead author on the study. "Given the aging population and the simplicity of increasing a person's level of vitamin

D, a small improvement in death rates could have a substantial impact on public health."

Older adults are at high risk for vitamin D deficiency because their skin has less exposure to the sun due to more limited outdoor activities as well as reduced ability to make vitamin D.

The study analyzed data from the Third National Health and Nutrition Examination Survey conducted by the National Center for Health Statistics. The research team analyzed vitamin D in blood samples of more than 3,400 participants that were selected to be representative of the 24 million older adults in the United States. Compared to those with optimal vitamin D status, those with low vitamin D levels were 3 times more likely to die from heart disease and 2.5 times more likely to die from any cause.

Dr. Ginde says the findings suggest that current daily recommendations of vitamin D may not be enough for older adults to maintain optimal health. The research team has applied for research funding from the National Institutes of Health to perform a large, population-based clinical trial of vitamin D supplementation in older adults to see if it can improve survival and reduce the incidence of heart disease.

"Confirmation of these results in large randomized trials is critically important for advancing public health," says Carlos Camargo, MD, DrPH, of the MGH Department of Emergency Medicine, the senior author of the study and an associate professor of medicine at Harvard Medical School.

The study looking at elderly death rates is the second of two studies by the same team of researchers on vitamin D and general health. The first study, published in Archives of Internal Medicine earlier this year, identified vitamin D as playing a significant role in boosting the immune system and warding off colds and flu.

"Vitamin D has health effects that go beyond strong bones," says Ginde. "It's likely that it makes a vital contribution to good health."

**Public release date: 22-Sep-2009**

## **New research provides new insight into age-related muscle decline**

Research published in the journal Genetics suggests new ways to stop byproducts from the air we breathe from harming our muscles

If you think the air outside is polluted, a new research report in the September 2009 issue of the journal Genetics (<http://www.genetics.org>) might make you to think twice about the air inside our bodies too. That's because researchers show how about 3 percent of the air we breathe gets converted into harmful superoxides, which ultimately harm our muscles. Specifically, these superoxides lead to the creation of a toxic molecule called "reactive oxygen species" or ROS, which is shown to be particularly harmful to muscle tissue, and may lead to problems ranging from aging and frailty to Parkinson's disease and cancer.

"At a minimum, we hope this research leads to new ways of addressing inevitable declining physical performance and other age-dependent infirmities among the elderly," said Atanu Duttaroy, associate professor of biology at Howard University in Washington, D.C. and one of the researchers involved in the work.

To make their discovery, Duttaroy and colleagues built on their previous research showing that ROS-induced cellular damage happens in the same way in fruit flies and in mice. They started with fruit flies that lack mitochondrial **superoxide dismutase enzyme** (SOD), which provides the primary line of defense against ROS by capturing the superoxides and converting them to water. This lack of SOD caused the fruit flies to die within a day after hatching. Then, through genetic manipulation, the researchers "turned on" the production of SOD separately in nerves and muscles. SOD in nerves did not appear to make a significant difference in prolonging the fruit flies' lives, but it did make a difference when it was activated in their muscles. The survival of fruit flies with SOD "turned on" in their muscles increased, and for several days, they remained as active as their normal counterparts. **Measurement of their muscle activity also showed that SOD helped the muscle work normally, helping survival.**

"It's long been known that the oxygen we breath can be toxic, and this work provides a concrete example of that with real consequences." said Mark Johnston, Editor-in-Chief of the journal Genetics. "As baby boomers get older, the need to help older people stay mobile and fit has never been greater in our lifetimes. This study helps address this need by providing insight into what causes physical decline, and in turn, bringing us a step closer toward finding ways to stop or reverse it."

**Public release date: 23-Sep-2009**

### **Medical ethics experts identify, address key issues in H1N1 pandemic**

The anticipated onset of a second wave of the H1N1 influenza pandemic could present a host of thorny medical ethics issues best considered well in advance, according to the University of Toronto Joint Centre for Bioethics, which today released nine papers for public discussion.

Topics include duty of health care workers to work during a serious flu pandemic; government restrictions on individual freedoms and privacy and their responsibilities administering vaccination programs; how to allocate limited medical resources; and the obligation of rich countries to share such resources with those less fortunate.

