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# MIND-BODY MEDICINE: SCIENCE, PRACTICE AND PHILOSOPHY©

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## Abstract

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Ancient approaches to health have been, in essence, holistic. Well-being, illness and healing were strongly connected to the mind, society, morality, spirituality and ecology. No part of our life and experience could be walled off from any other. In the 19<sup>th</sup> and 20<sup>th</sup> centuries, however, with the rise of reductionistic science and a generally more materialistic society, this holistic view has been replaced by a more mechanistic one. Most recently, with the rise of collaborative research and new fields of science such as mind-body medicine (MBM), there is gathering evidence that there was a practical wisdom in the ancient approach. Although the mechanisms which science attempts to elucidate now are infinitely complex than the ancients knew, the principles are extremely simple and, as such, they have enormous potential for successful integration into modern clinical practice. This uptake needs to be governed by sound clinical practice and the best available evidence.

MBM simply reminds us that psychological states like chronic stress, depression, anxiety and fear, along with our social context, produce profound effects upon the body and health. Psychological states and social context can also have an enormously positive influence. These effects manifest themselves on many different levels, from the superficial

experience of muscle tension to the subtleties of how our genes express themselves. Over time negative mental and emotional states take a heavy toll on the body and are a significant risk factor for many illnesses. Research suggests that many, but not all, psychosocial interventions can play an important part in ameliorating this effect. MBM has enormous scope and clinical potential but has been relatively slow to make its way into mainstream medical education and practice. This lack of general awareness may be the product of many things including a lack of access to information, bias against what does not fit current scientific paradigms, and lack of funding for things which are of lesser commercial potential. Ease of access to skills and information through medical literature and education will be important means for redressing some of this imbalance. Growing community interest and a need to foster approaches which provide superior cost-benefits are also likely to increase the uptake of MBM approaches.

This article will give a broad overview of the medical literature in the field of MBM, discuss some of the practical aspects of using a mindfulness meditation approach to stress management and raise some of the interesting associated philosophical and practical questions.

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## Introduction

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Any one piece of research data is only one piece of an enormous jigsaw puzzle and does not make a whole picture. It must be taken in context with other research and where discrepancies are found then attempts must be made to explain these. This paper will attempt to help bridge some apparent gaps and inconsistencies between different systems of thought and language. This paper cannot pretend to be definitive or exhaustive in its examination of MBM. The area is too vast to be covered in any one text. It will, however, give an overview of the main principles and highlight significant points with some key papers.

The father of Western medicine, Hippocrates, said that the ***“human being can only be understood as a whole”***, but what is the whole person? To the ancient Greeks, as with other ancient Eastern and Western healing systems, the whole person includes the physical body, mind, emotions and spirit or consciousness. As this individual was made of the same elements as the society and environment, so there was an implied continuity or inter-dependence between every level of the individual and the world. The physical body was viewed as the most superficial aspect of a person and was ‘moved’ or enlivened by the deeper layers of the self with consciousness being the primary substance of our being. The mind gave form and direction to the raw energy of consciousness. Thus, “the body is the shadow of the soul.” What effects one part our being will impact on all the others. This inter-relationship as defined by ancient healing systems is not dissimilar to the WHO definition of health.

***“A state of dynamic harmony between the body, mind and spirit of a person and the social and cultural influences which make up his or her environment.”***

Holism is an age-old concept, but much of what has dominated modern science and medical research has reflected an attitude of ‘reductionism’ and ‘materialism.’ This approach has often proved expensive, invasive and dehumanizing, and has shown only very limited success in

preventing and treating many common and chronic conditions. It is often perceived as attempting to deal with the manifestations of diseases but not with the causes of them. As a reaction many people are once again turning towards more traditional, complementary and/or integrative approaches to their health care to look for deeper causes, prevention and cures. The oft-cited search for a ‘holistic philosophy’ is a major reason as to why many people look for complementary healthcare.<sup>1</sup> Among ailments, anxiety and chronic pain are the most likely to predict a search for non-orthodox medicine.

With advances in medical research which attempt to ‘reconstruct’ the human being we are starting to appreciate just how profound the mind and consciousness are in determining health and ill-health. These effects take place through both physiology and behaviour. Acknowledging the role of the mind does not deny the important role of physical risk factors and treatments. Indeed, generally the best approach will be to use the best that conventional medicine has to offer, but to use it in a holistic context. Recognising, for example, that stress and emotion play a role in exacerbating asthma does not preclude or ignore the importance of pharmacological maintenance therapy, careful monitoring, and occasional emergency care. Indeed, conventional at its best combines the holistic approach. Many would call this ‘Integrative Medicine’. Integrative Medicine (IM) is a term used to describe an approach to healthcare which incorporates the best of evidence-based conventional medicine and complementary therapies with a further emphasis on lifestyle and holism (body, mind, society, spirit, environment). It is challenging for any single practitioner to be proficient in many modalities and so sometimes the IM approach will be delivered by a range of healthcare practitioners.

### **Mind vs. brain**

In discussion about MBM much debate arises about the distinction, if any, between mind and brain. In the mind-body view, mind is non-physical and is constituted by thought and emotion. The brain is the physical organ which

translates thought and emotion into biological, electrical or chemical activity and subsequently regulates all the other functions throughout the body. If someone says that an illness, pain, or stress is 'in the mind' they are correct, but from here it then expresses itself through the brain and thence the rest of the body.

Depression, for example, is a symptom which is experienced emotionally but which has a number of somatic effects through the interconnections with emotional and cognitive centres. Using brain scans one can show that the placebo response is biologically similar to that in people who do actually receive the active drug by mapping the regional metabolic changes in particular parts of the brain which modulate the pain response.<sup>2</sup> Such observations are difficult to explain if one takes the view that the cause of the recovery from depression is purely a chemical one. The recovery from depression associated with cognitive therapies uses different pathways and so observing individual responses to therapies may demonstrate "modality-specific effects with implications for understanding mechanisms underlying different treatment strategies."<sup>3 4</sup>

In a similar way, fMRIs or 'brain scans' indicate that giving a placebo to people who believe that it is an analgesic leads to an different cascade of neurochemical changes specific to analgesic pathways.<sup>5</sup> Interestingly, empathy, or experiencing another's pain, has been shown with fMRI to produce similar changes in brain activity as the loved one actually experiencing the pain so that in empathy one 'suffers' emotionally as one would if one experienced physical pain although the brain and body do not register physical pain. "Thus, a neural response ... activated in common for "self" and "other" conditions, suggests that the neural substrate for empathic experience does not involve the entire "pain matrix." We conclude that only that part of the pain network associated with its affective qualities, but not its sensory qualities, mediates empathy."<sup>6</sup> It seems that for a range of chronic pain syndromes there are changes in the brain which sensitise the brain to experiencing pain with relatively low level stimuli. Conditions where it is often difficult to demonstrate somatic disease include burnout, epidemic fatigue,

multiple chemical sensitivity, chronic musculoskeletal pain, chronic low back pain, chronic fatigue syndrome, and fibromyalgia.<sup>7</sup> Evidence suggest that 'neural loops' are literally sensitized and maintained by "sustained attention and arousal."<sup>8</sup> In other words, the person has become highly vigilant and reactive to pain messages. This may be part of the reason that attention regulation exercises, such as mindfulness, which also help to reduce reactivity may actually help to 'rewire' the brain in such a way as to minimize these effects.

There are undoubted physical sequelae of depression, stress and other psychological and emotional states. To change the chemistry and activity of the brain, for better or for worse, one must change thought and emotion, or at least, the thoughts and emotions we give our consciousness to. Thus we have the foundations of cognitive, behavioural and contemplative strategies.

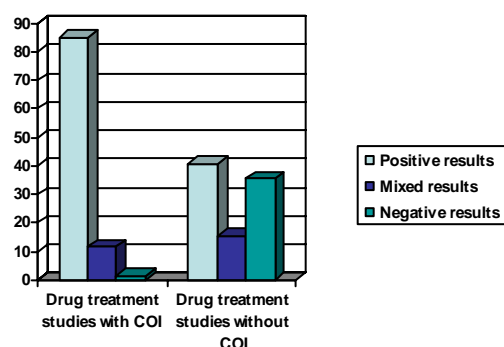
In the materialist view, mind and brain are the same. Mind, with all its thoughts and emotions, and even consciousness, bubble up out of the chemistry of the brain. In this view, to change thought and emotion you change the chemical constituents of the brain; thus we have a reliance on the pharmacological approach to psychological and emotional problems. Of course, the observation that somewhere between 60-80% of the clinical effect of antidepressants is placebo effect, depending on whether you analyse only published or include unpublished studies, tells us that the major part of what is happening in the brain is based on belief rather than chemicals.

The interest in MBM has spawned a number of new fields of scientific endeavour such as psychoneuroimmunology (PNI) and psycho-oncology and has renewed interest in the interface of medical science with metaphysics and philosophy. This shift in perspective, while offering great potential for effective and good quality health care, also challenges commonly held paradigms and rigid ways of thinking but an openness of mind must be balanced with sound research and clinical experience. Anyone who wishes to form an informed and considered point of view in the field of mind-body medicine should

not be too ready to accept any claims about the role of psychological factors on health unquestioningly. Nor should they be rejected without question.

***“You need to keep an open mind, but not so open that your brain falls out.”***  
**Prof. A. MacLennan**

Keeping an open mind but not letting our brains fall out is just as important when we consider the role and effectiveness of conventional medical treatments as it is when we consider mind-body and complementary approaches. It is apparent that research on drugs for example is very selectively published in order to create the appearance of benefit and downplay potential harms.



**Figure 1: findings from drug trials published in JAMA and NEJM where conflict of interest (COI) did or did not exist**

A recent review of drug trials in the two leading medical journal in the US was very sobering and confirmed what many had long suspected.<sup>9</sup> Drug trials performed through independent researchers and funding were far less likely to show positive results and 20 times more likely to report negative findings than drug trials

performed by researchers funded by pharmaceutical companies. Obviously market forces have a significant effect on what we have assumed was authentic research and makes a mockery of the 'evidence-based medicine' upon which clinicians are trying to make decisions. Obviously any balanced approach to healthcare would not reject the use of pharmaceuticals out of hand. Their use, based on independent research and rational prescribing practices, has a place in preventing and treating illness which cannot be denied. Unfortunately there is far too much promotion and use of pharmaceuticals with questionable evidence, marginal benefits and significant side-effects. Interestingly, drug adherence to beneficial drugs has a similar level of mortality benefit compared to placebo, whereas good adherence to 'harmful drug therapy' (those with significant side-effects) is associated with significantly higher mortality. This was illustrated in data from 21 studies (46,847 participants) including eight studies with placebo arms (19,633 participants).<sup>10</sup> Overall, good adherence to drug therapy was associated with a lower mortality (Odds Ratio 0.56; i.e. a 44% reduction in mortality) but this was a similar outcome to good adherence to placebo (OR 0.56). Good adherence to 'harmful drug therapy' was associated with an increased mortality (OR 2.90), meaning that active drug therapy increased mortality compared with placebo. The author's conclusion: "Good adherence to drug therapy is associated with positive health outcomes. Moreover, the observed association between good adherence to placebo and mortality supports the existence of the "healthy adherer" effect, whereby adherence to drug therapy may be a surrogate marker for overall healthy behaviour."

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## The Science

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### The cause and effects of stress

One cannot take stress lightly nor the label 'stress' at face value without exploring fully what a person means by it. 'Stress' is a commonly used term which covers a wide range of human experiences. Some describe it as a "perceived inability to cope", others as when "demands exceed means." We often use it to describe the physical effects of sympathetic nervous system (SNS) activity associated with anxiety or fear such as muscle tension, tremulousness, clamminess, rapid heart beat. These manifestations of the 'fight or flight response' can lead on to tiredness and many other stress-related symptoms associated with chronic stress. For some stress is a word also used to describe psychological, emotional and existential states like confusion, distractibility, forgetfulness, worry, fear, anger, frustration, aimlessness, despondency and depression. We often cycle through a variety of these states. Stress and depression are well known to be connected and western societies are observing similar increases in rates of depression and suicide. Accumulating evidence suggests that stress hormones may play a role in the development of psychiatric disorders<sup>11</sup> as well as the direct effects of stress on serotonergic pathways.<sup>12</sup> Serotonin is the main neurotransmitter in the brain implicated in depression and antidepressant medications largely seek to increase serotonin levels.

Chronic stress or the accumulation of a number of minor stresses is a contributor to, or direct cause of, many illnesses. On one level the fight or flight response is a natural, necessary and appropriate physiological response to an exceptional situation. For example, if one is about to be bitten by a snake, chased by a tiger or be run over by a truck then one may need to respond quickly to get out of the way. This 'fight or flight' response, based on a clearly perceived threat, is encoded into our physiology to *preserve life* by allowing the body to respond to dangerous situations. Such changes include:

- elevation of blood-pressure and heart rate,

- diversion of blood-flow to muscles and away from the gut,
- platelet adhesiveness (platelets becoming 'stickier' and thereby the blood being more ready to clot),
- short-term mobilisation of white-blood cells and as surge in white cell numbers,
- activation of inflammatory chemicals such as cytokines and interleukins,
- mobilisation of energy or glucose stores,
- perspiration and an increase in respiration and metabolic rate.

These changes associated with mobilization of energy and defending the body against damage and facilitating healing. They are to help the body cope with demands and potential injury. The response will be mobilized by whatever we perceive to be a threat. Strangely, seeing your GP coming at you to measure your blood pressure is enough to put your blood pressure up, enough in fact to cause up to one quarter of patients being diagnosed inappropriately with hypertension.<sup>13</sup> This is called 'white-coat hypertension'. When the situation is over the physiology would return to rest if the mind left the event in the past and moved on.

The appropriate activation of this response is not bad for the health so long as it is mobilized when it needs to be, is deactivated when it is no longer required and it is not prolonged. Unfortunately, the vast majority of occasions the fight or flight response is mobilized it is done so unnecessarily and even if we notice it we have lost the ability to switch it off. Much of this has to do with the imagination of future and past events. The word 'anxiety' comes from the Latin word 'anxius' meaning to anticipate some future event. The replaying of the event in the mind can reproduce the stress response even though the event is over. In the most extreme cases this replaying can lead to what is called 'post-traumatic stress disorder' where the memory, emotion and physiological response have become strongly wired into the system.

Chronic or long-term activation of the stress response, mediated through the sympathetic nervous system, leads to what is called 'allostatic load'.<sup>14</sup> It is like prolonged wear-and-tear on the body, much like a car being driven hard and which is having heavy demands placed upon it. The levels of allostatic load are high for both anxiety and depression. High allostatic load is associated with impaired immunity, acceleration of atherosclerosis, an increased incidence of type-2 diabetes and metabolic syndrome (type-2 diabetes, central obesity, hyperlipidemia, hypertension), bone demineralization or osteoporosis because of the chronically high cortisol levels and atrophy of nerve cells in the brain. This will be expanded upon in later sections.

These stress and inflammatory chemicals, like cytokines, have important effects on mood, behaviour and emotion as illustrated by a recent review article.<sup>15</sup> Administering cytokines to patients can produce symptoms of depression and also produce similar effects on the immune system as observed in many depressed patients. Furthermore, depression occurs more frequently in those with medical disorders associated with immune dysfunction. Activation of the immune system induces sickness behavior (apathy, lethargy, lack of motivation and appetite), which resembles depression. Some cytokines activate cerebral noradrenergic (related to 'adrenaline-like substances') and serotonergic systems (related to serotonin) in ways which are similar to that seen in depressed patients. One is therefore not surprised to see links between chronic anxiety and suicide. The presence of anxiety disorders are significantly associated with suicidal ideation (OR 2.32) and suicide attempts (OR 3.64).<sup>16</sup> In patients with a pre-existing mood disorder, the presence of an anxiety disorder increased the risk of suicidal behaviour 17-fold. The important thing to remember from a therapeutic perspective is that every step a patient takes towards reducing anxiety, improving their coping and wellbeing is a step away from this high suicide risk.

By any indicator, mental health in most developed countries is not heading in a positive direction in recent decades. "In spite of recent clinical and research

advances, an increased burden of mortality and morbidity related to stress and mental ill health can be noted, especially in European societies and populations undergoing stressful transitions and dramatic changes. A societal syndrome, consisting of depression, suicide, abuse, risk-taking and violent behaviour as well as vascular morbidity and mortality, can be observed."<sup>17</sup> Much research has gone into researching the effects of stress in recent years.<sup>18 19</sup> Whether real or perceived, evidence suggests that the stress of modern life is increasing at an alarming rate; 45% over the last 30 years in some surveys.<sup>20</sup> This could be explained by both increased awareness of stress and also more stressful, insecure and busy lives. The rapid increase in the amount of change socially as well as job insecurity, the speed of life, competitiveness and many other factors probably all contribute.

Currently depression "causes the largest amount of non-fatal burden, accounting for almost 12% of all total years lived with disability worldwide."<sup>21</sup> Predictions estimate that in Australia mental health issues, principally depression and anxiety, may be the major cause of morbidity within the next two decades.<sup>22</sup> This is independent of the secondary effects of stress – such as being an independent risk factor for heart disease – and associated co-morbidities – such as substance abuse. It certainly seems that we are seeing higher rates of depression occurring at younger ages. Suicidal ideation is alarmingly common in adolescents with some reports suggesting that 1 in 2 young people experiencing high levels of psychological stress and as many as 1 in 4 15-24 year-olds presenting to GP's for any reason experiencing recent suicidal thoughts.<sup>23</sup> Most of the adolescents did not present for psychological reasons.

Despite the fact that there is no evidence to support the use of anti-depressant medications in children and adolescents, they are widely used. Depression is being diagnosed, and pharmacologically treated, in younger age groups but serious concerns about this approach have been raised in recent major reviews.<sup>24 25</sup> Part of the overuse may be market-driven. The efficacy of many antidepressants in childhood depression may have been

exaggerated and the benefit from drugs is of doubtful clinical significance. Furthermore, adverse effects have been downplayed. Significant question about the use and research-base of these drugs have been raised. Thankfully, attention is starting to go into the social causes of stress and also fostering protective factors and resilience through education and community programs.

The causes of declining adolescent mental health will no doubt depend on a wide range of factors including physical inactivity, poor nutrition, substance abuse and many social influences. Popular culture and pleasure-seeking behaviour may also be factors. It has been a widespread opinion that adolescents "self-medicate" depression with substance use and sexual behaviors but a recent study tested whether substance use and sexual behavior precede and predict depression or vice versa. The National Longitudinal Study of Adolescent Health<sup>26</sup>, a sample of 13,491 young people from grades 7 to 11, in fact found that "Sex and drug behavior predicted an increased likelihood of depression, but depression did not predict behavior." Among girls, both experimental and high-risk behavior patterns predicted depression but among boys, only high-risk behavior patterns increased the odds of later depression. Depression decreased the odds of high-risk behavior among girls abstaining from substance use (RR=0.14) and increased the odds of high-risk behavior (RR=2.68) among girls already experimenting with substance use. Their conclusion: "Engaging in sex and drug behaviors places adolescents, and especially girls, at risk for future depression."

These findings are emphasized with other studies. A school and community-based study of 19 year olds living in Scotland<sup>27</sup> measured the lifetime prevalence of self harm and attempted suicide and the association with Goth subculture. Identification as belonging to Goth subculture strongly associated with prevalence of self harm (53%) and attempted suicide (47%) in a 'dose-response relationship'. Their conclusion: "Both selection and modelling mechanisms are involved, selection mechanisms possibly being more likely", meaning that people with these dispositions are drawn to that form of

culture and environment. Music can also have effects upon not only mood but also behaviour.<sup>28</sup> "Exposure to non-degrading sexual content was unrelated to changes in participants' sexual behavior." Music with degrading sexual lyrics related to advances in a range of sexual activities but this did not hold for other sexual lyrics. Their conclusion: "Cultural messages about expected sexual behavior among males and females may underlie the effect. Reducing the amount of degrading sexual content in popular music or reducing young people's exposure to music with this type of content could help delay the onset of sexual behavior."

It seems a natural and ubiquitous thing that human beings pursue happiness, but there are no doubt differing ideas of what happiness is and how to attain it. The monk who meditates in the cave and chastises his desires is pursuing it every bit as much as the extreme sportsman, or the stockbroker, or the drug addict who is putting a needle in their arm. Each, according to their understanding, pursues it. If these approaches could be broadly categorised, there are those, like the monk, who wish to transcend attachment to worldliness and pleasure and pain, and there are those who pursue happiness through materialism and by avidly attempting to maximise pleasure and minimise pain. Differing pathways in the brain accord with these differing approaches. Dopamine is a neurotransmitter having multiple actions at each level of the mesocorticolimbic reward pathway, i.e. it is associated with the ability to experience pleasure and motivation.<sup>29</sup>

Most people experience pleasure and pain in daily life without being unduly moved by the one or repelled by the other, but increasingly there are messages and stimuli which encourage people to seek pleasure as an end in itself. Part of this is no doubt linked to the marketing of products and an increasingly prevalent assumption that happiness and pleasure are the same thing. The problem with pleasure-seeking behaviours, which are associated with various addictions including to drugs, gambling and sex, is that it requires increasingly intense and more frequent stimuli to produce the same response. This seems to 'tire' the system over time. What begins as a lunge into



pleasure becomes a retreat from the pain and anxiety associated with withdrawal. Dysfunction of the dopamine transmission in the reward circuit is associated with symptoms such as anhedonia (inability to experience pleasure), apathy and dysphoria (disturbed mood). It is found in various neuropsychiatric disorders, including Parkinson's disease, depression and drug addiction. Stress early in the upbringing can affect dopamine pathways for life.<sup>30</sup> This has implications for greater impulsivity and reactivity. The number and type of stimuli which young and developing brains are subjected today through some aspects of popular culture may go some way to explaining the rise in mental illness and addictive behaviours. For example, a large survey of US adolescents<sup>31</sup> estimated that exposure to smoking in movies strongly affects the risk of taking up smoking. High exposure to smoking in movies nearly tripled the chance of experimenting with smoking. "Limiting exposure of young adolescents to movie smoking could have important public health implications."

