More about... mind-body medicine

Mind matters: Etchings of a mental life

VICTORIA IVES-DELIPERI, ***MA (Psychology)***
PhD Candidate, University of Cape Town

In 1994 Nobel prize winner Francis Crick presented what he described as an astonishing hypothesis: 'You, your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will are, in fact, nothing more than the behaviour of a vast assembly of nerve cells and their associated molecules.'[1] But Crick's account of the mind-body relationship was less than astonishing, given that it was proposed in a scientific community largely dominated by reductionist thinking. What is astonishing is the growing body of neuroscientific evidence that has emerged in that same environment, suggesting that our mental activities exert a profound influence over the way our brains and bodies work – to the extent of sculpting our very physiology.

The mind-brain/body enigma dates back to antiquity but remains as topical a subject of study as ever, particularly in the neurosciences. Related research focuses on how mental activity emerges from a material brain and how the two entities, if separable at all, interrelate and exert a mutual influence over each other. Two recent developments have made important contributions to this inquiry, i.e. technology and the discovery of neuroplasticity in the adult brain.

Advances in brain imaging technology, most notably functional magnetic resonance imaging (fMRI) but also the more time-honoured positron emission tomography (PET), have made it possible to conduct investigations into the working brain for the first time. Simply, the study of the brain, and its mind, has never been better equipped. The second significant contribution to the study of mind over matter has been the discovery of neuroplasticity and, perhaps more impressively, directed neuroplasticity resulting from willed mental control. Neuroplasticity refers to alterations in the organisation of the brain resulting from experience once critical developmental periods have been reached – this reorganisation is made possible by a process called axonal sprouting whereby axons form new nerve endings and connect to alternative neurons.[2] Previously it was believed that the adult brain is hard wired or immutable to such adaptation. Over and above the obvious clinical implications of neuroplasticity, most importantly the potential for recovery of lost function after brain injury or disease, it provides strong evidence that mental activity indeed moulds the physical brain.

Research in the spotlight

The placebo effect stirs interest and controversy in the field of medical science, provoking the notion that the mind elicits change in the body. In a study investigating the neuroanatomy of the placebo effect, hospitalised men with unipolar depression were administered placebo as part of an inpatient imaging study of an antidepressant drug.[3] After a 6-week double-blind trial PET scans showed glucose metabolic increases in the same brain regions of patients receiving placebo as those receiving the antidepressant drugs. In other words, the mere belief that treatment was being administered brought about improvements in mental health but also associated neurophysiological alterations.

Fortunately, deception is not the only means of invoking such plasticity; intentional and directed mental activity has been shown to yield the same results. Again, research into depression detected altered brain activity – this time as a result of cognitive behavioural therapy (CBT) in which patients assume an active role in their treatment.[4] The study in question investigated the efficacy of CBT in treating major depression and found that self-reported improvements in affect were accompanied by the modulation of cortical-limbic pathways implicated in the condition. Equally impressive has been the discovery that directed mental activity brings about improved self-reported functioning in patients with obsessive compulsive disorder (OCD) as well as the moderation of the hyperactive neural structures involved in the pathology.[5] In a series of research studies conducted on OCD patients, a four-step attention strategy successfully redirected pathological OCD circuitry, as revealed by marked changes in the metabolic consumption of associated brain regions including the orbital frontal cortex, caudate nucleus and anterior cingulated gyrus.

These findings suggest that mental activity can indeed manipulate the working of the brain and alter its physiology to restore impaired functioning, but can mental activity optimise functioning in healthy people? To date research on meditation, as a learnt mental skill, has shown that the brains of experienced meditators differ significantly anatomically,[6] functionally[7] and electrophysiologically[8-10] from people with no experience in mental control techniques. Although it may be argued that these changes may be ascribed to individual differences, the same electrophysiological changes have been noted in response to mindfulness meditation training.[11] Interestingly, correlated improvements in immune function were also noted in the latter study. Research has also revealed alterations in heart rate variability (HRV) and respiration patterns associated with improved well-being during meditation practice.[10] These findings certainly provide support for the application of mental training in optimising mental and physical health.

Despite its brevity, this preview of prominent neuroscientific research regarding mind-brain/body interaction highlights findings that are motivating new scientific paradigms but also endorsing the basic tenet in the field of psychoneuroimmunology – that our thoughts and feelings impact significantly on our mental and physical functioning. An important direction for ongoing research is to establish exactly *how* the immaterial mind reshapes the physical brain and its body, a topical conundrum referred to as the binding problem and one very much under the scrutiny of neuroscience.