"While we hope there will not be a major second wave of the H1N1 flu, there is limited cause for optimism and we could well see the pandemic's full onset late this year or early next when the traditional flu season begins," says JCB Director Ross Upshur.

"Now is the time to think through the serious ethical challenges societies may confront, not in the midst of crisis with line-ups at hospital doors. These issues and concerns,

though drawn largely from a Canadian point of view, have relevance to countries everywhere."

JCB's Canadian Program of Research on Ethics in a Pandemic (CanPREP) prepared the papers with the benefit of both academic and public opinion research, obtaining the views of 500 Canadians through a national telephone survey and nearly 100 more via a series of town hall meetings nationwide.

Dr. Upshur, who is also Director of the Pan American Health Organization / World Health Organization Collaborating Centre for Bioethics, will host a symposium on the issues Weds. September 23, 88 College Street, Toronto, attended by health care providers, professional college representatives, community organizations and the public.

Duty to care

**Competing obligations may explain why 25 to 85% of health care workers (HCWs) report being unwilling to work in a pandemic, according to the papers.**

**Do HCWs have an obligation to treat patients despite risk of infection?** What limits, if any, are there to health care workers' duty to care? What institutional supports are owed to health care workers in a pandemic?

Important documents such as codes of ethics and professional directives are unclear on the question of acceptable risk for HCWs.

The JCB says 90% of those surveyed believe HCWs should report to work and face all risks provided safety precautions are provided. 85% believe governments should provide HCWs with free disability insurance and death benefits during a flu crisis and 84% think HCWs who feel unsafe at work have a right to file a grievance.

The public, though, was somewhat conflicted on what to do with HCWs who do not come to work without a legitimate reason. Almost half (48%) agree they should face loss of employment or professional license, 38% disagree. The sharpest division appears with respect to the government using conscription of HCWs during a pandemic: 47% agree, 43% disagree.

**The research showed strong agreement that health care professionals have an implicit social contract based on their profession and training to provide care under adverse conditions.**

**The researchers heard from study participants that, "like soldiers, HCWs should be expected to uphold their duties no matter how challenging and frightening the situation.** On the other hand, the group also felt that the government and health care organizations had reciprocal obligations to protect health care professionals from elevated risks in all ways possible, including policies to ensure a safe working environment."

The obligation to work is not without qualification, as 89% of survey participants agreed that a serious health problem that could increase flu vulnerability was a legitimate excuse from work.

The public was less supportive of competing care obligations such as young children or elderly relatives: 57% agreed that caring for a family member is a legitimate reason to not work.

A related paper dedicated to their legal obligations says health care providers (HCPs) who breach the "duty to care," causing a patient to suffer an injury or loss, may be guilty of negligence and forced to pay damages.

"There has been limited case law, literature, and legislation on what a HCP's legal duty to care is during a pandemic," the authors say. "HCPs can gain insight into their obligations by informing themselves about the general legal doctrines developed in non-pandemic cases and legislation."

#### Priority setting

The JCB papers say a major pandemic will demand difficult ethical choices related to ventilators, vaccines, antivirals and other resources. Who should get the last bed and ventilator in an intensive care unit, for example: an accident victim suffering a severe but potentially reversible brain injury or a nurse who contracted the flu while caring for patients in the hospital?

Should resources be allocated to save the most lives or to give everyone a fair chance at survival? Should special consideration be given to vulnerable populations in determining access to resources? Who should make these allocation decisions?

The authors say some of the ethical goals of priority-setting involve legitimacy, fairness and equity. Public participants in JCB research, meanwhile, identified three considerations in priority-setting decisions: need, survivability, and social value.

Need was described as giving resources to those most sick or those directly responsible for the care of others (such as elderly parents). Participants also suggested that scarce resources be given to individuals most likely to benefit and survive, and that consideration be given to the social value of health care workers, police officers or others integral to a functioning society in a pandemic crisis.

Those surveyed seem conflicted when it comes to allocating medicines. While 59% believe every Canadian should have an equal chance of receiving antivirals, 94% say health care providers should receive priority in a pandemic, while 89% believe children should be given second priority.

Participants suggested predetermined guidelines or criteria could help decision-makers formulate concrete allocation decisions in the context of an actual pandemic influenza.

