Health Benefits Of Physical Activity More Pronounced In Women

ScienceDaily (July 31, 2009) — Many experimental studies have found that physical exercise can improve cholesterol levels and subsequently decrease the risks of cardiovascular disease; however, few of these studies have included enough participant diversity to provide ethnic breakdowns. Now, a long-term study of over 8,700 middle-aged men and women provides race- and gender-specific data on the cholesterol effects of physical activity, with the interesting result that women, particularly African-American women, experience greater benefits as a result of exercise than men.

The analysis of this large Atherosclerosis Risk in Communities (ARIC) Study, which appears in the August issue of Journal of Lipid Research, was carried out by Keri Monda and colleagues at North Carolina and Baylor. They found that over a 12 year period, all individuals who increased their exercise by about 180 metabolic units per week (equivalent to an additional hour of mild or 30 minutes of moderate activity per week) displayed decreased levels of triglycerides and increased levels of the "good" HDL cholesterol. However, statistically significant decreases in the "bad" LDL cholesterol were only observed in women, with particularly strong effects in menopausal women and African-American women. And total cholesterol levels were only significantly decreased in African-American women.

The authors speculate that these novel differences may arise from hormonal differences between the sexes, especially considering the extra effects seen post-menopause. The racial differences observed may stem from genetic variations that require further exploration.

The authors do also note that their exercise data was assessed by questionnaire and this was non-scientific, though the particular methodology used has been extremely reliable in other studies. They also note that all evaluated participants were healthy, so these results cannot be generalized to individuals with diabetes or those on cholesterol-lowering medications.

Journal reference:

August 2nd, 2009 at 11:27 am

Living Near A Wind Farm Could Be Bad For Your Health

Living too close to wind turbines can cause heart disease, tinnitus, vertigo, panic attacks, migraines and sleep deprivation, according to new research by a leading American doctor.

Dr Nina Pierpont, a top New York paediatrician, has been studying the effects of living near wind turbines in the UK, US, Canada, Ireland and Italy for more than five years.

She has identified a new health risk – wind turbine syndrome (WTS) – causing a wide range of problems ranging from internal pulsation, quivering, nervousness, fear, chest tightness and tachycardia – increased heart rate.

Turbine noise can also cause nightmares and other disorders in children as well as harm development in the young, she claims, but points out that not all people living near turbines are at a high risk of developing problems. Dr Pierpont’s studies indicate that humans are affected by low-frequency noise and vibrations from wind turbines through their ear bones, similar to fish and other amphibians.

'It has been gospel among acousticians for years that if a person can’t hear a sound, it’s too weak for it to be detected or registered by any other part of the body,’ she said. ‘But this is no longer true. Humans can hear through the bones. This is amazing. It would be heretical if it hadn’t been shown in a well-conducted experiment.’

In the UK, Dr Christopher Hanning, founder of the British Sleep Society, who has also backed her research, said: ‘Dr Pierpont’s detailed recording of the harm caused by wind turbine noise will lay firm foundations for future research. It should be required reading for all planners considering wind farms.

‘Like so many earlier medical pioneers exposing the weaknesses of current orthodoxy, Dr Pierpont has been subject to much denigration and criticism and … it is tribute to her strength of character and conviction that this important book is going to reach publication,’ he added.

Until now, the Government and the wind companies have rejected any health risks associated with the powerful noises and vibrations from wind turbines. They have argued that claims by Dr Pierpont are "imaginary" and are likely to argue against her latest findings.

The American added that the wind turbine companies constantly argue that the health problems are "imaginary, psychosomatic or malingering". But she said their claims are “rubbish” and that medical evidence supports that the reported symptoms are real.
‘The wind industry will try to discredit me and disparage me, but I can cope with that,’ she added. ‘This is not unlike the tobacco industry dismissing health issues from smoking. The wind industry, however, is not composed of clinicians, nor is it made up of people suffering from wind turbines.’

Lord May, the former chief scientific adviser to the UK government, describes her research as “impressive, interesting and important”.

**Kefir, although rich in probiotics, didn’t prevent diarrhea in children using antibiotics**

Results, however, suggest the fermented drink might be of benefit to sicker children.

Washington, DC - Kefir, one of the world’s oldest “health” drinks, did little to prevent diarrhea in young children being treated with antibiotics, say researchers at Georgetown University Medical Center (GUMC), who tested the drink in a unique and rigorous double-blind clinical trial.

While the study results, published in the August issue of Archives of Pediatrics and Adolescent Medicine, are negative, investigators say there are intriguing hints that the drink, which is rich in probiotics – live bacteria - appeared to help the children in the study who were the least healthy.

“We were initially interested in this study because many physicians are already recommending yogurts, kefirs, and probiotics supplements to prevent diarrhea associated with use of antibiotics,” says the study’s lead author, Daniel J. Merenstein, MD, director of research in the Department of Family Medicine at GUMC.

A number of studies have shown that probiotics can help prevent and treat diarrhea, even in people using antibiotics but this has often been shown in very different settings than is typical in the United States, Merenstein says. Children are especially susceptible to this problem, he says - about 20-30 percent of kids using antibiotics will develop diarrhea from the antibiotic, and this often results in them stopping the antibiotic or additional doctor visits.

Many of these previous studies, however, were not "double-blinded" – that is, compared with a placebo drink that resembled kefir.

"This study didn't prove the benefit of kefir in these children– not all probiotics work the same - but the results also suggest that kefir may work best in younger, sicker children," Merenstein says. "More studies with this particular group of children are warranted."

Kefir, which originated in Europe and Asia and has been used for hundreds of years, is a milk drink. The kefir Merenstein studied was fermented by ten probiotics. It is believed to keep the stomach and immune system strong and stable.

Previous studies lacked the rigor needed to be conclusive, so Merenstein designed a clinical trial in which 125 children, ages 1-5, being treated for antibiotics, were given either a kefir drink to use with their antibiotic tablet each day for ten days or a kefir drink in which the probiotics were previously destroyed by heat (placebo). Neither the study coordinators, the children, nor their parents knew which drink was given to which participant until the study ended. “This double-blind trial design is the gold standard for a clinical trial,” Merenstein says. “It is the best way to determine if an agent or substance being studied provides benefit.”

The study was designed by Merenstein and funded by Lifeway Foods, which manufacturers Probug’s Organic Whole Milk Kefir™, but Georgetown University owns the data that results from the study and has had full publication rights, Merenstein says.

Researchers found that 18 percent of children in the kefir group developed diarrhea compared to 22 percent in the placebo group – which is not a statistically significant difference. However, in the children whose health was poorer at enrollment, 23 percent developed diarrhea in the kefir group, compared with 31 percent in the placebo group.

“Our theory is that kefir may not have helped healthy children that much because the extra immune system boost provided by the drink may not be necessary,” Merenstein says. “It is possible looking at our data that Probug’s kefir may have some benefit in specific groups. We have found with our other studies that in very healthy children the benefit of probiotics may be minute and difficult to elicit in small studies. That is why we need new larger studies in children to elicit who might benefit.”

**Groundbreaking study shows exercise benefits leukemia patients**

CHAPEL HILL, N.C. – One of the most bothersome symptoms of leukemia is extreme fatigue, and asking these patients to exercise doesn’t sound like a way to help them feel better.

A new study from the University of North Carolina at Chapel Hill indicates that exercise may be a great way to do just that, combating the debilitating fatigue that these patients experience.
In a first-of-its-kind clinical trial, a team of researchers from the Department of Exercise and Sport Science and UNC Lineberger Comprehensive Cancer Center have shown that physical activity can significantly improve symptoms of fatigue and depression, increase cardiovascular endurance and maintain quality of life for adult patients undergoing treatment for leukemia.

A total of 10 patients undergoing treatment participated in the EQUAL (Exercise and Quality of Life in Leukemia/ Lymphoma Patients) study. Each patient was provided with specially-treated exercise equipment to minimize the risk of infection. They participated in an individualized exercise session while in the hospital for the 3-5 weeks of the induction phase of leukemia treatment. The exercise prescription comprised of aerobic and resistance exercises, core exercises, and light stretches tailored to the patient’s level of fitness and leukemia symptoms. Upon their discharge from the hospital, each patient received an aerobic- based exercise prescription to use during their 2-week home recovery period.

Before and after the exercise program, the researchers tested key physiological measurements including resting heart rate, blood pressure and hemoglobin, body weight and height, body composition, cardiorespiratory fitness and muscular endurance. Psychological measures were tested using standard scales for assessing fatigue, depression and quality of life in cancer patients. Blood samples were also taken at baseline, mid, and at the conclusion of the study, and analyzed for cytokines, biomarkers of inflammation. The results of the study were recently published in the journal Integrative Cancer Therapies.

"We found that the patients experienced significant reduction in total fatigue and depression scores, as well as improved cardiorespiratory endurance and maintenance of muscular endurance," said Claudio Battaglini, Ph.D., assistant professor of exercise and sport science and UNC Lineberger member.

"This is important because of the numerous side-effects related to cancer treatment, and particularly leukemia treatment, which requires confinement to a hospital room for 4-6 weeks to avoid the risk of infection. We have demonstrated that these patients not only can complete an exercise program in the hospital but that they may receive both physiological and psychological benefits that could assist in their recovery," he added.

EQUAL phase II is in development. The follow-up study will consisted of a randomized clinical-controlled trial to assess the effects on an individualized exercise prescription in acute leukemia patients vs. a group of leukemia patients receiving the usual treatment. If the results prove to be beneficial to patients, the goal of the research team will be to expand the trial by developing a multi-site research program involving other cancer centers throughout North Carolina and around the United States.

**Scientists Uncork Potential Secret Of Red Wine's Health Benefits**

ScienceDaily (Aug. 3, 2009) — Scientists from Scotland and Singapore have unraveled a mystery that has perplexed scientists since red wine was first discovered to have health benefits: how does resveratrol control inflammation? New research published in the August 2009 print issue of The FASEB Journal, not only explains resveratrol’s one-two punch on inflammation, but also show how it—or a derivative—can be used to treat potentially deadly inflammatory disease, such as appendicitis, peritonitis, and systemic sepsis.

"Strong acute inflammatory diseases such as sepsis are very difficult to treat and many die every day due to lack of treatment," said Alirio Melendez, senior lecturer on the faculty of medicine at Glasgow Biomedical Research Centre in Scotland and one of the researchers involved in the work. "Moreover, many survivors of sepsis develop a very low quality of life due to the damage that inflammation causes to several internal organs. The ultimate goal of our study was to identify a potential novel therapy to help in the treatment of strong acute inflammatory diseases."

In this study, researchers administered an inflammatory agent to two groups of mice. One group was pretreated with resveratrol and the other group was not. The mice that were not pretreated with resveratrol experienced a strong inflammatory response, simulating disease in humans, while the group pretreated with resveratrol was protected from the inflammation. The scientists then examined the tissues of the mice to determine exactly how resveratrol was able to protect the mice from inflammation. They found that resveratrol used a one-two punch to stop inflammation in the mice by preventing the body from creating two different molecules known to trigger inflammation, sphingosine kinase and phospholipase D. This finding suggests that resveratrol may be harnessable as a treatment for inflammatory diseases and may also lead to entirely new resveratrol-based drugs that are even more effective.

"The therapeutic potential of red wine has been bottled up for thousands of years," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal, "and now that scientists have uncorked its secrets, they find that studies of how resveratrol works can lead to new treatments for life-threatening inflammation."

**Journal reference:**

Issuree et al. Resveratrol attenuates C5a-induced inflammatory responses in vitro and in vivo by inhibiting phospholipase D and sphingosine kinase activities. The FASEB Journal, 2009; 23 (8): 2412 DOI: 10.1096/fj.09-130542
The way you eat may affect your risk for breast cancer

PHILADELPHIA – How you eat may be just as important as how much you eat, if mice studies are any clue.

Cancer researchers have long studied the role of diet on breast cancer risk, but results to date have been mixed. New findings published in Cancer Prevention Research, a journal of the American Association for Cancer Research, suggest the method by which calories are restricted may be more important for cancer protection than the actual overall degree of calorie restriction.

"Understanding how calorie restriction provides protection against the development of mammary tumors should help us identify pathways that could be targeted for chemoprevention studies," said Margot P. Cleary, Ph.D., professor at the Hormel Institute, University of Minnesota. "Further identification of serum factors that are involved in tumor development would possibly provide a way to identify at risk individuals and target interventions to these people."

Previous studies have shown that intermittent calorie restriction provided greater protection from mammary tumor development than did the same overall degree of restriction, which was implemented in a chronic fashion. The researchers compared changes of a growth factor (IGF-1) in relationship to these two calorie restriction methods — chronic and intermittent — and tumor development beginning in 10-week old female mice at risk to develop mammary tumors. Their hope was to explain why intermittent restriction is more effective.

The overall degree of restriction was 25 percent reduction compared to control mice. Mammary tumor incidence was 71 percent in the control mice who ate the amount of food they wanted, 35 percent among those who were chronically restricted and only nine percent in those who intermittently restricted calories.

The researchers were initially surprised by these findings for several reasons. First, the prevailing wisdom is that the degree of protection from calorie restriction is proportional to the degree of mammary tumor prevention. Second, they originally thought that intermittent calorie restriction might enhance tumor growth due to growth factors being secreted in response to re-feeding, Cleary said.

In an accompanying editorial also published in Cancer Prevention Research, Michael Pollak, M.D., stated that some major challenges of pharmacologic approaches to cancer prevention and/or treatment include defining the underlying causes and determining the relevance of these caloric restriction methods. Pollak is professor of oncology at McGill University and director of the Cancer Prevention Center at the Jewish General Hospital, both in Montreal.

This study "contributes to accumulating evidence that caloric restriction acts by altering hormone levels rather than by directly starving cancers of energy. In particular, lower levels of insulin are associated with reduced food intake, and this may be protective," said Pollak, who is also an editorial board member for Cancer Prevention Research.

In the editorial Pollak wrote: "there is reason for concern that the 'obesity epidemic' may lead to an increased prevalence of a hormonal profile associated with elevated cancer risk and/or an adverse cancer prognosis. Therefore, in addition to its well-known general health benefits, maintaining an ideal body weight is also important in the specific contexts of cancer prevention and improving the prognosis of cancer patients."

Based on varied findings from clinical trials, Pollak suggested that lifestyle and pharmacologic methods to reduce IGF-1 and insulin deserve ongoing investigations. Cleary agreed, stating that these results may provide interest to more aggressively pursue cancer prevention studies related to calorie restriction.

"Humans frequently regain lost weight discouraging the application of calorie restriction protocols for disease prevention," she said. "We hope these studies will identify biomarkers and/or pathways that could be used in human studies to determine agents that would mimic calorie restriction."

New index offers first science-based definition of nutrient density

Nutrient-Rich Foods Index aims to reshape nutrition education

WHAT: The Nutrient-Rich Foods (NRF) Index is a new, objective, science-based way to measure the total nutritional quality of foods and beverages.

Effective nutrition profiling should be based on existing science and validated against proven measures of diet quality, according to the August issue of the Journal of Nutrition. A study in the issue outlined the scientific approach taken to develop the NRF Index, a measurement of nutrient density validated against the USDA's scientifically based Healthy Eating Index (HEI). While the HEI mainly measures the recommended eating pattern from the five food groups, the NRF Index goes a step further by focusing on the nutrient density of individual foods and beverages. The NRF Index has implications for people of all ages, allowing them to choose more nutrient-rich foods first in order to build a healthier diet.
WHY: Both adults and children are overweight and undernourished – missing out on important nutrients because they are not choosing nutrient-rich foods first. In much of today's nutrition education the focus is on avoiding specific nutrients – such as sugar or fat – and it appears to have failed to provide Americans with the means to build a healthy, complete diet. For this reason, the 2005 Dietary Guidelines for Americans Committee requested the development of a scientifically valid definition of nutrient density to help with nutrition guidance. Thus, the NRF Index was created to provide a positive, science-based approach to inform people about what to eat rather than what not to eat, and how to choose more nutrient-rich foods. The Index balances beneficial nutrients and nutrients to limit in order to find the true nutritional value of a food, beverage, meal or total daily food intake.

HOW: To use an objective approach to develop a nutrient density index that could be validated against the HEI, different formulas featuring hundreds of varying numbers and combinations of nutrients were evaluated. A formula based on 100 calories and taking the sum of the percent daily values of nine nutrients to encourage (protein, calcium, magnesium, iron, fiber, potassium and vitamins A, C and E) minus the sum of percent daily values of three nutrients to limit (saturated fats, sodium and added sugars) resulted in the greatest correlation with the HEI, and was established as the NRF Index. Consumer research is currently underway to create tools that will help people use the NRF Index in their everyday lives.

PILOT STUDY: WORKPLACE YOGA AND MEDITATION CAN LOWER FEELINGS OF STRESS
COLUMBUS, Ohio – Twenty minutes per day of guided workplace meditation and yoga combined with six weekly group sessions can lower feelings of stress by more than 10 percent and improve sleep quality in sedentary office employees, a pilot study suggests.

The study offered participants a modified version of what is known as mindfulness-based stress reduction (MBSR), a program established in 1979 to help hospital patients in Massachusetts assist in their own healing that is now in wide use around the world.

In this context, mindfulness refers in part to one’s heightened awareness of an external stressor as the first step toward relaxing in a way that can minimize the effects of that stress on the body.

While the traditional MBSR program practice takes up an hour per day for eight weeks supplemented by lengthy weekly sessions and a full-day retreat, the modified version developed at Ohio State University for this study was designed for office-based workers wearing professional attire.

The results of the pilot study are published in a recent issue of the journal Health Education & Behavior.

Participants attended one-hour weekly group meetings during lunch and practiced 20 minutes of meditation and yoga per day at their desks. After six weeks, program participants reported that they were more aware of external stressors, they felt less stressed by life events, and they fell asleep more easily than did a control group that did not experience the intervention.

“Because chronic stress is associated with chronic disease, I am focusing on how to reduce stress before it has a chance to contribute to disease,” said Maryanna Klatt, lead author of the study and an assistant professor of clinical allied medicine at Ohio State.

“My interest is to see whether or not we can get people to reduce their health care utilization because they’re less stressed. I want to deliver something low cost at the work site, something practical that can be sustained, that can help reduce health care costs,” Klatt said.

Klatt and colleagues are building on these preliminary findings and continuing to study the broader impact of the intervention in various populations, such as cancer survivors, intensive-care nurses and inner-city schoolchildren. In addition to gathering self-reported data from research participants, the scientists plan to collect biological samples to determine whether the intervention can lead to lower levels of stress hormones.

For the pilot study, the researchers recruited 48 adult office workers with body mass index scores lower than 30 who exercised less than 30 minutes on most days of the week. Half were randomized to the intervention and half were wait-listed to receive the intervention later. Forty-two people completed the study.

Those who received the intervention participated in weekly one-hour group sessions during which breathing, relaxation and gentle yoga movement were designed to coax participants toward a meditative state. Participants also discussed work-related stress. As part of the pursuit of mindfulness, they were coached to contemplate a specific topic in each session that explored their response to a specific type of stress over the past week.

“It doesn’t matter what the stress is, but how you change the way you perceive the stress,” Klatt noted. “I like to describe mindfulness as changing the way you see what’s already there. It’s a tool that teaches people to become aware of their options. If they can’t change the external events in their life, they can instead change the way they view the stress, which can make a difference in how they experience their day-to-day life.”
The weekly sessions were supplemented by 20 minutes each day of movement and meditation guided by verbal cues and music provided on compact discs that Klatt designed and recorded. The entire intervention lasted six weeks.

The study analyzed participants’ responses to the intervention using data from established research questionnaires that measured perceived stress, or the degree to which situations in life are considered stressful; a number of components of sleep quality; and what is called mindful attention awareness, which refers to how often a person is paying attention to and is aware of what is occurring in the present.

All participants completed the questionnaires before and after the intervention. Twenty-two adults completed the intervention. Their pre- and post-test results were compared to those reported by the 20 control participants.

Mindful attention awareness increased significantly and perceived stress decreased significantly among the intervention group when compared to the control group’s responses. Overall sleep quality increased in both groups, but three of seven components of sleep were more affected in the intervention group.

On average, mindfulness increased by about 9.7 percent and perceived stress decreased by about 11 percent among the group that experienced the intervention. These participants also reported that it took them less time to fall asleep, they had fewer sleep disturbances and they experienced less daytime dysfunction than did members of the non-intervention group.

The researchers also took saliva samples to test for the presence of cortisol, a stress hormone, but found no significant changes in average daily levels of the hormone over time for participants in both groups. Klatt said the design of this part of the pilot study could have affected the result, and the sample collection technique will be changed in subsequent studies.

Klatt said mindfulness-based stress reduction, developed by Jon Kabat-Zinn at the University of Massachusetts Medical Center, has been studied widely and determined to be useful in lowering symptoms ranging from depression and anxiety to chronic pain. But the time commitment required in the program makes it impractical for busy working professionals, and adding a stress-reduction class outside of work could add stress to these people, she said.

So Klatt set out to develop what she calls a “low dose” of the program that is suitable for the workplace and still offers stress-reduction benefits. She specifically scheduled weekly sessions during lunch to avoid interfering with work time or home time, and combined movement with verbal prompts and music that are cues for participants to relax.

“As I’ve been working on the program, I heard so many of the participants say they wish they had learned this earlier,” Klatt said.

Because the low-dose program remains a work-in-progress that is still under investigation, it is not available for public use, Klatt noted.

Mounting Evidence Of Fish Oil’s Heart Health Benefits
ScienceDaily (Aug. 5, 2009) — There is mounting evidence that omega-3 fatty acids from fish or fish oil supplements not only help prevent cardiovascular diseases in healthy individuals, but also reduce the incidence of cardiac events and mortality in patients with existing heart disease. A new study, published in the August 11, 2009, issue of the Journal of the American College of Cardiology, extensively reviews data from a broad range of studies in tens of thousands of patients and sets forth suggested daily targets for omega-3 consumption.

"This isn't just hype; we now have tremendous and compelling evidence from very large studies, some dating back 20 and 30 years, that demonstrate the protective benefits of omega-3 fish oil in multiple aspects of preventive cardiology," said Carl Lavie, M.D., F.A.C.C., medical director of Cardiac Rehabilitation and Prevention, Ochsner Medical Center, New Orleans, LA, and lead author of the article. "The strongest evidence of a cardioprotective effect of omega-3s appears in patients with established cardiovascular disease and following a heart attack with up to a 30 percent reduction in CV-related death."

Dietary intake of fish oil can also decrease the risk of atherosclerosis, arrhythmias, heart attack, sudden cardiac death and even health failure. Dr. Lavie adds that although there is a smaller benefit in reducing heart failure death—9 percent mortality benefit in a major recent randomized controlled trial—this is still very impressive given patients' grave prognosis.

"If we translate this finding, it means that we only need to treat 56 patients for four years to prevent one death," he said. "And we are talking about a very safe and relatively inexpensive therapy."

Most of the evidence for the cardioprotective benefits supports the use of DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid), the long-chain fatty acids in the omega-3 family. According to Dr. Lavie, EPA and DHA work by getting into the membranes of cells and, in doing so, may help to improve the heart's electrical
activity, vascular tone, plaque stabilization and blood pressure, among other benefits. Studies show that the reduction in CV events is inversely related to the tissue level EPA and, even more so, DHA.

Based on these findings, and because the body does not produce its own essential fatty acids, the authors recommend that healthy individuals should consume 500 mg daily of omega-3 fish oil containing EPA and DHA, and people with known heart disease or heart failure aim for at least 800 to 1,000 mg daily.

"There are clear health and heart benefits associated with increasing one's intake of foods that are rich in Omega-3s, including oily fish like salmon, sardines, trout, herring, and oysters" said Dr. Lavie "Patients should talk with their doctors about whether a fish oil supplement is needed to get the right amount and, in turn, benefit from the associated cardiovascular protection."

Dr. Lavie and his team came across only a few negative studies, including a recent one that showed no benefit in post-MI patients, but it has raised the possibility that omega-3 fatty acids may not provide as much additional protective benefits in low-risk patients already receiving extensive and rigorous post-MI therapies. "It was a one-year study that enrolled fewer than 4,000 patients and the majority were using aspirin, clopidogrel, statins, beta-blockers and ACE-inhibitors—the best of modern medicine," he said. "It may be that their risk was so low to start, that a larger study with longer follow-up would be required to better assess the true efficacy of omega-3 in such relatively low-risk patients."

Authors say further studies are needed to investigate and determine optimal dosages, as well as the relative ration of DHA and EPA that provides maximal heart protection in those at risk of cardiovascular disease, and in the treatment of atherosclerosis, arrhythmias and heart attacks.

Interestingly, culture has historically played a role; sometimes dubbed the "Eskimo factor," research shows cultures that have traditionally supported a diet rich in fish oil (Asian and Alaskan American populations) had a lower prevalence of cardiovascular disease and mortality, including a reduced prevalence of atherosclerosis and heart disease, compared to European and United States populations where consumption of fish is lower. Ironically, the introduction of Western dietary practices into Asian and Native American cultures may be diluting the cardioprotective benefits enjoyed by these populations by both reducing the overall intake of fish oils, as well as overwhelming its benefits with other deleterious dietary practices, including high intakes of saturated and trans fats and cholesterol.

The hepatitis healing power of blueberry leaves
Appearing in the Aug. 7, 2009, issue of JBC

A chemical found in blueberry leaves has shown a strong effect in blocking the replication of the Hepatitis C virus, opening up a new avenue for treating chronic HCV infections, which affect 200 million people worldwide and can eventually lead to cirrhosis and liver cancer.

Among the areas of especially high Hepatitis C incidence is the Miyazaki prefecture of southern Japan, a trend that led Hiroaki Kataoka and colleagues at the University of Miyazaki and elsewhere in Japan on a search for better treatment options. Currently, there is no vaccine for HCV, and though a combination drug regimen can clear HCV infection, this treatment is only about 60% effective on average and poses risks of severe side effects.

Kataoka and colleagues believed that since HCV is localized in the liver and can take 20 years or more to develop into disease, a dietary supplement might help slow or stop disease progression. So they screened nearly 300 different agricultural products for potential compounds that suppress HCV replication and uncovered a strong candidate in the leaves of rabbit-eye blueberry (native to the southeastern US).

They purified the compound and identified it as proanthocyandin (a polyphenol similar to the beneficial chemicals found in grapes and wine). While proanthocyandin can be harmful, Kataoka and colleagues noted its effective concentration against HCV was 100 times less than the toxic threshold, and similar chemicals are found in many edible plants, suggesting it should be safe as a dietary supplement. In the meantime, the researchers now hope to explore the detailed mechanisms of how this chemical stops HCV replication.

From the Article: "Proanthocyanidin from Blueberry Leaves Suppresses Expression of Subgenomic Hepatitis C Virus RNA" by Masahiko Takeshita, Yo-ichi Ishida, Ena Akamatsu, Yusuke Ohmori, Masayuki Sudoh, Hirofumi Uto, Hirohito Tsubouchi, and Hiroaki Kataoka

Article link: http://www.jbc.org/cgi/content/full/284/32/21165

Beetroot Juice Boosts Stamina, New Study Shows

ScienceDaily (Aug. 7, 2009) — Drinking beetroot juice boosts your stamina and could help you exercise for up to 16% longer. A University of Exeter led-study shows for the first time how the nitrate contained in beetroot juice leads to a reduction in oxygen uptake, making exercise less tiring.

The study reveals that drinking beetroot juice reduces oxygen uptake to an extent that cannot be achieved by any other known means, including training.
The research team believes that the findings could be of great interest to endurance athletes. They could also be relevant to elderly people or those with cardiovascular, respiratory or metabolic diseases.

The research team conducted their study with eight men aged between 19 and 38. They were given 500ml per day of organic beetroot juice for six consecutive days before completing a series of tests, involving cycling on an exercise bike. On another occasion, they were given a placebo of blackcurrant cordial for six consecutive days before completing the same cycling tests.

After drinking beetroot juice the group was able to cycle for an average of 11.25 minutes, which is 92 seconds longer than when they were given the placebo. This would translate into an approximate 2% reduction in the time taken to cover a set distance. The group that had consumed the beetroot juice also had lower resting blood pressure.

The researchers are not yet sure of the exact mechanism that causes the nitrate in the beetroot juice to boost stamina. However, they suspect it could be a result of the nitrate turning into nitric oxide in the body, reducing the oxygen cost of exercise.

The research was carried out by the University of Exeter and Peninsula Medical School and published in the *Journal of Applied Physiology*. The research team now hopes to conduct further studies to try to understand in more detail the effects of nitrate-rich foods on exercise physiology.

Corresponding author of the study, Professor Andy Jones of the University of Exeter’s School of Sport and Health Sciences, said: "Our study is the first to show that nitrate-rich food can increase exercise endurance. We were amazed by the effects of beetroot juice on oxygen uptake because these effects cannot be achieved by any other known means, including training. I am sure professional and amateur athletes will be interested in the results of this research. I am also keen to explore the relevance of the findings to those people who suffer from poor fitness and may be able to use dietary supplements to help them go about their daily lives."

This study follows research by Barts and the London School of Medicine and the Peninsula Medical School (published in February 2008 in the American Heart Association journal Hypertension), which found that beetroot juice reduces blood pressure.

**Exercise and Mediterranean-type diet combined associated with lower risk for Alzheimer’s**

*Findings of observational study warrant further research in controlled clinical trial to clarify the role of these and other possible factors contributing to AD risk*

NEW YORK – Both being more physically active and adhering to a Mediterranean-type diet appears to be associated with reduced Alzheimer’s risk, according to a new report in the August 12, 2009 issue of the *Journal of the American Medical Association* (JAMA).

While previous studies have only investigated the association between either physical activity or diet and Alzheimer’s disease risk separately, this new research explored their combined association.

"Often times people who exercise also follow a healthy diet and vice versa. We wanted to tease out which of these two behaviors may be associated with lower risk for AD, or if the combination of the two is associated with decreased risk even further," said Nikos Scarmeas, M.D., lead author of the study and associate professor of clinical neurology in the Department of Neurology, in the Sergievsky Center and in the Taub Institute for Research on Alzheimer's Disease and the Aging Brain at Columbia University Medical Center.

This population-based study in a multi-ethnic community living in Northern Manhattan, observed 1880 elderly subjects, with an average age of 77. The participants were interviewed about their level of physical activity and dietary habits, and their responses were then summarized into two single scores. The study subjects were then followed to observe which subjects went on to develop Alzheimer’s over the course of approximately five and a half years.

To learn about their physical exercise routine, participants were queried about their activity during a two week period prior to the interview. The subjects were asked to quantify how many times they engaged in physical activity and for how long. Participants were queried regarding three categories of activities: vigorous activity (i.e., jogging etc), moderate activity (i.e., hiking, bicycling, etc), and light activity (i.e., golfing, gardening, etc).

For the dietary portion of the study, subjects were asked regarding their food consumption over the course of the previous year. Their responses were then grouped into nine food categories, the sum of which represented the Mediterranean-type diet score. A Mediterranean-type diet is typically characterized by high intake of fish, vegetables, legumes, fruits, cereals and monounsaturated fatty acids; relatively low intake of dairy products, meats and saturated fats; and moderate alcohol consumption.

The study found that those subjects who were very physically active had a 33 percent risk reduction of Alzheimer’s; those who adhered more strongly to a Mediterranean-type diet had a 40 percent risk reduction. In addition, Dr. Scarmeas and his colleagues found that there was a gradual decreasing risk for Alzheimer’s in study
participants who were reporting that they were both exercising a lot and following a diet closer to the Mediterranean-type: those subjects had a 60 percent reduction in their risk for developing Alzheimer's disease.

"So it seemed that the more that they were doing in terms of both diet and exercise, the lower was their risk for the disease,” said Dr. Scarmeas.

Dr. Scarmeas further noted that even low degrees of physical activity reported by these elderly study subjects seemed to be associated with having a protective effect against Alzheimer’s

"This study is important because it shows that people may be able to alter their risk of developing Alzheimer's by modifying their lifestyles through diet and exercise,” said Dr. Scarmeas.

Dr. Scarmeas cautions, however, that this was an observational, epidemiological study – based on interviews with study subjects on their physical activity routines and dietary habits. Therefore, the associations were based on what subjects reported and no randomized interventions were done. Only a clinical trial type of design would offer additional information to help clarify the role of these behaviors and reveal other potential contributing factors.

"We know that some part of Alzheimer's is related to genetic changes and as time goes on we discover more and more of these changes. But it is also possible that non-genetic changes, including lifestyle and behavior, may also be affecting our brain health and our risk of developing brain diseases, like Alzheimer’s, maybe in combination with our genetic predisposition,” said Dr. Scarmeas. "We need to understand and learn more about the exact biological mechanisms that may connect physical activity and diet with the biological changes of Alzheimer's disease."

"Since the benefits of following a healthy diet and remaining active have already been suggested as beneficial in other disease prevention and since based on the present and other similar studies we have some preliminary hints that this may also be helpful for brain health, it seems advisable that we emphasize not only to patients, but to healthy individuals, too, the importance of these lifestyle behaviors in affecting our overall health," said Dr. Scarmeas.

Authors of the JAMA study include: Nikolaos Scarmeas, M.D.; Jose A. Luchsinger, M.D.; Nicole Schupf, Ph.D.; Adam M. Brickman, Ph.D.; Stephanie Cosentino, Ph.D.; Ming X. Tang, Ph.D.; and Yaakov Stern, Ph.D.

Note: In the same issue of JAMA, Dr. Scarmeas co-authored with researchers from the Université Victor Ségalen Bordeaux 2 in France, a separate study titled, "Adherence to Mediterranean Diet, Cognitive Decline, and Risk of Dementia." Dr. Scarmeas expressed his encouragement about the study, which helps to validate findings by Dr. Scarmeas and his colleagues on the association between the Mediterranean diet and a reduced risk for Alzheimer's disease. More specifically, the French study found an association between higher adherence to this diet and slower rates of cognitive decline. No associations with risk for developing Alzheimer's disease were noted in this study, but this was clearly due to methodological limitations including the relatively small number of study subjects who developed Alzheimer's disease according to Dr. Scarmeas. Dr. Scarmeas also noted the significance of the fact that the French study looked at a different population, and in particular, a Mediterranean one.

Chinese Acupuncture Affects Brain's Ability To Regulate Pain, UM Study Shows

ScienceDaily (Aug. 11, 2009) — Acupuncture has been used in East-Asian medicine for thousands of years to treat pain, possibly by activating the body's natural painkillers. But how it works at the cellular level is largely unknown.

Using brain imaging, a University of Michigan study provides novel evidence that traditional Chinese acupuncture affects the brain's long-term ability to regulate pain.

The results appear online ahead of print in the September Journal of NeuroImage.

In the study, researchers at the U-M Chronic Pain and Fatigue Research Center showed acupuncture increased the binding availability of mu-opioid receptors (MOR) in regions of the brain that process and dampen pain signals – specifically the cingulate, insula, caudate, thalamus and amygdala.

Opioid painkillers, such as morphine, codeine and other medications, are thought to work by binding to these opioid receptors in the brain and spinal cord.

"The increased binding availability of these receptors was associated with reductions in pain," says Richard E. Harris, Ph.D., researcher at the U-M Chronic Pain and Fatigue Research Center and a research assistant professor of anesthesiology at the U-M Medical School.

One implication of this research is that patients with chronic pain treated with acupuncture might be more responsive to opioid medications since the receptors seem to have more binding availability, Harris says.

These findings could spur a new direction in the field of acupuncture research following recent controversy over large studies showing that sham acupuncture is as effective as real acupuncture in reducing chronic pain.

"Interestingly both acupuncture and sham acupuncture groups had similar reductions in clinical pain," Harris says. "But the mechanisms leading to pain relief are distinctly different."
The study participants included 20 women who had been diagnosed with fibromyalgia, a chronic pain condition, for at least a year, and experienced pain at least 50 percent of the time. During the study they agreed not to take any new medications for their fibromyalgia pain.

Patients had position emission tomography, or PET, scans of the brain during the first treatment and then repeated a month later after the eighth treatment.

Journal reference:

Essential nutrient found in eggs may help lower risk of neural tube defects
Only 1 in 10 women achieve adequate choline intake

Park Ridge, Ill. (August 12, 2009) – Research published online in the journal Epidemiology found that higher levels of total blood choline are associated with a 2.5-fold reduction in risk for neural tube birth defects (NTDs). NTDs are birth defects of the brain and spinal cord, and are the two most common NTDs are spina bifida and anencephaly. According to the Centers for Disease Control (CDC), an estimated 3,000 pregnancies in the U.S. are affected by NTDs each year. This study adds to the growing body of evidence demonstrating the important role of choline in fetal development.

Study Findings
The Epidemiology study investigated blood samples from more than 180,000 pregnant women and found 80 cases of NTDs. Researchers compared the blood samples to samples from 409 controls without birth defects and examined the specimens for markers including choline, folate, homocysteine, methionine and betaine among others. The researchers observed:

• a 2.5-fold reduction in risk for NTDs with the highest blood choline levels
• no other significant differences between the two study groups for any of the other blood markers

In the research discussion, the investigators note that the cause of NTDs is very complex and that supplementation of the food supply with folic acid, though effective, is only part of the solution. "This study is exciting because it offers new clues for preventing serious birth defects like spina bifida," said Dr. Gary M. Shaw, co-author of the study and professor of pediatrics at Stanford University School of Medicine. "This research should be repeated in other settings so we can learn more about the best nutrition advice to give pregnant women."

The Benefits of Choline
Choline is an essential nutrient needed for many of life's most basic functions including brain and nerve function, liver metabolism, the transportation of nutrients and the normal functioning of every cell in the body. Adequate choline intake is especially important for pregnant and breastfeeding women because it has been shown to influence prenatal and infant brain and spinal cord development as well as lifelong memory and learning functions. There is a high rate of choline transfer from mother to fetus and breast milk is also rich in choline, so meeting maternal choline needs is very important.

Emerging research also shows that choline may have additional benefits in areas such as:

• Memory function: Animal studies have demonstrated that age-associated memory decline seems to be delayed in offspring when mothers' diets are supplemented with choline during pregnancy.
• Breast cancer prevention: A study funded by a grant from the National Institutes of Health (NIH) found that the risk of developing breast cancer was 24 percent lower among women with the highest intake of choline compared to women with the lowest intake.
• Cardiovascular health: Choline has been shown to play an important role in reducing homocysteine, an amino acid in the blood that may be associated with an increased risk of chronic inflammation, which is considered a risk factor for heart disease.

Closing the Choline Consumption Gap
Despite its important role in the body, only one in 10 Americans is meeting the Adequate Intake (AI) guidelines for choline. "Most people don't know how important choline is for their bodies, or how easy it is to get the choline you need from food," explains Elizabeth Ward, a registered dietitian in private practice and author of the new book "Expect the Best: Your Guide to Healthy Eating Before, During, & After Pregnancy." Ward, who is not affiliated with Stanford, also notes "One large egg can help meet roughly one-quarter of the recommended daily intake of choline for men, women and women who are pregnant or nursing."

For those looking to add more choline to their diet, Ward offers these additional tips:
• **Focus on Foods:** Most prenatal and regular multivitamins provide far less than the AI for choline. The easiest way to get the choline you need is by eating a balanced diet rich in foods that contain choline such as eggs, lean beef, salmon, cauliflower, milk and peanut butter.

• **Don't Skip the Yolk:** Choline is found exclusively in the egg yolk, and one yolk contains 125 milligrams of choline. The egg yolk also contains nearly half the protein in an egg, and the yolk is the only place you'll find the nutrients lutein and zeaxanthin which are important antioxidants related to eye health. While eggs contain a small amount of lutein and zeaxanthin, research suggests that these nutrients may be more bioavailable from eggs than from richer sources.

**Do high-fat diets make us stupid and lazy?**

New research in the FASEB Journal shows that high-fat diets are just as unhealthful in the short term as they are in the long term

Short-term memory getting worse? Exercise getting harder? Examine your diet. New research published online in The FASEB Journal (http://www.fasebj.org) showed that in less than 10 days of eating a high-fat diet, rats had a decreased ability to exercise and experienced significant short-term memory loss. These results show an important link between what we eat, how we think, and how our bodies perform.

"Western diets are typically high in fat and are associated with long-term complications, such as obesity, diabetes, and heart failure, yet the short-term consequences of such diets have been given relatively little attention," said Andrew Murray, co-author of the study and currently at the University of Cambridge in the United Kingdom. "We hope that the findings of our study will help people to think seriously about reducing the fat content of their daily food intake to the immediate benefit of their general health, well-being, and alertness."

Murray and colleagues studied rats fed a low-fat diet (7.5 percent of calories as fat) and rats fed a high-fat diet (55 percent of calories as fat). The researchers discovered that the muscles of the rats eating the high-fat diet for four days were less able to use oxygen to make the energy needed to exercise, causing their hearts to work harder—and increase in size. After nine days on a high-fat diet, the rats took longer to complete a maze and made more mistakes in the process than their low-fat-diet counterparts. Researchers then investigated the cellular causes of these problems, particularly in the mitochondria of muscle cells. They found increased levels of a protein called uncoupling protein 3, which made them less efficient at using oxygen needed to make the energy required for running.

"It's nothing short of a high-fat hangover," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "A long weekend spent eating hotdogs, French fries, and pizza in Orlando might be a great treat for our taste buds, but they might send our muscles and brains out to lunch."

**Carnitine supplements reverse glucose intolerance in animals**

DURHAM, N.C. – Supplementing obese rats with the nutrient carnitine helps the animals to clear the extra sugar in their blood, something they had trouble doing on their own, researchers at Duke University Medical Center report.

A team led by Deborah Muoio (Moo-ee-oo), Ph.D., of the Duke Sarah W. Stedman Nutrition and Metabolism Center, also performed tests on human muscle cells that showed supplementing with carnitine might help older people with prediabetes, diabetes, and other disorders that make glucose (sugar) metabolism difficult.

Carnitine is made in the liver and recycled by the kidney, but in some cases when this is insufficient, dietary carnitine from red meat and other animal foods can compensate for the shortfall.

After just eight weeks of supplementation with carnitine, the obese rats restored their cells' fuel- burning capacity (which was shut down by a lack of natural carnitine) and improved their glucose tolerance, a health outcome that indicates a lower risk of diabetes.

These results offer hope for a new therapeutic option for people with glucose intolerance, older people, people with kidney disease, and those with type 2 diabetes (what used to be called adult-onset diabetes).

Muoio said that soon her team of researchers will begin a small clinical trial of carnitine supplementation in people who fit the profile of those who might benefit from additional carnitine – older people (60 to 80 years) with glucose intolerance.

The study is published in the Aug. 21 issue of the Journal of Biological Chemistry.

The Duke researchers began studying carnitine more closely when abnormalities in the nutrient emerged from blood chemistry profiles of obese and old animals. These chemical profiles report on hundreds of byproducts of cell metabolism called metabolites and give scientists an opportunity to identify markers of disease states.

Carnitine is a natural compound known for helping fatty acids enter the mitochondria, the powerhouses of cells, where fatty acids are "burned" to give cells energy for their various tasks. Carnitine also helps move excess fuel...
from cells into the circulating blood, which then redistributes this energy source to needier organs or to the kidneys for removal. These processes occur through the formation of acylcarnitine molecules, energy molecules that can cross membrane barriers that encase all cells.

Researchers at Duke had observed that skeletal muscle of obese rats produced high amounts of the acylcarnitines, which requires free carnitine. As these molecules started to accumulate, the availability of free, unprocessed carnitine decreased. This imbalance was linked to fuel-burning problems, that is, impairments in the cells' combustion of both fat and glucose fuel.

"We suspected that persistent increases in acylcarnitines in the rats were causing problems, and we could also see that the availability of free carnitine was decreasing with weight gain and aging," said Muoio. "It appeared that carnitine could no longer do its job when chronic metabolic disruptions were stressing the system. That's when we designed an experiment to add extra carnitine to the rats' diet."

**New study shows that cocoa flavanols can be preserved during cooking and baking**

In a study published this month in the *Journal of Food Science*, scientists from The Hershey Company and Brunswick Laboratories (Norton, MA) showed that over 85% of the cocoa flavanols were preserved in recipes for chocolate frosting, hot cocoa drink and chocolate cookies. In chocolate cakes, antioxidant activity and cocoa flavanols could be largely retained by using a combination of baking powder and baking soda.

The scientists initially saw that 50 to 95% of the flavanols were lost in making chocolate cakes. After further investigation, they found that the use of baking soda in the chocolate cake recipe was associated with increased pH of the cake, darker color, and a loss of flavanols and antioxidant activity during the baking process. Use of only baking powder in the cake recipes allowed complete retention of the antioxidant activity and cocoa flavanols, but resulted in a flat cake. By partially substituting baking powder for the baking soda, the cake pH was moderated and almost all of the flavanols were retained while still resulting in a cake with acceptable color and height.

According to the published report, numerous studies have reported on the fate of naturally occurring flavanols during cocoa bean fermentation and roasting, but there's been little investigation into what happens during cooking with cocoa powder. In this study, researchers selected recipes from cookbooks for a variety of cocoa-containing foods such as chocolate frosting, hot cocoa drinks, chocolate cookies and chocolate cakes. The recipes were prepared using Hershey's Natural Cocoa Powder and then measured for antioxidant activity, total polyphenols, and flavanols.

"According to our estimates, approximately one third of cocoa ingredients used in the United States is cocoa powder, which is used in a diverse array of chocolate-flavored foods including beverages, cookies, cakes, snack bars and ice cream. Natural cocoa powder, like most dark chocolates, is a concentrated source of naturally occurring flavanols and can be a significant dietary source of flavanols" says David Stuart, Ph.D., Director of the Hershey Center for Health and Nutrition.

Although previous studies have reported on the effect of fermentation and roasting on cocoa flavanols, this is the first paper to report on the effect of common cooking processes on cocoa flavanols in a wide variety of products ranging from a hot cocoa drink to chocolate frosting and chocolate cake. This study showed that the choice of leavening agent and its effect on pH during baking is a key factor in the levels of antioxidant activity and flavanols in a baked product.

**Mango Seeds May Protect Against Deadly Food Bacteria**

ScienceDaily (Aug. 14, 2009) — Life in the fruit bowl is no longer the pits, thanks to a University of Alberta researcher.

Christina Engels has found a way to turn the throwaway kernels in mangoes into a natural food preservative that could help prevent Listeriosis outbreaks like the one that killed 21 Canadians last year.

The findings can also apply to other fruit seeds like grapes, said Engels, who conducted the research to earn her master's degree from the Department of Agricultural, Food and Nutritional Science at the U of A. The research is published in the latest *Journal of Agricultural and Food Chemistry*.

Pure tannins, a plant component extracted from otherwise useless mango kernels by Engels, have proven inhibitory effects against various strains of bacteria including Listeria, a potentially deadly pathogen that infected some packaged meats and caused an outbreak of disease in Canada in 2008.

Engels' research focuses on a way to recycle wood-like mango kernels, which are usually thrown away or burned. "By processing the kernels for their tannins, businesses have a way to completely utilize all fruit parts and therefore increase their profit," she said. Currently, mangos are one of the main fruits marketed globally, ranked fifth in world production among the major fruit crops.
An Apple A Day Keeps Kidney Stones Away: More Fruits And Veggies, Less Salt Prevents Stones From Forming

ScienceDaily (Aug. 14, 2009) — Researchers have found another reason to eat well: a healthy diet helps prevent kidney stones. Loading up on fruits, vegetables, nuts, low-fat dairy products, and whole grains, while limiting salt, red and processed meats, and sweetened beverages is an effective way to ward off kidney stones, according to a study appearing in an upcoming issue of the Journal of the American Society Nephrology (JASN).

Because kidney stones are linked to higher rates of hypertension, diabetes, increased body weight, and other risk factors for heart disease, the findings have considerable health implications.

Eric Taylor, MD (Maine Medical Center) and his colleagues at Brigham and Women's Hospital conducted a large study to determine the effects of healthy eating habits on the formation of kidney stones. The investigators collected information from individuals enrolled in three clinical studies: the Health Professionals Follow-up Study (45,821 men followed for 18 years), the Nurses' Health Study I (94,108 older women followed for 18 years), and the Nurses' Health Study II (101,837 younger women followed for 14 years).

Dr. Taylor's team assigned a score to each participant based on eight components of a DASH (Dietary Approaches to Stop Hypertension) style diet: high intake of fruits, vegetables, nuts and legumes, low-fat dairy products, and whole grains and low intake of salt, sweetened beverages, and red and processed meats. Individuals with higher DASH scores consumed diets that were higher in calcium, potassium, magnesium, oxalate, and vitamin C and lower in sodium.

A total of 5,645 incident kidney stones developed in the participants in the three studies. In each study, participants with the highest DASH scores were between 40% and 45% less likely to develop kidney stones than participants with the lowest DASH scores. The reductions in kidney stone risk were independent of age, body size, fluid intake, and other factors.

Because a DASH-style diet may affect the development of hypertension, diabetes, and other chronic diseases associated with kidney stones, the researchers also performed an analysis limited to study participants without hypertension or diabetes. Even among those individuals the DASH diet reduced the risk of kidney stones.

Many of the medications used to treat kidney stones have unpleasant side effects. This study indicates that adopting a DASH-style diet may be an effective alternative.

White Tea Could Keep You Healthy And Looking Young

ScienceDaily (Aug. 14, 2009) — Next time you’re making a cuppa, new research shows it might be wise to opt for a white tea if you want to reduce your risk of cancer, rheumatoid arthritis or even just age-associated wrinkles. Researchers from Kingston University teamed up with Neal’s Yard Remedies to test the health properties of 21 plant and herb extracts. They discovered all of the plants tested had some potential benefits, but were intrigued to find white tea considerably outperformed all of them.

Professor Declan Naughton, from the School of Life Sciences at Kingston University in South West London, said the research showed white tea had anti-ageing potential and high levels of anti-oxidants which could prevent cancer and heart disease. “We’ve carried out tests to identify plant extracts that protected the structural proteins of the skin, specifically elastin and collagen,” he explained. “Elastin supports the body’s natural elasticity which helps lungs, arteries, ligaments and skin to function. It also helps body tissue to repair when you suffer wounds and stops skin from sagging.” Collagen is a protein found in connective tissues in the body and is important for skin, strength and elasticity, he added.

Results showed white tea prevented the activities of the enzymes which breakdown elastin and collagen which can lead to wrinkles that accompany ageing. These enzymes, along with oxidants, are associated with inflammatory diseases such as rheumatoid arthritis. Professor Naughton said: “These enzymes and oxidants are key components of normal body processes. However, in inflammatory conditions, suppressing the activities of these excess components has been the subject of decades of research. We were surprised to find such high activity for the white tea extracts in all five tests that were conducted.”

The researchers were blown away by exactly how well the white tea had performed. “We were testing very small amounts far less than you would find in a drink.” Professor Naughton, one of the country’s leading specialists
on inflammation, said. “The early indicators are that white tea reduces the risk of inflammation which is characteristic of rheumatoid arthritis and some cancers as well as wrinkles.”

Eight of the other plants and herbs analysed also helped protect against the breakdown of both elastin and collagen. After white tea, bladderwrack performed well followed by extracts of cleavers, rose, green tea, angelica, anise and pomegranate.

Dr Pauline Hili, Technical Director for Neal’s Yard Remedies, said: “We are really excited by this research as it helps us to remain innovative and at the cutting edge of natural skin care. Celebrating the plants used in the Neal’s Yard Remedies products and understanding their specific actions on the skin is what it is all about. The Kingston University research program helps us to create safe, highly effective and cutting-edge products so it’s an ideal partnership for us.”

Journal reference:

"Killer spices’ provide eco-friendly pesticides for organic fruits and veggies
WASHINGTON, Aug. 16, 2009 — Mention rosemary, thyme, clove, and mint and most people think of a delicious meal. Think bigger…acres bigger. These well-known spices are now becoming organic agriculture's key weapons against insect pests as the industry tries to satisfy demands for fruits and veggies among the growing portion of consumers who want food produced in more natural ways.

In a study presented here today at the American Chemical Society's 238th National Meeting, scientists in Canada are reporting exciting new research on these so-called "essential oil pesticides" or "killer spices." These substances represent a relatively new class of natural insecticides that show promise as an environmentally-friendly alternative to conventional pesticides while also posing less risk to human and animal health, the researcher says.

"We are exploring the potential use of natural pesticides based on plant essential oils — commonly used in foods and beverages as flavorings," says study presenter Murray Isman, Ph.D., of the University of British Columbia. These new pesticides are generally a mixture of tiny amounts of two to four different spices diluted in water. Some kill insects outright, while others repel them.

Over the past decade, Isman and colleagues tested many plant essential oils and found that they have a broad range of insecticidal activity against agricultural pests. Some spiced-based commercial products now being used by farmers have already shown success in protecting organic strawberry, spinach, and tomato crops against destructive aphids and mites, the researcher says.

"These products expand the limited arsenal of organic growers to combat pests," explains Isman. "They're still only a small piece of the insecticide market, but they're growing and gaining momentum."

The natural pesticides have several advantages. Unlike conventional pesticides, these "killer spices" do not require extensive regulatory approval and are readily available. An additional advantage is that insects are less likely to evolve resistance — the ability to shrug off once-effective toxins — Isman says. They're also safer for farm workers, who are at high risk for pesticide exposure, he notes.

But the new pesticides also have shortcomings. Since essential oils tend to evaporate quickly and degrade rapidly in sunlight, farmers need to apply the spice-based pesticides to crops more frequently than conventional pesticides. Some last only a few hours, compared to days or even months for conventional pesticides. As these natural pesticides are generally less potent than conventional pesticides, they also must be applied in higher concentrations to achieve acceptable levels of pest control, Isman says. Researchers are now seeking ways of making the natural pesticides longer-lasting and more potent, he notes.

"They're not a panacea for pest control," cautions Isman. Conventional pesticides are still the most effective way to control caterpillars, grasshoppers, beetles and other large insects on commercial food crops, he says. "But at the end of the day, it comes down to what's good for the environment and what's good for human health."

The "killer spices’ aren’t just limited to agricultural use. Some show promise in the home as eco-friendly toxins and repellents against mosquitoes, flies, and roaches. Unlike conventional bug sprays, which have a harsh odor, these natural pesticides tend to have a pleasant, spicy aroma. Many contain the same oils that are used in aromatherapy products, including cinnamon and peppermint, Isman notes.