Increased dopamine release in the brain during the relaxation response, on the other hand, is associated with the experience of reduced readiness for action or reactivity.<sup>32</sup> This may have something to do with the development of emotional and impulse regulation, and may help to explain why people who cultivate the relaxation response regularly find it easier to make healthy lifestyle change as a result and why strategies such as mindfulness training may be helpful in treating eating disorders.

Mood, neurochemistry and behaviour are all intertwined. Mood can affect behaviour. Major depression, for example, triples the risk of progression to daily smoking<sup>33</sup> but a history of daily smoking nearly doubles the risk of major depression. In adolescents, experimental smokers had 29 times the risk of taking up daily smoking.<sup>34</sup> Depression, anxiety and peer smoking strongly predicted the risk of experimental smoking, but further, the presence of depression and/or anxiety predicted increased risk only in presence of peer smoking, that is, depression and anxiety increase susceptibility to peer influence to take up risk-taking behaviour. Building resilience and emotional intelligence may therefore have a number

of benefits including an ability to avoid unhealthy behaviours. In terms of being able to give up addictive behaviours, such as smoking cessation, such attempts tend to be associated with high levels of depression during smoking cessation, and depression is often associated with relapse.<sup>35</sup> This goes part way to explaining why cognitive behavioural therapy and anti-depressants both reduce relapse rates for smokers.<sup>36 37</sup>

### **Stress and perception**

***"There is nothing either good or bad but thinking makes it so." William Shakespeare***

***"The optimist proclaims that we live in the best of all possible worlds; and the pessimist fears this is true." James Cabell***

***"An optimist sees an opportunity in every calamity; a pessimist sees a calamity in every opportunity." Winston Churchill***

***"Man is not disturbed by events but by the view he takes of them." Epictetus***

The mind has the key role in eliciting the stress response through its functions of perception, cognition, interpretation, and conditioning. Learned patterns of coping and personality styles are possibly more important than a situation itself and so one can readily see how important techniques such as meditation, relaxation, cognitive-behaviour therapy (CBT), rational-emotive therapy (RET) are in helping to reverse the effects of this inappropriate stress by attacking it at its cause; thought. Reviews of the literature suggest that cognitive and relaxation based forms of stress management in general practice seem to be most effective and that working in groups seems to potentiate therapy.<sup>38</sup>

So although a level of stress can be associated with motivation, and although the 'fight or flight' response can be entirely necessary in extreme situations, the vast majority of stress experienced in daily life is not appropriate or helpful. The unnecessary and excessive switching on of the stress-response, which we might call inappropriate stress, though common, is not healthy nor does it help us to cope with demands. In fact it does quite the

opposite. Here the mind is agitated and unfocussed. One can, and usually does, become overwhelmed with imaginings, projections and anticipation which are given a reality they do not deserve. Rather than a highly conscious and aware state this is the opposite. Examples might include projecting fears into the future about exams or interviews, catastrophising about upcoming events and habitually recreating past anxieties and conflicts. Here the stressors are in the mind, not in reality. The body, however, will faithfully reproduce the stress response until it is told to stop regardless of whether the stressor is real or imagined. If one imagines a rope to be a snake the body will react to the perception, not the reality. Even events which are actually happening may or may not cause stress depending on what the mind thinks about them. Events are just events unless our thinking interprets them as stressful and threatening.

If the stress-response is severe or prolonged enough it negatively affects health, lifestyle, relationships and behaviour as we shall later see. As such it places responsibility on the individual for their own health by empowering them to understand themselves better and take charge of these responses. Any response to stress which merely apportions blame to environment will be of very limited success as it ignores the most important element in the process, the person responding to the environment. This, of course, does not preclude the fact that a more conscious and focused response to an event may be exactly what is required. If there really is a snake in the vicinity then it may need evasive action. Furthermore, one must be careful that in the acknowledgement of the role of the individual in generating their own stress and illness as a result it is important to not encourage a process of self-blame. Responsibility is much more about fostering a healthy 'ability to respond' than it is about blame or recrimination.

### **Gender and the stress response**

A very interesting review article seemed to provide a new perspective<sup>39</sup> on the stress response not often acknowledged. This review article pointed out that much of the early research on the stress response focused on men. Hence the fight-or-flight response, which is largely a male

response, has become the predominant paradigm. But there is good evidence to suggest that women do not respond to stressful situations in entirely the same way, emotionally, socially, behaviourally or physiologically. The article said, "We suggest that the female stress response of tending to offspring and affiliating with a social group is facilitated by the process of 'befriending', which is the creation of networks of associations that provide resources and protection for the female and her offspring under conditions of stress."

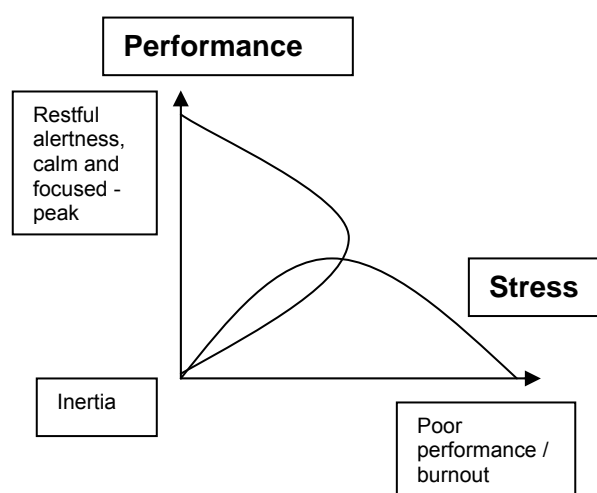
Both males and females have the necessary mechanisms for activation of the fight-or-flight response if required, but it seems that men are especially built for this response especially because of the presence of testosterone.<sup>40</sup> Testosterone also seems to have a role in the development of 'rough and tumble play' and sport for boys. This is a part of normal development, but excessive testosterone levels are implicated in excessive physical aggression and crime. Female aggression, on the other hand, is more 'cerebral', i.e. it seems more likely to express itself "in the form of gossip, rumour spreading and enlisting the cooperation of a third party in undermining an acquaintance."<sup>41</sup> In terms of the more general response to stress, however, Taylor et al suggested that as the female of most species is involved in tending the young that they have the biological or behavioural disposition to 'tend-and-befriend'. These effects are largely mediated through female hormones like oxytocin and oestrogen<sup>42</sup> which are particularly active in periods like breast-feeding as well as in social interaction and caring physical contact. They seem to have a calming or settling effect on stress as well as being an 'antidote' for the fight-or-flight response.<sup>43</sup> Oxytocin levels can be influenced by many things as one would expect. For example, they can be increased by a relaxation massage or close relationships and reduced by sad emotions or social isolation. This might be part of the explanation behind interesting clinical studies demonstrating things like massage and maternal handling improving the survival of pre-term infants.<sup>44</sup> Of course none of this suggests that men can't tend and befriend nor that women can't elicit the fight or flight when required, but it does suggest that each gender is

more or less adapted for one or other response which, taken together, is an example of the complementarity of nature.

### Stress and performance

Stress can be a motivator to enhance performance and this is one reason why many people value stress. Inertia or procrastination are, initially at least, low stress states. No stress and no performance. As stress increases however, perhaps before an exam or some other deadline, there tends to be an increase in performance. If the stress is not too high or prolonged then all is well. If the stress is too high, or the demands on performance escalate, and stress is the only motivator being used to drive performance, then we may find that despite high stress and energy consumption we perform less and less well. If this is prolonged then we will soon burnout. This relationship is illustrated in figure 1.

There is another possibility and all of us will have had experience of it at those times when we were functioning at our peak. Athletes would call it being in the zone. Increasing focus through attention regulation has two significant effects. Firstly, because attention is being less drawn to fears, ruminations and concerns, there is a reduction in stress. A person feels inwardly calm. Secondly, because of this 'effortless concentration' or 'restful alertness' they are alert and responsive to the situation they are in. The person feels undistracted. This is associated with high level and sustainable performance.



Stress-performance curve

Unfortunately, burnout is not uncommon. A study on medical students and interns in New South Wales found that in mid-final year 28% of participants met study criteria for burnout. During internship however there was a steady increase in point prevalence of burnout, to a peak prevalence of 75% at 8 months into the intern year. Seventy-three percent of interns met criteria for psychiatric morbidity – and anxiety disorder or depression – on at least one occasion.<sup>45</sup> For this reason some, albeit few, medical schools are starting to introduce self-care programs into medical education to bring about healthy change and resilience for later careers.

Increasingly we live in a busier and faster world. Some have suggested a newly recognized neurological phenomenon: attention deficit trait (ADT).<sup>46</sup> It is a response to hyperkinetic environment. In trying to deal with too much input a person tends to soon become increasingly reactive and adopts 'black-and-white thinking', as well as difficulty staying organized, setting priorities, and managing time. A person often feels a constant low level of panic and guilt. This can be well managed with learning to regulate attention, lifestyle maintenance, changing the environment to be less frenetic and learning how to switch off.

Biggs developed a model describing the types of approaches people have to learning.<sup>47</sup> There are three categories: surface learning, achievement learning and deep learning. Deep learners are driven by interest, not stress. They integrate what they learn and tend to enjoy it far more. Interesting relationships exist between stress and performance in these categories. There was a positive correlation between anxiety and performance for students whose motivation was achievement or failure avoidance (*surface*), i.e. they need stress to drive performance. On the other hand, students who adopted mastery goals (*deep*) did not show a correlation between anxiety and performance, that is, they did not have to be anxious to do well. Students who tend to perform at the level of first or second class honours all used deep approaches, while third class honours students tended to use surface approaches.<sup>48</sup>

### **Mapping mind and brain**

It is beyond the scope of this article to review the vast and rapidly expanding field of neurosciences which seems to be giving us plausible ways of understanding mind-body communication in biological terms but some general comments might be useful. This topic will also be considered in a philosophical perspective in the later section on the philosophical issues.

The materialistic view of the mind, psyche or soul has a long history. Attempts to find the seat of the soul in the brain date back to ancient Egypt and can be traced through ancient Greece right up to the modern day. Today, with the rise of the neurosciences, brain scanning techniques and genetics, we are discovering biological correlates for all psychological phenomena. Even spiritual experiences are being examined, described and demystified. For some this is seen as a direct challenge to metaphysical explanations of the human condition and for others it is a fascinating elucidation of the details underpinning the metaphysical view.

***“Cartesian dualism was dominant for centuries and still infiltrates our thinking today. But there were always scientists who held that mind and brain function were one and the same, and during the nineteenth and early twentieth centuries many of them worked feverishly hard to produce coherent brain maps.”***<sup>49</sup>

On this view, awareness can be traced to activity in the brain's reticular formation, emotions to the limbic system, stress to the Hypothalamic Pituitary Adrenal (HPA) axis, mysticism to the temporal lobe etc. A material view of existence might conclude that the causes of psychological phenomena are chemical and electrical, and the effects of these chemical reactions are thought, emotion and even consciousness. Thus the cause of depression or anxiety is often described to patients as a chemical imbalance in the brain which therefore largely needs a chemical solution, principally antidepressants and sedatives.

From the early twentieth century the brain began to be mapped to specific functions and this early work led to some naïve and

simplistic approaches to treating mental illness and behavioural problems. It was by the 1940s when this information began to be used in 'therapeutic' settings with the rise of frontal lobotomy.<sup>50</sup> Psychosurgical techniques have understandably been relegated to history although other physical techniques like Electro-Convulsive Therapy (ECT) remain in use and newer techniques like Transcranial Magnetic Stimulation (TMS) are being developed. The mainstay of the modern approach to mental illness since the 1960's are pharmaceutical therapies.

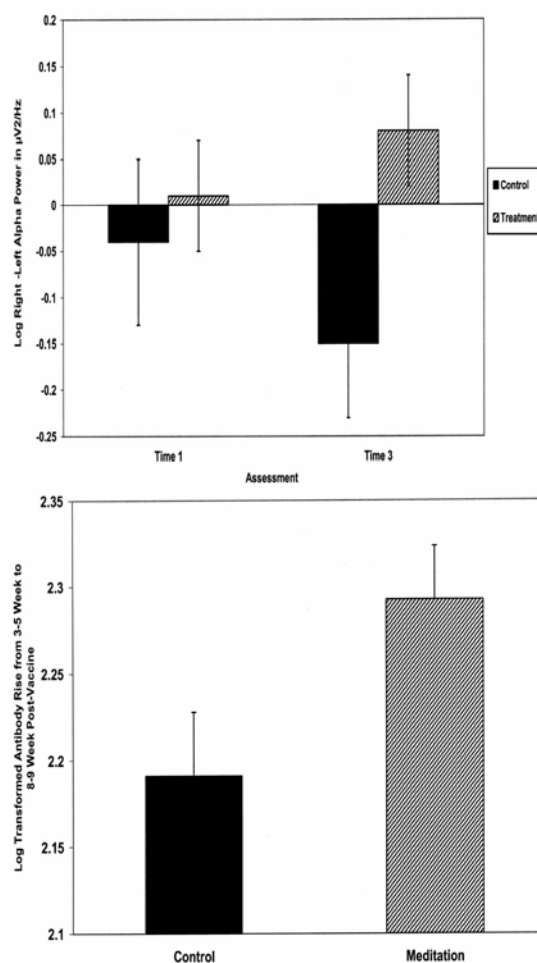
With the rise of the neurosciences, many long-held myths about the brain and CNS are being challenged. It has long been held that after initial development the CNS changes very little for the rest of the life, but it seems that it is subject to major modification in response to experience, memory, attention and emotion. The adaptability of the CNS is exemplified by recent experiments examining the effects of stress on the animal brain.<sup>51</sup> It has been found that by stressing an animal, chemicals such as tissue-plasminogen activator (tPA) were crucial in the remodeling the brain's anatomy, particularly the part of the brain called the amygdala which is associated with emotions and anxiety states. This 'rewiring' was reversed if the animal was allowed to return to a stress-free environment again. Such modeling and remodeling are likely to be more responsive in younger than older animals and has significant implications for the long-term development of anxiety and depression. Memory of emotionally traumatic events with a high level of reactivity seems to reinforce this wiring and may play a significant part in post-traumatic-stress-disorder.

Allostatic load has been previously mentioned. There are a number of changes in the brain associated with high allostatic load. The brain, being a malleable and changing organ, biochemically and structurally, is very responsive to various stress hormones. The hippocampal formation, important for learning and memory and learning, is affected detrimentally with cell loss or atrophy. It is vulnerable to the effects of stress and trauma. The prefrontal cortex plays role in working memory, executive function like reasoning, and extinction of

learning. It too is detrimentally affected. The amygdala on the other hand, mediates the physiological and behavioral fear response. Neurons in the amygdala show a growth response because they are being stimulated so often. Other parts of the brain have also been shown to be involved in the stress and fear responses. "Our results provide neuro-imaging evidence that psychological stress induces negative emotion and vigilance and that the ventral Right Prefrontal Cortex plays a key role in the central stress response."<sup>52</sup> This indicates that the higher centres of the brain can play an important role in modulating the response.

Brain scans show that anticipation as well as physical events have significant effects. Thoughts of eating of chocolate, for example, will most definitely 'light up' parts of the brain associated with rewards and pleasure.<sup>53</sup> Some parts of the brain light up with rewards, others with addictions, and others with punishment. Because of these correlates there are likely to be potential forms of therapy for treating conditions such as gambling addiction by targeting these biochemical reactions.<sup>54</sup> How one can change the biological correlates of these conditioned behaviours and addictions with behavioural therapies is not yet fully known.

More peaceful states of mind, such as those induced by meditation, are associated with increased levels of activity in the brain, specifically the left frontal lobe, associated with better mood and also improved immunity.<sup>55</sup> This was demonstrated in a trial on the effects on brain and immune function of an 8-week program in mindfulness-based stress reduction. At the end of the 8-week period, subjects in both groups were vaccinated with influenza vaccine. Among meditators significant increases in left-sided anterior (prefrontal) activation (associated with positive mood) were found which also correlated with a significant increase in antibody titers to influenza vaccine. Although this will topic will be explored in far greater detail in the section on psychoneuroimmunology, it demonstrates the interconnectedness of psychology, brain and immunity and also shows that there is much a person can do to enhance their own health.



**Figure 2: Effects on brain symmetry and antibody response comparing meditators and non-meditators. (from Davidson et al.)**

Religious experience is among the hardest fields of psychology and sociology to study because it is so hard to define, isolate and measure. Can it simply be reduced to chemical and electrical changes in the brain? There has been the identification of biological and neural correlates of spiritual experiences and to an extent they have been artificially induced through drugs or electrical stimulation. "During religious recitation, self-identified religious subjects activated a frontal-parietal circuit, composed of the dorsolateral prefrontal, dorsomedial frontal and medial parietal cortex."<sup>56</sup> Activity in temporal lobes of the brain is also associated with a number of religious and psychological phenomena including blurring of interpersonal boundaries.<sup>57</sup> Whether the biological changes are caused by psychological or spiritual phenomena or the effect of them is a source of ongoing debate.

Recent studies are linking the practice of meditation to specific changes in brain activity. fMRI identified significant signal increases were observed “in the dorsolateral prefrontal and parietal cortices, hippocampus/parahippocampus, temporal lobe, pregenual anterior cingulate cortex, striatum, and pre- and post-central gyri during meditation,” indicating that meditation activates neural structures involved in attention and control of the autonomic nervous system.<sup>58</sup> Such changes also correlated to improvements in mood. So is intention and attention merely a chemical state or is the chemical state being driven by intention and attention.

Even more interesting are the studies starting to show that long term meditation has effects on brain structure and slowing of age-related degeneration.<sup>59</sup> MRI was used to assess the cortical thickness of the brain in 20 long-term mindfulness meditators. Brain regions associated with attention, interoception and sensory processing were significantly thicker in meditators than matched controls, including in the prefrontal cortex which is associated with higher level functions. Meditation “might offset age-related cortical thinning” and provide “evidence for ... cortical plasticity”. These effects are probably a result of down-regulation of the various stress hormones or allostatic load implicated in acceleration of ageing.

Other behaviours can have other affects on the brain. For example, there is an increased bilateral activation in prefrontal cortex when normal individuals lie.<sup>60</sup> A study assessed with MRI whether deceitful individuals who pathologically lie, cheat and deceive show structural abnormalities in prefrontal grey and white matter volume compared with normal and antisocial controls. Liars show 22-26% increase in prefrontal white matter and 36-42% reduction in prefrontal grey/white ratios c/w both antisocial controls and normal controls suggesting that a chronic behaviour such as this gets hardwired into the brain making it less and less easy to recognize or change.

Again, interpretation of mind-mapping techniques depends on how one views the relationship between mind and body. The mind-body way of viewing things is to see that the physical events are not the cause but rather the effect of what goes on in the

mind. The causes being in the mind does not preclude the effects being biochemical but it does mean that the remedies are in the mind. But even if the causes are mental that does not necessarily mean that one can readily change physical conditions, at least in the short term, purely by thought. Our mental state may influence the speed of wound healing but we cannot necessarily wish the wound away. We may have considerable influence on our neurochemistry but that does not mean that medications may not be indicated and necessary for a significant mental illness. That having been said, we do not yet fully know the potential for the body's ability to heal itself with the mind.

### **The placebo response**

The placebo response was one of the first fields of mind-body medicine to attract attention. It refers to where a clinically significant effect is derived from the use of an inert substance or intervention and, in terms of drug trials, has long been the bane of the researcher's life. It is hard to explain, confounds the ability to determine the effectiveness of medications and can also produce unwanted ‘side-effects’ sometimes called the ‘nocebo’ effect. Harnessing its clinical potential raises ethical issues and demystifying it has the potential to remove perhaps the major part of the clinical response for many treatments. Phenomena which seem to be most responsive to the placebo effect seem to be the ones most susceptible to emotion, perception and interpretation, such as mood and pain perception.