As well, there should be an appeals process open to persons denied resources and all decisions taken should be transparent in order to engender a sense of public trust.

Should time not permit preliminary deliberation on allocation criteria, participants felt one appointee should make decisions since efficiency would become vital.

Finally, public participants expressed skepticism about the capacity of Canada's health care system to respond effectively to an influenza pandemic. They noted that priority setting is already a challenge in Canadian health care and that an outbreak of H1N1 would simply highlight and exacerbate that weakness.

Despite this, approximately 91% of survey participants identified saving lives as the most important goal of pandemic influenza preparations, with 41% endorsing saving lives solely in Canada as the highest priority and 50% endorsing saving lives globally as the highest priority.

H1N1 vaccinations

**Coercion in vaccination policy could range from aggressive marketing campaigns, to introducing policies that exclude unvaccinated individuals, to introducing mandatory vaccination.**

In order for public health officials to justify the more coercive measures, they need scientific evidence that supports the population health benefits of the vaccination program.

**"Arguably, the greater the evidence for population health benefit, the more coercion is permitted," according to the papers.**

"To determine the ethical principles that govern an H1N1 vaccination program, it is first essential to determine the purpose of the program. Are public health officials primarily making the vaccine available to Canadians for their own protection? In this instance autonomy of decision-making and individual liberty would predominate as guiding principles. Under these circumstances there can be little justification of any coercion on the part of public health officials, in particular the use of mandatory vaccination legislation, and the government's reciprocal responsibilities to vaccine recipients are limited.

"Or is the objective of the program to reduce the population health effects of the virus? In this case principles of solidarity and the protection of the public from harm could predominate over individual liberty. Public health officials can be justified in introducing more coercive policies. However, accompanying this infringement of individual liberty is an increase in the government's reciprocal responsibilities to vaccine recipients."

Rarely, some individuals may be harmed by a mass vaccination program and "the more

coercive the strategy, the greater are the reciprocal responsibilities of the state to the vaccine recipients.

"Two key elements of reciprocity would include the creation of enhanced (vaccine) safety and effectiveness post market surveillance and the introduction of a no-fault compensation program for post-vaccination adverse events."

Restrictive measures

**Governments may need to limit three basic personal freedoms – mobility, freedom of assembly, and privacy – in order to protect the public good.**

JCB authors ask readers to imagine an order by public health officials to close community centers and cancel all large public gatherings.

One family, whose two daughters were killed in a car accident, plans to hold a large memorial service with family and friends the following day with over 500 attendees expected. Should public health officials prevent it from happening?

In the aftermath of SARS, JCB research showed that citizens understood and accepted the need for restrictive measures to control the spread of infection.

Most saw it as a form of civic duty and were willing to accept limits to their individual liberties for the public good.

**A large majority (85%) of survey respondents agreed that governments should have the power to suspend some individual rights (e.g. traveling, right to assemble) during a pandemic influenza.**

However, they also contended (95%) that there is a reciprocal obligation of governments to provide food, shelter, social support and other basic needs of restricted individuals and support services after restrictive measures end (79%).

And they argued that restricted individuals should not be penalized by an employer for following a quarantine order (e.g., losing a job).

**Half of survey respondents reported that violation of an appropriate quarantine order was equivalent to manslaughter.**

Managing a pandemic flu outbreak, including the use of restrictive measures, requires a citizenry that is informed, engaged, and responsive, according to the JCB papers. "This means involving citizens prior to the outbreak as policy and plans are set as well as during the outbreak when these will be implemented."

Among other recommendations, the authors urge public health officials to ensure that

pandemic flu plans include a comprehensive and transparent protocol for implementing restrictive measures, founded on the principles of proportionality and least restrictive means, balancing individual liberties with protection of public from harm, and with safeguards such as the right to appeal built in.

## Global ethics

What obligations, if any, do Canadians have to support poorer countries in response to a flu pandemic? Should countries have the right to close their borders to travelers coming from affected areas? How might a collaborative focus on minimizing harms, avoiding stigmatization, and preventing unnecessary constraints on international travel and trade be fostered and maintained?