References

1. Francis C. *The Astonishing Hypothesis: The Scientific Search for the Soul.* New York: Touchstone Books/Simon & Schuster, 1994.
2. Carmichael T, Chesselet MF. Synchronous neuronal activity is a signal for axonal sprouting after cortical lesions in the adult. *J Neurosci* 2002; 22(14): 6062-6070.
3. Mayberg HS. The functional neuroanatomy of the placebo effect. *Am J Psychiatry* 2002; 159(11): 1830-1840.
4. Mayberg HS. Modulation of cortical-limbic pathways in major depression: treatment specific effects of cognitive behavioral therapy. *Arch Gen Psychiatry* 2004; 61: 34-41.
5. Schwartz JM. *The Mind and the Brain.* New York: Harper Collins Publishers, 2003.
6. Lazar SW, Kerr CE, Wasserman RH, *et al.* Meditation experience is associated with

increased cortical thickness. Neuroreport 2005; 16(17): 1893-1897.

7. Lou HC, Kjaer TW, Friberg L. A 150-H20 PET study of meditation and the resting state of normal consciousness. *Hum Brain Mapp* 1999; 7: 98-105.
8. Austin JH. *Zen and the Brain: Toward an Understanding of Meditation and Consciousness.* Cambridge: MIT Press, 1998.
9. Lutz A, Greischar LL, Rawlings NB, Ricard M, Davidson RJ. Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *Proc Natl Acad Sci USA* 2004; 101: 16369-16373.
10. Davidson RJ, Kabat-Zinn J, Scumacher J, *et al.* Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med* 2003; 65: 564-570.
11. Takahashi T, Murata T, Hamada T, *et al.* Changes in EEG and autonomic nervous activity during meditation and their association with personality traits. *Intern J Psychophysiol* 2005; 55: 199-207.

Guided imagery

LINDA FRIEDLAND, *MB BCh*
Consultant, Linda Friedland Consulting, Johannesburg

Having been shot in the neck during a hi-jacking, Elaine Lucy spent many months in the Milpark Hospital Trauma ICU. Despite extensive reconstructive surgery Elaine was told that she would never talk again or swallow independently. In an attempt to help her to cope with the trauma of the horrific ordeal, she was given a guided imagery tranquillity CD. From the outset Elaine listened to the programme daily, often many times per day, drawing immense hope and courage from the guided imagery process towards a complete recovery. Elaine speaks and swallows and has returned to a normal life. She maintains that the imagery CD was a most soothing and effective emotional tool.

To Gertrude Michaels the diagnosis of Hodgkin's lymphoma could have heralded a period of severe depression and anxiety. She received a copy of a guided imagery cancer CD almost immediately. The programme (CD) became a constant companion during the months of chemotherapy, helping Gertrude to relax during the treatment process. 'My CDs were a source of immense comfort,' recalls Gertrude. 'I listened to them every day, and believe that they contributed towards my recovery.'

'What more can I do, doctor? What can *I personally* do to improve my condition?' As medical professionals this question from our patients is often very difficult to address. Illness, especially cancer, is associated with feelings of helplessness and anxiety. Whether we are dealing with chronic pain, healthy pregnancies, depression or incurable cancer, we have a great responsibility to attend to the whole patient. In addition to support and counselling there are many modalities that our patients can use in conjunction with their mainstream medical care. Guided imagery (or visualisation) is one of these methods.

Given the fact that science has shown that there is a strong mind-body connection, it comes as no surprise that guided imagery has been very successful in enhancing overall health and wellness. Using the technique together with traditional medical practices may improve patient well-being and result in positive physical benefits.

When used in conjunction with traditional medical practices, guided imagery has been shown to improve physical and psychological outcomes. It helps patients regain a sense of control over their illness and become active in their healing. Numerous international research studies have documented benefits such as enhanced immune cell response, lowered blood pressure, decreased cholesterol and glucose levels, reduced depression and anxiety, fewer side-effects after chemotherapy, decreased pain, and improved quality of life.

Visualisation and imagery can influence one's body and biochemistry. These images actually stimulate the same brain centres as the 'real thing', which in turn send signals to the limbic system, the autonomic nervous system and the endocrine system. So, in short, one's thoughts can elicit a physical response.

