RESEARCH BRIEF

Vitamin D for the Heart

Many people know the human body needs vitamin D for strong bones. But a recent study suggests that the vitamin is also good for a strong heart. The research, published in the May 2007 issue of *Archives of Internal Medicine,* hints that taking vitamin D supplements could have a positive impact on people's health—but a single recommended dose might not necessarily be a good fit for everyone.

Several earlier studies revealed high rates of hypertension and diabetes, two risk factors for cardiovascular disease, among people with low amounts of vitamin D in their blood. But these studies were conducted in small groups of people or in groups that were not representative of the general population.

To address this weakness, Keith Norris and colleagues at Charles R. Drew University of Medicine and Science and associated collaborators analyzed data from the Centers for Disease Control and Prevention's Third National Health and Nutrition Examination Survey (NHANES), which combined interviews with physical examinations. The survey sample of more than 15,000 participants included sufficiently large numbers of individuals aged 60 years and older, African Americans, and Mexican Americans to more precisely estimate the prevalence of different conditions in these groups.

Norris, who heads the Comprehensive Center on Health Disparities in Chronic Kidney Disease at Charles R. Drew University, a center supported by NCRR's Research Centers in Minority Institutions (RCMI) program, found that many people have low levels of vitamin D, particularly women, the elderly, and racial and ethnic minorities. The lowest amounts of vitamin D were found in people with hypertension, obesity, diabetes, and high triglyceride levels—even after adjusting for many other factors—suggesting that vitamin D deficiency contributes to these cardiovascular disease risk factors.

Although vitamin D deficiency is not the only cause of these conditions, it is easy to treat. "Even if it's half or a third as good as other treatments, but much cheaper, taking a vitamin supplement becomes an important therapy, particularly for minority communities in which people are apprehensive of the medical system," explains Norris.

■ Research by Keith Norris and colleagues at Charles R. Drew University of Medicine and Science suggests that current recommended doses for vitamin D supplements, based on the amounts necessary to maintain strong bones, are inadequate. Higher amounts of the vitamin could be needed to protect some people from cardiovascular disease.

The study also suggests that the recommended intake of vitamin D, based solely on the levels needed to maintain strong bones, might be inadequate for preventing heart disease. Recommendations might need to be adjusted particularly for the elderly, women, and minorities, who typically have smaller amounts of this vitamin than other groups.

The finding points to the importance of including diverse populations in clinical research. "If the evidence is there for Caucasians, we usually say it's okay for other racial and ethnic groups. If it's there for men, we say it's okay for women," says Norris. "That's not always true."

The NCRR-funded Translational Research Network, a collaboration of RCMI institutions headed by Norris, will make it easier to conduct such studies. The Network, launched earlier this year, will help participating institutions, many of which focus on diseases that primarily affect minorities, to pool their resources and expertise and create more opportunities to conduct multisite clinical and translational studies.

—FRANCES MCFARLAND HORNE

NCRR RESOURCES: The RCMI program enhances the research capacity and infrastructure at minority colleges and universities that offer doctorates in health sciences. For more information, visit www.ncrr.nih.gov/RIrcmi.

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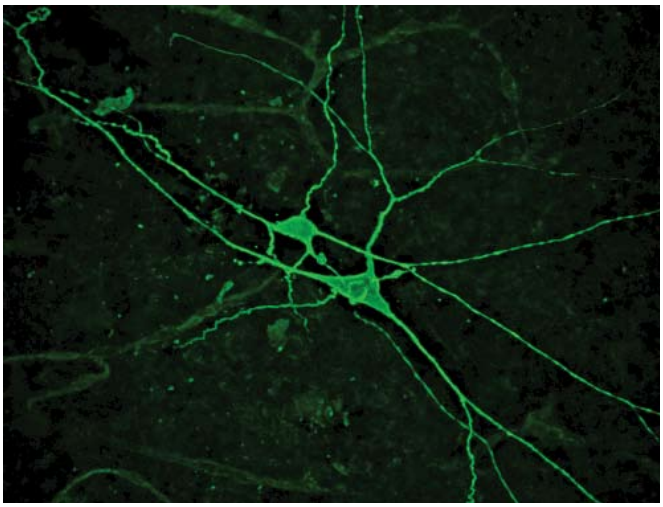
RESEARCH BRIEF