According to the JCB authors, "in the face of an H1N1 pandemic influenza and other threats to global public health, anything less than the mobilization of substantial enduring financial and other support will amount to an abdication of the shared responsibility for global health and of the fundamental values of equality, reciprocity, and justice."

Canadians not only recognize the lack of equality, reciprocity and justice at the global level, but regard them as ethical imperatives and support policies that take aim at changing current realities. For example, a majority of survey respondents (54%) gave priority to saving lives globally over saving lives of Canadians (36%) in response to an influenza pandemic.

A strong majority (70%) of those surveyed agreed that Canada should provide international assistance to poorer countries facing a pandemic, even if this means fewer resources for Canadians as a result. When asked how much assistance should be provided, most Canadians (92%) responded that aid should amount to at least 7% of total resources committed to pandemic preparedness, and many (43%) felt that that amount should be 10% or more.

Participants thought that Canada ought to assume a more prominent leadership role internationally and that the traditional distinction between public and private sector responsibilities needed to change in order to mount an effective global response to the pandemic.

Support ran high for increasing regulatory control over drug manufacturing capacity and profit-seeking, and for prioritizing equity in global distribution of drugs. Town Hall participants were less united on the extent to which domestic obligations and the recent global economic downturn should modulate Canada's duty to reach out globally.

Among the authors' recommendations: Canada should share at least a 10% portion of its national stockpile of antiviral medications, H1N1 vaccine allocations, and outbreak management kits with poor countries, and encourage other wealthy countries to follow suit.

It should also seek global reassurances that vaccine priority will be given to health care workers, as well as the most vulnerable (children under five, pregnant women, people with weak immune systems and members of indigenous communities).

"Prioritizing the most vulnerable in other countries prior to the least vulnerable in this country would contribute immensely to allaying fears that the rich will live and the poor will die during a worsening global influenza pandemic."

As well, Canada's domestic vaccine producers should maintain full production capacity for as long as there is need in other countries and even after all Canadians have been offered vaccines. Consideration of the use of adjuvants in order to extend the overall vaccine supply should also be a priority, as should exploration of policy initiatives to create a global network of regionalized vaccine production sites insulated from market forces.

#### Risk communication

During the 2003 SARS crisis, poor communication between public health officials, health care workers and the public was cited as a major factor contributing to the confusion and even spread of the virus.

According to the JCB papers: "For people to accept public health measures that may limit their individual liberty and potentially cause them to be stigmatized, they must trust the information they receive as well as the authorities who provide the information."

Information must be available through a variety of sources for both professionals and the public, and recipients should know where information is coming from and from whom. Being transparent also means being open about what is known and what is not known about the situation, the authors add.

For citizens to be honest about their own health, the state need to acknowledge that transparency will not be penalized. For example, someone who accepts voluntarily quarantine needs assurance they will not lose their job.

Likewise, at the international level, "countries need to be able to trust each other to be transparent and honest about infectious disease outbreaks.

"Reciprocally, countries that do not trust the international community to be fair and to provide assistance may fear things such as economic loss as a consequence of having open and honest communications about outbreaks. The result may be that they chose not to be transparent with the global community."

"If countries have a moral duty to be transparent, then the global community has reciprocal moral obligations to compensate and support those countries that may suffer economic or health consequences as a result of transparent communication."

## Vulnerability

Although the prevalence of chronic and acute diseases is higher among elderly and other certain groups, stakeholders felt that it was important to distinguish between age and disease and noted that age should not be a proxy for disease or provide the basis for allocation decisions.

In places, isolation due to geography may increase vulnerability.

"In Northeastern Ontario alone, the land mass is equivalent of Spain and Portugal combined, so 100,000 square miles, so logistical distribution of emergency supply and stockpile is a huge issue".

A particular challenge noted by many stakeholders: pandemic influenza planning occurs primarily at urban centres, for urban centres, thus not being sensitive to the difficulties that might arise in rural areas. Similarly disadvantaged: those who live in poverty or in crowded housing conditions such as shelters and prisons.

**Public release date: 23-Sep-2009**

## **Study reveals 2/3 of prostate cancer patients do not need treatment**

In the largest study of its kind, the international team of pathologists studied an initial 4,000 prostate cancer patients over a period of 15 years to further understanding into the natural progression of the disease and how it should be managed. The research, published in the British Journal of Cancer, could be used to develop a blood test to distinguish between aggressive and non-aggressive forms of prostate cancer.