In his book, *Head First: The Biology of Hope*, Norman Cousins, the great scholar and humanitarian, notes, '… the human mind converts ideas and expectations into biochemical realities. Our mind seems to hold within it a natural pharmacy, or healing system, which when evoked and called upon, can bring about changes in our physiology, biochemistry and immunology; helping us to heal physically and to calm ourselves emotionally.'[1]

By using guided imagery, one can take advantage of the powerful connection between the mind and body and play an active part in contributing to one's personal health and well-being. Guided imagery has also been shown to increase plasma levels of serotonin, which may abate feelings of depression, helplessness and pain. The pain pathways between one's body and brain may be diminished by this therapy. Even in studies with children, guided imagery has been shown to be a highly promising adjunctive therapy. For example, in children using guided imagery the incidence, severity and intensity of migraine headaches decreased significantly.[2]

At Columbia Presbyterian Medical Center in the USA researchers found that patients who used guided imagery techniques before undergoing first-time elective coronary bypass surgery were significantly more relaxed after surgery and needed less pain medication compared with the control group that did not use such relaxation techniques.[3] A similar study was conducted by Wits Business School Master's students in 2001, which revealed significantly reduced preoperative anxiety levels in patients undergoing elective cardiac bypass surgery with the use of a single guided imagery recording. Within the South African context the Soundhealth[4] guided imagery series has been tested and utilised for the past few years with great success, also within several oncology, surgical, cardiothoracic, and obstetric units. Guided imagery within the hospital environment has proved successful wherever it has been used, serving to transform the patient's experience from one of fear and anxiety to one of care and comfort.

In a clinical study at the Fred Hutchinson Cancer Research Center in the USA of patients receiving bone marrow transplants, guided imagery was shown to be an effective intervention against pain. Patients in the guided imagery group experienced less pain. Interesting to note is that the guided imagery group reported even less pain than those assigned to a therapist who was at their side to offer support during treatment.[5]

Some documented physical benefits of guided imagery include the following:

- Improved blood pressure control
- Enhanced immune response
- Decreased pain
- Reduced need for pain medication (post operatively)
- Accelerated post-operative recovery
- Improved wound healing
- Shorter hospital stay
- Fewer side-effects after chemotherapy and dialysis
- Improved fetal and maternal outcomes with reduced complications
- Minimised blood loss
- Enhanced breast milk production
- Decreased depression and anxiety.

References

1. Cousins N. *The Biology of Hope*. New York: Dutton, 1989.
2. Biofeedback training in paediatric headache. *Neurology* 2001; 56(1): 33.
3. *J Cardiovasc Surg* (Torino) 1997; 38: 69-75.
4. Friedland L, Bekker H. Soundhealth (series on guided imagery – CDs) (tgbooks@nashuabb.co.za).
5. Syrjala KL, Donaldson GW, Davis MW, Kippes ME, Carr JE. *Pain* 1995; 63(2): 189-198.

Mindfulness-based cognitive therapy for depression

MAURA KENNY, *MB ChB, MRCPsych, FRANZCP*

Head of Unit, Mood Disorder Program, Centre for the Treatment of Anxiety and Depression, Central Northern Adelaide Health Service, Australia

The term 'mindfulness' appears in a variety of recent psychological treatment modalities, which include dialectical behaviour therapy (DBT), acceptance and commitment therapy (ACT), mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT). Mindfulness-based approaches have been shown to be useful in a variety of physical and mental health conditions including chronic pain, cancer, psoriasis, eating disorders, anxiety and depression.[1] In this article I will briefly discuss why MBCT is used in the treatment of depression, how mindfulness meditation practices are integrated into this new treatment programme, and the results from clinical trials.

The fact that depression is often a chronic and relapsing condition with relapse rates as high as 50 - 80%, [2] raises awareness of the seriousness of the WHO projection that by 2020, depression will be the second largest burden of ill health worldwide.[3] The need for a treatment programme that will reduce relapse rates has never been clearer.

Cognitive behaviour therapy (CBT) already has a central place in the treatment and prevention of depression. CBT is an evidence-based short-term psychological therapy that deals with the content of negative thinking which causes or maintains depression. It helps individuals to challenge these thoughts and get them into perspective, at the same time teaching them behavioural strategies to overcome the cycle of inactivity that is a common feature of depression. Although CBT is as effective as antidepressants in the acute and relapse prevention stage, neither antidepressants nor CBT are 100% protective.[4,5] Many patients do not like the idea of being on long-term medication, especially if they have side-effects, plus individual CBT is often difficult to access in mainstream health settings.