Depending on whether one reviews only published data or also includes unpublished data, the level of placebo effect of anti-depressants can vary from 60% to 80%. It is interesting to note that using brain scans one can show that the placebo response is biologically similar to that in people who do actually receive the active compound. In each case it involves regional metabolic increases in the prefrontal, anterior cingulate, premotor, parietal, posterior insula, and posterior cingulate and metabolic decreases in the subgenual cingulate, parahippocampus, and thalamus.<sup>61</sup> Interestingly, the recovery of depression associated with cognitive therapies uses different pathways, being associated with significant metabolic changes via

increases in hippocampus and dorsal cingulate area and decreases in dorsal, ventral and medial frontal cortex. Observing individual responses to therapies may demonstrate "modality-specific effects with implications for understanding mechanisms underlying different treatment strategies."<sup>62 63</sup> Such observations are difficult to explain if one takes the view that the cause of the recovery from depression is purely a chemical one. In the case of placebo the change occurs in response to belief and this seems to lead to corresponding physiological and neurochemical changes.

Giving the same placebo to people who believe that it is an analgesic leads to an entirely different cascade of neurochemical changes specific to analgesic pathways. Functional magnetic resonance imaging (fMRI) experiments have demonstrated that placebo analgesia was related to "decreased brain activity in pain-sensitive brain regions, including the thalamus, insula, and anterior cingulate cortex, and was associated with increased activity during anticipation of pain in the prefrontal cortex, providing evidence that placebos alter the experience of pain."<sup>64</sup> Attempts to explain such phenomena would have to revolve around belief being wired into the brain and thus being able to stimulate physiological conditioned responses according to past experience and expectation.

Rarely are surgical techniques subjected to placebo controlled trials but when they are the results are interesting. For example, a trial on arthroscopic surgery found, "the outcomes after arthroscopic lavage or arthroscopic debridement were no better than those after a placebo procedure."<sup>65</sup> The mechanism for response may well follow similar pathways to analgesia referred to later. Very few surgical procedures have ever been subjected to placebo controlled trials.

### **The experience of pain**

The experience of pain is 'holistic' in the sense that every part of our mental, emotional and physical makeup can be affected by it. It is not localizable to any one center of the brain but is dependant on the interaction of many centers which register and modify pain signals. They include the ones involved with attention, mood, emotion, fear and cognition.

Empathy, or experiencing another's pain, has been shown with fMRI to produce similar changes in brain activity as the loved one actually experiencing the pain. "Thus, a neural response ... activated in common for "self" and "other" conditions, suggests that the neural substrate for empathic experience does not involve the entire "pain matrix." We conclude that only that part of the pain network associated with its affective qualities, but not its sensory qualities, mediates empathy."<sup>66</sup>

It may be that stress not only affects pain perception but also the chemistry of the nerve endings and pain pathways. Chronic pain syndromes are understandably very common in individuals with low coping and high levels of helplessness and hopelessness. Conditions where it is often difficult to demonstrate somatic disease include burnout, epidemic fatigue, multiple chemical sensitivity, chronic musculoskeletal pain, chronic low back pain, chronic fatigue syndrome, and fibromyalgia. Evidence from a series of studies suggest that neural loops are literally sensitized and maintained by "sustained attention and arousal."<sup>67 68</sup> Thus, practices like mindfulness meditation, which reduce arousal and reactivity and help to gently shift the focus of attention, have excellent long-term effects in the management of chronic pain.<sup>69</sup> Other chronic pain conditions, such as irritable bowel, seem to be responsive to a range of mind-body interventions such as hypnosis. In a study<sup>70</sup> it was found that 71% of patients initially responded to therapy and of these, 81% maintained their improvement over time with subsequent improvements in quality of life and anxiety or depression scores and a reduction in consultation rates and medication use. These benefits were still demonstrable after 5 years.

### **The effects of stress reduction**

The effects of psychological stress on the body involve every system. For example, there are effects on cardiac risk factors such as increased blood pressure and heart rate, increased cholesterol, and addictive behaviours including smoking. Other important effects are on the immune function (see section on PNI) and a slowing wound healing<sup>71 72</sup> and alterations in genetic function, damage and repair

(see section on genetic expression). The implications of this research, although it is early days, are enormous. Psychosocial factors must, of course, be taken in context with other well accepted lifestyle factors such as smoking and diet.

The relaxation response, on the other hand, helps to undo the harmful effects of this inappropriate stress. It can be fostered in a variety of ways and incorporates a deeply relaxed physical condition and a focussed, clear and alert mental state. This combined state of body and mind is sometimes called 'restful alertness' or 'active calmness' because it is highly potent in terms of effective action and yet the actor feels inwardly calm.

Some of the reversible physical and psychological effects of stress are presented in tables 1 & 2 and are summarised in a number of books.<sup>73 74 75</sup>

Overall the move is towards restoring a natural balance. This move towards balance, harmony, efficiency and health of the body is natural and will take place automatically if it is allowed, just as the mind will return to happiness and contentment if it is allowed. The return to balance and harmony is not an induction of some artificial state but rather a return to a natural state through the removal of impediments. Impediments take the form of the anxiety and depression-producing thought patterns which have become entrenched in the thinking (see the later section on mindfulness). Such thought patterns are 'toxic' for the mind every bit as much as some things can be toxic for the body. Relaxation is what lies beneath the cover of thought and emotion, so it is, in a manner of speaking, a process of self 'discovery'.

### Physiological benefits of relaxation and stress reduction

- marked decrease in oxygen consumption and metabolic rate well below that achieved in sleep, decrease in respiration rate and minute ventilation associated with greater efficiency and economy, and a lowering of catechol receptor sensitivity.<sup>76 77 78</sup>
- reduction in blood pressure and heart rate.<sup>79</sup>
- reduction in serum cholesterol<sup>80</sup>, more than would be accounted for by diet alone, sharp increase in skin resistance (low skin resistance is an accurate marker of stress responses), decrease in blood lactate, associated with anaerobic metabolism which is high in stressful situations<sup>81</sup>.
- changes in EEG patterns associated with the state of restful alertness including an increase in alpha and theta waves and EEG coherence (coordination of EEG waves).<sup>82</sup>
- a reduction in epileptic seizure frequency.<sup>83</sup>
- changes in neurotransmitter profile including high serotonin production as seen in recovery from depression.<sup>84</sup>
- a suggested selective increase in cerebral blood flow.<sup>85</sup>
- reduction in cortisol levels.
- reduced TSH and T3 levels.<sup>86</sup>
- improved response time and reflexes.<sup>87</sup>
- improvement in perceptiveness of hearing and other senses.<sup>88</sup>
- improved immune function. For an immune system under-active due to chronic stress it is stimulated and for over-active immune systems such as in auto-immune and inflammatory illnesses it seems to reduce its over-activity.<sup>89</sup>
- increased calcium loss and osteoporosis is associated with high cortisol levels and depression.<sup>90</sup>
- very beneficial as an adjunct to therapy for a variety of illnesses such as heart disease, cancer, chronic pain<sup>91</sup>, asthma<sup>92</sup>, diabetes<sup>93</sup> and many more.



### Psychological benefits of stress reduction

- decreased anxiety.<sup>94 95</sup>
- more optimism, decreased depression as indicated by elevation of serotonin.<sup>96 97</sup>
- greater self-awareness and self-actualisation.<sup>98</sup>
- improved coping capabilities.<sup>99</sup>
- happiness tends to be less conditional. Improved well-being and as an adjunct to psychotherapy.<sup>100</sup>
- reduced reliance upon drugs, prescribed and non-prescribed, or alcohol.<sup>101</sup>
- improved sleep<sup>102</sup>; more restful, less insomnia, and in time less sleep needed.
- reduced aggression and criminal tendency.<sup>103</sup>
- improved I.Q. and learning capabilities, including the aged and intellectually impaired.
- greater efficiency and output and reduced stress at work.<sup>104</sup>
- better time management and improved concentration and memory.<sup>105 106</sup>
- reduction in personality disorders and ability to change undesired personality traits.<sup>107</sup>
- stimulus reduction was the most effective known form of treatment for infantile colic.<sup>108</sup>

Consistent evidence is accumulating that meditation is possibly the most powerful way of eliciting the relaxation response and when practiced over a period of time the cumulative effects seem to be significant. It seems to be able to reverse the unwanted effects of allostatic load mentioned previously and this has benefits for the prevention of heart disease and associated risk factors. Psychosocial stress clearly contributes to high BP and CVD morbidity and mortality but reversal of these effects can be seen even in older patients. A review of two RCTs that included the TM program and other behavioral stress-decreasing interventions looked at the outcomes for 202 subjects with a mean age in their 70's.<sup>109</sup> Follow-up was for an average of 7.6 years. The TM group compared with controls showed a 23% decrease in the primary outcome of all-cause mortality, a 30% decrease in the rate of CVD mortality and a 49% decrease in the rate of mortality due to cancer.

Results suggest that TM program, may contribute to decreased mortality from all causes and CVD in older subjects who have systemic hypertension

It would seem that insurance companies are interested in stress reduction through meditation following on the results of some large audits that have been performed. One compared 600,000 non-meditators to 2,000 meditators<sup>110</sup> and the findings suggest that in every disease category there are significant reductions in illness, for example an 87% reduction in heart disease and a 55% reduction in tumours. Follow-up over an 11-year period showed further improvements with an overall 63% reduction in health-care costs (i.e. 63 cents

in the health dollar saved) with 11.4 times less hospital admission for cardiovascular disease, 3.3 times less for cancer, and 6.7 times less for mental disorders and substance abuse when meditators were compared to non-meditating controls.<sup>111</sup> These studies did not control for self-selection and healthy lifestyle change would play a part in the results. More conscious and healthy lifestyle choice, after all, is one of the natural side-effects of meditation. In any case, on the strength of this sort of evidence insurance companies in the US and Europe are starting to offer substantial reductions on life insurance premiums of up to 30% for people who practice an approved form of meditation regularly, in this case TM. Such results are likely to be explained by the direct physiological benefits of a more conscious, harmonious, autonomous and conscious state of mind and the healthy lifestyle changes which often accompany it.

The incorporation of stress management and meditation into a holistic approach to medical care, especially for chronic conditions where lifestyle plays an important role. For example, research on diabetes shows that stress management leads to a significantly better level of control and lower rate of complications over the follow-up period.<sup>112</sup> This will later be discussed at length particularly using heart disease, cancer and asthma as cases in point.

Specific areas of MBM research will be outlined below. The view taken of MBM has been an extremely broad one to encompass social and spiritual factors as well as individual and psychological ones

as the literature tends to support the age-old principle that all things are connected.

### **Psychoneuroimmunology (PNI):**

***“The mind in addition to medicine has powers to turn the immune system around.” Jonas Salk (discoverer of the polio vaccine)***

There is presently an enormous explosion of research in how stress affects the immune system. PNI, put simply, means that the mind is connected through the nervous and endocrine systems to the immune system. PNI has major implications for our susceptibility to infections and cancer, response to allergens, and the modulation of auto-immune and inflammatory conditions. In fact, it would be hard to find a disease process not profoundly influenced by immune function so PNI must take a central place in elucidating mechanisms which explain observed clinical phenomena.

***“There is no reason for any panic. Fear is cowardly and very injurious. Cheerfulness increases resistance and prevents complications.” Public Health Bulletin - Influenza epidemic of 1919.***

The intuitive sense that the mind is interconnected through the nervous system to the immune system really began to gain credence since the 1970's. This communication takes place via 'hard-wiring' through nerves, and also via a blood-borne 'postal system' through hormones and neurotransmitters. By these two means the nervous system communicates with every element of our immune defenses. Both systems are two-directional, that is, the white blood cells send messages back to the central nervous system (CNS).<sup>113 114</sup>  
<sup>115</sup> Especially important in the feedback loop is the limbic system in the brain which is primarily concerned with emotion.

Now over 60 neurotransmitter receptors have been found on the surface of WBC's. The 'chemistry of thought' not to be localised to the brain for the same neurotransmitter receptors are found in the gut and many other places explaining how emotional states like stress, anxiety and depression can cause distant physiological effects and susceptibility to disease. Sayings such as having 'butterflies in ones stomach' have more substance to them

than generally recognised. Furthermore, drugs which have psychoactive properties are also found to effect the functioning of immune cells because they have the same receptors. Even the blood-brain barrier is made more porous by stress.<sup>116</sup> There is even accumulating evidence that PNI and stress hormones may play a role in the development of psychiatric disorders.<sup>117</sup>

In the studies referred to below there will be mention of improved or diminished immune status, immuno-enhancement or immuno-suppression. The commonly used tests of immune status are simply to measure the number and types of immune cells. This tells one 'how large the army is' but tells us little about how well the army is functioning. Tests of immune function are more specialised and expensive but are designed to tell us how well the cells are performing their designated roles.<sup>118</sup> Such tests include measuring white blood cell 'proliferation' which indicates how quickly and well the army multiplies in response to an antigenic (e.g. mitogenic) challenge. Another test is to measure how quickly and well Natural Killer (NK) cells kill tumour cells through a 'cytotoxic activity assay'. These tests are performed 'in vivo', that is, in the laboratory. Other tests are performed 'in vitro', that is, things such as measuring the body's ability to stimulate antibodies or the delayed-type hypersensitivity response (allergic response).

Negative emotional states have a negative effect on immunity largely by effecting how well the immune cells carry out their core functions, such as lymphocyte proliferation in response to infection<sup>119</sup> or inhibiting NK cell activity<sup>120</sup>, rather than major effects on cell numbers. The size of the army, though important, may be of secondary importance to how well that army is performing in terms of day to day health. For these reasons compromised immune function due to stress is harder to pick up on standard blood tests which only give cell counts but tell one little about how well those cells are functioning.

Much like a defense force WBC's can function poorly either because the 'soldiers' are too few, too under-active, too over-reactive or indiscriminately active. Immune cells are meant to discriminate 'self' from 'non-self'. They do not attack self unless a cell has become dangerous, as in cancer, or the cell has died and needs to be broken

down. Cancer cells, mutating as they do, wear antigens generally on their surface which set them apart from normal cells. Immune cells should also attack non-self as in infectious agents like bacteria and viruses. Immune dysfunction takes place when the immune cells lose their ability to discriminate between self and non-self and attack healthy tissue inappropriately or do not attack things they should such as germs or cancer cells. The one leads to auto-immune disease and the other can predispose to infection and cancer.

It seems as if the immune cells mirror the emotional state.<sup>121</sup> Emotional stress has been associated with a variety of disease states whether that stress is a result of an accumulation of small stressors or due to the impact of large ones. In fact, it seems that an accumulation of small daily stressors can be as detrimental if not more detrimental to health than major stressors.<sup>122</sup> It would seem that changes in immune cell numbers and function start to occur within five minutes of the stressful event<sup>123</sup> and, depending on the reaction to the stressor, can remain for up to 72 hours afterwards.<sup>124</sup> Those who perceive that they have some control over their situation are buffered from stress and the consequent immuno-suppression whereas those who perceive no control, especially if they are anxious to be in control, experience prolonged effects. States of prolonged stress and depression are associated with immuno-suppression.

Acute stress alters quantitative and functional components of cellular immunity with individuals varying markedly in their magnitude of response. Differences can be predicted by individual variability in stress-induced SNS activation. Those who have higher sympathetic nervous system reactivity to stress (increased blood pressure, heart rate, catechol hormones related to adrenaline) also have the greatest disturbance to immunity and greatest susceptibility to infection. These variations are of clinical significance.<sup>125</sup> Further demonstrating the clinical importance of this were a series of experiments. 115 healthy subjects completed a stressful life events checklist. They were then tested to assess in response to stressor (speech task) and had their SNS (blood pressure, heart rate, and catecholamines), HPA (cortisol), Immune (NK cell cytotoxicity and cell

subsets) parameters measured. Participants were followed weekly for 12 weeks. High cortisol reactors with high levels of life events had a greater incidence of verified URI than did high reactors with low levels of life events and low reactors irrespective of their life event scores. Acute HPA and immune responses to laboratory stressors are markers of how vulnerable people are to the increased risk for URI associated with stressors.<sup>126</sup>

The above principle has been further illustrated in studies measuring intern stress and its correlation with heart rate (HR) and WBC count.<sup>127</sup> HR, a measure of stress, and WBC count were monitored during "on call" periods for hospital doctors and compared to doctors who were not on call. Mean HR "on call" increased from an average of 71 to 87 beats per minute in all resident groups as compared with controls. WBC count in interns increased from control values of 5.2 x 1,000 cells/muL to 7.5 x 1,000 cells/muL "on call" but was not so affected by senior doctors who were no doubt more able to cope with the stress. "The degree of tachycardia and the increase in WBC count are inversely related to the level of training. SRMO cope better with stress "on call" than JRMO and interns."

Conversely, if there is an inflammatory process taking place somewhere in the body, such as rheumatoid arthritis, then stress and anger will aggravate the inflammation. The mechanisms are infinitely complex but the principle is infinitely simple: a healthy and happy mind is fundamental for a health body.

Salivary Immunoglobulin A is one of our first line defences against infection in the respiratory system and the gastrointestinal and urinary tracts. It is one of the easiest markers of immune competence and has therefore been more extensively studied. For many years it has been known that low levels of S-IgA are associated with increased risk of infection.<sup>128 129</sup> S-IgA levels have been found to be reduced by stressful life-events such as exam pressure, social isolation<sup>130</sup>, grief<sup>131</sup>, anxiety<sup>132</sup> and the "need to have power and to influence others".<sup>133</sup> Positive emotional states, however, seem to be associated with immuno-enhancement<sup>134 135</sup> although some studies have given some variable

results depending on how the emotional state was induced. This background data led one group of researchers to further test the effects of emotion on S-IgA by measuring levels in subjects before and after they had induced positive (care and compassion) or negative (anger and frustration) emotions. This they did for only five minutes. The positive emotion group had increased S-IgA levels for a number of hours afterwards whereas the negative emotion group had a short burst of increased S-IgA followed by five hours of immuno-suppression.<sup>136</sup>

Early PNI research was hampered by apparently inconsistent findings. For example, in response to 'standardised stressors' some people have immuno-enhancement and others immuno-suppression. On this basis one could easily conclude that there is no reliable and predictable basis to stress and its effect on immune function. If such a result was averaged out over a large group then there would be little overall change. Some studies looking at life stress and its impact on cancer incidence have made similar findings. When, however, researchers also take into account individual's perception and coping style it is found that those with positive perceptions and coping styles consistently have immuno-enhancement including NK-cell activity and S-IgA (i.e. they are more resistant to disease) and those with negative perceptions and coping styles, including the need to have power over others, consistently have immuno-suppression (i.e. are at greater risk of disease).<sup>137 138</sup>

<sup>139</sup> The links between immune response and other markers of the stress response seem to be strong. Those who have higher sympathetic nervous system reactivity to stress (increased blood pressure, heart rate, catechol hormones related to adrenaline) also seem to have the greatest disturbance to immunity.<sup>140</sup> These results are reproducible but evidence that the relationship is causal still remains circumstantial.<sup>141</sup> Immune change also seems to be predicted by brain activity.<sup>142</sup>

The above findings raise other issues also. It would seem that significant phenomena and findings can be mistakenly interpreted as inconclusive or negative, whether it be in PNI or psycho-oncology, not because there are not an important processes at

work but just because we do not understand the processes well enough to design the research methodology appropriately. Perhaps if one had consulted a long-recognised philosophical principle one might not have made the mistake.

***"Man is not disturbed by events but by the view he takes of them." Epictetus***

Another ancient principle exhorted by the Greek philosophers was "nothing too much" or "moderation in all things" and this too is a good adage for life as lifestyle factors also influence immune function (see table 3).<sup>143</sup> Perhaps it is not the case that immune function is enhanced but rather that it elevates to the sort of levels it was designed to work at when the lifestyle is healthy and balanced. None of these things listed below, of course, are good regardless of measure. Too much exercise or too little are both associated with poor immune function as is too much or little sleep. Sleep deprivation and poor quality sleep are strongly associated with depression. Not surprisingly, many who are depressed can largely cure their depression by improving quality of sleep. Whether missing breakfast is damaging in itself or rather the sort of person who is too stressed or rushed to stop for breakfast is immuno-compromised is not really known. Being employed is also good for health but too little or too much work is associated with poor health.<sup>144</sup> So what are moderate hours. It would seem that somewhere between 7 to 9 hours is optimal. The attitude to the work, however, will naturally have an enormous effect on whether it plays a positive or negative role in health. People can work harder and for longer periods when they have commitment and a positive attitude to their work; a 'labour of love' as we say. Alcohol abstinence does not seem to provide an advantage over moderate intake in healthy individuals but high intake leads to poor immune function. Whether the same would be true for alcohol intake in those with serious illness such as cancer is unknown.

It has also been well documented that an unhealthy life-style is promoted by stress<sup>145</sup> and depression<sup>146</sup> and is reversed by effective stress management.<sup>147</sup> It would seem that meditation,<sup>148</sup> psychological interventions,<sup>149</sup> a positive attitude and humour<sup>150</sup> are all powerful immune system

stimulants, or perhaps more accurately, they help to reverse the immunosuppressive effect of stress mediated through the stress hormones like adrenocorticoids.