Globally, prostate cancer is the fifth most common malignancy and accounts for 13% of male deaths in the UK. Studies have shown that men with non-aggressive prostate cancer can live with the disease untreated for many years, but aggressive cancer requires immediate treatment.

**Pathologists found that the presence of a protein, called Hsp-27, in cancer cells was an indicator that the disease will progress and require treatment.** The study showed, however, that in more than 60% of cases the protein was not expressed and the cancer could be managed by careful monitoring, rather than with active intervention methods, such as drug treatment or surgery.

The protein normally has a positive function in the body, helping healthy cells survive when they are placed under 'stressful' conditions, such as disease or injury. If the protein is expressed in cancer, however, it can prevent the diseased cells from dying, allowing the cancer to progress. The team, supported by Cancer Research UK (CRUK) and in collaboration with scientists in London and New York, found that the protein can be used to predict how the disease will behave and could help doctors advise patients on how the disease could affect their daily lives.

Professor Chris Foster, Head of the University's Division of Pathology, explains: "Cancer of any kind is a very distressing disease and has the ability to impact on every aspect of a person's life. Chemotherapy and surgery can also have a significant effect on health and wellbeing and that is why it is important that we first understand the biological nature of the disease and how it will behave in each individual patient, before determining if and when a person needs a particular type of treatment.

"By studying the disease in a large number of men throughout the UK and over a long period of time, we have been able to get a more complete picture of how to manage the disease successfully, whilst limiting the negative impact it can have on a patient's life. The study also demonstrates the role of modern of Pathology, not only in establishing diagnoses but in determining if the subsequent management of individual patients is biologically appropriate for their particular condition.

"The protein – or biomarker – we have identified provides us with a signal that the disease will continue to progress. We know that at the point this marker is expressed, medics need to administer treatment to kill the cancer cells. We have shown that in the majority of cases, however, this marker is not expressed and therefore patients do not necessarily need to go through treatment to lead a normal life."

**Public release date: 28-Sep-2009**

## **Heparin can cause skin lesions**

Heparin, a commonly used anticoagulant, can cause skin lesions, reports a study <http://www.cmaj.ca/press/cmaj081729.pdf> in CMAJ (Canadian Medical Association Journal) [www.cmaj.ca](http://www.cmaj.ca). Skin lesions caused by heparin may indicate the presence of a life-threatening decrease in the number of platelets, a condition called "heparin-induced thrombocytopenia" or a, in most cases self-limiting, allergic skin reaction.

The study looked at 320 patients undergoing heparin injections over 12 months at The Hospital of The Johann Wolfgang Goethe University in Frankfurt, Germany. Twenty-four patients - 7.5% of the study group - exhibited heparin-induced skin lesions, considerably above the expected rate of 2%.

"During the study, we were surprised by the high number of patients with heparin-induced skin lesions," state Dr. Ralf Ludwig, University of Lubeck, and coauthors. For most patients, the diagnosis was made because of our study."

After clinical examination, they suggested "a delayed-type hypersensitivity response was the most common cause for all the observed lesions," which was confirmed by subsequent allergologic and histologic testing.

Significantly more women had hypersensitivity reactions. Pregnancy, obesity and long duration of current heparin treatment were associated with a delayed-type

hypersensitivity reactions.

The authors write that physicians must be aware that skin lesions are a possibility with subcutaneous heparin therapy, and they raise awareness, that the underlying cause of the lesion should be determined.

**Public release date: 28-Sep-2009**

## **Gut worms may protect against house-dust mite allergy**

A study conducted in Vietnam has added further weight to the view that parasitic gut worms, such as hookworm, could help in the prevention and treatment of asthma and other allergies.

Led by Dr Carsten Flohr, a Clinical Scientist from The University of Nottingham, and Dr Luc Nguyen Tuyen from the Khanh Hoa Provincial Health Service in central Vietnam, the study is the largest double-blind placebo controlled clinical trial to date looking at the potential links between hookworm and other gut worm infections and allergic conditions such as asthma and eczema.