MBCT was developed by Segal, Williams and Teasdale, who are all internationally recognised researchers in the field of cognitive processes in depression.[6] Their review of what is known about cognitive vulnerability factors for depressive relapse led them to explore the use of mindfulness practices in combination with CBT to see if this could enhance the protective power of CBT. One cognitive vulnerability factor is that of increased cognitive reactivity, which refers to the measurable tendency of previously depressed patients to fall back into negative thinking more readily when sad or stressed.[7] The other cognitive vulnerability factor is that of a ruminative thinking style.[8] Here attempts are made to solve a problem by repeatedly thinking about it. Such endless and circular thinking results in a loss of clarity and perspective, prevents skilful action being taken, and contributes to a deepening of depression.

Hence MBCT was designed to specifically target these two cognitive processes. Its format was modelled on the mindfulness-based stress reduction programme developed by Kabat-Zinn and colleagues at the University of Massachusetts Medical Centre,[9] and is offered in a class format to increase accessibility to effective relapse prevention. This treatment is taught in a series of eight 2-hour classes at weekly intervals and participants practise meditation for about 45 minutes daily, using CDs with specific instructions. There can be as many as 12 - 15 in an MBCT group.

Both MBSR and MBCT incorporate mindfulness training as a central component. Mindfulness meditation teaches people how to focus more on the present moment with full attention in a non-judgementally accepting way. Its application therefore, in recurrent depression, is to help individuals become more aware of their thoughts and feelings, and to disengage gently but deliberately from negative rumination if it arises, by bringing their awareness back to the here and now. At the same time participants are encouraged to cultivate a kind and accepting stance towards any difficulties they experience so that they are seen in perspective and with steadiness. The equanimity that ensues often prevents temporary negative mind and feeling states from cascading into a full depressive relapse. Basic CBT strategies are also taught as a way of encouraging more skilful responses to the emergence of any early warning signs of depression.

Two randomised control trials have demonstrated MBCT's efficacy in reducing relapse rates of depression at 12-month follow-up compared with treatment as usual, in those with three or more episodes. Patients who had two or less episodes were no different to controls.[10,11] It has also been used successfully in an open trial with treatment-resistant depression, where CBT and antidepressants have failed to bring about a full response.[12]

MBCT is a new group intervention which has been shown to make a significant impact on relapse rates of depression.

References

1. Baer RA. Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice* 2003; 10: 125-143.
2. Judd LJ. The clinical course of unipolar major depressive disorders. *Arch Gen Psychiatry* 1997; 54: 989-991.
3. Murray CL, Lopez AD. *The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability from Disease, Injuries and Risk Factors in 1990 and Projected to 2020.* Boston: Harvard University Press, 1998.
4. DeRubeis RJ, Hollon SD, Amsterdam JD, *et al.* Cognitive therapy vs. medications in the treatment of moderate to severe depression. *Arch Gen Psychiatry* 2005; 62: 409-416.
5. Hollon SD, DeRubeis RJ, Shelton RC, et al. Prevention of relapse following cognitive therapy vs. medications in moderate to severe depression. *Arch Gen Psychiatry* 2005; 62: 417-422.
6. Segal ZV, Williams JMG, Teasdale JD. *Mindfulness-based Cognitive Therapy for Depression – a New Approach to Preventing Relapse.* New York: Guilford Press, 2002.
7. Segal ZV, Gemar M, Williams S. Differential cognitive response to a mood challenge following successful cognitive therapy or pharmacotherapy for unipolar depression. *J Abnorm Psychol* 1999; 108: 3-10.
8. Nolen-Hoeksema S. The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *J Abnorm Psychol* 2000; 109: 504-511.
9. Kabat-Zinn J. *Full Catastrophe Living: The Program of the Stress Reduction Clinic at the University of Massachusetts Medical Center.* New York: Delta, 1990.
10. Teasdale JD, Segal ZV, Williams JMG, *et al.* Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *J Clin Consult Psychol* 2000; 68: 615-623.
11. Ma SH, Teasdale JD. Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *J Clin Consult Psychol* 2004; 72: 31-40.
12. Kenny MA, Williams JMG. Treatment-resistant depressed patients show a good response to mindfulness-based cognitive therapy. *Behav Res Ther* 2007; 45: 617-625.