Manufacturers have already developed spice-based products that can repel ticks and fleas on dogs and cats without harming the animals. Researchers are now exploring the use of other spice-based products for use on fruits and vegetables to destroy microbes, such as E. coli and Salmonella, which cause food poisoning.

Other scientists are currently exploring the insect-fighting potential of lavender, basil, bergamot, patchouli oil, and at least a dozen other oils from exotic plant sources in China. Funding for this study was provided by EcoSMART®, a botanical pesticide company based in Alpharetta, Ga.
New 'biofactories' produce rare healing substances in the endangered Devil's claw plant

WASHINGTON, Aug. 16, 2009 — Deep in Africa's Kalahari Desert lies the "Devil's claw," a plant that may hold the key to effective treatments for arthritis, tendonitis and other illnesses that affect millions each year. Unfortunately, years of drought have pushed the Devil's claw toward extinction, so scientists are scrambling to devise new ways to produce the valuable medicinal chemicals of the Devil's claw and other rare plants.

One group of scientists reported a major advance toward that goal here today at the 238th National Meeting of the American Chemical Society (ACS). They described the first successful method of producing the active ingredients in Devil's claw — ingredients that have made the Devil's claw a sensation in alternative medicine in Europe. Their technique may eventually lead to the development of "biofactories" that could produce huge quantities of rare plant extracts quickly and at little cost.

Milen I. Georgiev, Ph.D., who delivered the report, pointed out that for thousands of years, native populations in Southern Africa have used the Devil's claw as a remedy for a huge number of ailments, including fever, diarrhea and blood diseases. Today, there are dozens of medicinal and herbal products around the world that are based on chemicals derived from the Devil's claw.

In particular, studies suggest that two chemicals — the so-called iridoid glycosides harpagoside and harpagide — may have beneficial effects in the treatment of degenerative rheumatoid arthritis, osteoarthritis, tendonitis, and other conditions, Georgiev said.

"In Germany, 57 pharmaceutical products based on Devil's claw, marketed by 46 different companies, have cumulative sales volumes alone worth more than $40 million," Georgiev noted. In the United States, Devil's claw extracts are in phase II clinical trials for the treatment of hip and knee arthritis. Other promising uses are not far behind. But while the demand for these beneficial compounds is increasing, the supply of natural Devil's claw is dwindling.

"The Devil's Claw faces significant problems with its natural renewal, especially low rainfall," Georgiev notes. "These problems are driving efforts to find alternative ways to produce high value compounds from the plant, independent of geographical and climatic factors," he says.

Currently, more than 25 percent of all prescribed medicines used in industrialized countries are derived either directly or indirectly from plants, many of which are rare and sometimes endangered. "Hairy root," an infectious plant disease caused by the soil bacteria Agrobacterium rhizogenes, is at the core of a promising new technique that could one day lead to "biofactories" that produce medicines derived from rare plants in huge quantities at a low cost.

Georgiev notes that hairy roots are a big improvement over traditional, greenhouse-based plant culturing. "The transformed root cultures possess fast growth rates, genetic and biochemical stability and the capacity for synthesis of plant metabolites. It should be also mentioned that the amount of active metabolites in naturally grown plants in greenhouses significantly vary seasonally," notes Georgiev. Hairy root biofactories, on the other hand, could produce consistently high levels of plant metabolites year round.

Georgiev and his team are the first to induce hairy root cultures of Devil's claw. They took the roots of the Devil's claw and infected them with the A. rhizogenes soil bacteria — a natural genetic engineer — to create a system of hairy roots to produce the plant's key medicinal chemicals. Their studies demonstrated stable growth and high production of both iridoid glycosides harpagoside and harpagide. Previous studies were only capable of producing one of these two compounds.

Georgiev notes that there is a long way to go before hairy root biofactories become commercialized, but he hopes to make the technology ready for use within a few years.

"Our target aim is to develop such technology, so we are paying attention not only to fundamental scientific tasks, but also to those related to some of the technological problems associated with hairy root biofactories," Georgiev said. "It is the desire of each scientist is to see the fruits of his work. In the current case, we hope to be able to develop cost-effective laboratory technology for production of these pharmaceutically-important metabolites within the next five years."
No Evidence Of 'Unhealthful' Relation Between Animal Foods And Breast Cancer, New Studies Find

ScienceDaily (Aug. 17, 2009) — Breast cancer is the 7th leading cause of mortality in the United States and results in approximately 41,000 deaths each year. Although genetic factors are important, there is considerable evidence that breast cancer risk is related to modifiable lifestyle factors, such as physical activity, body weight, alcohol intake, and dietary choices. The September 2009 issue of The American Journal of Clinical Nutrition reports the results of 3 human studies designed to better delineate the relation between animal foods and breast cancer risk.

"These studies highlight two very important points," said American Society for Nutrition Spokesperson Shelley McGuire, PhD. "First we all need to remember that there are really no such things as 'bad' foods. Second, observational studies that show associations between diet and health need to be considered with a proverbial grain of salt. These studies clearly provide additional and strong evidence that consumption of meat and dairy products by women does not, by itself, increase breast cancer risk. Further, moderate and mindful consumption of these foods can be very important in attaining optimal nutrition for most women who often do not consume sufficient iron and calcium."

In the first study, which was a controlled dietary intervention trial conducted in the United States, 35 obese postmenopausal women with type 2 diabetes received conjugated linoleic acid (CLA) supplements or a control supplement (safflower oil) each for 36 wk; adiposity was assessed. In another study, researchers examined the association between CLA intake from natural sources and breast cancer incidence in a large cohort of initially cancer-free Swedish women for 17.4 y. The third study assessed whether the consumption of meat, eggs, and dairy products was associated with breast cancer risk in a very large group of healthy European women followed for 8.8 y.

These studies provide no evidence that animal-food consumption increases (or decreases) risk of breast cancer, although CLA supplementation may decrease adiposity (a major risk factor for this disease). In an editorial, Linos and Willett remind us that these studies did not assess the relation between animal-food intake during early life and later breast cancer, a likely important piece of the puzzle. Nonetheless, they conclude, "These data are sufficient to exclude any major effect of consuming these foods during midlife or later on risk of breast cancer." Perhaps we finally have the answer to this long-standing question.

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NYTimes, August 18, 2009

Weight Lifting May Help to Avert Lymph Problem

By TARA PARKER-POPE

After a woman has surgery for breast cancer, she is typically given a long list of don’ts. Don’t lift anything heavier than 15 pounds, including your child. Don’t carry a heavy purse or grocery bags. Don’t scrub, push, pull or hammer.

The goal is to prevent lymphedema, a painful and unsightly swelling of an arm or leg that can occur near the site where lymph nodes have been removed or damaged by radiation. But new research suggests that much of that advice may be too restrictive. To prevent lymphedema after breast cancer, the best strategy may be more exercise, not less.

Last week, The New England Journal of Medicine reported on a study of 141 breast cancer patients who had lymphedema. Half adhered to the traditional restrictions, while the other half embarked on a slow, progressive program of weight lifting. To the researchers’ surprise, the weight lifters actually had significantly fewer flare-ups than the women who restricted their activity.

“Lymphedema is a very feared complication, and many women have made major alterations to their lifestyle in an effort to avoid it,” said Dr. Monica Morrow, chief of breast surgery at Memorial Sloan-Kettering Cancer Center in Manhattan.

“This is a very welcome study that very clearly shows controlled weight lifting does not make it worse and, in fact, improves symptoms. That should be a reason to re-evaluate a whole lot of things we tell people about lymphedema.”
The findings don’t mean that patients should disregard everything their doctors tell them about lymphedema, which can also occur with other cancers. Once lymph nodes have been damaged or removed, the lymphatic system is less able to cope with trauma or infection, and the painful swelling, tightness and heaviness of lymphedema can result. While physical therapy can ease the symptoms, some patients never fully recover.

Doctors say some of the standard guidelines are reasonable. Intravenous lines, for example, pose a risk of infection, and they should not be used on an arm affected by lymphedema. But other restrictions, like not carrying children or using a blood pressure cuff on the affected arm, may be too extreme.

An editorial accompanying the weight-lifting study in The New England Journal notes that the current “policy of avoidance” should be replaced by recommendations for rehabilitation, particularly because many women have to ignore the restrictions anyway — they are caring for young children, or their jobs require manual labor.

“Rather than saying, ‘Don’t ever lift more than 15 pounds, don’t carry a suitcase,’ instead we should empower women,” said Wendy Demark-Wahnefried, a professor of behavioral science at the University of Texas M. D. Anderson Cancer Center, who wrote the editorial. “Give them the rehab and the exercise training they need after their treatment.”

Kathryn H. Schmitz, an associate professor at the University of Pennsylvania School of Medicine and the study’s lead author, notes that in the past, patients were wrongly advised to avoid activity after a heart attack or a back injury.

“It’s the same principle as back rehab and cardiac rehab,” she said. “You’re slowly and progressively increasing the stress that your system can handle. We’re applying that to lymphedema.”

Corrie Roberts of Philadelphia developed lymphedema in her left arm in June 2004, about 18 months after a mastectomy. She had taken the usual precautions, but during back surgery the anesthesiologist mistakenly used her left arm to insert the intravenous line.

After taking part in the weight-lifting study, she said the swelling and discomfort were finally under control. She uses an exercise room in her apartment building and lifts weights three to five days a week.

“It sure was an improvement,” said Ms. Roberts, 75. “As long as I keep the weight lifting up, I don’t have swelling in my arm.”

Dr. Schmitz is conducting a separate study to determine whether weight lifting can prevent symptoms in women who have never had lymphedema. Another study will focus on exercise programs for people with lower-limb lymphedema.

Experts warn that women should not embark on an exercise program on their own, but should ask their doctor about finding a rehabilitation center or exercise program for patients at risk for lymphedema. The women in the study began with very light weights and were regularly monitored for swelling or pain. Dr. Schmitz noted that not every woman is a candidate, and that a few women in the study developed swelling almost immediately after exerting the arm.

Centers that offer the weight-lifting program used in the New England Journal study can be found at www.uphs.upenn.edu/news. Patients can look for a personal trainer who has a cancer exercise certification from the American College of Sports Medicine. In addition, many Y’s now have exercise programs for cancer patients through a partnership with the Lance Armstrong Foundation.

Women can also order the DVD “Strength and Courage: Exercises for Breast Cancer Survivors,” which was developed by Dr. Sharon Cowden, a Pittsburgh pediatrician and golfer who had breast cancer, and Janette Poppenberg, a health fitness specialist certified by the American College of Sports Medicine.

NYTimes, August 18, 2009
Tests Begin on Drugs That May Slow Aging
By NICHOLAS WADE
It may be the ultimate free lunch — how to reap all the advantages of a calorically restricted diet, including freedom from disease and an extended healthy life span, without eating one fewer calorie. Just take a drug that tricks the body into thinking it’s on such a diet.

It sounds too good to be true, and maybe it is. Yet such drugs are now in clinical trials. Even if they should fail, as most candidate drugs do, their development represents a new optimism among research biologists that aging is not immutable, that the body has resources that can be mobilized into resisting disease and averting the adversities of old age.

This optimism, however, is not fully shared. Evolutionary biologists, the experts on the theory of aging, have strong reasons to suppose that human life span cannot be altered in any quick and easy way. But they have been confounded by experiments with small laboratory animals, like roundworms, fruit flies and mice. In all these species, the change of single genes has brought noticeable increases in life span.
With theorists’ and their gloomy predictions cast in the shade, at least for the time being, experimental biologists are pushing confidently into the tangle of linkages that evolution has woven among food intake, fertility and life span. “My rule of thumb is to ignore the evolutionary biologists — they’re constantly telling you what you can’t think,” Gary Ruvkun of the Massachusetts General Hospital remarked this June after making an unusual discovery about longevity.

Excitement among researchers on aging has picked up in the last few years with the apparent convergence of two lines of inquiry: single gene changes and the diet known as caloric restriction.

In caloric restriction, mice are kept on a diet that is healthy but has 30 percent fewer calories than a normal diet. The mice live 30 or 40 percent longer than usual with the only evident penalty being that they are less fertile. People find it almost impossible to maintain such a diet, so this recipe for longevity remained a scientific curiosity for many decades. Then came the discovery of the single gene changes, many of which are involved in the body’s regulation of growth, energy metabolism and reproduction. The single gene changes thus seem to be pointing to the same biochemical pathways through which caloric restriction extends life span.

If biologists could only identify these pathways, it might be possible to develop drugs that would trigger them. Such drugs could in principle have far-reaching effects. Mice on caloric restriction seem protected from degenerative disease, which may be why they live longer. A single drug that protected against some or all the degenerative diseases of aging would enable people to enjoy more healthy years, a great benefit in itself, even if it did not extend life span.

The leading candidates for such a role are drugs called sirtuin activators, which may well be mimicking caloric restriction, in whole or in part. The chief such drug is resveratrol, a minor ingredient of grapes and red wine. Sirtris Pharmaceuticals, of Cambridge, Mass., is now conducting clinical trials of resveratrol, in a special formulation, and of small-molecule drugs that also activate sirtuin but can be given in much lower doses. The resveratrol formulation and one of the small chemicals have passed safety tests and are now being tested against diabetes and other diseases. The Food and Drug Administration does not approve drugs to delay aging, because aging in its view is not a disease.

The sirtuin activators have a strong scientific pedigree. They emerged as the surprising outcome of a quest begun in 1991 by Leonard P. Guarente of M.I.T. to look for genes that might prolong life span in yeast, a single-cell organism. Working with David A. Sinclair, now at Harvard Medical School, he discovered such a gene, one called sir-2. People and mice turned out to have equivalent genes, called sirt genes, that produce proteins called sirtuins.

Dr. Guarente then found that the sirtuins can detect the energy reserves in a cell and are activated when reserves are low, just what would be needed for a protein that mediates the effects of caloric restriction. Dr. Sinclair and colleagues screened a number of chemicals for their ability to activate sirtuin, and resveratrol landed at the top of the list. The chemical was already known as the suspected cause of the French paradox, the fact that the French eat a high fat diet without penalty to their longevity.

The two researchers and their colleagues thus argued that caloric restriction works by activating sirtuins, and so drugs that activate sirtuins should offer the same health benefits.

In 2004 Dr. Sinclair co-founded Sirtris with Christoph Westphal, a scientific entrepreneur. Helped by growing interest in the sirtuin story, Dr. Westphal was able to sell the company last year to GlaxoSmithKline for $720 million.

Dr. Sinclair says that “the results from the Sirtris compounds are promising and will be submitted for publication in coming months.”

But despite the high promise and strong scientific foundation of the sirtuin approach, it has yet to be proved that Sirtris’s drugs will work. The first of many questions is that of whether caloric restriction applies at all to people.

Two experts on aging, Jan Vijg of the Albert Einstein College of Medicine and Judith Campisi of the Lawrence Berkeley National Laboratory, argued recently in Nature that the whole phenomenon of caloric restriction may be a misleading result unwittingly produced in laboratory mice. The mice are selected for quick breeding and fed on rich diets. A low-calorie diet could be much closer to the diet that mice are adapted to in the wild, and therefore it could extend life simply because it is much healthier for them.

“Life extension in model organisms may be an artifact to some extent,” they wrote. To the extent caloric restriction works at all, it may have a bigger impact in short-lived organisms that do not have to worry about cancer than in humans. Thus the hope of mimicking caloric restriction with drugs “may be an illusion,” they write.

To decide whether life extension by caloric restriction is an artifact of mice in captivity, why not try it on wild mice? Just such an experiment has been done by Steven N. Austad of the University of Texas Health Science Center. Dr. Austad reported that caloric restriction did not extend the average life span of wild mice, suggesting the diet’s benefits are indeed an artifact of mice in captivity. But others interpret his results differently. Richard A. Miller of the University of Michigan, says the maximum life span of the wild mice was extended, and so the experiment was a success for caloric restriction.
Laboratory mice are very inbred, and researchers can get different results depending on the breed they use. To put the mouse data on a firmer footing, the National Institute on Aging has set up a program to test substances in three labs simultaneously. Its first round of candidate agents for reversing aging include green tea extract and two doses of resveratrol.

The resveratrol tests are still under way, but last month the results with another substance, the antifungal drug rapamycin, were published. Rapamycin was found to extend mice’s lives significantly even though by accident the mice were already the equivalent of 60 years old when the experiment started.

Rapamycin has nothing to do with caloric restriction, so far as is known, but the study provided striking proof that a chemical can extend life span.

Another result, directly related to the caloric restriction approach, emerged last month from a long-awaited study of rhesus monkeys kept on such a diet. The research was led by Richard Weindruch of the University of Wisconsin. As fellow primates, the monkeys are the best possible guide to whether the mouse results will apply in people. And the answer they gave was ambiguous.

The monkeys who had spent 20 years on caloric restriction were in better health than their normally fed counterparts, and suffered less diabetes, cancer and heart disease, apparently confirming that caloric restriction holds off the degenerative diseases of aging in primates as well as rodents.

But as for life span, the diet extended life significantly only if the researchers excluded deaths that were apparently unrelated to aging, such as under the anesthesia necessary to take blood samples. When all deaths were counted, life span was not significantly extended.

Some researchers think it is perfectly valid to ignore such deaths. Others note that in mouse studies one just counts the numbers of dead mice without asking what they died of, and the same procedure should be followed with monkeys, since one cannot be sure if a death under anesthesia might have been age related.

With the rapamycin and rhesus monkey results, Dr. Sinclair said, “We have more weight on the side of people who think it’s going to be possible.” He stressed the ability of both caloric restriction and sirtuin-activating drugs to postpone the many diseases of aging, at least in mice. To have one drug that postponed many degenerative diseases in people would be a significant advance, he said, even without any increase in longevity.

People may live so long already that no drug could make much of a difference. Probably because of reductions in infant mortality and other types of disease, human life expectancy in developed countries has been on a remarkable, unbroken upward trend for the last 160 years. Female life expectancy at birth rose from 45 years in 1840 to 85 years in 2000.

An important difference among experts on aging is whether there is an intrinsic rate of aging. Supposing there were cures for all diseases, what would one die of, if one died at all? Dr. Vijg and Dr. Campisi believe there is a steady buildup of damage to DNA and to proteins like the collagen and elastin fibers that knit the body together. Damage to DNA means that the regulation of genes gets less precise, and this regulatory drift disrupts the stem cells that repair each tissue. Even if all disease could be treated, it is not clear that anything could overcome intrinsic aging.

Dr. Miller, on the other hand, believes no clear distinction can be made between disease and other frailties of aging. “Anything a doctor can charge for we call disease, but wrinkled skin, white hair or not feeling good in the morning, these we don’t call disease,” he said.

He thinks that the idea of intrinsic aging is not well defined and that contrary to the theories of the evolutionary biologists, there may be simple ways to intervene in the aging process.

In the view of evolutionary biologists, the life span of each species is adapted to the nature of its environment. Mice live at most a year in the wild because owls, cats and freezing to death are such frequent hazards. Mice with genes that allow longer life can rarely be favored by natural selection. Rather, the mice that leave the most progeny are those that devote resources to breeding at as early an age as possible.

According to this theory, if mice had wings and could escape their usual predators, natural selection ought to favor longer life. And indeed the maximum life span of bats is 3.5 times greater than flightless mammals of the same size, according to research by Gerald S. Wilkinson of the University of Maryland.

In this view, cells are so robust that they do not limit life span. Instead the problem, especially for longer-lived species, is to keep them under control lest they cause cancer. Cells have not blocked the evolution of extremely long life spans, like that of the bristlecone pine, which lives 5,000 years, or certain deep sea corals, whose age has been found to exceed 4,000 years.

Some species seem to be imperishable. A tiny freshwater animal known as a hydra can regenerate itself from almost any part of its body, apparently because it makes no distinction between its germ cells and its ordinary body cells. In people the germ cells, the egg and sperm, do not age; babies are born equally young, whatever the age of
their parents. The genesis of aging was the division of labor in the first multicellular animals between the germ cells and the body cells.

That division put the role of maintaining the species on the germ cells and left the body cells free to become specialized, like neurons or skin cells. But in doing so the body cells made themselves disposable. The reason we die, in the view of Thomas Kirkwood, an expert on the theory of aging, is that constant effort is required to keep the body cells going. “This, in the long run, is unwarranted — in terms of natural selection, there are more important things to do,” he writes.

All that seems clear about life span is that it is not fixed. And if it is not fixed, there may indeed be ways to extend it.

**Whole grain cereals, popcorn rich in antioxidants, not just fiber, new research concludes**

WASHINGTON, Aug. 18, 2009 — In a first-of-its kind study, scientists reported today at the 238th National Meeting of the American Chemical Society (ACS) that snack foods like popcorn and many popular breakfast cereals contain "surprisingly large" amounts of healthful antioxidant substances called "polyphenols."

Polyphenols are a major reason why fruits and vegetables — and foods like chocolate, wine, coffee, and tea — have become renowned for their potential role in reducing the risk of heart disease, cancer, and other diseases.

Until now, however, no one knew that commercial hot and cold whole grain cereals — regarded as healthful for their fiber content — and snack foods also were a source of polyphenols.

"Early researchers thought the fiber was the active ingredient for these benefits in whole grains, the reason why they may reduce the risk of cancer and coronary heart disease," said Joe Vinson, Ph.D., who headed the new study. "But recently, polyphenols emerged as potentially more important. Breakfast cereals, pasta, crackers, and salty snacks constitute over 66 percent of whole grain intake in the U.S. diet."

Vinson, a chemist at the University of Scranton in Pennsylvania, said "We found that, in fact, whole grain products have comparable antioxidants per gram to fruits and vegetables. This is the first study to examine total phenol antioxidants in breakfast cereals and snacks, whereas previous studies have measured free antioxidants in the products."

Polyphenols are a group of chemicals found in many fruits, vegetables, and other plants, such as berries, walnuts, olives, tea leaves and grapes. Known as antioxidants, they remove free radicals from the body. Free radicals are chemicals that have the potential to cause damage to cells and tissues in the body.

The whole grain cereal with the most antioxidants are made with wheat, with corn, oats and rice cereals following in descending order, according to Vinson. He also noted that raisin bran has the highest amount of antioxidants per serving, primarily due to the raisins.

Bran cereals made from wheat overall do not have more antioxidants than wheat cereals, though they do have more fiber, he said. In other findings, he said that whole grain flours are very high in antioxidants; whole grain snacks have slightly lower levels of antioxidants than cereals; of snacks, popcorn has the highest level of antioxidants; and there is a wide variation in the amount of antioxidants in each class of cold cereal.

**WHO Recommends Against Using Homeopathic Treatments For HIV, TB, Malaria, Influenza, Infant Diarrhea**

The WHO has warned that people with conditions such as HIV, tuberculosis and malaria should not rely on homeopathic treatments, the BBC reports. The agency was responding to a June letter (full text available here), in which researchers from the Voice of Young Science Network called on the agency "to condemn the promotion of homeopathy for treating TB, infant diarrhoea, influenza, malaria and HIV." The group, which is part of the Sense About Science organization that advocates for "evidence-based" care, has conveyed the WHO's views in a letter to health ministers, according to the BBC (8/20).

According to a Sense About Science release, the organizations received comments from five WHO officials, which "clearly express WHO's position" (8/21). Mario Raviglione, director of the Stop TB department at the WHO, said, "Our evidence-based WHO TB treatment/management guidelines, as well as the International Standards of Tuberculosis Care do not recommend use of homeopathy."

In addition, a spokesman for the WHO department of child and adolescent health and development said of treating diarrhea in children: "We have found no evidence to date that homeopathy would bring any benefit," the BBC writes (8/20). The release includes additional comments from the associate director of WHO's global malaria program, the HIV/AIDS department interim director and others (8/21).
Robert Hagan, a researcher in biomolecular science at the University of St. Andrews and a member of Voice of Young Science Network, said, “We need governments around the world to recognise the dangers of promoting homeopathy for life-threatening illnesses. We hope that by raising awareness of the WHO’s position on homeopathy we will be supporting those people who are taking a stand against these potentially disastrous practices,” BBC writes (8/20).

**Little known type of cholesterol may pose the greatest heart disease risk**  
WASHINGTON, Aug. 20, 2009 — Health-conscious people know that high levels of total cholesterol and LDL cholesterol (the so-called “bad” cholesterol) can increase the risk of heart attacks. Now scientists are reporting that another form of cholesterol called oxycholesterol — virtually unknown to the public — may be the most serious cardiovascular health threat of all. Scientists from China presented one of the first studies on the cholesterol-boosting effects of oxycholesterol here today at the 238th National Meeting of the American Chemical Society. The researchers hope their findings raise public awareness about oxycholesterol, including foods with the highest levels of the substance and other foods that can combat oxycholesterol’s effects.

"Total cholesterol, low-density lipoprotein cholesterol (LDL), and the heart-healthy high-density lipoprotein cholesterol (HDL) are still important health issues,” says study leader Zhen-Yu Chen, Ph.D., of Chinese University of Hong Kong. "But the public should recognize that oxycholesterol is also important and cannot be ignored. Our work demonstrated that oxycholesterol boosts total cholesterol levels and promotes atherosclerosis ["hardening of the arteries"] more than non-oxidized cholesterol."

Fried and processed food, particularly fast-food, contains high amounts of oxycholesterol. Avoiding these foods and eating a diet that is rich in antioxidants, such as fresh fruits and vegetables, may help reduce its levels in the body, the researchers note.

Scientists have known for years that a reaction between fats and oxygen, a process termed oxidation, produces oxycholesterol in the body. Oxidation occurs, for instance, when fat-containing foods are heated, as in frying chicken or grilling burgers or steaks. Food manufacturers produce oxycholesterol intentionally in the form of oxidized oils such as trans-fatty acids and partially-hydrogenated vegetable oils. When added to processed foods, those substances improve texture, taste and stability. Until now, however, much of the research focused on oxycholesterol’s effects in damaging cells, DNA, and its biochemical effects in contributing to atherosclerosis. Chen believes this is one of the first studies on oxycholesterol’s effects in raising blood cholesterol levels compared to non-oxidized cholesterol.

In the new study, Chen’s group measured the effects of a diet high in oxycholesterol on hamsters, often used as surrogates for humans in such research. Blood cholesterol in hamsters fed oxycholesterol rose up to 22 percent more than hamsters eating non-oxidized cholesterol. The oxycholesterol group showed greater deposition of cholesterol in the lining of their arteries and a tendency to develop larger deposits of cholesterol. These fatty deposits, called atherosclerotic plaques, increase the risk for heart attack and stroke.

Most importantly, according to Chen, oxycholesterol had undesirable effects on "artery function." Oxycholesterol reduced the elasticity of arteries, impairing their ability to expand and carry more blood. That expansion can allow more blood to flow through arteries that are partially blocked by plaques, potentially reducing the risk that a clot will form and cause a heart attack or stroke.

But a healthy diet rich in antioxidants can counter these effects, Chen said, noting that these substances may block the oxidation process that forms oxycholesterol. Good sources of antioxidants include fruits, veggies, beans, and certain herbs and spices. Healthy alternatives to fast-food, which also boosts oxycholesterol, include whole grains, fresh fruits and vegetables, seeds, and nuts.

Scientists do not know whether the popular anti-cholesterol drugs called statins lower oxycholesterol, Chen said.

**No Comfort In Comfort Foods During Tough Economic Times, Study Finds**  
ScienceDaily (Aug. 20, 2009) — When times are tough and people are in a state of upheaval, it is expected that they might take refuge in "comfort foods" such as Grandma's fried chicken or a Sonic milkshake? Not so, says Stacy L. Wood, Associate Professor of Marketing at the Moore School of Business, University of South Carolina.
In fact, in a study to be published in the *Journal of Consumer Research*, Woods found that when people are in a state of upheaval, they're more likely to choose an unfamiliar food such as "camembert-and-plum crisps" from Britain rather than good old Lay's potato chips.

Wood's study went beyond comfort foods and looked at "familiar anything." When individuals in her study were in more upheaval, they were more likely to download an unfamiliar song or jog in a new park. Her research has interesting implications for public policy. If, for example, the government is trying to get people to stop smoking or begin a new exercise program, a period of upheaval might be the time to do it.

"That's when people might be drawn naturally to different choices – not when things are status quo, but when things are already in a state of flux," says Wood, an expert in how consumers respond to change.

Antioxidants help cancer cells?
Posted by Victoria Stern
[Entry posted at 19th August 2009 05:24 PM GMT]
Antioxidants, often credited with an ability to protect cells from the damage that makes them turn cancerous, may actually help cancerous cells survive, says a study published online in *Nature* today (August 19).

"The study was certainly intriguing, but how generally applicable the results are remains to be seen," Harold Seifried of the Division of Cancer Prevention at the National Cancer Institute in Bethesda, Md., who was not involved in the study, told The Scientist.

Healthy mammary epithelial cells undergo programmed cell death when they stray from their normal cellular environment. Tumor cells, however, receive survival signals from oncogenes, which keep the cells alive when they migrate to different parts of the body. Joan Brugge at Harvard University and her colleagues hypothesized that oncogenes support tumor cells by blocking apoptosis, but when they prevented apoptosis in cell culture, cells still died when they were transplanted outside a supportive extracellular matrix.

In addition to apoptosis, the researchers found what was killing those cells was an inability to produce glucose. When they expressed a breast cancer oncogene in detached tumor cells, glucose metabolism in the cells was restored, fueling the production of ATP. Surprisingly, though, adding two types of antioxidants also prevented the tumor cells from dying by restoring ATP production -- not by increasing glucose, but via another metabolic pathway called fatty acid oxidation. "We got as good if not better rescue of the ATP with antioxidants," Brugge said.

The scientists found the same results in a cell culture system that more closely resembled living tissue: Blocking apoptosis was not enough to allow tumor cells to survive, but neutralizing oxidative stress with antioxidants kept them alive. "The antioxidants we used were able to restore normal cellular energy levels to cancerous cells," said Zachary Schafer at the University of Notre Dame in Indiana, the study's first author.

Balz Frei, director of the Linus Pauling Institute at Oregon State University, cautioned that the results were a long way from showing that antioxidants actually increase the survival of pre-cancerous and cancerous cells in living organisms.

"It's important to be careful about how we interpret the results of the study," said Frei, who did not participate in the research. Frei questioned why the authors chose to use one of the antioxidants, Trolox (a water-soluble vitamin E derivative), instead of a more powerful one such as vitamin C.

Not all antioxidants, treatments, or tumor cells are the same, added Seifried. In future research, for example, "it would be good to use different cell types to test [the findings] on a more general level," he said.

Brugge said her group plans to repeat the experiment using different antioxidants and in living tissue. She agreed, though, that "it is too early to extrapolate because we have no in vivo data yet."

Why Sleep? Snoozing May Be Strategy To Increase Efficiency, Minimize Risk
ScienceDaily (Aug. 23, 2009) — Bats, birds, box turtles, humans and many other animals share at least one thing in common: They sleep. Humans, in fact, spend roughly one-third of their lives asleep, but sleep researchers still don't know why.

According to the journal Science, the function of sleep is one of the 125 greatest unsolved mysteries in science. Theories range from brain "maintenance" — including memory consolidation and pruning — to reversing damage from oxidative stress suffered while awake, to promoting longevity. None of these theories are well established, and many are mutually exclusive.

Now, a new analysis by Jerome Siegel, UCLA professor of psychiatry and director of the Center for Sleep Research at the Semel Institute for Neuroscience and Human Behavior at UCLA and the Sepulveda Veterans Affairs Medical Center, has concluded that sleep's primary function is to increase animals' efficiency and minimize their risk by regulating the duration and timing of their behavior.

The research appears in the current online edition of the journal *Nature Reviews Neuroscience*. 
"Sleep has normally been viewed as something negative for survival because sleeping animals may be vulnerable to predation and they can't perform the behaviors that ensure survival," Siegel said. These behaviors include eating, procreating, caring for family members, monitoring the environment for danger and scouting for prey.

"So it's been thought that sleep must serve some as-yet unidentified physiological or neural function that can't be accomplished when animals are awake," he said.

Siegell's lab conducted a new survey of the sleep times of a broad range of animals, examining everything from the platypus and the walrus to the echidna, a small, burrowing, egg-laying mammal covered in spines. The researchers concluded that sleep itself is highly adaptive, much like the inactive states seen in a wide range of species, starting with plants and simple microorganisms; these species have dormant states — as opposed to sleep — even though in many cases they do not have nervous systems. That challenges the idea that sleep is for the brain, said Siegel.

"We see sleep as lying on a continuum that ranges from these dormant states like torpor and hibernation, on to periods of continuous activity without any sleep, such as during migration, where birds can fly for days on end without stopping," he said.

Hibernation is one example of an activity that regulates behavior for survival. A small animal, Siegel noted, can't migrate to a warmer climate in winter. So it hibernates, effectively cutting its energy consumption and thus its need for food, remaining secure from predators by burrowing underground.

Sleep duration, then, is determined in each species by the time requirements of eating, the cost-benefit relations between activity and risk, migration needs, care of young, and other factors. However, unlike hibernation and torpor, Siegel said, sleep is rapidly reversible — that is, animals can wake up quickly, a unique mammalian adaptation that allows for a relatively quick response to sensory signals.

Humans fit into this analysis as well. What is most remarkable about sleep, according to Siegel, is not the unresponsiveness or vulnerability it creates but rather that ability to reduce body and brain metabolism while still allowing that high level of responsiveness to the environment.

"The often cited example is that of a parent arousing at a baby's whimper but sleeping through a thunderstorm," he said. "That dramatizes the ability of the sleeping human brain to continuously process sensory signals and trigger complete awakening to significant stimuli within a few hundred milliseconds."

In humans, the brain constitutes, on average, just 2 percent of total body weight but consumes 20 percent of the energy used during quiet waking, so these savings have considerable adaptive significance. Besides conserving energy, sleep invokes survival benefits for humans too — "for example," said Siegel, "a reduced risk of injury, reduced resource consumption and, from an evolutionary standpoint, reduced risk of detection by predators."

"This Darwinian perspective can explain age-related changes in human sleep patterns as well," he said. "We sleep more deeply when we are young, because we have a high metabolic rate that is greatly reduced during sleep, but also because there are people to protect us. Our sleep patterns change when we are older, though, because that metabolic rate reduces and we are now the ones doing the alerting and protecting from dangers."

**Friendly Gut Bacteria Lend A Hand To Fight Infection, Study Suggests**

ScienceDaily (Aug. 23, 2009) — Immunology researchers at UT Southwestern Medical Center have found that bacteria present in the human gut help initiate the body's defense mechanisms against Toxoplasma gondii, the parasite responsible for toxoplasmosis.

Toxoplasmosis is generally a mild infection, but it can have serious and potentially fatal effects in pregnant women, their fetuses and others with weakened immune systems.

In mice, T. gondii directly activates a specific immune protein in the host, called toll-like receptor 11 (TLR-11), which helps control the animals' immune response to the parasite. Humans, however, don't have an active form of this receptor. Exactly how the body senses T. gondii has remained unclear because the parasite doesn't activate any of the functioning toll-like receptors that humans do possess.

In a new study appearing online and in the Aug. 20 issue of Cell Host & Microbe, researchers at UT Southwestern suggest that instead of activating toll-like receptors directly, T. gondii's first interaction in the human gut is with the helpful bacteria that live inside us. Those bacteria then release signaling molecules, alerting the human host to the invader.

"While this is very early data, our results suggest that looking at the bacteria present in each patient's gut could help physicians understand their susceptibility to infectious diseases," said Dr. Felix Yarovinsky, assistant professor of immunology at UT Southwestern and senior author of the paper. "It also suggests the possibility of developing novel probiotic strategies for treating parasitic infections such as toxoplasmosis and cryptosporidiosis, a related disease caused by the parasite Cryptosporidium."
T. gondii affects more than 1 billion people worldwide. The protozoan parasite can infect most warm-blooded animals, but the primary host is the house cat. Animals are generally infected with T. gondii by ingesting contaminated meat, water or the feces of a cat that has recently been infected; however, the parasite also can be passed from mother to fetus.

Because toxoplasmosis is passed to humans through contaminated cat feces, pregnant women are encouraged to keep all house cats indoors and recruit someone who is not pregnant to clean the litter box daily. Once a person is infected, the parasite penetrates the intestine and spreads throughout all organs.

The researchers studied mice in which TLR-11 had been genetically eliminated. This mimics the human immune response to T. gondii. They then infected the TRL-11-deficient mice with T. gondii both orally and systemically by injection.

Even though the mice lacked their normal mechanism for fighting infection, they nonetheless mounted an attack against T. gondii. The researchers found that the commensal – or good – bacteria in the gut activated their immune system, thereby inducing various inflammatory responses against the invading pathogen. In humans, he said, it is those helpful bacteria that send activating signals to the three toll-like receptors that are functional, inducing various inflammatory responses against invading pathogens like T. gondii.

"This seems to be the first example of indirect pathogen recognition in vivo where activation of the immune system depends on indirect rather than direct sensing of a pathogen," Dr. Yarovinsky said.

The problem, Dr. Yarovinsky said, is that TLR-11 appears to cause more harm than good. Though the mice lacking the receptor – but with commensal bacteria – were able to mount enough signaling proteins to defeat the parasite, those with the receptor activated too many signaling proteins and developed severe inflammation in their small intestines. When infected with higher doses of T. gondii, the mice with TLR-11 also died in much greater numbers because of the increased inflammatory response.

"We speculate that because commensal bacteria co-evolved with the host, they must have found this fine balance to induce the sufficient stimulatory effects of the immune system without causing illness or death," Dr. Yarovinsky said. "The fact that commensal bacteria vary dramatically from person to person might explain why therapeutic outcomes vary so much."

The next step, Dr. Yarovinsky said, is to determine whether particular species of commensal bacteria are more beneficial than others.

Heat forms potentially harmful substance in high-fructose corn syrup
Researchers have established the conditions that foster formation of potentially dangerous levels of a toxic substance in the high-fructose corn syrup (HFCS) often fed to honey bees. Their study, which appears in the current issue of ACS' bi-weekly Journal of Agricultural and Food Chemistry, could also help keep the substance out of soft drinks and dozens of other human foods that contain HFCS. The substance, hydroxymethylfurfural (HMF), forms mainly from heating fructose.

In the new study, Blaise LeBlanc and Gillian Eggleston and colleagues note HFCS's ubiquitous usage as a sweetener in beverages and processed foods. Some commercial beekeepers also feed it to bees to increase reproduction and honey production. When exposed to warm temperatures, HFCS can form HMF and kill honeybees. Some researchers believe that HMF may be a factor in Colony Collapse Disorder, a mysterious disease that has killed at least one-third of the honeybee population in the United States.

The scientists measured levels of HMF in HFCS products from different manufacturers over a period of 35 days at different temperatures. As temperatures rose, levels of HMF increased steadily. Levels jumped dramatically at about 120 degrees Fahrenheit. "The data are important for commercial beekeepers, for manufacturers of HFCS, and for purposes of food storage. Because HFCS is incorporated as a sweetener in many processed foods, the data from this study are important for human health as well," the report states. It adds that studies have linked HMF to DNA damage in humans. In addition, HMF breaks down in the body to other substances potentially more harmful than HMF.

Reference: "Formation of Hydroxymethylfurfural in Domestic High-Fructose Corn Syrup and Its Toxicity to the Honey Bee (Apis mellifera)", http://pubs.acs.org/stoken/presspac/presspac/full/10.1021/jf9014526

Nuisance or nutrient? Kudzu shows promise as a dietary supplement
Kudzu, the nuisance vine that has overgrown almost 10 million acres in the southeastern United States, may sprout into a dietary supplement. Scientists in Alabama and Iowa are reporting the first evidence that root extracts from kudzu show promise as a dietary supplement for a high-risk condition — the metabolic syndrome — that affects almost 50 million people in the United States alone. Their study appears in the current issue of ACS' Journal of Agricultural and Food Chemistry, a bi-weekly publication.
J. Michael Wyss and colleagues note in the new study that people with metabolic syndrome have obesity, high blood pressure, high blood cholesterol, and problems with their body's ability to use insulin. Those disorders mean a high risk for heart attacks, strokes, and other diseases. Scientists have been seeking natural substances that can treat the metabolic syndrome. The new study evaluated kudzu root extracts, which contain healthful substances called isoflavones. People in China and Japan long have used kudzu supplements as a health food.

The study found that a kudzu root extract had beneficial effects lab rats used as a model for research on the metabolic syndrome. After two months of taking the extract, the rats had lower cholesterol, blood pressure, blood sugar, and insulin levels that a control group not given the extract. Kudzu root "may provide a dietary supplement that significantly decreases the risk and severity of stroke and cardiovascular disease in at-risk individuals," the article notes.


People vary widely in ability to eliminate arsenic from the body

Large variations exist in peoples' ability to eliminate arsenic from the body, according to a new study that questions existing standards for evaluating the human health risks from the potentially toxic substance. The study found that some people eliminate more than 90 percent of the arsenic consumed in the diet. Others store arsenic in their bodies, where it can have harmful effects. The research, based on the first application of new methods for studying arsenic, is scheduled for the Sept. 21 issue of ACS's Chemical Research in Toxicology, a monthly journal.

In the study, Kevin Francesconi and colleagues point out that drinking water in many parts of the world, including some regions of the United States, contain amounts of arsenic that exceed the World Health Organization's maximum acceptable levels. Consumption of seafood, the article notes, is another major source of arsenic contamination. Health effects from chronic arsenic exposure include skin and internal cancers, cardiovascular disease, and possibly diabetes, it adds.

The scientists describe monitoring arsenic excretion in the urine of human volunteers. They found that ability to eliminate arsenic from the body varied greatly, with some participants excreting up to 95 percent of the ingested arsenic but others eliminating as little as four percent. "This observed individual variability in handling [arsenic] exposure has considerable implications for the risk assessment of arsenic ingestion," the paper states. It adds that further study is needed to assess potential risks to humans consuming seafood products. "The data presented here suggest that the long held view that seafood arsenic is harmless because it is present mainly as organoarsenic compounds needs to be reassessed."


Acupuncture May Bring Relief For Common Condition In Women, Study Suggests

ScienceDaily (Aug. 25, 2009) — Polycystic ovary syndrome, a common condition among women, can be relieved by the use of acupuncture and exercise. This is the conclusion of a recent study at the Sahlgrenska Academy, University of Gothenburg, Sweden.

Nearly 10% of women of reproductive age have polycystic ovary syndrome (PCOS). The syndrome expresses itself as a large number of small immature cysts on the ovaries that cause a disturbance in the production of hormones and an increase in the secretion of the male sex hormone. This means that many women with the condition do not ovulate normally, and the syndrome may lead to infertility. The women run an increased risk of becoming obese, developing type 2 diabetes, or developing cardio-vascular disease.

“We do not know for certain what causes the condition, despite it being so common. We have seen that women with the syndrome often have high activity in that part of the nervous system that we cannot consciously control, known as the 'sympathetic nervous system'. We believe that this may be an important underlying factor in the syndrome,” says Elisabet Stener-Victorin, who has led the research at the Sahlgrenska Academy.

During the study, one group of women with polycystic ovary syndrome received acupuncture regularly for four months. They received a type of acupuncture known as 'electro-acupuncture', in which the needles are stimulated with a weak low-frequency electric current, similar to that developed during muscular work. A second group of women were provided with heart rate monitors and instructed to exercise at least three times a week. A control group was informed about the importance of exercise and a healthy diet, but was given no other specific instructions.

The study showed that activity in the sympathetic nervous system was lower in the women who received acupuncture and in those who took regular exercise than it was in the control group. The acupuncture treatment brought further benefits.
“Those who received acupuncture found that their menstruation became more normal. We could also see that their levels of testosterone became significantly lower, and this is an important observation, since elevated testosterone levels are closely connected with the increased activity in the sympathetic nervous system of women,” says Elisabet Stener-Victorin. 

Journal reference:

Using Cranberry Juice To Combat Urinary Tract Infections 'Inconclusive'
ScienceDaily (Aug. 25, 2009) — Current clinical evidence for using cranberry juice to combat urinary tract infections is 'unsatisfactory and inconclusive', according to Raul Raz.

Not all medical problems require a state-of-the-art solution, and it would be nice to think that products from the corner shop could treat a widespread and uncomfortable ailment. Cranberry juice and related products have been touted as a simple solution for urinary tract infections, but Raul Raz, a member of F1000 Medicine, finds little to support this claim.

Urinary tract infections (UTIs) are a common complaint. Between 10% and 20% of women will suffer a UTI at least once, and a third of these will experience it recurrently. Some recent studies support the use of cranberry as a preventative, but Dr Raz, Director of Infectious Diseases at the Technion School of Medicine in Israel, and his associate Faculty Member, Hana Edelstein, advise the medical community that "cranberry should no longer be considered as an effective [preventative] for recurrent UTIs".

Cranberry contains hundreds of compounds, and it has been difficult to determine which might be responsible for any therapeutic effect, hindering its adoption. Raz and Edelstein point to differences in clinical trial design and the lack of standardization for doses and formulation. There is a range of potential side-effects including stomach upsets and weight gain. Cranberry can also interact badly with other medicines such as Warfarin, commonly used to treat heart disease.

In any event, up to 55% of patients discontinue cranberry therapy after a short time. It would seem that the public have already voted with their feet.

The full text of this evaluation is available at http://www.f1000medicine.com/article/11w8y35hg6gsx6y/id/1159865.

How Safe Or Unsafe Are Medical Imaging Procedures?
ScienceDaily (Aug. 28, 2009) — In a new study of nearly one million adults between the ages of 18 and 64, nearly 70 percent of participants underwent at least one medical imaging procedure between July 2005 and December 2007, resulting in an average effective dose of radiation nearly double the amount they would otherwise be exposed to from natural sources.

Nearly 20 percent of participants received at least moderate annual doses of radiation from diagnostic tests, and women and older individuals were at greater risk for radiation exposure, according to a report in the August 27 issue of the New England Journal of Medicine.

The study looked at imaging procedures involving radiation for diagnostic or treatment purposes; procedures in which radiation was specifically delivered for treatment, such as radiation for cancer, were excluded. Computed tomography (CT) scans and nuclear imaging accounted for three-fourths of radiation exposure, with nuclear stress tests to detect coronary heart disease, also known as myocardial perfusion imaging, cited as the procedure accounting for the largest single radiation exposure (22 percent of total effective dose in study participants).

In an accompanying Perspective article, "Elements of Danger – The Case of Medical Imaging," Michael S. Lauer, M.D., director of the Divisions of Prevention and Population Sciences and of Cardiovascular Diseases at the National Heart, Lung, and Blood Institute (NHLBI), calls for more research to demonstrate whether the use of cardiovascular imaging tests, such as myocardial perfusion imaging and CT scans, improves patient outcomes. He notes that "no large-scale, randomized trials have shown that imaging [in patients with stable or suspected heart disease] prolongs life, improves quality of life, prevents major clinical events [such as heart attacks], or reduces long-term medical costs." The NHLBI is part of the National Institutes of Health.

Studies are needed to determine whether the benefits of such imaging procedures to diagnosis and treat patients outweigh the potential risks of cumulative radiation exposure, according to Lauer. He calls on clinicians to "think and talk explicitly about the elements of danger in exposing our patients to radiation. This means taking a careful history to determine the cumulative dose of radiation a patient has already received and providing proper, personalized information to each patient about the risk” of developing cancer from cumulative exposure to radiation.

Radiation exposure is a known risk factor for cancer. Recent estimates suggest, for example, that as many as two percent of cancers could be attributed to radiation during CT scans. Although the radiation exposure from a
single test is minimal, the frequency of the use of imaging tests that emit radiation continues to grow expansively, and often patients undergo repeated or multiple types of tests, thereby increasing their cumulative exposure to potentially cancer-causing radiation. Since 1992, the number of CT scans obtained has quadrupled. In addition, use of myocardial perfusion scans -- which accounted for the single most frequent test and the highest radiation dose -- increased by more than six percent per year between 1993 and 2001.

Journal references:

**Immune Defect Is Key To Skin Aging**
ScienceDaily (Aug. 28, 2009) — Scientists funded by the Biotechnology and Biological Sciences Research Council (BBSRC) have discovered why older people may be so vulnerable to cancer and infections in the skin. The team from UCL has shown in human volunteers that defective immunity in the skin is caused by an inability to mobilise essential defences that would otherwise recognise threats and clear them before irreparable damage is done.

This discovery could be important for preventing, managing or treating many age-related skin health problems. The study will be published in 31 August edition of the *Journal of Experimental Medicine.*

"Older people are very prone to having infections generally and our studies in the skin of such subjects identifies one reason for this," said Professor Arne Akbar from UCL, who led the study.

He continued: "It's actually incredibly difficult to get to the root of exactly which mechanisms cause the diseases that show up as a factor of old age. We wanted to uncover the workings of skin health in order to see why older people don't deal well with skin infections and are prone to skin cancers also."

It has been known for some time that older people have compromised immunity and therefore defend themselves less well against infection and disease than younger people. In the past, the reduction in skin health was put down to potential defects in the white blood cells called T-cells that would usually help to identify and clear infection. However, when experiments were carried out with healthy young individuals under the age of 40 years and older individuals over the age of 70 years in this study, it was shown that in fact there is nothing wrong with the T-cells in the older group; instead it is the inability of their skin tissue to attract T-cells where and when they are needed that is the source of reduced immunity.

Professor Akbar added: "Knowing this now raises the question of whether the same defect also occurs in other tissues during ageing. Is it possible that, for example, lung tissues also fail to give out the right message to T-cells to bring them into the tissue to do their job? This may explain, in part, the higher rates of lung cancer, chest infections and pneumonia in older people, perhaps.

"We also, obviously, would like to know if it is possible to reverse the skin defect in older people. We've done some experiments that show that, at least in the test tube, it is possible to make older skin express the missing signals that attract T-cells. This indicates that, in principle, the defect is entirely reversible. Once we get to the bottom of exactly which part of the signal to T-cells has gone wrong we might then be in a position to intervene to boost skin immunity in older people."

BBSRC Deputy Chief Executive, Steve Visscher said: "We are living longer and longer in the UK, but we need to ensure that a long life is also a healthy one. What Professor Akbar and his team have identified is a normal part of the ageing process that contributes to disease and therefore reduced quality of life in older people. The more knowledge we have about healthy ageing, the better we get at preventing, managing and treating diseases that are simply a factor of an ageing body."

**Taking Up Music So You Can Hear**
ScienceDaily (Aug. 27, 2009) — Anyone with an MP3 device -- just about every man, woman and child on the planet today, it seems -- has a notion of the majesty of music, of the primal place it holds in the human imagination. But musical training should not be seen simply as stuff of the soul -- a frill that has to go when school budgets dry up, according to a new Northwestern University study.

The study shows that musicians -- trained to hear sounds embedded in a rich network of melodies and harmonies -- are primed to understand speech in a noisy background, say in a restaurant, classroom or plane. It is the first demonstration of musical training offsetting the deleterious effects of background noise, and the implications are provocative.

"The study points to a highly pragmatic side of music's magic," said Nina Kraus, Hugh Knowles Professor of Communication Sciences and Neurobiology and director of Northwestern's Auditory Neuroscience Laboratory, where the research was done.
The findings strongly support the potential therapeutic and rehabilitation use of musical training to address auditory processing and communication disorders throughout the life span.

Hearing speech in noise is difficult for everyone. But the difficulty is particularly acute for older adults, who are likely to have hearing and memory loss, and for poor readers who have normal hearing but whose nervous systems poorly transcribe sounds that ultimately are critical to good reading skills.

"Many older adults will say, 'I can hear what you’re saying, but I don't understand you,'" Kraus said. "So they might have a little bit of a hearing loss, but often not enough to warrant the difficulty that a lot of older adults report."

Such populations could benefit from the reordering of the nervous system that occurs with musical training, according to the study. Because the brain changes with experience, musicians have better-tuned circuitry -- the pitch, timing and spectral elements of sound are represented more strongly and with greater precision in their nervous systems.

"Musical training makes musicians really good at picking out melodies, the bass line, the sound of their own instruments from complex sounds," Kraus said. Now, for the first time, this study has confirmed that such fine tuning of the nervous system also makes musicians highly adept at translating speech in noise.

The finding has particular implications for hearing certain consonants which are vulnerable to misinterpretation by the brain and are a big problem for some poor readers in a noisy environment. The brain's unconscious faulty interpretation of sounds makes a big difference in how words ultimately will be read.

Thirty-one study participants, with normal hearing and a mean age of 23, were divided into one group with music experience and another without it. They had to listen to sentences presented in increasingly noisy conditions and repeat back what they heard.

Better perception in noise was linked with better working memory and tone discrimination ability. The results imply that musical training enhances the ability to hear speech in challenging listening environments by strengthening auditory memory and the representation of important acoustic features.

In one of the tests, for example, participants had to repeat back "The square peg will settle in the round hole." Such longer sentences that are syntactically correct but lack familiar cues measure working memory as well as the ability to distinguish sounds in noise.

The Auditory Neuroscience Lab at Northwestern has helped establish the relationship between sound encoding in the brain and linguistic abilities by showing that the very neural sound transcription processes that are deficient in children with dyslexia are enhanced in people with musical experience. Based on this collective work, poor readers may show greater benefits from training programs that include music as well as speech sounds.

By reinforcing the pervasive effects that musical experience has on sound-processing abilities, Kraus stressed, this study underscores the importance of music education being more accessible to the general population.

Journal reference:

By Bob Grant

Where's the Super Food?

Scientists have genetically engineered several biofortified food plants to tackle a scourge of developing countries—micronutrient malnutrition. The crops have yet to be planted on a wide scale, but that may be about to change.

Right now, one billion people are starving. That’s one in every six people on this planet. The number of these hungry people is roughly equivalent to the populations of the United States, Indonesia, Brazil, Pakistan, and Bangladesh combined.

The world reached this bleak milestone in the middle of June this year. With the global human population continuing to explode and resources being stripped at an increasing rate, the outlook is not good. More people will go hungry. Less will have access to the nutrients their bodies need. And more will succumb to the illnesses that take advantage of the malnourished body. More people will die.

But this is only half the story. The insidious corollary to the global hunger crisis is that even more people—at least half the world’s population, according to a 2004 United Nations report—suffer from micronutrient malnutrition. People suffering from this “hidden hunger” may consume sufficient calories, but lack suitable amounts of essential nutrients, vitamins, and minerals. These legions of nutrient-starved people largely reside in developing countries. Their plight is dire. Even mild micronutrient deficiencies can increase infant mortality rates and lead to cognitive impairment and immune system problems in children, among other serious health issues.