Thanks to improved hygiene practices parasitic worms have been mostly eradicated among human populations living in developed countries. However, experts believe that over millions of years of co-evolution worms have found methods to dampen down host immune responses to prolong their own survival inside humans. This relationship seems to have become so intertwined that without gut worms or other parasites, our immune system can become unbalanced, which in turn could contribute to the development of asthma and other allergies. At the same time, it is important to remember that gut parasites can cause severe disease and are a major cause of iron-deficiency anaemia in developing countries.

Dr Flohr's study was conducted in a rural area of central Vietnam where two out of three children have hookworm and other gut parasite infections and where allergies are extremely rare. More than 1,500 schoolchildren aged 6-17 took part.

The team investigated whether repeated tablet treatments to clear the body of gut worms made it more likely for children to develop allergic conditions. While the treatment did not demonstrate an effect on asthma or eczema, **the treated children had a significantly increased risk of having a positive allergy skin test to house-dust mites and cockroach.** This suggests that gut worms have the potential to tone down human immune responses and so further research is now needed to identify precisely how gut worm infection can prevent allergic sensitisation.

Dr Carsten Flohr of The University of Nottingham adds: "The next step is to understand exactly how and when gut parasites programme the human immune system in a way that protects against allergic sensitisation, and for such studies, follow-up from birth will be

essential.”

**As up to 80 per cent of people with asthma also have allergies to house-dust mites and other environmental allergens, additional research in this area could aid the creation of new treatments that work in the same way as gut parasites, by dampening down or rebalancing the immune system so that the body does not respond to allergens and trigger asthma attacks.**

Dr Elaine Vickers, Research Relations Manager at Asthma UK, says: “Asthma affects more than five million people in the UK, with a person being admitted to hospital every seven minutes following an asthma attack. The prospects of further studies in this area are therefore very exciting as we could see groundbreaking treatments for asthma and other allergies developed as a result. It’s now vital that we see more funding being invested in this important area of research, so that we can increase our understanding of the link between gut parasites and the development of allergies from birth.”

**Public release date: 29-Sep-2009**

### **Most would refuse emergency use H1N1 vaccine or additive**

PITTSBURGH, Sept. 29 – A majority of Americans would not take an H1N1 flu vaccine or drug additive authorized for emergency use by the Food and Drug Administration, according to a University of Pittsburgh Graduate School of Public Health and University of Georgia study. The study, available online today in *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, **found that fewer than 10 percent of those surveyed said they would be willing to take such a vaccine or drug and nearly 30 percent remained undecided.**

The passage of the Project Bioshield Act in 2004 created the emergency use authorization (EUA) giving the FDA the ability to use experimental or "off label" drugs in the event of an actual or potential emergency. To date, four vaccines against H1N1 virus have been approved under the same process used by the FDA for the seasonal flu vaccine. Also, several drug additives, or adjuvants – sometimes added to vaccines to strengthen the immune response and stretch the quantity of available vaccines in the event of a pandemic – have been ordered and stockpiled by the federal government in case they may be needed. But adding them to H1N1 vaccines would trigger an EUA, which is one of the reasons the federal government has chosen not to use them.

"Although the U.S government has held off on including an adjuvant in H1N1 vaccines for now, American officials may need to reconsider this decision as the pandemic unfolds," said study author Sandra Quinn, Ph.D., associate dean for Student Affairs and Education and associate professor at the University of Pittsburgh Graduate School of Public Health. "There also remains a significant shortage of the vaccines in many countries around the world. Given this, our finding that few people would accept a new but not yet fully approved H1N1 vaccine or drug is very worrisome," she said.

The study was based on a survey that focused on attitudes toward H1N1 and willingness to accept flu vaccines and drugs not officially approved by the FDA, but authorized for emergency use. Of the 1,543 adults questioned in June 2009, 46 percent of people surveyed said they were concerned about getting swine flu. However, nearly 86 percent said they thought it was unlikely or very unlikely that they themselves would become ill.

Researchers also report that 63 percent of people surveyed said they would not be willing to take "a new, but not yet approved vaccine", and 50 percent said they would be very or extremely worried about taking it. Of those who reported they would be moderately to extremely worried, 70 percent said they would refuse the vaccine outright. Only 4 percent of the most worried said they would take the vaccine, compared to 23 percent of those who were not at all or slightly worried.