Revving Up the Brain

When a person sleeps, the brain hums slowly, like an idling automobile engine. The slower the engine idles, the deeper the sleep. As the engine is revved up, a person wakes up and—provided the foot remains on the accelerator—stays awake. Researchers at the NCRR-funded Center for Translational Neuroscience in Little Rock, Ark., have now discovered how that process works.

During sleep, two parts of the brain, called the thalamus and cortex, take turns firing at rhythms below 10 oscillations per second. For a person to wake up, oscillations between the thalamus and cortex need to speed up to around 40 per second. In the past, researchers believed that sleep and waking were controlled by chemicals called neurotransmitters. But these chemicals, although crucial to brain functioning, might not create rhythms that are sufficiently fast to keep the brain awake and alert.

The new research, published in the April 2007 issue of the *Journal of Neurophysiology* and in the November 2007 issue of the journal *Sleep,* shows that groups of nerve cells in a region of the brain stem called the reticular activating system (RAS) communicate electrically through tiny openings in their membranes, or gap junctions. Cells that communicate this way are said to be coupled. "An electrical message moves across a whole population of coupled cells extremely quickly, synchronizing their firing," says lead author Edgar Garcia-Rill, director of the Center for Translational Neuroscience. "Think of this process like the clapping of hands by an audience. If the clapping is synchronized, the sound is louder."



■ Groups of cells in the reticular activating system (RAS) of the brain communicate electrically with one another through tiny openings in their membranes. Such cells are said to be electrically coupled. The photo shows two RAS cells injected with fluorescent dye filling the cell body and dendrites visualized using a confocal microscope.

PHOTO COURTESY OF EDGAR GARCIA-RILL, CENTER FOR TRANSLATIONAL NEUROSCIENCE

When the RAS in the brain receives a signal from the outside world, such as a loud noise, it fires, essentially stepping on the accelerator. The firing causes oscillations between the thalamus and cortex of the brain to speed up. These faster oscillations, called gamma rhythm, alert higher centers of the brain and cause a person to wake up. Gamma rhythms occur during both waking and rapid eye movement sleep, the time when we dream. "People remember dreams and waking hours because the brain is revved up," explains Garcia-Rill.

The work sheds new light into the nature of wakefulness and sleep, but it also has important medical implications. "If you know that waking up people has to do at least partially with gap junctions, the same mechanism could explain why some anesthetics put you to sleep," explains Garcia-Rill. "Armed with this knowledge, you could explore treating coma patients with drugs that modulate gap junctions."

Indeed, researchers at New York University recently discovered that the stimulant modafinil, a drug approved for people with the sleep disorder narcolepsy, could increase the "coupling" of cells through gap junctions (Urbano et al. *Proc. Natl. Acad. Sci. U. S. A.* 104: 12554-12559, 2007).

In addition, because the sleep-wake cycle is thought to be disturbed in certain psychiatric disorders, the knowledge gained through Garcia-Rill's research might eventually be used to develop new treatments for anxiety disorders, depression, and schizophrenia.

—NANCY VOLKERS

NCRR RESOURCES: The Center for Translational Neuroscience (www.uams.edu/ctn) is the recipient of a $7.5-million Institutional Development Award (IDeA) from NCRR. The IDeA program was developed to provide support for training and research in states that have historically received a relatively low amount of NIH funding due to the challenges of serving rural or dispersed populations. For more information, visit www.ncrr.nih.gov/research_infrastructure/institutional_development_award.