news briefs

Exercise keeps you Sane—In More Ways than One

At middle age, you may not have the desire to go to the gym and lift a few barbells to work on strengthening your biceps, but new research suggests you may not want to cancel that gym subscription just yet either. In a study published in early October by the journal *Lancet Neurology,* researchers from the Karolinska Institute concluded that people who exercise in middle age have much lower risks of developing such neurodegenerative diseases as Alzheimer's or other forms of dementia. In the study researchers checked for Alzheimer's disease (AD) or dementia in 1,449 people 65 and older whose exercise habits they had monitored for nearly 35 years. To ensure that exercise was the only contributing protective factor, the researchers sought to eliminate other influences by controlling for age, sex, education, vascular illness, movement disorders, smoking, and alcohol consumption. Their results showed clearly that those who participated in some sort of physical activity at least twice a week as they approached middle age were 50% less likely to develop dementia, and had a 60% lower chance of developing AD when compared to similar inactive adults. Doctors have long known that regular exercise throughout the duration of one's life could prevent and control heart disease, diabetes and high blood pressure. But the link between protecting oneself from senility even many years later with the help of exercise is certainly novel. It is not surprising that the brain, like the body, would benefit from exercise; however, it is still difficult to prove a strong correlation here, as there could be several confounding factors that, for example, may inhibit those predisposed to AD from exercising. The researchers were not able to specify an exact mechanism, but they did note that in previous studies with mice, exercise was correlated with far fewer deposits for beta amyloid in the brain. Large aggregations of this protein are characteristic signs of Alzheimer's in mice and men and may point to a more complex biochemical explanation. Thus, this study has certainly paved the way for a deeper understanding of such mechanisms, and consequently, a long-awaited cure for the more than 4.5 million Americans who are debilitated by Alzheimer's disease today.

—Christine Megerdichian

▲ Exercising may be as helpful as doing your reading when it comes to preventing AD.

credit: Photo by Brian Liau, HSR

Rovio S, Kareholt I, et al. "Leisure-time physical activity at midlife and the risk of dementia and Alzheimer's disease." *Lancet Neurology*. 4(11) (November 2005): 705-11.

Possible Explanation of Claims of Alien Abduction

Alien abduction: a claim taken seriously by some, and as the butt of a joke by others. Recent research by Harvard scientists offer an explanation of these claims that seem to be "crazy," despite that in most cases, "abductees" rarely exhibit any symptoms of mental illness. Many assume they are intentionally lying to get attention. It has been found that false memory creation and sleep paralysis may be the culprits. Some people report memories of traumatic events that in reality, have probably not occurred. Interestingly enough, individuals who claimed abduction showed the same measurements of sweating, heart rate, and brain waves by those suffering from post-traumatic stress symptom. This shows that the emotional distress of a memory, real or imagined, is enough to affect people physically. People who report having been abducted by aliens also exhibit higher rates of sleep paralysis. When people sleep, they are paralyzed; this is a natural adaptation to avoid getting out of bed and walking around when people sleep, which would be dangerous. However, it is possible (and completely normal) to wake up while paralyzed, and sometimes hallucinate sights, sounds, and feelings; in effect, "dreaming with your eyes wide open." People who experience this may mistake it for abduction: waking up, paralyzed, unable to move, seeing flashing lights or hearing sounds. Perhaps some explanations to claims of alien abduction have been found?

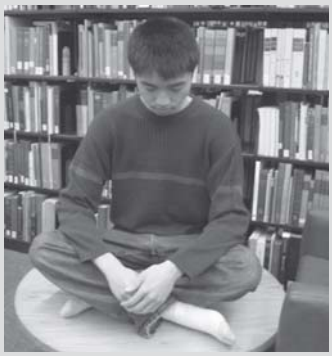
—Lauren Gibilisco

1. Clancy S, McNally R, Schacter D, and Lezenweger M. "Memory Distortion in People Reporting Abduction by Aliens". *Journal of Abnormal Psychology*. 2002;111(3):455-461.
2. Cromie, William. "Alien abduction claims explained." Harvard Gazette. 22 September 2005.