**Lifestyle and effect on NK cell activity**

Behaviour	Advantage in NK activity %
Exercise	47
Managing stress	45
Enough sleep	44
Balanced meals	37
Not smoking	27
Eating breakfast	21
Working moderate hours	17
Avoiding alcohol	0

What is the net effect of the above observations? One of the effects is that these fluctuations in immune function are significant factors in terms of our susceptibility to infection.<sup>151</sup> One study of 394 people measured their levels of stress and then inoculated directly with five different cold viruses. The results demonstrated that the likelihood of getting the cold was directly proportional to the level of stress which the host was experiencing not just at the time of exposure but over the preceding six months. Not surprisingly, if one gets a viral illness, like influenza, then higher stress levels are associated with more severe symptoms.<sup>152</sup>

There is also a strong link between stress and relapse for chronic infections such as herpes viruses.<sup>153</sup> These viruses lie in waiting until times when the immune system is depleted and they can re-emerge. Meta-analysis has consistently shown stress affecting interleukin 2 receptor expression on lymphocytes whereas relaxation can elevate resistance to infection as represented in antibody titres.<sup>154</sup> Data is also showing that stress and social connectedness are important factors effecting the rate of progression of HIV to AIDS.<sup>155</sup> Those who were above average for stress and below average for social support were 2-3 times more likely to progress to AIDS over 5-year follow-up. Another study on HIV showed that<sup>156</sup> for every one severe stressor per six-month study interval the risk of early disease progression was doubled. It is important to take such observations and turn them into useful interventions. One such intervention gave CBT to HIV men and

found that the reductions in depression and anxiety were paralleled by reductions in stress hormones and improvements in white cell counts<sup>157</sup> and elevation of DHEA (dehydroepiandrosterone).<sup>158</sup> DHEA is also thought to be an important hormone in patients with chronic fatigue syndrome.

Another study on medical students<sup>159</sup> looked at the immune function over the exam period. It revealed profound immune suppression, in particular lowered NK cell activity, a 90% reduction in gamma interferon and lowered response of T-cell lymphocytes corresponding with the general observation that students frequently succumb to illness during or just after exams. Students were randomised into two groups, one being taught relaxation techniques and the others not. Those who were not taught relaxation had the predicted poor immune function, but among those who were taught there was a variable response because those who learned but practiced infrequently showed no improvement. Those who learnt and practiced regularly, on the other hand, showed significantly better immune function and less illness in exam periods. Even keeping a journal about significant events was also associated with improved immune function and fewer doctor visits for infectious disease.<sup>160</sup>

Carers of those with Alzheimers disease have been found to exhibit immune suppression proportional to the level of distress they feel.<sup>161</sup> Similarly, the immunosuppression observed in those going through marital separation is proportional to the amount of negative emotion and difficulty the person experiences in letting go. Such studies illustrate the fact that the person's perception of a situation and their coping abilities are central in determining the physiological response.

**Autoimmune diseases:**

Autoimmune diseases, in principle, are where the immune system attacks healthy tissue as if it were foreign, in other words it sees 'self' and 'not-self.' We only partially understand the mechanisms behind this phenomenon but part of the story seems to be that in genetically predisposed individuals the immune cells may have previously encountered an invader like a virus or antigen which looks similar to healthy tissue because of resemblances in the antigens and markers on the surface of

each. In such cases the immune system gets fooled in a case of 'mistaken identity'.<sup>162</sup> The inappropriate response can be directed to joints as in rheumatoid arthritis, to the pancreas in Type 1 diabetes, to the bowel in inflammatory bowel disease, or to the myelin 'insulation' of nerve fibres in the nervous system as in multiple sclerosis (MS). There is even some suggestion that coronary heart disease may have some sort of immune connection although it is early days in terms of this research.

Exactly how the emotional state can effect this process of immune recognition is not clear but PNI offers potential to explain some of the triggers and aggravating factors for autoimmune conditions.<sup>163</sup> Whatever the mechanisms there are connections found between emotional state and disease activity noted in a variety of autoimmune diseases. For some time it has been noted that stressful life events and unsupportive social environments are associated with the onset and exacerbation of a variety of autoimmune diseases.<sup>164 165</sup>

Rheumatoid arthritis (RA), because of its being so common, has been more closely looked at than other autoimmune conditions, although one could expect similar findings for other diseases that are yet to be looked at. To illustrate, a recent study found that stress in the prior week was clearly associated with increased inflammation, pain and disease activity.<sup>166</sup> Furthermore, women with stronger marriages were also noted to deal with stress better and have lower levels of inflammatory hormones like interleukins.<sup>167</sup> Other studies have further explored such associations. "Irrational beliefs are associated with increased inflammation process, among apparently healthy individuals."<sup>168</sup> "Male major depression patients with increased early life stress exhibit enhanced inflammatory responsiveness (IL-6) to psychosocial stress, providing preliminary indication of a link between major depression, early life stress and adverse health outcomes in diseases associated with inflammation."<sup>169</sup>

Systemic Lupus Erythematosus (SLE) is a disease not dissimilar to RA. SLE is also significantly affected by life stress.<sup>170</sup> The authors of this study conclude that, "comprehensive treatment of SLE requires management of life stress." Similar points are raised in regards to Multiple Sclerosis

(MS)<sup>171</sup> but unfortunately such research is still awaiting to be done. For example, previously mentioned is the effect of stress on producing a 90% reduction in interferon levels. Also recently noted is the beneficial effect of early administration of interferon on the progression of MS.<sup>172</sup> What would be the outcome of a stress management intervention on the progression of MS? Strangely, such a trial has not yet been done but the potential for therapy is enormous. A further discussion about MS will be found in the section dealing with holistic models for dealing with medical conditions.

It is one thing to show that stress aggravates a medical condition but it is important to take the next step and show whether stress management and relaxation help to reverse or modify the process. For example, an inflammatory condition, psoriasis, was shown to be amenable to relaxation through mindfulness meditation. The condition cleared twice as quickly when the orthodox medical approach was combined with meditation.<sup>173</sup> There may be precedent for the management of many other conditions with mind-body approaches. Another innovative study did test the therapeutic potential of stress reduction benefiting two inflammatory disease, RA and asthma, by demonstrating the therapeutic potential of journal writing as a form stress release.<sup>174</sup> Patients with moderate to severe asthma and RA were randomised into two groups. Both groups had usual medical care but one was given the exercise of writing in a journal for three consecutive days about the most stressful event in their lives. Four-month follow-up showed that the group that kept the journal had significantly fewer symptoms and reduced disease activity on every parameter measured. Interestingly no psychotherapy or processing the events was required to produce the benefit. Simply writing about and expressing what had not been expressed before helped the people to come to a state of understanding and objectivity with previously traumatic events. It is also another example that people can, through their own inner resources, deal with most events themselves. An early review of CBT interventions for RA showed that there was considerable potential for altering the course of the disease. As with other studies on heart disease and cancer, not all interventions are successful in improving

the mental and emotional state of the individuals undergoing the intervention and not all participants are equally compliant with the strategies and these tend not to translate into better disease outcomes.<sup>175</sup>

Observations of the predisposing effect of stress and the potentially helpful effect of stress management are important. Also important is the need to elucidate the mechanisms behind these observations. The role of mediators of inflammation such as cytokines has been previously mentioned. Cytokines can be typed as Type 1 ( $\gamma$ -interferon) and Type 2 (Interleukin-10). A high ratio of Type 1 to Type 2 is called a Type 1 response and a low ratio is a Type 2 response. During high stress periods it has been shown that there is a shift towards the type 2 response which may partially explain the increased incidence of type-2-mediated conditions including infections, latent viral expression, allergic conditions and autoimmune conditions during high stress periods.<sup>176</sup> This is an example of how psychological state not only regulates the level of immune response but also the type of response. This inappropriate response is called immune 'dysregulation.' Other mechanisms are still being explored and the therapeutic potential has yet to be fully tapped, for example, there is much interest in the therapeutic effects of interferon for the treatment of Hepatitis C but this is extremely expensive and has considerable side-effects when administered artificially. Can the stress-induced reduction of interferon be reversed through stress reduction and hence alter outcomes for hepatitis sufferers? Time will tell.

#### **Allergies:**

As with immuno-suppression it has also been demonstrated that one can classically condition allergies by pairing stimulus with exposure to the allergen.<sup>177</sup> Can we un-condition them? Furthermore unhealthy lifestyles with regard to both physical and mental health practices have been associated with aggravating allergic disease.<sup>178</sup> The reverse hypothesis that stress reduction reduces allergies is still to be comprehensively tested but one study on the treatment of atopic dermatitis compared the effectiveness of relaxation therapy, cognitive behavioural therapy, and an education program with standard medical care.<sup>179</sup> At one-year follow-up the relaxation therapy, cognitive therapy and a

combination of cognitive therapy and education all lead to significant improvements in the dermatitis and a reduction in the need for topical steroids. All these psychological treatments were superior to education alone or standard medical care. It may well underline, again, the importance of a holistic approach to patient care where combination of psychosocial interventions potentiate the judicious use of pharmacological therapies.

Although studies have found that psychological stress plays a role in atopy and response to immunomodulating vaccination it has been more recently found that stress can be an important prognostic factor with non-stressed patients responding well to immunotherapy. "Psychological stress can affect response to (immunotherapy) also in allergic subjects and are consistent with data recently reported showing a correlation between stress and poor response to antimicrobial vaccines. ... Stress evaluation may become a useful prognostic factor in immunotherapy."<sup>180</sup>

#### **Stress and immunisation:**

The efficacy of vaccination such as with the Hepatitis B or Influenza vaccines seems to be effected by stress. In a series of controlled studies it was shown that those who were stressed prior to vaccination had significantly worse results in terms of antibody and T-cell response.<sup>181 182</sup> More recently the effects of reducing stress have been demonstrated to improve response to Flu vaccination.<sup>183</sup>

#### **The mind and genetics:**

DNA contains the blueprint for the body and every chemical and function within it. Genes are segments of DNA which code for compounds like proteins and hormones. The genes are written with a 4 letter alphabet and humans have 99.9% of genes in common with other humans meaning that the other 0.1% make for all the differences between humans. DNA can become damaged and it can be repaired which will be discussed below. Our 'genotype' is what is in our genes and our 'phenotype' is what our genes are expressing. Thus, not all genes express themselves at any given time with many lying dormant. It is the activation and deactivation of various genes which can

trigger the onset and progression of many diseases.

Our DNA or genes, which control virtually every aspect of a creature's expression, have long been viewed as rather static short of chemical or radiation damage. But, it seems, genes are far more malleable than we previously imagined and a central factor in determining the development, expression and repair of genes may include the mental state. Can thought, emotion, motivation and even the search for meaning really be reduced to biochemistry and genetics?

***“We will not understand important things like “love” by knowing the DNA sequence of homo sapiens.... If humanity begins to view itself as a machine, programmed by this DNA sequence, we’ve lost something really important.” Francis Collins, Head of the Human Genome Project<sup>184</sup>***

It has been noted for some time that psychogenic stress can induce DNA damage. For obvious reasons many of these studies are performed on animals rather than humans but what they found was a significant increase in chromosomal aberrations for animals subjected to a variety of stresses. Changes are seen too in humans under stress, such as taking examinations. Initial research from animal studies<sup>185 186</sup> and more recent research from human studies suggest that mental state effects genetic function. It increases the number of genetic mutations and seems to impair the body's ability to repair them.<sup>187</sup> This may be mediated by a variety of mechanisms such as elevations in chromosomal aberration and sister chromatid exchanges and effects on DNA repair enzymes such as methyl transferase.

DNA damage is, of course, particularly important in the genesis of cancer.<sup>188</sup> We can have genetic or family inherited predispositions to all sorts of conditions including particular types of cancer and these are also mediated through genetically modulated cell replication, cell death (apoptosis) and cancer suppressor genes. Damage to these genetic mechanisms can lead on to cancer. The ability of the cell to repair this damage is measured by what is called DNA Repair Capacity (DRC). Stresses such as coping

with trauma can increase oxidative stress as well as stimulate the compensatory DNA repair mechanisms.<sup>189</sup> A recent study on healthy medical students confirmed that during high stress periods, such as during exams, compared to low stress periods, such as after vacations, there was an increase in DRC in nearly all subjects studied.<sup>190</sup> This implies an adaptive response to increased DNA damage. Interestingly, the students who had higher and more consistent levels of stress and mood disturbance had a reduction in DRC or no change suggesting that the response had been impaired in some way.

A retrospective case-control clinical study<sup>191</sup> compared DRC in 33 women with breast cancer and 47 cancer-free women. Among the cancer cases (5.6%) there was a 36% reduction in DRC compared with the control group (8.7%). Younger breast cancer patients had a more significant reduction in DRC. “A low DRC is a susceptibility factor for breast carcinoma. A 1% decrease in DRC corresponded to a 22% increase in breast carcinoma risk. ... Because DRC is an independent risk factor for breast carcinoma, the DRC of women may be a useful marker in predicting susceptibility.”

Also important because of the implications for the development and acceleration of disease processes is the way that psychological state seems to effect genetic expression. These latter effects are extremely varied and can predispose to addictive behaviours<sup>192</sup>, cardiovascular reactivity<sup>193</sup>, depression<sup>194</sup>, schizophrenia<sup>195</sup>, asthma<sup>196</sup> and many other things which begins to explain why stress is such a common trigger for many disease processes. It would seem that genetic disposition is often lying dormant can be triggered by events which lead to its playing out, rather like clicking onto an icon on a computer to start up a program. In schizophrenia, for example, “The normal in-growth of dopamine fibers during late adolescence and their formation of aberrant connections with abnormal intrinsic cortico-limbic circuits could “trigger” the onset of symptoms in those who carry the constitutional vulnerability for schizophrenia.” In terms of genetic tendency towards addictive behaviours, “Stresses, such as drug use and social adversity, in adolescence or



early adult life may propel the neuro-developmentally impaired individual over a threshold into frank psychosis.<sup>197</sup> Drug-seeking behavior can be triggered by a variety of factors including 'priming injections', drug-associated environmental stimuli and stress. Drug-associated stimuli and stress may activate this system via neural circuits from the prefrontal cortex, amygdala and HPA-axis

"Given the long-lasting nature of increased risk of relapse, it is likely that the relevant neuro-adaptations are mediated via drug-induced changes in gene expression."<sup>198</sup>

It would seem that not only is DNA function, damage and repair affected by psychological states, but it also significantly affects genetic ageing. Telomeres are segments of DNA on the end of the DNA strands which help the DNA not to 'unravel' thus causing the cell to die. A study on healthy pre-menopausal women found that psychological stress, both in terms of perception and chronicity, is significantly associated with known determinants of cell death and longevity. These include higher oxidative stress, lower telomerase activity (the enzyme which repairs telomeres) and shorter telomere length. Women with the highest levels of perceived stress compared with low stress women had telomeres shorter on average by the equivalent of 9-17 years of additional aging.<sup>199</sup>

This is a landmark study and has many implications for understanding how stress may promote earlier onset of age-related diseases. For example, psychological stress is a major risk factor for CVD and part of this may be because of genetic ageing. Telomere shortness has been associated with CVD. Low telomerase activity is associated with exaggerated autonomic reactivity (allostatic load) to acute mental stress and elevated nocturnal catechols (adrenaline-like compounds). Low telomerase activity is associated with risk factors for CVD - smoking, lipids, high BP, high fasting glucose, greater abdominal adiposity (Metabolic Syndrome).<sup>200</sup>

A study investigated the pain-induced activation of the hippocampus to try and determine the molecular and cellular basis of the co-morbidity of chronic pain and depression. It found that pain altered the

hippocampus and gene expression and neurogenesis was significantly reduced. This has a range of developmental implications including the sensitization of the nervous and limbic systems in depressed patients.<sup>201</sup>

Depression can be predisposed to by an inherited disposition, but it seems to be the interaction between heredity and upbringing which may be so crucial for risk later in life. Childhood trauma (CT) and genetic factors are known to contribute to the pathophysiology of depression and experience of at least one type of childhood trauma is reported by 80% of adults with depression. The common traumas include physical neglect, emotional abuse, and emotional neglect. The study noted an earlier age of onset of depression in those with CT and earliest onset in those with highest CT. "The effect of CT on individuals with an underlying genetic vulnerability to depression may result in differences in depressive phenotype characterized by earlier AO of depression and the expression of specific depressive symptom dimensions."<sup>202</sup> Children raised in deprived environments can have severe cognitive and behavioural difficulties and poor response to stress lasting into adulthood. "These changes reflect permanently altered gene expression, so-called "environmental programming", and its downstream effects on the HPA axis."<sup>203</sup>

How malleable genetic expression is is not entirely known but some long-held beliefs are being challenged. For example, it has been found that environment can impact upon the onset of Huntington's disease. Huntington's disease is an inherited (autosomal dominant) disorder which means that it is assumed that if a person has the gene then they will come down with the condition. It is a severely debilitating, progressive neuro-degeneration producing uncontrollable movements, loss of motor control and dementia. There is no known cure. Animal studies, however, show that an enriching environment delays the onset of Huntington's Disease with 1/7 mice with enriched environment demonstrating symptoms compared to 7/7 controls.<sup>204</sup> The therapeutic potential for this observation has not been explored but

does potentially herald in a new age of mind-body based 'gene therapies'.

***"The human mind is not capable of grasping the Universe. We are like a little child entering a huge library. ... The child knows that someone must have written those books. It does not know who or how."*** Albert Einstein: cited in *The Next Thousand Years* by A. Berry

#### **Personality and illness:**

The notion that personality directly affects our physical health has a long history. Mythology and religion often related moral and emotional character to health and healing although many such stories may well be symbolic and allegorical rather than literal. In more recent history early observers such as James Paget noted more rapid progression of cancer among those with depression and deferred hope. Most recently contemporary research seems to be confirming that this idea has some merit.

Strong relationships seem to exist between disease patterns and personality-type although care needs to be taken in discussing this issue for a number of reasons. Firstly, objective self-examination and a sense of personal responsibility for our behaviour is useful but one should avoid the tendency for either self-blaming or fatalism. Secondly, giving such information without the skills and support to modify unhelpful traits may possibly do more harm than good. Thirdly, personality is just one factor, albeit an important one, inter-playing with a number of others, such as environment, life-style and genetic predisposition. Fourthly, some of the popular interpretations of these relationships are more specific than the research evidence can presently support, for example, relating a lack of communicativeness to a specific form of cancer like laryngeal cancer. Lastly, research in this field is inherently difficult due to different personality classification and interpretation.

Any trait, even anger could, of course, have its place if it is appropriate to the situation, is not 'over-expressed' or 'under-expressed' and is left in the past once the situation is over. The person themselves will generally know if the expression is appropriate or inappropriate as they will or will not feel at

ease with the way they expressed themselves. Some early studies into Type-A (hard-driving, ambitious, aggressive etc) gave inconsistent findings. Some suggested a relationship with heart disease but others did not. More recent and decisive studies have tended to concentrate more on individual traits such as anger or hostility rather than combining a number of traits together. This may make more sense as personality traits are blended differently in every individual and traits are also open to interpretation. One person might be ambitious or hard-driving, for example, but in a very compassionate and altruistic rather than self-centred way. Assertiveness can be useful or destructive depending on which aspect of our nature is wishing to assert itself. When driven by selfishness, misunderstanding or inappropriate anger, it is likely to be a negative trait that is harmful both to ourselves and others, whereas if the assertiveness is born of reason and necessity then it may well be a very positive trait. Any personality trait taken on face value, without considering the emotional context behind it, will be unavoidably ambiguous and confusing. So in this field, possibly more than any other, one has to take each individual piece of research data in the context of other data and never ignore the importance of personal insight and clinical experience as being our most useful guides to intelligent interpretation.

Be that as it may, Hans Eysenck is one researcher who has been prominent in this field. His work, though hotly debated, demonstrated that various types of personality are predisposed to particular illnesses. These four personality types which he identified are listed below. Outlined below are the four types of personality which Eysenck defined and a table relating the different incidences for cancer, CHD and overall mortality when individuals with these personality types were followed over 10 years.

- **Type 1:** Cancer-prone individuals tend to hopelessness, helplessness and suppression of emotion.
- **Type 2:** Coronary Heart Disease (CHD) prone individuals tend to anxiety, aggression, ambition and they express emotion inappropriately.

- **Type 3:** A mixture of the other types and were intermediate in terms of amount and type of illness.
- **Type 4:** These people suffered far less illness. They tended to live more in harmony with themselves and others, communicate better, tended to optimism, were more self-aware and remained calmer under stress.

**Proportion of people with personality types 1,2,3 and 4 dying of cancer, heart disease (CHD) and other causes over 10 year follow-up.**<sup>205</sup>

	No.	Cancer	CHD	Other	No. living	% living
Type 1	901	<b>347</b>	61	155	338	38
Type 2	818	36	<b>208</b>	221	353	43
Type 3	570	8	21	80	346	81
Type 4	946	3	9	39	<b>895</b>	95

The differences were striking although establishing a causal relationship would be difficult. Furthermore some of the lifestyle factors not controlled for in the study may explain some of this relationship. Nevertheless Eysenck wished to test the hypothesis that if one altered the personality traits then one would also alter the diseases they are predisposed to. Personality, of course, except in the more extreme examples, is not nearly as fixed as many people take it to be. What Eysenck showed was that as one minimised the unhelpful personality traits and communication patterns and enhanced the better ones it had a very positive long term effect on the physical and psychological health as the data below shows. In this

experiment cancer and heart disease prone individuals were randomised into an intervention group (given 'autonomy training' over six months) and a control group. When followed up over seven years the control group had a 76% death rate compared to only 20% for the intervention group; i.e. as these personality markers changed so too did the disease profiles. It is also interesting that incidence rates were proportionately much closer but in those who had the therapy the disease seemed to be progressing much more slowly. This may be explainable by mechanisms previously mentioned in PNI and later to be mentioned in the sections on cancer and heart disease.