In addressing global hunger and micronutrient malnourishment, biotechnology holds potential solutions: specifically, nutritionally enhanced, transgenic crops. The technology that makes these plants possible took center
stage in January 2000 with the publication of a brief but high-impact Science paper on the creation of a prototype that would become known as “Golden Rice,” packed with beta-carotene (also called pro-vitamin A), the precursor to vitamin A and an essential component of healthy diets. Genetically modified (GM) crop plants were already becoming commonplace, but existing genetic changes mostly endowed plants with desirable producer traits, such as herbicide or pest resistance in soybeans or cotton plants. To create Golden Rice, European scientists, with funding from the Rockefeller Foundation, inserted bacterial transgenes into the latent pro-vitamin A biosynthesis molecular pathways in wild-type rice, which contains no pro-vitamin A. This modification transformed the normally nutrient-poor endosperm—or kernel—of milled rice into a source of beta-carotene.

Their work was trumpeted on the cover of TIME magazine with the headline: “This rice could save a million kids a year,” preventing night blindness and other disorders caused by low vitamin A, a nutrient often lacking in developing world diets. While it got people talking and thinking about the potential of genetic engineering to salve the world’s hunger pangs, Golden Rice also set up a contentious debate that still rages today. “[Golden Rice] was something that attracted the attention of both opponents and proponents in the same way,” recalls Peter Beyer, a plant biochemist at the University of Freiburg in Germany and one of Golden Rice’s inventors.

Nutritionists took Beyer and his co-inventor, now-retired biologist Ingo Potrykus, to task, pointing out that Golden Rice could do little to address vitamin A deficiencies in the developing world because its beta-carotene content was too low. Beyer says that anti-GM groups “hijacked” the issue and used Golden Rice as a springboard to rail against all GM crops. Largely due to this controversy, along with political and technological obstacles, nearly 10 years after it was unveiled, Golden Rice has yet to make its wide debut in the paddies of the developing (and vitamin A–deficient) world. “Once [the science] is there, your initial belief is that your work is done, but by far it is not,” says Beyer.

But Beyer, Potrykus, and several collaborators have continued to forge on, refining the technology that made Golden Rice possible and amassing a larger consortium to try to get the enhanced staple crop into the dinner bowls of the people who most need it. And the failure of Golden Rice to leap directly into the world’s rice paddies has not dissuaded scientists from trying the same with other enhanced crops: carrots with twice the calcium, tomatoes with 20% more antioxidants, cassava boosted with additional iron, protein, and vitamins. There are dozens of reports in the scientific literature of common food plants that have been engineered to produce increased levels of one nutrient or another. One cannot yet find vast paddies of Golden Rice waving in the tropical sun or fields of super-cassava blanketing African farmland, but this may be about to change.

More than 250 million sub-Saharan Africans rely on the cassava, a starchy tuber native to South and Central America, as their staple food. Cassava supplies 38.6% of the caloric requirements in some parts of Africa, where hunger and nutrient deficiencies grip the populace and more than 40% of global cassava production takes place.

But cassava is not a particularly nutrient-rich food. It lacks much of the iron, zinc, and vitamins A and E that healthy bodies need to grow. University of Nebraska–Lincoln biochemist Ed Cahoon has worked for several years as part of the BioCassava Plus program, which aims to improve the nutritional profile of cassava through genetic engineering.

Launched in July 2005 with $7.5 million from the Bill and Melinda Gates Foundation’s Grand Challenges in Global Health Initiative, the program’s overarching goal is to develop what essentially amounts to a super-charged cassava plant variety—one with increased levels of iron, zinc, protein, vitamins, and resistance to the cassava mosaic and brown streak viruses plaguing African farmers.

The program has started by developing separate GM cassavas with each of these nutritional improvements one by one. Cahoon and his colleagues have produced a beta-carotene–enhanced cassava by inserting genes that impart higher levels of the pro-vitamin (and give an orangey glow to the normally pallid root). They inserted a gene called phytoene synthase (psy) originally derived from the soil bacterium Erwinia herbicola (and also used to develop Golden Rice), which codes for an enzyme that catalyzes a crucial step in the beta-carotene biosynthetic pathway.

The researchers packaged psy into the plasmid of a disarmed Agrobacterium—the workhorse of plant genetic engineering—together with a root-specific promoter derived from potatoes, a 5’ leader sequence consisting of plant DNA that shuttles the protein into root-bound plastids, and the standard 3’ untranslated region (UTR) from mRNA. Cahoon recalls the first time he saw the successfully engineered cassava root (the part of the plant that’s eaten), in 2007. “It was a good day,” Cahoon says. “[The cassava] was noticeably orange.”
Cassava β-Carotene is a dietary precursor of vitamin A that is synthesized by the methylerthritol phosphate (MEP) pathway in plastids of some plant cells. Conventional cassava roots lack some of the essential enzymes necessary to produce β-carotene. The initial step in the pathway is controlled by deoxyxylulose-5-phosphate synthase (DXS), which is added to Cahoon’s cassava via the gene dxs, originally sourced from a different plant species. Additional steps generate the C5 isopentenyl diphosphate (IPP) that is used as the building block for the synthesis of the C20 geranylgeranyl diphosphate (GGDP). Phytoene synthase (PSY), the product of an introduced gene (psy) from a bacterial source, combines two molecules of GGDP to form phytoene, which is converted to β-carotene via lycopene through a series of desaturation, isomerization, and cyclization reactions. The end result is a noticeably more orangey cassava root.

Meanwhile, Cahoon decided to try inserting the Arabidopsis gene, 1-deoxy-d-xylulose 5-phosphate synthase (dxs), which regulates the isoprenoid pathway, a set of biochemical reactions further upstream from the biosynthetic step in which psy is involved. Inserting dxs, which increases the amount of chemical precursors to beta-carotene, was “like turning up the whole isoprenoid pathway,” Cahoon says. He found that inserting both the psy and dxs genes resulted in a cassava even more orange than the roots with only the psy modification—and with 30 times more beta-carotene than normal roots.

“It’s an informal chain of influence that discourages African farmers from planting any GM crops at all.”

After running more greenhouse trials on plants with both the single and double genetic modifications and choosing the cassava with the most beta-carotene, Cahoon and his team sent tissue samples to Puerto Rico, where scientists propagated clonal offspring. Now, the cassava plants are growing in field trials, which Cahoon recently visited. “They’re looking good,” he says. “For the most part they look like the control plants,” which contain normal levels of beta-carotene.

Eventually, the BioCassava Plus program hopes to move into its second phase—set to commence in 2010 with an additional infusion of funding—in which nutritional modifications to increase iron, zinc, protein, vitamins, and virus resistance will be combined into one cassava plant. “We would actually address all of the deficiencies in cassava in a single cultivar,” says Richard Sayre, a molecular biologist at the Danforth Plant Science Center in St. Louis and director of the BioCassava Plus program. But, as he and Cahoon learned from Golden Rice, getting the science right is just the first step.

There are reasons Cahoon and his colleagues picked Puerto Rico as the site of field tests for the beta-carotene-boosted cassava. Puerto Rico enjoys a tropical climate like much of the core cassava growing areas of Africa but, equally important, the island territory operates under the laws and regulations of the United States, not Africa. “It’s not Africa, but getting in the field in Puerto Rico is a much simpler process than getting through the regulatory processes in Africa,” Cahoon says.

It’s this regulatory tangle facing GM crops in much of the world, including Africa, that largely explains why many transgenic plants that could address widespread nutrient deficiencies are trapped in laboratories instead of growing in soil.

According to Val Giddings, president of Prometheus Agricultural Biotech, most of the restrictions stem from European politics, as influenced by vocal anti-GM groups. Giddings, who helped craft the US Department of Agriculture’s GM crop regulations in the early 1990s as a geneticist at the agency’s Animal and Plant Health Inspection Service (APHIS), says that European countries have effectively exported their restrictive regulations by “making their overseas development programs a slave to their domestic political policies.” In 2004, American officials entreated EU officials to reassure three African nations—Zimbabwe, Zambia and Mozambique—that the hundreds of thousands of tons of GM food aid they had rejected was in fact safe; the EU refused. Add to this the influence that European importers and governments have over food producers in Asia and Africa, and the developing world’s soil is rendered pretty infertile for GM crops. Robert Paarlberg, a Harvard political scientist and author of the book Starving for Science, concurs about the difficulties in getting biotech crops into developing
nations. “It’s an informal chain of influence,” he says, “that discourages African farmers from planting any GM crops at all.”

Even in the United States, GM regulations are cumbersome and require a team of people to navigate. Agricultural biotech entrepreneurs, like drug developers, often cite a 10-year time frame to go from initial discovery to saleable product. But compared to the European system, the US regulatory system is manageable. For the betacarotene–fortified cassava to gain approval from the Department of Agriculture (USDA), for instance, the agency would require data indicating that the introduced genetic construct stably integrated, that the introduced gene does not cause plant disease or produce an infectious agent, and that the cassava was not modified using a gene derived from human or animal pathogens, among other criteria. “It may feel cumbersome to people, but I don’t think [the regulations] are unreasonable,” says Mark Manary, a pediatrician at Washington University in St. Louis who collaborates on the BioCassava Plus program and spends more than half the year working with aid groups in the African nation of Malawi.

However, even if scientists get past the regulatory hurdles associated with any GM foods, there is another practical obstacle that stands in the way of fields full of nutrient-packed cassava or carrots: These foods will cost more than the non-modified versions, and the people who most need them are also the least able to afford them.

In a basement lab at a DuPont research facility, a technician loads bright green soybean tissue samples into a “gene gun,” an unassuming contraption that looks more like a toaster oven than a firearm, and shoots gold nanoparticles coated with DNA molecules into soybean cells at more than 1500 kilometers per hour. The machine makes a muffled pop and the deed is done. DNA will incorporate into the soybean genome and inhibit the activity of fatty acid saturase-2, an enzyme that normally catalyzes the biochemical conversion of oleic to linoleic acid in the soybean plant. Plant molecular biologist Ted Klein stands by, watching. “If we knock out the expression of that enzyme, specifically, in the seed at the right time, then there’s no detrimental impact on the whole plant,” he says.

Elsewhere in DuPont’s Wilmington, Del.–based experimental station, giant walk-in coolers feature lines of bright fluorescent bulbs glowing above rows of the modified soybean plants that grew from tissues earlier shot with the gene gun. While they may not address nutrient deficiencies in poverty-stricken corners of the globe, these plants may one day reduce the need to use hydrogenated oils—AKA the dreaded trans fats—in frying, for example. For now, the plants simply stretch to gather as much of the light as possible; eventually, they will produce oil that is more stable in storage and cooking conditions, with 20% less saturated fat and a higher proportion of oleic acid than normal soy oil. The company will screen these soybeans in the grow room looking for the best phenotypes, which develop after several semi-random gene gunshots. DuPont and Pioneer Hi-Bred, the DuPont company that managed the research and development of the technology behind the plants, known as Plenish, hopes to sell “high oleic oil” from the beans to food processing companies, restaurant chains, and other industrial customers around the world as early as the end of this year. With such a market, the company isn’t too concerned about finding customers who can afford the technology.
**Tomato** Anthocyanins are types of antioxidants, which have been linked to many health benefits. Adding two genes (*Del* and *Ros1*) originating from the snapdragon genome to conventional tomatoes, leads to the upregulation of several key enzymes in the pathway, including phenylalanine ammonia lyase (PAL), anthocyanidin synthase (ANS), flavonoid 3-O-glucosyltransferase (3-GT), flavonoid 3-O-glucoside-rhamnosyltransferase (RT), anthocyanin acyltransferase (AAC), flavonoid-5-glucosyltransferase (5-GT), and glutathione S-transferase (GST) and putative anthocyanin transporter (PAT), which may be involved in transport of anthocyanins into the vacuoles of cells within the tomato’s flesh. The end result is a tomato with a threefold increase in antioxidants and very empurpled flesh.

The oil has already been approved by Mexican and Canadian regulatory agencies. “Now we’re just waiting for the USDA,” says Susan Knowlton, a DuPont research manager.

Other scientists are also trying to tweak the nutritional content of common foods. Kendal Hirschi, a Baylor University pediatrician and geneticist, has genetically engineered a carrot that contains twice the calcium of normal carrots by upping the expression of a plant calcium transporter (*sCAX1*) in the roots with the addition of an Arabidopsis gene construct. He’s even performed a pilot nutritional study, which was funded by the National Institutes of Health, where subjects absorbed about 40% more calcium from his carrots than they did from normal carrots. Feeding studies are essential if nutritionally enhanced GM foods are going to have a real-world impact, Hirschi says. “None of these improvements are any good until we actually show they’re good in the food supply.”

In order to ensure that the technology has a buyer, that could perhaps compensate for the expense of distributing it free or below cost to the developing world, Hirschi is trying to attract attention from large food company General Mills, which has expressed some interest in his carrots as a way to make thicker canned soups. (Calcium chloride is often added to foods as a thickener.)
Cathie Martin, a geneticist at the John Innes Centre in Norwich, UK, has developed a tomato variety that may prove useful to consumers worldwide, not just the malnourished. Martin’s deep purple tomato has 20% higher levels of anthocyanins, antioxidants that may guard the body against chronic diseases and cancer. She and colleagues recently showed that mice consuming a diet that includes her GM tomatoes, whose boosted antioxidant profile is thanks to two transcription factors from snapdragons, lived an average of 30% longer than mice that consumed regular tomatoes. Western countries—where people tend not to get the recommended 5 fruits and vegetables per day, and the giant food companies that operate therein—can play a role in moving these types of GM foods closer to a widespread reality, Martin says. “You’ve got to get the food companies interested in sowing better foods,” she says. “If you can improve tomatoes, then you can get the good things in fruit and vegetables into something that people actually eat.”

“We know how this story ends,” says Val Giddings—nutritionally fortified, GM foods will get into the global marketplace and the mouths of the people who need them. “You can’t stop the tide. Biotech will, in time, become the new conventional agriculture. The question is how long will it be until that happens, and what, if anything, can we do to accelerate the process.”

There are hints now emerging that bear out Giddings’ prediction. Since first introducing the world to Golden Rice in 2000, Beyer’s collaborators have developed new versions of the beta-carotene–enhanced grain. Golden Rice 2, which Beyer says will be available on the market in the Philippines and in Bangladesh within the next 2 or 3 years, contains 30–35 micrograms of beta-carotene/gram—more than 30 times more beta-carotene than the original kernel introduced in 2000. Beyer and his colleagues accomplished this massive increase by tinkering with the promoter sequences used in the genetic modification, by changing the source of one of the gene inserts from daffodils to maize (which boosts beta-carotene production), and other subtle tweaks to the science behind Golden Rice. This new version recently completed feeding trials and is now growing in experimental plots in the Philippines and Bangladesh.

Golden Rice Wild-type white rice produces geranylgeranyl-diphosphate (GGPP), a precursor of β-carotene. However, the grain endosperm lacks phytoene synthase, which catalyzes the conversion of GGPP to phytoene.
Golden Rice 1 was engineered to express daffodil phytoene synthase, while Golden Rice 2 uses a more efficient maize version of the gene. Zeta-carotene desaturase, an enzyme expressed by a gene from the soil bacterium *Erwinia uredovora*, further increases β-carotene levels in the grain.

But the research was relatively easy—to create a GM product that regulators and citizens would accept, Beyer needed help. Funding came from philanthropic organizations, such as the Bill and Melinda Gates Foundation, the Rockefeller Foundation, and government aid agencies, such as the United States Agency for International Development. A private-public partnership between Golden Rice’s inventors and the agrichemicals company Syngenta, along with several collaborations with research institutions throughout Asia, made the imminent market introduction of Golden Rice possible. Beyer says. The project is now conducting the social marketing research and local rice variety back-crosses, which will blend the beta-carotene trait into locally popular rice varieties—both necessary to successfully and safely introduce the crop and get farmers to grow the plants.

The BioCassava Plus program has also recently seen significant progress in its goal to introduce biofortified foods into the developing world. Director Richard Sayre says that the program’s pro-vitamin A cassava plants have been approved for field trials in Nigeria, the world’s number one consumer of the food. In July, the country planted between 4000 and 8000 m² with Cahoon’s two-gene GM cassava, the first GM product Nigeria has field tested. “We are quite proud of that,” Sayre says. To advance the BioCassava Plus program to the next stage, Sayre says that more donor money will be needed. He says that the program is “planning on approaching other donors,” but declined to name them.

Navigating through Nigeria’s regulatory approval process was no small task, Sayre says, for which the BioCassava Plus program enlisted the help of Nigeria’s National Root Crop Research Institute (NRCRI) and a Nigerian product developer who was a former member of the country’s National Biosafety Committee. “We think that was an important part of our strategy,” Sayre says, “because it meant that the government was buying into the process.” The Nigerian regulations, for example, required experimenters to dig a fence around the experimental plots a meter deep into the soil to prevent burrowing animals from carrying off bits of the GM cassava. The Nigerian regulations were “redundancies upon redundancies of protection,” according to Sayre.

“You can’t stop the tide. Biotech will, in time, become the new conventional agriculture.”

To ensure the cassava gets where it needs to go, the project will again call upon the infrastructure and local knowledge of national agriculture research institutions such as the NRCRI and nongovernmental organizations to distribute the cassava plants to poor farmers for free or for a nominal fee. The BioCassava Plus project will utilize the traditional dissemination scheme—where farmers share cuttings of their successful plants with friends and neighbors—to further disseminate their enhanced cassava. (The Gates Foundation, in fact, requires that the technology come with royalty-free humanitarian license.) Poor farmers can get and share cuttings for free, while those who make more than $10,000 per year must pay a royalty fee to companies like Monsanto that donated enabling technologies (patented Agrobacterium transformation systems, and gene promoters, for example) to the project. Sayre also says that a “very critical” part of the BioCassava project is to eventually transfer research and production capabilities and responsibilities to African labs, scientists, and countries. “I put myself out of business in many ways,” he says.

Other GM advocates say they hope cassava is not the only biofortified food to be planted in Nigeria. “What I’d like to see is hundreds of millions of very poor people improving their nutritional status and improving their health status,” says Lawrence Kent, senior program officer of agricultural development at the Bill and Melinda Gates Foundation, which funds genetic research in biofortification, but also donates money to efforts aimed at conventional fortification, supplementation, and dietary diversification. “We’re hoping some initial successes are going to trigger additional interest, especially from national governments. If we can help get more nutrients into these staple foods, we really can help millions of people improve their lives.

Have a comment? E-mail us at mail@the-scientist.com

References

**Exercise alone shown to improve insulin sensitivity in obese sedentary adolescents**

New study isolates impact of exercise from diet and weight loss interventions
Chevy Chase, MD—A moderate aerobic exercise program, without weight loss, can improve insulin sensitivity in both lean and obese sedentary adolescents, according to a new study accepted for publication in The Endocrine Society's *Journal of Clinical Endocrinology & Metabolism* (JCEM). Insulin is a hormone produced in the pancreas that permits glucose to enter cells to be used for energy or stored for future use by the body.

Because obese adolescents are resistant to insulin, in order to maintain normal blood sugar levels, they have to increase their production of insulin. Increased insulin production however, places higher demands on the pancreas. These higher demands can exhaust pancreatic beta cells to the point that they no longer produce sufficient amounts of insulin to keep blood sugar levels normal, which might subsequently lead to type 2 diabetes.

"Because weight loss can be difficult to achieve and maintain in obese sedentary children, the purpose of this study was to determine whether a controlled exercise program, without any diet intervention and with no intention of weight loss, would improve fat distribution and sensitivity to insulin," said Agneta Sunehag, MD, PhD, of Baylor College of Medicine and senior author of the study. "We found that a 12-week moderate aerobic exercise program consisting of four 30-minute workouts a week increased fitness and improved insulin sensitivity in both lean and obese adolescents."

In this study, 29 adolescents (14 lean and 15 obese) completed the 12-week moderate aerobic exercise program. During the exercise sessions, subjects worked out on a treadmill, elliptical or bicycle. The goal of each exercise session was to get the participants’ heart rate to increase to at least 70 percent of their maximum capacity. Glucose and insulin concentrations were measured both before and after the exercise program. Cardiovascular fitness was determined using an oxygen consumption test which consists of measuring oxygen uptake of the participant during a treadmill exercise where speed and incline is increased every three minutes until the subject reaches his maximum exercise capacity.

"Many studies include both diet and exercise interventions, which makes it difficult to determine which intervention is most effective and best accepted by adolescents," said Sunehag. "Our findings show that exercise alone can increase fitness and improve insulin sensitivity, making an aerobic program like the one used in this study a potential useful tool in preventing obesity-related illnesses."

**Exercise Minimizes Weight Regain By Reducing Appetite, Burning Fat, And Lowering ‘Defended’ Body Weight**

**BETHESDA, Md.** (September 2, 2009) — Exercise helps prevent weight regain after dieting by reducing appetite and by burning fat before burning carbohydrates, according to a new study with rats. Burning fat first and storing carbohydrates for use later in the day slows weight regain and may minimize overeating by signaling a feeling of fullness to the brain.

The University of Colorado Denver study also found that exercise prevents the increase in the number of fat cells that occurs during weight regain, challenging the conventional wisdom that the number of fat cells is set and cannot be altered by dietary or lifestyle changes.

These coordinated physiological changes in the brain and the body lower the ‘defended’ weight, that is, the weight that our physiology drives us to achieve, and suggest that the effects of exercise on these physiological processes may make it easier to stay on a diet.

The study is “Regular exercise attenuates the metabolic drive to regain weight after long term weight loss.” Paul S. MacLean, Janine A. Higgins, Holly R. Wyatt, Edward L. Melanson, Ginger C. Johnson, Matthew R. Jackman, Erin D. Giles, Ian E. Brown and James O. Hill, all of the University of Colorado Denver, conducted the study. The American Physiological Society published the research in the *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology*. **How exercise works**

Weight gain is, on the surface, remarkably simple, occurring when the calories consumed exceeds the calories expended. On closer examination, the process is remarkably complex. Laboratory, animals eat according to physiological signals that may suppress appetite or arouse the desire to eat. These signals are relatively weak in humans, as their intake is largely influenced by psychological, cognitive and lifestyle factors. After dieting, however, the physiological signals emerge to play a more substantial role in controlling intake. Being persistently hungry after losing weight with restricted diets is a big part of the weight regain problem. Most people are unable to ignore this physiological cue and are pushed by their biology to overeat and regain the weight they worked so hard to lose.

Some people are successful at keeping the weight off, and those tracked by The National Weight Control Registry share a number of common characteristics, including a program of regular exercise. The aim of this investigation was to uncover how exercise affects the body’s physiology to minimize weight regain.
The researchers used obesity-prone rats. For the first 16 weeks, the rats ate a high-fat diet, as much as they wanted, and remained sedentary. They were then placed on a diet. For the following two weeks, the animals ate a low-fat and low-calorie diet, losing about 14% of their body weight. The rats maintained the weight loss by dieting for eight more weeks. Half the rats exercised regularly on a treadmill during this period while the other half remained sedentary.

In the final 8-weeks, the relapse phase of the study, the rats stopped dieting and ate as much low-fat food as they wanted. The rats in the exercise group continued to exercise and the sedentary rats remained sedentary. Compared to the sedentary rats, the exercisers:

• regained less weight during the relapse period
• developed a lower ‘defended’ body weight
• burned more fat early in the day, and more carbohydrates later in the day
• accumulated fewer fat cells and less abdominal fat during relapse
• reduced the drive to overeat
• enhanced the ability to balance energy intake with energy expended

During feeding, the sedentary group preferentially burned carbohydrates while sending fat from the diet to fat tissue. This preferential fuel use stores more calories because it requires less energy to store fat than to store carbohydrates. In addition, burning away the body’s carbohydrates may contribute to the persistent feeling of hunger and large appetite of the sedentary animals.

Exercise blunted this fuel preference, favoring the burning of fat for energy needs and saving ingested carbohydrates so that they could be used later in the day. Taken together, the exercise led to a much lower appetite and fewer calories ending up in fat tissue.

The researchers also found that exercise prevented the increase in the number of fat cells observed with weight regain in sedentary rats. In sedentary rats, a population of very small, presumably new, fat cells appears early in the relapse process. Small, new fat cells would not only accelerate the process of regain, but also increase fat storage capacity in the abdomen. It would also explain why sedentary rats overshoot their previous weight when they relapse.

Conventional wisdom holds that the number of fat cells is determined by genetics, rather than being regulated by diet or lifestyle. Because this effect of exercise is a novel finding, the team will do further research to demonstrate that exercise is, indeed, preventing the formation of new fat cells early in relapse and not simply altering the size of pre-existing fat cells.

**Vitamin C deficiency impairs early brain development - 01.09.2009**

New research at LIFE – Faculty of Life Sciences at University of Copenhagen shows that vitamin C deficiency may impair the mental development of new-born babies.

In the latest issue of the well-known scientific journal The American Journal of Clinical Nutrition, a group of researchers headed by professor Jens Lykkefeldt shows that guinea pigs subjected to moderate vitamin C deficiency have 30 per cent less hippocampal neurones and markedly worse spatial memory than guinea pigs given a normal diet. Like guinea pigs, human beings are dependent on getting vitamin C through their diet, and Jens Lykkefeldt therefore speculate that vitamin C deficiency in pregnant and breast-feeding women may also lead to impaired development in foetuses and new-born babies.

**The brain retains vitamin C**

Several factors indicate that the neonatal brain, in contrast to other tissue, is particularly vulnerable to even a slight lowering of the vitamin C level. The highest concentration of vitamin C is found in the neurons of the brain and in case of a low intake of vitamin C, the remaining vitamin is retained in the brain to secure this organ. The vitamin thus seems to be quite important to brain activity. Tests have shown that mouse foetuses that were not able to transport vitamin C develop severe brain damage. Brain damage which resembles the ones found in premature babies and which are linked to learning and cognitive disabilities later in life.

**Widespread vitamin C deficiency**

In some areas in the world, vitamin C deficiency is very common – population studies in Brazil and Mexico have shown that 30 to 40 per cent of the pregnant women have too low levels of vitamin C, and the low level is also found in their foetuses and new-born babies. It is not yet known to what extent new-born babies in Denmark or the Western World suffer from vitamin C deficiency but a conservative estimate would be 5 to 10 per cent based on the occurrence among adults.

“We may thus be witnessing that children get learning disabilities because they have not gotten enough vitamin C in their early life. This is unbearable when it would be so easy to prevent this deficiency by giving a vitamin
supplement to high-risk pregnant women and new mothers” says Jens Lykkesfeldt whose research group is currently studying how early in pregnancy vitamin C deficiency affects the embryonic development of guinea pigs and whether the damage may be reversed after birth.

Read more in the scientific article Vitamin C deficiency in early postnatal life impairs spatial memory and reduces the number of hippocampal neurons in guinea pigs in the online edition of American Journal of Clinical Nutrition

Biotransformed Blueberry Juice Fights Fat And Diabetes
ScienceDaily (Sep. 2, 2009) — Juice extracted from North American lowbush blueberries, biotransformed with bacteria from the skin of the fruit, holds great promise as an anti-obesity and anti-diabetic agent.

The study, published in the International Journal of Obesity, was conducted by researchers from the Université de Montréal, the Institut Armand-Frappier and the Université de Moncton who tested the effects of biotransformed juices compared to regular blueberry drinks on mice.

"Results of this study clearly show that biotransformed blueberry juice has strong anti-obesity and anti-diabetic potential," says senior author Pierre S. Haddad, a pharmacology professor at the Université de Montréal's Faculty of Medicine. "Biotransformed blueberry juice may represent a novel therapeutic agent, since it decreases hyperglycemia in diabetic mice and can protect young pre-diabetic mice from developing obesity and diabetes."

The scientists tested the effect of biotransformed blueberry juice on a group of mice prone to obesity, insulin resistance, diabetes and hypertension. Incorporating biotransformed blueberry juice into the water of mice reduced their food intake and their body weight. "These mice were an excellent model that closely resembles obesity and obesity-linked type 2 diabetes in humans," says Dr. Haddad, who is also director of the CIHR Team in Aboriginal Anti-Diabetic Medicines at the Université de Montréal.

Biotransformation of the blueberry juice was achieved with a new strain of bacteria isolated from the blueberry flora, specifically called Serratia vaccinii, which increases the fruit's antioxidant effects. "The identification of the active compounds in biotransformed blueberry juice may result in the discovery of promising new antiobesity and antidiabetic molecules," says Dr. Haddad.

As for the impact of blueberry products on diabetes, says Trî Vuong, lead author and recent PhD graduate from the Université de Montréal's Department of Pharmacology: "Consumption of fermented blueberry juice gradually and significantly reduced high blood glucose levels in diabetic mice. After three days, our mice subjects reduced their glycemia levels by 35 percent."

This study was funded by the Canadian Institutes of Health Research, the Atlantic Canada Opportunities Agency and the Fonds de recherche sur la nature et les technologies.

Journal reference:
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Anticancer Compound Found In Common Weed: American Mayapple
ScienceDaily (Sep. 8, 2009) — A common weed called American mayapple may soon offer an alternative to an Asian cousin that's been harvested almost to extinction because of its anti-cancer properties. The near-extinct Asian plant, Podophyllum emodi, produces podophyllotoxin, a compound used in manufacturing etoposide, the active ingredient in a drug used for treating lung and testicular cancer. Podophyllum emodi is a cousin of the common mayapple weed found in the United States.

Podophyllotoxin is found in Indian mayapple (Podophyllum emodi Wall.), American mayapple (Podophyllum peltatum L.), and other species. Podophyllotoxin and its derivatives are used in several commercially available pharmaceutical products such as the anticancer drugs etoposide, teniposide, and etopophos, which are used in the treatment of small-cell lung cancer, lymphoblastic leukemia, testicular cancer, and brain tumors. Podophyllotoxin derivatives are also used for the treatment of psoriasis and malaria, and some are being tested for the treatment of rheumatoid arthritis. Currently, podophyllotoxin is produced commercially using the roots and rhizomes of Indian mayapple, an endangered species harvested from the wild in India, Pakistan, Nepal, and China.

Researchers at Mississippi State University and the University of Mississippi recently set out to identify American mayapple types with high podophyllotoxin content. Valtcho D. Zheljazkov and colleagues at Mississippi State University published the research results in HortScience. According to Zheljazkov; "The objective of this study was to estimate podophyllotoxin concentration in American mayapple across its natural habitats in the eastern United States and to identify high podophyllotoxin types that could be used for further selection and cultivar development."
Mayapple has been long been grown as a cash crop in Europe and Russia, but has never been introduced or domesticated in the United States, although the idea was suggested by researchers more than 30 years ago. Previous research demonstrated that American mayapple leaves contain podophyllotoxin, making way for the development of American mayapple as a high-value crop for American growers. Zheljazkov explained that, until now, there has been no comprehensive study on the genetic resources of American mayapple colonies across the United States. "We hypothesized that there might be great variation with respect to podophyllotoxin content within American mayapple across the eastern United States."

The researchers studied the effect of location, plant nutrient concentration, and phytoavailable nutrients in soil on podophyllotoxin concentration in American mayapple across its natural habitats in the eastern United States. The study was the largest of its kind ever conducted; American mayapple leaves were collected from 37 mayapple colonies across 18 states.

This groundbreaking study confirmed that mayapple colonies in the eastern part of the United States can be used for the development of high podophyllotoxin cultivars, which could subsequently provide the base for commercial production of podophyllotoxin in the United States. The results from this study will help to develop a Geographic Information System (GIS) map of the genetic resources of American mayapple in the U.S.

Journal reference:

Designing probiotics that ambush gut pathogens
Researchers in Australia are developing diversionary tactics to fool disease-causing bacteria in the gut. Many bacteria, including those responsible for major gut infections, such as cholera, produce toxins that damage human tissues when they bind to complex sugar receptors displayed on the surface of cells in the host’s intestine.

At the Society for General Microbiology’s meeting at Heriot-Watt University, Edinburgh, today (8 September), Professor James Paton and colleagues from the University of Adelaide explained how they had added molecular mimics of these host cell receptors onto the surface of harmless bacteria capable of surviving in the human gut. If given during an infection caused by a toxin-producing bacterium, these "receptor-mimic probiotics" will bind the toxins in the gut very strongly, thereby preventing the toxins from interacting with receptors on host intestinal cells and causing disease.

Effective vaccines are not yet available for many diarrhoeal diseases; and trying to control or treat these diseases with antibiotics can lead to the development of drug-resistance. One advantage of this approach to treatment is that the pathogenic bacteria are unlikely to develop a resistance to it, as that would destroy the basic mechanism by which they cause disease.

A further advantage is that the receptor-mimic bacteria bind toxins more strongly than previous technologies in which synthetic receptors were displayed on inert silica particles. They are also more cost effective, as the bacteria can be grown cheaply in large-scale fermenters.

"We initially developed this technology to prevent disease caused by strains of E. coli bacteria that produce Shiga toxin. These include the infamous E. coli O157 strain, which causes outbreaks of severe bloody diarrhoea and the potentially fatal haemolytic uraemic syndrome. Our prototype receptor mimic probiotic provided 100% protection against otherwise fatal E. coli disease in an animal model." said Professor Paton. "We have also developed similar receptor mimic probiotics that are capable of preventing cholera and travellers’ diarrhoea. As well as being able to treat disease, these probiotics could be given to vulnerable populations following natural disasters to help prevent outbreaks of diseases like cholera”.

Baby boomers’ boon? LED light and green tea cream to smooth facial wrinkles
Scientists in Germany are reporting a major improvement in their potential new treatment for facial wrinkles that could emerge as an alternative to Botox and cosmetic surgery. The non-invasive technique combines high-intensity light from light-emitting diodes (LEDs) and a lotion made of green tea extract. It works ten times faster than a similar anti-wrinkle treatment that uses LEDs alone, the researchers say. Their study is scheduled for the Oct. 7 issue of ACS’ *Crystal Growth & Design*, a bi-monthly journal.

Andrei P. Sommer and Dan Zhu point out that researchers have used light-therapy, or phototherapy, for more than 40 years to help heal wounds. Recently the scientists showed that use of high-intensity LEDs, similar to those
used in automotive tail lights and computers, could help reduce skin wrinkles when applied daily for several months. But exposure to intense LED light is also involved in generating high levels of reactive oxygen species as byproducts that can potentially damage cells. To combat that effect, the researchers combined the LED with a potent antioxidant in green tea extract called epigallocatechin gallate.

They applied a daily combination of LED light and green tea extract to the facial wrinkles of a human volunteer one month. The combination treatment resulted in smoother skin, including "less pronounced wrinkle levels, shorter wrinkle valleys, and juvenile complexion," the scientists say. The treatment showed promising results in only one-tenth of the time it took for LED therapy alone to reduce wrinkles. The study could form the basis of "an effective facial rejuvenation program," and lead to a new understanding of the effect reactive oxygen species on cellular aging, they note.

Reference: Facial Rejuvenation in the Triangle of ROS
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Muscle: ‘hard to build, easy to lose’ as you age
Fri, 11 Sep 2009 12:44:00 GMT
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Have you ever noticed that people have thinner arms and legs as they get older? As we age it becomes harder to keep our muscles healthy. They get smaller, which decreases strength and increases the likelihood of falls and fractures. New research is showing how this happens — and what to do about it.

A team of Nottingham researchers has already shown that when older people eat, they cannot make muscle as fast as the young. Now they’ve found that the suppression of muscle breakdown, which also happens during feeding, is blunted with age.

The scientists and doctors at The University of Nottingham Schools of Graduate Entry Medicine and Biomedical Sciences believe that a ‘double whammy’ affects people aged over 65. However the team think that weight training may “rejuvenate” muscle blood flow and help retain muscle for older people.

These results may explain the ongoing loss of muscle in older people: when they eat they don’t build enough muscle with the protein in food; also, the insulin (a hormone released during a meal) fails to shut down the muscle breakdown that rises between meals and overnight. Normally, in young people, insulin acts to slow muscle breakdown. Common to these problems may be a failure to deliver nutrients and hormones to muscle because of a poorer blood supply.

The work has been done by Michael Rennie, Professor of Clinical Physiology, and Dr Emilie Wilkes, and their colleagues at The University of Nottingham. The research was funded by the UK’s Biotechnology and Biological Sciences Research Council (BBSRC) as part of ongoing work on age-related muscle wasting and how to lessen that effect.

Research just published in The American Journal of Clinical Nutrition compared one group of people in their late 60s to a group of 25-year-olds, with equal numbers of men and women. Professor Rennie said “We studied our subjects first — before breakfast — and then after giving them a small amount of insulin to raise the hormone to what they would be if they had eaten breakfast, of a bowl of cornflakes or a croissant.”

“We tagged one of the amino acids (from which proteins are made) so that we could discover how much protein in leg muscle was being broken down. We then compared how much amino acid was delivered to the leg and how much was leaving it, by analysing blood in the two situations.

“The results were clear. The younger people’s muscles were able to use insulin we gave to stop the muscle breakdown, which had increased during the night. The muscles in the older people could not.”

“In the course of our tests, we also noticed that the blood flow in the leg was greater in the younger people than the older ones,” added Professor Rennie. “This set us thinking: maybe the rate of supply of nutrients and hormones is lower in the older people? This could explain the wasting we see.”

Following this up led Beth Phillips, a PhD student working with Professor Rennie, to win the Blue Riband Award for work she presented at the summer meeting of The Physiological Society in Dublin. In her research Beth confirmed the blunting effect of age on leg blood flow after feeding, with and without exercise. The team predicted that weight training would reduce this blunting. “Indeed, she found that three sessions a week over 20 weeks ‘rejuvenated’ the leg blood flow responses of the older people. They became identical to those in the young,” said Professor Rennie.

“I am extremely pleased with progress,” he said. “Our team is making good headway in finding more and more out about what causes the loss of muscle with age. It looks like we have good clues about how to lessen it with weight training and possibly other ways to increase blood flow.”

1September 14, 2009
**Aging Muscles: 'Hard To Build, Easy To Lose’**

Have you ever noticed that people have thinner arms and legs as they get older? As we age it becomes harder to keep our muscles healthy. They get smaller, which decreases strength and increases the likelihood of falls and fractures. New research is showing how this happens — and what to do about it.

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**High Fruit And Vegetable Intake Linked To Antioxidant Status And Cognitive Performance In Healthy Subjects**

ScienceDaily (Sep. 10, 2009) — Researchers at the Institute of Biochemistry and Molecular Biology I of the Heinrich-Heine University, Düsseldorf, Germany, investigated the relationship between fruit and vegetable intake, plasma antioxidant micronutrient status and cognitive performance in healthy subjects aged 45 to 102 years. Their results, published in the August issue of the *Journal of Alzheimer’s Disease*, indicated higher cognitive performance in individuals with high daily intake of fruits and vegetables.

Subjects with a high daily intake (about 400 g) of fruits and vegetables had higher antioxidant levels, lower indicators of free radical-induced damage against lipids as well as better cognitive performance compared to healthy subjects of any age consuming low amounts (< 100 g/day) of fruits and vegetables. Modification of nutritional habits aimed at increasing intake of fruits and vegetables, therefore, should be encouraged to lower the prevalence of cognitive impairment.
The work was performed in collaboration with the Department of Pharmacology at Temple University in Philadelphia, Pennsylvania, the Department of Geriatrics at Perugia University, Italy, and the Department of Neurology of the St. Elisabeth Hospital in Cologne, Germany.

Dr. M. Cristina Polidori, currently at the Department of Geriatrics, Marienhospital Herne, Ruhr-University of Bochum, Germany, explains: “It is known that there is a strong association between fruit and vegetable intake and the natural antioxidant defenses of the body against free radicals. It is also known that bad nutritional habits increase the risk of developing cognitive impairment with and without dementia. With this work we show a multiple link between fruit and vegetable intake, antioxidant defenses and cognitive performance, in the absence of disease and independent of age. Among other lifestyle habits, it is recommended to improve nutrition in general and fruit and vegetable intake in particular at any age, beginning as early as possible. This may increase our chances to remain free of dementia in advanced age.”

These findings are independent of age, gender, body mass index, level of education, lipid profile and albumin levels, all factors able to influence cognitive and antioxidant status. The relevance of the findings is also strengthened by the large sample that included 193 healthy subjects.

Further studies are planned that will include larger subject cohorts, patients with Alzheimer’s disease at different stages and patients with mild cognitive impairment without dementia.

*Journal reference:*

**Model Backs Green Tea And Lemon Claim, Lessens Need To Test Animals**

ScienceDaily (Sep. 10, 2009) — An animal study at Purdue University has shown that adding ascorbic acid and sugar to green tea can help the body absorb helpful compounds and also demonstrates the effectiveness of a model that could reduce the number of animals needed for these types of studies.

Mario Ferruzzi, associate professor of food science and nutrition, adapted a digestion model with human intestinal cells to show that adding ascorbic acid to green tea would increase the absorbability of catechins found in the tea. Catechins, a class of polyphenols common in tea, cocoa and grape, are antioxidants thought to fight heart disease, stroke, cancer, diabetes and other health problems.

Ferruzzi, Elsa Janle, a Purdue associate research professor of foods and nutrition, and Catrina Peters, a Purdue graduate student in nutrition, were able to demonstrate that adding ascorbic acid, sucrose or both together increases by as much as three times the amount of catechins that can be absorbed into the bloodstream. The results of the in vivo study compared well with those predicted by the in vitro model.

"This model may be used as a pre-emptive screening tool at very little cost before you do expensive tests on animals or humans," said Ferruzzi, whose findings were published in the early online edition of the journal *Food Research International*. "If you want to get human screening off the ground, it takes months. If you want to use this model, it takes hours."

The model charts how the digestive stability, solubility and absorption of polyphenols changes based on modifications to a beverage's formula. It will not be exact in terms of measurements, but when compared to the in vivo test in rats, the model's predictions matched directionally to the in vivo study and were relatively close proportionately.

Ferruzzi said testing with the model could allow researchers to predict how a new product formula might change the product's properties, reducing the number of animals needed for testing to only products that showed desired characteristics in the model. The model also can be adapted to simulate the digestive characteristics of other animals or humans as originally intended.

"As long as we know the typical gastrointestinal conditions of an animal and the volumes, we can adapt the model to mimic those conditions," Ferruzzi said. "You don't have to do expensive precursor studies."

The in vivo study backed up the model study that showed adding sugar and vitamin C to green tea enhanced the body's ability to absorb polyphenols. Ferruzzi said that adding lemon juice or other citrus juice to tea would do the trick, or consumers could look for ready-to-drink products that contain 100 percent of the recommended amount of vitamin C or ascorbic acid on the ingredient list.

"Having that vitamin C seems to do it," Ferruzzi said. "And if you don't want to squeeze a lemon into your cup, just have a glass of juice with your green tea."

Connie Weaver, head of the National Institutes of Health Purdue University-University of Alabama at Birmingham Botanical Research Center for Age-Related Diseases, which funded the research, said the study's focus was an important part of understanding how to get the most out of compounds considered beneficial.
"There is a lot of interest in bioactive materials to protect people from disease and promote better health," Weaver said. "What's been totally ignored is the way these materials are found in foods in combination with other ingredients. How they're involved in the food matrix can affect how you absorb these health promoters."

Ferruzzi said the next step in the research is to stage a human clinical trial.

**Green tea component may help preserve stored platelets, tissues**

Tampa, Fla. (September 14th, 2009) – In two separate studies, a major component in green tea, epigallocatechin-3-O-gallate (EGCG), has been found to help prolong the preservation of both stored blood platelets and cryopreserved skin tissues. Published in the current double issue of *Cell Transplantation* (18:5/6), now freely available on-line at [http://www.ingentaconnect.com/content/cog/ct](http://www.ingentaconnect.com/content/cog/ct), devoted to organ preservation and transplantation studies from Japan, the two complimentary studies have shown that EGCG, known to have strong anti-oxidative activity, can prolong platelet cell "shelf life" via anti-apoptosis (programmed cell death) properties and preserve skin tissues by controlling cell division.

Dr. Suong-Hyn Hyon, lead author on both studies and associate professor in the Institute for Frontier Medical Sciences in Kyoto, Japan, says that EGCG, a green tea polyphenol, is a known anti-oxidation and anti-proliferation agent, yet the exact mechanism by which EGCG works is not yet known. However, some of the activity of EGCG is likely to be related to its surface binding ability.

**Enhanced platelet preservation**

Using standard blood banking procedures, the storage duration for platelet cells (PCs) is limited to five days internationally or three days in Japan. During storage, PCs undergo biochemical, structural and functional changes, and PCs may lose membrane integrity and haemostatic functions, such as aggregability and affinity for surface receptors. Thus, PC shortages often occur. When EGCG was added to blood platelet concentrates, aggregation and coagulation functions were better-maintained after six days, perhaps due to EGCG's anti-oxidative ability. Researchers suggested that EGCG inhibited the activation of platelet functions and protected the surface proteins and lipsids from oxidation.

"Functions were restored by the maintained surface molecules with the detachment of ECGC by washing," noted Dr. Hyon. "EGCG may lead to an inhibition of platelet apoptosis and lower rates of cell death, offering a potentially novel and useful method to prolong platelet storage period."

**EGCG enhances life of cryopreserved skin grafts**

Another team of Japanese researchers studied the effects of using EGCG on frozen, stored skin tissues. As with platelet storage, the storage of skin tissue for grafting presents problems of availability and limitations on the duration of storage.

"To provide best outcomes, skin grafts must be processed and stored in a manner that maintains their viability and structural integrity until they are needed for transplantation," explained Dr. Hyon. "Transplant dysfunction often occurs as the result of oxidation. A better storage solution could prevent this."

It is known that polyphenols in green tea promote the preservation of tissues, such as blood vessels, cornea, islet cells, articular cartilage and myocardium at room temperature. Also, it is known that ECGC has stronger anti-oxidant activities than vitamin C because of its stereochemical structure and is reported to play an important role in preventing cancer and cardiovascular diseases.

This study examined how EGCG might help extend the preservation duration of frozen rat skin tissues and found that skin grafts could be protected from freeze-thaw injuries when EGCG was absorbed into various membrane lipids and proteins. Results of the study showed that EGCG enhanced the viability and stored duration of skin grafts up to seven weeks at 4 degrees C.

"The storage time of skin grafts was extended to 24 weeks by cryopreservation using EGCG and the survival rate was almost 100 percent," noted Dr. Hyon.

"These studies highlight the benefits of using natural compounds such as ECGC to enhance the preservation of stored tissues, possibly due to their anti-oxidative properties" said Dr. Naoya Kobayashi, guest editor of this double issue of *Cell Transplantation*.

**Designing probiotics that ambush gut pathogens**

Researchers in Australia are developing diversionary tactics to fool disease-causing bacteria in the gut. Many bacteria, including those responsible for major gut infections, such as cholera, produce toxins that damage human tissues when they bind to complex sugar receptors displayed on the surface of cells in the host’s intestine.

At the Society for General Microbiology's meeting at Heriot-Watt University, Edinburgh, today (8 September), Professor James Paton and colleagues from the University of Adelaide explained how they had added molecular mimics of these host cell receptors onto the surface of harmless bacteria capable of surviving in the human gut. If
given during an infection caused by a toxin-producing bacterium, these "receptor-mimic probiotics" will bind the toxins in the gut very strongly, thereby preventing the toxins from interacting with receptors on host intestinal cells and causing disease.

Effective vaccines are not yet available for many diarrhoeal diseases; and trying to control or treat these diseases with antibiotics can lead to the development of drug-resistance. One advantage of this approach to treatment is that the pathogenic bacteria are unlikely to develop a resistance to it, as that would destroy the basic mechanism by which they cause disease.

A further advantage is that the receptor-mimic bacteria bind toxins more strongly than previous technologies in which synthetic receptors were displayed on inert silica particles. They are also more cost effective, as the bacteria can be grown cheaply in large-scale fermenters.

"We initially developed this technology to prevent disease caused by strains of E. coli bacteria that produce Shiga toxin. These include the infamous E. coli O157 strain, which causes outbreaks of severe bloody diarrhoea and the potentially fatal haemolytic uraemic syndrome. Our prototype receptor mimic probiotic provided 100% protection against otherwise fatal E. coli disease in an animal model." said Professor Paton, "We have also developed similar receptor mimic probiotics that are capable of preventing cholera and Traveller's diarrhoea. As well as being able to treat disease, these probiotics could be given to vulnerable populations following natural disasters to help prevent outbreaks of diseases like cholera".

'Hygiene hypothesis' challenged

Day care doubles early respiratory problems, does not prevent later asthma and allergy

New research hints that the common belief that kids who go to daycare have lower rates of asthma and allergy later in life might be nothing more than wishful thinking. While young children in daycare definitely do get more illnesses and experience more respiratory symptoms as a result, any perceived protection these exposures afford against asthma and allergy seem to disappear by the time the child hits the age of eight.

"We found no evidence for a protective or harmful effect of daycare on the development of asthma symptoms, allergic sensitization, or airway hyper-responsiveness at the age of eight years," wrote Johan C de Jongste, M.D., Ph.D., of Erasmus University in the Netherlands and principle investigator of the study. "Early daycare was associated with more airway symptoms until the age of four years, and only in children without older siblings, with a transient decrease in symptoms between four and eight years."

The results are published in the September 15 issue of the American Journal of Respiratory and Critical Care Medicine, a journal of the American Thoracic Society.

The researchers prospectively followed a birth cohort of nearly 4,000 Dutch children over the course of eight years in the Prevention and Incidence of Asthma and Mite Allergy (PIAMA) Study. Parents completed questionnaires during pregnancy, at three and 12 months, and then yearly until the child reached the age of eight, and reported their children's airway symptoms annually. At the age of eight, more than 3,500 of the children were also assessed for specific allergies. Some also underwent testing for lung function and airway hyper-responsiveness.

Daycare use was assessed each year, and the children were categorized in early attendees (first attendance before two years of age), late attendees (first attendance between two and four years of age) and non-attendees.

They found that children who started daycare early were twice as likely to experience wheezing in the first year of life compared to those who didn't go to daycare. However, as the children aged, there was a shift: by age five, there was a trend for less wheezing among early attendees: they were about 80 percent as likely as non-attendees to wheeze, but this was not statistically significant. What's more, the shift reversed itself by age eight, when there was no association between early daycare attendance and wheezing at all.

Late daycare attendees had similar, but less pronounced and statistically nonsignificant effects. The effects of daycare on wheeze were not different between boys and girls, but were more marked in children with older siblings.

"Children with older siblings and early daycare had more than fourfold higher risk of frequent respiratory infections and more than twofold risk of wheezing in the first year compared to children without older siblings and daycare," said Dr. de Jongste. "Importantly, children exposed to both early daycare and older siblings experienced most infections and symptoms in early childhood, without a protective effect on wheeze, inhaled steroid prescription or asthma symptoms until the age of eight years."

Despite the widespread acceptance of the idea that these early exposures pay off in later health benefits, the data in this study do not support that belief. If anything, this study suggests that these exposures cause more airway symptoms early in life with no counterbalancing benefit later.
"Early daycare merely seems to shift the burden of respiratory morbidity to an earlier age where it is more troublesome than at a later age," said Dr. de Jongste. "[E]arly daycare should not be promoted for reasons of preventing asthma and allergy."

**Antioxidant Ingredient Proven To Relieve Stress**

ScienceDaily (Sep. 15, 2009) — A dietary ingredient derived from a melon rich in antioxidant superoxide dismutase enzymes has been shown to relieve stress. In a double-blind, randomised, placebo-controlled trial, published in BioMed Central's open access *Nutrition Journal*, researchers found that the supplement decreased the signs and symptoms of perceived stress and fatigue in healthy volunteers.

Marie-Anne Milesi from Seppic, France, worked with a team of researchers to evaluate its anti-stress effects in 70 volunteers. She said: "Several studies have shown that there is a link between psychological stress and intracellular oxidative stress. We wanted to test whether augmenting the body’s ability to deal with oxidative species might help a person’s ability to resist burnout. The 35 people in our study who received capsules containing superoxide dismutase showed improvement in several signs and symptoms of perceived stress and fatigue."

The researchers found a strong placebo effect in the volunteers who received inactive starch capsules, as can be expected when studying subjective feelings like stress. However, the improvements seen in the supplement group were significantly greater, especially after 28 days.

According to Milesi: "The placebo effect was only present during the first 7 days of supplementation and not beyond. It will be interesting to confirm these effects and better understand the action of antioxidants on stress in further studies with a larger number of volunteers and a longer duration."

**Journal reference:**


**Allergy: Solving The Mystery Of IgE**

ScienceDaily (Sep. 14, 2009) — Immunoglobulin E (IgE) is the main actor in the drama of allergy. The biological role of IgE in the immune response of an organism and the lack of control leading to allergy is the research topic of Gernot Achatz, Molekular Biology, University of Salzburg.

At the 2nd European Congress of Immunology ECI 2009 held in Berlin the scientist presents new data revealing the evolution of IgE.

Allergic diseases have risen dramatically during the last decades. They represent a major health problem, which affects up to one third of the whole population. A prerequisite for the development of effective therapeutic strategies is the detailed analysis of the biological role of IgE and its control mechanisms.

IgE is an evolutionary conserved member of the immunoglobulin (Ig) family. Immunoglobulins are antibodies, which play a key function in immune response. Compared to all other immunoglobulin classes, which are present in concentrations of micrograms to milligrams per ml serum, the titre of IgE is very low (nano- to micrograms per ml range) in plasma of normal healthy individuals and of normal laboratory mouse strains. IgE is most prominent in epitheliae and mucosae where it is bound to specific receptors on highly potent effector cells like eosinophilic granulocytes and mast cells. Bound to these cells IgE has a long half-life (weeks to months), while free in plasma the half-life is very short (~ 6 hours). “This suggests that IgE plays a role in local immune defence mechanisms”, says Achatz.

However, the core function for IgE is still unknown. From an evolutionary point of view, IgE is conserved and can be found in all mammalia. It therefore originated at least 160 million years ago, possibly even more than 300 million years ago, from a gene duplication of IgY, in which the anaphylactic and opsonic activities of IgY were separated, giving rise to IgE and IgG, respectively. IgG now represented the opsonic activities, which are needed to label antigens with antibodies and complement factors to enable scavenger cells to recognizes and destroy the enemy. IgE was responsible for the anaphylactic activities, which represent another way of immune defense, which may involve the whole body. Apparently, in an evolutionary sense, anaphylactic defence mechanisms are needed, but at a potentially high price to the organism. “The division of anaphylactic and opsonic activities in separate genes allowed principally a tighter and more specific control of both immune mechanisms”, stresses Achatz.