Meditation Changes Brain Structure

A recent study led by Massachusetts General Hospital found that regular meditation structurally changes the brain. The study focused on imaging particular areas of the cerebral cortex with MRI and found that among practitioners of Insight meditation, regions of the brain associated with emotional and sensory processing displayed thickening. Previous studies on Buddhist monks showed that meditation alters brain activity and may produce long-term neural changes in the practitioner. Researchers hoped to examine the effects of meditation practices more common to the U.S., and so enrolled a group of practitioners of Buddhist Insight meditation, which focuses on attention and mindfulness. Each practitioner had on average nine years of experience and meditated 40 minutes a day as part of a practice incorporated into an otherwise normal lifestyle. The study found that regular meditation led to a thickening of certain areas of cortical regions associated with sensory, auditory, visual, and interoceptive processing mostly in the right hemisphere, which is essential for attention. In parts of the prefrontal cortex, which is known to thin with age, older participants showed similar thickness to younger participants, which suggests that meditation may help reduce some age-related cortical thinning. Although the conclusions of this and similar studies will need to be verified by larger studies, researchers predict that similar practices, such as yoga, will likely also lead to structural changes in areas of the cortex related to the specific focus of the meditation.

—Cynthia Chi



credit: Photo by Brian Liau, HSR

◀A Harvard student relaxes by meditating.

Lazar, S. et al. "Meditation experience is associated with increased cortical thickness." *NeuroReport* 16 (November 28, 2005).

Zebrafish developmental biologist to study neurodevelopment at Harvard

Harvard University's Faculty of Arts and Sciences has recently appointed developmental biologist Alexander F. Schier as Professor of Molecular and Cellular Biology. Prior to coming to Harvard, Schier was associate professor of cell biology at New York University's School of Medicine. He also helped found its Skirball Institute of Biomolecular Medicine and is an affiliate of its Developmental Genetics Program. Prof Schier is known in the field of developmental biology for his study of morphogens, chemicals that groups of developing cells secrete to provide information on spatial organization to the rest of the developing embryo. He has been using the zebrafish as a model system to investigate such developmental processes as gastrulation, left-right axis formation, and neural development. He also helped develop a genetic screen for mutations affecting the development of vertebrate embryos. Harvard's Department of Molecular and Cellular Biology is excited to welcome Prof. Schier, whose laboratory will foster interdisciplinary investigations in genetics, developmental biology, and neuroscience. Now at Harvard, Prof. Schier will continue to study signaling in vertebrate embryogenesis using zebrafish. He will also apply his expertise in zebrafish development and genetics to study sensory neuron development and function, as well as sleep and wakefulness.