**Group therapy: 490 matched persons: type 1 and 2: seven year follow-up. (17 patients not able to be contacted)**<sup>206</sup>

	No.	Cancer deaths	Cancer incidence	CHD deaths	CHD incidence	Other deaths
Control	234	111	129	36	45	33
Therapy	239	18	75	10	29	20

**Individual therapy: 192 matched persons: mean age 50 years: 13 year follow-up.**<sup>207</sup>

Type 1	No.	Cancer deaths	Cancer incidence	Other deaths	Living
Control	50	16	21	15	19
Therapy	50	0	13	5	45

Type 2	No.	CHD deaths	CHD incidence	Other deaths	Living
Control	46	16	20	13	17
Therapy	46	3	11	6	37

Personality traits are far more malleable than we often think given the right support and motivation. Personality, being part genetic (nature) and part 'learned' (nurture) can, it would seem, be unlearned. Important elements in the autonomy training, which is a behavioural approach

to psychotherapy, were greater self-awareness, relaxation, improved communication, group support and practicing new ways of dealing with stressful situations. Without some level of awareness, insight and motivation it is all but impossible to change personality traits

except by the less conscious path of consistent conditioning and reinforcement. Counselling and psychotherapy directed at individuals without awareness etc can be a fruitless task.

There is little doubt that personality factors have a powerful influence over health independent of life-style factors, but there is debate over how marked the influence is. Other researchers use different classifications of personality and such research will always be difficult due to examining something which is inherently imprecise and hard to define.

Another recent study<sup>208</sup> looked at people with already established and severe CHD and showed that those with a 'type D' personality were 4.7 times more likely to have another acute myocardial infarction (AMI) over the next 6-10 years. The study controlled for other cardiac risk-factors and these were not the cause of the effect. Type D personality is made up of two main elements: a high level of negative affect (anxiety, anger, worry etc) and a tendency to inhibit the expression of these emotions. Elsewhere it was shown that for those with CHD mental stress was found to increase the number of ischaemic episodes by a factor of 2.2 even when controlled for other factors.<sup>209</sup> Previous work has produced some varied results on type A personality and heart disease. Type A are described as hurried, hostile and intensely competitive and are more prone to CHD. The evidence for type A as originally defined predisposing to CHD has been a little inconsistent and this inconsistency may have something to do with how we understand and define words like hurried, hostile and competitive. One person can enjoy competition and another find it threatening. So once again, perception and cognition are all important.

Other studies have looked at the effect of just one trait. Among emotions anger seems to be the most 'toxic'. A large study looking into the causes of bowel cancer also showed significant links to personality when controlled for all other known risk factors. Especially important was the role of anger suppression which nearly doubled the risk of bowel cancer.<sup>210</sup> Another article demonstrated a significant relationship between psychological response and breast cancer survival<sup>211</sup> in finding that women who measured high on

depression scales were 3.59 times as likely to die from all causes over 5 year follow-up (95% CI 1.39-9.24). Those who had high scores for helplessness and hopelessness had a 1.55 times increased recurrence rate (CI<sup>1</sup> 1.07-2.25). In heart disease hostility and cynical distrust were associated with significantly more rapid development of coronary artery calcification in young adults.<sup>212</sup> Those with greater than average hostility had 2.57 times the chance of having early coronary calcification and 9.56 times the odds of having a calcification scores of 20 or more. The usual risk-factors were controlled for. Other personality traits seem to be protective and possibly specific for particular sub-groups and genders. Higher scores on scales of submissiveness, which is independent of hostility, were found to be associated with 40% protection against CHD for women but no significant relationship was found for men.<sup>213</sup> Such an observation would not be surprising nor disturbing for someone taking a very traditional view of the roles and natures of men and women nor for one trained in Traditional Chinese Medicine (TCM) where the principles of Yin and Yang, female and male energy, are widely held. It would, no doubt, raise a lot of questions from those with more modern views. The study raises the possibility that there may be more to these traditional views than modern interpretations allow but one would have to proceed with caution. How much this finding is inherent in the nature of men and women, is a remnant of social conditioning or is an aberration of methodology and personality typing will, no doubt, be hotly debated.

Other studies have given conflicting results looking at adverse life events and cancer. For example, one recently looked at stressful life-events and their correlation with the onset of breast cancer<sup>214</sup> and did not find a connection between the two. This study is at variance with another large study which found a strong relationship between adverse life-events and breast cancer<sup>215</sup>. In this study the increased odds ratio was 3.2 (95% CI 1.35-7.6) and when other factors were controlled for the odds ratio rose to 11.6. Part of the discrepancy is explained by the fact that

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<sup>1</sup> Confidence Interval – the two figures represent the range within which one could be 95% confident that the result was not just a statistical aberration.

the former study did not control as stringently for individual perception, personality and coping style. People perceive the same event differently. Two people undergoing divorce will respond differently. For one it may be a relief of stress and for the other a trauma. In each case the physiological, endocrine and immune response will react to the *perception* of the event not the event itself and so the former is at minimal increased risk of illness whereas the latter has a much higher risk.

Mechanisms to mediate these observed relationships between personality and illness will be many and varied. One important one previously discussed relates to immune function. Various researchers have shown that traits such as power motivation, pessimistic style,<sup>216</sup> and repression<sup>217</sup> as well as depression are associated with poor immune function.

So, in conclusion, telling someone that the mind has a role in the genesis, experience and progression of their illness is not to tell them that it is 'all in their mind'. It is to emphasise that the state of the mind effects the body. The two are not separate and the body will be expressing what is happening on deeper levels. As Plato would have said, prevention and therapy, therefore, must include help on the psychological as well as the physical level if it is to achieve its potential.

***"You ought not to attempt to cure the body without the soul."* Plato; Charmides**

#### **Mind-body and heart disease:**

It has been a consistent finding that Monday mornings were peak period for heart attacks but, it seems, this is only among the working population.<sup>218</sup> Now it seems that it is also the peak time for strokes.<sup>219</sup> Furthermore, cardiovascular events appear to peak in the winter months in places where there is a large seasonal variation in temperature. Weekends, on the other hand, are associated with a reduced incidence.<sup>220</sup><sup>221</sup> Another study in General Practice also found a peak in cardiovascular events on Mondays and, interestingly, an increase in incidence of headaches on Tuesdays.<sup>222</sup> Perhaps this was the hangover from Monday?

The question as to whether vacations are good for one's health seems to be a vexed one. Some studies suggest that a higher number of vacations for men at higher risk of CHD protects them from the risk of having a heart attack (RR 0.71).<sup>223</sup> Other studies have suggested that the incidence of AMI is associated with vacations particularly during the first 2 days of vacation. Having a lower education, living with a spouse, traveling by car and especially staying in a tent or mobile home were associated with significantly higher risk.<sup>224</sup>

Why is this so? Perhaps we do suffer from "Mondayitis." The physical mechanisms which might be behind such phenomena will be described later but what are the psychological and emotional triggers? One does not have to look too far to consider that the attitude that many have towards their work might be related. Long working hours, often under high pressure, is increasingly common, but so is unemployment. Many in the population are suffering from the effects of over and under employment, both of which can be harmful for health.<sup>225</sup> So did Kahlil Gibran get it wrong when he said that:

***"Work is love made visible."* Kahlil Gibran: The Prophet**

Perhaps the above figures are a confirmation of what he said for the above research may be telling us that where there is a lack of love of one's work is also made visible, but in an entirely undesirable way such as cardiovascular events.

This work is not unrelated to the work of Michael Marmot and the Whitehall studies examining the relationship between the social determinants of health and heart disease. Some work has focused on how socioeconomic factors can be associated with different pressor responses to stress causing differences in blood pressure and cortisol thus contributing to variations in disease risk.<sup>226</sup> Similar relationships have been found between socioeconomic status, acute stress and plasma fibrinogen level. Thus "low job control may influence cardiovascular disease risk in men partly through provoking greater fibrinogen stress responses."<sup>227</sup> The finding seemed to be consistent in other social contexts. "Low employment grade and low educational background were associated

with increased age-adjusted plasma fibrinogen level (in Japanese workers).<sup>228</sup> Furthermore, employees who experienced a high level of justice at work had a lower risk of CHD (Hazard Ratio 0.65) than employees with low or intermediate level of justice. This did not change after adjustment for CHD risk factors. "Justice at work may have benefits for heart health among employees."<sup>229</sup>

There are a wide range of things which can trigger cardiac events in those who are predisposed. One study found that vigorous physical exertion increased the risk three and a half-fold and anger more than doubled the risk.<sup>230</sup>

Even acknowledging the usual cardiovascular risk-factors like smoking, cholesterol, and inactivity etc it is important to note that cardiovascular risk-reduction is taken up differentially by different social groups with lower social groups being far less advantaged, perhaps because of the autonomy factor discussed in more depth below. The authors concluded that, "the adoption of healthier behaviour confers greater benefits on those in higher socioeconomic status groups."<sup>231</sup> Their findings are interesting as are the therapeutic recommendations which arise from them.

**"Low control in the work environment is associated with an increased risk of future coronary heart disease among men and women employed in government offices. The cumulative effect of low job control assessed on two occasions indicates that giving employees more variety in tasks and a stronger say in decisions about work may decrease the risk of coronary heart disease."**<sup>232</sup>

Some of the original research has looked for major stresses as being a predictor of acute cardiovascular events and indeed a positive relationship has been found. It is probably not surprising that a major catastrophe like an earthquake<sup>233 234</sup> produces a large but short-lived spike on the incidence of fatal heart attacks which is thought to only occur in individuals who are already susceptible. Perhaps a little more concerning is that events like major football events are also predictive of cardiac events. Home teams losing was associated with a 28% increased risk of

AMI for men but not for women.<sup>235</sup> This had been suggested in previous work. "Risk of admission for acute myocardial infarction increased by 25% on 30 June 1998 (the day England lost to Argentina in a penalty shoot-out) and the following two days. ... The increase in admissions suggests that myocardial infarction can be triggered by emotional upset, such as watching your football team lose an important match."<sup>236</sup>

Much of this might be predictable at least to some extent. For example it was found that men who had larger (20mmHg) increases in blood pressure in anticipation of an exercise stress-test were 87% more likely to have an ischaemic stroke over 11 year follow-up.<sup>237</sup> If the men were poorly educated then the risk was three times as great. This observation like many others could not be attributed to other cardiac and lifestyle risk factors. The increase in blood pressure was an indication of sympathetic arousal in response to emotional stress. This is discussed in more detail in other sections but a similar pattern repeats itself where reactivity to events and perceptions is related to greater distortion of physiology and immunity. In a study of 3,600 people followed over 10 years<sup>238</sup>, chronic tension and anxiety increased the risk of CHD by 25%, Atrial Fibrillation by 24% and mortality by 23%. Anxiety increased the risk of mortality by 22% in men and 27% in women.

Employing a holistic mind-body approach as an adjunct to medical care for serious illness seems to be extremely beneficial because of the direct physiological and indirect life-style benefits. Employing the mind and emotions can include relaxation therapy, meditation, communication, cognitive therapy, resolution of emotional and personal issues, openness and acceptance in a group, looking for meaning and social connectedness. These factors are prerequisites for healing and human flourishing. David Spiegel made the following quote in relation to cancer but it is just as relevant for other diseases. When the emphasis is given to quality of life, mental and social, there is a 'side-effect' that the physical condition improves.

**"Living better also seems to mean living longer." David Spiegel**

Controlled trials looking at the effects of an holistic approach to treating CHD have yielded remarkable results. The fact that such studies are not more often funded and the results not more widely promoted raises some interesting and controversial questions in itself. One such study, looking at the progression of CHD, demonstrated significant improvement in both the disease and quality of life.<sup>239</sup> In this study of people with already well established CHD the control group had conventional medical

management only and the intervention group also had a comprehensive lifestyle program. The logic is that because risk factors are synergistic so too should be the positive interventions. The program consisted of:

1. group support
2. stress management consisting of meditation and yoga
3. a low fat vegetarian diet
4. moderate exercise
5. stopping smoking

	Intervention	Control
<b>Progression</b>	82% regressed	53% progressed
<b>Symptom frequency</b>	91% ↓	165% ↑
<b>Duration</b>	42% ↓	95% ↑
<b>Severity</b>	28% ↓	39% ↑

Interestingly, only a few patients in the control group improved but most deteriorated. What was notable about those in the control group who improved was that they also made significant lifestyle changes of their own accord. In both groups improvement was related to lifestyle change in a 'dose response' manner, i.e. the more change the greater the improvement. Another important point is that the costs of the lifestyle program were vastly less than for bypass surgery despite the results being so much superior. In the US at the time the comparative costs are around \$3,900 for the Ornish program compared to \$40,000 for bypass surgery. Average cost savings were \$58,000 per patient.<sup>240</sup> The observation that better mental health was a great facilitator towards healthy lifestyle change is not surprising. It has been well known that the presence of high stress and depression is a significant predictor of relapse to unhealthy lifestyle.<sup>241</sup>

Recently published five-year follow-up shows that the divergence between the two groups has widened<sup>242</sup> with the intervention group continuing to reverse their disease angiographically. Furthermore, the usual-care group has had nearly 2.5 times as many major cardiac events over the follow-up period. Needless to say the insurance companies are very interested in promoting it but, unfortunately the medical profession has been a little slower in some quarters which raises some interesting potential medico-legal dilemmas if medically valid and effective treatment option are not offered.

***"It is almost medical malpractice not to offer it"***<sup>ii</sup> **Dr Steven Horowitz**

One study does not make a whole case by itself. Another comprehensive study only looked at stress management as a part of cardiac rehabilitation.<sup>243</sup> In this paper the researchers followed 107 people with established coronary heart disease and divided them randomly into three groups, which were matched for other factors. The treatment given to the three groups were included usual medical management but one group also had a comprehensive physical exercise program and the other a stress management program. The elements of the 16-week stress management program included cognitive and behavioral approaches like, learning to monitor stressful thoughts, altering perception and response to stressors. It also taught relaxation and biofeedback and provided group support. Patients were then followed up for a period of five years to see who had major cardiac events over that time; for example non-fatal AMI, fatal AMI, deterioration requiring bypass surgery etc.

- |                         |    |      |
|-------------------------|----|------|
| 1. Control group        | RR | 1.00 |
| 2. Exercise group       | RR | 0.68 |
| 3. Stress manag't group | RR | 0.26 |

The stress management group has a RR of 0.26 (i.e. a 74% reduction in the risk of having another major cardiac event) over that 5 year period. The essential factor

<sup>ii</sup> A leading US cardiologist, was quoted in Business Week magazine in 1993.

which distinguished the stress management group from the others was a reduction in overall distress and, more significantly, a reduction in hostility. This study complements nicely the studies previously mentioned where hostility was related to an increased incidence of CHD and coronary artery calcification.

These are two among many studies. Others too have consistently demonstrated the importance of providing psychosocial support for people with CHD as a way of not only improving quality of life but also helping to slow or even reverse the disease process. A meta-analysis of 23 available studies clearly showed major reductions in ongoing morbidity and mortality for those who have such psychosocial interventions as a part of their cardiac rehabilitation.<sup>244</sup> The increased risk for those with no psychosocial treatment as a part of their management was 1.70 for mortality and 1.84 for recurrence. The conclusions drawn from this study were unambiguous. *"The addition of psychosocial treatments to standard cardiac rehabilitation regimens reduces mortality and morbidity, psychological distress, and some biological risk factors... It is recommended to include routinely psychosocial treatment components in cardiac rehabilitation."*

There are a few so-called 'exceptions to the rule' according to the findings from some studies<sup>245 246</sup> where psychosocial interventions produced no reduction in mortality for depressed and/or anxious patients who had CHD. What was notable, however, was that in each study the intervention produced no change in depression or anxiety either. Obviously an intervention must not only be given but it also must be effective in improving mental health in order to produce a beneficial effect in terms of disease outcomes. Similar issues arise in relation to psychosocial interventions and cancer survival which will be mentioned later.

A large review<sup>247</sup> of the medical literature found consistent data linking particularly depression and anxiety to CHD aetiology with 11 out of 11 studies proving positive. The relationship was less well defined but still positive for type-A personality, work characteristics and social support. The role of depression and anxiety and social support in the progression of CHD is also

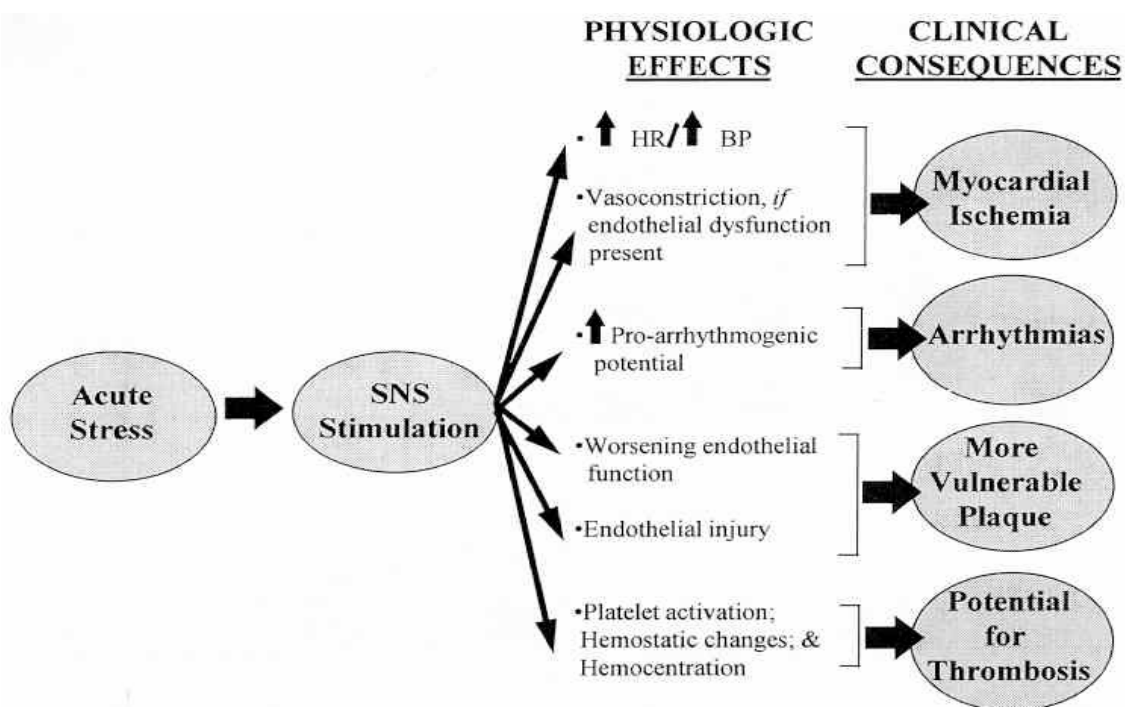
very strong with 6/6 studies yielding a positive relationship. Extensive meta-analysis has suggested that there are good clinical and biological grounds for noting depression as an independent risk-factor for heart disease.<sup>248</sup> Another large review<sup>249</sup> drew a similar conclusion. "Recent studies provide clear and convincing evidence that psychosocial factors contribute significantly to the pathogenesis and expression of CAD." They related CHD risk to 5 specific psychosocial domains being depression, anxiety, personality factors and character traits, social isolation and chronic life stress.

Attempts must be made not only to demonstrate outcomes but also to describe the biological mechanisms behind those outcomes. There is quite a lot known about this now as summarised in figure 2. One of the most important aspects of this work is that links between immunity, inflammation and psychological states are growing stronger all the time.<sup>250</sup>

The autonomic nervous system (ANS) regulates various bodily functions including the cardiovascular system, digestion and many others. It is made up of two aspects; the sympathetic (SNS) associated with the 'fight or flight' response and the para-sympathetic (PNS) associated with restful activities like digestion. One of the things which have been noted with ANS activation in response to negative emotional states like anxiety and stress is that virtually all the activation is SNS. The response is an extremely unbalanced one. In positive emotional states there is a similar increase in ANS activity but it is a balanced one where SNS and PNS remain in harmony.<sup>251</sup>

A range of things can trigger cardiac events including vigorous physical exertion and anger. Physical exertion was reported by 10% and anger by 17.4% of patients in the 1-2 hours before a cardiac event. The risk of a cardiac event after physical exertion compared with light or no activity was 3.50. The risk of onset with anger was 2.06. Anger was more common in younger and socio-economically deprived patients who presented with heart attacks.<sup>252</sup>





**Fig 2: Pathophysiological effects of acute psychosocial stress.** Sympathetic nervous system stimulation from stress leads to a variety of effects which form the substrate for acute myocardial ischaemia and sudden cardiac death. *From Rozanski et al. Circulation 1999;99:2192-2217.*

A relatively new term, called 'vital exhaustion', has recently been used. It is also a major risk for post-AMI complications. When followed for 18 months post-angioplasty the risk for new cardiac events for those with vital exhaustion was tripled unrelated to the medical condition.<sup>253</sup> Long-term follow-up of males showed an increased risk for cardiac death of 8.96 at 10 months, 6.33 at 20, 4.47 at 30, 3.16 at 40 months.<sup>254</sup> The assessment of vital exhaustion was gauged by the response to the statement, "at the end of the day I am completely exhausted mentally and physically." Vital exhaustion is not clinical depression nor is it fatigue secondary to demonstrable physical disease like anaemia.