In these days IgE is best known for its strong, unwanted effector functions, in the form of allergic reactions. These can range from annoying, local symptoms, like hay fever, to life-threatening, systemic reactions like anaphylactic shock. This underlines the potential hazard of high systemic IgE titres. Remarkably, over the last four
decades the incidence of allergic disease has risen. This represents an intriguing problem from a medical, epidemiological, immunological, genetic and evolutionary view. Unfortunately, it is also a major socio-economic problem. Achatz’ interpretation of these data is that control mechanisms, that were adequate in the past and honed in evolution, are failing. In the recent past he and others have described several B cell specific control mechanisms that indicate a tight control of the IgE response. The understanding of these mechanisms, combined with the analysis of the biological function of the IgE molecule during an immune response are the prerequisite for the establishment of new systemic IgE targeted therapeutic strategies in the future.

**Supplementing Babies’ Formula With DHA Boosts Cognitive Development, Study Finds**

ScienceDaily (Sep. 17, 2009) — Research has shown that children who were breast fed as infants have superior cognitive skills compared to those fed infant formula, and it’s thought that this is due to an essential fatty acid in breast milk called docosahexaenoic acid (DHA). Now a new study has found that babies fed formula supplemented with DHA have higher cognitive skills than babies fed regular formula.

The study, which used a more sensitive test of the babies’ cognitive abilities and higher concentrations of DHA than previous research, was carried out by researchers at the Retina Foundation of the Southwest and the University of Texas Southwestern Medical Center. It appears in the September/October 2009 issue of the journal *Child Development*.

The researchers studied 229 infants, who received either formula supplemented with DHA or traditional infant formula. The babies were given the different formulas either shortly after birth, after 6 weeks of breastfeeding, or after 4 to 6 months of breastfeeding. When they were 9 months old, they were given a problem-solving test in which they had to complete a sequence of steps to get a rattle.

Babies who were fed formula supplemented with DHA were more likely to get the rattle and showed more intentional behaviors that allowed them to get the rattle.

"Currently, there is no clear consensus on whether infant formula should be supplemented with DHA," notes lead author James R. Drover, a former postdoctoral fellow at the Retina Foundation of the Southwest who is now assistant professor of psychology at Memorial University in Canada.

"However, our results clearly suggest that feeding infants formula supplemented with high concentrations of DHA provides beneficial effects on cognitive development. Furthermore, because infants who display superior performance on the means-end problem-solving task tend to have superior IQ and vocabulary later in childhood, it’s possible that the beneficial effects of DHA extend well beyond infancy."

The study was funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

**Journal reference:**

September 29, 2009

**Probiotics: Looking Underneath the Yogurt Label**

By **TARA PARKER-POPE**

When the label tells you the food you are buying “contains probiotics,” are you getting health benefits or just marketing hype? Perhaps a bit of both.

Probiotics are live micro-organisms that work by restoring the balance of intestinal bacteria and raising resistance to harmful germs. Taken in sufficient amounts, they can promote digestive health and help shorten the duration of colds. But while there are thousands of different probiotics, only a handful have been proved effective in clinical trials. Which strain of bacteria a given product includes is often difficult to figure out.

There is no standard labeling requirement to help buyers make sense of probiotic products. The word “probiotic” on the label is not enough information to tell whether a given product will be effective for a particular health concern. Just as a doctor would prescribe different antibiotics for strep throat or tuberculosis, different probiotic species and strains confer different health benefits.

“It’s a huge problem for the consumer to try to make heads or tails of whether the products that are out there really work,” said Dr. Shira Doron, an assistant professor of medicine at Tufts. Consider Lactobacillus, a probiotic that comes in a number of strains, among them: Lactobacillus GG (often called LGG), which can be found in the diet supplement Culturelle as well as several milk products in Finland; L. casei.
DN114 001, included in Dannon products; and L. casei Shirota, found in Yakult, a popular probiotic drink from Japan.

Studies show that all of these strains are associated with reducing diarrhea; LGG, among the most studied, has also shown a benefit in treating atopic eczema and milk allergy in infants and children, according to a 2008 report in The Journal of Clinical Gastroenterology. Meanwhile, both LGG and Dannon’s L. casei strain have been shown in studies of children attending day care to reduce illness.

“Lactobacillus is just the bacterium,” said Gregor Reid, director of the Canadian Research and Development Center for Probiotics. “To say a product contains Lactobacillus is like saying you’re bringing George Clooney to a party. It may be the actor, or it may be an 85-year-old guy from Atlanta who just happens to be named George Clooney. With probiotics, there are strain-to-strain differences.”

The outcome of a recent legal case may help. Dannon, one of the biggest sellers of probiotic yogurts, settled a class-action lawsuit this month over its Activia yogurts and DanActive yogurt drinks, which claimed to help regulate digestion and stimulate the immune system. As part of the $35 million settlement, Dannon agreed to reimburse dissatisfied consumers and make labeling changes, among them adding the scientific names of probiotic strains it uses.

Dannon says that it settled the suit to avoid litigation and that it stands by all of its product claims. The company’s Web site lists numerous scientific studies of its patented probiotic strains.

“A scientific approach has been central to our business for decades,” said a spokesman, Michael Neuwirth, who added, “The essence of the claims of Activia and DanActive remain unchanged.”

So what health problems can probiotics really help? After gathering at a Yale workshop to review the available evidence, a panel of 12 experts concluded that there was strong evidence that several probiotic strains could reduce diarrhea, including that associated with antibiotic use. Several studies have also suggested that certain probiotics may be useful for irritable bowel syndrome, with the strongest recommendation for Bifidobacterium infantis 35624, the probiotic in the Procter & Gamble supplement Align. (Two members of the panel had ties to Procter & Gamble; three others had ties to other companies that sell probiotics.)

A variety of other claims for probiotics, like lowering cholesterol and blood pressure, preventing cavities and reducing cancer risk, were not reviewed by the panel.

And scientists continue to debate whether probiotics offer a meaningful benefit to the immune system.

“The evidence for the general immune strengthening is just not there,” said Barry R. Goldin, a Tufts professor who helped discover LGG but no longer receives royalties from the patent.

But the gastrointestinal tract is an important part of the immune system, and studies show that intestinal bacteria play an essential role in immune defenses. These bacteria not only aid digestion but essentially help form a protective barrier inside the intestine.

The Yale group, whose report appeared in The Journal of Clinical Gastroenterology in July 2008, concluded that the “immune response is definitely affected by the administration of probiotics.” But it did not decide whether probiotics were useful for general disease prevention and maintaining overall health, saying more study was needed. The group reported that many studies suggested that certain probiotics reduced duration of colds, along with time away from work and day care.

“Such findings,” the authors wrote, “suggest that probiotics might be of value for incorporation into the daily diet of healthy people for the purpose of staying healthy.”

Consumers interested in probiotics should look for products that list the specific strain on the label and offer readers easy access to scientific studies supporting the claims. A good place to find studies on various probiotic strains is the Web site www.PubMed.gov.

**Scientists discover clues to what makes human muscle age**
A study led by researchers at the University of California, Berkeley, has identified critical biochemical pathways linked to the aging of human muscle. By manipulating these pathways, the researchers were able to turn back the clock on old human muscle, restoring its ability to repair and rebuild itself.

The findings will be reported in the Sept. 30 issue of the journal *EMBO Molecular Medicine*, a peer-reviewed, scientific publication of the European Molecular Biology Organization.

"Our study shows that the ability of old human muscle to be maintained and repaired by muscle stem cells can be restored to youthful vigor given the right mix of biochemical signals," said Professor Irina Conboy, a faculty member in the graduate bioengineering program that is run jointly by UC Berkeley and UC San Francisco, and head of the research team conducting the study. "This provides promising new targets for forestalling the debilitating muscle atrophy that accompanies aging, and perhaps other tissue degenerative disorders as well."

Previous research in animal models led by Conboy, who is also an investigator at the Berkeley Stem Cell Center and at the California Institute for Quantitative Biosciences (QB3), revealed that the ability of adult stem cells to do their job of repairing and replacing damaged tissue is governed by the molecular signals they get from surrounding muscle tissue, and that those signals change with age in ways that preclude productive tissue repair.

Those studies have also shown that the regenerative function in old stem cells can be revived given the appropriate biochemical signals. What was not clear until this new study was whether similar rules applied for humans. Unlike humans, laboratory animals are bred to have identical genes and are raised in similar environments, noted Conboy, who received a New Faculty Award from the California Institute of Regenerative Medicine (CIRM) that helped fund this research. Moreover, the typical human lifespan lasts seven to eight decades, while lab mice are reaching the end of their lives by age 2.
Working in collaboration with Dr. Michael Kjaer and his research group at the Institute of Sports Medicine and Centre of Healthy Aging at the University of Copenhagen in Denmark, the UC Berkeley researchers compared samples of muscle tissue from nearly 30 healthy men who participated in an exercise physiology study. The young subjects ranged from age 21 to 24 and averaged 22.6 years of age, while the old study participants averaged 71.3 years, with a span of 68 to 74 years of age.

In experiments conducted by Dr. Charlotte Suetta, a post-doctoral researcher in Kjaer's lab, muscle biopsies were taken from the quadriceps of all the subjects at the beginning of the study. The men then had the leg from which the muscle tissue was taken immobilized in a cast for two weeks to simulate muscle atrophy. After the cast was removed, the study participants exercised with weights to regain muscle mass in their newly freed legs. Additional samples of muscle tissue for each subject were taken at three days and again at four weeks after cast removal, and then sent to UC Berkeley for analysis.

Morgan Carlson and Michael Conboy, researchers at UC Berkeley, found that before the legs were immobilized, the adult stem cells responsible for muscle repair and regeneration were only half as numerous in the old muscle as they were in young tissue. That difference increased even more during the exercise phase, with younger tissue having four times more regenerative cells that were actively repairing worn tissue compared with the old muscle, in which muscle stem cells remained inactive. The researchers also observed that old muscle showed signs of inflammatory response and scar formation during immobility and again four weeks after the cast was removed.

"Two weeks of immobilization only mildly affected young muscle, in terms of tissue maintenance and functionality, whereas old muscle began to atrophy and manifest signs of rapid tissue deterioration," said Carlson, the study's first author and a UC Berkeley post-doctoral scholar funded in part by CIRM. "The old muscle also didn't recover as well with exercise. This emphasizes the importance of older populations staying active because the evidence is that for their muscle, long periods of disuse may irrevocably worsen the stem cells' regenerative environment."

At the same time, the researchers warned that in the elderly, too rigorous an exercise program after immobility may also cause replacement of functional muscle by scarring and inflammation. "It's like a Catch-22," said Conboy.

The researchers further examined the response of the human muscle to biochemical signals. They learned from previous studies that adult muscle stem cells have a receptor called Notch, which triggers growth when activated. Those stem cells also have a receptor for the protein TGF-beta that, when excessively activated, sets off a chain reaction that ultimately inhibits a cell's ability to divide.

The researchers said that aging in mice is associated in part with the progressive decline of Notch and increased levels of TGF-beta, ultimately blocking the stem cells' capacity to effectively rebuild the body.

This study revealed that the same pathways are at play in human muscle, but also showed for the first time that mitogen-activated protein (MAP) kinase was an important positive regulator of Notch activity essential for human muscle repair, and that it was rendered inactive in old tissue. MAP kinase (MAPK) is familiar to developmental biologists since it is an important enzyme for organ formation in such diverse species as nematodes, fruit flies and mice.

For old human muscle, MAPK levels are low, so the Notch pathway is not activated and the stem cells no longer perform their muscle regeneration jobs properly, the researchers said.

When levels of MAPK were experimentally inhibited, young human muscle was no longer able to regenerate. The reverse was true when the researchers cultured old human muscle in a solution where activation of MAPK had been forced. In that case, the regenerative ability of the old muscle was significantly enhanced.

"The fact that this MAPK pathway has been conserved throughout evolution, from worms to flies to humans, shows that it is important," said Conboy. "Now we know that it plays a key role in regulation and aging of human..."
tissue regeneration. In practical terms, we now know that to enhance regeneration of old human muscle and restore tissue health, we can either target the MAPK or the Notch pathways. The ultimate goal, of course, is to move this research toward clinical trials."

**Natural Compound In Extra-virgin Olive Oil -- Oleocanthal -- May Help Prevent, Treat Alzheimer's**

ScienceDaily (Sep. 29, 2009) — Oleocanthal, a naturally-occurring compound found in extra-virgin olive oil, alters the structure of neurotoxic proteins believed to contribute to the debilitating effects of Alzheimer's disease. This structural change impedes the proteins' ability to damage brain nerve cells.

"The findings may help identify effective preventative measures and lead to improved therapeutics in the fight against Alzheimer's disease," said study co-leader Paul A.S. Breslin, PhD, a sensory psychobiologist at the Monell Center.

Known as ADDLs, these highly toxic proteins bind within the neural synapses of the brains of Alzheimer’s patients and are believed to directly disrupt nerve cell function, eventually leading to memory loss, cell death, and global disruption of brain function. Synapses are specialized junctions that allow one nerve cell to send information another.

"Binding of ADDLs to nerve cell synapses is thought to be a crucial first step in the initiation of Alzheimer's disease. Oleocanthal alters ADDL structure in a way that deters their binding to synapses," said William L. Klein, PhD, who co-led the research with Breslin. "Translational studies are needed to link these laboratory findings to clinical interventions." Klein is Professor of Neurobiology & Physiology, and a member of the Cognitive Neurology and Alzheimer's Disease Center, at Northwestern University.

Klein and his colleagues identified ADDLs in 1998, leading to a major shift in thinking about the causes, progression and treatment of Alzheimer's disease. Also known as beta-amyloid oligomers, ADDLs are structurally different from the amyloid plaques that accumulate in brains of Alzheimer's patients.

Reporting on a series of in vitro studies, the team of Monell and Northwestern researchers found that incubation with oleocanthal changed the structure of ADDLs by increasing the protein’s size.

Knowing that oleocanthal changed ADDL size, the researchers next examined whether oleocanthal affected the ability of ADDLs to bind to synapses of cultured hippocampal neurons. The hippocampus, a part of the brain intimately involved in learning and memory, is one of the first areas affected by Alzheimer's disease.

Measuring ADDL binding with and without oleocanthal, they discovered that small amounts of oleocanthal effectively reduced binding of ADDLs to hippocampal synapses. Additional studies revealed that oleocanthal can protect synapses from structural damage caused by ADDLs.

An unexpected finding was that oleocanthal makes ADDLs into stronger targets for antibodies. This action establishes an opportunity for creating more effective immunotherapy treatments, which use antibodies to bind to and attack ADDLs.

Breslin commented on the implications of the findings. "If antibody treatment of Alzheimer's is enhanced by oleocanthal, the collective anti-toxic and immunological effects of this compound may lead to a successful treatment for an incurable disease. Only clinical trials will tell for sure."

In earlier work at Monell, Breslin and co-workers used the sensory properties of extra virgin olive oil to identify oleocanthal based on a similar oral irritation quality to ibuprofen. Oleocanthal and ibuprofen also have similar anti-inflammatory properties, and ibuprofen – like extra virgin olive oils presumably rich in oleocanthal – is associated with a decreased risk of Alzheimer's when used regularly.

Future studies to identify more precisely how oleocanthal changes ADDL structure may increase understanding of the pharmacological actions of oleocanthal, ibuprofen, and structurally related plant compounds. Such pharmacological insights could provide discovery pathways related to disease prevention and treatment.

The findings are reported in the October 15 issue of *Toxicology and Applied Pharmacology*. 

**Eat Soybeans To Prevent Diseases, New Research Suggests**

ScienceDaily (Oct. 1, 2009) — Soybeans contain high levels of several health-beneficial compounds including tocopherols, which have antioxidant properties. These molecules can be used in the development of functional foods, which have specific health-beneficial properties and can be used in the treatment or prevention of diseases.

Tocopherols exist in four forms (α, β, γ, and δ) of which γ-tocopherol is found in greatest concentration in soybeans. However, α-tocopherol has the greatest antioxidant activity, and is the form converted to vitamin E in the human body. Thus, most interest for soybean tocopherols resides in α-tocopherol; however, certain health-properties
have also been attributed to other tocopherol forms and interest for these remains. It has been suggested that all tocopherols could play a role in cardiovascular diseases and cancer prevention.

Although few studies have determined soybean tocopherols concentration in a range of genotypes or environments, none has investigated differences among several early-maturing genotypes grown in multiple environments. Such study allows for the determination of the tocopherols concentration range found in soybean, but also to determine how genotypes perform and compare to each other in contrasting environments. Such information is vital for both plant breeders and agricultural producers.

Researchers at McGill University, the Centre de Recherche sur les Grains, and Agriculture and Agri-Food Canada in Quebec have investigated tocopherols concentration and stability, with an emphasis on α-tocopherol, among early-maturing genotypes grown in multiple environments, and determined the relationship between tocopherols concentration and other important seed characteristics. Their study was funded by research grants from the Ministère de l’Agriculture, des Pêcheries, et de l’Alimentation du Québec (MAPAQ) and the Natural Sciences and Engineering Research Council of Canada (NSERC). Results from the study are published in the September-October issue of *Agronomy Journal*. The research was also presented in Beijing, China at the 8th World Soybean Research Conference in August 2009.

Philippe Seguin, who led the study, stated “The large variation observed among genotypes for α-tocopherol, the relatively high stability of genotypes performance across environments, and the lack of negative correlation with other important seed characteristics suggest that selection for high α-tocopherol will be possible. Such characteristics will also help in the development of functional foods, which requires consistency in concentrations of health-beneficial compounds.”

Research is ongoing to identify factors affecting soybean tocopherols concentration. Preliminary results suggest that both specific environmental factors and management practices, such as seeding date, could significantly affect concentrations. Getting a better understanding of factors affecting soybean tocopherols concentration will help in the development of a new value-added use for soybean and thus to diversify markets for soybean producers.

Journal reference:

### Protection Or Peril? Gun Possession Of Questionable Value In An Assault, Study Finds

ScienceDaily (Sep. 30, 2009) — In a first-of-its-kind study, epidemiologists at the University of Pennsylvania School of Medicine found that, on average, guns did not protect those who possessed them from being shot in an assault. The study estimated that people with a gun were 4.5 times more likely to be shot in an assault than those not possessing a gun.

The study was released online this month in the *American Journal of Public Health*, in advance of print publication in November 2009.

“This study helps resolve the long-standing debate about whether guns are protective or perilous,” notes study author Charles C. Branas, PhD, Associate Professor of Epidemiology. “Will possessing a firearm always safeguard against harm or will it promote a false sense of security?”

What Penn researchers found was alarming – almost five Philadelphians were shot every day over the course of the study and about 1 of these 5 people died. The research team concluded that, although successful defensive gun uses are possible and do occur each year, the chances of success are low. People should rethink their possession of guns or, at least, understand that regular possession necessitates careful safety countermeasures, write the authors. Suggestions to the contrary, especially for urban residents who may see gun possession as a defense against a dangerous environment should be discussed and thoughtfully reconsidered.

A 2005 National Academy of Science report concluded that we continue to know very little about the impact of gun possession on homicide or the utility of guns for self-defense. Past studies had explored the relationship between homicides and having a gun in the home, purchasing a gun, or owning a gun. These studies, unlike the Penn study, did not address the risk or protection that having a gun might create for a person at the time of a shooting.

Penn researchers investigated the link between being shot in an assault and a person’s possession of a gun at the time of the shooting. As identified by police and medical examiners, they randomly selected 677 cases of Philadelphia residents who were shot in an assault from 2003 to 2006. Six percent of these cases were in possession of a gun (such as in a holster, pocket, waistband, or vehicle) when they were shot.

These shooting cases were matched to Philadelphia residents who acted as the study’s controls. To identify the controls, trained phone canvassers called random Philadelphians soon after a reported shooting and asked about their
possession of a gun at the time of the shooting. These random Philadelphians had not been shot and had nothing to do with the shooting. This is the same approach that epidemiologists have historically used to establish links between such things as smoking and lung cancer or drinking and car crashes.

“The US has at least one gun for every adult,” notes Branas. “Learning how to live healthy lives alongside guns will require more studies such as this one. This study should be the beginning of a better investment in gun injury research through various government and private agencies such as the Centers for Disease Control, which in the past have not been legally permitted to fund research ‘designed to affect the passage of specific Federal, State, or local legislation intended to restrict or control the purchase or use of firearms.’”

This study was funded by the National Institutes of Health. The authors are also indebted to numerous dedicated individuals at the Philadelphia Police, Public Health, Fire, and Revenue Departments as well as DataStat Inc, who collaborated on the study.

Journal reference:

Higher folates, not antioxidants, can reduce hearing loss risk in men

New research released at world’s largest ENT meeting
San Diego, CA – Increased intakes of antioxidant vitamins have no bearing on whether or not a man will develop hearing loss, but higher folate intake can decrease his risk by 20 percent, according to new research presented at the 2009 American Academy of Otolaryngology-Head and Neck Surgery Foundation (AAO-HNSF) Annual Meeting & OTO EXPO, in San Diego, CA.

The study, which identified 3,559 cases of men with hearing loss, found that there was no beneficial association with increased intakes of antioxidant vitamins such as C, E, and beta carotene. However, the authors found that men over the age of 60 who have a high intake of foods and supplement high in folates have a 20 percent decrease in risk of developing hearing loss.

Hearing loss is the most common sensory disorder in the United States, affecting more than 36 million people. High folate foods include leafy vegetables such as spinach, asparagus, turnip greens, lettuces, dried or fresh beans and peas, fortified cereal products, sunflower seeds and certain other fruits and vegetables are rich sources of folate. Baker’s yeast, liver and liver products also contain high amounts of folate.

The authors believe this is the largest study to delve prospectively into the relation between dietary intake and hearing loss. They used the most recent figures from the Health Professionals Follow-up Study cohort from years 1986 to 2004, a group consisting of 51,529 male health professionals. They were first enrolled into this study in 1986 and filled out detailed health and diet questionnaires every other year. The authors believe their findings can allow greater education, prevention, and screening efforts.

Title: Vitamin Intake and Risk of Hearing Loss in Men
Author: Josef Shargorodsky, MD; Gary Curhan, MD; Sharon Curhan, MD; Ronald Eavey, MD
Date: Monday, October 5, 2009, 10:30-11:50 am

Mediterranean diet associated with reduced risk of depression

Individuals who follow the Mediterranean dietary pattern—rich in vegetables, fruits, nuts, whole grains and fish—appear less likely to develop depression, according to a report in the October issue of Archives of General Psychiatry, one of the JAMA/Archives journals.

The lifetime prevalence of mental disorders has been found to be lower in Mediterranean than Northern European countries, according to background information in the article. One plausible explanation is that the diet commonly followed in the region may be protective against depression. Previous research has suggested that the monounsaturated fatty acids in olive oil—used abundantly in the Mediterranean diet—may be associated with a lower risk of severe depressive symptoms.

Almudena Sánchez-Villegas, B.Pharm., Ph.D., of University of Las Palmas de Gran Canaria and Clinic of the University of Navarra, Pamplona, Spain, and colleagues studied 10,094 healthy Spanish participants who completed an initial questionnaire between 1999 and 2005. Participants reported their dietary intake on a food frequency questionnaire, and the researchers calculated their adherence to the Mediterranean diet based on nine components (high ratio of monounsaturated fatty acids to saturated fatty acids; moderate intake of alcohol and dairy products; low intake of meat; and high intake of legumes, fruit and nuts, cereals, vegetables and fish).

After a median (midpoint) of 4.4 years of follow-up, 480 new cases of depression were identified, including 156 in men and 324 in women. Individuals who followed the Mediterranean diet most closely had a greater than 30 percent reduction in the risk of depression than whose who had the lowest Mediterranean diet scores. The
association did not change when the results were adjusted for other markers of a healthy lifestyle, including marital status and use of seatbelts.

"The specific mechanisms by which a better adherence to the Mediterranean dietary pattern could help to prevent the occurrence of depression are not well known," the authors write. Components of the diet may improve blood vessel function, fight inflammation, reduce risk for heart disease and repair oxygen-related cell damage, all of which may decrease the chances of developing depression.

"However, the role of the overall dietary pattern may be more important than the effect of single components. It is plausible that the synergistic combination of a sufficient provision of omega-three fatty acids together with other natural unsaturated fatty acids and antioxidants from olive oil and nuts, flavonoids and other phytochemicals from fruit and other plant foods and large amounts of natural folates and other B vitamins in the overall Mediterranean dietary pattern may exert a fair degree of protection against depression," the authors write.

(Arch Gen Psychiatry. 2009;66[10]:1090-1098. Available pre-embargo to the media at www.jamamedia.org.)

Scientists Develop Nasal Spray That Improves Memory

ScienceDaily (Oct. 2, 2009) — Good news for procrastinating students: a nasal spray developed by a team of German scientists promises to give late night cram sessions a major boost, if a good night’s sleep follows. In a research report featured as the cover story of the October 2009 print issue of The FASEB Journal, these scientists show that a molecule from the body's immune system (interleukin-6) when administered through the nose helps the brain retain emotional and procedural memories during REM sleep.

"Sleep to remember, a dream or reality?" said Lisa Marshall, co-author of the study, from the Department of Neuroendocrinology at the University of Lubeck in Germany. "Here, we provide the first evidence that the immunoregulatory signal interleukin-6 plays a beneficial role in sleep-dependent formation of long-term memory in humans."

To make this discovery, Marshall and colleagues had 17 healthy young men spend two nights in the laboratory. On each night after reading either an emotional or neutral short story, they sprayed a fluid into their nostrils which contained either interleukin-6 or a placebo fluid. The subsequent sleep and brain electric activity was monitored throughout the night. The next morning subjects wrote down as many words as they could remember from each of the two stories. Those who received the dose of IL-6 could remember more words.

"If a nasal spray can improve memory, perhaps we're on our way to giving some folks a whiff of common sense, such as accepting the realities of evolution," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "This is exciting piece of interdisciplinary science, since IL-6 had previously been considered a by-product of inflammation, not an agent that affects cognition."

Journal reference:

High-fat Diet Impairs Muscle Health Before Impacting Function

ScienceDaily (Oct. 6, 2009) — Skeletal muscle plays a critical role in regulating blood sugar levels in the body. But few studies have comprehensively examined how obesity caused by a high-fat diet affects the health of muscle in adolescents who are pre-diabetic.

In a paper published in the scientific journal PLoS ONE, a team of McMaster University researchers report that the health of young adult muscle declines during the pre-diabetic state, which is when blood sugar levels are higher than normal but lower than during type 2 diabetes. The researchers found that during this period significant impairments occur in the muscle, even though it appears to be functioning normally.

"Based on the way the muscles performed, you would think that they're still healthy," said Thomas Hawke, an associate professor of pathology and molecular medicine of the Michael G. DeGroote School of Medicine at McMaster University. "But the fact is the muscle is not healthy. It's undergone a lot of pathological changes."

Hawke led a team of researchers at McMaster and York universities in using mice to examine how a high-fat diet, leading to obesity, affected the form and function of skeletal muscle. The researchers found the high-fat diet resulted in insulin resistance, large increases in fat mass and weight gain. But it also led to initial adaptations in the muscle.

"What our results tell us is that, initially, skeletal muscle appears to respond positively to the high-fat diet. By changing the size or type of its muscle fibres, the muscle adapts to the high-fat diet by saying 'Let's burn more of this fuel,'" Hawke said.
"But with continued high-fat feeding, we're giving the muscle more fuel than it can handle. So, even though it has made these initial, positive changes, continued high-fat feeding is more than the muscle can cope with. That's when a downward spiral starts."

The researchers also discovered that not all muscles responded in the same way to obesity. Some adapted by changing their fibre type, while others altered the size of their fibres. But, in all cases analyzed, a high-fat diet decreased the ability of skeletal muscle to use fat or glucose as fuel.

When the researchers looked at function, and examined the maximum effort the muscles could generate, they discovered no difference between the high-fat diet group and the control group which was eating a diet significantly lower in fat. However, if the muscles were fatigued and then were required to work, the high-fat diet group didn't recover as quickly as the control group.

"What this suggests is that the muscle is trying to maintain function despite all the negative changes that have resulted," Hawke said. "When we stress the muscle a bit though, such as fatiguing it, there are some hints toward functional impairment, but overall the muscle has coped well, functionally anyways."

The authors concluded that early therapeutic interventions in obese, pre-diabetic youth are needed prior to significant long-term effects on the growth and function of their muscles.

In Canada, 2.4 million people are living with diabetes and up to six million more have pre-diabetes, according to the Canadian Diabetes Association. If left untreated, approximately 25 per cent of people with pre-diabetes will progress to diabetes within three to five years.

Light Shed On The Secret Behind Probiotic Bacteria Promoting Health
ScienceDaily (Oct. 5, 2009) — Functional food is the food industry’s fastest-growing product group, its leading products including dairy products which contain probiotics, that is, bacteria promoting health. Valio’s Lactobacillus rhamnosus GG (LGG®) is the most frequently studied and used probiotic.

Under the supervision of researchers at the Institute of Biotechnology, and the Department of Basic Veterinary Sciences at the University of Helsinki, an international research team determined the genome sequences of LGG and a bacterium closely related to it. The results, published in the renowned PNAS journal, shed light on the origin of probiotic mechanisms and promote product development in the food industry.

Functional food includes products designed for daily use, which have been shown by clinical studies to have positive health effects. Scientific study results have particularly contributed to the success of dairy products containing probiotic bacteria. Many research publications have confirmed that these bacteria promote health and boost immune system and improve digestion. Some probiotics can also alleviate the symptoms suffered by those with irritable bowel syndrome. As many as every fifth westerner suffers from this pain, also called spastic colon. Studies say that LGG probiotics are also an effective treatment method for reducing children’s atopic symptoms, and the risk of respiratory infections.

In its recent publication, the research team showed that the protein component found by the team has a fundamental role in LGG binding with the human intestinal mucus. The team found out that the surface structures of LGG has a specific adhesion component. Remarkably, the binding feature has been assumed to be one of the most important characteristics of bacteria with health-benefiting effects. Moreover, the researchers assume that the protein structure in question enables the health-promoting effects of LGG and other probiotic bacteria, and the positive immune modulation produced by them.

The research is a prime example of productive co-operation between researchers and the food industry. According to Tuomas Salusjärvi, research manager for Valio, the successful sequencing provides valuable additional information to support the already existing research information. The safety of the LGG probiotic and its advantages to consumers can now be shown in an even better way than before. A significant research field has been established around probiotic bacteria. So far, thousands of scientific articles have been published on the subject. For this line of research, the findings of the genome, and the molecular mechanism possibly behind probiotics, are a breakthrough.

Journal reference:
Kankainen et al. Comparative genomic analysis of Lactobacillus rhamnosus GG reveals pili containing a human-mucus binding protein. Proceedings of the National Academy of Sciences, 2009; DOI: 10.1073/pnas.0908876106

Trial raises doubts over alternative pain therapy for arthritis
Posted on 16 October 2009
Copper bracelets and magnetic wrist straps are ineffective in relieving arthritis pain, according to a new study led by a University of York academic.
Researchers conducted the first randomised placebo-controlled trial on the use of both copper bracelets and magnetic wrist straps for pain management in osteoarthritis – the most common form of the condition.

The devices are used worldwide for helping to manage pain associated with chronic musculoskeletal disorders. The results of this trial conflict with those from previous studies, by showing that both magnetic and copper bracelets were ineffective for managing pain, stiffness and physical function in osteoarthritis. The research is published in the latest issue of the journal *Complementary Therapies in Medicine*.

The trial was led by Stewart Richmond, a Research Fellow in the Department of Health Sciences at the University of York, who said: “This is the first randomised controlled trial to indicate that copper bracelets are ineffective for relieving arthritis pain.”

“It appears that any perceived benefit obtained from wearing a magnetic or copper bracelet can be attributed to psychological placebo effects. People tend to buy them when they are in a lot of pain, then when the pain eases off over time they attribute this to the device. However, our findings suggest that such devices have no real advantage over placebo wrist straps that are not magnetic and do not contain copper.

“Although their use is generally harmless, people with osteoarthritis should be especially cautious about spending large sums of money on magnet therapy. Magnets removed from disused speakers are much cheaper, but you would first have to believe that they could work.”

The trial involved 45 people aged 50 or over, who were all diagnosed as suffering from osteoarthritis. Each participant wore four devices in a random order over a 16-week period – two wrist straps with differing levels of magnetism, a demagnetised wrist strap and a copper bracelet.

The study revealed no meaningful difference between the devices in terms of their effects on pain, stiffness and physical function.

Magnet therapy is a rapidly growing industry, with annual worldwide sales of therapeutic devices incorporating permanent magnets worth up to $4 billion US.

The trial also involved researchers from the universities of Hull, Durham, and the NHS.

Reference:
The paper ‘Therapeutic effects of magnetic and copper bracelets in osteoarthritis: A randomised placebo-controlled crossover trial’ is available in Complementary Therapies in Medicine at: [http://linkinghub.elsevier.com/retrieve/pii/S0965229909000569](http://linkinghub.elsevier.com/retrieve/pii/S0965229909000569)

NYTimes, October 14, 2009, 12:01 am

**Phys Ed: Does Exercise Boost Immunity?**

*By Gretchen Reynolds*

Two recent experiments hit rather close to home at this time of year. In the first, published last year in the journal *Brain, Behavior, and Immunity*, researchers divided mice into two groups. One rested comfortably in their cages. The other ran on little treadmills until they were exhausted. This continued for three days. The mice were then exposed to an influenza virus. After a few days, more of the mice who’d exhausted themselves running came down with the flu than the control mice. They also had more severe symptoms.

In the second experiment, published in the same journal, scientists from the University of Illinois and other schools first infected laboratory mice with flu. One group then rested; a second group ran for a leisurely 20 or 30 minutes, an easy jog for a mouse; the third group ran for a taxing two and a half hours. Each group repeated this routine for three days, until they began to show flu symptoms. The flu bug used in this experiment is devastating to rodents, and more than half of the sedentary mice died. But only 12 percent of the gently jogging mice passed away. Meanwhile, an eye-popping 70 percent of the mice in the group that had run for hours died, and even those that survived were more debilitated and sick than the control group.

Is this good news or bad? This is a particularly relevant question as two important human events converge: the peaking of the fall marathon and other sports seasons and the simultaneous onset of the winter cold and flu term. Scientists are diligently working to answer that question, perhaps because they are as interested as the rest of us in avoiding or lessening the severity of colds and the flu. The bulk of the new research, including the mouse studies mentioned, reinforce a theory that physiologists advanced some years ago, about what they call “a J-shaped curve” involving exercise and immunity. In this model, the risk both of catching a cold or the flu and of having a particularly severe form of the infection “drop if you exercise moderately,” says Mary P. Miles, PhD, an associate professor of exercise sciences at Montana State University and the author of an editorial about exercise and immunity published in the most recent edition of the journal Exercise and Sport Sciences Review. But the risk both of catching an illness and of becoming especially sick when you do “jump right back up” if you exercise intensely or for a prolonged period of time, surpassing the risks among the sedentary. (Although definitions of intense exercise...
T1- and T2-helper cells must be exquisitely calibrated. Other workouts may shut down that first line of defense before it has completed its work, which could lead, Woods says. "Moderate exercise appears to suppress TH1 a little, increase TH2 a little," Woods says. "And moderate exercise may prop up your immune response and lessen the duration and severity of a mild infection, but be honest about your condition. "If you don’t feel well, especially if you have fever or body aches, I would recommend stopping daily exercise until you are recovered," Woods says. "It is okay to exercise if you have a simple head cold or congestion — in fact, it may improve the way you feel. I would avoid heavy, prolonged exercise with a head cold, though," since it can unbalance that important T1 and T2-helper cell response.

If scientists aren’t sure yet why intense exercise temporarily depresses the immune system, however, they seem to be closer to understanding why, once you’ve caught a bug, intense exercise can make the symptoms and severity worse. In work at the University of Illinois, reported last month in the journal Exercise and Sport Sciences Review, some of the same scientists who’d studied mice and flu looked at just what was going on inside the cells of the affected animals. They found that the leisurely jogging rodents showed signs of a very particular immune response to the flu. In general, and this is true in both mice and men, says Jeffrey A. Woods, a professor of kinesiology and community health at the University of Illinois and one of the scientists involved, viruses evoke an increase in what are called T1-type helper immune cells. These T1-helper cells induce inflammation and other changes in the body that represent a first line of defense against an invading virus. But if the inflammation, at first so helpful, continues for too long, it becomes counterproductive. The immune system needs, then, at some point to lessen the amount of T1-mediated inflammatory response, so that, in fighting the virus, it doesn’t accidentally harm its own host. The immune system does this by gradually increasing the amount of another kind of immune cell, T2-helper cells, which produce mostly an anti-inflammatory immune response. They’re water to the T1 fire. But the balance between the T1- and T2-helper cells must be exquisitely calibrated.

In the mice at the University of Illinois, moderate exercise subtly hastened the shift from a T1 response to a T2-style immune response — not by much, but by just enough, apparently, to have a positive impact against the flu. "Moderate exercise appears to suppress TH1 a little, increase TH2 a little," Woods says.

On the other hand, intense or prolonged exercise "may suppress TH1 too much," he says. Long, hard runs or other workouts may shut down that first line of defense before it has completed its work, which could lead, Woods says “to increased susceptibility to viral infection.” So, if you have just completed a strenuous 20-mile training run and have, in consequence, a depressed immune response, avoid colleagues who are sniffling. Wash your hands often. "I would recommend everyone get the annual influenza vaccination and the new H1N1 vaccination," Woods says. But if all of that has been for naught and you now feel the early stirrings of sickness, “listen to your body and be prudent in your exercise decisions,” Woods says. In general, moderate exercise, such as a leisurely jog or walk, may prop up your immune response and lessen the duration and severity of a mild infection, but be honest about your condition. "If you don’t feel well, especially if you have fever or body aches, I would recommend stopping daily exercise until you are recovered," Woods says. "It is okay to exercise if you have a simple head cold or congestion — in fact, it may improve the way you feel. I would avoid heavy, prolonged exercise with a head cold, though," since it can unbalance that important T1 and T2-helper cell response.

And take comfort in the results of the most recent study to look at actual, practicing marathoners. In it, 1,694 runners at the 2000 Stockholm Marathon informed researchers about any colds or other infectious illness they developed in the three weeks before or three weeks after the race. Nearly one-fifth of the runners fell ill during that time period. That’s higher than the rates in people generally, but it still means that the overwhelming majority of runners didn’t get sick.

Balancing Protein Intake, Not Cutting Calories, May Be Key to Long Life
ScienceDaily (Dec. 6, 2009) — Getting the correct balance of proteins in our diet may be more important for healthy ageing than reducing calories, new research funded by the Wellcome Trust and Research into Ageing suggests.

The research may help explain why ’dietary restriction’ (also known as calorie restriction) -- reducing food intake whilst maintaining sufficient quantities of vitamins, minerals and other important nutrients -- appears to have health benefits. In many organisms, such as the fruit fly (drosophila), mice, rats and the Rhesus monkey, these
benefits include living longer. Evidence suggests that dietary restriction can have health benefits for humans, too, though it is unclear whether it can increase longevity.

Dietary restriction can have a potentially negative side effect, however: diminished fertility. For example, the female fruit fly reproduces less frequently on a low calorie diet and its litter size is reduced, though its reproductive span lasts longer. This is believed to be an evolutionary trait: in times of famine, essential nutrients are diverted away from reproduction and towards survival.

To understand whether the health benefits of dietary restriction stem from a reduction in specific nutrients or in calorie intake in general, researchers at the Institute of Healthy Ageing, UCL (University College London), measured the effects of manipulating the diet of female fruit flies. The results of the study are published December 3 in the journal Nature.

The fruit flies were fed a diet of yeast, sugar and water, but with differing amounts of key nutrients, such as vitamins, lipids and amino acids. The researchers found that varying the amount of amino acids in the mixture affected lifespan and fertility; varying the amount of the other nutrients had little or no effect.

In fact, when the researchers studied the effect further, they found that levels of a particular amino acid known as methionine were crucial to maximising lifespan without decreasing fertility. Adding methionine to a low calorie diet boosted fertility without reducing lifespan; likewise, reducing methionine content in a high calorie diet prolonged lifespan. Previous studies have also shown that reducing the intake of methionine in rodents can help extend lifespan.

"By carefully manipulating the balance of amino acids in the diet, we have been able to maximise both lifespan and fertility," explains Dr Matthew Piper, one of the study authors. "This indicates that it is possible to extend lifespan without wholesale dietary restriction and without the unfortunate consequence of lowering reproductive capacity."

Amino acids are the building blocks of life as they form the basis of proteins. Methionine is one of the most important amino acids at it is essential to the formation of all proteins. Whilst proteins are formed naturally in the body, we also consume proteins from many different food types, including meat and dairy products, soy-derived food such as tofu, and pulses. The relative abundance of methionine differs depending on the food type in question; it occurs in naturally high levels in foods such as sesame seeds, Brazil nuts, wheat germ, fish and meats.

"In the past, we have tended to think that the amount of protein is what is important to our diet," says Dr Piper. "We've shown here that in flies -- and this is likely to be the case for other organisms -- the balance of amino acids in the diet can affect health later in life. If this is the case for humans, then the type of protein will be more important.

"It's not as simple as saying 'eat less nuts' or 'eat more nuts' to live longer -- it's about getting the protein balance right, a factor that might be particularly important for high protein diets, such as the Atkins diet or body builders' protein supplements."

Because the effects of dietary restriction on lifespan appears to be evolutionarily conserved -- occurring in organisms from yeast to monkeys -- scientists believe that the mechanisms may also be conserved. This opens up the possibility of using these organisms as models to study how dietary restriction works.

Although the human genome has around four times the number of genes as the fruit fly genome, there is a close relationship between many of these genes. Since it is easy to create mutants and carry out experiments on fruit flies, the functions of many fly genes have been established and newly discovered human genes can often be matched against their fly counterparts. Therefore, even though the fruit fly does not on the surface resemble humans, many findings about its basic biology can be interpreted for human biology.

Journal References:

Green Tea Chemical Combined With Another May Hold Promise for Treatment of Brain Disorders
ScienceDaily (Dec. 6, 2009) — Scientists at Boston Biomedical Research Institute (BBRI) and the University of Pennsylvania have found that combining two chemicals, one of which is the green tea component EGCG, can prevent and destroy a variety of protein structures known as amyloids. Amyloids are the primary culprits in fatal brain disorders such as Alzheimer's, Huntington's, and Parkinson's diseases. Their study, published in the current issue of Nature Chemical Biology (December 2009), may ultimately contribute to future therapies for these diseases.
These findings are significant because it is the first time a combination of specific chemicals has successfully destroyed diverse forms of amyloids at the same time," says Dr. Martin Duennwald of BBRI, who co-led the study with Dr. James Shorter of University of Pennsylvania School of Medicine.

For decades a major goal of neurological research has been finding a way to prevent the formation of and to break up and destroy amyloid plaques in the brains and nervous systems of people with Alzheimer's and other degenerative diseases before they wreak havoc.

Amyloid plaques are tightly packed sheets of proteins that infiltrate the brain. These plaques, which are stable and seemingly impenetrable, fill nerve cells or wrap around brain tissues and eventually (as in the case of Alzheimer's) suffocate vital neurons or brain cells, causing loss of memory, language, motor function and eventually premature death.

To date, researchers have had no success in destroying plaques in the human brain and only minimal success in the laboratory. One reason for these difficulties in finding compounds that can dissolve amyloids is their immense stability and their complex composition.

Yet, Duennwald experienced success in previous studies when he exposed amyloids in living yeast cells to EGCG. Furthermore, he and his collaborators also found before that DAPH-12, too, inhibits amyloid production in yeast.

In their new study, the team decided to look in more detail at the impact of these two chemicals on the production of different amyloids produced by the yeast amyloid protein known as PSI+. They chose this yeast amyloid protein because it has been studied extensively in the past, and because it produces varieties of amyloid structures that are prototypes of those found in the damaged human brain. Thus, PSI+ amyloids are excellent experimental paradigms to study basic properties of all amyloid proteins.

The team's first step was to expose two different amyloid structures produced by yeast (e.g., a weak version and a strong version) to EGCG. They found that the EGCG effectively dissolved the amyloids in the weaker version. To their surprise, they found that the stronger amyloids were not dissolved and that some transformed to even stronger versions after exposure to EGCG.

The team then exposed the yeast amyloid structures to a combination of the EGCG and the DAPH-12 and found that all of the amyloid structures broke apart and dissolved.

The next steps for the research team will be to explore the mechanism and potency of such a combinatorial therapy for the treatment of diverse neurodegenerative diseases. "Our findings are certainly preliminary and we need further work to fully comprehend the effects of EGCG in combination with other chemicals on amyloids. Yet, we see our study as a very exciting initial step towards combinatorial therapies for the treatment of amyloid-based diseases," says Duennwald.

December 10, 2009
Personal Best

Ready to Exercise? Check Your Watch

By GINA KOLATA

MY friend Jen Davis and I often run together in the morning because it can be easier to fit in a run before work than after. But we always thought we ran better in the evening.

Then I accidentally discovered something weird. I took a spinning class one Thursday night, and my heart rate, measured by a monitor strapped around my chest, soared. I don’t usually use a heart-rate monitor, but with stationary bikes, heart rate is pretty much the only way to know how hard you are working. And that night, my high heart rate told me it really was a tough workout.

The next morning I did a workout in my garage on a trainer — a device that holds a road bike, turning it into a stationary bike and yet allowing you to use its gears. My heart rate was about 15 beats a minute lower than it had been the night before. It seemed like a pitiful workout.

So the next night I got on the trainer again. I had the same playlist (I use music to set my cadence). I used the same gears for each song. And during the hourlong workout, my average heart rate and my maximum heart rate were about 15 beats a minute higher than they’d been the morning before.

I tried again the next morning. My heart rate was low. Intrigued, I tried my experiment for a week, alternating between early morning and early evening workouts. I got really sick of that playlist, but I wanted to control every variable.

And the pattern persisted: high heart rate at night, low in the morning for the identical workout. Once I even tried the workout in midday — that time, my heart rate was in between.
Could it be that I actually was a more efficient athlete in the morning, doing the same work but with less effort, as measured by a lower heart rate?

Jen reminded me that we’d seen the heart-rate effect last year but had not appreciated it. I had a stress fracture and was confined to pool running, which involves sprinting in the deep end of a pool. Your feet never touch the bottom. It was hard to gauge how hard we were working, so Jen and I wore heart rate monitors, just as we do in spinning classes.

We did the pool workouts together, and neither of us got our heart rates as high as we wanted in the morning. Evenings were fine, though. We thought we were just sluggish in the morning.

I also asked some friends who use heart rate monitors if they’d noticed anything like what I’d experienced. Tara Martin, a triathlete, said she could never get her heart rate up in the morning.

Richard Friedman, a swimmer, said his heart rate was always lower in the morning. His swim team does the same workout in the morning as in the evening, and he swims it just as fast. He had assumed that somehow he was just not putting in the same effort early in the day. “Still,” he said, “I’m pretty energetic all the time.”

I asked Dr. William Haskell, an exercise researcher and emeritus professor of medicine at Stanford, if I’d stumbled on a known fact about heart rates. But he was baffled. Maybe I didn’t have caffeine in the morning? So I tried taking NoDoz before the next morning workout. It made no difference.

Dr. William Roberts, a former president of the American College of Sports Medicine and a family physician at the University of Minnesota, said it was a “tough question.” He added, “I do not have a good physiologic explanation for the phenomenon you are describing.”

But, it turns out, a small group of researchers has studied the question of exercise performance and time of day, even doing studies of heart rates. And not only are performances better in the late afternoon and early evening, but, contrary to what exercise physiologists would predict, heart rates are also higher for the same effort.

One recent study, by the late Thomas Reilly and his colleagues at the Research Institute for Sport and Exercise Sciences at Liverpool John Moores University in England, found that people’s maximum heart rates and sub-maximal heart rates were lower in the morning but that their perception of how hard they were working was the same in the morning as it was later in the day.

Dr. Reilly and his colleague Jim Waterhouse, in a review published this year, also noted that athletes’ best performances, including world records, were typically set in the late afternoon or early evening.

Greg Atkinson, also at Liverpool John Moores University, said that some researchers, noticing that heart rates during exercise were lower in the morning, reasoned the way I did — that people must be more efficient in the morning. It would mean that exercise was easier in the morning. Of course, it seemed harder to me, but I could have been deluding myself. Not really, Dr. Atkinson said. It actually is harder to exercise in the morning.

“Most components (strength, power, speed) of athletic performance are worst in the early hours of the morning,” he wrote in an e-mail message. “Ratings of perceived exertion during exercise have generally been found to be highest in the early morning.”

If you exercise later in the day, your muscles are more flexible and stronger and your heart and lungs are more efficient, said Michael H. Smolensky, an expert in chronobiology, the study of the body clock.

“If a heart rate of 140 in the morning indicative of the same level of workout cost as in the afternoon?” asked Dr. Smolensky, a visiting professor at the University of Texas Health Sciences Center in Houston.

“I would say no,” he added. “Exercise physiologists say you should be able to perform at the same level with a heart rate of 140 in the morning as in the afternoon or early evening. But chronobiologists say your capacity to generate and tolerate a higher heart rate is better later in the day.”

“In the afternoon and evening,” Dr. Smolensky said, “you are in a different biological state.”

But, he added, all this applies to people who are regular exercisers, who work out vigorously three or more times a week. People who are not regular exercisers, Dr. Smolensky said, put much more strain on their hearts in the morning, making their heart rates higher then.

In fact, Dr. Smolensky added, people at risk for a heart attack should plan their workouts for late afternoon or early evening.

But if you are used to regular exercise, is it better to train in the early evening?

“I really don’t know the answer,” Dr. Smolensky said.

“My personal approach is to train when your biological efficiency is greatest, which means late afternoon or early evening for most people,” he said. “Others say if you train when your biological efficiency is least you will get a harder workout.”

Some elite athletes prefer morning workouts for reasons that have nothing to do with research studies.

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Deena Kastor, who holds the American marathon record, said her former coach and mentor, Joe Vigil, insisted on morning workouts. He told her that there was more fluid between the vertebrae of the spine after a night in bed, Ms. Kastor said. And, she said, “fluid made your spine more forgiving and more able to absorb the pounding of running.” She noted that she had been running in the morning for the last 13 years “with very little injury.”

But when people compete, if, for example, they want a personal best time, they might want to seek out one of the few events that start late in the day. Or, even better, it might make sense for endurance events, like marathons, to start in the afternoon instead of the morning, when they almost always are held. Maybe they could be held later in the year, to avoid afternoon heat.

Dr. Smolensky agreed.

“Most marathons start early under the guise that it’s cooler then,” he said. “That needs to be looked at.”

Older Dental Fillings Contain Form of Mercury Unlikely to Be Toxic, Study Finds

ScienceDaily (Dec. 12, 2009) — A new study on the surface chemistry of silver-colored, mercury-based dental fillings suggests that the surface forms of mercury may be less toxic than previously thought.

It appears online in ACS’ journal Chemical Research in Toxicology.

In the study, Graham George and colleagues note that mercury-based fillings, also called amalgams, have been used by dentists to repair teeth for well over a century. In recent decades their use has become controversial because of concerns about exposure to potentially toxic mercury. However, mercury can potentially exist in several different chemical forms, each with a different toxicity. Prior to this report, little was known about how the chemical forms of mercury in dental amalgam might change over time.

Using a special X-ray technique, the scientists analyzed the surface of freshly prepared metal fillings and compared these with the surface of aged fillings (about 20 years old) from a dental clinic. Fresh fillings contained metallic mercury, which can be toxic. Aged fillings, however, typically contain a form of mercury, called beta-mercuric sulfide or metacinnabar, which is unlikely to be toxic in the body.

The scientists found that the surfaces of metal fillings seem to lose up to 95 percent of their mercury over time. Loss of potentially toxic mercury from amalgam may be due to evaporation, exposure to some kinds of dental hygiene products, exposure to certain foods, or other factors.

The scientists caution that “human exposure to mercury lost from fillings is still of concern.”

Journal Reference:

New Study Links DHA Type of Omega-3 to Better Nervous-System Function

ScienceDaily (Dec. 19, 2009) — The omega-3 essential fatty acids commonly found in fatty fish and algae help animals avoid sensory overload, according to research published by the American Psychological Association. The finding connects low omega-3s to the information-processing problems found in people with schizophrenia; bipolar, obsessive-compulsive, and attention-deficit hyperactivity disorders; Huntington's disease; and other afflictions of the nervous system.

The study, reported in the journal Behavioral Neuroscience, provides more evidence that fish is brain food. The key finding was that two omega-3 fatty acids -- docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) -- appear to be most useful in the nervous system, maybe by maintaining nerve-cell membranes.

"It is an uphill battle now to reverse the message that 'fats are bad,' and to increase omega-3 fats in our diet," said Norman Salem Jr., PhD, who led this study at the Laboratory of Membrane Biochemistry and Biophysics at the National Institute on Alcohol Abuse and Alcoholism.

The body cannot make these essential nutrients from scratch. It gets them by metabolizing their precursor, α-linolenic acid (LNA), or from foods or dietary supplements with DHA and EPA in a readily usable form. "Humans can convert less than one percent of the precursor into DHA, making DHA an essential nutrient in the human diet," added Irina Fedorova, PhD, one of the paper's co-authors. EPA is already known for its anti-inflammatory and cardiovascular effects, but DHA makes up more than 90 percent of the omega-3s in the brain (which has no EPA), retina and nervous system in general.

In the study, the researchers fed four different diets with no or varying types and amounts of omega-3s to four groups of pregnant mice and then their offspring. They measured how the offspring, once grown, responded to a classic test of nervous-system function in which healthy animals are exposed to a sudden loud noise. Normally, animals flinch. However, when they hear a softer tone in advance, they flinch much less. It appears that normal
nervous systems use that gentle warning to prepare instinctively for future stimuli, an adaptive process called sensorimotor gating.

Only the mice raised on DHA and EPA, but not their precursor of LNA, showed normal, adaptive sensorimotor gating by responding in a significantly calmer way to the loud noises that followed soft tones. The mice in all other groups, when warned, were startled nearly as much by the loud sound. When DHA was deficient, the nervous system most obviously did not downshift. That resulted in an abnormal state that could leave animals perpetually startled and easily overwhelmed by sensory stimuli.

The authors concluded that not enough DHA in the diet may reduce the ability to handle sensory input. "It only takes a small decrement in brain DHA to produce losses in brain function," said Salem.