In addition, 65 percent of those who said they would refuse the vaccine reported being confident about their decision, compared to only 46 percent of those who said they would take the vaccine.

Race also was associated with refusal to take the vaccine – 66 percent of whites and 60 percent of blacks reported they would refuse the vaccine, compared to 47 percent of Hispanics. Blacks reported they were the most worried (62 percent), followed by Hispanics (52 percent) and whites (46 percent).

According to Dr. Quinn, these results differ from some current opinion polls on public acceptance of an H1N1 vaccine because the researchers explicitly asked about vaccines approved under the EUA designation.

"Communication about the H1N1 vaccine is enormously challenging," said Dr. Quinn. "The additional issue of emergency use designation would further complicate challenges to clear communication. In the event an emergency-use adjuvant is required to stem the H1N1 pandemic, public health professionals will need to articulate a strong case for the vaccine and aggressively address myths and misinformation to increase understanding and acceptance."

The potential challenge in communicating with the public about emergency use authorization is relevant beyond the question of the H1N1 vaccine, added Dr. Quinn. "EUAs are an important tool for the protection of the public's health in an emergency. It would behoove public health agencies to begin now to think about communication and education of the public on this issue."

**Ralph's Note - I found it very interesting they broke it down by race. Like, why would that matter?**

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**Young Adults May Outgrow Bipolar Disorder**

MU researchers find evidence that there may be developmentally limited forms of bipolar disorder

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COLUMBIA, Mo. –Bipolar disorder, or manic-depression, causes severe and unusual shifts in mood and energy, affecting a person’s ability to perform everyday tasks. With symptoms often starting in early adulthood, bipolar disorder has been thought of traditionally as a lifelong disorder. Now, University of Missouri researchers have found evidence that nearly half of those diagnosed between the ages of 18 and 25 may outgrow the disorder by the time they reach 30.

“Using two large nationally representative studies, we found that there was a strikingly high peak prevalence of bipolar disorders in emerging adulthood,” said David Cicero, doctoral student in the Department of Psychological Sciences in the College of Arts and Science

David Cicero is a graduate student, who led a paper on treatment of bipolar disorder and lead author of the paper. “During the third decade of life, the prevalence of the disorder appears to resolve substantially, suggesting patients become less symptomatic and may have a greater chance of recovery.”

By examining the results of two large national surveys, MU researchers found an “age gradient” in the prevalence of bipolar disorder, with part of the population appearing to outgrow the disorder. In the survey results, 5.5 to 6.2 percent of people between the ages of 18 and 24 suffer from bipolar disorder, but only about 3 percent of people older than 29 suffer from bipolar disorder.

“Young adults between the ages of 18 and 24 are going through significant life changes and social strain, which could influence both the onset and course of the disorder,” said Kenneth J. Sher, Curators’ Professor in the Department of Psychological Sciences and co-author of the study. “During this period of life, young adults are exploring new roles and relationships and begin to leave their parents’ homes for school or work. By the mid 20s, adults have begun to adjust to these changes and begin to settle down and form committed relationships.”

Researchers predict the prevalence of the disorder also could be affected by brain development, particularly the prefrontal cortex. The prefrontal cortex, the very front part of the brain, is thought to control perception, senses, personality and intelligence. In particular, it controls reactions to social situations, which can be a challenge for people with bipolar disorder.

“The maturing of the prefrontal cortex of the brain around 25 years of age could

biologically explain the developmentally limited aspect of bipolar disorder,” Cicero said. “Other researchers have found a similar pattern in young adults with alcohol or substance abuse disorders.”

While some scholars suggest that the difference could be due to discounting factors such as early mortality, the sheer number of those who are recovering rules out this possibility, Sher said.

The study, “Are There Developmentally Limited Forms of Bipolar Disorder?” was published in the Journal of Abnormal Psychology. It was co-authored by Cicero, Sher and Ameer Epler, a doctoral student in the Department of Psychological Sciences.

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**These reports are done with the appreciation of all the Doctors, Scientist, and other Medical Researchers who sacrificed their time and effort. In order to give people the ability to empower themselves. Without the base aspirations for fame, or fortune. Just honorable people, doing honorable things.**