There is also an increased risk for stroke, especially for men. Those with anxiety and panic are more than twice as likely to die from CHD or stroke.<sup>255</sup> Another study concluded that "rates of stroke were 2.3 to 2.7 times higher in most subgroups with depressive symptomatology."<sup>256</sup> Stroke also seems to be closely related to levels of anger, especially for men, but only for 'outwardly expressed' anger not for

'controlled anger'. Men who expressed more anger had double the chance of having a stroke whereas the risk grew to 6.9 times as great for men with a previous history of IHD.<sup>257</sup>

Meditation by itself is being increasingly investigated as a treatment for cardiovascular disease and risk-factor reduction. For example, use of TM over four months was associated with a 9mmHg reduction in ambulatory blood-pressure readings.<sup>258</sup> These findings have been confirmed in other studies.<sup>259</sup> In a landmark study<sup>260</sup> patients with cerebrovascular disease (CVD) were divided into intervention and control groups with the intervention group taking up meditation for 20 minutes twice a day. The control group had a CVD health education program aimed at lowering risk-factors and also were encouraged to spend 20 minutes a day in relaxing leisure activities other than meditation. What was found over the 6-9 month follow-up was that the meditation group were reversing their vascular disease (0.1mm average reduction in intima-media thickening of the carotid arteries) compared to the control

group whose disease advanced (by an average of 0.05mm). The improvements were not attributable to changes in other cardiovascular risk factors. Such reductions in arterial wall thickness would translate into reductions of risk of AMI of 11% and of stroke of 15%. Larger and more prolonged studies are needed to more fully measure the cumulative effects of meditation on CVD but these preliminary outcome trials are extremely encouraging. This has been followed up with subsequent studies on TM. When elderly people in two RCTs<sup>261</sup> were followed up in the US for over 7 years it was found that the TM group compared with controls showed:

- 23% decrease in the primary outcome of all-cause mortality ( $p = 0.04$ )
- 30% decrease in the rate of CVD mortality ( $p = 0.045$ )
- 49% decrease in the rate of mortality due to cancer ( $p = 0.16$ )

#### **Mind-body and cancer:**

There has been much debate over the years about the role of psychosocial factors in the aetiology and progression of cancer as has already been intimated. A number of studies have suggested a link between them and some of the mechanisms explaining such a link will be discussed later.

Poor coping, distress and depression have been linked to poor survival for a number of cancers including lung cancer<sup>262</sup>, breast cancer<sup>263</sup>, malignant melanoma<sup>264</sup>, and bowel cancer among others. Some studies have not confirmed a link.<sup>265</sup> Elsewhere, global quality of life has also been linked to survival for a variety of cancers.<sup>266 267 268</sup> One study, as an example, showed that a number of factors including the perceived aim of treatment, minimisation<sup>iii</sup>, quality of life and anger all influenced survival.<sup>269</sup> Interestingly, patients who were married also lived longer. It would be true to say that most, but not all, studies have confirmed a relationship between psychological factors and cancer but there are many methodological issues which still

need to be resolved in terms of doing this research.

If psychosocial factors are important in the aetiology and prognosis of cancer then the question which most often raises itself is whether psychosocial interventions such as group support, relaxation and meditation, CBT etc will produce better prognosis. That they improve quality of life is clear but there are very few completed controlled trials examining psychological interventions and survival for cancer patients. Those which have been done have tended to show a significant improvement in both quality of life and survival time but one must elucidate why others have not.

The most noted and first study of its type was done by David Spiegel. He studied women with metastatic breast cancer and showed a doubling of survival time from 18.9 months to 36.6 months from the time of entry into the study. The intervention was group support and some simple relaxation and self-hypnosis techniques plus the usual medical management.<sup>270</sup> Ten years after the study three women in the intervention group were still alive but none in the control group who had the usual medical management alone. Importantly, divergence between the survival curves of the two groups did not take place until some 20 months after entry into the trial.

Sixty-eight patients with early stage malignant melanoma<sup>271</sup> were divided into two groups. At six-year follow-up those who had usual care plus stress management showed a halving of recurrence (7/34 vs. 13/34) and much lower death rate (3/34 vs. 10/34;  $p=0.03$ ) than the group with only the usual surgical management. The intervention was only six weeks of stress management early after the diagnosis and surgery. Both groups also had their immune function monitored which showed that after being originally comparable the stress management group had significantly better immune function six months into the study. We know that melanoma is one of the tumours aggressively attacked by the NK cells of the immune system and this probably contributed to a major difference in survival rates. It would seem that both studies suggest a lag-time between the intervention and improving clinical outcomes. Ten year follow-up on the Fawzy program has still

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<sup>iii</sup> Minimisation is where a person minimises the importance or impact of something such as cancer. In a less appropriate form it is closely related to denial but in a more appropriate form it may reflect an ability to adapt or to see the illness in a larger perspective.

shown a positive effect although this effect has weakened a little over time.<sup>272</sup> With the relatively little amount of research in the field we do not know if, by analogy, the 'dose-response' is not similar to immunization in that 'boosters' may be required to maintain the therapeutic effect.

Other studies, for example with gastrointestinal malignancies, have also yielded promising results in terms of survival for liver,<sup>273</sup> gastrointestinal malignancies,<sup>274</sup> lymphoma<sup>275</sup> but others have shown equivocal or negative results.<sup>276 277 278 279 280</sup> The last of these trials was a large-scale attempt to replicate the findings of David Spiegel some years before but the results were negative despite the fact that the effects of the intervention had a positive effect on mental health. Of the negative trials only two have shown a positive effect on mental health but no significant effect on survival. Of those that showed a positive effect on survival they also showed improved mental health as a result of the intervention. So the trend seems that, similar to the findings in heart disease mentioned previously, where the psychosocial intervention has marginal long-term effect on mood or quality of life it does not seem to translate into longer survival. Although there are an increasing number of trials coming out there are still questions left open in the area of psychosocial support and cancer survival. Such questions can only be answered by judicious and insightful research.<sup>281</sup>

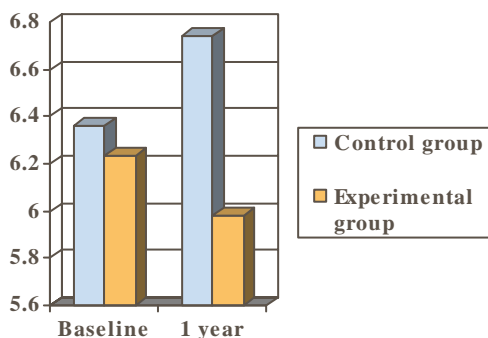
- Does psychosocial support work in terms of improved survival and if so why do some studies show the positive results and not others?
- Doesn't it work and if not what are the factors which are leading to 'false-positive results'.
- Does it help all forms of cancer or only some such as those against which a more vigorous immune response is mounted like melanoma?
- Does it help all patients or only those who really need it or only those who comply with the program's objectives (this is what Ornish found for heart disease)?
- Do all programs work or are positive findings only found with the best targeted and run programs?
- What should a doctor tell their patients on the basis of the presently available data?

An important issue needs to be addressed as in the case of Ornish's work. It would seem that it is not just being in a program which is protective but the level to which the person participates or lives by it. This was demonstrated by a study finding that high involvement in the program was associated with better survival.<sup>282</sup> If studies do not control for this factor they may find ambiguous results. Also important is the fact that different interventions use different styles of group support, meditation etc. Those which use the most validated forms of meditation and also foster positive emotional responses including humour and hope, for example, are far more likely to be successful. Not all interventions are equal. A lot of work needs to take place in determining what sort of interventions work and what is the best way of administering them, either by residential programs, regular support groups or in some other way.

Programs attempting to deal with psychological factors need to take into account that personality traits and coping styles such as 'helplessness'<sup>283</sup> and 'optimism'<sup>284</sup> are probably both inherited and conditioned.

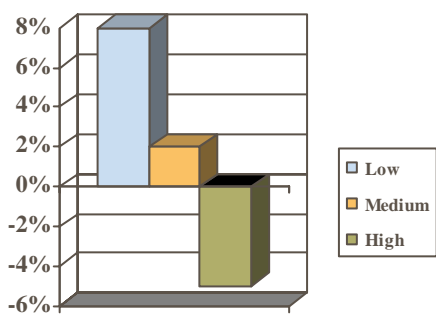
The most interesting research in this field has come along very recently when the first controlled trial on a total lifestyle program was assessed.<sup>285</sup> Again, it was the Ornish lifestyle program, similar to heart disease, but with some important modifications making it particularly relevant to cancer. The study was on men with prostate cancer and evaluated the effects after 1 year of comprehensive lifestyle changes on PSA, treatment trends and LNCaP (a marker of the body's defences against prostate cancer) in men with early, biopsy proven prostate cancer. Participants were men who had chosen not to undergo any conventional treatment, i.e. they had chosen to watch and wait which is not unreasonable considering that most early prostate cancers are not aggressive or life threatening. Ninety-three volunteers were randomly assigned to the experimental lifestyle group or usual care. Over the following year, no experimental (lifestyle) group patients developed aggressive cancer but 6 control group patients underwent conventional treatment due to

an increase in PSA and/or progression of disease on MRI.

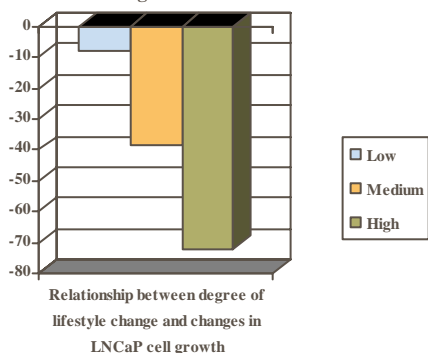


**Mean changes in PSA (ng/ml) after 1 year.**

Furthermore, changes in PSA and LNCaP cell growth were significantly associated with the degree of change in diet and lifestyle meaning that the more lifestyle change the men adhered to the greater the improvement in their condition. The belief that cancer is an inevitably progressive condition may in fact be far from the truth.



Relationship between degree of lifestyle change and changes in PSA



Relationship between degree of lifestyle change and changes in LNCaP cell growth

PSA decreased by an average of 4% in the experimental group but increased by an average of 6% in the control group and growth of LNCaP prostate cancer cells were inhibited 8 times more by serum from experimental than from control group.

The role of exercise by itself is looming large as both a preventive and a therapeutic strategy for prolonging survival for cancer patients. This is independent of its effects on improving mood, immunity, vitality etc. To illustrate, a study on 2987 women with stage 1-3 breast cancer followed for up to 18y found that the risk of death for those who engaged in >9 MET-hr/wk (~ walking 3-5 hr/wk) was 0.50, i.e. they had half the chance of dying over that time.<sup>286</sup> A study on 47620 men over 14 years found that ~3000 had developed prostate cancer. In those older than 65 the risk of advanced prostate cancer was 0.33, i.e. it was one third the risk.<sup>287</sup> In a study on 526 patients with colorectal cancer followed for over 5 years it was found that the risk of death was halved (0.49) for stage II&III cancer.<sup>288</sup> The success of chemotherapy for cancer has been much oversold and compares extremely poorly next to the findings for exercise. "As the 5-year relative survival rate for cancer in Australia is now over 60%, it is very clear that cytotoxic chemotherapy only makes a minor contribution (2%) to cancer survival. To justify the continued funding and availability of drugs used in cytotoxic chemotherapy, a rigorous evaluation of the cost-effectiveness and impact on quality of life is urgently required."<sup>289</sup>

The role of the mind in cancer is hotly debated and on the basis of the present direct evidence one would have to express cautious optimism but to ignore the vigorous pursuit of further research in this field would be a significant oversight. The potential mechanisms for longer survival in those with better mental health and less stress will now be briefly discussed. In summary mechanisms largely fall into a number of categories.

1. Via the HPA axis, cortisol and other stress hormones
2. Genetic mutation and expression
3. Stress causing suppression of the immune cells (NK cells) leading to reduced host defences
4. Induction of protective 'anti-cancer' hormones such as melatonin
5. Angiogenesis; i.e. the ability of cancers to make their own blood supply
6. Better compliance with treatment
7. Improved lifestyle
8. Others?

The stress response, via networks such as the hypothalamic-pituitary axis (HPA), has many far-reaching physiological effects. These mechanisms, built into the physiology to protect life, can be harmful if switched on inappropriately over a prolonged period. Recent research has demonstrated that poor social support, chronic stress and depression are associated with higher cortisol levels and a flattening of the natural diurnal rhythm.<sup>290</sup>

<sup>291</sup> High allostatic load is associated with adverse health outcomes and flattened diurnal cortisol rhythm is a marker of allostatic load. It has been shown to predict shorter survival among women with metastatic breast cancer. Women with metastatic breast cancer have significantly flatter diurnal cortisol rhythms than controls and patients with greater disease severity showed higher mean cortisol levels and flatter diurnal cortisol rhythms.<sup>292</sup> In women with breast cancer these studies suggest that this pattern is highly predictive of poor survival up to seven years later. These patterns of cortisol secretion were also associated with low counts and suppressed activity of NK cells.

Chronic stress produces immuno-suppression and/or inefficient immune function.<sup>293</sup> It has commonly been thought, however, that the body's main defense against cancer is a tumour 'rejection' response mediated through the NK-cells of the immune system. The original hypothesis was that immuno-enhancement through better stress managing potentiated this effect. This mechanism may well explain some of the beneficial effects for some tumours but not all. In some cases, like malignant melanoma, the immune system has been shown to recognise and aggressively attack the tumour but it has also been noted that many other tumours do not wear their antigens on their surface and therefore the immune system cannot recognise them.<sup>294</sup> Other potential mechanisms whereby stress can aggravate cancer include the chemical mediators of the stress response which can stimulate tumour growth, almost like a 'fertiliser'. Some of these mediators can also suppress cancer or even induce apoptosis (cell suicide). Many stress mediators facilitate wound healing but when induced inappropriately they float

around the body and act on rapidly replicating cells, like cancer cells. Even the physiological stress associated with surgery has been shown to increase the growth of tumour metastases at distant sites via these hormones.<sup>295</sup> Therefore it is being increasingly postulated that our approach to cancer has focused far too much on the cell types and has ignored "the aberrant signaling on control pathways malignant cells manifest."<sup>296</sup> Reducing stress hormones such as cytokines, mitogens, PAF and PDGF<sup>297</sup> and inducing hormones associated with well-being and relaxation like melatonin may be part of the reason why stress reduction and psychosocial interventions help cancer survival.<sup>298</sup>

Immune mediators TNF-alpha can kill tumour cells and have anti-tumour effects. It has been demonstrated that many tumours are held 'dormant' by a balance between cell division, cell death and the body's defenses.<sup>299</sup> Upsetting this balance may explain why it has been consistently noted that the occurrence and recurrence of cancer often follow recent traumatic events that the person did not deal with well.<sup>300</sup> In this case it would be more accurate to say that the stress is a contributing or precipitating factor rather than a cause of the cancer.

Many things affect the 'stress system' such as circadian, neuro-sensory, blood-borne and limbic signals. One particular immune mediator which is generating a lot of interest is melatonin. Melatonin apart from having significant immuno-modulatory<sup>301</sup> and anti-aging effects<sup>302</sup> has anti-tumour effects, is anti-proliferative, an intranuclear down-regulator of gene expression, and an inhibitor of the release and activity of growth factors.<sup>303 304</sup> Because of the biological activity of melatonin, these studies also have a number of implications for cancer therapies.<sup>305</sup> Melatonin stimulated endogenously, i.e. at physiological levels, has many beneficial effects but at the much higher pharmacological doses it can actually have very negative effects, such as immuno-suppression, hence there is a risk when people self-medicate. More is not necessarily better. If one looks at the things which stimulate melatonin endogenously we find many of the

interventions which form a part of holistic cancer support programs.

Because sleep is so intimately linked with melatonin, immunity and mood one might expect that it is also linked with cancer progression.<sup>306</sup> Indeed, circadian system – “body-clock” – alterations occur in cancer patients with greater disruption seen in more advanced cases. Psychosocial factors engender the dysregulation of these rhythms. The mechanisms by which circadian disruption might hasten tumor growth are due to the direct effects of altered hormone levels on tumor cells, the effects on tumor versus host metabolism, immunosuppression and reduced efficacy and tolerability of cancer treatments. From a therapeutic perspective, sleep regulation may be a prerequisite for maintenance of host defenses and have implications for cancer prognosis.

The effect of stress on genetic expression has already been mentioned but the evidence is more circumstantial than definitive that stress triggers cancer genes. We do know that we can have

genetic dispositions to cancer and that there are protective genes such as ‘cancer suppressor genes.’ It has also been shown that stress impairs repair of genetic mutations, for example, lymphocytes taken from distressed patients had significantly poorer DNA repair than controls.<sup>307</sup> Stress has been well shown to cause oxidative damage to DNA. Another major defense the body has against cancer is the ability to switch on apoptosis (cell death). In one series of experiments it was noted that psychological stress affected the ability of immune cells to initiate genetically programmed apoptosis.<sup>308</sup> This has implications not only for genetics but also for cancer because a switching off of apoptosis is one of the mechanisms behind the growth of cancer cells. Other markers of DNA repair (unscheduled DNA synthesis and ADP-ribosyl transferase activity) are noted to be suppressed in cancer patients and are potential markers of cancer susceptibility.<sup>309</sup> Thus oxidative stress due to psychological stress and a low intake of antioxidants may both be crucial factors in the evolution and progression of cancer.

<b>The mediation of melatonin</b> <sup>310 311 312 313 314</sup>	
<p><b>Enhanced by:</b>                      Meditation<sup>315 316</sup>                      Subdued lighting after sunset                      Calorie restriction                      Exercise                      Diet: foods rich in Ca, Mg, B6, tryptophane rich foods (e.g. milk, spirulina seaweed)                      Relaxing music</p>	<p><b>Inhibited by:</b>                      Stress                      Drugs especially before bed (e.g. caffeine, β-blockers, alcohol, sedatives)                      Inactivity                      Electromagnetic radiation                      Night shift                      Jet lag                      Excessive calories</p>

Melatonin, among other powerful anti-oxidants and hormonal modulators of immunity and genetic function, may be more important than we realize. Evidence is accumulating that “a cognitive-behavioral regimen integrating cognitive techniques (meditation-based anti-stress, anti-inflammatory techniques, others), dietary modification (“dietary restriction” or modified dietary restriction), and certain forms of aerobic exercise, may prolong the healthy life span.”<sup>317</sup> The likely molecular mediators include DHEA, a variety of interleukins and melatonin which all possess potential regenerative, including stem cell-activating properties. There is potential for dramatic regeneration associated with changes in the pineal gland and bone marrow.

In a series of experiments on workers perceived workload, perceived psychological stress and the impossibility of alleviating stress were all associated with poor markers for DNA damage.<sup>318 319</sup> Further analysis revealed that personality factors were linked to measures of oxidative DNA damage. High measures of ‘Tension-Anxiety’ particularly for males or ‘Depression-Rejection’ for females were correlated with DNA damage as were low levels of ‘Vigor’.<sup>320</sup> Even more interesting was the fact that a low level of closeness to parents in childhood and bereavement in the previous three years were also associated with greater DNA damage. The papers therefore hypothesise that perceived workload, ability to alleviate

stress, psychological distress, gender, coping style, poor interpersonal relationships and family loss might have implications for the pathogenesis of cancer via genetic mechanisms. There is even evidence in animal studies that oxidative DNA damage can be classically conditioned.<sup>321</sup> The implications for all these findings are significant but, as yet, barely explored.

Another area just beginning to be explored involves angiogenesis which is the process of blood vessel formation, a vital process for the growth of tumours. This growth is mediated via many chemicals, principally cytokines. One particularly important cytokine is vascular endothelial growth factor (VEGF). In patients with ovarian carcinoma, for example, high levels of this cytokine have been associated with poor prognosis. It has been known that it is also mediated through sympathetic nervous system activation, a vital part of the stress response, but until recently researchers had not looked for more than a circumstantial link until recently when a study clearly showed that women who reported higher levels of social well being had lower levels of VEGF, good prognostic sign. 'Helplessness' and 'worthlessness' were both associated with higher levels of VEGF but, inexplicably, depression was not related to VEGF.<sup>322</sup> Other studies have also emphasized the importance of angiogenesis in tumour progression and found a link with depression.<sup>323</sup> Due to the effects of stress on immune, neurochemical and endocrine functions chronic stress leads to greater tumor burden and more invasive growth of ovarian carcinoma. Tumors in stressed animals showed markedly increased vascularization (angiogenesis) and enhanced expression of hormones which modulate these effects.<sup>324</sup>

Much more work needs to be done and as yet it has not been studied to know if these poor prognostic signs can be reversed by psychosocial interventions.