In humans, weak sensorimotor gating is a hallmark of many nervous-system disorders such as schizophrenia or ADHD. Given mounting evidence of the role omega-3s play in the nervous system, there is intense interest in their therapeutic potential, perhaps as a supplement to medicines. For example, people with schizophrenia have lower levels of essential fatty acids, possibly from a genetic variation that results in poor metabolism of these nutrients.

More broadly, the typical American diet is much lower in all types of omega-3 than in omega-6 essential fatty acids, according to Salem. High intake of omega-6, or linoleic acid, reduces the body's ability to incorporate omega-3s. As a result, "we have the double whammy of low omega-3 intake and high omega-6 intake," he said.

Journal Reference:

New Filling, Cooling and Storage System May Prevent Bacterial Growth and Prolong Shelf Life of Orange Juice

ScienceDaily (Dec. 21, 2009) — Researchers in Brazil have estimated the growth timeline of a bacterium that causes orange juice spoilage during shelf life (approximately 6 months) and developed a safe and inexpensive filling, cooling, and storage protocol that inhibits bacterial growth and offers an alternative to other proposed treatments.

They report their findings in the December 2009 issue of the journal Applied and Environmental Microbiology. Alicyclobacillus sp. was first attributed to spoiled apple juice, or "off" flavors, in 1982 and Alicyclobacillus acidoterrestris is recognized as the most significant spoilage species within the family. Its ability to grow in a broad temperature range under acidic conditions and withstand heat allows for both survival during pasteurization and growth during juice storage and creates a continuous challenge for fruit juice and beverage industries worldwide.

Pasteurization followed by hot-fill or cold-fill processes are the two main methods used by the fruit juice industry to eradicate bacterial presence. Hot-filling, described as heating the product to approximately 200°Fahrenheit and holding for 15 to 20 seconds then filling into the package and cooling at room temperature, has been used extensively to process fruit drinks. However, the extended time that the product is maintained at room temperature allows for growth of bacteria such as A. acidoterrestris that can thrive in a wide temperature range. In the study researchers estimated and compared growth timelines of A. acidoterrestris in hot-filled orange juice following pasteurization that was cooled and stored in various conditions ranging from 68˚ to 95˚ Fahrenheit and inoculated with two different amounts of the bacterium. Only one treatment involving storage at 68˚ completely inhibited A. acidoterrestris growth for the full 6-month shelf life.

"In conclusion, treatment 5 (storage at 20˚C) was more efficient than any of the others since in this case the A. acidoterrestris population remained inhibited for the entire shelf-life of the orange juice,” say the researchers. "This measure can be considered a safe, easy, and inexpensive alternative procedure to avoid A. acidoterrestris growth during the orange juice shelf-life."

Journal Reference:

Pomegranates: Latest Weapon in the Fight Against MRSA

ScienceDaily (Dec. 22, 2009) — Pomegranates have already been hailed as a super-food but a team of scientists from Kingston University in South West London has found a new use for the deep red fruit. The team, led by Professor Declan Naughton, has discovered that the rind can be turned into an ointment for treating MRSA and other common hospital infections.

In a series of tests conducted over three years, Professor Naughton and researchers from the School of Life Sciences learnt that the infection-fighting properties of pomegranate were greatly enhanced by combining the rind of
the fruit with two other natural products -- metal salts and Vitamin C. "We have developed a topical ointment that can successfully attack a range of drug resistant microbes," Professor Naughton said. "It's a significant breakthrough and a striking example of the effectiveness of adding more components to create a more active product."

The tests were conducted using microbes such as MRSA (Methicillin-Resistant Staphylococcus aureus) taken from hospital patients. MRSA is an important pathogen -- an agent of a disease -- that can cause infections in humans and is difficult to combat because it has developed a resistance to some antibiotics. "The increase in drug-resistant infections found in hospitals has made our research topical and pressing," Professor Naughton said. "The idea of using a foodstuff is unusual and means that the body should be able to cope more easily with its application; patients are less likely to experience any major side-effects."

Pomegranate rind combined with metal salts was the most effective combination for treating MRSA, while other common hospital infections were better dealt with by all three components: pomegranate rind, metal salts and Vitamin C. Professor Naughton said it was exciting to discover a new use for natural products. "It shows that nature still has a few tricks up its sleeve," he said.

Journal References:

Citrus surprise: Vitamin C boosts the reprogramming of adult cells into stem cells
Famous for its antioxidant properties and role in tissue repair, vitamin C is touted as beneficial for illnesses ranging from the common cold to cancer and perhaps even for slowing the aging process. Now, a study published online on December 24th by Cell Press in the journal Cell Stem Cell uncovers an unexpected new role for this natural compound: facilitating the generation of embryonic-like stem cells from adult cells.

Over the past few years, we have learned that adult cells can be reprogrammed into cells with characteristics similar to embryonic stem cells by turning on a select set of genes. Although the reprogrammed cells, called induced pluripotent stem cells (iPSCs), have tremendous potential for regenerative medicine, the conversion is extremely inefficient.

"The low efficiency of the reprogramming process has hampered progress with this technology and is indicative of how little we understand it. Further, this process is most challenging in human cells, raising a significant barrier for producing iPSCs and serious concerns about the quality of the cells that are generated," explains senior study author Dr. Duanqing Pei from the South China Institute for Stem Cell Biology and Regenerative Medicine at the Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences.

Dr. Pei and colleagues measured the production of reactive oxygen species or ROS during reprogramming and discovered a potential link between high ROS and low reprogramming efficiency. They became particularly interested in antioxidants, hypothesizing that they might suppress ROS and cell senescence, which seems to be a major roadblock for the generation of iPSCs.

The researchers found that adding vitamin C, an essential nutrient that is abundant in citrus fruits, enhanced iPSC generation from both mouse and human cells. Vitamin C accelerated gene expression changes and promoted a more efficient transition to the fully reprogrammed state. Somewhat to their surprise, they found that other antioxidants do not have the same effect, but vitamin C does seem to act at least in part through slowing cell senescence.

"Our results highlight a simple way to improve iPSC generation and provide additional insight into the mechanistic basis of reprogramming," concludes Dr. Pei. "It is also of interest that a vitamin with long-suspected anti-aging effects has such a potent influence on reprogramming, which can be considered a reversal of the aging process at the cellular level. It is likely that our work may stimulate further research in this area as well."

Acupuncture reduces hot flashes, improves sex drive for breast cancer patients
DETROIT – Not only is acupuncture as effective as drug therapy at reducing hot flashes in breast cancer patients, it has the added benefit of potentially increasing a woman's sex drive and improving her sense of well-being, according to a Henry Ford Hospital study.

Study results show that acupuncture, when compared to drug therapy, has a longer-lasting effect on the reduction of hot flashes and night sweats for women receiving hormone therapy for breast cancer treatment. Women also report that acupuncture improves their energy and clarity of thought.
The study, published online this week in the Journal of Oncology, is the first randomly controlled trial to compare acupuncture and drug therapy in this way. "Acupuncture offers patients a safe, effective and durable treatment option for hot flashes, something that affects the majority of breast cancer survivors. Compared to drug therapy, acupuncture actually has benefits, as opposed to more side effects," says study lead author Eleanor Walker, M.D., division director of breast services in the Department of Radiation Oncology at Henry Ford Hospital.

According to the National Cancer Institute, one in eight women will develop breast cancer in her lifetime. For these women, conventional medical treatment involves chemotherapy and five years of hormone therapy. With such a long course of treatment, side effects of hormone therapy such as vasomotor symptoms – hot flashes and night sweats – can become a major cause of decreased quality of life, and even discontinuation of treatment.

Venlafaxine (Effexor) has been the drug therapy of choice to manage these common and debilitating side effects associated with breast cancer treatment. Venlafaxine, however, comes with its own set of side-effects: dry mouth, decreased appetite, nausea and constipation.

Since acupuncture has been shown to effectively reduce hot flashes in menopausal women, Dr. Walker and her research team decided to test the use of acupuncture to combat vasomotor symptoms in breast cancer patients as an alternative to drug therapy.

To compare the two options, 50 patients were recruited from oncology clinics at Henry Ford. Patients were randomly assigned to receive either acupuncture or venlafaxine treatment for 12 weeks. The drug therapy group took venlafaxine orally each night, 37.5mg the first week and then 75mg for the remaining 11 weeks. The other group received acupuncture treatments twice per week for the first four weeks, and then once a week for the remaining eight weeks.

At the end of 12 weeks, all patients stopped their therapy and were followed for one year. Patients kept a diary to record the number and severity of hot flashes, and took surveys to measure their overall health and mental health. The study found that both groups initially experienced a 50 percent decline in hot flashes and depressive symptoms, indicating that acupuncture is as effective as drug therapy.

Differences, however, between the two groups began to emerge two weeks post-treatment: The acupuncture group continued to experience minimal hot flashes, while the drug therapy group had a significant increase in hot flashes. The acupuncture group did not experience an increase in the frequency of their hot flashes until three months post-treatment.


**Putting Limits on Vitamin E**

Wednesday, December 30, 2009

**The potent antioxidant may do more harm than good, TAU research suggests**

Vitamin-fortified foods and dietary health supplements can ease health worries. But what kinds of vitamins are right for you? And how much of them should you take, and how often?

A research group from Tel Aviv University has done the most comprehensive and accurate study of clinical data on Vitamin E use and heart disease to date, and it warns that indiscriminate use of high-dose Vitamin E supplementation does more harm than good. Their results were recently reported in *ATVB*, a leading journal of cardiology, and discussed in the journal *BioFactors*.

"There were so many conflicting reports about Vitamin E and its effect on various diseases, particularly heart disease, that we wanted to set the record straight," says Prof. Dov Lichtenberg of TAU's Sackler School of Medicine.

"Our new study shows that some people may be harmed by the treatment, whereas others may benefit from it. Now we're trying to identify groups of people that are most likely to benefit from the effects of Vitamin E," adds study co-researcher Dr. Ilya Pinchuk. The TAU research team also included decision analyst Dr. Moshe Leshno of the Sackler Faculty of Medicine and the Leon Recanati Faculty of Management and Dr. Yedidya (Didi) Dotan, whose PhD thesis is the basis for this analysis.

**A longer life without it?**

Applying a very different approach than any previous study, the team of researchers put their heads together to draw definitive conclusions about Vitamin E. In their publication in *ATVB* the Tel Aviv University researchers evaluated the results of the prominent studies measuring the health benefits of Vitamin E but reached varying conclusions. There have been many previous publications on the subject. Analysis of the results of all these past publications
together revealed that subjects who did not take a Vitamin E supplement enjoyed more quality-adjusted-life-years (QALY), a standard parameter used in medicine to assess the effect of medical interventions.

"To explain the meaning of this parameter," says Dr. Pinchuk, "consider a participant who was healthy during the first 10 out of 20 years of the study, but then suffered a stroke and became dependent on others throughout the following 10 years. The QALY during the first 10 years of healthy life is 10, but after the stroke the quality of life is only half of what this person had before. Therefore, the second decade is considered the equivalent of merely 5 years of healthy life and in sum a person's QALY is 15.

The researchers examined data from more than 300,000 subjects in the US, Europe and Israel. "Our major finding," says Dr. Pinchuk, "was that the average quality-adjusted life years (QALY) of Vitamin E-supplemented individuals was 0.30 less than that of untreated people. This, of course, does not mean that everybody consuming Vitamin E shortens their life by almost 4 months. But on average, the quality-adjusted longevity is lower for vitamin-treated people. This says something significant."

Overturning earlier studies
In the BioFactors article, the TAU researchers defined "the real challenge as being able to identify who is likely to benefit taking Vitamin E." They also explored the first hypothesis of the oxidative theory of atherosclerosis published more than 20 years ago, which was the basis for the widespread use of antioxidants today. At first, this hypothesis raised great enthusiasm that anti-oxidants like Vitamins E and C and flavonoids could be used to prevent disease or its progression. In this respect, the new findings are very disappointing.

"We've now concluded that going to the grocery or to a health food store to buy Vitamin E supplements, for the most part, won't do you good. In some cases it can do harm," says Dr. Pinchuk. "A doctor wouldn't prescribe anti-hypertension drugs to the whole population, only to those with low blood pressure. It seems this is true for antioxidants, too. When you give them to everybody, you may be doing more harm than good. Some people may benefit from it, but more may be harmed."

The researchers are now building sets of criteria that detail under what conditions Vitamin E supplements should be taken. They are also investigating the chemical mechanisms of antioxidants in general to better understand how they work.

Aerobic Exercise No Big Stretch For Older Adults But Helps Elasticity Of Arteries
ScienceDaily (Dec. 30, 2009) — Just three months of physical activity reaps heart health benefits for older adults with type 2 diabetes by improving the elasticity in their arteries -- reducing risk of heart disease and stroke, Dr. Kenneth Madden told the 2009 Canadian Cardiovascular Congress, co-hosted by the Heart and Stroke Foundation and the Canadian Cardiovascular Society.

Dr. Madden studied adults between the ages of 65 to 83 with controlled Type 2 diabetes, high blood pressure, and high blood cholesterol to see how increased activity might affect stiffness of the arteries.

"The theory is that aerobic activity makes your arteries less stiff and makes artery walls more elastic," says Dr. Madden, a geriatric specialist at the University of British Columbia.

An improvement was seen in the elasticity of the arteries of the group that performed the activity compared to those who didn't exercise. "There was an impressive drop in arterial stiffness after just three months of exercise. In that time we saw a 15 to 20 per cent reduction."

The subjects were divided into two groups to either receive three months of vigorous physical activity (one hour, three times per week) or to get no aerobic exercise at all. Subjects were classified as sedentary at the beginning of the study but gradually increased their fitness levels until they were working at 70 per cent of their maximum heart rate, using treadmills and cycling machines. They were supervised by a certified exercise trainer.

Dr. Beth Abramson, spokesperson for the Heart and Stroke Foundation, stresses the importance of lifestyle factors on heart health, especially with our aging population. "Almost everyone can benefit from active living," she says. "The Foundation recommends that, like adults of any age, older adults -- with the consent of their physicians -- need 30 to 60 minutes of moderate activity most days of the week."

Dr. Madden says that the exercise requirements may be viewed as controversial because of the age of the participants but the exercise level was safe and well tolerated. "There seems to be a knee-jerk reluctance to getting these older adults to exercise yet we used a vigorous level of activity and didn't have any trouble keeping participants in our study. They enjoyed the activity," Dr. Madden says. "People always underestimate what older adults can do."

Dr. Madden notes that realistically, seniors need someone to help them get started. "We need to learn how to do it effectively and how to do it safely," he says. "It could mean visiting your family doctor to find out about provincially funded programs, or joining programs for seniors that are offered at many local community centres."
Dr. Abramson recommends that seniors choose activities they enjoy, such as walking, gardening, golfing, dancing, or joining a yoga or tai chi class. If weather is a barrier, she suggests climbing stairs at home, joining a mall-walking group, or strolling the halls of their apartment building or retirement residence.

In his next project, Dr. Madden wants to find out if there is a less expensive but equally effective way to reduce the stiffness of arteries in older adults. "Our first step was to prove that it was at all possible for older adults to have reduced narrowing in their arteries due to exercise," he says. "Now we want to find out just how rigorous the levels of activity need to be to demonstrate the same results. The next step is to try studying a home-based walking program using pedometers. This is something easy for doctors to prescribe and cheap and easy for participants."

The HeartWalk Workout, a special activity program developed by the Heart and Stroke Foundation to help people with cardiovascular problems get regular, healthy physical activity is available online at heartandstroke.ca. It helps people slowly build up exercise tolerance until they can walk at least 30 minutes, five times a week.

**Ginkgo Biloba Does Not Appear to Slow Rate of Cognitive Decline**

ScienceDaily (Dec. 30, 2009) — Older adults who used the herbal supplement Ginkgo biloba for several years did not have a slower rate of cognitive decline compared to adults who received placebo, according to a new study.

"Ginkgo biloba is marketed widely and used with the hope of improving, preventing, or delaying cognitive impairment associated with aging and neurodegenerative disorders such as Alzheimer disease," the authors write. "Indeed, in the United States and particularly in Europe, G biloba is perhaps the most widely used herbal treatment consumed specifically to prevent age-related cognitive decline." However, evidence from large clinical trials regarding its effect on long-term cognitive functioning is lacking.

Beth E. Snitz, Ph.D., of the University of Pittsburgh, and colleagues analyzed outcomes from the Ginkgo Evaluation of Memory (GEM) study to determine if G biloba slowed the rate of cognitive decline in older adults who had normal cognition or mild cognitive impairment (MCI) at the beginning of the study. The GEM study previously found that G biloba was not effective in reducing the incidence of Alzheimer dementia or dementia overall. The randomized, double-blind, placebo-controlled clinical trial included 3,069 community-dwelling participants, ages 72 to 96 years, who received a twice-daily dose of 120-mg extract of G biloba (n = 1,545) or identical-appearing placebo (n = 1,524). The study was conducted at six academic medical centers in the United States between 2000 and 2008, with a median (midpoint) follow-up of 6.1 years. Change in cognition was assessed by various tests and measures.

In this study, the largest randomized controlled trial of G biloba to report on outcomes to date, the researchers found no evidence for an effect of G biloba on global cognitive change and no evidence of effect on specific cognitive domains of memory, language, attention, visuospatial abilities and executive functions. They also found no evidence for differences in treatment effects by age, sex, race, education or baseline cognitive status (MCI vs. normal cognition).

"In sum, we find no evidence that G biloba slows the rate of cognitive decline in older adults. These findings are consistent with previous smaller studies examining prevention of decline and facilitation of cognitive performance and with the 2009 Cochrane review of G biloba for dementia and cognitive impairment."

**Journal Reference:**

Beth E. Snitz, PhD; Ellen S. O'Meara, PhD; Michelle C. Carlson, PhD; Alice M. Arnold, PhD; Diane G. Ives, MPH; Stephen R. Rapp, PhD; Judith Saxton, PhD; Oscar L. Lopez, MD; Leslie O. Dunn, MPH; Kaycee M. Sink, MD; Steven T. DeKosky, MD; for the Ginkgo Evaluation of Memory (GEM) Study Investigators. *Ginkgo biloba for Preventing Cognitive Decline in Older Adults.* JAMA, 2009;302(24):2663-2670. [link](https://www.jama.com/jamori/jamadolost决定于2009年12月30日）

**Ginkgo biloba for Preventing Cognitive Decline in Older Adults**

**A Randomized Trial**

Beth E. Snitz, PhD; Ellen S. O'Meara, PhD; Michelle C. Carlson, PhD; Alice M. Arnold, PhD; Diane G. Ives, MPH; Stephen R. Rapp, PhD; Judith Saxton, PhD; Oscar L. Lopez, MD; Leslie O. Dunn, MPH; Kaycee M. Sink, MD; Steven T. DeKosky, MD; for the Ginkgo Evaluation of Memory (GEM) Study Investigators *Ginkgo biloba for Preventing Cognitive Decline in Older Adults* JAMA, 2009;302(24):2663-2670. [link](https://www.jama.com/jamori/jamadolost决定于2009年12月30日）

**Context** The herbal product *Ginkgo biloba* is taken frequently with the intention of improving cognitive health in aging. However, evidence from adequately powered clinical trials is lacking regarding its effect on long-term cognitive functioning.

**Objective** To determine whether *G biloba* slows the rates of global or domain-specific cognitive decline in older adults.
Design, Setting, and Participants  The Ginkgo Evaluation of Memory (GEM) study, a randomized, double-blind, placebo-controlled clinical trial of 3069 community-dwelling participants aged 72 to 96 years, conducted in 6 academic medical centers in the United States between 2000 and 2008, with a median follow-up of 6.1 years.

Intervention  Twice-daily dose of 120-mg extract of G biloba (n = 1545) or identical-appearing placebo (n = 1524).

Main Outcome Measures  Rates of change over time in the Modified Mini-Mental State Examination (3MSE), in the cognitive subscale of the Alzheimer Disease Assessment Scale (ADAS-Cog), and in neuropsychological domains of memory, attention, visual-spatial construction, language, and executive functions, based on sums of z scores of individual tests.

Results  Annual rates of decline in z scores did not differ between G biloba and placebo groups in any domains, including memory (0.043; 95% CI, 0.034-0.051 vs 0.041; 95% CI, 0.032-0.050), attention (0.043; 95% CI, 0.037-0.050 vs 0.048; 95% CI, 0.041-0.054), visuospatial abilities (0.107; 95% CI, 0.097-0.117 vs 0.118; 95% CI, 0.108-0.128), language (0.045; 95% CI, 0.037-0.054 vs 0.041; 95% CI, 0.033-0.048), and executive functions (0.092; 95% CI, 0.086-0.099 vs 0.089; 95% CI, 0.082-0.096). For the 3MSE and ADAS-Cog, rates of change varied by baseline cognitive status (mild cognitive impairment), but there were no differences in rates of change between treatment groups (for 3MSE, P = .71; for ADAS-Cog, P = .97). There was no significant effect modification of treatment on rate of decline by age, sex, race, education, APOE*E4 allele, or baseline mild cognitive impairment (P > .05).

Conclusion  Compared with placebo, the use of G biloba, 120 mg twice daily, did not result in less cognitive decline in older adults with normal cognition or with mild cognitive impairment.

Discovery May Help Baby Boomers Get Buff: Free Radicals Damage Mitochondria in Muscle Cells
ScienceDaily (Jan. 7, 2010) — If you're an aging baby boomer hoping for a buffer physique, there's hope. A team of American scientists from Texas and Michigan have made a significant discovery about the cause of age-related muscle atrophy that could lead to new drugs to halt this natural process. This research, available online the FASEB Journal, shows that free radicals, such as reactive oxygen species, damage mitochondria in muscle cells, leading to cell death and muscle atrophy. Now that scientists understand the cause of age-related muscle loss, they can begin to develop new drugs to halt the process.

"Age-related muscle atrophy in skeletal muscle is inevitable. However, we know it can be slowed down or delayed," said Holly Van Remmen, Ph.D., co-author of the study, from the Sam and Ann Barshop Institute for Longevity and Aging Studies at the University of Texas Health Science Center at San Antonio. "Our goal is to increase our understanding of the basic mechanisms underlying sarcopenia to gain insight that will help us to discover therapeutic interventions to slow or limit this process."

To make this discovery, Van Remmen and colleagues used mice that were genetically manipulated to prevent them from having a protective antioxidant (CuZnSOD). As a result of not being able to produce this antioxidant, the mice had very high levels of free radicals (reactive oxygen species) and lost muscle mass and function at a much faster rate than normal mice. Additionally, the muscles of the genetically modified mice were much smaller and weaker than those of normal mice. Scientists believe that these findings mimic effects of the normal aging process in humans, but at an accelerated rate.

"I don't expect to see baby boomers gracing the pages of body building magazines tomorrow. But this research is important because it identifies molecules responsible for the aging of our muscles: free radicals," said Gerald Weissmann, M.D., Editor-in-Chief of the FASEB Journal. "Stop these from acting and we'll all look younger, stronger and fit at any age."

Journal Reference: Youngmok C. Jang, Michael S. Lustgarten, Yuhong Liu, Florian L. Muller, Arunabh Bhattacharya, Hanyu Liang, Adam B. Salmon, Susan V. Brooks, Lisa Larkin, Christopher R. Hayworth, Arlan Richardson, and Holly Van Remmen. Increased superoxide in vivo accelerates age-associated muscle atrophy through mitochondrial dysfunction and neuromuscular junction degeneration. The FASEB Journal, 2009; DOI: 10.1096/fj.09-146308

Study Links Vitamin D, Race and Cardiac Deaths
ScienceDaily (Jan. 7, 2010) — Vitamin D deficiency may contribute to a higher number of heart and stroke-related deaths among black Americans compared to whites, according to a University of Rochester Medical Center study. The journal Annals of Family Medicine is publishing the study in the January-February edition, which goes online Jan. 11, 2010.
Researchers sought to understand the well-documented disparity between blacks and whites in cardiovascular deaths. They turned to vitamin D because growing evidence links low serum levels of D to many serious illnesses including diabetes, hypertension, kidney and heart disease.

Lead author Kevin Fiscella, M.D., said a complex host of genetic and lifestyle factors among blacks may explain why this population group has lower vitamin D levels across the lifespan than other races.

People get vitamin D through their diets, sun exposure, and oral supplements. Genetic factors common to blacks sometimes preclude vitamin D absorption, such as a higher incidence of lactose intolerance, which can eliminate vitamin-D fortified milk from the diet, and darker skin pigment that significantly reduces vitamin D synthesis.

"Therefore, our study suggests that the next step would be to intervene to boost vitamin D levels safely, with supplements," said Fiscella, a national expert on disparities in health care and a professor of Family Medicine and Community and Preventive Medicine at URMC.

With funding through the National Heart Lung and Blood Institute, Fiscella and colleagues studied a sample of more than 15,000 American adults. The data included measurements of blood levels of vitamin D and death rates due to cardiovascular disease. Researchers also looked at other factors that contribute to heart health, such as body mass index, smoking status and levels of C-reactive protein.

Overall, the analysis showed that, as expected, a vitamin D deficiency was associated with higher rates of death among all people in the sample. In fact, those adults with the worst deficiency had a 40 percent higher risk of death from cardiac illness. This suggests that vitamin D may be a modifiable, independent risk factor for heart disease, Fiscella said.

Most striking, however, was that when researchers adjusted the statistics to look at race, blacks had a 38 percent higher risk of death than whites. As vitamin D levels rose, however, the risk of death was reduced. The same was true when researchers analyzed the effect of poverty on cardiovascular death rates among blacks, which suggests that vitamin D deficiency and poverty each exert separate risk factors, the study said.

A review article published in September 2009 in The American Journal of Medicine, noted that Vitamin D deficiency is a worldwide health problem. In the U.S., inadequate Vitamin D has been reported in about 36 percent of otherwise healthy young adults and about 57 percent of general medicine hospitalized patients.

Vitamin D is metabolized in the liver and converted to 25 hydroxyvitamin D or 25(OH) D, the form used to determine a person's status through a blood test. Deficiency is usually defined by levels of less than 20 nanograms per milliliter; 30 ng/ml is viewed as sufficient. The mean blood level in the study sample was 29.5 ng/ml.

Most of the body's tissues and cells have vitamin D receptors, making it a potent regulator of cell activity and growth. A deficiency contributes to inflammation associated with heart disease, many cancers and poor bone health.

Fiscella cautions, however, that not all observational studies of vitamin deficiency are borne out by subsequent clinical trials. For example, previous observational studies of vitamin E and beta-carotene that were associated with poor heart health did not hold up in later clinical studies. The need to further assess the vitamin D connection to heart disease is convincing, however, particularly among blacks, he added.

Other at-risk people include the obese and the elderly, (particularly housebound or nursing home residents), because vitamin D levels decline with age. And although more sun exposure can boost levels of D, skin cancer is also an increasing risk to many people. Therefore, medical authorities usually recommend increased dietary intake and/or supplementation as the best way to correct a deficiency.

Journal Reference:

Strength Training, Self-Management Improve Outcomes for Knee Osteoarthritis

ScienceDaily (Jan. 7, 2010) — Researchers participating in the Multidimensional Intervention for Early Osteoarthritis of the Knee (Knee Study) determined that physically inactive, middle-aged people with symptomatic osteoarthritis benefitted equally from strength training regimens, self-management programs, or a combination of the two.

Details of this study are available in the January 2010 issue of Arthritis Care & Research, a journal published by Wiley-Blackwell on behalf of the American College of Rheumatology.

Osteoarthritis (OA) is the most common form of arthritis and the second leading cause of disability in the United States. Currently OA is the most prevalent chronic condition among women, afflicting 35-45% of women by the age of 65. A number of studies have compared strength training protocols with self-management programs in older patient populations, but few have examined the potential benefit of using both approaches in conjunction. "We
hypothesized that combining the 2 treatments might enhance the outcomes,” said Patrick McKnight, lead author of the Knee Study.

The Knee Study, conducted at the University of Arizona Arthritis Center in Tucson, AZ, was a 24-month unblinded, randomized intervention trial to compare the effects of strength training programs, self-management programs, and a combination of both. The 273 study participants were between the ages of 35 and 65 years, reported pain and disability due to knee pain on most days in one or both knees for a period of no more than 5 years, and had Kellgren/Lawrence classification grade 2 radiographic evidence of knee OA in one or both knees.

Study participants were randomly assigned to 1 of 3 treatment groups. The strength training group engaged in a 9-month initial phase designed to improve the core areas of stretching and balance, range of motion and flexibility, and isotonic muscle strength. The second, 15-month phase of this group concentrated on developing independent, long-term exercise habits. The second study group participated in a 2-phase self-management program designed to educate participants and provide one-on-one treatment advice. The combined group participated in both the complete strength training and self-management programs. A total of 201 out of 273 participants completed the 2-year trial, with the self-management group achieving the highest compliance rates.

The study team set out to demonstrate that a combination of OA treatment programs would prove most effective, however, the study failed to uncover significant differences in results among the 3 study participant groups. All 3 groups demonstrated improvements in physical function tests and decreased self-reported pain and disability. "The logic behind the combined treatment was that the different factors addressed in physical and psychological treatments might produce an additive effect if administered together," said Dr. McKnight. "These results suggest otherwise. Instead, the comparison of the 3 treatment arms showed no difference, suggesting similar benefits for all 3 over a 2-year period."

Given the higher rate of compliance in the self-management group, the Knee Study researchers suggest that self-management may be a less intrusive and equally effective early treatment for knee OA. The CDC also recommends self-management activities to decrease pain, improve function, stay productive, and lower health care costs, including self-management education programs such as the Arthritis Foundation Self Help Program (AFSHP), or the Chronic Disease Self Management Program (CDSMP) to manage arthritis on a day-to-day basis.

**Journal Reference:**

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**Running Shoes May Cause Damage to Knees, Hips and Ankles, New Study Suggests**

ScienceDaily (Jan. 6, 2010) — Knee osteoarthritis (OA) accounts for more disability in the elderly than any other disease. Running, although it has proven cardiovascular and other health benefits, can increase stresses on the joints of the leg. In a study published in the December 2009 issue of *PM&R: The journal of injury, function and rehabilitation*, researchers compared the effects on knee, hip and ankle joint motions of running barefoot versus running in modern running shoes. They concluded that running shoes exerted more stress on these joints compared to running barefoot or walking in high-heeled shoes.

Sixty-eight healthy young adult runners (37 women), who run in typical, currently available running shoes, were selected from the general population. None had any history of musculoskeletal injury and each ran at least 15 miles per week. A running shoe, selected for its neutral classification and design characteristics typical of most running footwear, was provided to all runners. Using a treadmill and a motion analysis system, each subject was observed running barefoot and with shoes. Data were collected at each runner’s comfortable running pace after a warm-up period.

The researchers observed increased joint torques at the hip, knee and ankle with running shoes compared with running barefoot. Disproportionately large increases were observed in the hip internal rotation torque and in the knee flexion and knee varus torques. An average 54% increase in the hip internal rotation torque, a 36% increase in knee flexion torque, and a 38% increase in knee varus torque were measured when running in running shoes compared with barefoot.

These findings confirm that while the typical construction of modern-day running shoes provides good support and protection of the foot itself, one negative effect is the increased stress on each of the 3 lower extremity joints. These increases are likely caused in large part by an elevated heel and increased material under the medial arch, both characteristic of today's running shoes.

Writing in the article, lead author D. Casey Kerrigan, MD, JKM Technologies LLC, Charlottesville, VA, and co-investigators state, "Remarkably, the effect of running shoes on knee joint torques during running (36%-38%
increase) that the authors observed here is even greater than the effect that was reported earlier of high-heeled shoes during walking (20%-26% increase). Considering that lower extremity joint loading is of a significantly greater magnitude during running than is experienced during walking, the current findings indeed represent substantial biomechanical changes." Dr. Kerrigan concludes, "Reducing joint torques with footwear completely to that of barefoot running, while providing meaningful footwear functions, especially compliance, should be the goal of new footwear designs."

**Journal Reference:**

**Thyme oil can inhibit COX2 and suppress inflammation**
**Appearing in the January 2010 issue of JLR**
For those who do not drink, researchers have found that six essential oils –from thyme, clove, rose, eucalyptus, fennel and bergamot—can suppress the inflammatory COX-2 enzyme, in a manner similar to resveratrol, the chemical linked with the health benefits of red wine. They also identified that the chemical carvacrol was primarily responsible for this suppressive activity.

These findings, appearing in the January issue of *Journal of Lipid Research*, provide more understanding of the health benefits of many botanical oils and provide a new avenue for anti-inflammatory drugs.

Essential oils from plants have long been a component of home remedies, and even today are used for their aromatherapy, analgesic (e.g. cough drops), or antibacterial properties. Of course, the exact way they work is not completely understood. However, Hiroyasu Inoue and colleagues in Japan believed that many essential oils might target COX-2 much like compounds in wine and tea.

So, they screened a wide range of commercially available oils and identified six (thyme, clove, rose, eucalyptus, fennel and bergamot) that reduced COX-2 expression in cells by at least 25%. Of these, thyme oil proved the most active, reducing COX-2 levels by almost 75%.

When Inoue and colleagues analyzed thyme oil, they found that the major component –carvacrol– was the primary active agent; in fact when they use pure carvacrol extracts in their tests COX-2 levels decreased by over 80%.

From the article: "Carvacrol, a component of thyme oil, activates PPAR-gamma and suppresses COX-2 expression" by Mariko Hotta, Rieko Nakata, Michiko Katsukawa, Kazuyuki Hori, Saori Takahashi, and Hiroyasu Inoue
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**Green Tea Could Modify the Effect of Cigarette Smoking on Lung Cancer Risk**
ScienceDaily (Jan. 13, 2010) — Drinking green tea could modulate the effect of smoking on lung cancer.

Results of this hospital-based, randomized study conducted in Taiwan were presented at the AACR-IASLC Joint Conference on Molecular Origins of Lung Cancer, held here from Jan. 11-14, 2010.

"Lung cancer is the leading cause of all cancer deaths in Taiwan," said I-Hsin Lin, M.S., a student at Chung Shan Medical University in Taiwan. "Tea, particularly green tea, has received a great deal of attention because tea polyphenols are strong antioxidants, and tea preparations have shown inhibitory activity against tumorigenesis."

However, previous studies of green tea have been inhibited by the flaws of the epidemiologic model with its inherent biases.

Lin and colleagues enrolled 170 patients with lung cancer and 340 healthy patients as controls. The researchers administered questionnaires to obtain demographic characteristics, cigarette smoking habits, green tea consumption, dietary intake of fruits and vegetables, cooking practices and family history of lung cancer. They also performed genotyping on insulin-like growth factors as polymorphisms on the following insulin-like growth factors: IGF1, IGF2 and IGFBP3, which have all been reported to be associated with cancer risk.

Among smokers and non-smokers, those who did not drink green tea had a 5.16-fold increased risk of lung cancer compared with those who drank at least one cup of green tea per day. Among smokers, those who did not drink green tea at all had a 12.71-fold increased risk of lung cancer compared with those who drank at least one cup of green tea per day.

Lin and colleagues suspect genetics may play a role in this risk differential. Green tea drinkers with non-susceptible IGF1 (CA)19/(CA)19 and (CA)19/X genotypes reported a 66 percent reduction in lung cancer risk as compared with green tea drinkers carrying the IGF1 X/X genotype.

Heavy smokers carrying susceptible IGF1, IGF2 and IGFBP3 genotypes also had a higher risk of lung cancer compared with nonsmokers carrying non-susceptible IGF1, IGF2 and IGFBP3 genotypes.
"Our study may represent a clue that in the case of lung cancer, smoking-induced carcinogenesis could be modulated by green tea consumption and the growth factor environment," said Lin.

**Does electro-acupuncture prevent prolonged postoperative ileus?**

A research article to be published on January 7, 2010 in the *World Journal of Gastroenterology* addresses this question. In this prospective randomized clinical trial, the authors examined if acupuncture could prevent prolonged postoperative ileus (PPOI) after intraperitoneal surgery among patients with colon cancer in Shanghai, China. Acupuncture did not prevent PPOI in this population. Subset analyses in patients who developed PPOI also suggested acupuncture was not useful in this setting to treat PPOI once it developed.

The study was part of a unique collaboration between researchers in the United States at The University of Texas M. D. Anderson Cancer Center in Houston, Texas and China at the Fudan University Cancer Hospital in Shanghai. Only one previous randomized trial, conducted in the United States, has examined the use of acupuncture to prevent PPOI in cancer patients. According to colleagues and standard postoperative care is very different in China than in the United States, and some of these treatment differences could play an important role in postoperative gastrointestinal motility and development of complications such as prolonged ileus. The authors state that future studies examining the use of acupuncture to prevent or treat PPOI should include assessment of activity, diet, and postoperative medication for pain control.

This study was funded by a grant from the National Cancer Institute. The Principal Investigator of the international collaboration, Dr. Lorenzo Cohen, stated the focus of the International Center of Traditional Chinese Medicine (TCM) for Cancer is to study TCM within its traditional context. Although the study was a negative trial, it is consistent with a similar trial conducted in the United States. We learned from this study that the specific use of certain acupuncture points in combination with standard postoperative care in China had no effect on PPOI, but it also demonstrated that we can conduct rigorous multinational research to examine TCM for cancer. Conducting rigorous research on TCM is an important step towards understanding the potential efficacy and mechanisms of many ancient therapies such as acupuncture.


**Fish Oil Given Intravenously to Patients in Intensive Care Has Many Benefits, Study Finds**

ScienceDaily (Jan. 19, 2010) — A randomised controlled trial of fish oil given intravenously to patients in intensive care has found that it improves gas exchange, reduces inflammatory chemicals and results in a shorter length of hospital stay.

Researchers writing in BioMed Central’s open access journal *Critical Care* investigated the effects of including fish oil in the normal nutrient solution for patients with sepsis, finding a significant series of benefits.

Philip Calder, from the University of Southampton, UK, worked with a team of researchers to carry out the study in 23 patients with systemic inflammatory response syndrome or sepsis in the Hospital Padre Américo, Portugal. He said, "Recently there has been increased interest in the fat and oil component of vein-delivered nutrition, with the realization that it not only supplies energy and essential building blocks, but may also provide bioactive fatty acids. Traditional solutions use soybean oil, which does not contain the omega-3 fatty acids contained in fish oil that act to reduce inflammatory responses. In fact, soybean oil is rich in omega-6 acids that may actually promote inflammation in an excessive or unbalanced supply."

Calder and his colleagues found that the 13 patients in the fish oil group had lower levels of inflammatory agents in their blood, were able to achieve better lung function and left hospital earlier than the 10 patients who received traditional nutrition.

According to Calder, "This is the first study of this particular fish oil solution in septic patients in the ICU. The positive results are important since they indicate that the use of such an emulsion in this group of patients will improve clinical outcomes, in comparison with the standard mix."

**Journal Reference:** Vera M Barbosa, Elizabeth A Miles, Conceicao Calhau, Estevao Lafuente and Philip C Calder. *Effects of a fish oil containing lipid emulsion on plasma phospholipid fatty acids, inflammatory markers, and clinical outcomes in septic patients: a randomized, controlled clinical trial. Critical Care, 2010;* (in press)
Med students say conventional medicine would benefit by integrating alternative therapies

Joint UC study reveals need for more field research, better classroom education

In the largest national survey of its kind, researchers from UCLA and UC San Diego measured medical students' attitudes and beliefs about complementary and alternative medicine (CAM) and found that three-quarters of them felt conventional Western medicine would benefit by integrating more CAM therapies and ideas.

The findings will be published in the online issue of Evidence-based Complementary and Alternative Medicine (eCAM) on January 20, 2010.

"Complementary and alternative medicine is receiving increased attention in light of the global health crisis and the significant role of traditional medicine in meeting public health needs in developing countries," said study author Ryan Abbott, a researcher at the UCLA Center for East-West Medicine. "Integrating CAM into mainstream health care is now a global phenomenon, with policy makers at the highest levels endorsing the importance of a historically marginalized form of health care."

CAM, which includes therapies such as massage, yoga, herbal medicine and acupuncture, is characterized by a holistic and highly individualized approach to patient care. It's emphasis is on maximizing the body's inherent healing ability; getting patients involved as active participants in their own care; addressing the physical, mental and spiritual attributes of a disease; and preventive care. While interest in these fields has increased dramatically in the United States in recent years, information about such therapies has not yet been widely integrated into medical education.

"Even with the high prevalence of CAM use today, most physicians still know little about non-conventional forms of medicine," said study author Michael S. Goldstein, Ph.D., a senior research scientist at the UCLA Center for Health Policy Research and professor of Public Health and Sociology, UCLA. "Investigating medical students' attitudes and knowledge will help us assess whether this may change in the future."

The team of UCLA and UC San Diego experts in the fields of CAM, integrative medicine, Western medicine, medical education and survey development created a novel 30-question survey and sent it to 126 medical schools throughout the United States. In return, the team received 1,770 completed surveys from a pool of about 68,000 medical students nationwide, roughly three percent.

While the current results offer valuable insight into medical students' perceptions of CAM, given the low response rate, researchers plan future studies to further refine the tool and see if the findings can be more generalized.

Researchers found that although medical students endorsed the importance of complementary and alternative medicine, obstacles remain that may prevent future doctors from recommending these treatments in their practices. According to the findings:

- 77 percent of participants agreed to some extent that patients whose doctors know about complementary and alternative medicine in addition to conventional medicine, benefit more than those whose doctors are only familiar with Western medicine.
- 74 percent of participants agreed to some extent that a system of medicine that integrates therapies of conventional and complementary and alternative medicine would be more effective than either type of medicine provided independently.
- 84 percent of participants agreed to some extent that the field contains beliefs, ideas, and therapies from which conventional medicine could benefit.
- 49 percent of participating medical students indicated that they have used complementary and alternative treatments however few would recommend or use these treatments in their practice until more scientific assessment has occurred.

"Our research suggests that persuading doctors to integrate CAM will require investment in the types of clinical research that form the backbone of Western medicine," adds Abbott. "Even now, medical schools have the opportunity to train the next generation of medical practitioners in health care systems outside of conventional medicine. Core values of CAM can help students develop a more holistic and individualized approach to patient care."

The study also found that the further along in school the student was, the more likely they were to believe their learning regarding CAM therapies was sufficient. Still, researchers note that more than 60 percent of participants favored more education related to this field during their time in medical school. Although more than half of all U.S. medical schools currently offer some type of CAM course, researchers say these courses could be augmented or streamlined into more formal, standardized curricula.
"Although the content of integrative medicine programs remains controversial, medical schools across the country are moving forward with ambitious new programs to teach the next generation of health care leaders," said Dr. Ka Kit Hui, Wallis Annenberg Chair in Integrative East-West Medicine at UCLA, founder and director, UCLA Center for East-West Medicine, and chair, of UCLA's Collaborative Centers for Integrative Medicine. "Through the Collaborative Centers for Integrative Medicine, UCLA has become one of the nation's leading academic centers for integrative medical education. UCLA offers training programs for health sciences students and residents, as well as fellowships for clinicians and researchers."

Hui added that the importance of integrative medical education is increasingly being realized outside of UCLA. Forty-four highly esteemed academic medical centers now comprise the Consortium of Academic Health Centers for Integrative Medicine, which was established to advance the principles and practices of integrative health care within academic institutions. It provides a community of support for academic missions and a collective voice for influencing change. The Consortium also helps disseminate evidence-based information on CAM, informs health care policy, and supports medical education.

Consumers over age 50 should consider steps to cut copper and iron intake

With scientific evidence linking high levels of copper and iron to Alzheimer's disease, heart disease, and other age-related disorders, a new report in ACS' Chemical Research in Toxicology suggests specific steps that older consumers can take to avoid build up of unhealthy amounts of these metals in their bodies. "This story of copper and iron toxicity, which I think is reaching the level of public health significance, is virtually unknown to the general medical community, to say nothing of complete unawareness of the public," George Brewer states in the report.

The article points out that copper and iron are essential nutrients for life, with high levels actually beneficial to the reproductive health of younger people. After age 50, however, high levels of these metals can damage cells in ways that may contribute to a range of age-related diseases.

"It seems clear that large segments of the population are at risk for toxicities from free copper and free iron, and to me, it seems clear that preventative steps should begin now." The article details those steps for people over age 50, including avoiding vitamin and mineral pills that contain copper and iron; lowering meat intake: avoiding drinking water from copper pipes; donating blood regularly to reduce iron levels; and taking zinc supplements to lower copper levels.

"Risks of Copper and Iron Toxicity during Aging in Humans"
DOWNLOAD FULL TEXT ARTICLE: http://pubs.acs.org/stoken/presspac/presspac/full/10.1021/tx900338d

First evidence that blueberry juice improves memory in older adults

Scientists are reporting the first evidence from human research that blueberries — one of the richest sources of healthful antioxidants and other so-called phytochemicals — improve memory. They said the study establishes a basis for comprehensive human clinical trials to determine whether blueberries really deserve their growing reputation as a memory enhancer. A report on the study appears in ACS' Journal of Agricultural and Food Chemistry, a bi-weekly publication.

Robert Krikorian and colleagues point out that previous studies in laboratory animals suggest that eating blueberries may help boost memory in the aged. Until now, however, there had been little scientific work aimed at testing the effect of blueberry supplementation on memory in people.

In the study, one group of volunteers in their 70s with early memory decline drank the equivalent of 2-2 1/2 cups of a commercially available blueberry juice every day for two months. A control group drank a beverage without blueberry juice. The blueberry juice group showed significant improvement on learning and memory tests, the scientists say. "These preliminary memory findings are encouraging and suggest that consistent supplementation with blueberries may offer an approach to forestall or mitigate neurodegeneration," said the report. The research involved scientists from the University of Cincinnati, the U.S. Department of Agriculture, and the Canadian department of agriculture.

"Blueberry Supplementation Improves Memory in Older Adults"
DOWNLOAD FULL TEXT ARTICLE: http://pubs.acs.org/stoken/presspac/presspac/full/10.1021/jf9029332

Antioxidants aren't always good for you and can impair muscle function, study shows

Antioxidants increasingly have been praised for their benefits against disease and aging, but recent studies at Kansas State University show that they also can cause harm.
Researchers in K-State's Cardiorespiratory Exercise Laboratory have been studying how to improve oxygen delivery to the skeletal muscle during physical activity by using antioxidants, which are nutrients in foods that can prevent or slow the oxidative damage to the body. Their findings show that sometimes antioxidants can impair muscle function.

"Antioxidant is one of those buzz words right now," said Steven Copp, a doctoral student in anatomy and physiology from Manhattan and a researcher in the lab. "Walking around grocery stores you see things advertised that are loaded with antioxidants. I think what a lot of people don't realize is that the antioxidant and pro-oxidant balance is really delicate. One of the things we've seen in our research is that you can't just give a larger dose of antioxidants and presume that there will be some sort of beneficial effect. In fact, you can actually make a problem worse."

David C. Poole and Timothy I. Musch, K-State professors from both the departments of kinesiology and anatomy and physiology, direct the Cardiorespiratory Exercise Laboratory, located in the College of Veterinary Medicine complex. Researchers in the lab study the physiology of physical activity in health and disease through animal models. Copp and Daniel Hirai, an anatomy and physiology doctoral student from Manhattan working in the lab, have conducted various studies associated with how muscles control blood flow and the effects of different doses and types of antioxidants.

Abnormalities in the circulatory system, such as those that result from aging or a disease like chronic heart failure, can impair oxygen delivery to the skeletal muscle and increase fatigability during physical activity, Copp said. The researchers are studying the effects antioxidants could have in the process.

"If you have a person trying to recover from a heart attack and you put them in cardiac rehab, when they walk on a treadmill they might say it's difficult," Poole said. "Their muscles get sore and stiff. We try to understand why the blood cells aren't flowing properly and why they can't get oxygen to the muscles, as happens in healthy individuals."

Copp said there is a potential for antioxidants to reverse or partially reverse some of those changes that result from aging or disease. However, K-State's studies have shown that some of the oxidants in our body, such as hydrogen peroxide, are helpful to increase blood flow.

"We're now learning that if antioxidant therapy takes away hydrogen peroxide – or other naturally occurring vasodilators, which are compounds that help open blood vessels – you impair the body's ability to deliver oxygen to the muscle so that it doesn't work properly," Poole said.

Poole said antioxidants are largely thought to produce better health, but their studies have shown that antioxidants can actually suppress key signaling mechanisms that are necessary for muscle to function effectively.

"It's really a cautionary note that before we start recommending people get more antioxidants, we need to understand more about how they function in physiological systems and circumstances like exercise," Poole said.

Hirai said the researchers will continue to explore antioxidants and the effects of exercise training. Their studies are looking at how these can help individuals combat the decreased mobility and muscle function that comes with advancing age and diseases like heart failure.

"The research we do here is very mechanistic in nature, and down the road our aim is to take our findings and make recommendations for diseased and aging populations," Copp said.

What You Eat After Exercise Matters
ScienceDaily (Jan. 29, 2010) — Many of the health benefits of aerobic exercise are due to the most recent exercise session (rather than weeks, months and even years of exercise training), and the nature of these benefits can be greatly affected by the food we eat afterwards, according to a study published in the *Journal of Applied Physiology*.

"Differences in what you eat after exercise produce different effects on the body's metabolism," said the study's senior author, Jeffrey F. Horowitz of the University of Michigan. This study follows up on several previous studies that demonstrate that many health benefits of exercise are transient: one exercise session produces benefits to the body that taper off, generally within hours or a few days.

"Many of the improvements in metabolic health associated with exercise stem largely from the most recent session of exercise, rather than from an increase in 'fitness' per se," Dr. Horowitz said. "But exercise doesn't occur in a vacuum, and it is very important to look at both the effects of exercise and what you're eating after exercise."

Specifically, the study found that exercise enhanced insulin sensitivity, particularly when meals eaten after the exercise session contained relatively low carbohydrate content. Enhanced insulin sensitivity means that it is easier for the body to take up sugar from the blood stream into tissues like muscles, where it can be stored or used as fuel. Impaired insulin sensitivity (i.e., "insulin resistance") is a hallmark of Type II diabetes, as well as being a major risk factor for other chronic diseases, such as heart disease.
Interestingly, when the research subjects in this study ate relatively low-calorie meals after exercise, this did not improve insulin sensitivity any more than when they ate enough calories to match what they expended during exercise. This suggests that you don't have to starve yourself after exercise to still reap some of the important health benefits.

The paper, "Energy deficit after exercise augments lipid mobilization but does not contribute to the exercise-induced increase in insulin sensitivity," appears in the online edition of the journal. The authors are Sean A. Newsom, Simon Schenk, Kristin M. Thomas, Matthew P. Harber, Nicolas D. Knuth, Haila Goldenberg and Dr. Horowitz. All are at the University of Michigan. The American Physiological Society (APS: www.the-aps.org) published the research.

**Study Design**

The study included nine healthy sedentary men, all around 28-30 years old. They spent four separate sessions in the Michigan Clinical Research Unit in the University of Michigan Hospital. Each session lasted for approximately 29 hours. They fasted overnight before attending each session, which began in the morning.

The four hospital visits differed primarily by the meals eaten after exercise. The following describes the four different visits:

1. They did not exercise and ate meals to match their daily calorie expenditure. This was the control trial.
2. They exercised for approximately 90 min at moderate intensity, and then ate meals that matched their caloric expenditure. The carbohydrate, fat, and protein content of these meals were also appropriately balanced to match their expenditure.
3. They exercised for approximately 90 min at moderate intensity and then ate meals with relatively low carbohydrate content, but they ate enough total calories to match their calorie expenditure. This reduced-carbohydrate meal contained about 200 grams of carbohydrate, less than half the carbohydrate content of the balanced meal.
4. They exercised for approximately 90 min at moderate intensity and then ate relatively low-calorie meals, that is, meals that provided less energy than was expended (about one-third fewer calories than the meals in the other two exercise trials). These meals contained a relatively high carbohydrate content to replace the carbohydrate "burned" during exercise.

The exercise was performed on a stationary bicycle and a treadmill. The order in which the participants did the trials was randomized.

In the three exercise trials, there was a trend for an increase in insulin sensitivity. However, when participants ate less carbohydrate after exercise, this enhanced insulin sensitivity significantly more. Although weight loss is important for improving metabolic health in overweight and obese people, these results suggest that people can still reap some important health benefits from exercise without undereating or losing weight, Dr. Horowitz said.

The study also reinforces the growing body of evidence that each exercise session can affect the body's physiology and also that differences in what you eat after exercise can produce different physiological changes.

**Next Steps**

The research team is now performing experiments with obese people, aimed at better identifying the minimum amount of exercise that will still improve insulin sensitivity at least into the next day.

**Nutritional Drink for Alzheimer’s Patients Evaluated in Clinical Trial**

ScienceDaily (Jan. 29, 2010) — Rush University Medical Center is leading a nationwide clinical trial of a nutritional drink to determine whether it can improve cognitive performance in people with mild to moderate Alzheimer’s.

The study follows recently released results from an earlier trial conducted in Europe showing that the drink, called Souvenaid, improved verbal recall in people with mild disease who were followed for three months.

"Our primary goal is to see whether Souvenaid can slow the worsening of memory difficulties in persons with mild to moderate Alzheimer’s who are already taking approved treatments for the disease," said Dr. Raj Shah, medical director of the Rush Memory Clinic and one of the study’s lead investigators.

Results of the first European study were released recently following publication in the journal Alzheimer's & Dementia. In that study, 225 patients with mild Alzheimer’s were divided into two groups. Some drank Souvenaid and the others sipped a non-medical drink every day for 12 weeks.

Researchers found that the patients who drank Souvenaid improved in a delayed verbal recall task.

A total of 500 individuals who are taking medications approved by the U.S. Food and Drug Administration for the symptomatic treatment of mild to moderate Alzheimer’s disease will be enrolled in the present study at 40 sites across the U.S. In the double-blinded study, half of the participants will drink about four ounces of Souvenaid once a day for 24 weeks. The other half will drink a control product that is similar in flavor, appearance, and composition,
but without the Souvenaid nutrients. Neither group will know whether they are drinking Souvenaid or the other beverage.

Researchers will test whether the participants’ cognitive and functional performance -- including memory, language, attention/concentration, executive functioning, information processing and recall -- shows any greater improvement with Souvenaid than with medication alone.

