**The scientific evidence supporting the benefits of daily meditation practice**

Meditators have long claimed that meditation has a profound, long term effect on cognitive and psychological functions however, scientists can now demonstrate the physiological changes in brain structure that occur, suggesting that the benefits of meditation are more than just transitory feelings of peace and relaxation.

Using techniques such as Positron Emission Tomography (PET), functional Magnetic Resonance Imaging (fMRI), regional Cerebral Blood Flow (rCBF) and electroencephalogram machines (EEG), it has been possible to monitor exactly which changes take place in the brain during meditation, and long-term changes to the brain’s structure. MRI imaging has shown that the amygdala’s grey matter, the gland associated with fear and aggression, is seen to shrink; leaving an overall increase in positive brain activity and decrease in negative, stressful activity.

The measurably thicker tissue in the left prefrontal cortex can reverse ageing and memory loss and promote wellbeing (study led by Sara Lazar of Harvard University 2005) whilst the brain’s neuroplasticity (the ability to form new neural pathways) means that regular practice can not only reverse destructive thought patterns but also physical damage to the brain through accident and stroke. Using chemical dye to show newly formed neurons proves that neurogenesis occurs until the point of death, meaning that new patterns can be created at any point in life. The areas associated with pain processing have also been demonstrated to reduce in activity.

Dr. Fred Travis, neuroscientist, used EEG on eight hundred patients over twenty years studying Transcendental Meditation and found that patterns have remained remarkably similar. During T.M. the Frontal lobes (Left and Right) change very quickly from high intensity beta waves (our normal alert conscious state) to alpha waves which are lower frequency and are associated with a relaxed, calm state. Further studies have also identified theta waves, very low-frequency brain waves associated with deep relaxation, creativity and imagination, to be present during deep meditation. These studies also demonstrate that this state remains after meditation has ended, confirming that lasting effects on our lives are produced. Gamma rays have also been detected in long term meditators and are associated with transcendence. These are different from delta waves, produced during deep sleep, indicating that meditation is a completely different process.

Physiological changes in the body have also been documented. Dr. Herbert Benson began studying what he called the ‘Relaxation Response’ in the 1970s and since then numerous medical studies have confirmed that regular meditation has helped or cured conditions such as asthma, bowel problems, auto-immune illnesses, rheumatoid arthritis and many others. It has also been demonstrated to improve the immune system, activate genes, improve cancer survival rates and reduce heart attacks.

One suggested cause is stress reduction. Hyperactivation of the Sympathetic Nervous System produces damaging stress hormones: adrenalins and cortisol. Since the 1960s the occurrence of heart attacks in younger men has significantly increased (around thirteen years earlier in each generation) as the levels of recorded stress have soared. The 1999 U.S. Senate report concluded that stress contributed to a host of medical conditions that current medical practice could not adequately treat. Regular meditation, however, reduces stress and increases production of hormones such as oxytocin which boost the immune system. A 2004 mindfulness study showed that as participants’ emotional and social functioning improved, so did their general health and vitality. Studies by Jon Kabat Zinn and others have also demonstrated the benefits to chronic conditions, showing significantly reduced pain and decreased drug use.

One suggested cause of stress is the constant stimulation of Beta waves, resulting from our modern lifestyle. An Fmri study at Emory University demonstrated that meditators were much better at ignoring the bombardment of stimuli whilst performing tasks, suggesting not only improved concentration but an ability to filter out unnecessary stress triggers.

MR images from the MGH Psychiatric Neuroimaging Research Program 2011 have not only found increased grey-matter density in the hippocampus, important for learning and memory, but in structures associated with self-awareness, compassion, and introspection. Amishi Jha, a University of Miami neuroscientist who investigates mindfulness-training’s effects on individuals in high-stress situations, says,

“These results shed light on the mechanisms of action of mindfulness-based training. They demonstrate that the first-person experience of stress can not only be reduced with an eight-week mindfulness training program but that this experiential change corresponds with structural changes in the amygdala, a finding that opens doors to many possibilities for further research on MBSR’s potential to protect against stress-related disorders, such as post-traumatic stress disorder.”

Importantly, this study also showed that all meditation methods produce the same results, supporting earlier studies by Benson which demonstrated that TM, Zen and Yoga all decrease oxygen consumption, respiratory rate, heart rate and blood pressure, whilst Alpha waves increased. These were conclusive results compared with other forms of relaxation which were inconclusive. There is now clear evidence that regular meditation brings measurable benefits.