#### **Mind-body and asthma:**

The role of the mind in other chronic illnesses such as asthma is becoming well established. This too is not a new idea for many years ago it was observed that people with asthma could have an attack brought on by the sight of a 'paper rose' or

the photo of a cat if they were sensitive to roses or cats suggesting that immune, allergic and inflammatory signals given by the brain can be conditioned. Since then the relationship has been far more fully described and mental and social states can impact on every aspect of the process.

It has also been found that children with a genetic predisposition to asthma will be three times more likely to express the illness depending on domestic stresses and parenting.<sup>325 326</sup> One should not, however, suggest that every child with asthma comes from an unsettled background nor that children from unsettled backgrounds will necessarily get asthma. Emotional states have also been well shown to have effects as asthma triggers and increase asthma severity.<sup>327</sup> It has also been found that unsettled social situations, emotions and relationships are all significantly predictive of asthma deaths.<sup>328</sup> Their conclusion was that *"this study indicates that psychological risk factors were prominent in severely asthmatic children who subsequently died of asthma."* Conflict between child, parents and therapists in any combination were particularly predictive. The discussion about PNI starts to build a platform from which we can begin to understand how it is that stress and psychological states have such an effect on an inflammatory condition like asthma. Further, "Associations among SES, psychological stress, and immune pathways suggest that the experience of stress, particularly among lower SES children, has implications for childhood asthma morbidity."<sup>329</sup>

Programs for the treatment of CHD, such as Dr Dean Ornish's for example, can be possible models for the treatment of other chronic conditions. As most asthma patients are also interested for their medication dose to be the minimum which is compatible with good asthma control there are things which can be suggested. There have been a number of studies which have looked at mind-body interventions for asthma and they will be briefly described below.

Yoga is one adjunct to asthma management which has clear potential. In one controlled trial a two-week training program for 53 patients demonstrated significantly less attacks per week, improved scores for drug treatment and

improved respiratory function tests.<sup>330</sup> These improvements were dependent upon whether the techniques were practiced regularly. Similar results were demonstrated in another larger study.<sup>331</sup> Elsewhere it has been shown that Yoga pranayama breathing reduces histaminic activity.<sup>332</sup> Such exercises, a vital part of many relaxation and meditation practices, are found to improve respiratory function, reduce  $\beta_2$  agonist use, and reduce hospitalisations and sick leave.<sup>333</sup> A double-blind study to compare the effects of breathing exercises (shallow nasal breathing & non-specific upper-body exercises) on asthma symptoms, QoL, disease control, and inhaled corticosteroid (ICS) dose. Patients were randomised to one of two breathing techniques. During 30 weeks, subjects practised twice daily and as-needed. Across both groups, reliever use decreased by 86% and ICS dose reduced by 50%. Reducing medications has related effects of reducing side-effects and costs.<sup>334</sup>

There is some promising early data on Buteyko but though there are subjective benefits not all of the studies have shown improvements on objective measures.<sup>335</sup> Placebo, as with most other conditions, also is effective in treatment of acute episodes of asthma<sup>336</sup> although one would not advocate it as a recommended treatment. Nevertheless placebo does demonstrate the importance of the mind in therapy. Trust, past experience and expectations, therapist enthusiasm and conviction all affect therapeutic outcome significantly. There are other ways of reducing stress, such as using music, and these could offer potential new adjuncts to treatment and this will be discussed later.

### **Mind-body and HIV/AIDS**

For many reasons HIV/AIDS have captured an enormous amount of attention since they burst onto the world health scene in the early 1980's. Accompanying this interest has been a corresponding level of research activity. As HIV/AIDS has so many psychosocial dimensions thankfully much of this research has followed the connections between psychosocial factors, immunity and disease progression.

Consistently HIV progression to AIDS and speed of AIDS progression has been linked with a range of psychosocial factors. For example one study, controlling for a range

of relevant variables including treatment showed that increased stressful life-events, coping by means of denial, low social support as well as high serum cortisol significantly predicted disease progression.<sup>337</sup> The increased risk is not insignificant (2-3 times) at 5 years follow-up.<sup>338</sup> The high cortisol levels associated with chronic stress are also found to be associated with low white cell numbers and higher DHEA-S concentrations, both markers of poor prognosis.<sup>339</sup> Other studies have also confirmed the findings of social isolation and pessimism being poor prognostic factors<sup>340</sup> and 'active confrontational coping style' being associated with better prognosis probably because of both improved compliance and PNI mechanisms.<sup>341</sup>

Promising findings from a randomised controlled trial also suggest that reducing stress through Cognitive Behavioural Stress Management, relaxation and increasing social support is associated with reduced anxiety and catechol output, increased white cell counts,<sup>342</sup> reduced cortisol, DHEA-S, and Herpes Simplex Virus type 2 antibody titres (a common infection in gay men).<sup>343</sup> In another arm of the same study it was also found that the relaxation training on its own was associated with reductions of cortisol levels depending on the level of compliance.<sup>344</sup>

Also interesting is the observation that religious coping (placing trust in God, seeking comfort in religion) and religious behaviour (church attendance, prayer, spiritual discussion, reading religious literature) were associated with reduced scores for depression but only the latter was associated with better immune parameters like higher white cell counts. This effect was independent of symptom status.<sup>345</sup>

So it will be important to consider the role of psychosocial factors in potentially worsening prognosis and also to include these factors in any complete approach to therapy.

### **MS and the holistic approach**

About the same time that Dean Ornish was publishing his groundbreaking research in the holistic management of heart disease<sup>346</sup> another remarkable study was being published in the Lancet on a dietary intervention for the management of



MS but for some reason the study received relatively little notice among neurologists.<sup>347 348</sup> Swank and his team found that over 34-year follow-up, when non-MS causes of death were excluded, only 31% of MS patients put on a low fat diet (less than 20g/day) had died compared to 80% of MS patients on a higher fat diet. Furthermore, the rates of disability and progression of the disease were vastly different in the two groups. It seems that it is not just the amount of fat but the type of fat which is important in MS. In other trials it has been found that supplements with omega-3 fatty acids are associated with significant reductions frequency and severity of relapses.<sup>349</sup> It has been well known for some time that fish and flax-seed oils have significant anti-inflammatory properties in a range of conditions including MS and fish oils are also an excellent source of vitamin D. Countries with lower levels of sunshine have significantly higher incidences of MS. This may well have to do with the ability of sunshine to generate vitamin D which is known to have excellent properties for enhancing immune function, reducing the incidence of MS and also in the treatment of MS.<sup>350</sup> Case control studies on the progression of MS over an 11-year period found that the odds ration for death from MS was nearly halved (OR: 0.53) for those with higher residential sun exposure.<sup>351</sup> High residential exposure and occupational exposure combined was associated with an OR of 0.24, that is, a quarter chance of dying over that 11-year period. The benefits of sunlight may be due to the direct effects of sunlight on immune function and melatonin levels<sup>352</sup> as well as the indirect effects on vitamin D.<sup>353</sup>

Interesting recent research is showing that psychological health also seems to have a significant impact upon the progression of MS as well as the experience of it. For example, one trial has shown that MS "exacerbations were more likely during at-risk periods following (stressful) life events and were relatively independent of the threat level and type of stressor" particularly for people with a high degree of physiological reactivity to stressful events.<sup>354</sup> This has been confirmed in other studies examining MRI evidence of new lesions in the central nervous system. In these studies the researchers found that "stress was significantly related to the

development of new brain lesions 8 weeks later (OR = 1.62, p = .009) and the use of positive coping strategies was associated with a reduced number of brain lesions.<sup>355</sup> Stress is also known to have significant effects upon hormones like Tumour Necrosis Factor (TNF-alpha) which is a significant prognostic factor for MS.<sup>357</sup>

Recent reviews of the literature are increasingly pointing to the importance of the mind playing a role in MS progression. "Chronic psychosocial stressors, however, such as interpersonal conflicts, loss and complicated bereavement, low perceived social support, anxiety and depressive episodes have to be regarded as possible risk factors for the development of MS exacerbations."<sup>358</sup> "Recent MRI and experimental studies, supporting the important role of nervous and immune system interactions, particularly by the hypothalamic-pituitary-adrenal axis and by the sympathetic nervous pathways, seem to demonstrate a significant correlation between stress and MS exacerbations."<sup>359</sup> Possibly mechanisms are being examined although there are many questions still to be answered.<sup>360</sup>

Despite the majority of patients with MS using complementary approaches<sup>361</sup> discussion about lifestyle, diet and complementary therapies rarely forms a significant part of the management of MS for most patients.

Given all this accumulating evidence the only medical therapy widely propagated is Interferon beta.<sup>362</sup> Perhaps this has to do with the fact that it has such huge support of a major pharmaceutical company. Most studies on this product are only short term and it can be expected to reduce the number of relapses by perhaps 30% although "one-third of patients experienced a higher or identical annual relapse rate while on IFNB treatment."<sup>363</sup> This has to be balanced against the enormous physical cost and, more importantly, the significant side-effects including major levels of malaise and lethargy. Because of its effects as an immune system modulator, it can be likened to waking up every day with the flu. These symptoms have to be controlled with a variety of medications which each have their list of side-effects. Another compound, glatiramer acetate

(Copaxone-Teva), has fewer side-effects and similar benefits but is less widely used.<sup>364</sup> We know, however, that levels of interferon can be modulated with psychological (self-hypnosis or meditation) rather than pharmacological interventions with beneficial side-effects<sup>365 366</sup> but we do not know how clinically significant this change might be yet. Of course, we can expect that there will be a far greater economic imperative to investigate the pharmacological solution rather than the natural one.

The example of the case of the management of MS raises as many philosophical and ethical questions as it does clinical ones.

#### **Social factors and health:**

There is a wealth of research data to confirm that social integration and personal relationships have a profound effect upon susceptibility to illness independent of the usual lifestyle risk factors or participation in preventive health programs. Social isolation can clearly have a negative effect but there are many ways in which we can understand what isolation is. Solitude can be a human need just as social contact can be threatening. One can have a 'social life' but be 'socially isolated.' A person can be alone and yet not feel isolated and a person can be in a crowded social situation and feel intensely alone. So social connectedness has as much to do with the way we relate to others as it has to do with availability of social contact. Both contact and relating are important.

Some of the overlap between social isolation, stress and health has already been described in the section on PNI. This connection was further demonstrated in a recent study<sup>367</sup> where 276 health people had their level of social connectedness measured and were then given nasal drops containing two different cold viruses. Those with the least social connectedness had 4.2-times the risk of getting the cold, as well as it being far more severe. Other lifestyle and socioeconomic factors controlled for in the study only explained a part of the finding. The researcher's conclusion was that *"more diverse social networks were associated with greater resistance to upper respiratory illness."*

There are even biochemical changes in the body's neurotransmitter receptors

associated with romantic love. In an observation which will surprise some and not others the changes of romantic love are almost identical to the changes seen with obsessive compulsive disorder (OCD).<sup>368</sup> These changes are high dopamine and low serotonin levels. These changes seemed to last an average of six months. Anyone who has fallen in and out of love may be able to recognise this phenomenon. Perhaps there is a biochemical correlate for different forms of love like lust, infatuation, romantic and Platonic? If one may speculate, one suspects that friendship, companionship and Platonic love would be associated with a far higher level of autonomy and better health.

In terms of the research, social factors can have a negative effect. A US taskforce looking into predictors for CHD found that job dissatisfaction and unhappiness were stronger predictors than the usually accepted risk factors.<sup>369</sup> Some social factors are found to have protective effects on health, for example being married, having an extended network of friends and family, church membership and group affiliation.<sup>370</sup> Social connectedness at home and school seem to be particularly important for adolescents.<sup>371</sup> One huge survey showed this convincingly and also demonstrated that connectedness was also protective from many co-morbidities like depression, suicide, drug and alcohol abuse, teen pregnancy, crime and violence. These are sobering observations in Australia having among the highest rates of youth suicide in the world.<sup>372</sup> Contact between adolescents and adults is important and there were specific times of the day which were particularly important, for example, meal times and when the young person arrives home from school. If a person happens to become depressed then the presence of a 'functional relationship' is associated with a doubled likelihood of recovery after one-year follow-up.<sup>373</sup>

In a cohort study of 13000 people, high social deprivation was associated with double the risk of CHD even when controlled for other factors.<sup>374</sup> Social deprivation was assessed in terms of income, employment, housing, health, education and access to services. It was equivalent in risk-scoring terms to a decade in age or having diabetes.

It would be true to say that not all interventions designed to prevent the problems associated with social dislocation work but there are some that seem to. One study of high-risk young children followed over 20 years showed that preschool classes combined with weekly visits from well-trained teachers reduced the risk of frequent arrests significantly with less than 5% of children in the intervention group having been arrested more than 5 times compared to 35% in the control group.<sup>375</sup> It would seem that the scope for prevention begins to taper off after 11 years of age.

Social support, or the lack of it, are obviously important at every step of the life-cycle. One very surprising study related to the role of stress in the causation of schizophrenia. Previously it had been well known that people with a predisposition to schizophrenia could have it triggered by stress. What is surprising, however, is the role of maternal stress during pregnancy in the etiology of schizophrenia. It was recently demonstrated that women placed under major stress during the first trimester of pregnancy had a 2.8-times increased risk of schizophrenia in the offspring.<sup>376</sup> Previous studies had also noted that stressors like the death of the husband, famine, and unwanted pregnancy made similar findings. The mechanism postulated by the authors is the neuro-toxic effect of extremely high cortisol levels overwhelming the placenta's ability to degrade them effecting the development of the foetal brain. Another intriguing study looked at the effect of support in the form of pre and post-natal home-visits over a one-year period for single and disadvantaged pregnant women.<sup>377</sup> Fifteen years later they followed up the offspring of the women who had the visits and compared them to women in a matched control group who had no such visits 15 years before. What they found was that the offspring of the intervention group had less than half the rate of running away, arrests, convictions, smoking, alcohol use, and lifetime sexual partners. The implications of reducing community supports, especially at a time when traditional family supports have been so much eroded, may be a misguided policy which will bear unhappy fruit many years hence. Short-term economic cost-cutting may be far more expensive in the long run.

Social marginality has been shown to predispose to CHD, cancer, depression, hypertension, arthritis, schizophrenia, TB and overall mortality.<sup>378</sup> Epidemiological data from 2,754 adults demonstrated that socially isolated males were 2 to 3 times more likely to die over the following 9 to 12 years and that women were 1.5 times as likely to die.<sup>379</sup> With regards to CHD socioeconomic factors are clearly independent risk factors<sup>380</sup> but even when a person has well established illness their social context has a profound effect on recovery. Looking at 2,320 adults found that there was a four times increased death rate following AMI if the person was socially isolated and experienced high levels of stress.<sup>381</sup> In another study those over 65 years of age were 3-times more likely to die post-AMI if they had poor social support as measured by the simple question which was, "can you count on anyone to provide you with emotional support (talking over problems or helping you to make a difficult decision)?"<sup>382</sup> These observations were not explainable by the usual physical risk factors or access to medical care.

### **Marriage**

Despite some level of bad press, it has long been acknowledged that marriage is good for health, especially for males. Obviously a happy marriage is a lot better for one's health than an unhappy one but just having a partner is no protection against illness if that relationship is under stress. In such cases an unmarried person is likely to be happier overall than an unhappily married one,<sup>383</sup> but on balance it is clear that marriage is protective for depression and other mental health problems and as a buffer against stress.<sup>384</sup> Interestingly, one study found that of the psychosocial variables "the single best predictor of relapse (of depression) was a patient's response to one question: "How critical is your spouse of you?"<sup>385</sup>

The impact of marriage upon physical health is significant. Let this be illustrated by a range of studies. One which controlled for various risk and prognostic factors, for example, found that women with coronary heart disease had a 3-times higher chance of further major cardiac events including death over nearly 5 years follow-up if they had a stressful marital or cohabiting relationship.<sup>386</sup> Other studies have also suggested that relationships are

relatively more important for women and work for men.<sup>387</sup> Marriage has also been shown to have demonstrable effects upon immune dysfunction and chronic fatigue,<sup>388</sup> the experience of acute and chronic pain<sup>389</sup> and cancer also. One review of the role of relationships and cancer found that "social support in the form of marriage, frequent daily contact with others, and the presence of a confidant may all have protective value against cancer progression."<sup>390</sup> The potential mechanisms probably centre around the modulating effect of stress and psychosocial factors on immunity and resistance.

The effects on physical health are extremely varied including things as diverse as improvements in sperm count for infertile couples who receive CBT<sup>391</sup> to lower blood pressure.<sup>392</sup> Recalling of marital conflict, particularly for women, can have a significant effect upon blood pressure and autonomic activity as one would expect.<sup>393</sup>

Many years ago it had been noted that recent separation or divorce was associated with a significant increase in the chance of death from infectious disease with up to a 6-fold increased chance from death due to pneumonia<sup>394</sup> so there is substance to the myth that one elderly partner is likely to die not long after the other. More recent efforts have gone into finding out the plausible mechanisms explain these observations. It is quite clear from a range of studies that the stress of negative relationships and the hostility in marriage can produce a clinically significant compromise of immunity.<sup>395</sup>

Indeed, one impressive review of nearly 300 references clearly indicated that marriage, and in particular healthy marriage, was profoundly important for good social, mental and physical health.<sup>396</sup> Some studies report that marriage is more protective for men than for women although it is significant for both<sup>397</sup> <sup>398</sup> whereas others suggest that it is more protective for women.<sup>399</sup> Part of the positive effect for men in particular is probably related to the role of marriage on modifying lifestyle or health habits in conjunction with improved relationships and mental health. This latter study also reported that roles within the relationship

have a differential effect in that greater companionship and equality in decision making have a strong positive influence on women but not on men. Taken in its totality we can only say with confidence that marriage is protective for men and women although there are probably some gender differences. It may be difficult and possibly unnecessary to exactly define these differences.

#### **Autonomy:**

A lot of the stress we experience has to do with how we relate to our environment and also to ourselves. Self-control, locus of control and autonomy are important to health for many reasons. Feeling more autonomous (i.e. having greater self-control) seems to be a vital pre-requisite in making and maintaining healthy lifestyle change with less stress. When advice about making healthy behaviour change is given without helping a person to improve autonomy then there is little beneficial effect seen in long-term health.<sup>400</sup> <sup>401</sup> Such advice given with education about self-control, enhancing problem-solving ability and community support starts to have a significant and beneficial effect on health.

The work of Karasek and Theorell has clearly shown that low levels of job control, higher demands than the person has the present capacity to cope with and low support are all associated with high levels of stress and physical illness including cardiovascular disease even when all the usual risk-factors are controlled for.<sup>402</sup> Interventions can therefore be aimed at increasing control, enhancing support or adapting demands to match capacity. With regards to control, the more important is the 'internal' locus of control, i.e. the control which a person feels they have over themselves. CBT, many approaches to psychotherapy and mindfulness are examples of interventions which improve autonomy and ability to meet demands. Demands can be measured in many ways but even the coarsest measure of 'number of hours spent at work' is important. It would seem that the optimal amount of time worked on a daily basis is 7 to 9 hours in terms of avoiding the risk of myocardial infarction.<sup>403</sup> People can extend themselves for a time but the less motivated and committed the person feels or the more their efforts are not met with rewards then the greater the stress the person begins to experience. One must, of

course, distinguish between real and perceived demands. A sense of being overwhelmed can just as easily be related to a perception that the demands are larger than they are or that one's resources are more meager than they are. One must say, in closing, that fostering reasonable empowerment must form a part of any total management plan.