**Physical Activity Associated With Healthier Aging: Links Between Exercise and Cognitive Function, Bone Density and Overall Health**

ScienceDaily (Jan. 30, 2010) — Physical activity appears to be associated with a reduced risk or slower progression of several age-related conditions as well as improvements in overall health in older age, according to a commentary and four articles published in the January 25 issue of *Archives of Internal Medicine*, one of the JAMA/Archives journals.

Exercise has previously been linked to beneficial effects on arthritis, falls and fractures, heart disease, lung disease, cancer, diabetes and obesity, write Jeff Williamson, M.D., M.H.S., and Marco Pahor, M.D., of University of Florida, Gainesville, in a commentary. All of these conditions threaten older adults' ability to function independently and handle tasks of daily living.

"Regular physical activity has also been associated with greater longevity as well as reduced risk of physical disability and dependence, the most important health outcome, even more than death, for most older people," they continue. Four new studies published in this issue of the Archives -- outlined below -- "move the scientific enterprise in this area further along the path toward the goal of understanding the full range of important aging-related outcomes for which exercise has a clinically relevant impact."

**Midlife Exercise Associated With Better Health in Later Years**

Among women who survive to age 70 or older, those who regularly participated in physical activity during middle age appear more likely to be in better overall health. Qi Sun, M.D., Sc.D., of the Harvard School of Public Health, Brigham and Women’s Hospital and Harvard Medical School, Boston, and colleagues analyzed data from 13,535 participants in the Nurses’ Health Study.

The women reported their physical activity levels in 1986, at an average age of 60. Among those who had survived to age 70 or older as of 1995 to 2001, those who had higher levels of physical activity at the beginning of the study were less likely to have chronic diseases, heart surgery or any physical, cognitive or mental impairments.

"Since the American population is aging rapidly and nearly a quarter of Americans do not engage in any leisure-time activity, our findings appear to support federal guidelines regarding physical activity to promote health among older people and further emphasize the potential of activity to enhance overall health and well-being with aging," the authors conclude. "The notion that physical activity can promote successful survival rather than simply extend the lifespan may provide particularly strong motivation for initiating activity."

**Resistance Training Programs Appear to Improve Some Cognitive Skills in Older Women**

One year of once- or twice-weekly resistance training appears to improve attention and conflict resolution skills among older women. Teresa Liu-Ambrose, Ph.D., P.T., of Vancouver Coastal Health Research Institute and University of British Columbia, Vancouver, Canada, and colleagues studied 155 women age 65 to 75. Participants were randomly assigned to participate in resistance training once (54 women) or twice (52 women) weekly, whereas 49 women in a control group participated in twice-weekly balance and tone training.

After one year, women in both resistance training groups significantly improved their scores on tests of selective attention (maintaining mental focus) and conflict resolution. The program simultaneously improved muscular function in the women.

"This has important clinical implications because cognitive impairment is a major health problem that currently lacks a clearly effective pharmaceutical therapy and because resistance training is not widely adopted by seniors," the authors write. "The doses of resistance training we used in this study fall within those recommended by the 2008 Physical Activity Guidelines for seniors."

**Physical Activity May Be Associated With Reduced Cognitive Impairment In Elderly Population**

Moderate or high physical activity appears to be associated with a lower the risk of developing cognitive impairment in older adults after a two-year period. Thorleif Etgen, M.D., of Technische Universität München, Munich, and Klinikum Traunstein, Germany, and colleagues examined physical activity and cognitive function in 3,903 participants (older than 55) from southern Bavaria, Germany between 2001 and 2003.

At the beginning of the study, 418 participants (10.7 percent) had cognitive impairment. After two years, 207 (5.9 percent) of the remaining 3,485 unimpaired study participants developed cognitive impairment. "The incidence
of new cognitive impairment among participants with no, moderate and high activity at baseline was 13.9 percent, 6.7 percent and 5.1 percent, respectively," the authors write.

"Future large randomized controlled intervention trials assessing the quantity (e.g., no activity vs. moderate vs. high activity) and quality (aerobic exercise or any kind type of physical exercise, like balance and strength training or even integrated physical activities like dancing or games) of physical activity that is required to prevent or delay a decline in cognitive function are recommended," they conclude.

**Exercise Program Associated With Denser Bones, Lower Fall Risk in Older Women**

Women age 65 or older assigned to an exercise program for 18 months appeared to have denser bones and a reduced risk of falls, but not a reduced cardiovascular disease risk, compared with women in a control group. Wolfgang Kemmler, Ph.D., and colleagues at Freidrich-Alexander University of Erlangen-Nuremberg, Erlangen, Germany, studied a total of 246 older women. Half of the women exercised four days per week with special emphasis on intensity while the other half participated in a wellness program that focused on well-being.

Among the 227 women who completed the study, the 115 who exercised had higher bone density in their spine and hip, and also had a 66 percent reduced rate of falls. Fractures due to falls were twice as common in the controls vs. the exercise group (12 vs. six). However, the 10-year risk of cardiovascular disease -- assessed using the Framingham Risk Calculator, which incorporates factors such as cholesterol level, blood pressure and presence of diabetes -- decreased in both groups and did not differ between the two.

"Because this training regimen can be easily adopted by other institutions and health care providers, a broad implementation of this program is feasible," the authors conclude.

**Journal References**

Qi Sun; Mary K. Townsend; Olivia I. Okereke; Oscar H. Franco; Frank B. Hu; Francine Grodstein. Physical Activity at Midlife in Relation to Successful Survival in Women at Age 70 Years or Older. Arch Intern Med, 2010; 170 (2): 194-201 [link]

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**Cholesterol's link to heart disease gets clearer -- and more complicated**

By considering molecular-level events on a broader scale, researchers now have a clearer, if more complicated, picture of how one class of immune cells goes wrong when loaded with cholesterol. The findings reported in the February 3rd issue of *Cell Metabolism*, a Cell Press publication, show that, when it comes to the development of atherosclerosis and heart disease, it's not about any one bad actor—it's about a network gone awry.

The new findings also highlight a pretty remarkable thing, Heinecke says: "Despite 30 years of study, we still don't know how cholesterol causes heart disease." But, with the new findings, scientists are getting closer.

Earlier studies had shown that heart disease is about more than just high LDL ("bad") cholesterol. Cells known as macrophages also play a critical role. Macrophages are part of the innate immune system that typically gobble up pathogens and clear away dead cells. But they also take up and degrade cholesterol derivatives. When they get overloaded with those lipoproteins, they take on a foamy appearance under the microscope to become what scientists aptly refer to as foam cells. Those foam cells are the ones that seem to have critical importance in the development of atherosclerosis.

People had typically thought about this problem in terms of linear pathways, Heinecke explained. In essence, macrophages end up with too much cholesterol going in and not enough coming out. The macrophages get overwhelmed and trapped in the artery wall, and somehow plaques form as a result.

But the new results show that it isn't really about simple paths in and out; rather, there is an integrated network of macrophage proteins involved. When that network gets disrupted, as it does when too much cholesterol comes in, atherosclerosis forms. "It's definitely a different way to think about what is going on," Heinecke says.

Heinecke's group applied sophisticated technologies and statistical tools to get a global view of what happens to macrophage proteins when they turn into foam cells. Their analysis revealed what they call a macrophage sterol-responsive network (MSRN), including proteins already known to work together. Most of them are also found in one place, within microvesicles outside the macrophage cells.

The researchers further found that drugs used to lower cholesterol and inflammation, including statins and rosiglitazone, restore the macrophage network to almost normal, even in mice that don't have the LDL receptors that are considered the usual targets of the drugs. On the other hand, mice lacking single proteins in the network, including APOE and so-called complement proteins of the immune system, have macrophages that look like foam cells even when they aren't loaded with cholesterol.

The findings suggest that anything that sends the macrophage network off kilter could promote heart disease, Heinecke said. They also change the way researchers should think about how heart disease is treated. The key may be how to best restore the function of an integrated network rather than to lower cholesterol levels or ratchet individual proteins up or down.
"We propose that the atherogenic actions of cholesterol-loaded macrophages are an emergent property that results when the normal balance of MSRN proteins in microvesicles is perturbed," the researchers conclude. "We further suggest that certain dietary factors or genetic variations can disturb this network, thereby promoting vascular disease. By integrating mouse and human data, we hope to better understand the MSRN's role in foam cell formation, with the long-term goal of identifying therapeutic interventions for targeting networks rather than individual proteins."

**Magnesium Supplement Helps Boost Brainpower**

ScienceDaily (Feb. 2, 2010) — New research finds that an increase in brain magnesium improves learning and memory in young and old rats. The study, published in the January 28th issue of the journal *Neuron*, suggests that increasing magnesium intake may be a valid strategy to enhance cognitive abilities and supports speculation that inadequate levels of magnesium impair cognitive function, leading to faster deterioration of memory in aging humans.

Diet can have a significant impact on cognitive capacity. Identification of dietary factors which have a positive influence on synapses, the sites of communication between neurons, might help to enhance learning and memory and prevent their decline with age and disease. Professor Guosong Liu, Director of the Center for Learning and Memory at Tsinghua University in Beijing, China, led a study examining whether increased levels of one such dietary supplement, magnesium, boosts brain power.

"Magnesium is essential for the proper functioning of many tissues in the body, including the brain and, in an earlier study, we demonstrated that magnesium promoted synaptic plasticity in cultured brain cells," explains Dr. Liu. "Therefore it was tempting to take our studies a step further and investigate whether an increase in brain magnesium levels enhanced cognitive function in animals."

Because it is difficult to boost brain magnesium levels with traditional oral supplements, Dr. Liu and colleagues developed a new magnesium compound, magnesium-L-threonate (MgT) that could significantly increase magnesium in the brain via dietary supplementation. They used MgT to increase magnesium in rats of different ages and then looked for behavioral and cellular changes associated with memory.

"We found that increased brain magnesium enhanced many different forms of learning and memory in both young and aged rats," says Dr. Liu. A close examination of cellular changes associated with memory revealed an increase in the number of functional synapses, activation of key signaling molecules and an enhancement of short- and long-term synaptic processes that are crucial for learning and memory.

The authors note that the control rats in this study had a normal diet which is widely accepted to contain a sufficient amount of magnesium, and that the observed effects were due to elevation of magnesium to levels higher than provided by a normal diet.

"Our findings suggest that elevating brain magnesium content via increasing magnesium intake might be a useful new strategy to enhance cognitive abilities," explains Dr. Liu. "Moreover, half the population of industrialized countries has a magnesium deficit, which increases with aging. This may very well contribute to age-dependent memory decline; increasing magnesium intake might prevent or reduce such decline."

**Journal Reference:**

Inna Slutsky, Nashat Abumaria, Long-Jun Wu, Chao Huang, Ling Zhang, Bo Li, Xiang Zhao, Arvind Govindarajan, Ming-Gao Zhao, Min Zhuo, Susumu Tonegawa and Guosong Liu. *Enhancement of Learning and Memory by Elevating Brain Magnesium*. *Neuron*, Jan. 28, 2010

**Ginkgo Herbal Medicines May Increase Seizures in People With Epilepsy**

ScienceDaily (Feb. 2, 2010) — Restrictions should be placed on the use of Ginkgo biloba (G. biloba) -- a top-selling herbal remedy -- because of growing scientific evidence that Ginkgo may increase the risk of seizures in people with epilepsy and could reduce the effectiveness of anti-seizure drugs, a new report concludes. The article appears in ACS' *Journal of Natural Products*.

It also suggests that Ginkgo may have harmful effects in other people after eating raw or roasted Ginkgo seed or drinking tea prepared from Ginkgo leaves.

Eckhard Leistner and Christel Drewke note that consumers use pills, teas, and other products prepared from leaves of the Ginkgo tree to treat a wide array of health problems. Those include Alzheimer's disease and other memory loss, clinical depression, headache, irritable bladder, alcohol abuse, blockages in blood vessels, poor concentration, and dizziness. Scientific concern focuses mainly on one chemical compound in the herb. It is a potentially toxic material known as ginkgotoxin.

They reviewed scientific research on Ginkgo, and found 10 reports indicating that patients with epilepsy who take Ginkgo products face an increased risk of seizures. They note that laboratory studies explain how Ginkgo could
have that unwanted effect. Ginkgotoxin seems to alter a chemical signaling pathway in ways that may trigger epileptic seizures. Further evidence showed that Ginkgo can interact with anti-seizure medications and reduce their effectiveness. "Contrary to our own previous assumption, we are now convinced, however, that G. biloba medications and other products can have a detrimental effect on a person's health condition," the report concludes. "It is therefore important that the large number of G. biloba product users and their health care providers be made aware of these risks, in order to enable them to make informed decisions about the use of these preparations."

**Journal Reference:**

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**Fish Oil May Reduce the Risk of Psychotic Disorders in High-Risk Individuals**

Fish Daily (Feb. 2, 2010) — Individuals at extremely high risk of developing psychosis appear less likely to develop psychotic disorders following a 12-week course of fish oil capsules containing long-chain omega-3 polyunsaturated fatty acids, according to a report in the February issue of *Archives of General Psychiatry*, one of the JAMA/Archives journals.

"Early treatment in schizophrenia and other psychoses has been linked to better outcomes," the authors write as background information in the article. "Given that subclinical psychotic symptoms may predict psychotic disorder and psychosis proneness in a population may be related to the rate of psychotic disorder, intervention in at-risk individuals holds the promise of even better outcomes, with the potential to prevent full-blown psychotic disorders."

Long-chain omega-3 polyunsaturated fatty acids are a promising intervention in individuals with schizophrenia, who may have an underlying dysfunction in fatty acid metabolism, the authors note. G. Paul Amminger, M.D., of Medical University of Vienna, Austria, and Orygen Youth Health Research Centre, Melbourne, Australia, conducted a randomized, double-blind, placebo-controlled clinical trial of their effect on the risk of progression to psychosis in 81 individuals at ultra-high risk. These individuals either had mild psychotic symptoms, transient psychosis or a family history of psychotic disorders plus a decrease in functioning. These criteria identify individuals whose risk of becoming psychotic may be as high as 40 percent in a 12-month period.

For 12 weeks, 41 individuals were assigned to take daily fish oil capsules containing 1.2 grams of omega-three polyunsaturated fatty acids and 40 were assigned to take placebo; a total of 76 (93.8 percent) completed the intervention. By the end of the study, two (4.9 percent) in the omega-3 group and 11 (27.5 percent) in the placebo group had transitioned to psychotic disorder. The difference between progression to psychosis was 22.6 percent. Based on the results, the authors estimate that four adults would need to be treated with omega-3 fatty acids to prevent one from developing psychosis over a 12-month period. Polyunsaturated fatty acids also significantly reduced symptoms and improved functioning compared with placebo. Rates of adverse effects were minimal and similar between the two groups.

The potential effects of fatty acids on psychosis development may result from changes to cell membranes and interactions with neurotransmitter systems in the brain, the authors note. "The finding that treatment with a natural substance may prevent or at least delay the onset of psychotic disorder gives hope that there may be alternatives to antipsychotics for the prodromal [early symptomatic] phase," the authors write. "Stigmatization and adverse effects -- which include metabolic changes, sexual dysfunction and weight gain -- associated with the use of antipsychotics are often not acceptable for young people."

In contrast, omega-3 fatty acids may cause some digestive complications but largely "are free of clinically relevant adverse effects. They have the advantage of excellent tolerability, public acceptance, relatively low costs and benefits for general health," the authors conclude. "Long-chain omega-3 fatty polyunsaturated fatty acids reduce the risk of progression to psychotic disorder and may offer a safe and efficacious strategy for indicated prevention in young people with subthreshold psychotic states."

**Journal Reference:**
G. Paul Amminger; Miriam R. Schafer; Konstantinos Papageorgiou; Claudia M. Klier; Sue M. Cotton; Susan M. Harrigan; Andrew Mackinnon; Patrick D. McGorry; Gregor E. Berger. *Long-Chain ω-3 Fatty Acids for Indicated Prevention of Psychotic Disorders: A Randomized, Placebo-Controlled Trial. Arch Gen Psychiatry*, 2010; 67 (2): 146-154 [link]

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**Acupuncture found effective against depression during pregnancy**

CHICAGO, Ill. (February 4, 2010) — In a study to be presented today at the Society for Maternal-Fetal Medicine's (SMFM) annual meeting, The Pregnancy Meeting ™, in Chicago, researchers will unveil findings that show that acupuncture may be an effective treatment for depression during pregnancy.

"Depression during pregnancy is an issue of concern because it has negative effects on both the mother and the baby as well as the rest of the family," said Dr. Schnyer, one of the study's authors.
About 10% of pregnant women meet criteria for major depression and almost 20% have increased symptoms of depression during pregnancy. The rates of depression in pregnant women are comparable to rates seen among similarly aged non-pregnant women and among women during the postpartum period, but there are far fewer treatment studies of depression during pregnancy than during the postpartum period.

Dealing with depression is difficult for pregnant women because the use of anti-depressants poses concerns to the developing fetus and women are reluctant to take medications during pregnancy.

In the study, an evaluator-blinded randomized trial, 150 participants who met the Diagnostic & Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for Major Depressive Disorder were randomized to receive either acupuncture specific for depression (SPEC, n=52) or one of two active controls: control acupuncture (CTRL, n=49) or massage (MSSG, n=49). Treatments lasted eight weeks (12 sessions). Junior acupuncturists masked to treatment assignment needled participants at points prescribed by senior acupuncturists. Massage therapists and patients were not blinded. The primary outcome was the Hamilton Rating Scale for Depression, administered by blinded raters at baseline and after four and eight weeks of treatment. Data were analyzed using mixed effects models and by intent-to-treat.

The results showed that the women who received SPEC experienced a significantly greater decrease in depression severity (p<0.05) compared to the combined controls (d=0.39, 95% CI [-1.31, 1.65]) or CTRL acupuncture alone (p<0.05; Cohen’s-d = 0.46, 95% CI [-1.24, 2.31]). They also had a higher response rate (63.0%) than the combined controls (44.3%; p<0.05; NNT=5.3, 95% CI [2.8, 75.0]) or CTRL acupuncture alone (37.5%; p<0.05; NNT=3.9, 95% CI [2.2, 19.8]). Symptom reduction and response rates did not differ significantly between controls (CTRL 37.5% and MSSG 50.0%). Mild and transient side effects were reported by 43/150 participants (4 in MSSG; 19 in CTRL, 20 in SPEC). Significantly fewer participants reported side-effects in MSSG than the two acupuncture groups (p<0.01).

"The results of our study show that the acupuncture protocol we tested could be a viable treatment option for depression during pregnancy" said Dr. Schnyer.

York study maps the effects of acupuncture on the brain

Important new research about the effects of acupuncture on the brain may provide an understanding of the complex mechanisms of acupuncture and could lead to a wider acceptability of the treatment.

The study, by researchers at the University of York and the Hull York Medical School published in Brain Research, indicates that acupuncture has a significant effect on specific neural structures. When a patient receives acupuncture treatment, a sensation called deqi can be obtained; scientific analysis shows that this deactivates areas within the brain that are associated with the processing of pain.

Dr Hugh MacPherson, of the Complementary Medicine Research Group in the University’s Department of Health Sciences, says: "These results provide objective scientific evidence that acupuncture has specific effects within the brain which hopefully will lead to a better understanding of how acupuncture works."

Neuroscientist Dr Aziz Asghar, of the York Neuroimaging Centre and the Hull York Medical School, adds: "The results are fascinating. Whether such brain deactivations constitute a mechanism which underlies or contributes to the therapeutic effect of acupuncture is an intriguing possibility which requires further research."

Last summer, following research conducted in York, acupuncture was recommended for the first time by the National Institute for Health and Clinical Excellence (NICE) as a treatment option for NHS patients with lower back pain. NICE guidelines now state that GPs should 'consider offering a course of acupuncture comprising a maximum of 10 sessions over a period of up to 12 weeks' for patients with this common condition.

Current clinical trials at the University of York are investigating the effectiveness and cost-effectiveness of acupuncture for Irritable Bowel Syndrome (IBS) and for depression. Recent studies in the US have also shown that acupuncture can be an effective treatment for migraines and osteoarthritis of the knee.

The York team believe that the new research could help to clear the way for acupuncture to be more broadly accepted as a treatment option on the NHS for a number of medical conditions.

**Little Effect of Soy Isoflavones Found on Bone Loss in Postmenopausal Women**

ScienceDaily (Feb. 10, 2010) — A previous six-month study by Iowa State University researchers had indicated that consuming modest amounts of soy protein, rich in isoflavones, lessened lumbar spine bone loss in midlife, perimenopausal women. But now an expanded three-year study by some of those same researchers does not show a bone-sparing effect in postmenopausal women who ingested soy isoflavone tablets, except for a modest effect at the femoral (hip) neck among those who took the highest dosage.

The multi-center clinical trial of 224 postmenopausal women -- led by D. Lee Alekel, professor of nutrition and interim associate director of the Nutrition and Wellness Research Center (NWRC) at Iowa State, and supported by the National Institute of Arthritis, Musculoskeletal and Skin Diseases, one of the research institutes of the National Institutes of Health (NIH) -- was the longest ever conducted on the effects of soy isoflavones on bone mineral density (BMD). It compared the effects of either ingesting daily 80-mg daily or 120-mg soy isoflavone tablets, compared to placebo tablets on BMD and other health outcomes.

Iowa State NWRC researchers collaborated with research physiologist Marta D. Van Loan and her colleagues at the USDA Agricultural Research Service's Western Human Nutrition Research Center, located at the University of California, Davis. The primary results of their study were published in the January issue of The American Journal of Clinical Nutrition.

**New study expands upon earlier research**

"Our six-month preliminary study, published in 2000, indicated that soy protein, rich in isoflavones, exerted the greatest impact in slowing the loss of bone mineral density in the lumbar spine," Alekel said. "But we believed that we needed to replicate these results in a study with a greater sample size and longer duration, which is what we did with this three-year intervention.

"In this longer study, we had sufficient power to detect change," she continued. "We monitored adverse events, had excellent compliance throughout, and accounted for potential confounding factors."

NWRC research staff members Laura Hanson, Jeanne Stewart and Kathy Hanson also joined Kenneth Koehler and C. Ted Peterson from statistics as part of the eight-member ISU team that conducted the research.

The researchers ran statistical analyses to determine change in BMD at the lumbar spine, total proximal femur (hip), femoral neck and whole body. They accounted for treatment, age, whole body fat mass and bone removal (using a biochemical marker).

While the 120-mg dose soy isoflavones did reveal a small protective effect on femoral neck bone BMD, researchers found no significant effect of treatment on lumbar spine, total hip, or whole-body BMD.

"This trial used isoflavones extracted from soy protein, compressed into tablet form, consumed over the course of three years, which is very different than either providing soy protein or soy foods," Alekel said. "In our recent study, we did not demonstrate an important biological effect on BMD or bone turnover."

**Research questions bone loss value of soy isoflavones**

The new study calls into question the value of postmenopausal women consuming soy isoflavone tablets to help lessen bone loss and minimize the effect of osteoporosis.

"The preponderance of studies that have been published -- particularly the longer term, more carefully conducted studies, like our own -- have shown little to no biological effects of soy isoflavones on BMD," she said. "This field of research has attracted 'believers,' making it difficult to convince them otherwise. They may continue to believe what they want to believe, rather than what the evidence shows."

And when it comes to minimizing the consequences of osteoporosis in postmenopausal women, Alekel urges a more holistic approach.

"People, in general, would like an easy fix. We would all like soy isoflavones to be that magic pill, but this study has found that they are not," she said.

Results from other health outcomes from this research have been published in six manuscripts to date, with six additional manuscripts underway. The NWRC research team will continue to study factors that influence bone mineral density and health outcomes in postmenopausal women.

**Mediterranean Diet May Lower Risk of Brain Damage That Causes Thinking Problems**
A Mediterranean diet may help people avoid the small areas of brain damage that can lead to problems with thinking and memory, according to a study that will be presented at the American Academy of Neurology's 62nd Annual Meeting in Toronto April 10 to April 17, 2010.

The study found that people who ate a Mediterranean-like diet were less likely to have brain infarcts, or small areas of dead tissue linked to thinking problems.

The Mediterranean diet includes high intake of vegetables, legumes, fruits, cereals, fish and monounsaturated fatty acids such as olive oil; low intake of saturated fatty acids, dairy products, meat and poultry; and mild to moderate amounts of alcohol.

For the study, researchers assessed the diets of 712 people in New York and divided them into three groups based on how closely they were following the Mediterranean diet. Then they conducted MRI brain scans of the people an average of six years later. A total of 238 people had at least one area of brain damage.

Those who were most closely following a Mediterranean-like diet were 36 percent less likely to have areas of brain damage than those who were least following the diet. Those moderately following the diet were 21 percent less likely to have brain damage than the lowest group.

"The relationship between this type of brain damage and the Mediterranean diet was comparable with that of high blood pressure," said study author Nikolaos Scarmeas, MD, MSc, of Columbia University Medical Center in New York and a member of the American Academy of Neurology. "In this study, not eating a Mediterranean-like diet had about the same effect on the brain as having high blood pressure."

Previous research by Scarmeas and his colleagues showed that a Mediterranean-like diet may be associated with a lower risk of Alzheimer's disease and may lengthen survival in people with Alzheimer's disease. According to the present study, these associations may be partially explained by fewer brain infarcts.

Beer Is a Rich Source of Silicon and May Help Prevent Osteoporosis

ScienceDaily (Feb. 9, 2010) — A new study suggests that beer is a significant source of dietary silicon, a key ingredient for increasing bone mineral density. Researchers from the Department of Food Science & Technology at the University of California, Davis studied commercial beer production to determine the relationship between beer production methods and the resulting silicon content, concluding that beer is a rich source of dietary silicon.

Details of this study are available in the February issue of the Journal of the Science of Food and Agriculture, published by Wiley-Blackwell on behalf of the Society of Chemical Industry.

"The factors in brewing that influence silicon levels in beer have not been extensively studied" said Charles Bamforth, lead author of the study. "We have examined a wide range of beer styles for their silicon content and have also studied the impact of raw materials and the brewing process on the quantities of silicon that enter wort and beer."

Silicon is present in beer in the soluble form of orthosilicic acid (OSA), which yields 50% bioavailability, making beer a major contributor to silicon intake in the Western diet. According to the National Institutes of Health (NIH), dietary silicon (Si), as soluble OSA, may be important for the growth and development of bone and connective tissue, and beer appears to be a major contributor to Si intake. Based on these findings, some studies suggest moderate beer consumption may help fight osteoporosis, a disease of the skeletal system characterized by low bone mass and deterioration of bone tissue.

The researchers examined a variety of raw material samples and found little change in the silicon content of barley during the malting process. The majority of the silicon in barley is in the husk, which is not affected greatly during malting. The malts with the higher silicon contents are pale colored which have less heat stress during the malting process. The darker products, such as the chocolate, roasted barley and black malt, all have substantial roasting and much lower silicon contents than the other malts for reasons that are not yet known. The hop samples analyzed showed surprisingly high levels of silicon with as much as four times more silicon than is found in malt. However, hops are invariably used in a much smaller quantity than is grain. Highly hopped beers, however, would be expected to contain higher silicon levels.

No silicon was picked up from silica hydrogel used to stabilize beer, even after a period of 24 hours and neither is there pick up from diatomaceous earth filter aid.

The study also tested 100 commercial beers for silicon content and categorized the data according to beer style and source. The average silicon content of the beers sampled was 6.4 to 56.5 mg/L.

"Beers containing high levels of malted barley and hops are richest in silicon," concludes Dr. Bamforth. "Wheat contains less silicon than barley because it is the husk of the barley that is rich in this element. While most of the silicon remains in the husk during brewing, significant quantities of silicon nonetheless are extracted into wort and much of this survives into beer."
Blueberries Counteract Intestinal Diseases
ScienceDaily (Feb. 9, 2010) — It is already known that blueberries are rich in antioxidants and vitamins. New research from the Lund University Faculty of Engineering in Sweden shows that blueberry fibre are important and can alleviate and protect against intestinal inflammations, such as ulcerative colitis. The protective effect is even better if the blueberries are eaten together with probiotics.

The project originated as an attempt to see whether various types of dietary fibre and health-promoting bacteria, so-called probiotic bacteria such as lactobacillus and bifidobacteria, can help alleviate and prevent the risk of ulcerative colitis and colorectal cancer.

"But new knowledge of this field is also of interest to those who don't believe they run the risk of developing any intestinal diseases. In recent years the research world has been realizing that our health is governed to a great extent by what happens in our large intestine," explain Camilla Bränning, a PhD in Applied Nutrition and Åsa Håkansson, a doctoral candidate in Food Hygiene at the Division of Applied Nutrition and Food Chemistry.

The researchers tested various types of diets of blueberry husks, rye bran and oat bran with or without a mixture of probiotic bacteria. The results showed that the protective effect of blueberries was reinforced if they were eaten together with probiotics.

"The probiotics proved to have a protective effect on the liver, an organ that is often negatively impacted by intestinal inflammations," explains Åsa Håkansson.

Blueberries are rich in polyphenols, which have an antimicrobial and antioxidative effect. The combination of blueberries and probiotics reduced inflammation-inducing bacteria in the intestine at the same time as the number of health-promoting lactobacilla increased.

Åsa Håkansson and Camilla Bränning also noted that if blueberries are eaten together with probiotics, the content of butyric acid and propionic acid increased in the blood, two substances that are formed when fibre are broken down and that have previously been known to be important energy sources for intestinal cells. In recent years they have also been shown to favourably impact the immune defence. It seems as if the absorption of these components is facilitated by the presence of probiotics.

"What surprised us was that such a large share of the butyric acid not only was taken up by the intestinal cells but was also transported onward to the blood. Previously it was thought that the intestinal cells used all of the butyric acid, but this is not at all the case," says Camilla Bränning, who recently defended her dissertation on the subject.

"A further explanation for the extremely positive effect of blueberries may be that the blueberry fibre are not degraded to such a high degree in the large intestine. This means that inflammation-inducing substances do not come into contact with the mucous lining of the intestine but are embedded in the fibre instead. Then these substances are transported out of body together with the faeces," explains Camilla Bränning.

The researchers also found that rye bran was broken down in the large intestine, in the same place that ulcerative colitis and large-intestine cancer often occur, and that the rye bran provided a rich supply of butyric acid and propionic acid. On the other hand, the fibre in oat bran were degraded earlier in the large intestine. The most striking result, however, was that blueberries themselves had such a favourable effect compared with both rye bran and oat bran.

Some 15-20 percent of all Swedes suffer from stomach pains, diarrhoea, or constipation, complaints resulting from intestinal disorders and more undefined intestinal problems. The disease ulcerative colitis is one of the inflammatory intestinal diseases included under the general name IBD, inflammatory bowel diseases. It can lead to colorectal cancer and afflicts about 1,000 Swedes per year.

Can chocolate lower your risk of stroke?
ST. PAUL, Minn. – Eating chocolate may lower your risk of having a stroke, according to an analysis of available research that will be released today and presented at the American Academy of Neurology's 62nd Annual Meeting in Toronto April 10 to April 17, 2010. Another study found that eating chocolate may lower the risk of death after suffering a stroke.

The analysis involved reviewing three studies on chocolate and stroke.

"More research is needed to determine whether chocolate truly lowers stroke risk, or whether healthier people are simply more likely to eat chocolate than others," said study author Sarah Sahib, BScCA, with McMaster
University in Hamilton, Ontario, Canada. Sahib worked alongside Gustavo Saposnik, MD, MSc, where the study was completed at St. Michael's Hospital and the University of Toronto.

Chocolate is rich in antioxidants called flavonoids, which may have a protective effect against stroke, but more research is needed.

The first study found that 44,489 people who ate one serving of chocolate per week were 22 percent less likely to have a stroke than people who ate no chocolate. The second study found that 1,169 people who ate 50 grams of chocolate once a week were 46 percent less likely to die following a stroke than people who did not eat chocolate.

The researchers found only one additional relevant study in their search of all the available research. That study found no link between eating chocolate and risk of stroke or death.

Researchers develop dietary formula that maintains youthful function into old age

HAMILTON, ON. February 11, 2010 – Researchers at McMaster University have developed a cocktail of ingredients that forestalls major aspects of the aging process.

The findings are published in the current issue of Experimental Biology and Medicine.

"As we all eventually learn, ageing diminishes our mind, fades our perception of the world and compromises our physical capacity," says David Rollo, associate professor of biology at McMaster. "Declining physical activity—think of grandparents versus toddlers—is one of the most reliable expressions of ageing and is also a good indicator of obesity and general mortality risk."

The study found that a complex dietary supplement powerfully offsets this key symptom of ageing in old mice by increasing the activity of the cellular furnaces that supply energy—or mitochondria—and by reducing emissions from these furnaces—or free radicals—that are thought to be the basic cause of ageing itself.

Most of the primary causes of human mortality and decline are strongly correlated with age and free-radical processes, including heart disease, stroke, Type II diabetes, many cancers, neurodegenerative diseases, and inflammatory and autoimmune conditions. Successful intervention into the ageing process could consequently prevent or forestall all of these.

Using bagel bits soaked in the supplement to ensure consistent and accurate dosing, the formula maintained youthful levels of locomotor activity into old age whereas old mice that were not given the supplement showed a 50 per cent loss in daily movement, a similar dramatic loss in the activity of the cellular furnaces that make our energy, and declines in brain signaling chemicals relevant to locomotion. This builds on the team's findings that the supplement extends longevity, prevents cognitive declines, and protects mice from radiation.

Ingredients consists of items that were purchased in local stores selling vitamin and health supplements for people, including vitamins B1, C, D, E, acetylsalicylic acid, beta carotene, folic acid, garlic, ginger root, ginkgo biloba, ginseng, green tea extract, magnesium, melatonin, potassium, cod liver oil, and flax seed oil. Multiple ingredients were combined based on their ability to offset five mechanisms involved in ageing.

For Rollo, the results go beyond simply prolonging the lifespan.

"For ageing humans maintaining zestful living into later years may provide greater social and economic benefits than simply extending years of likely decrepitude," he says. "This study obtained a truly remarkable extension of physical function in old mice, far greater than the respectable extension of longevity that we previous documented. This holds great promise for extending the quality of life of "health span" of humans."

Development of new and hopefully more effective supplements is ongoing.

Hypnosis can relieve symptoms in children with respiratory diseases

New Rochelle, NY, February 12, 2010—Hypnosis has potential therapeutic value in children with respiratory disorders for alleviating symptoms such as habit cough or unexplained sensations of difficulty breathing and for lessening a child's discomfort during medical procedures. Proper utilization of hypnosis as an adjunct to conventional treatment and its ability to use the mind-body connection to bring about physiological changes are explored in a provocative paper in Pediatric Asthma, Allergy & Immunology, a peer-reviewed journal published by Mary Ann Liebert, Inc. The paper is available free online.

Ran D. Anbar, MD, Professor of Pediatrics at SUNY Upstate Medical University, in Syracuse, NY, recommends hypnosis as a treatment option when a child's respiratory symptoms appear to have a psychological component. In his paper, "Adding Hypnosis to the Therapeutic Toolbox of Pediatric Respiratory Care," Dr. Anbar points to symptoms such as difficulty taking a breath, a disruptive cough, hyperventilation, noise on inspiration such as a gasp or squeak, and difficulty swallowing despite normal lung function as possible indications for the use of hypnosis to supplement medical therapy. Symptoms that are absent during sleep, can be associated with a particular
activity or location, or are linked to or triggered by an emotional response may be particularly responsive to hypnosis.

Published data support the benefit of hypnosis in children with respiratory disorders with a large mind-body component such as vocal cord dysfunction and habit cough. Hypnosis can also help lessen sensations of difficulty breathing and anxiety in other respiratory diseases such as cystic fibrosis and asthma. Hypnosis is also a valuable tool for easing a child's anxiety and helping patients control their response to discomfort.

Dr. Anbar cautions that hypnosis should not be attempted or considered for use by someone who is not a health care provider and has not received appropriate training in the technique.

"Dr. Anbar has added hypnosis to our therapeutic toolbox. When breathing problems have a large mind-body component, resolution with hypnosis can dramatically reduce the need for expensive testing and medications," says Harold Farber, MD, MSPH, Editor of Pediatric Asthma, Allergy Immunology, and Associate Professor of Pediatrics, Section of Pulmonology, at Baylor College of Medicine, Houston, TX.

**Muscle Loss Finding May One Day Save Physiques**

*ScienceDaily* (Feb. 13, 2010) — Hey guys, remember the muscle shirts we wore in our teens and 20s? After the age of 40 that meager part of our wardrobes usually is obsolete. Yes, at the big 4-0 we begin to lose muscle, and by age 80 up to a third of it may be gone. It's an inevitable process of aging called sarcopenia.

Why does sarcopenia happen and can it be stopped? A study conducted in mice with accelerated muscle loss at The University of Texas Health Science Center at San Antonio provides this insight: Less protection from antioxidants and more damage from oxidative stress results in impairment to cells' energy centers, which slowly leads to death of muscle cells.

A team directed by Holly Van Remmen, Ph.D., associate professor with the university's Barshop Institute for Longevity and Aging Studies and the Department of Cellular and Structural Biology, found that without a certain antioxidant enzyme to balance the formation of harmful reactive oxygen species (ROS), cellular energy centers called mitochondria fail to work properly. The mitochondria even add to the spate of ROS molecules and release factors leading to cell death.

"The impaired function of mitochondria also has a detrimental effect on the way motor neurons 'talk' to the muscle to achieve muscle contraction," Dr. Van Remmen said. "This interaction occurs at a specialized synapse where the nerve and muscle come in close contact." This key structure is called the neuromuscular junction, she said.

**Smaller and weaker muscles**

Youngmok C. Jang, Ph.D., a leading author in the study, investigated mice that were genetically engineered to lack an antioxidant enzyme called copper-zinc superoxide dismutase. He compared mitochondria from these mice and normal mice and found reduced function of the energy centers in the enzyme-deficient mice. This contributed to more cell death and muscle atrophy in the rodents. "As a result, their muscles were a lot smaller and weaker," Dr. Van Remmen said.

Insights gleaned about muscle loss can help scientists better understand other neuromuscular diseases such as amyotrophic lateral sclerosis (Lou Gehrig's disease). "Age-related muscle atrophy is a complex process and involves multiple systems," Dr. Van Remmen said. "There are, however, common mechanisms occurring in sarcopenia and other neuromuscular diseases. By understanding the mechanisms underlying age-related muscle atrophy and alterations at the neuromuscular junction, we should be able to gain insight that will help us to discover new therapeutic interventions."

If a muscle-preserving therapy is one day developed, future generations of young men will be able to keep their muscle shirts a bit longer.

**Herbal Medicines Can Be Lethal, Pathologist Warns**

*ScienceDaily* (Feb. 12, 2010) — A University of Adelaide forensic pathologist has sounded a worldwide warning of the potential lethal dangers of herbal medicines if taken in large quantities, injected, or combined with prescription drugs.

A paper by Professor Roger Byard published in the US-based *Journal of Forensic Sciences* outlines the highly toxic nature of many herbal substances, which a large percentage of users around the world mistakenly believe are safe.

"There's a false perception that herbal remedies are safer than manufactured medicines, when in fact many contain potentially lethal concentrations of arsenic, mercury and lead," Professor Byard says.
"These substances may cause serious illnesses, exacerbate pre-existing health problems or result in death, particularly if taken in excess or injected rather than ingested."

Professor Byard says there can also be fatal consequences when some herbal medicines interact with prescription drugs.

"As access to such products is largely unrestricted and many people do not tell their doctor they are taking herbal medicines for fear of ridicule, their contribution to death may not be fully appreciated during a standard autopsy."

An analysis of 251 Asian herbal products found in United States stores identified arsenic in 36 of them, mercury in 35 and lead in 24 of the products.

In one documented case a 5-year-old boy who had ingested 63 grams of "Tibetan herbal vitamins" over a period of four years was diagnosed with lead poisoning. Another case involved a young boy with cancer of the retina whose parents resorted to a traditional Indian remedy that caused arsenic poisoning.

A herbal medicine known as Chan su, used to treat sore throats, boils and heart palpitations, contains the venomous secretions of Chinese toads, which can cause cardiac arrests or even comas, according to Professor Byard.

Other side effects of herbal medicines can include liver, renal and cardiac failure, strokes, movement disorders, muscle weakness and seizures.

"Herbal medicines are frequently mixed with standard drugs, presumably to make them more effective. This can also have devastating results," Professor Byard says.

In his paper he cites the case of an epileptic patient on prescription medicine who had also ingested a Chinese herbal preparation and lapsed into a coma. Cushing's syndrome, a hormonal disorder, has also been linked to the ingestion of steroids and herbal cures mixed together.

Some herbal medicines may also have a variety of effects on standard drugs, according to Professor Byard. St John's Wort can reduce the effects of warfarin and cause intermenstrual bleeding in women taking the oral contraceptive pill.

Gingko and garlic also increase the risk of bleeding with anticoagulants and certain herbal remedies such as Borage Oil and Evening Primrose Oil lower the seizure threshold in epileptics.

Professor Byard says the American Society of Anesthesiologists has recommended its patients discontinue using herbal medicines at least two weeks before surgery because of the risks of herbal and drug interaction, including an increased chance of hemorrhaging.

Herbal medicines have become increasingly popular in western countries in recent years, with an estimated 30% of United States citizens using them, often without their doctor's knowledge.

"Forensic pathologists the world over need to become more aware of the contribution that herbal medicines are playing in a range of deaths, that is not currently recognised," Professor Byard says.

High levels of vitamin D in older people can reduce heart disease and diabetes
Middle aged and elderly people with high levels of vitamin D could reduce their chances of developing heart disease or diabetes by 43%, according to researchers at the University of Warwick.

A team of researchers at Warwick Medical School carried out a systematic literature review of studies examining vitamin D and cardiometabolic disorders. Cardiometabolic disorders include cardiovascular disease, type 2 diabetes mellitus and metabolic syndrome.

Vitamin D is a fat-soluble vitamin that is naturally present in some foods and is also produced when ultraviolet rays from sunlight strike the skin and trigger vitamin D synthesis. Fish such as salmon, tuna and mackerel are good sources of vitamin D, and it is also available as a dietary supplement.

Researchers looked at 28 studies including 99,745 participants across a variety of ethnic groups including men and women. The studies revealed a significant association between high levels of vitamin D and a decreased risk of developing cardiovascular disease (33% compared to low levels of vitamin D), type 2 diabetes (55% reduction) and metabolic syndrome (51% reduction).

The literature review, published in the journal *Maturitas*, was led by Johanna Parker and Dr Oscar Franco, Assistant Professor in Public Health at Warwick Medical School.

Dr Franco said: “We found that high levels of vitamin D among middle age and elderly populations are associated with a substantial decrease in cardiovascular disease, type 2 diabetes and metabolic syndrome.

“Targeting vitamin D deficiency in adult populations could potentially slow the current epidemics of cardiometabolic disorders.”

All studies included were published between 1990 and 2009 with the majority published between 2004 and 2009. Half of the studies were conducted in the United States, eight were European, two studies were from Iran, three from Australasia and one from India.

**White Rye Bread Healthier Than Whole Wheat?**

ScienceDaily (Feb. 15, 2010) — Wholegrain bread is good and good for you, as most people know. But it is not only the fiber-rich bran, the outer shell of the grain, that is healthful. On the contrary, research at the Lund University Faculty of Engineering shows that bread baked with white rye flour, which is flour made from the inner, white part of the rye kernel, leads to better insulin and blood sugar levels compared with wheat bread with rye bran. White rye flour thus leads to much better values than both regular wheat flour and rye bran. At the same time, much of the bread that is sold in stores today in most countries is in fact baked with wheat flour and bran from various grains.

The great difference between white rye and white wheat surprises the researchers.

“Precisely what it is that makes rye lead to a stable blood sugar curve is as yet unknown. But we are getting closer and closer to an answer. There are several different types of rye, and all not all types have the same effect, which means that some of them can be omitted from future studies. The rye flour that is sold in stores is often a mixture of different types,” says Liza Rosén, a doctoral candidate in Applied Nutrition and Food Chemistry at the Lund University Faculty of Engineering, who has led the study. The research is part of the EU project "Healthgrain,"
in which researchers study how wholemeal products can be used to prevent diseases including type 2 diabetes and heart and vascular diseases.

According to Liza Rosén, if you want to optimize the health benefits, you should eat porridge or bread made from whole grain, where all the parts of the grain are included.

"This gives you all the benefits of rye. The bran includes many healthful fibers, vitamins, minerals, and antioxidants. This also helps give a feeling of satiety and helps lower blood sugar responses over the long term. On the other hand, we did not see such good results regarding blood sugar and insulin directly after the meal," she says.

In meal tests the researchers also found that individuals who ate boiled rye kernels for breakfast were fuller and ate significantly less for lunch, more precisely 16 percent less in energy intake, compared with those who ate bread made from white flour. They also found that both bread and hot cereal made with white rye and wholegrain rye are more filling than white wheat bread. The most effective form was rye porridges.

"It is probably the water in the porridge that increases the feeling of satiety. But the water has to be mixed into the product. If you drink the same amount of water with rye bread, the results are not as good," she explains.

The original objective of Liza Rosén's research was to try to determine the reasons that wholegrain products are so beneficial, in that they have been shown to protect against cardiovascular diseases and certain types of cancer. There is also strong evidence that whole grains can prevent type 2 diabetes and insulin resistance.

"Since rye has been shown to yield low insulin responses, I started with that. A high insulin response can lead to insulin resistance in the body, that is, that the body has a hard time responding to insulin. Insulin resistance can result in high blood sugar, high blood pressure, and bad blood fats, which in turn increase the risk of age-related diabetes and cardiovascular diseases. Since I have found so much of interest, I haven't had yet time to look into barley, for instance, but perhaps in the future. On the other hand, several other researchers at Lund University have studied barley and its health benefits," says Liza Rosén.

Liza Rosén has not carried out any studies of how rye affects humans over the long term, but her colleague Ulrika Andersson did such a study on mice. For a half year a number of mice were fed wholegrain wheat or wholegrain rye, respectively. The results show that the mice that ate wheat gained significantly more weight than the mice on a rye diet.

"A possible explanation would be that wheat prompts a higher insulin response than rye, which means that the cells in the body can store more fat. The fact that rye contains more soluble fibers than wheat also plays a role, since they probably prevent the uptake of fat and other nutritional substances in the intestine."

There are only a few studies of how wholegrain forms of various cereal grains affect our health, so there is a great need for more detailed studies of the issue. Enhanced knowledge in this field creates a base for the development of a new generation of custom-designed wholegrain products that can counteract different types of diseases associated with our prosperity.

**How the tests were done:**

**Study 1:**
Twelve subjects ate breakfasts consisting of white wheat bread, porridge from wheat flour, white rye bread, wholegrain rye bread, wholegrain rye bread with lactic acid, hot cereal porridge from wholegrain rye, and wheat bread with rye bran, all in rotation. The researchers monitored blood sugar, insulin, and satiety over the following three hours. The results for the various products were then compared with each other for each individual subject (that is, subject 1's response to wholegrain bread was compared with subject 1's response to wheat bread and subject 2's response with subject 2's responses, etc.).

Since the researchers found that the products that led to low insulin release provided greater satiety after three hours, they designed a second study to address the question: Can rye products that lead to low insulin response provide greater satiety and reduce the food intake in the following meal?

**Study 2:**
Ten subjects ate breakfasts consisting of white wheat bread, boiled wholegrain rye kernels (the whole grain), boiled whole wheat kernels, white rye bread, white rye bread baked with acid (corresponding to sourdough bread), wholegrain rye bread, and wholegrain rye bread baked with acid. The researchers monitored blood sugar, insulin, and satiety over the following 4.5 hours. For lunch, the subjects were allowed to eat as many meatballs and pasta as they wanted, until they felt full. Then the results were compared for the various products with each other and for each individual subject.

In an ongoing third study, the researchers are investigating different kinds of rye.

**New evidence that green tea may help fight glaucoma and other eye diseases**
Scientists have confirmed that the healthful substances found in green tea — renowned for their powerful antioxidant and disease-fighting properties — do penetrate into tissues of the eye. Their new report, the first documenting how the lens, retina, and other eye tissues absorb these substances, raises the possibility that green tea may protect against glaucoma and other common eye diseases. It appears in ACS's bi-weekly *Journal of Agricultural and Food Chemistry*.

Chi Pui Pang and colleagues point out that so-called green tea "catechins" have been among a number of antioxidants thought capable of protecting the eye. Those include vitamin C, vitamin E, lutein, and zeaxanthin. Until now, however, nobody knew if the catechins in green tea actually passed from the stomach and gastrointestinal tract into the tissues of the eye.

Pang and his colleagues resolved that uncertainty in experiments with laboratory rats that drank green tea. Analysis of eye tissues showed beyond a doubt that eye structures absorbed significant amounts of individual catechins. The retina, for example, absorbed the highest levels of gallocatechin, while the aqueous humor tended to absorb epigallocatechin. The effects of green tea catechins in reducing harmful oxidative stress in the eye lasted for up to 20 hours. "Our results indicate that green tea consumption could benefit the eye against oxidative stress," the report concludes.

**An Ibuprofen a Day Could Keep Parkinson's Disease Away, Study Suggests**

*ScienceDaily* (Feb. 18, 2010) — New research shows people who regularly take ibuprofen may reduce their risk of developing Parkinson's disease, according to a study released February 17 that will be presented at the American Academy of Neurology's 62nd Annual Meeting in Toronto April 10 to April 17, 2010.

The research involved 136,474 people who did not have Parkinson's disease at the beginning of the research. Participants were asked about their use of non-steroid anti-inflammatory drugs (NSAIDs), including aspirin, ibuprofen and acetaminophen. After six years, 293 participants had developed Parkinson's disease.

The study found regular users of ibuprofen were 40 percent less likely to develop Parkinson's disease than people who didn't take ibuprofen. Also, people who took higher amounts of ibuprofen were less likely to develop Parkinson's disease than people who took smaller amounts of the drug. The results were the same regardless of age, smoking and caffeine intake.

"Ibuprofen was the only NSAID linked to a lower risk of Parkinson's," said Xiang Gao, MD, with Harvard School of Public Health in Boston. "Other NSAIDs and analgesics, including aspirin and acetaminophen, did not appear to have any effect on lowering a person's risk of developing Parkinson's. More research is needed as to how and why ibuprofen appears to reduce the risk of Parkinson's disease, which affects up to one million people in the United States."

**NYTimes, February 23, 2010**

**When It Comes to Salt, No Rights or Wrongs. Yet.**

By JOHN TIERNEY

Suppose, as some experts advise, that the new national dietary guidelines due this spring will lower the recommended level of salt. Suppose further that public health officials in New York and Washington succeed in forcing food companies to use less salt. What would be the effect?

A) More than 44,000 deaths would be prevented annually (as estimated recently in *The New England Journal of Medicine*).

B) About 150,000 deaths per year would be prevented annually (as estimated by the New York City Department of Health and Mental Hygiene).

C) Hundreds of millions of people would be subjected to an experiment with unpredictable and possibly adverse effects (as argued recently in *The Journal of the American Medical Association*).

D) Not much one way or the other.

E) Americans would get even fatter than they are today.

Don’t worry, there’s no wrong answer, at least not yet. That’s the beauty of the salt debate: there’s so little reliable evidence that you can imagine just about any outcome. For all the talk about the growing menace of sodium in packaged foods, experts aren’t even sure that Americans today are eating more salt than they used to.

When you don’t know past trends, predicting the future is a wide-open game.

My personal favorite prediction is E, the further fattening of America, but I’m just guided by a personal rule: Never bet against the expansion of Americans’ waistlines, especially not when public health experts get involved.
The harder the experts try to save Americans, the fatter we get. We followed their admirable advice to quit smoking, and by some estimates we gained 15 pounds apiece afterward. The extra weight was certainly a worthwhile trade-off for longer life and better health, but with success came a new challenge.

Officials responded by advising Americans to shun fat, which became the official villain of the national dietary guidelines during the 1980s and 1990s. The anti-fat campaign definitely made an impact on the marketing of food, but as we gobbled up all the new low-fat products, we kept getting fatter. Eventually, in 2000, the experts revised the dietary guidelines and conceded that their anti-fat advice may have contributed to diabetes and obesity by unintentionally encouraging Americans to eat more calories.

That fiasco hasn’t dampened the reformers’ enthusiasm, to judge from the growing campaign to impose salt restrictions. Pointing to evidence that a salt-restricted diet causes some people’s blood pressure to drop, the reformers extrapolate that tens of thousands of lives would be saved if there were less salt in everybody’s food.

But is it even possible to get the public to permanently reduce salt consumption? Researchers have had a hard enough time getting people to cut back during short-term supervised experiments.

The salt reformers say change is possible if the food industry cuts back on all the hidden salt in its products. They want the United States to emulate Britain, where there has been an intensive campaign to pressure industry as well as consumers to use less salt. As a result, British authorities say, from 2000 to 2008 there was about a 10 percent reduction in daily salt consumption, which was measured by surveys that analyzed the amount of salt excreted in urine collected over 24 hours.

But the British report was challenged in a recent article in The Clinical Journal of the American Society of Nephrology by researchers at the University of California, Davis, and Washington University in St. Louis. The team, led by Dr. David A. McCarron, a nephrologist at Davis, criticized the British authorities for singling out surveys in 2008 and 2000 while ignoring nearly a dozen similar surveys conducted in the past two decades.

When all the surveys in Britain are considered, there has been no consistent downward trend in salt consumption in recent years, said Dr. McCarron, who has been a longtime critic of the salt reformers. (For more on him and his foes, go to nytimes.com/tierneylab.) He said that the most notable feature of the data is how little variation there has been in salt consumption in Britain — and just about everywhere else, too.

Dr. McCarron and his colleagues analyzed surveys from 33 countries around the world and reported that, despite wide differences in diet and culture, people generally consumed about the same amount of salt. There were a few exceptions, like tribes isolated in the Amazon and Africa, but the vast majority of people ate more salt than recommended in the current American dietary guidelines.

The results were so similar in so many places that Dr. McCarron hypothesized that networks in the brain regulate sodium appetite so that people consume a set daily level of salt. If so, that might help explain one apparent paradox related to reports that Americans are consuming more daily calories than they used to. Extra food would be expected to come with additional salt, yet there has not been a clear upward trend in daily salt consumption evident over the years in urinalysis studies, which are considered the best gauge because they directly measure salt levels instead of relying on estimates based on people’s recollections of what they ate. Why no extra salt? One prominent advocate of salt reduction, Dr. Lawrence Appel of Johns Hopkins University, said that inconsistent techniques in conducting the urinalysis surveys may be masking a real upward trend in salt consumption.

