YOUR BRAIN ON MEDITATION:
RECENT SCIENTIFIC STUDIES EXPLAIN HOW A DAILY PRACTICE CHANGES THE BRAIN'S STRUCTURE AND FUNCTION

By Diane Breneman[1]

The art of meditation has long been acknowledged in Eastern societies as an essential tool in a spiritual journey. However, in the last decade, Western scientists have transported meditation practice into the most respected universities, hospitals and laboratories as they seek to explore and understand its physical and psychological benefits.

Facing skyrocketing health care costs fueled by oftentimes ineffective and side-effect producing pharmaceuticals, the United States' government is spending millions of dollars to study the benefits of such alternative therapies as meditation. At this point, the National Institute of Health has funded over 120 studies on the impact of meditation. The results have been almost universally positive.

Although pioneering mind/body scientists that have been studying meditation for decades, it wasn't until relatively recent advances in brain scanning technology, that the area experienced an explosion in research activity. Brain scanning technology has now evolved to the point where not only can it allow us to see how the brain changes over time, but it can also show us, which portions of the brain are working during any given activity.

As a result, we now have multiple studies scanning participants' brains to understand exactly how various meditative practices impact neurological function in both the short and the long-term. A wealth of additional studies, have also been performed to determine meditation's impact on emotions, genes, and various diseases.

The evidence is now in. If you want to create a stronger and younger brain, control how you react to emotions, improve your ability to fight disease and prevent illness, science is telling us that meditation may be just what the doctor should order.

This article will examine the growing body of evidence regard they actual physical impact that meditation has been shown to have on the structures of the brain in both the short and long term. Science has now shown that in a relatively short period of time, a daily meditation practice can have a beneficial impact on the physical structure of the brain.

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Meditation and the Brain's Physical Structure

Brain imaging studies have shown that not only do meditating brains function differently during meditation but that the brain's physical structures actually change in terms of both blood flow and size. This research has revolutionized neurology. Once thought to be a piece of permanently hard-wired equipment, scientists now know that even in the elderly, the brain can actually change its wiring if exercised through a meditation regimen. This phenomenon is oftentimes referred to as brain "plasticity" and the overwhelming evidence is that meditation is one of the most effective ways to quickly improve brain function.

Bigger, Younger and Smarter Brain

In 2006, researchers from Harvard, MIT and Yale, led by Massachusetts General Hospital Neuroscientist, Dr. Sara Lazar studied meditators who had an average of nine years of meditation experience and spent approximately 40 minutes a day meditating[2]

What these researchers found was that those who engaged in long-term meditation practice had bigger and younger brains. Specifically, the brain regions associated with attention, sensation, emotion, sensory processing and the planning of complex cognitive behaviors were bigger in the meditation participants then in those who did not mediate.

Additionally, Dr. Lazar's team found that portions of the brain involved in functions such as memory, attention, perceptual awareness and language were the size of an average 20 to 30 year olds' brain in meditators between the ages of 40 to 50. This finding was critical given that these areas of the brain were known to thin with age. Therefore, the study concluded that certain portions of meditators' brains appeared approximately a decade younger then those who did not meditate. Those portions controlled such vital functions as memory and higher reasoning.

Even more encouraging, is research documenting that you do not have to spent 9 years or even 40 minutes a day meditating before you begin to see the positive neurological changes. Dr. Lazar's group has now performed a follow-up study to their original 2006 work.

In this 2010 study, Lazar followed participants though an 8-week meditation course where participants meditated an average of 27 minutes a day. Participants' brains were scanned two weeks before the study began and two weeks after the study ended. The study found increased gray-matter density in the brain's hippocampus, which is important for learning and memory and in other brain structures associated with self-learning, self-awareness, emotional

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[2] "Growing the Brain through Meditation", The Harvard Mahoney Neuroscience Institute Letter, Vol. 12, No. 3, Fall 2006. *See also*, "Meditation Associated With Increased Grey Matter in the Brain, Science Daily", November 11, 2005 and NeuroReport 17: 1893-1897 (November 28, 2005).

regulation, compassion, perspective and introspection such as the cerebellum and the brainstem.[3]

Decreased stress was also correlated with decreased gray-matter density in a portion of the brain known as the amygdala, which plays a key role in regulating anxiety, stress and anger and is often time referred to as the reptilian brain. The amygdala controls lower functions and is one of the oldest and therefore, less evolved portions of the brain.

This study concluded by noting that a in a relatively short period of time, a daily meditative practice could result in "enduring changes in the brain structure that could support improved mental functioning."[4]

Similarly, in a study conducted by the Wake Forest University School of Medicine and the University of North Carolina study participants were given just 4 days of meditation training, followed by a 20 minute daily meditation practice. The meditation participants achieved significantly higher cognitive test scores particularly in areas requiring sustained focus.[5]

Similar studies conducted at the University of Wisconsin have led researchers to conclude that "attention can be trained" through meditation "in a way that is not fundamentally different than how physical exercise changes the body."[6] In other words, meditation is a work out for your brain that allows it to be healthier, stronger and younger.

Altered Blood Flow to Critical Portions of the Brain

Scientists believe that one of the ways in which meditation strengthens the brain's structure is by redirecting the flow of blood to certain higher functioning areas of the brain. Dr. Andrew Newberg, is a radiologist at the University of Pennsylvania, who, since the late 1990's, has been extensively involved in studies regarding the brain. Newberg's team has discovered that long-term meditators have significantly different patterns of blood flow in areas of the brain that play an important role in attention, emotion and memory particularly the pre-frontal and middle frontal cortex.[7] From an evolutionary standpoint, the pre-frontal cortex is one of the most evolved and youngest portions of the brain controlling or influencing many higher functions.

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[3] Holzel, B.K. et. Al., Mindfulness Practice Leads to Increases in Regional Brain Gray Matter Density, Psychiatry Research: Neuroimaging, (2010), doi 10.1016/j.pscychresns.2010.08.006

[4] Id.

[5] "Brief Meditative Exercise Helps Cognition", Science Daily, April 19, 2010.

[6] "Brain Scans Show Meditation Changes Minds, Increases Attention,", University of Wisconsin Education News, June 25, 2007,

[7] Newberg, A.B., et al., "Cerebral Blood Flow Differences Between Long-Term Mediators and Non-Meditators", Consciousness and Cognition (2010), doi: 10.1016/j.concog.2010.05.003.

Summary

What scientists are proving is that the brain operates much like a computer in that, with the right exercise, it can be reprogrammed to operate more effectively and efficiently. Surprisingly, it also appears that the solution to upgrading your neurological program, a daily meditation practice, costs absolutely nothing and is without negative side effects.