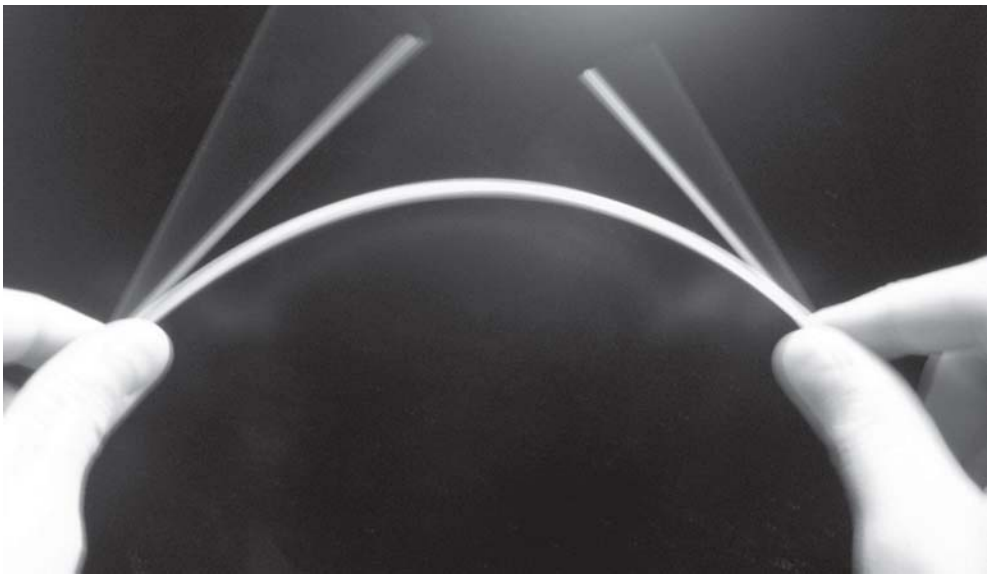
—Shirleen Soh

credit: Harvard Department of Molecular and Cellular Biology

▲ Professor Alexander F. Schier

1. Harvard University Department of Molecular and Cellular Biology. "Faculty: Alexander Schier." URL: http://www.mcb.harvard.edu/Faculty/Schier.html
2. Harvard University Department of Molecular and Cellular Biology. "MCB News: Alex Schier To Join MCB Faculty." URL: http://www.mcb.harvard.edu/NewsEvents/News/Schier.html
3. Bradt, Steve. "Schier named professor of molecular and cellular biology." *Harvard University Gazette*. 3 March 2005. URL: http://www.news.harvard.edu/gazette/2005/03.03/11-schier.html

news briefs



▲ Although a commonly observed phenomena, the breaking of spaghetti is not entirely understood.

credit: Photo by Brian Liau, HSR

Strand Theory

For decades, mathematicians and physicist have sought a grand unified theory encompassing all the forces acting in the universe. However, several scientists have attempted to solve problems much closer to home. To be precise, they are actually in the kitchen. While renowned physicists have been studying string theory, one proposed grand unified theory, several other scientists have been trying to determine why and how a spaghetti strand breaks as it does. Instead of simply snapping in half, a strand of spaghetti will fragment into several pieces when pressure is applied to one of its ends (1). Nobel Laureates Richard Feynman and Pierre-Gilles both admitted to being vexed by this spaghetti quandary almost two decades ago (1). More recently, two published reports in the *Physical Review Letters* propose solutions to this perplexing problem. Gladden *et al.* (2) used a high speed camera to observe what takes place when a small weight is smashed into the end of a spaghetti stand. Their results revealed that for an instant the spaghetti strand acts as a pseudo-wave. As soon as it is compressed at one end, the stand appears wavy, like a taught rope with a force being propagated along it. The spaghetti ultimately fractures at the points that represent the peaks and valleys of the wave. It also breaks at the points that are halfway between the peaks and valleys, the nodal points of the wave. Although the spaghetti strand is initially able to buckle into a wave, there is not enough of a restoring force to return it to its straight state. Consequently, it fractures at the most stressed points. Audoly *et al.* (3) went about testing spaghetti strand breakage differently. Instead of compressing the strand at one of its ends, they bent it in a catapult-like fashion. When released from its catapult position, the spaghetti did not return to its original rod-like state. Instead, the spaghetti experienced increases in curvature as the potential energy being released traveled down the strand. The curvature increases caused parts of the strand to be even more bent than they were in the initial catapult position; it was at these points that the spaghetti fractured. These studies have significantly advanced scientists' understanding of how spaghetti strands break, but perhaps most of all, they reveal that cooking is more than just an art. It is at least partially a science.

—Eli Nagler

1. Weiss, Peter. "That's the Way the Spaghetti Crumbles." *Science News Online* 168 (12 November 2005). URL: http://www.sciencenews.org/articles/20051112/bob10.asp.
2. Gladden, J.R., N.Z. Handzy, A. Belmonte, and Villermaux, E. "Dynamic buckling and fragmentation in brittle rods." *Physical Review Letters* 94 (2005): 035503.
3. Audoly, B., and Neukirch, S. "Fragmentation of rods by cascading cracks: Why spaghetti does not break in half." *Physical Review Letters* 85 (2005): 095505.