But Dr. McCarron called the measurements reliable and said they could be explained by the set-point theory:

As Americans ate more calories, they could have eased up on some of the saltier choices so that their overall sodium consumption remained constant. By that same logic, he speculated, if future policies reduce the average amount of salt in food, people might compensate by seeking out saltier foods — or by simply eating still more of everything.

The salt reformers dismiss these speculations, arguing that with the right help, people can maintain low-salt diets without gaining weight or suffering other problems. But even if people could be induced to eat less salt, would they end up better off? The estimates about all the lives to be saved are just extrapolations based on the presumed benefits of lower blood pressure.

If you track how many strokes and heart attacks are suffered by people on low-salt diets, the results aren’t nearly as neat or encouraging, as noted recently in JAMA by Michael H. Alderman, a hypertension expert at Albert Einstein College of Medicine. A low-salt diet was associated with better clinical outcomes in only 5 of the 11 studies he considered; in the rest, the people on the low-salt diet fared either the same or worse.

“When you reduce salt,” Dr. Alderman said, “you reduce blood pressure, but there can also be other adverse and unintended consequences. As more data have accumulated, it’s less and less supportive of the case for salt reduction, but the advocates seem more determined than ever to change policy.”
Before changing public policy, Dr. Alderman and Dr. McCarron suggest trying something new: a rigorous test of the low-salt diet in a randomized clinical trial. That proposal is rejected by the salt reformers as too time-consuming and expensive. But when you contemplate the potential costs of another public health debacle like the anti-fat campaign, a clinical trial can start to look cheap.

**Remember Magnesium If You Want to Remember: Synthetic Supplement Improves Memory and Staves Off Age-Related Memory Loss**

ScienceDaily (Feb. 23, 2010) — Those who live in industrialized countries have easy access to healthy food and nutritional supplements, but magnesium deficiencies are still common. That's a problem because new research from Tel Aviv University suggests that magnesium, a key nutrient for the functioning of memory, may be even more critical than previously thought for the neurons of children and healthy brain cells in adults.

Begun at MIT, the research started as a part of a post-doctoral project by Dr. Inna Slutsky of TAU's Sackler School of Medicine and evolved to become a multi-center experiment focused on a new magnesium supplement, magnesium-L-theronate (MgT), that effectively crosses the blood-brain barrier to inhibit calcium flux in brain neurons.

Published recently in the scientific journal *Neuron*, the new study found that the synthetic magnesium compound works on both young and aging animals to enhance memory or prevent its impairment. The research was carried out over a five-year period and has significant implications for the use of over-the-counter magnesium supplements.

In the study, two groups of rats ate normal diets containing a healthy amount of magnesium from natural sources. The first group was given a supplement of MgT, while the control group had only its regular diet. Behavioral tests showed that cognitive functioning improved in the rats in the first group and also demonstrated an increase of synapses in the brain -- connective nerve endings that carry memories in the form of electrical impulses from one part of the brain to the other.

**Bad news for today’s magnesium supplements**

"We are really pleased with the positive results of our studies," says Dr. Slutsky. "But on the negative side, we've also been able to show that today's over-the-counter magnesium supplements don't really work. They do not get into the brain.

"We've developed a promising new compound which has now taken the first important step towards clinical trials by Prof. Guosong Liu, Director of the Center for Learning and Memory at Tsinghua University and cofounder of Magceutics company," she says.

While the effects were not immediate, the researchers in the study -- from Tel Aviv University, MIT, the University of Toronto, and Tsinghua University in Beijing -- were able to assess that the new compound shows improved permeability of the blood-brain barrier. After two weeks of oral administration of the compound in mice, magnesium levels in the cerebral-spinal fluid increased.

**Toward a more "plastic" brain**

"It seems counterintuitive to use magnesium for memory improvement because magnesium is a natural blocker of the NMDA receptor, a molecule critical for memory function. But our compound blocks the receptor only during background neuronal activity. As a result, it enhances the brain's 'plasticity' and increases the number of brain synapses that can be switched on," says Dr. Slutsky.

"Our results suggest that commercially available magnesium supplements are not effective in boosting magnesium in cerebro-spinal fluid," she says. "Magnesium is the fourth most abundant mineral in the body, but today half of all people in industrialized countries are living with magnesium deficiencies that may generally impair human health, including cognitive functioning."

Before the new compound becomes commercially available, Dr. Slutsky advises people to get their magnesium the old-fashioned way -- by eating lots of green leaves, broccoli, almonds, cashews and fruit. The effects on memory won't appear overnight, she cautions, but with this persistent change in diet, memory should improve, and the effects of dementia and other cognitive impairment diseases related to aging may be considerably delayed.

**Vitamin B3 Shows Early Promise in Treatment of Stroke**

ScienceDaily (Feb. 26, 2010) — An early study suggests that vitamin B3 or niacin, a common water-soluble vitamin, may help improve neurological function after stroke, according to Henry Ford Hospital researchers.

When rats with ischemic stroke were given niacin, their brains showed growth of new blood vessels, and sprouting of nerve cells which greatly improved neurological outcome.
Now research is underway at Henry Ford to investigate the effects of an extended-release form of niacin on stroke patients. Henry Ford is the only site nationally conducting such a study.

"If this proves to also work well in our human trials, we'll then have the benefit of a low-cost, easily-tolerable treatment for one of the most neurologically devastating conditions," Michael Chopp, Ph.D., scientific director of the Henry Ford Neuroscience Institute.

Dr. Chopp will present results from the animal model study at the International Stroke Conference in San Antonio.

According to the National Stroke Association, stroke is the third-leading cause of death in America and a leading cause of disability.

Ischemic strokes occur as a result of an obstruction within a blood vessel supplying blood to the brain. Ischemic stroke accounts for about 87 percent of all cases. One underlying condition for this type of obstruction is the development of fatty cholesterol deposits lining the vessel walls.

Niacin is known to be the most effective medicine in current clinical use for increasing high-density lipoprotein cholesterol (HDL-C), which helps those fatty deposits.

Dr. Chopp and his colleagues found that in animals, niacin helps restore neurological function in the brain following stroke.

In 2009, stroke physicians at Henry Ford Hospital published research which showed that HDL-C is abnormally low at the time stroke patients arrive at the hospital.

Dr. Chopp's research found that in animals, niacin increased "good" cholesterol (HDL-C), which increased blood vessels in the brain and axonal and dendritic growth leading to a substantial improvement in neurological function.

"Niacin essentially re-wires the brain which has very exciting potential for use in humans," says Dr. Chopp. "The results of this study may also open doors in other areas of neurological medicine, including brain injury."

Andrew Russman, D.O., is the principal investigator of the team at Henry Ford Hospital who will evaluate in clinical trials whether niacin improves recovery for human stroke patients.

"If we are able to prove that treating patients with niacin helps to restore neurological function after stroke, we're opening a whole new avenue of treatment for the leading cause of serious long-term disability in adults," says Dr. Russman.

**Biggest Marathon, Half-Marathon Training Mistakes**

ScienceDaily (Mar. 1, 2010) — Half marathons and marathons can be over in a matter of hours, but runners, both newbies and elite, often spend months training for the 13.1- and 26.2-mile races. Robert Chapman, director of the Human Performance Laboratory in Indiana University's School of Health, Physical Education and Recreation, and coach of Brook Team Indiana Elite, discusses four common mistakes runners make when preparing for these major races.

**Mistake #1: Discounting the importance of the weekly long run.**

For the half-marathon and marathon, the weekly long run is one of the most important components of training. The adaptations that take place physiologically and psychologically during the long run are critical in helping the runner complete the race distance, as well as helping the runner achieve a goal time. Key adaptations that take place with the weekly long run:

- Increased storage of muscle glycogen. Glycogen is the primary storage form of carbohydrates in the body, and the amount of glycogen the body can store is limited. In a typical person, there is enough glycogen present to fuel about two to three hours of moderate exercise. When glycogen stores get low or run out, the runner "hits the wall" and will struggle to finish the event. However, glycogen stores can increase as a result of training, and stores improve significantly as a result of including long runs each week.
- Improved psychological ability to handle the race distance. With each weekly long run, there is an improvement in the runner's ability to mentally tolerate exercising for long periods of time.
- Improved ability to absorb and tolerate the "pounding" the legs will take during the race. Feet, joints, tendons and muscles are all gradually strengthened over time from the overloading they receive from the weekly long run. Many runners who fail to finish a marathon do so because of leg pain and discomfort, resulting from the weight-bearing pounding over 26 miles.
- Chapman recommends a long run once each week, starting early in training at about 20 percent of overall weekly volume. From there, athletes in the half-marathon should aim for a minimum long run distance of 8-10 miles, ideally completed at least twice before their race. Marathoners should aim for a minimum long run
distance of 15 miles, completed at least twice before the race, with at least two long runs of around 20 miles being ideal.

**Mistake #2: Selecting a race without considering the weather or lifestyle considerations for training.**

Most marathons are held in the spring or fall because of the milder temperatures in the Northern Hemisphere. Most experts recommend a training buildup of 10-16 weeks for most experienced runners prior to a marathon, perhaps a few weeks less for a half marathon.

For athletes who select a spring race, this will mean completing a large portion of their training during the thick of winter -- where cold temperatures, snow and ice, and limited daylight hours can all have a dramatic effect on the quality of training and motivation for completion. Runners with work and family commitments, who have to train in early morning or evening hours, may find preparation for a spring marathon challenging. For athletes who select a fall marathon or half marathon, the bulk of the training load will come during the heat and humidity of summer. For most runners, training in extreme heat is more challenging than training in cold weather, where additional clothing can be worn. While it may be considerably easier to get runs in during early morning or late evening hours, summer is typically full of family vacations and weekend outings that can make sticking with a rigid training routine more difficult.

In the end, when deciding on a marathon or half marathon, each runner should take a look not just at the time of the year of the race, but the logistics of how well they will be able to complete their training in the three to four months prior to the event.

**Mistake #3: Failing to "practice" the race day routine.**

After weeks and weeks of training, many runners end up failing to finish or meet their goals -- often due to some simple, small detail that was overlooked regarding race day routine. Here are some examples:

- Not being used to running in the early morning, when most races start.
- Logistics such as bus departure for the race start, parking, proximity of race to hotel.
- Breakfast decisions, such as what and when to eat.
- Clothing, shoes, socks -- will they cause chafing or blistering?
- Uncertainty about the sports drink provided by the race and whether it upsets runners' stomachs.
- Shoe choice -- newer or older pair.

Many of these questions can be worked out during weekly long runs, such as clothing and breakfast choices. Runners also can contact race organizers for details about sports drinks and then try out the drinks during training. The weekly long run is not just an important component for training adaptations. It is also a great "dry run" for the race.

**Mistake #4: Starting the race too fast.**

Three athletes who Chapman coaches qualified for the U.S. Olympic Marathon Trials and another won the Columbus Marathon in her debut at the distance. In all four cases, the athletes executed a "negative split" strategy -- where the second half of the race was faster than the first.

Based on the paces completed in training, runners should have a strong idea of what pace they are capable of executing for the race distance, with slight modifications based on changing race day conditions such as weather. Once that pace is determined, Chapman recommends a conservative approach, especially if the goal is simply to finish the race. Even if a runner has a goal time in mind, a conservative, negative split approach will often lead to best performances, typically without the late race discomfort that normally accompanies a more aggressive pacing approach.

Starting out at a conservative pace can often be a challenge with the excitement of the race start, the bands and music, and even fireworks that are present when the gun fires. However, the most common recipe for disaster in a marathon is going out too fast.

**Acupuncture May Relieve Joint Pain Caused by Some Breast Cancer Treatments**

ScienceDaily (Mar. 5, 2010) — A new study, led by researchers at the Herbert Irving Comprehensive Cancer Center at NewYork-Presbyterian Hospital/Columbia University Medical Center, demonstrates that acupuncture may be an effective therapy for joint pain and stiffness in breast cancer patients who are being treated with commonly used hormonal therapies.

Results were published in the *Journal of Clinical Oncology*.

Joint pain and stiffness are common side effects of aromatase inhibitor therapy, in which the synthesis of estrogen is blocked. The therapy, which is a common and effective treatment for early-stage, hormone-receptor-
positive breast cancer in post-menopausal women, has been shown in previous research to cause some joint pain and stiffness in half of women being treated.

"Since aromatase inhibitors have become an increasingly popular treatment option for some breast cancer patients, we aimed to find a non-drug option to manage the joint issues they often create, thereby improving quality of life and reducing the likelihood that patients would discontinue this potentially life-saving treatment," said Dawn Hershman, M.D., M.S., senior author of the paper, and co-director of the breast cancer program at the Herbert Irving Comprehensive Cancer Center at NewYork-Presbyterian Hospital/Columbia University Medical Center, and an assistant professor of medicine (hematology/oncology) and epidemiology at Columbia University Medical Center.

To explore the effects of acupuncture on aromatase inhibitor-associated joint pain, the research team randomly assigned 43 women to receive either true acupuncture or sham acupuncture twice a week for six weeks. Sham acupuncture, which was used to control for a potential placebo effect, involved superficial needle insertion at body points not recognized as true acupuncture points. All participants were receiving an aromatase inhibitor for early breast cancer, and all had reported musculoskeletal pain.

Among the women treated with true acupuncture, findings demonstrated that they experienced significant improvement in joint pain and stiffness over the course of the study. Pain severity declined, and overall physical well-being improved. Additionally, 20 percent of the patients who had reported taking pain relief medications reported that they no longer needed to take these medications following acupuncture treatment. No such improvements were reported by the women who were treated with the sham acupuncture.

"This study suggests that acupuncture may help women manage the joint pain and stiffness that can accompany aromatase inhibitor treatment," said Katherine D. Crew, M.D., M.S., first author of the paper, and the Florence Irving Assistant Professor of Medicine (hematology/oncology) and Epidemiology at Columbia University Medical Center and a hematological oncologist at NewYork-Presbyterian Hospital/Columbia University Medical Center. "To our knowledge, this is the first randomized, placebo-controlled trial establishing that acupuncture may be an effective method to relieve joint problems caused by these medications. However, results still need to be confirmed in larger, multicenter studies."

Journal Reference:

**Vitamin D Lifts Mood During Cold Weather Months, Researchers Say**

ScienceDaily (Mar. 8, 2010) — A daily dose of vitamin D may just be what people in northern climates need to get through the long winter, according to researchers at Loyola University Chicago Marcella Niehoff School of Nursing (MNSON). This nutrient lifts mood during cold weather months when days are short and more time is spent indoors.

"Vitamin D deficiency continues to be a problem despite the nutrient's widely reported health benefits," said Sue Penckofer, PhD, RN, professor, MNSON. "Chicago winters compound this issue when more people spend time away from sunlight, which is a natural source of vitamin D."

Diet alone may not be sufficient to manage vitamin D levels. A combination of adequate dietary intake of vitamin D, exposure to sunlight, and treatment with vitamin D2 or D3 supplements can decrease the risk of certain health concerns. The preferred range in the body is 30 -- 60 ng/mL of 25(OH) vitamin D.

Loyola faculty members plan to take vitamin D research a step further by evaluating whether weekly vitamin D supplements improve blood sugar control and mood in women with diabetes. Depression is associated with increased insulin resistance, so people with diabetes have a greater risk for the disease than those without depression. Women also tend to have greater rates of depression and poorer blood sugar control than men with diabetes.

"There is evidence to suggest that vitamin D supplementation may decrease insulin resistance," said Dr. Penckofer. "If we can stabilize insulin levels, we may be able to simply and cost effectively improve blood sugar control and reduce symptoms of depression for these women."

Loyola is currently enrolling women in this clinical trial. In order to enter the study, they must be 18 to 70 years of age, have stable type 2 diabetes, signs of depression and no other major medical illness. Eighty women with type 2 diabetes and signs of depression will be given a weekly dose of vitamin D (50,000 IU) for a period of six months. Study participants will be evaluated at three points during this time.

"Vitamin D has widespread benefits for our health and certain chronic diseases in particular," Dr. Penckofer said. "Our research may shed greater light on the role this nutrient plays in managing two conditions that impact..."
March 8, 2010

**Massage eases anxiety, but no better than simple relaxation does**

Randomized trial with Group Health patients shows general response

Seattle—A new randomized trial shows that on average, three months after receiving a series of 10 massage sessions, patients had half the symptoms of anxiety. This improvement resembles that previously reported with psychotherapy, medications, or both. But the trial, published in the journal *Depression and Anxiety*, also found massage to be no more effective than simple relaxation in a room alone with soft, soothing music.

"We were surprised to find that the benefits of massage were no greater than those of the same number of sessions of 'thermotherapy' or listening to relaxing music," said Karen J. Sherman, PhD, MPH, a senior investigator at Group Health Research Institute. "This suggests that the benefits of massage may be due to a generalized relaxation response."

Massage therapy is among the most popular complementary and alternative medical (CAM) treatments for anxiety, she added. But this is the first rigorous trial to assess how effective massage is for patients with generalized anxiety disorder.

The trial randomly assigned 68 Group Health patients with generalized anxiety disorder to 10 one-hour sessions in pleasant, relaxing environments, each presided over by a licensed massage therapists who delivered either massage or one of two control treatments:

- Relaxation therapy: breathing deeply while lying down
- Thermotherapy: having arms and legs wrapped intermittently with heating pads and warm towels

All three treatments were provided while lying down on a massage table in a softly lighted room with quiet music. All participants received a handout on practicing deep breathing daily at home. Unlike the two control treatments, massage was specifically designed to enhance the function of the parasympathetic nervous system and relieve symptoms of anxiety including muscle tension.

Using a standard rating scale in interviews, the researchers asked the patients about the psychological and physical effects of their anxiety right after the 12-week treatment period ended and three months later, Dr. Sherman said.

All three of the groups reported that their symptoms of anxiety had decreased by about 40 percent by the end of treatment—and by about 50 percent three months later. In addition to the decline in anxiety, the patients also reported fewer symptoms of depression and less worry and disability. The research team detected no differences among the three groups; but the trial did not include a control group that got no treatment at all.

"Treatment in a relaxing room is much less expensive than the other treatments (massage or thermotherapy), so it might be the most cost-effective option for people with generalized anxiety disorder who want to try a relaxation-oriented complementary medicine therapy," Dr. Sherman said.

**The new exercise HIT: do less**

The usual excuse of "lack of time" for not doing enough exercise is blown away by new research published in *The Journal of Physiology*.

The study, from scientists at Canada's McMaster University, adds to the growing evidence for the benefits of short term high-intensity interval training (HIT) as a time-efficient but safe alternative to traditional types of moderate long term exercise. Astonishingly, it is possible to get more by doing less!

"We have shown that interval training does not have to be 'all out' in order to be effective," says Professor Martin Gibala. "Doing 10 one-minute sprints on a standard stationary bike with about one minute of rest in between, three times a week, works as well in improving muscle as many hours of conventional long-term biking less strenuously."

HIT means doing a number of short bursts of intense exercise with short recovery breaks in between. The authors have already shown with young healthy college students that this produces the same physical benefits as conventional long duration endurance training despite taking much less time (and amazingly, actually doing less exercise!) However, their previous work used a relatively extreme set-up that involved "all out" pedaling on a specialized laboratory bicycle. The new study used a standard stationary bicycle and a workload which was still above most people's comfort zone —about 95% of maximal heart rate — but only about half of what can be achieved when people sprint at an all-out pace.
This less extreme HIT method may work well for people (the older, less fit, and slightly overweight among us) whose doctors might have worries about them exercising "all-out". We have known for years that repeated moderate long-term exercise tunes up fuel and oxygen delivery to muscles and aids the removal of waste products. Exercise also improves the way muscles use the oxygen to burn the fuel in mitochondria, the microscopic power station of cells.

Running or cycling for hours a week widens the network of vessels supplying muscle cells and also boosts the numbers of mitochondria in them so that a person can carry out activities of daily living more effectively and without strain, and crucially with less risk of a heart attack, stroke or diabetes.

But the traditional approach to exercise is time consuming. Martin Gibala and his team have shown that the same results can be obtained in far less time with brief spurts of higher-intensity exercise.

To achieve the study's equivalent results by endurance training you'd need to complete over 10 hours of continuous moderate bicycling exercise over a two-week period.

The "secret" to why HIT is so effective is unclear. However, the study by Gibala and co-workers also provides insight into the molecular signals that regulate muscle adaptation to interval training. It appears that HIT stimulates many of the same cellular pathways that are responsible for the beneficial effects we associate with endurance training.

The upside of doing more exercise is well-known, but a big question for most people thinking of getting fit is: "How much time out of my busy life do I need to spend to get the perks?"

Martin Gibala says "no time to exercise" is not an excuse now that HIT can be tailored for the average adult. "While still a demanding form of training," Gibala adds, "the exercise protocol we used should be possible to do by the general public and you don't need more than an average exercise bike."

The McMaster team's future research will examine whether HIT can bring health benefits to people who are overweight or who have metabolic diseases like diabetes.

As the evidence for HIT continues to grow, a new frontier in the fitness field emerges.

Vitamin D and calcium interplay explored

Increasing calcium intake is a common--yet not always successful--strategy for reducing bone fractures. But a study supported in part by the Agricultural Research Service (ARS) underscores the importance of vitamin D and its ability to help the body utilize calcium. The study also may explain why increasing calcium alone isn't always successful in dealing with this problem.

Currently, calcium intake recommendations are not tied to vitamin D status, which may explain why markedly different recommended calcium intakes exist among countries. In the United States, the recommended calcium intake is 1,200 milligrams (mg) daily for adults aged 50 and older.

The body's skeleton needs adequate dietary calcium to reach its full potential in terms of bone mass. Still, many other factors affect bone mass, such as exercise, smoking and vitamin D--the latter through its effect on calcium absorption and direct effect on the skeleton.

The study involved a close look at about 10,000 men and women aged 20 and older participating in a nationally representative survey. Coauthors included nutrition specialist Bess Dawson Hughes with the Jean Mayer USDA Human Nutrition Research Center on Aging (HNRCA) at Tufts University in Boston, Mass. Dawson Hughes is director of the HNRCA Bone Laboratory.

Blood levels of 25-hydroxyvitamin D are used as the primary indicator of vitamin D adequacy. Within the study sample of U.S. adults, a large fraction of younger and older adults were below a suggested desirable serum vitamin D concentration of at least 75 nanomoles-per-liter (nmol/L).

The study supports the idea that correcting inadequate blood levels of vitamin D is more important than increasing dietary calcium intake beyond 566 mg a day among women and 626 mg a day among men for better bone mineral density. For example, a higher calcium intake beyond 566 mg a day may only be important among women whose vitamin D concentrations are low (less than 50 nmol/L), according to authors.

Details of this study can be found in the publication Journal of Bone and Mineral Research.

High-Intensity Interval Training Is Time-Efficient and Effective, Study Suggests

ScienceDaily (Mar. 12, 2010) — The usual excuse of "lack of time" for not doing enough exercise is blown away by new research published in The Journal of Physiology.
The study, from scientists at Canada's McMaster University, adds to the growing evidence for the benefits of short term high-intensity interval training (HIT) as a time-efficient but safe alternative to traditional types of moderate long term exercise. Astonishingly, it is possible to get more by doing less!

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Journal Reference:

Vitamin D levels have different effects on atherosclerosis in blacks and whites

WINSTON-SALEM, N.C. – Vitamin D is quickly becoming the "go-to" remedy for treating a wide range of illnesses, from osteoporosis to atherosclerosis. However, new evidence from a Wake Forest University School of Medicine study suggests that supplementing vitamin D in those with low levels may have different effects based on patient race and, in black individuals, the supplement could actually do harm.

The study is the first to show a positive relationship between calcified plaque in large arteries, a measure of atherosclerosis or "hardening of the arteries," and circulating vitamin D levels in black patients. It appears in the March issue of the Journal of Clinical Endocrinology and Metabolism.

"In black patients, lower levels of vitamin D may not signify deficiency to the same extent as in whites," said the study's lead investigator, Barry I. Freedman, M.D., John H. Felts III Professor and chief of the section on nephrology at the School of Medicine "We should use caution when supplementing vitamin D in black patients while we investigate if we are actually worsening calcium deposition in the arteries with treatment."
Vitamin D is widely used to treat patients with osteoporosis and/or low vitamin D levels based on a medically accepted normal range. This "normal" range is typically applied to all race groups, although it was established predominantly in whites. It is thought that as low vitamin D levels rise to the normal range with supplementation, protection from bone and heart disease (atherosclerosis) may increase, as well.

Blacks generally have lower vitamin D levels than whites, partly because their darker skin pigmentation limits the amount of the vitamin produced by sunlight. Blacks also consume fewer dairy products and ingest less dietary calcium than whites, said Freedman, an affiliate of the Maya Angelou Center for Health Equity, part of the School of Medicine. Despite these lower vitamin D levels and dietary calcium ingestion, blacks naturally experience lower rates of osteoporosis and have far less calcium in their arteries. Studies further reveal that black patients with diabetes have half the rate of heart attack as whites, when provided equal access to health care. This shows that lower levels of calcified atherosclerotic plaque in blacks are associated with a lower risk of heart disease. However, blacks in the general community have higher rates of heart attack than whites, potentially due to unequal access to medical care, Freedman said.

The research team determined the relationship between circulating vitamin D levels and arterial calcium in 340 black men and women with type 2 diabetes. Calcium can deposit in blood vessel walls forming a bone-like material called "calcified atherosclerotic plaque" and this plaque can be detected by computed tomography (CT) scans. Calcified atherosclerotic plaque is a reliable predictor of risk for heart attack and stroke. The investigators measured vitamin D levels in all study participants and then performed a CT scan to detect calcium in the heart and major arteries.

"We found that higher circulating levels of vitamin D in blacks were associated with more calcium in the artery walls," Freedman said. "This is the opposite effect of what is felt to occur in white patients and shows that the accepted "normal" range of vitamin D may be different between blacks and whites.

"Many of these study patients would be placed on supplemental vitamin D by their physicians simply because their levels were felt to be in the low range." Freedman added that physicians should use caution in supplementing vitamin D levels in blacks – especially if they do not have weak bones or other reasons to take this vitamin – until the effects of supplementing vitamin D on blood vessels and heart disease are better understood.

"Doctors frequently prescribe supplemental vitamin D," Freedman said. "However, we do not know all of its effects and how they may differ between the races. The bottom line is that racial differences in calcium handling are seen and black and white patients have differing risk for bone and heart disease. We should more clearly determine the effects of supplementing vitamin D in black patients with low levels based on existing criteria and should not assume that the effects of supplementation will be the same between the races."

Hypnotherapy Eases Irritable Bowel Syndrome Symptoms, Expert Says

ScienceDaily (Mar. 18, 2010) — Hypnotherapy seems to be very effective for easing the distressing symptoms of irritable bowel syndrome (IBS), and in a goodly proportion of cases, clears up symptoms altogether, reveal experts during a wide ranging discussion of the condition in a Frontline Gastroenterology podcast.

Excluding certain foodstuffs may help alleviate symptoms, but usually only for a while, says Professor Roland Valori, editor of Frontline Gastroenterology. That's because dietary measures don't tackle the root cause of the symptoms -- an overly sensitised gut. One of the best ways to do that is to use hypnotherapy, he says.

His experience of using hypnotherapy in the first 100 IBS patients treated with it showed that it significantly improved symptoms in nine out of 10 of them. It stopped symptoms altogether in four out of 10, while the remainder said they felt more in control of their symptoms. "To be frank, I have never looked back," he says.

Another option for patients is probiotics, which can be very effective, says Professor Quigley of the University of Cork, Ireland, and past president of the World Gastroenterology Organisation.

But given the current regulations for food products making medicinal claims, patients are not really in a position to know which ones might work best.

Probiotic products need to contain the specific live strain and species of bacteria they claim to contain; maintain viability throughout their shelf-life; and be backed up by good quality clinical trial evidence, he says.

Doctors have tended to diagnose IBS when they couldn't find any other cause for the symptoms, making it something of a "wastebasket diagnosis," he says. It is "extremely important" to get away from that and recognise that IBS is a constellation of symptoms in its own right.

And he points out that while anxiety and depression worsen IBS symptoms, not all patients with IBS will be anxious and depressed. None the less, it is important to take into account the way in which the brain and gut can interact to increase the severity and impact of symptoms.
An Apple a Day? Study Shows Soluble Fiber Boosts Immune System

ScienceDaily (Mar. 17, 2010) — A new University of Illinois study touts the benefits of soluble fiber -- found in oats, apples, and nuts, for starters -- saying that it reduces the inflammation associated with obesity-related diseases and strengthens the immune system.

"Soluble fiber changes the personality of immune cells -- they go from being pro-inflammatory, angry cells to anti-inflammatory, healing cells that help us recover faster from infection," said Gregory Freund, a professor in the U of I's College of Medicine and a faculty member in the College of Agriculture, Consumer and Environmental Sciences' Division of Nutritional Sciences.

This happens because soluble fiber causes increased production of an anti-inflammatory protein called interleukin-4, he said.

The study will appear in the May 2010 issue of *Brain, Behavior, and Immunity* and is available online now.

In the experiment, laboratory mice consumed low-fat diets that were identical except that they contained either soluble or insoluble fiber. After six weeks on the diet, the animals had distinctly different responses when the scientists induced illness by introducing a substance (lipopolysaccharide) that causes the body to mimic a bacterial infection.

"Two hours after lipopolysaccharide injection, the mice fed soluble fiber were only half as sick as the other group, and they recovered 50 percent sooner. And the differences between the groups continued to be pronounced all the way out to 24 hours," said Christina Sherry, who also worked on the study.

"In only six weeks, these animals had profound, positive changes in their immune systems," she said.

Now Freund has a new question: Could soluble fiber offset some of the negative effects of a high-fat diet, essentially immunizing obese persons against the harmful effects of fat?

Scientists have long known that obesity is linked to inflammatory conditions, such as diabetes and heart disease.

Yet, in a recent study, the U of I scientists demonstrated that fat tissue produces hormones that appear to compensate for this inflammation. "There are significant anti-inflammatory components in fat tissue and, if they were strategically unleashed, they could potentially protect obese people from further inflammatory insults, such as a heart attack or stroke. In obese animals, you can see the body compensating in an effort to protect itself," he said.

Not all fat is bad, the researcher noted. The Mediterranean diet, which receives high marks for its health benefits, includes such foods as olive oil; salmon, tuna, sardines, and trout, which contain important omega-3 and -6 fatty acids; and plant sources of fat, such as flaxseed.

"Now we'd like to find a way to keep some of the anti-inflammatory, positive effects that develop over time with a high-fat diet while reducing that diet's negative effects, such as high blood glucose and high triglycerides. It's possible that supplementing a high-fat diet with soluble fiber could do that, even delaying the onset of diabetes," he said.

This study is one of the first to provide two valuable lessons, said Sherry. The first, already noted, is that soluble fiber has direct anti-inflammatory effects and builds up the immune system. The second is that the amount of soluble fiber necessary to achieve these health benefits is a reasonable, not a pharmacological, amount.

The recommended daily dietary recommendation is 28 to 35 grams of total fiber, but most of the FDA's health claims are for insoluble fiber, and that's where things get a bit complicated, she said.

"Not all fiber is created equal, although you wouldn't know that by reading nutrition labels," said Sherry. "Most manufacturers don't tell you how much of each type of fiber a food contains, and we think it's important that this information be included on a product's packaging."

Good sources of soluble fiber are oat bran, barley, nuts, seeds, lentils, citrus fruits, apples, strawberries, and carrots. "We used a citrus-based pectin in our study," Sherry said.

Insoluble fiber, found in whole wheat and whole-grain products, wheat bran, and green, leafy vegetables, is also valuable for providing bulk and helping food move through the digestive system, but it doesn't provide the boost to the immune system that soluble fiber provides.

Journal Reference:
Christina L. Sherry, Stephanie S. Kim, Ryan N. Dilger, Laura L. Bauer, Morgan L. Moon, Richard I. Tapping, George C. Fahey Jr., Kelly A. Tappenden, Gregory G. Freund. Sickness behavior induced by endotoxin can be mitigated by the dietary soluble fiber, pectin, through up-regulation of IL-4 and Th2 polarization. *Brain Behavior and Immunity*, 2010; DOI: [10.1016/j.bbi.2010.01.015](http://dx.doi.org/10.1016/j.bbi.2010.01.015)

Clove A Best' Natural Antioxidant, Spanish Study Finds

ScienceDaily (Mar. 19, 2010) — Using spices eaten in the Mediterranean diet as natural antioxidants is a good way forward for the food industry, given the beneficial health effects of these products. This has been shown by researchers from the Miguel Hernández University (UMH), who have put the clove in first place.
Researchers from the Miguel Hernández University have identified cloves (Syzygium aromaticum) as the best antioxidant spice, due to the fact they contain high levels of phenolic compounds, as well as having other properties. "Out of the five antioxidant properties tested, cloves had the highest capacity to give off hydrogen, reduced lipid peroxidation well, and was the best iron reducer," says Juana Fernández-López, one of the authors of the study and a researcher at the UMH.

As a result, the research study published in the latest issue of the Flavour and Fragrance Journal ranks this spice as the best natural antioxidant.

"The results show that use of the natural oxidants occurring in spices used in the Mediterranean diet, or their extracts, is a viable option for the food industry, as long as the organoleptic characteristics of the food product are not affected," adds the researcher.

"These substances exhibit high antioxidant capacity, and could have beneficial effects for health," says the researcher.

The team also evaluated the antioxidant effect of the essential oils from other spices used in the Mediterranean diet -- oregano (Origanum vulgare), thyme (Thymus vulgaris), rosemary, (Rosmarinus funcionarios cinalis) and sage (Salvia funcionarios cinalis).

The objective of the study is to enable these spices to be incorporated into food products (above all meat products) as natural antioxidants.

Changing the food industry
"Lipid oxidation is one of the main reasons for foods deteriorating, and causes a significant reduction in their nutritional value, as well as loss of taste," says Fernández-López.

These alterations lead to a reduction in the useful lifespan of the food product. To avoid such deterioration, the food industry uses synthetic antioxidants in its products. However, as these are chemical compounds, questions have been raised about their potential toxicity and side-effects.

As a result, there is a growing interest in using plant-based products (spices, aromatic and medicinal plants) with potential antioxidant activity, in order to replace the synthetic antioxidants with "natural" substances.

Journal Reference:

Real-world health nuts: First evidence that walnuts may help fight prostate cancer
SAN FRANCISCO, March 22, 2010 — Scientists in California are reporting for the first time that walnuts — already renowned as a rich source of omega-3 fatty acids that fight heart disease — reduce the size and growth rate of prostate cancer in test animals. They described their findings today at the 239th National Meeting of the American Chemical Society (ACS), being held here this week.

"Walnuts should be part of a prostate-healthy diet," said Paul Davis, Ph.D., who headed the study. He is with the University of California-Davis. "They should be part of a balanced diet that includes lots of fruits and vegetables."

More than 190,000 men in the United States will get a diagnosis of prostate cancer in 2010, making it the most common non-skin cancer. It claims about 27,000 lives annually. Evidence suggests that diet is among the largest factors that influence a man's risk for developing prostate cancer. Studies suggest that tomatoes and pomegranate juice, for instance, may reduce the risk.

Davis and colleagues note that walnuts are a rich source of healthful substances, including omega-3 fatty acids found in more expensive foods like salmon; gamma tocopherol (a form of vitamin E), polyphenols, and antioxidants. The scientists recently showed that walnuts could help fight heart disease by reducing levels of endothelin, a substance that increases inflammation of blood vessels. This effect was in addition to walnuts reducing levels of "bad" cholesterol (low-density lipoprotein cholesterol, or LDL) in the blood. Knowing that people with prostate cancer have elevated levels of endothelin, the scientists decided to test whether eating walnuts could be beneficial in prostate cancer.

"We decided to use whole walnuts in the diet because when a single component of a food linked to cancer prevention has been tested as a supplement, that food's cancer-preventative effects disappear in most cases," Davis said.

The scientists fed lab mice genetically programmed to develop prostate cancer the equivalent of about 2.5 ounces of walnuts per day — equivalent to 14 shelled nuts — for 2 months. A control group of mice got the same
diet except with soybean oil. The walnut-fed mice developed prostate cancers that were about 50 percent smaller than the control mice. Those cancers also grew 30 percent slower.

The scientists reported that the walnut-fed mice had lower levels of insulin-like growth factor-1. High levels of the protein may increase the risk of developing prostate cancer in the first place. In an effort to understand what walnuts were doing, the scientists used gene chip technology to look for changes in gene levels in the tumor itself as well as the mouse's liver. They found that walnuts also had large, beneficial effects in both tumor and liver on genes that have been shown to be involved in controlling tumor growth, the scientists noted.

**Research confirms that some forms of massage help against low-back pain**

But not all techniques live up to the promises made for them

This release is available in German.

Most people have experienced back pain – and many hope that massage will relieve it. But not all forms of massage have been scientifically proven to help against low back pain. That is what the German Institute for Quality and Efficiency in Health Care (IQWiG) pointed out in information published on informedhealthonline.org today.

Back pain often affects the lower back and can be a big physical and psychological burden. "The cause of back pain is not always immediately clear," explains Professor Peter Sawicki, the Institute's Director. "But low back pain usually gets better on its own within a few weeks." Back pain is only rarely caused by a more serious health problem.

Classic massage, Thai massage and acupressure could help against low back pain

If low back pain does not get better on its own, massage therapy could be a worthwhile option. "Research suggests that classic massage, Thai massage and acupressure can relieve low back pain that has lasted longer than several weeks," says the Institute's Director. In classic (Swedish) massage the affected area of skin and muscles are massaged, in Thai massage the limbs are pulled and stretched, and acupressure involves applying pressure to certain points on the body. "But relying on massage alone does not appear to be the best approach when it comes to back pain", adds Sawicki. Research indicates that people could benefit more if they combine massages with exercises and stretching. In some trials this combination of approaches led to better pain relief and mobility compared to massage alone.

Not all massages are the same

"Not all forms of massage have been scientifically proven to help against chronic back pain though," concludes Sawicki. "So it is worth finding out about the different techniques before deciding to have a certain type of massage." An overview of the most common forms of massage is now available on informedhealthonline.org.

**Acupuncture Calms Highly Anxious Dental Patients, Study Suggests**

ScienceDaily (Mar. 30, 2010) — Acupuncture can calm highly anxious dental patients and ensure that they can be given the treatment they need, suggests a small study published in *Acupuncture in Medicine*.

A visit to the dentist provokes extreme fear and anxiety in an estimated one in 20 people, and can put them off going altogether, a condition termed odontophobia. And up to a third of patients report moderate anxiety at the prospect of dental treatment, studies show.

The authors base their findings on 16 women and four men from eight dental practice lists.

Each of the patients was moderately or extremely anxious about going to the dentist for treatment, as assessed by a validated questionnaire -- the Back Anxiety Inventory (BAI).

All were in their 40s and had been trying to deal with this problem for between two and 30 years.

The BAI score was assessed before and after five minutes of acupuncture treatment, targeting two specific acupuncture points (GV20 and EX6) on the top of the head.

The acupuncture was carried out by the dentists themselves, all of whom are members of the British Dental Acupuncture Society.

The average BAI score of 26.5 fell to 11.5, and all 20 patients were able to undergo their planned treatment, whereas before this had only been possible in six -- and then only partially and after a great deal of effort on the part of both dentist and patient.

The authors point out that several attempts have been made to conquer this type of anxiety, including sedatives, relaxation techniques, behavioural therapies, biofeedback and hypnosis. The research indicates that these do help, but they are time consuming and require considerable levels of psychotherapeutic skills, if applied properly, say the authors.
They caution that further larger studies are needed to confirm the value of acupuncture in these sorts of cases, but suggest that acupuncture "may offer a simple and inexpensive method of treatment."

**Flaxseed Lowers High Cholesterol in Men, Study Suggests**

ScienceDaily (Mar. 30, 2010) — A new study from Iowa State University's Nutrition and Wellness Research Center (NWRC) may give men a way to combat high cholesterol without drugs -- if they don't mind sprinkling some flaxseed into their daily diet.

Suzanne Hendrich, an ISU professor in food science and human nutrition, led a study that examined the effects of flaxseed lignan in 90 people diagnosed with high cholesterol. The results showed that consuming at least 150 milligrams of flaxseed lignans per day (about three tablespoons) decreased cholesterol in men, but not women, by just under 10 percent over the three months that they were given the flaxseed.

While Hendrich admits that's considerably less than the expected outcome from cholesterol-lowering drugs -- approximately 10 to 20 percent for three months, depending on the individual -- it's still enough to make flaxseed a more natural option for some men.

"Because there are people who can't take something like Lipitor, this could at least give you some of that cholesterol-lowering benefit," Hendrich said. "The other thing is, there are certainly some people who would prefer to not use a drug, but rather use foods to try to maintain their health. So this potentially would be something to consider."

**Americans suffer from high blood cholesterol**

According to the Centers for Disease Control and Prevention, about 17 percent of Americans suffer from high blood cholesterol -- a fat-like substance found in the body that can clog arteries and contribute to heart disease.

Hendrich developed the study with ISU master's student Kai Ling Kong and doctoral graduates Zhong Ye, Xianai Wu, and Sun-Ok Lee to determine whether the main lignan in flaxseed, secoisolariciresinol diglucoside, could lower cholesterol. They'll be presenting results of the research at the American Society for Nutrition's annual meeting at Experimental Biology 2010, April 24-28, in Anaheim, Calif.

The study's 90 subjects -- which included twice as many men as women -- all had high cholesterol, but no other underlying health conditions. The participants were divided into three groups and were randomly assigned to daily consume tablets that contained zero, 150, or 300 milligrams of flaxseed lignans for 12 weeks.

It's the flaxseed lignans -- a group of chemical compounds found in plants that are known for their protective health effects -- that may help lower cholesterol, according to Hendrich. These compounds are converted to their bioactive forms by gut microbes. Hendrich reports that they made a healthy conversion in the subjects in this study, with no adverse health consequences.

**No cholesterol-lowering effect in women**

While the study found that the flaxseed lignans lowered cholesterol in men, it did not produce a significant change in women.

"We're really puzzled about that because we were looking at post menopausal women and these lignans are known as plant estrogens, so they have a very weak but measurable estrogen effect," Hendrich said. "So potentially, they would have a mild effect for substituting some estrogens in women. It's really hard to know why [there was no effect in women] and whether these substances are counteracting, possibly, some testosterone in men, which of course women don't have. It's definitely something we'd like to investigate further."

Hendrich reports the flaxseed lignan tablets used in this study are not currently available in the U.S. to her knowledge. In the absence of tablets, she says flaxseed can also be sprinkled on cereal, or added in a muffin mix or bread, although whole seeds are not very digestible. Ground flaxseed meal can also provide the desired cholesterol-lowering lignans, according to Hendrich, but it will oxidize over time and could potentially affect the flavor of the foods that it's in. She points out that the oxidation of the product also would diminish the flaxseed's omega-3 fatty acids, which can prevent heart attacks, so freshness is important in the product's impact.

The ISU researcher hopes to publish the study in a professional journal. She also plans further investigation on whether flaxseed can be taken in combination with other known cholesterol-lowering substances, and whether it could prevent high cholesterol in the first place.

**Marathon Runners Should Pick Cherries for Speedy Recovery**

ScienceDaily (Apr. 3, 2010) — Dr Glyn Howatson, exercise physiologist and Laboratory Director in the School of Psychology and Sports Sciences at Northumbria University, examined the properties of Montmorency cherries in a
study that found that athletes who drank the juice recovered faster after Marathon running than a placebo controlled group.

In the investigation, 20 marathon runners drank either a tart cherry blend juice or a placebo drink twice a day for five days before taking part in the London Marathon and for two days afterwards.

The findings indicated that the group who drank the cherry juice recovered their strength more rapidly than the control group over the 48-hour period following the marathon. Inflammation was also reduced in the cherry juice group, as was oxidative stress, a potentially damaging response that can be caused by strenuous physical activity, particularly long distance endurance exercise.

The study, which was run in collaboration with PhD student Jess Hill of St Mary's University College, concluded that cherry juice appears to aid recovery following strenuous exercise by increasing total antioxidative capacity, reducing inflammation and oxidative stress, hence aiding in the recovery of muscle function.

Dr Howatson said: "Participating in long-distance endurance events, such as the London Marathon, causes a degree of muscle damage and inflammation for the runners. It takes several days to recover and during that period the runner's ability to conduct physical activity can be vastly inhibited.

"The phytochemicals, in particular, anthocyanins found in Montmorency cherries have anti-inflammatory and antioxidating properties, which the research has shown to be effective in helping exercisers to recover from strenuous physical activity."

Although it remains to be examined, Dr Howatson believes that the findings will not only benefit marathon runners but could also have serious implications in the treatment of people living with inflammatory diseases, such as arthritis.

He said: "If funding can be secured to embark on a further study, we can determine whether the use of tart cherry juice has implications for the management of some clinical pathologies that display high levels of inflammation and oxidative stress, such as rheumatoid arthritis and fibromyalgia.

"People are increasingly looking at natural remedies, or neutraceuticals, to treat their conditions, and scientific studies, such as the research into tart cherries, examine the potentially untapped treatments held in natural resources, that can provide adjunct therapy for the management of disease, which can help reduce negative symptoms and improve quality of life."

Journal Reference:

**Acupuncture may be an effective treatment for post-viral infection loss of smell**

*This release is available in Chinese.*

Alexandria, VA – Traditional Chinese acupuncture (TCA), where very thin needles are used to stimulate specific points in the body to elicit beneficial therapeutic responses, may be an effective treatment option for patients who suffer from persistent post-viral olfactory dysfunction (PVOD), according to new research in the April 2010 issue of *Otolaryngology – Head and Neck Surgery.*

Olfactory dysfunction can arise from a variety of causes and can profoundly influence a patient's quality of life. The sense of smell determines the flavor of foods and beverages and also serves as an early warning system for the detection of environmental hazards, such as spoiled food, leaking natural gas, smoke, or airborne pollutants. The loss or distortions of smell sensation can adversely influence food preference, food intake, and appetite.

Approximately 2 million Americans experience some type of olfactory dysfunction. One of the most frequent causes of loss of smell in adults is an upper respiratory tract infection (URI). Patients usually complain of smell loss following a viral URI. The smell loss is most commonly partial, and reversible. However, occasionally patients may also present with parosmia (a distortion of the sense of smell), phantosmia (smelling things that aren't there), or permanent damage of the olfactory system.

To date, there is no validated pharmacotherapy for PVOD, but attempts have been made to establish a standardized treatment. In the literature, systemic and topical steroids as well as vitamin B supplements, caroverine, alpha lipoic acid, and other drugs were used to treat patients. The researchers point out that in addition to these treatments, complementary and alternative medicines are currently being employed by many patients on their own, and that exploration into their usefulness by traditional Western medicine should be validated.

In the current study, 15 patients presenting to an outpatient clinic with PVOD were treated by TCA in 10 weekly 30-minute sessions. Subjective olfactometry was performed using the Sniffin' Sticks test set. Treatment success was defined as an increase of at least six points in the sticks test scores. The effects of TCA were compared
to matched pairs of people suffering from PVOD who had been treated with vitamin B complex. Eight patients treated with TCA improved olfactory function, compared with two treated with vitamin B complex.

The authors acknowledge that their study is limited by its size, and that further studies should be conducted in a larger population. However, the authors write "...the observed high response rate of about 50 percent under TCA was superior to that of vitamin B complex or that of spontaneous remission, and offers a possible new therapeutic regimen in postviral dysosmia."

The cancer protective effect of fruits and vegetables may be modest at best

An analysis of dietary data from more than 400,000 men and women found only a weak association between high fruit and vegetable intake and reduced overall cancer risk, according to a study published online April 6, 2010 in the Journal of the National Cancer Institute.

It is widely believed that a diet rich in fruits and vegetables can reduce the risk of cancer. In 1990, the World Health Association recommended eating five servings of fruit and vegetables a day to prevent cancer and other diseases. But many studies since then have not been able to confirm a definitive association between fruit and vegetable intake and cancer risk.

To address the issue, Paolo Boffetta, M.D., M.P.H., of the Mount Sinai School of Medicine in New York, and colleagues analyzed data from the EPIC study (European Prospective Investigation into Cancer and Nutrition), which included 142,605 men and 335,873 women recruited for the study between 1992 and 2000. The participants were from 23 centers in ten Western European countries-- Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom. Detailed information on their dietary habit and lifestyle variables was obtained. After a median follow-up of 8.7 years, over 30,000 participants were diagnosed with cancer.

The authors found a small inverse association between high intake of fruits and vegetables and reduced overall cancer risk. Vegetable consumption also afforded a modest benefit but was restricted to women. Heavy drinkers who ate many fruits and vegetables had a somewhat reduced risk, but only for cancers caused by smoking and alcohol.

The authors caution against attributing any risk reduction to diet and they conclude that any cancer protective effect of these foods is likely to be modest, at best.

"In this population, a higher intake of fruits and vegetables was also associated with other lifestyle variables, such as lower intake of alcohol, never-smoking, short duration of tobacco smoking, and higher level of physical activity, which may have contributed to a lower cancer risk," they write.

In an accompanying editorial, Walter C. Willett, M.D., Dr.P.H., of the Harvard School of Public Health, notes that "this study strongly confirms" the findings of other prospective studies that high intake of fruits and vegetables has little or no effect in reducing the incidence of cancer, although it has been shown to affect the risk of cardiovascular disease. He suggests that future research investigate the potential cancer-reducing benefits of specific fruits and vegetables and also study the effects of fruit and vegetable consumption at earlier periods of life.

Endocrine Disruptors: Babies Absorb the Most Bisphenol A

ScienceDaily (Apr. 6, 2010) — The hormonally active substance bisphenol A is contained in many synthetic and packaging materials. As a result, the substance can find its way into the food chain and the human organism. Just who is exposed and to what extent is shown in a new study from ETH Zurich: babies who are fed with polycarbonate bottles are especially at risk.

Bisphenol A (BPA) is the key element in polycarbonate synthetics and epoxy resins — about three million tons being produced annually all over the world. Many plastic everyday objects, medical equipment, baby bottles and food packaging are made of PC synthetic materials, whilst epoxy resins are used to coat food and drink cans and seal drinking water pipelines. Apart from via air, water and dental fillings, BPA therefore also finds its way into the organism as a result of the food coming into contact with the packaging materials or plastic containers.

Harmful even in small doses

BPA is a hormonally active substance that acts like the natural hormone estrogen and as an anti-androgen. Even small amounts of the substance can thus affect sexual development, especially for male fetuses and babies. Based on toxicological studies, the European Food Safety Authority has established a limit for the acceptable daily intake of BPA: currently 50 micrograms per kilogram of body weight. "However, the limit doesn't include the studies on the hormonal impact of bisphenol A, which are often difficult to interpret," says Natalie von Götz, a scientist from the Institute of Chemistry and Bioengineering.
Von Götz is the first author of a recent publication, in which various exposure studies on BPA were linked to exposure analyses. The aim was to calculate representative average values for the daily dose of BPA per kilogram of body weight for nine age groups in Switzerland, Germany and Austria. The research team from Konrad Hungerbühler’s Safety and Environmental Technology Group began by determining the individual doses that are absorbed by a particular product. This involved measuring the concentration of BPA in various foods and other relevant sources. This was multiplied by the amount absorbed by the person, which the researchers worked out from previous nutrition studies. Finally, the product was divided by the consumer’s body weight. The authors then totted up the individual doses of the 17 sources examined to obtain the average daily intake for the respective age groups.

**Bottle-fed babies especially vulnerable**

The study revealed that babies and infants absorb the most BPA. Babies fed using PC bottles are the worst affected, on average taking in 0.8 micrograms of BPA per kilogram of body weight via bottles. This amount is well below the statutory minimum. "But the latest studies on rats have shown that even low doses can have a harmful impact on the development of the animals,” says von Götz. The exposure declines with age, although the study also shows that it depends on the kind of diet or lifestyle: people who live on a lot of canned food, warm up their meals in PC containers in the microwave or have just had a new epoxy resin-based filling are exposed to a comparatively higher dosage of BPA. The difference with the latest studies is that they were the first to examine how much the single sources contribute to the total exposure in relation to each other, stresses von Götz. However, the study also revealed where there is still a need for research. For instance, BPA is found in canned food in different amounts. Whether this is due to the type of can or the processing remains unclear. Von Götz thus calls for the industry to share its knowledge and for more research to be carried out on the subject. After all, according to the scientist we need to reduce the amount of the substance released into food. However, the synthetic materials cannot be dispensed with altogether as they also carry considerable advantages, the coating of the cans protecting the cans as well as the food from corrosion, for example.

For von Götz, an important aspect is that nutrition studies should not only pay attention to what people eat, but also how the food is packed. More research might be necessary on the chain of custody as it is often unclear as to how substances like BPA ultimately get into the food.

**Bisphenol: experts disagree on harmfulness**

Like phthalates, Bisphenol A is an essential component in many synthetic materials. The fact that there is still a considerable need for research on these chemicals not only shows that the way in which they are absorbed is often unknown, but also that some scientists warn against such substances whilst others do not perceive any adverse effects for the human organism.

**Journal Reference:**

**Music therapy fails dyslexics**

There is no link between dyslexia and a lack of musical ability. Moreover, attempts to treat dyslexia with music therapy are unwarranted, according to scientists in Belgium writing in the current issue of the *International Journal of Arts and Technology*.

Cognitive neuroscientist José Morais of the Free University of Brussels and colleagues point out that research into dyslexia has pointed to a problem with how the brain processes sounds and how dyslexic readers manipulate the sounds from which words are composed, the phonemes, consciously and intentionally. It was a relatively short step between the notion that dyslexia is an issue of phonological processing and how this might also be associated with poor musical skills – amusia – that has led to approaches to treating the condition using therapy to improve a dyslexic reader's musical skills.

Morais and colleagues demonstrate that theoretically this is an invalid argument and also present experimental evidence to show that there is no justification either for the link or for using music therapy to treat dyslexia.

Language and music are apparently uniquely human traits and many researchers have tried to find direct links between the two. A whole industry of music therapy hinges on this purported association with claims that language remediation is possible through the application of learning in music. Given the social importance of literacy, a role for music in helping poor or dyslexic readers to overcome their difficulties has been at the forefront of therapy for many years. Morais' team points out that the notion is based on studies that are generally flawed in two respects.

