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A healthy lifestyle
can build a healthy brain

By **Paul D. Nussbaum**

We know a healthy lifestyle is beneficial to our overall health and longevity. Recent research reaffirms the basic importance of healthy living, and a 2010 study by Kvaavik et al., published in the *Archives of Internal Medicine* (14; *doi: 10.1001/archinternmed.2010.76*), found that regular physical activity, not smoking, eating a diet filled with fruits and vegetables and mild alcohol intake helped to increase longevity.

Dr. Deborah Danner of the Sanders-Brown Center on Aging at the University of Kentucky has said, "Longevity is about 30 percent genetics and 70 percent lifestyle." This raises the question: Why do we not do what we know is good for us? We all need to understand why we do not maintain a healthy lifestyle and try to remove the emotional, motivational and other blocks that prevent us from maximizing our health.

Impacts of Lifestyle on the Brain

Can lifestyle influence our cognition, information processing and emotional well-being? This is an important question, as nearly 5.2 million Americans suffer from Alzheimer's disease, the leading cause of dementia. It is estimated that this number will increase to nearly 15 million by 2050, causing a huge emotional and financial hardship for millions of American families. It will also devastate the financial and care capacities of our healthcare system.

We learned from studies on the animal brain in the 1950s that environmental input has an effect on the structural and functional aspects of the brain. This was particularly true for the cortex and the hippocampus (a critical region for memory and learning). Dr. Marian C. Diamond, with University of California, Berkeley's Department of Integrative Biology, is one of the pioneers who demonstrated the importance of socialization, physical activity and mental stimulation for the animal brain.

Neuroscience has helped us learn more about the brain in the past 20 years than we had ever known. The concept of neural plasticity has re-emerged and, with other findings, has advanced a new way of thinking about the brain and its potential. Plasticity can be defined as a brain that is dynamic, malleable and constantly reorganizing. Chronological age seems to matter less when it comes to plasticity than the type of environmental input the brain receives. My work champions stimuli that are "novel and complex" as critical for cortical stimulation and brain health.

From a brain with plasticity we can better understand human neurogenesis—the ability of the human hippocampus to generate new brain cells, and for what Robert Wilson calls "brain resilience." Wilson's research showed mental stimulation to be a powerful component in a brain health

lifestyle. Brain resilience (formerly called brain reserve) is the neurophysiological reaction (cellular growth) or outcome of a brain exposed to novel and complex stimuli across a life-span, and it serves as a type of natural defense against disease. It is also the foundation for how lifestyle can promote the health of the brain.

Components of a Brain Health Lifestyle

A brain health lifestyle involves conscious daily effort to engage in activities thought to help create brain resilience and to position the brain to function at peak efficiency. It is not about disease prevention, but health promotion—a critical distinction. An integrated and comprehensive approach to brain health is most important.

My work in the area of brain health lifestyle proposes five major components to such a lifestyle: mental stimulation, physical activity, socialization, nutrition and spirituality (see the sidebar below for more information on a brain-healthy lifestyle). Prospective research will help determine which lifestyle factors are most influential on brain health, but some findings are already emerging in studies on physical exercise and cognition (and with Wilson's work on mental stimulation).

Pioneering work continues on understanding the relationship between meditative practice and prayer and the impact on the brain as measured by EEG and functional MRI. Neurotheology is an entire new field of study dedicated to this type of research.

Nutrition will also continue to be a major focus of study and a robust nutritional neurosciences literature will help explore and explain the types of foods that best fuel our brain and maximize information-processing capacity. The role of food and emotional stability also will continue as a study focus. One interesting area of study within the domain of socialization has been the finding linking loneliness and cognitive decline.

We have known for some time the importance of remaining physically connected to others across our lifespan, particularly regarding cognitive health. However, recent studies, including one by Holwerda et al., published in 2012 in the *Journal of Neurology, Neurosurgery & Psychiatry* (*doi:10.1136/jnnp-2012-302755*), also found increased risk for Alzheimer's in those who felt lonely. This indicates emotional isolation is potentially detrimental to brain health.

The Human Brain—Still a Mystery

While each of the five domains mentioned above is critical and will continue to receive necessary research, it is also important to extend our thinking about the human brain—a complicated and integrated miracle about which we know very little.

Perhaps what I call "neural energies" will emerge as an area of study to better explore the brain as an energy source. We have tremendous untapped power with which our brains can help to heal our bodies, communicate with one another in a virtual way and even shape civilization.

Biofeedback, neurofeedback, military studies, visualization, mind-body control, neurotheology, near-death and death experiences and psycho-neuroimmunology are just a few examples of how we try to understand neural energies today. Yet we still are at the primitive stage for such exploration and discovery. ■

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