The first problem is that studies that attempt to link a lack of musical ability with reading difficulties is that the quality of published empirical studies is quite variable and many reviews of the field fail to discard papers
containing insufficient information, either on materials and methods, or on the experimental results. The second flaw is that many studies imply an explicit causality between amusia and dyslexia on the basis of results that are themselves merely statistical correlations. Such an approach to science leads to a circular argument in which some researchers argue that music discrimination predicts phonological skills, which in turn predicts reading ability and that reading ability implies phonological skills and so on.

More recent studies have broken the link between hearing and reading by showing that deaf children, who often learn to perceive speech accurately using lip reading and visual clues can have literacy levels just as high as hearing children. Of course, most of those children do not develop good musical ability with respect to musical pitch. Conversely, people who are unable even to hum a familiar tune show normal literacy levels.

Music and speech do overlap, but musical sounds and phonemes are not the same, the researchers explain. Musical tones are simply sounds, however, they are produced and can be heard without recourse to complex auditory analysis. Phonemes, in contrast, whether spoken or read, are abstractions of the units into which language might be broken down. They are purely symbolic and require significantly more interpretation to understand than simply hearing a sound.

"The conscious representations of phonemes play a crucial role in the learning of literacy abilities in the alphabetic writing system. Children do not become spontaneously aware of phonemes. Nor do they become aware of phonemes by learning music," the researchers say. The team has now studied the differing abilities of children, both with and without dyslexia, on understanding and interpretation of phonemes and syllables and musical notes and the intervals between them in a melody. They saw no significant differences between dyslexic readers and age-matched normal readers in the melodic tests.

Literacy is crucially dependent on phonological skills, but alphabetic literacy is strongly constrained by the development of phoneme awareness and abilities, and phonemes have no correspondence in music, the team explains. Thus, although music, through its emotional characteristics, might be a great motivational support for speech-based therapy, this limits, to a large extent, the possibilities of using music training to re-educate dyslexic readers.

Reference: "Music and dyslexia" in Int. J. Arts and Technology, 2010, 3, 177-194

Carbon Dioxide May Explain 'Near Death Experiences'
ScienceDaily (Apr. 7, 2010) — Near death experiences (NDEs), reported to include sensations such as life flashing before the eyes, feelings of peace and joy, and apparent encounters with mystical entities, may be caused by raised levels of carbon dioxide in the blood. Researchers writing in BioMed Central's open access journal Critical Care investigated the unexplained events in 52 cardiac arrest patients.

Zalika Klemenc-Ketis worked with a team of researchers from the University of Maribor, Slovenia, to examine patients who reported NDEs. She said, "Several theories explaining the mechanisms of NDEs exist. We found that in those patients who experienced the phenomenon, blood carbon dioxide levels were significantly higher than in those who did not."

Of the 52 patients, 11 reported NDEs. Their occurrence did not correlate with patients' sex, age, level of education, religious belief, fear of death, time to recovery or drugs given during resuscitation. They were more common in people who had previously experienced NDEs. According to Klemenc-Ketis, "Our study adds new and important information to the field of NDE phenomena. The association with carbon dioxide has never been reported before, and deserves further study."


Household Detergents, Shampoos May Form Harmful Substance in Waste Water
ScienceDaily (Apr. 8, 2010) — Scientists are reporting evidence that certain ingredients in shampoo, detergents and other household cleaning agents may be a source of precursor materials for formation of a suspected cancer-causing contaminant in water supplies that receive water from sewage treatment plants. The study sheds new light on possible environmental sources of this poorly understood water contaminant, called NDMA, which is of ongoing concern to health officials.

Their study is in ACS' Environmental Science & Technology.

William Mitch and colleagues note that scientists have known that NDMA and other nitrosamines can form in small amounts during the disinfection of wastewater and water with chloramine. Although nitrosamines are found in a wide variety of sources -- including processed meats and tobacco smoke -- scientists know little about their
precursors in water. Past studies with cosmetics have found that substances called quaternary amines, which are also ingredients in household cleaning agents, may play a role in the formation of nitrosamines.

Their laboratory research showed that when mixed with chloramine, some household cleaning products including shampoo, dishwashing detergent and laundry detergent -- formed NDMA. The report notes that sewage treatment plants may remove some of quaternary amines that form NDMA. However, quaternary amines are used in such large quantities that some still may persist and have a potentially harmful effect in the effluents from sewage treatment plants.

Journal Reference:

Doctor Warns Against St. John's Wort for Anxiety
ScienceDaily (Apr. 8, 2010) — In a broad-based review of studies focused on drugs that treat anxiety, a Saint Louis University doctor found no evidence supporting the use of so-called "natural" treatments in combating the effects of anxiety.

St. John's wort, kava extract and valerian, herbal remedies touted on the Internet, have not been proven to be effective in treating anxiety wrote Kimberly Zoberi, M.D., associate professor of family and community medicine at Saint Louis University School of Medicine. Additionally, she raised concerns about the safety of valerian, particularly lacking any long-term studies of the herb.

"Patients should be extremely cautious about garnering medical advice from the Internet," says Zoberi. "There is no evidence that those medications are effective. If a patient wishes to avoid drug therapy, her doctor can suggest alternatives such as cognitive behavioral therapy."

In addition to the findings regarding "natural" treatments, Zoberi compared the differing prescription drug regimens available on the market for patients suffering from anxiety. According to Zoberi, most physicians recommend selective serotonin reuptake inhibitors (SSRIs) as a first-line treatment because they were safe, effective and less expensive. However, some patients suffer sexual or gastrointestinal side effects.

Zoberi found that medications from the anticonvulsant class of drugs are among the quickest and most effective ways to provide relief to patients in distress without the side effects of other first-line treatments. The downside is that these prescriptions are fairly expensive compared to other treatments.

Ultimately, Zoberi strongly recommends consulting with a health care professional before beginning any drug regimen for anxiety.
The review article was published in last month's issue of the Journal of Family Practice.

Rheumatoid Arthritis Linked to Vitamin D Deficiency, Study Suggests
ScienceDaily (Apr. 10, 2010) — Women living in the northeastern United States are more likely to develop rheumatoid arthritis (RA), suggesting a link between the autoimmune disease and vitamin D deficiency, says a new study led by a Boston University School of Public Health researcher.

In the paper, which appears online in the journal Environmental Health Perspectives, a spatial analysis led by Dr. Verónica Vieira, MS, DSc, associate professor of environmental health, found that women in states like Vermont, New Hampshire and southern Maine were more likely to report being diagnosed with RA.

"There's higher risk in the northern latitudes," Dr. Vieira said. "This might be related to the fact that there's less sunlight in these areas, which results in a vitamin D deficiency."

The study looked at data from the Nurses' Health Study, a long-term cohort study of U.S. female nurses. Looking at the residential addresses, health outcomes and behavioral risk factors for participants between 1988 and 2002, researchers based their findings on 461 women who had RA, compared to a large control group of 9,220.

RA is a chronic inflammatory disease that affects the lining of the joints, mostly in the hands and knees. This chronic arthritis is characterized by swelling and redness and can wear down the cartilage between bones. RA is two to three times more common in women than in men.

Although the cause of RA is unknown, the researchers wrote, earlier studies have shown that vitamin D deficiency, which can be caused by a lack of sunlight, has already been associated with a variety of other autoimmune diseases.

"A geographic association with northern latitudes has also been observed for multiple sclerosis and Crohn's disease, other autoimmune diseases that may be mediated by reduced vitamin D from decreased solar exposure and the immune effects of vitamin D deficiency," the authors wrote.
The authors said further research is needed to look into the relationship between vitamin D exposure and RA.
Dr. Vieira said she and her co-authors were somewhat surprised by the findings. A previous geographic study of RA had suggested an ecologic association with air pollution, she said.

"The results were unexpected," Dr. Vieira said. "Prior to the analysis, we were more interested in the relationship with air pollution. I hadn't given latitudes much thought."

In addition to the geographic variation, the study suggested that the timing of residency may influence RA risk. "Slightly higher odds ratios were observed for the 1988 analysis suggesting that long term exposure may be more important than recent exposure," the study said.

Dr. Vieira and other BUSPH researchers previously have used innovative spatial-temporal analyses to study the incidence of breast cancer, specifically focused on Cape Cod.

Journal Reference:
Vieira et al. Association between Residences in U.S. Northern Latitudes and Rheumatoid Arthritis: A Spatial Analysis of the Nurses’ Health Study. Environmental Health Perspectives, 2010; DOI: 10.1289/ehp.0901861

Diet high in B-vitamins lowers heart risks in Japanese study

Study highlights:
• In a large study in Japan, women who reported eating more foods containing the B-vitamins folate and B-6 were less likely to die from stroke and heart disease.
• Japanese men reporting diets high in these B vitamins were less likely to die of heart failure.

DALLAS, April 15, 2010 — Eating more foods containing the B-vitamins folate and B-6 lowers the risk of death from stroke and heart disease for women and may reduce the risk of heart failure in men, according to Japanese research reported in Stroke: Journal of the American Heart Association.

“Japanese people need more dietary intake of folate and vitamin B-6, which may lead to the prevention of heart disease,” said Hiroyasu Iso, M.D., professor of public health at Osaka University.

The findings on the value of B vitamins were consistent with studies in Europe and North America, although the dietary consumption of vitamin B-6 is generally lower in Japan than in the United States.

Researchers analyzed data from 23,119 men and 35,611 women (ages 40–79) who completed food frequency questionnaires as part of the large Japan Collaborative Cohort (JACC) Study. During a median 14 years of follow-up, 986 died from stroke, 424 from heart disease and 2,087 from all diseases related to the cardiovascular system.

Investigators divided participants into five groups based on their intake of folate, vitamin B-6 and vitamin B-12. Comparing those with the diets lowest and highest for each nutrient, they found that higher consumption of folate and vitamin B-6 was associated with significantly fewer deaths from heart failure in men, and significantly fewer deaths from stroke, heart disease and total cardiovascular diseases in women. Vitamin B-12 intake was not associated with reduced mortality risk.

The protective effects of folate and vitamin B-6 didn’t change when researchers adjusted for the presence of cardiovascular risk factors, nor when they eliminated supplement users from the analysis.

Folate and vitamin B-6 may help guard against cardiovascular disease by lowering homocysteine levels, the investigators said. Homocysteine is an amino acid in the blood that’s affected by diet and heredity. Folic acid and other B vitamins help break down homocysteine in the body.

A direct causal link hasn’t been established, but evidence has shown that too much homocysteine may damage the inner lining of arteries and promote the formation of blood clots.

Sources of folate include vegetables and fruits, whole or enriched grains, fortified cereals, beans and legumes. Sources of vitamin B-6 include vegetables, fish, liver, meats, whole grains and fortified cereals.

Diet Alone Will Not Likely Lead to Significant Weight Loss, Study Suggests

ScienceDaily (Apr. 14, 2010) — Newly published research by scientists at Oregon Health & Science University demonstrates that simply reducing caloric intake is not enough to promote significant weight loss. This appears to be due to a natural compensatory mechanism that reduces a person’s physical activity in response to a reduction in calories.

The research is published in the April edition of the American Journal of Physiology -- Regulatory, Integrative and Comparative Physiology.

"In the midst of America's obesity epidemic, physicians frequently advise their patients to reduce the number of calories they are consuming on a daily basis. This research shows that simply dieting will not likely cause substantial weight loss. Instead, diet and exercise must be combined to achieve this goal," explained Judy Cameron Ph.D., a senior scientist at OHSU's Oregon National Primate Research Center, and a professor of behavioral
neuroscience and obstetrics & gynecology in the OHSU School of Medicine, as well as a professor of psychiatry at the University of Pittsburgh.

To conduct the research, Cameron and OHSU post-doctoral fellow Elinor Sullivan, Ph.D., studied 18 female rhesus macaque monkeys at the Oregon National Primate Research Center. The monkeys were placed on a high-fat diet for several years. They were then returned to a lower-fat diet (standard monkey food) with a 30 percent reduction in calories. For a one-month period, the monkeys' weight and activity levels were closely tracked. Activity was tracked through the use of an activity monitor worn on a collar.

"Surprisingly, there was no significant weight loss at the end of the month," explained Sullivan. "However, there was a significant change in the activity levels for these monkeys. Naturally occurring levels of physical activity for the animals began to diminish soon after the reduced-calorie diet began. When caloric intake was further reduced in a second month, physical activity in the monkeys diminished even further."

A comparison group of three monkeys was fed a normal monkey diet and was trained to exercise for one hour daily on a treadmill. This comparison group did lose weight.

"This study demonstrates that there is a natural body mechanism which conserves energy in response to a reduction in calories. Food is not always plentiful for humans and animals and the body seems to have developed a strategy for responding to these fluctuations," added Cameron. "These findings will assist medical professionals in advising their patients. It may also impact the development of community interventions to battle the childhood obesity epidemic and lead to programs that emphasize both diet and exercise."

**Journal Reference:**

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**Redox dysregulation affects the ventral but not dorsal hippocampus: impairment of parvalbumin neurons, gamma oscillations, and related behaviors**

Steullet P, Cabungcal JH, Kulak A, Kraftsik R, Chen Y, Dalton TF, Cuenod M, Do KQ

*J Neurosci* 2010 Feb 17 30(7):2547-58

In this paper, the authors provide compelling evidence that dysregulation of antioxidant systems caused by interference with glutathione (GSH) synthesis can induce a selective decrease in parvalbumin (PV)-expressing interneurons in the ventral hippocampus. Therefore, elevations in oxidative stress have electrophysiological as well as behavioral consequences which are proposed to contribute to the underlying pathology of psychiatric disorders, such as schizophrenia.

Recent postmortem studies in schizophrenia patients and rat models have drawn attention to deficits in GABAergic PV interneurons in this condition. Using knockout mice lacking the modifier subunit of glutamate cysteine ligase (GCLM), the authors tested whether alterations in the action of the rate-limiting enzyme for GSH leads to changes in PV-expressing fast-spiking interneurons and gamma oscillations in the hippocampus. Loss of GCLM was associated with a progressive reduction in GSH levels in the cortex, striatum, hippocampus, midbrain and cerebellum. Despite the widespread reductions in GSH levels, the effect of reduced antioxidant activity on PV-expressing interneurons was region-specific. The dentate and CA3 regions of the ventral, but not dorsal, hippocampus demonstrated significantly reduced numbers of PV-expression interneurons in GCLM -/- mice. In addition, the decrease in PV expression in the ventral hippocampus was associated with an increase in 8-Oxo-dG labeling, a marker for DNA oxidative damage. Kainate-induced beta/gamma oscillations in CA3 of the central hippocampus were less powerful in GCLM -/- mice, suggesting loss of PV destabilized network activity in this region while baseline excitability of pyramidal neurons was preserved. Consistent with the pattern of PV reductions and the functional division between the dorsal and ventral hippocampus, GLCM — mice exhibited intact spatial working and reference memory but reduced anxiety-related behaviors and fear learning. Overall, these data support the vulnerability of the ventral hippocampus to oxidative stress which emerges gradually throughout adolescence. The authors suggest that the specificity of the oxidative stress in CA3 and dentate of the ventral hippocampus may be attributed to the dense noradrenergic innervation of these areas. In addition, PV neurons are susceptible to redox dysregulation due to the actions of the NR2A subunit of the NMDA receptor during maturation and alterations in calcium signaling. In conclusion, a genetically compromised antioxidant system or environmentally triggered redox dysregulation may be a component and can lead to the development of psychiatric disorders like schizophrenia.

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**Lack of Omega-3 Fatty Acid Linked to Male Infertility, Study Suggests**

ScienceDaily (Apr. 19, 2010) — According to a University of Illinois study, omega-3 fatty acids may be good for more than heart health. A little-known omega-3 may have implications for treating male infertility.
"In our experiment, we used 'knockout' mice that lacked the gene responsible for an enzyme important in making docosahexaenoic acid (DHA). In the absence of DHA, male mice are basically infertile, producing few if any misshaped sperm that can't get where they need to go,' said Manabu Nakamura, a U of I associate professor of food science and human nutrition.

"We looked at sperm count, shape, and motility and tested the breeding success rate, and the mice lacking DHA simply were not able to breed," said Manuel Roqueta-Rivera, a U of I doctoral student who also worked on the study.

In the DHA-deficient knockout mice, sperm counts were extremely low. The sperm that were produced were round instead of elongated and they were unable to move well, he said.

But, when DHA was introduced into the diet, fertility was completely restored. "It was very striking. When we fed the mice DHA, all these abnormalities were prevented," he said.

This is the first time that the importance of DHA to male fertility has been shown this directly, although some studies have suggested that male fertility patients with low sperm counts and less motile sperm tend to have low levels of this fatty acid.

The DHA study is part of the Nakamura team's efforts to understand the function of the omega-3 and -6 fatty acids. As part of that work, they have developed a mouse model to help them understand a particular fat's physiological role. By knocking out genes, they can create deficiencies of the fats they are interested in and learn about their functions.

"Knocking out the gene for the delta-6-desaturase enzyme has led to some surprising discoveries, including this one about the importance of DHA in sperm formation and mobility," he said.

Nakamura said our body must make DHA from dietary alpha-linolenic acids, the parent compound of the omega-3 fatty acid family. Vegetable oils, including soybean and canola oil, are good sources of alpha-linolenic acid.

Nakamura's team plans to continue focusing on this omega-3's effects on fertility. But he cautioned that there are still things they don't understand.

"We get hints from looking at sperm in the DHA-deficient animals about what type of pathology we may be looking at and why these polyunsaturated fatty acids are important. But we're still at the starting point in understanding the mechanisms that are involved, and we need to do more research at the cellular level," he said.

Journal Reference:

**Brief Meditative Exercise Helps Cognition**

ScienceDaily (Apr. 19, 2010) — Some of us need regular amounts of coffee or other chemical enhancers to make us cognitively sharper. A newly published study suggests perhaps a brief bit of meditation would prepare us just as well.

While past research using neuroimaging technology has shown that meditation techniques can promote significant changes in brain areas associated with concentration, it has always been assumed that extensive training was required to achieve this effect. Though many people would like to boost their cognitive abilities, the monk-like discipline required seems like a daunting time commitment and financial cost for this benefit.

Surprisingly, the benefits may be achievable even without all the work. Though it sounds almost like an advertisement for a "miracle" weight-loss product, new research now suggests that the mind may be easier to cognitively train than we previously believed. Psychologists studying the effects of a meditation technique known as "mindfulness” found that meditation-trained participants showed a significant improvement in their critical cognitive skills (and performed significantly higher in cognitive tests than a control group) after only four days of training for only 20 minutes each day.

"In the behavioral test results, what we are seeing is something that is somewhat comparable to results that have been documented after far more extensive training," said Fadel Zeidan, a post-doctoral researcher at Wake Forest University School of Medicine, and a former doctoral student at the University of North Carolina at Charlotte, where the research was conducted.

"Simply stated, the profound improvements that we found after just 4 days of meditation training- are really surprising," Zeidan noted. "It goes to show that the mind is, in fact, easily changeable and highly influenced, especially by meditation."

The study appears in the April 2 issue of *Consciousness and Cognition*. Zeidan's co-authors are Susan K. Johnson, Zhanna David and Paula Goolkasian from the Department of Psychology at UNC Charlotte, and Bruce J.
The research was also part of Zeidan's doctoral dissertation. The experiment involved 63 student volunteers, 49 of whom completed the experiment. Participants were randomly assigned in approximately equivalent numbers to one of two groups, one of which received the meditation training while the other group listened for equivalent periods of time to a book (J.R.R. Tolkein’s The Hobbit) being read aloud.

Prior to and following the meditation and reading sessions, the participants were subjected to a broad battery of behavioral tests assessing mood, memory, visual attention, attention processing, and vigilance.

Both groups performed equally on all measures at the beginning of the experiment. Both groups also improved following the meditation and reading experiences in measures of mood, but only the group that received the meditation training improved significantly in the cognitive measures. The meditation group scored consistently higher averages than the reading/listening group on all the cognitive tests and as much as ten times better on one challenging test that involved sustaining the ability to focus, while holding other information in mind.

"The meditation group did especially better on all the cognitive tests that were timed," Zeidan noted. "In tasks where participants had to process information under time constraints causing stress, the group briefly trained in mindfulness performed significantly better."

Particularly of note were the differing results on a "computer adaptive n-back task," where participants would have to correctly remember if a stimulus had been shown two steps earlier in a sequence. If the participant got the answer right, the computer would react by increasing the speed of the subsequent stimulus, further increasing the difficulty of the task. The meditation-trained group averaged approximately 10 consecutive correct answers, while the listening group averaged approximately one.

"Findings like these suggest that meditation's benefits may not require extensive training to be realized, and that meditation's first benefits may be associated with increasing the ability to sustain attention," Zeidan said.

"Further study is warranted," he stressed, noting that brain imaging studies would be helpful in confirming the brain changes that the behavioral tests seem to indicate, "but this seems to be strong evidence for the idea that we may be able to modify our own minds to improve our cognitive processing -- most importantly in the ability to sustain attention and vigilance -- within a week's time."

The meditation training involved in the study was an abbreviated "mindfulness" training regime modeled on basic "Shamatha skills" from a Buddhist meditation tradition, conducted by a trained facilitator. As described in the paper, "participants were instructed to relax, with their eyes closed, and to simply focus on the flow of their breath occurring at the tip of their nose. If a random thought arose, they were told to passively notice and acknowledge the thought and to simply let 'it' go, by bringing the attention back to the sensations of the breath." Subsequent training built on this basic model, teaching physical awareness, focus, and mindfulness with regard to distraction.

Zeidan likens the brief training the participants received to a kind of mental calisthenics that prepared their minds for cognitive activity.

"The simple process of focusing on the breath in a relaxed manner, in a way that teaches you to regulate your emotions by raising one's awareness of mental processes as they're happening is like working out a bicep, but you are doing it to your brain. Mindfulness meditation teaches you to release sensory events that would easily distract, whether it is your own thoughts or an external noise, in an emotion-regulating fashion. This can lead to better, more efficient performance on the intended task."

"This kind of training seems to prepare the mind for activity, but it's not necessarily permanent," Zeidan cautions. "This doesn't mean that you meditate for four days and you're done -- you need to keep practicing."

Journal Reference:
Zeidan et al. Mindfulness meditation improves cognition: Evidence of brief mental training. Consciousness and Cognition, 2010; DOI: 10.1016/j.concog.2010.03.014

Vitamin D Status Not Predicted By Surrogate Markers, UB Researchers Find

BUFFALO, N.Y. -- Vitamin supplements, diet, geographic location, demographic information or lifestyle, independently or in combination, cannot accurately predict vitamin D concentrations in blood, researchers at the University at Buffalo have found.

This finding indicates that data such as vitamin D from foods and supplements or latitude of residence (northern vs. southern) cannot be used dependably as surrogate markers to assess the risk of breast and colon cancer.

Low blood levels of vitamin D have been associated with an increased risk of developing cancer, while high levels are considered potentially protective, making knowledge of a person's vitamin D status important.
Having a dependable way to obtain this information without drawing blood would eliminate the need for the invasive procedure, which some people find unpleasant, and could encourage more investigations on associations between vitamin D and disease risk.

However, results of the study conducted by UB epidemiologists show that such factors (e.g., age, vitamin D intake, supplement use, etc.), taken together, could explain only 21 percent of the variation in vitamin D levels between people.

These markers were particularly poor at identifying women with severe vitamin D deficiency or those with high levels, according to the findings.

Results of the study appear online ahead of print on the American Journal of Clinical Nutrition website.

"If we could predict someone's vitamin D status by asking them about their location of residence and their lifestyle, and combining that information with their demographic and medical characteristics, then research could be conducted on vitamin D status and disease even if we don't have blood samples from study participants," says Amy E. Millen, PhD, UB assistant professor of social and preventive medicine and first author on the study.

"Our analysis says we are not there yet. Other factors, such as genetics or other variables not measured or not yet known, may help to better predict an individual's blood vitamin D level.

"This information is important, nevertheless, because it tells researchers that less weight should be given to previous studies that used proxy measures for vitamin D instead of blood measures to predict risk of cancer outcomes."

The investigation is based on blood samples from 3,055 postmenopausal women who took part in the Women's Health Initiative (WHI) Calcium plus Vitamin D clinical trial conducted from 1995-2000 or in the original WHI trial, which took place from 1993-98.

Actual vitamin D data from the samples was compared to surrogate markers for vitamin D status -- latitude of residence, annual sunlight at particular latitudes, and how much vitamin D participants consumed from foods and supplements.

Even after considering latitude, season of the year when blood samples were taken, regional sunlight exposure, age, race-ethnicity and other lifestyle factors such as waist circumference and physical activity, there still were differences in serum vitamin D levels between people that could not be explained, results showed.

"We learned that using this data still doesn't allow us to very accurately predict an individual's blood vitamin D status," says Millen.

"However, our study did not have very detailed data on individual sun exposure, so if we had had that information, perhaps we might have been able to more accurately predict an individual's vitamin D blood levels. We assume, though, based on other studies similar to ours, that even with measures of sun exposure, a predictive model still wouldn't be very valid."

Millen's advice? "When evaluating the information you hear in the news, be aware that relationships between location of residence and a disease outcome, or even studies that looked at just vitamin D intake from foods and supplements (without consideration of sunlight exposure) may not accurately tell you about the true relationship between cancer and vitamin D."

**Routine Lifting May Not Be as Bad for Your Back as Thought, Research Suggests**

ScienceDaily (Apr. 20, 2010) — Tapio Videman says back disorders in the working population are among the most costly illnesses in developed countries around the world. Disc degeneration is the main suspected origin of severe back symptoms and the main target in spine surgery.

But Videman, a researcher in the University of Alberta's Faculty of Rehabilitation Medicine, wants to dispute the common perception that disc degeneration is caused by physical loading, the pressure put on the spine that comes with, for example, frequent lifting. Videman's research team found that more physical loading may in fact slightly delay disc degeneration as it's known to be good for the bones, muscles and tendons.

Videman studied identical male twins where one of the siblings was, on average, 29 pounds heavier than the other. According to Videman, the most prevalent source of physical loading is what each individual is carrying around on a daily basis: their own body weight. What Videman's research found is that there was no evidence that the loading in the form of extra body weight was harmful to the person's spinal discs. In fact, the heavier twin had slightly less disc degeneration compared to the lighter twin.

What's Videman's take-home message? Routine physical loading is not bad for a disc, within limits. Videman says these findings have immediate implications for preventative strategies and patient education. He says people who are unsure about physical-loading activities while at work, home or at the gym because of fear of harming their back, should challenge their spines by gradually increasing daily physical loading.
Fish oil supplements provide no benefit to brain power
The largest ever trial of fish oil supplements has found no evidence that they offer benefits for cognitive function in older people.

The OPAL study investigated the effects of taking omega-3 long-chain polyunsaturated fatty acid supplements over a two year period on the cognitive function of participants aged 70-80 years.

The number of people with cognitive impairment is rising and it is estimated that by 2040, more than 81 million people globally will have dementia.

Some studies have suggested that high intakes of omega-3 fatty acids, most commonly found in oily fish, are important for the maintenance of good cognitive health in later life.

The OPAL (Older People And omega-3 Long-chain polyunsaturated fatty acids) study, published today in the American Journal of Clinical Nutrition, was a randomised controlled trial led by Alan Dangour, Senior Lecturer at the London School of Hygiene & Tropical Medicine and colleagues.

The study enrolled 867 participants aged 70-80 years from General Practice clinics in England and Wales. Trial participants who all had good cognitive health at the start of the study were randomly assigned into two groups, one of which received fish oil capsules while the other group received a placebo for two years. Cognitive function was assessed at the start and end of the study by trained research nurses using a series of paper and pencil tests of memory and concentration.

After two years, those participants receiving fish oil capsules had significantly higher levels of omega-3 fatty acids in their blood than those participants receiving placebo capsules. However, cognitive function did not change over the course of the study in either group of participants and there was no evidence that the consumption of omega-3 fatty acids had a benefit for cognitive function in older people.

Dr. Alan Dangour urges caution in interpreting these results: “From the data we have collected in the OPAL study there is no evidence of an important benefit for memory or concentration of increased omega-3 fatty acid consumption over a two year period among older people with good cognitive health. However, it is important to keep in mind that poor cognitive function can take many years to develop and although this is the longest trial of its kind ever conducted, it may be that it was not long enough for any true beneficial effects to be detected among this healthy cohort of older people”.

Vitamin K May Protect Against Developing Non-Hodgkin's Lymphoma, Say Mayo Clinic Researchers
ScienceDaily (Apr. 21, 2010) — In the first study of vitamin K and Non-Hodgkin lymphoma risk, researchers at the Mayo Clinic campus in Minnesota have found that people who have higher intakes of vitamin K from their diet have a lower risk of developing Non-Hodgkin lymphoma. Non-Hodgkin Lymphoma is a cancer of the immune system and is the most common hematologic malignancy in the United States.

At the 101st Annual Meeting of the American Association for Cancer Research (AACR), the researchers report that the risk of developing Non-Hodgkin lymphoma was approximately 45 percent lower for participants who had vitamin K intakes in the top quartile of intake in the study (>108 ug/day), compared to participants who had intakes in the bottom quartile (<39 ug/day). This association remained after accounting for other factors such as age, sex, education, obesity, smoking, alcohol use and intake of foods with high amounts of antioxidants.

Vitamin K is a fat-soluble vitamin and is derived from either plants (phyloquinone or vitamin K1) or bacterial synthesis. This study estimated intake of the plant form of vitamin K from diet and supplement use. The most common sources of vitamin K1 in the diet include leaf lettuce and spinach, with smaller amounts found in other vegetables, vegetable oils and some fruits.

Researchers at the Mayo Comprehensive Cancer Center are studying the connection between diet and Non-Hodgkin lymphoma risk, and they became interested in a potential role for vitamin K. While vitamin K is best known for its essential function in several proteins involved in blood clotting (the name of the vitamin is derived from the German word “Koagulations”), it also appears to be important in other biological processes, including inhibition of inflammatory cytokines thought to play a role in Non-Hodgkin lymphoma, as well as pathways involved in cell cycle arrest and cell death.

“These results are provocative, since they are the first work we have done on the connection between vitamin K and Non-Hodgkin lymphoma, and this is a fairly strong protective effect,” says the study’s lead investigator, James
Cerhan, M.D., Ph.D., a cancer epidemiologist. "However, as with all new findings, this will need to be replicated in other studies."

The Mayo study enrolled 603 patients who were newly diagnosed with Non-Hodgkin lymphoma as well as 1,007 matched cancer-free "control" participants. Researchers asked the participants to answer a food questionnaire about their usual intake of over 120 food items two years prior to their cancer diagnosis or enrollment into the study (controls). They also asked about use of a variety of supplements. Vitamin K intake was estimated from this data.

While there was a clear trend showing that a greater intake of vitamin K from dietary sources was associated with a lower risk of Non-Hodgkin lymphoma, the use of vitamin K supplements presented a slightly different picture. Increasing intake of vitamin K from supplements did protect against Non-Hodgkin lymphoma, but reached a point where the highest intake offered no reduction in risk. "The significance of this finding is unclear," notes Dr. Cerhan, "but suggests that taking high doses of supplements is unlikely to be helpful." Dr. Cerhan also notes that people taking certain oral anticoagulants or seizure medications should closely follow their physician's dietary recommendations with respect to vitamin K intake, since vitamin K can interfere with these drugs.

"Whether the protective effect we observed is due to vitamin K intake, or some other dietary or lifestyle exposure, cannot be definitely assessed in this study," notes Dr. Cerhan. "But these findings add to a lot of other data that support a diet that includes plenty of green leafy vegetables in order to prevent many cancers as well as other diseases."

**Dietary Supplement Speeds Silver Cyclists**

ScienceDaily (Mar. 23, 2010) — Taking arginine supplements can improve the cycling ability of over-50s. Researchers writing in BioMed Central's *Journal of the International Society of Sports Nutrition* tested a combination of the amino acid and an antioxidant in sixteen cyclists, finding that it enhanced their anaerobic threshold -- the amount of work done before lactic acid begins to accumulate in the blood.

Zhaoping Li worked with a team of researchers from the University of California, Los Angeles, USA, to carry out the randomized controlled trial. She said, "The loss of exercise capacity with age often results in a reduction in physical fitness and more rapid senescence. A dietary supplement that increases exercise capacity might help to preserve physical fitness by optimizing performance and improving general health and well being in older people."

One way in which older people may reduce their exercise capacity revolves around the signaling molecule nitric oxide (NO), which is involved in many physiological processes, including those related to working out. NO production diminishes in quantity and availability as we age and is associated with an increased prevalence of other cardiovascular risk factors. In the body, NO is created from the amino acid arginine and is inactivated by oxygen free radicals. By supplementing diet with both the precursor and an anti-oxidant, the researchers hoped to support the NO system in the cyclists and thereby enhance performance.

Sixteen cyclists aged between 50 and 73 were randomly assigned to receive either the supplement or dummy placebo pills. After one week of study, the anaerobic threshold of the supplement group increased, while that of the control group did not significantly alter. This increase in anaerobic threshold was preserved at week three. According to Li, "We've demonstrated a 16.7% increase in anaerobic threshold. This indicates a potential role of arginine and antioxidant supplementation in improving exercise performance in elderly."

**Journal Reference:**


**New research suggests choosing different fruits and vegetables may increase phytonutrient intake**

Study supported by Nutrilite Health Institute presented at Experimental Biology Meeting

GRAND RAPIDS, MICH., April 22, 2010 – Topping that bowl of cereal with raspberries instead of strawberries, or sautéing kale instead of spinach for dinner can boost phytonutrient intake, which may help decrease risk for certain chronic diseases, including cardiovascular disease, cancer and diabetes.

A study, supported by the Nutrilite Health Institute and presented at the Experimental Biology Meeting, April 25, in Anaheim, California, found that despite the availability of a wide range of foods that contain phytonutrients, many Americans are getting phytonutrients from a relatively small number of specific foods, which are not necessarily the most concentrated sources. Top food contributors for several key phytonutrient families in the diet include oranges, orange juice, carrots, grapes, garlic, tomatoes, strawberries, prepared mustard, tea and various soy products, according to the study.
"Americans could improve their phytonutrient intake by choosing to eat more concentrated sources of phytonutrients as well as a wider variety," said Keith Randolph, Ph.D., Technology Strategist for Nutrilite. "For example, grapes are the top contributor of the phytonutrient family of anthocyanidins in most Americans' diets, but blueberries actually contain higher amounts of this phytonutrient. Research suggests anthocyanidins support heart health," Randolph added.

Phytonutrients are compounds that naturally occur in plants and provide a range of potential health benefits from promoting eye, bone and heart health to supporting immune and brain function. It's widely believed that the health benefits that phytonutrients may offer come from the pigments in fruits and vegetables that give these foods their vibrant reds, yellows, greens and other rich colors. Certain fruits and vegetables contain higher levels of these compounds, making them more concentrated and potentially more effective sources of phytonutrients.

**Phytonutrient Intake Among Americans**

The two groups analyzed in the study include adults who eat the recommended amount of fruits and vegetables, as compared to adults who fail to meet U.S. government guidelines on fruit and vegetable consumption based on two days of intake. Findings suggested that for most phytonutrients, there is little difference in the relative contributions of phytonutrients by food source between groups, although those who meet the recommended five to 13 servings per day were shown to consume greater quantities of certain phytonutrient-rich foods. One key finding of the study concluded that, on average, Americans who consume the recommended amount of fruits and vegetables generally get two to three times more phytonutrients in their diet as compared to people who do not meet fruit and vegetable recommendations. This was true for all but two of the phytonutrients studied. Of note, these data relate to the findings of a previous study conducted by the Nutrilite Health Institute – America's Phytonutrient Report: Quantifying the Gap – that found eight in 10 Americans have a "phytonutrient gap," meaning they are missing out on health benefits provided by phytonutrients given their lack of fruit and vegetable intake.

**Power Up Produce**

For 10 of the 14 phytonutrients included in the analysis, a single food type accounted for approximately two-thirds or more of an individual's intake of the specific phytonutrient, regardless of whether that person was a high or low fruit and vegetable consumer. Based on the current study, the top food sources consumed by Americans for some selected phytonutrients were as follows:

- **Beta-carotene** – carrots
- **Beta-cryptoxanthin** – oranges/orange juice
- **Lutein/zeaxanthin** – spinach
- **Ellagic acid** – strawberries
- **Isothiocyanates** – mustard

For each of these phytonutrients, however, there is a more highly concentrated food that could be chosen instead:

- **Beta-carotene** – sweet potatoes
  - Sweet potatoes have nearly double the beta-carotene compared to carrots in a single serving.
- **Beta-cryptoxanthin** – papaya
  - A serving of fresh papaya has roughly 15 times the beta-cryptoxanthin of an orange.
- **Lutein/zeaxanthin** – kale
  - By substituting cooked kale for raw spinach, it is possible to triple lutein/zeaxanthin intake.
- **Ellagic acid** – raspberries
  - Serving per serving, raspberries have roughly three times the ellagic acid compared to strawberries.
- **Isothiocyanates** – watercress
  - Just one cup of watercress as the basis for a salad has about the same level of isothiocyanates as four teaspoons of mustard.

The overall goal is to encourage Americans to close their "phytonutrient gap" by increasing consumption of all phytonutrient-rich foods. Importantly, by "powering up produce" selection on a regular basis and by seeking a greater variety of fruits and vegetables, phytonutrient intakes can be increased.

"The study reiterates our earlier findings that American adults are missing out on the health benefits of fruits and vegetables by simply not including enough in their diet," said Randolph. "Additionally, these data highlight the importance of not only the quantity, but also the significant impact the quality and variety of the fruits and vegetables you eat can have on your health. All Americans can improve their phytonutrient intake by varying the fruits and vegetables they consume and by focusing on foods that have a higher concentration of certain phytonutrients," he added.
Study Details
Supporting research for America’s Phytonutrient Report was conducted by Exponent for NUTRILITE®, the world’s leading brand of vitamin, mineral, and dietary supplements based on 2008 sales. The dataset comes from National Health and Nutrition Examination Surveys (NHANES), surveys that capture what Americans eat daily, supplemental nutrient concentration data from the United States Department of Agriculture (USDA) and the published literature. The study population includes non-pregnant, non-lactating NHANES respondents ages 19 years and older with two complete and reliable 24-hour dietary recalls based on NHANES criteria. MyPyramid guidance for fruit and vegetable intake recommendations, which is based on the 2005 Dietary Guidelines for Americans, was used.

New research reinforces anti-inflammatory properties of tart cherries
Study links super fruit to reduced inflammation, risk for heart disease
ANAHEIM, CA, April 27, 2010 – There's more evidence of tart cherries' powerful anti-inflammatory benefits, according to a new study presented by a team of Michigan researchers today at the Experimental Biology annual meeting. Using a “whole food” approach, researchers found that a cherry-enriched diet not only reduced overall body inflammation, but also reduced inflammation at key sites (belly fat, heart) known to affect heart disease risk in obese, at-risk rats.

At-risk obese rats were fed a cherry-enriched "Western Diet," characterized by high fat and moderate carbohydrate – in line with the typical American diet – for 90 days. Cherry-enriched diets, which consisted of whole tart cherry powder as 1 percent of the diet, reduced risk factors for heart disease including cholesterol, body weight, fat mass and known markers of inflammation. While inflammation is a normal process the body uses to fight off infection or injury, according to recent science, a chronic state of inflammation increases the risk for diseases.

"Chronic inflammation is a whole body condition that can affect overall health, especially when it comes to the heart,” said study co-author Mitch Seymour, PhD, at the University of Michigan. "This study offers further promise that foods rich in antioxidants, such as cherries, could potentially reduce inflammation and have the potential to lower disease risk.”

A second pilot study found similar results in humans. Ten overweight or obese adults drank eight ounces of tart cherry juice daily for four weeks. At the end of the trial, there were significant reductions in several markers of inflammation, in addition to lower levels of triglycerides, another key risk factors for heart disease.

Researchers say both studies are encouraging and will lead to further clinical studies in humans to explore the link between diet, inflammation and lowering disease risk.

The Power of Eating Red
This new study is the latest linking cherries to protection against heart disease and inflammation. Researchers believe it’s the anthocyanins – powerful antioxidant compounds in cherries – also responsible for the fruit's bright red color, that link cherries to reduced inflammation, even inflammation related to muscle recovery post-exercise.

Since cherries are available year-round in dried, frozen and juice forms, it’s easy and delicious to incorporate them into the daily diet to help manage inflammation, from topping dried cherries in oatmeal to enjoying a post-exercise smoothie of cherry juice and lowfat yogurt.

Sources:

Brown Rice and Cardiovascular Protection
ScienceDaily (Apr. 26, 2010) — Rice is generally thought to be a healthy addition to the diet because it is a source of fiber. However, not all rice is equally nutritious, and brown rice might have an advantage over white rice by offering protection from high blood pressure and atherosclerosis ("hardening of the arteries"), say researchers at the Cardiovascular Research Center and Department of Physiology at Temple University School of Medicine in Philadelphia.

New research by Satoru Eguchi, Associate Professor of Physiology, suggests that a component in a layer of tissue surrounding grains of brown rice may work against angiotensin II. Angiotensin II is an endocrine protein and a known culprit in the development of high blood pressure and atherosclerosis.
The findings are contained in a study conducted by Dr. Eguchi and his colleague at the Temple lab, Akira Takaguri. The research team is also composed of Hiroshi Utsunomiya and Ryohi Kono of the Department of Pathology, School of Medicine, Wakayama Medical University, Wakayama, Japan; and Shin-ichi Akazawa, Department of Materials Engineering, Nagaoka National College of Technology, Nagaoka, Japan. Dr. Takaguri will present the team’s findings at the annual 2010 Experimental Biology conference in Anaheim, CA on April 24-28. This presentation is sponsored by The American Physiological Society.

Brown Rice and Angiotensin II

The subaleurone layer of Japanese rice, which is located between the white center of the grain and the brown fibrous outer layer, is rich in oligosaccharides and dietary fibers, making it particularly nutritious. However, when brown rice is polished to make white rice, the subaleurone layer is stripped away and the rice loses some of its nutrients. The subaleurone layer can be preserved in half-milled (Haigamai) rice or incompletely-milled (Kinnemai) rice. These types of rice are popular in Japan because many people there believe they are healthier than white rice.

The Temple team and their colleagues at the Wakayama Medical University Department of Pathology and the Nagaoka National College of Technology Department of Materials Engineering in Japan sought to delve into the mysteries of the subaleurone layer and perhaps make a case for leaving it intact when rice is processed. Because angiotensin II is a perpetrator in such lethal cardiovascular diseases, the team chose to focus on learning whether the subaleurone layer could somehow inhibit the wayward protein before it wreaks havoc.

First, the team removed the subaleurone tissue from Kinnemai rice. Then they separated the tissue’s components by exposing the tissue to extractions of various chemicals such as ethanol, methanol and ethyl acetate. The team then observed how the tissue affected cultures of vascular smooth muscle cells. Vascular smooth muscle cells are an integral part of blood vessel walls and are direct victims of high blood pressure and atherosclerosis.

During their analysis, the team found that subaleurone components that were selected by an ethyl acetate extraction inhibited angiotensin II activity in the cultured vascular smooth muscle cells. This suggests that the subaleurone layer of rice offers protection against high blood pressure and atherosclerosis. It could also help explain why fewer people die of cardiovascular disease in Japan, where most people eat at least one rice-based dish per day, than in the U.S., where rice is not a primary component of daily nutrition.

"Our research suggests that there is a potential ingredient in rice that may be a good starting point for looking into preventive medicine for cardiovascular diseases," said Dr. Eguchi. "We hope to present an additional health benefit of consuming half-milled or brown rice [as opposed to white rice] as part of a regular diet."

Early Death by Junk Food? High Levels of Phosphate in Sodas and Processed Foods Accelerate the Aging Process in Mice

ScienceDaily (Apr. 28, 2010) — Here's another reason to kick the soda habit. New research published online in the FASEB Journal shows that high levels of phosphates may add more "pop" to sodas and processed foods than once thought. That's because researchers have found that the high levels of phosphates accelerate signs of aging. High phosphate levels may also increase the prevalence and severity of age-related complications, such as chronic kidney disease and cardiovascular calcification, and can also induce severe muscle and skin atrophy.

"Humans need a healthy diet and keeping the balance of phosphate in the diet may be important for a healthy life and longevity," said M. Shawkat Razzaque, M.D., Ph.D., from the Department of Medicine, Infection and Immunity at the Harvard School of Dental Medicine. "Avoid phosphate toxicity and enjoy a healthy life."

To make this discovery, Razzaque and colleague examined the effects of high phosphate levels in three groups of mice. The first group of mice was missing a gene (klotho), which when absent, causes mice to have toxic levels of phosphate in their bodies. These mice lived 8 to 15 weeks. The second group of mice was missing the klotho gene and a second gene (NaPi2a), which when absent at the same time, substantially lowered the amount of phosphate in their bodies. These mice lived to 20 weeks. The third group of mice was like the second group (missing both the klotho and NaPi2a genes), except they were fed a high-phosphate diet. All of these mice died by 15 weeks, like those in the first group. This suggests that phosphate has toxic effects in mice, and may have a similar effect in other mammals, including humans.

"Soda is the caffeine delivery vehicle of choice for millions of people worldwide, but comes with phosphorous as a passenger" said Gerald Weissmann, M.D., Editor-in-Chief of the FASEB Journal. "This research suggests that our phosphorous balance influences the aging process, so don't tip it."

Journal Reference:
New Insights Into How Omega-3 Fatty Acids Reduce Inflammation Also Hints at Novel Disease Treatments

ScienceDaily (May 2, 2010) — Scientists at the University of Pittsburgh School of Medicine went on a molecular fishing trip and netted a catch of new mediators that not only can explain how omega-3 fatty acids reduce inflammation, but also hint at novel treatments for a host of diseases linked to inflammatory processes. Their findings were published in the online version of *Nature Chemical Biology*.

There is strong evidence that eating foods rich in omega-3 fatty acids, such as some fish, plant-derived oils and nuts, or taking omega-3s as a dietary supplement reduces inflammation and lowers the risk of illness and death from cardiovascular and other inflammatory diseases, said Bruce A. Freeman, Ph.D., professor and chair of the Department of Pharmacology and Chemical Biology, Pitt School of Medicine, and one of the study's senior authors.

"What has been a provocative question for people familiar with these impressive clinical actions is how omega-3 fatty acids actually induce such beneficial pharmacological effects," he said. "This study has given us fresh and revealing perspective into that process."

In this study, also led by Pitt assistant professor Francisco J. Schopfer, Ph.D., the researchers examined metabolic byproducts of omega-3 fatty acids that are produced by activated macrophages, a type of immune cell that is always present in inflamed tissue, and discovered previously unknown biochemical mediators of inflammation.

Using a small molecule called beta-mercaptoethanol (BME) as a reactive bait, Chiara Cipollina, Ph.D., one of the study's lead authors and a post-doctoral student from Palermo, Italy's Ri.MED Foundation, "hooked" several derivatives of omega-3 fatty acids that were produced by immune cells. These derivatives were chemically modified to become electrophilic fatty acid oxidation products (EFOX), meaning they are attracted to electrons and therefore react with critical molecular targets in many different cell types.

By interacting with certain protein residues that have electrons available for chemical binding, these derivatives stimulate changes in cellular protein function and the genetic expression patterns of cells, resulting in a broad range of antioxidant and anti-inflammatory responses.

The research team found that an enzyme called cyclooxygenase-2 (COX-2), which is the molecular target of common drugs such as aspirin, ibuprofen and acetaminophen, mediates the transformation of omega-3 fatty acids into EFOX. Notably, cellular EFOX concentrations were significantly increased in the presence of aspirin, suggesting another mechanism for that drug's beneficial effects.

"There is a lot of a evidence that supports minimizing inflammation as a fundamental therapy for many diseases," Dr. Freeman said. "Our new insights help explain in part the multitude of beneficial actions observed for both omega-3 fatty acids and aspirin, and the discovery of this new class of omega-3 fatty acid-derived anti-inflammatory mediators could point drug development activities in new and fruitful directions."

For example, drugs that, like aspirin, enhance the production of EFOX could be of value, or new agents might be synthesized that are able to induce anti-inflammatory signals that are similar to those induced by EFOX, he explained. Drs. Freeman and Schopfer and their drug discovery team now are working on some of these approaches.

**Journal Reference:**

Olive Oil Could Guard Against Developing Ulcerative Colitis

ScienceDaily (May 3, 2010) — Eating more olive oil could help prevent ulcerative colitis, according to a new study coordinated by medical researchers at the University of East Anglia (UEA).

Presented at the Digestive Disease Week conference in New Orleans, the findings show that people with a diet rich in oleic acid, which is present in olive oil, are far less likely to develop ulcerative colitis. Oleic acid is a monounsaturated fatty acid found in olive oil, peanut oil and grapeseed oil, as well as in butter and certain margarines.

The researchers, led by Dr Andrew Hart of UEA’s School of Medicine, studied more than 25,000 people aged 40-65 living in Norfolk, UK. The volunteers were recruited to the EPIC study (European Prospective Investigation into Diet and Cancer) between 1993 and 1997. The participants, none of whom had ulcerative colitis at the outset, completed detailed food diaries which were later analysed by specially trained nutritionists working in Cambridge.

By 2004, 22 participants in the study had developed ulcerative colitis and the researchers compared their diets with those who did not develop the disease. They found that those with the highest intake of oleic acid had a 90 per cent lower risk of developing the disease.
"Oleic acid seems to help prevent the development of ulcerative colitis by blocking chemicals in the bowel that aggravate the inflammation found in this illness," said Dr Hart.

"We estimate that around half of the cases of ulcerative colitis could be prevented if larger amounts of oleic acid were consumed. Two-to-three tablespoons of olive oil per day would have a protective effect," said Dr Hart.

Ulcerative colitis is a distressing disease affecting 120,000 people of all ages in the UK and 1 million in the US. It is characterized by inflammation of the lining of the colon or large bowel, which causes abdominal pain, diarrhoea and weight loss.

Similar work in other countries is now required to determine if these results are reproducible there, before the link can be said to be definite. If it is confirmed that oleic acid is truly protective, dietary modifications should be considered to prevent colitis. Additionally, the use of oleic acid supplements should also be assessed in the future as a possible treatment for colitis sufferers.

**Adhesion and immunomodulatory properties of a probiotic strain B. lactis HN019**

Probiotics are a group of live microorganisms administered in adequate amounts which confer a beneficial health effect on the host. This bacterial community plays a pivotal role in human nutrition and health by promoting the supply of nutrients, preventing pathogen colonization and shaping and maintaining normal mucosal immunity. While the precise mechanistic basis of the beneficial effects of probiotics is obscure and will most likely vary depending on the strain and species used.

A research article to be published on May 14, 2010 in the *World Journal of Gastroenterology* focused their studies mainly on how Intestinal Epithelium Cells (IECs) respond to a widely used probiotic strain *B. lactis* HN019, in so doing to reveal the mechanism of immunomodulatory effect of *B. lactis* HN019. The research team is led by Professor Guo from Shanghai Jiao Tong University, school of medicine. Adhesion assays of *B. lactis* HN019 and *S. typhimurium* ATCC 14028 to INT-407 cells were carried out by detecting copies of species-specific genes with Real-time PCR. Ultrastructure research was further conducted by transmission electron microscopy. Interleukin-1β, Interleukin-8, Tumor necrosis factor-α gene expression were assessed while enzyme linked immunosorbent assay was used to detect IL-8 protein secretion.

The results showed that the attachment of *S. typhimurium* ATCC 14028 to INT-407 intestinal epithelial cells was inhibited significantly by *B. lactis* HN019. It is also important to note that *B. lactis* HN019 could be internalized into the INT-407 cells. *B. lactis* HN019 attenuated both IL-8 mRNA level at baseline and *S. typhimurium*-induced pro-inflammatory responses. IL-8 secretion was reduced while IL-1β and TNF-α mRNA expression level was not changed at baseline after treated with *B. lactis* HN019.

As a probiotic strain, *B. lactis* HN019 could modulate immune system towards anti-inflammatory action and exclude enteropathogen adhesion, in so doing contributing to the homeostasis of the intestinal epithelium. This knowledge will contribute to offer, in the near future, new therapeutic means to counteract the inflammatory disorders observed in human inflammatory bowel disease.


**NASA Studies Find Omega-3 May Help Reduce Bone Loss**

*ScienceDaily* (May 11, 2010) — NASA-sponsored studies have found that omega-3 fatty acids found in fish oil may play a role in mitigating bone breakdown that occurs during spaceflight and in osteoporosis. Ongoing research for decades has looked for ways to stop bone density loss in astronauts. The solution could have significant implications for space travelers and those susceptible to bone loss on Earth.

The studies’ results are published in the May issue of the Journal of Bone and Mineral Research. The paper reports on four types of studies using cell culture, ground-based bed rest, and data from both space shuttle and International Space Station crew members. NASA studies bone density loss because it is one of the main effects of exposure to the weightlessness of space. Scientists hope to find ways to counteract the problem for astronauts on long-duration space voyages.

In a series of cell-based studies, scientists documented that adding a specific omega-3 fatty acid to cells would inhibit the activation of factors that lead to bone breakdown. This was true in both typical cell cultures and those designed to mimic weightlessness. The inhibited factor is known as "nuclear factor kappa B" or NFκB. NFκB is involved in immune system behavior and the inflammation process. The activation of NFκB in different tissues can lead to bone and muscle loss.

In a study of astronauts returning from short-duration shuttle missions, researchers found that NFκB activation was increased in blood cells collected at landing, and remained elevated for two weeks. These data provide evidence...
that inflammatory processes may be involved in some of the adaptation to microgravity and suggest that reducing NFκB activation could serve as a countermeasure to bone loss.

A ground-based bed rest study was conducted on 16 subjects with the evaluations performed after 60 days. Bed rest simulates some of the effects of weightlessness, including muscle and bone loss. During the study, higher intake of omega-3 fatty acids was associated with less bone loss.

Based on these studies, the investigators evaluated bone loss in astronauts and compared their findings to reported fish intake during spaceflight. Researchers found that astronauts who ate more fish lost less bone mineral after four-to-six-month spaceflights. Tracking fish consumption is not as accurate as determining exact diet and omega-3 fatty acid intake, but these data were not available.

"These results are very exciting, and provide initial evidence that nutrition may be a key factor in mitigating bone loss in astronauts." said Scott Smith, a nutritionist at NASA's Johnson Space Center in Houston and one of the paper's authors.

**Journal Reference:**