***“But if you want people to change their behaviour, you can't do it with proclamations from the top down by experts. Experts need to learn a new way of being an expert, to empower people to participate in events that impinge on their life.” Prof. L. Syme<sup>404</sup>***

#### **Humour and health:**

***“Studying humour is like dissecting a frog - you may know a lot but end up with a dead frog.” Mark Twain***

***“The arrival of a good clown exercises more beneficial influence upon the health of a town that of twenty asses laden with drugs.” Dr Thomas Sydenham***

Humour has long been associated with health but there are many correlates of good humour with physical states. To begin, it has been observed that with focal damage to the right frontal lobe of the brain it is difficult to appreciate humour or jokes.<sup>405</sup> Poor function of this part of the

brain may play a role in conditions with communicative impairment like autism.<sup>406</sup>

There is good evidence that humour helps to reverse the effects of stress both psychologically and physiologically. Stress has been observed to be much less likely to translate into anxiety and all its range of physical symptoms if the person's use of humour was high.<sup>407</sup> With a low level of humour the tendency for 'stress' to become 'anxiety' is high. A study demonstrated reductions in cortisol, 3,4-dihydrophenylacetic acid (dopac), epinephrine and growth hormone in response to 'mirthful laughter'.<sup>408</sup> That laughter is a potent anti-inflammatory is also documented in the celebrated case of Norman Cousins who managed to 'reverse' his severe ankylosing spondylitis with humour.<sup>409 410</sup> Humour has also been found to raise S-IgA levels in the breast milk and saliva of breast-feeding mothers and a reduced number of URTI's in both mother and infant.<sup>411</sup>

Humour can be introduced into clinical settings in a variety of ways as one study illustrated. Sixty percent of children suffer anxiety in the preoperative period and other studies have shown that high levels of anxiety predictors of postoperative troubles that can persist for 6 months. Clowns on wards were clearly shown to reduce anxiety and assist adjustment but unfortunately because they were seen to 'interfere with procedures' the program was abandoned.<sup>412</sup>

#### **Therapeutic effects of laughter**

##### **Psychological**

- Moderates stress and buffers physical effects of stress<sup>413</sup>
- Improves mood, coping with sadness<sup>414 415</sup> and loss<sup>416</sup>
- Adjunct to psychotherapy<sup>417</sup>
- Reduces anxiety and improves performance<sup>418</sup> and teamwork<sup>419</sup>
- Enhances education<sup>420</sup> and occupational therapy<sup>421</sup>
- Coping with terminal illness<sup>422</sup>, hospitalisation and major medical procedures<sup>423</sup>
- Positively associated with creativity,<sup>424</sup> generativity,<sup>425</sup> emotional stability, extraversion<sup>426</sup> optimism and self-esteem and negatively with distress and depression<sup>427</sup>

##### **Physiological**

- Longevity
- Reduces pain and improves pain threshold<sup>428 429 430</sup>
- Enhances relaxation response<sup>431</sup>
- Reduces stress hormones, e.g. cortisol<sup>432</sup>
- Improves immunity - Stimulates IgA<sup>433</sup>, increases blood leukocytes<sup>434</sup>, reduces stress hormones<sup>435</sup> and buffers against the immunosuppressive effects of stress<sup>436 437 438</sup>
- Improves blood and lymph flow, increases oxygenation, lowers blood pressure and exercises muscles<sup>439</sup>

That humour increases longevity may well accord with our intuition and possibly our

anecdotal experience. We are still awaiting hard evidence although some data does

suggest that long survivors tend to rate higher on humour rating scales.<sup>440</sup>

It is difficult to determine what lies behind the therapeutic effects of humour in health settings. Is it the effect on the patient or the therapist which is most important? One study found that showing humorous videos to schizophrenic patients over a period of time was significantly associated with reduced anxiety and depression. Analysis, however, suggest that the positive effects "may be mediated by the effects on the staff of the incidental exposure to humorous films."<sup>441</sup>

#### **Music and health:**

Music has been used for thousands of years to produce harmony of mind and body. In mythology gods of healing also frequently had connections with music. Philosophers such as Plato saw it as being of the utmost importance especially in terms of education. It was seen as having great potential to do good or harm.

***"Musical training is a more potent instrument than any other because rhythm and harmony find their way into the inward places of the soul on which they mightily fasten."* Plato: The Republic**

In the contemporary context it has a number of applications for wide ranging conditions some of which are listed in the following table. The full therapeutic potential, however, has not been tested adequately with well designed outcome trials. From what data we do have it seems that music has great potential as a form of therapy in itself and also as an adjunct for symptom control. For example, it seems clear that music can reduce the need for medications such as pain killers and sedatives and the unwanted side effects associated with them.

Not all forms of music, however, seem to have the same effects. When differences have been sought between the effects of different music types it has most generally been found that classical music, such as Mozart, and slower or more melodious music have the most beneficial effects whereas harsher, faster and more aggressive music can have a range of negative physiological and psychological effects.

There is also the observation, as one would expect, that that personality types dispose themselves to corresponding music types.<sup>442</sup> It has been shown that some forms of music such as 'grunge rock' are associated with increases in hostility, sadness, tension, and fatigue and decreases in caring, relaxation, mental clarity and vigour.<sup>443</sup> Elsewhere it has been shown that a taste for rock/metal music predicts "suicidal thoughts, acts of deliberate self-harm, depression, delinquency, drug taking and family dysfunction."<sup>444</sup> One must be careful, nevertheless, not to judge or condemn music or people. Perhaps a doctor can 'prescribe' music in therapeutic situations and at very least recommend that patients be more conscious of the effects of the music they listen to so that they may more consciously choose those forms of music which produce the physical, mental and emotional effects which they wish to cultivate.

#### **Therapeutic effects of music**

- relaxation and pain and symptom management<sup>445 446 447</sup>
- reducing cardiac reactivity and improving performance<sup>448</sup>
- reducing anxiety<sup>449</sup> and stress physiological markers<sup>450</sup>
- improved cognitive function in the elderly<sup>451</sup>, young adults<sup>452</sup> and children<sup>453 454</sup>
- improved mood and mental clarity<sup>455 456</sup>
- improved mood, cardiac and respiratory function for critically ill patients<sup>457 458</sup>
- EEG changes and reduced cortisol in depressed adolescents<sup>459 460</sup>
- increased empathy in children<sup>461</sup> but increased assertive behaviour with fast tempo music<sup>462</sup>
- enhanced immunity<sup>463</sup>
- increased melatonin levels<sup>464</sup>

Ambient sounds in our environment can have a positive or negative effect, not only on mental health but also on physical health. To illustrate, it is well known that chronic noise exposure is associated with pathophysiological effects. A study on over 4,000 middle-aged patients who were admitted with a heart attack (AMI) found annoyance with daily environmental noise

was associated with an increased risk of AMI in women and high environmental sound levels, such as are found in many noisy work environments, was associated with an increased risk in men and women.<sup>465</sup>

### Food for the mind

One thing which seems to be striking in the modern world is the pace of life and the apparent need for increasing levels of stimulation to maintain attention. This seems to be increasing rapidly as one observes a concurrent rapid decline in attention span, the very antithesis of mindfulness. This is evident in things as common as the shortening of news stories to ever-smaller 'grabs', the loudness of much popular music to the amount of 'info-overload' and 'multi-tasking' required in daily life. Whether this will have long-term negative effects on the mind will be known in the fullness of time. One suspects it will but the research required to prove this may take decades to perform. In the meantime we have personal experience, common sense and intuition to guide us.

There are other forms of 'food for the mind' apart from music such as literature and television and these can also have potent effects. This issue was pointed to in an interesting article appearing in the MJA.<sup>466</sup> Set against a backdrop of rising youth suicide rates and declining mental health the authors reviewed the themes and characters appearing in the 94 books recommended in the Notable Texts category of the Children's Book Council of Australia Awards for the years 1996-8. These are the books recommended to adolescents by Australian 'experts', although the Australian trend would more properly be seen as a world-wide phenomenon. The study's conclusion was, in short, "*The past decade appears to have been a time of trauma and loss for youth, unrelieved by humour and hope.*"

The power of the written word is enormous. An indication of this is given by an observational study which found a significant increase in suicide rates, particularly for males, following newspaper stories on suicide.<sup>467</sup> Much of this contemporary literature is written in the name of 'realism' or 'truth' but people perceive interpret reality and truth on different levels of depth. One famous saying, for example, suggests that, far

from making one nihilistic and depressed, "the truth shall make you free."<sup>468</sup>

### Mental health issues in contemporary Australian adolescent literature

#### Some key conclusions:

- Psychiatric themes are a major component of the Australian teenage novel. (69%)
- Young people in contemporary Australian literature are beset with trauma, loss and psychiatric disorders (64%) or major loss (78%).
- Even when help is obtained, the outcome is seldom positive but more often mixed or negative. Psychiatry was portrayed in a particularly negative light.
- Most characters were uncertain or despairing about life's challenges. (81%)
- 78% of patients with psychotic illness had a pessimistic illness and 55% completed suicide.
- Only 4% of the works were judged to be 'funny'.
- The nihilistic view may increase hopelessness and pose a barrier for teenagers seeking help.

Undoubtedly we should not ignore the fact of rising levels of suicide and depression in contemporary Western societies, but is our 'reality' merely a product of what we choose to cultivate whether it be in the mind of an individual or community? Would nihilism be our reality if we decided to think and behave in a different way? Perhaps there is an unchallenged belief that writing about such themes informs and protects people whereas the opposite may be the fact despite the best intentions of authors and publishers. Paradoxically, all this is happening at a time when substantial literature such as Shakespeare, the classics and that with more spiritual content, is either being phased out or banned from curricula as being 'elitist', 'outdated' or 'discriminatory'.

Reviews and meta-analyses on the effects of television violence and other negative health messages on behaviour consistently show significant relationships<sup>469 470 471 472</sup> and yet boundaries are for ever being pushed further back in regard to extremes and frequency of violence showed to younger audiences. There may be effects other than just the promotion and imitation of violent behaviour. The increasing amount of time spent by children in front of computers may also be a source of concern especially that recent reviews of the medical literature albeit limited,

suggest that it may be linked with depression and poorer social functioning. Violent computer games have also been linked with increased violence and decreased sensitivity to suffering.<sup>473</sup> Explicit sexual references and lyrics have also been associated with a significantly higher incidence of sexual risk-taking behaviour and associated co-morbidities.<sup>474</sup>

Excessive 'screen time' (TV and computer games) has been associated with psychosocial disturbance and pediatric obesity. The trend in screen time among Australian children aged 10-13 years is quite concerning. In one recent study<sup>475</sup> it was found that 10% boys watch over 5 hours/day and some spend up to 10 hours/day in front of the screen. Only 4-14% watch less than the recommended 2 hours/day. Average screen time is higher in boys – 264 minutes versus 196 minutes for girls – and is understandably higher on non-school days (260 vs. 190 min). Screen time decreased with higher socio-economic status. TV consumed 73% of screen time, video games 19%, non-game computer use 6%, and cinema 2%. The top quarter of screen users were more likely to be boys (OR=3.8), to have low physical activity (OR=4.3), spend more time playing video games (OR=1.8), sleep less, and be of lower SES. These trends and the future health problems which come in their wake later in life should be a source of concern. With US studies suggesting that 17.3% of 15-19 year olds have fatty liver and that 38% of obese children have fatty liver there are a lot of reasons to be concerned about screen time.<sup>476</sup>

The cultural influences which one exposes oneself to can obviously have an effect but equally one's personality will predict the sorts of cultural influence which one seeks out. This was illustrated in a school and community-based study of 1258 19y/o living in Scotland. They have been followed since 11 years old. Over that time the researchers have measured the lifetime prevalence of self harm and attempted suicide. There were strong associations with these and association with 'Goth' subculture. Being identified as belonging to Goth subculture is strongly linked to risk of self harm (53%) and attempted suicide (47%) in a 'dose-response' relationship. Punk and Mosher

were also linked to self-harm but not as strongly. "Both selection and modelling mechanisms are involved, selection mechanisms possibly being more likely."<sup>477</sup>

Media can have a powerful impact on a variety of health behaviours such as smoking, whether we are aware of it or not. A survey of 6522 US adolescents aged 10 to 14 years found that exposure to movie smoking is the primary independent risk factor for smoking initiation. Their conclusion: "Limiting exposure of young adolescents to movie smoking could have important public health implications."<sup>478</sup>

To answer questions as to whether nihilistic literature or violent television and movies has a causative role in encouraging mental illness is difficult due to the methodological issues involved in such research, but it is potentially dangerous to suggest that what we feed the mind doesn't effect it. If advertisers know that just a few seconds of advertising can profoundly change attitudes and behaviour then it is highly unlikely that we can soak the young and impressionable mind for hours in highly emotionally charged or violent literature, music or television and not effect it. So, who knows, we may have to revise our 'dietary guidelines' for the healthy mind in the future.

Ambient noise in the environment can also play a role in children's cognitive and educational development. The greater the exposure to noise such as traffic and aircraft noise the greater the effect. "Our findings indicate that a chronic environmental stressor-aircraft noise-could impair cognitive development in children, specifically reading comprehension. Schools exposed to high levels of aircraft noise are not healthy educational environments."<sup>479</sup> Chronic noise exposure is associated with pathophysiological effects similar to stress and, "Chronic noise burden is associated with the risk of myocardial infarction. The risk increase appears more closely associated with sound levels than with subjective annoyance."<sup>480</sup> A high exposure to noise, such as chronic aircraft noise, has been implicated in poor cognitive development of children including impairment of reading comprehension and recognition memory.



“Our findings indicate that a chronic environmental stressor-aircraft noise-could impair cognitive development in children, specifically reading comprehension. Schools exposed to high levels of aircraft noise are not healthy educational environments.”<sup>481</sup>

### Sunshine and health

For many cultures the sun has been held to be the source of life and health as well as being the symbol of spirituality. That light is good for us might not seem surprising but it has probably been much underrated and underused by the health profession. Sun exposure, of course, is a major source of vitamin D which has a range of important effects upon immunity.

Sunlight (UVB) and/or vitamin D are associated with reduced risk for over a dozen forms of cancer, MS, osteoporotic fractures, and other illnesses. Excess exposure has been associated with the risk of cataracts and skin cancer (only including melanoma in the case of sunburn rather than regular sun exposure) and so there has been a tendency to discourage regular moderate sun exposure. An analysis to estimate the potential benefit or harm of regular moderate sun exposure has yielded some interesting results.<sup>482</sup> Estimated economic burden of insufficient UVB irradiation and vitamin D insufficiency versus excess UV irradiation suggests that 50,000-63,000 individuals in US and 19,000-25,000 in the UK will die prematurely from cancer annually due to insufficient vitamin D. The U.S. economic burden due to vitamin D insufficiency from inadequate sunlight, diet, and supplements is estimated to be \$40-56 billion in 2004. The economic burden for excess UV irradiance on the other hand is estimated to be \$6-7 billion. The benefits as far as health and economy are concerned far outweigh the risks, and yet the vast majority of community messages discourage sun exposure. Obviously avoiding excess exposure is useful but not sun exposure per se.

The following is a brief review of the current literature.

#### The benefits of sun exposure

Sun exposure has been found to be beneficial for the following:

- Coronary Heart Disease
- Cancer

- Mental Health
- Rickets, osteomalacia and fractures
- Psoriasis
- Multiple Sclerosis
- Diabetes

### CHD

Cardiovascular mortality<sup>483</sup> and cholesterol levels<sup>484</sup> have been found to vary seasonally. It has also been found that higher than average levels of Vitamin D are associated with a reduced risk for CHD (odds ratio of 0.43, 95% CI 0.27 to 0.69)<sup>485</sup> and this has been confirmed in more recent studies.<sup>486</sup>

### Cancer

Recently it has been noted that there is a large geographic gradient in mortality rates for a number of cancers in the U.S.<sup>487</sup> which seemed to be related to sun exposure even when controlled for other possible risk factors. The risk in areas of low sun exposure were nearly twice as high as high exposure areas. Cancers noted to be most greatly protected against were cancer of the breast, colon, ovary, and prostate as well as non-Hodgkin lymphoma with eight other cancers showing a trend towards reduced risk. The authors predicted that “the annual number of premature deaths from cancer due to lower UV-B exposures was 21,700 for white Americans, 1400 for black Americans, and 500 for Asian Americans and other minorities. ... The results of the current study demonstrate that much of the geographic variation in cancer mortality rates in the U.S. can be attributed to variations in solar UV-B radiation exposure. Thus, many lives could be extended through increased careful exposure to solar UV-B radiation and more safely, vitamin D3 supplementation, especially in non-summer months.”

### Mental Health

Lowered mood associated with reduced sun exposure and winter is known as Seasonal Affective Disorder (SAD).<sup>488 489</sup> Suicide rates have also been directly related to a low level of sun exposure<sup>490 491</sup> and there is even some data to suggest higher rates of schizophrenia for those with inadequate sun-exposure.<sup>492</sup>

Furthermore one of the first RCT's of its type it was found that "dawn simulation" was significantly more effective than "bright light therapy" and placebo in the treatment of depression.<sup>493</sup>

#### **Rickets, osteomalacia and fractures**

By increasing vitamin D sunlight protects against rickets, osteomalacia and fractures.<sup>494 495</sup> One review concluded that sunshine was a cornerstone of prevention of osteoporosis.<sup>496</sup>

#### **Psoriasis**

Ultraviolet light, from natural and artificial sources, is a well established treatment for the inflammatory skin condition, psoriasis although there are other inflammatory skin conditions which can be aggravated by sun exposure.

#### **Multiple Sclerosis**

A large part of the variation in the incidence and relapse rate<sup>497</sup> of MS has to do with the level of sun exposure.<sup>498</sup> "Highly significant positive correlations were found between relapse duration and temperature variables, total number of sunshine hours and global radiation." Although mechanisms are yet to be fully elucidated vitamin D and PNI may play important roles. The potential for using sunlight as therapy for MS is yet to be tested.

#### **Diabetes**

There seems to be a relationship between inadequate sun exposure and Type 1 diabetes. For example, a population study found, "A low mean temperature and a low number of sunshine hours are inversely and independently correlated to the incidence of childhood diabetes which may partly explain the north-south gradient and seasonal variation in the incidence of the disease."<sup>499</sup>

These effects listed above are probably mediated by direct physiological effects of UV radiation, vitamin D, as well as the effects on mental health via mechanisms described above in sections on PNI etc.

#### **Cognitive decline:**

The CNS has many mechanisms to allow it to adapt to the environment, repair damage, and slow the aging process.<sup>500</sup> These mechanisms include "neurotrophic factors and cytokines, expression of various cell survival-promoting proteins, ... protection of the genome by telomerase and DNA repair proteins, and mobilization of neural stem-cells to replace damaged neurons and glia." Such mechanisms can be impaired by various forms of toxic and oxidative stress and also have significant implication for the development of neurodegenerative disorders like Alzheimers Disease (AD) and Parkinson's disease. Neuroprotective mechanisms can be enhanced by dietary factors (caloric restriction, folate and anti-oxidant supplements) and behavioural factors (intellectual and physical activities).<sup>501</sup> This is being confirmed now in prospective studies, for example, during 4.9 years of follow-up of a middle-aged to elderly population those high in distress proneness (90th percentile) had twice the risk of developing AD than those low in distress proneness (10th percentile). The conclusion of the study was that "proneness to experience psychological distress is a risk factor for AD, an effect independent of AD pathologic markers such as cortical plaques and tangles."<sup>502</sup>

Stress, emotion, memory of past experience, the use of attention and the way we use our leisure and work time all seem to have implications for the development of Alzheimer's disease.<sup>503</sup> Stress, for example, has been shown to damage neurons in the hippocampus which is involved in memory. Pro-inflammatory cytokines produced by immune cells in response to danger signals, or even the imagined perception of threat, act on the CNS. Prolonged activation can precipitate depression as well as trigger the 'sickness response' which may explain many of the symptoms which are experienced in depression like lack of appetite, energy and motivation.<sup>504</sup> This 'brain cytokine system' can become sensitized early in life depending on how we learn to deal with stress and emotional challenges. The 'plasticity' or adaptability of the brain – the ability of the brain to rewire itself even late in life – has been well demonstrated when examining the effects of stress on the brain. The brains of animals were able to be 'wired' for

stress and reactivity within weeks and could 'rewire' or reverse these effects if the animal was allowed to return to a normal environment.<sup>505</sup> Obviously the longer the stress and the older the creature the harder it is for the brain to rewire. This has significant implications for development of anxiety and depression as well as going part way to explaining the role of stress, emotion and past experience in the development of Alzheimer's disease.<sup>506</sup>

For some years the negative effects of television watching on attention focusing and the stress response have been questioned as having a causal relationship in the development of cognitive decline in the elderly.<sup>507</sup> Simple observation or common sense might suggest that if we don't use some capacity then nature withdraws it just as not using our muscles leads to their wasting away but using them builds them up. Perhaps it is the same with our intellectual capacities.

Studies now seem to be confirming these common-sense notions. Those who have less than average diversity in leisure activities, spend less time on them and practice more passive activities (principally watching television) were nearly four times as likely to develop dementia over forty year follow-up compared to those who rated higher than average on these parameters.<sup>508</sup> Protective against cognitive decline are diverse leisure activities, activities which are more intellectually engaging (playing music or games, reading etc) or physical activity. This finding has been confirmed in similar studies.<sup>509</sup> Work in a job one desires is also protective against cognitive decline as is high self-esteem<sup>510</sup> but a daily occupation which creates little interest or intellectual stimulation is associated with significantly increased risk. Physical exercise, even if moderate, also seems to be protective against cognitive decline and stimulates neuronal growth directly.<sup>511</sup> A prospective cohort study of 10308 civil servants aged 35-55 years at baseline (Whitehall 2)<sup>512</sup> measured physical activity levels and categorized them as low, medium, or high. Cognitive functioning was tested 12 years later. Low levels of physical activity were associated with nearly double the risk for poor performance on cognitive tests.

Persistently low exercise was particularly harmful with more than double the risk.

Marriage is also protective with dementia being nearly 2 ½ times more common in the never-married independent of the other risk-factors.<sup>513</sup> Is it the protection against mental illness, the need to engage in communication and diverse leisure activities or is it some other reason?

Major psychiatric illness, on the other hand, is 3-4 times more common in people who later go on to developed dementia.<sup>514</sup> Major psychiatric illness is 3-4 times more common in people who had developed dementia.<sup>515</sup> This is seen both with major depression as well as psychosis.<sup>516</sup> During 4.9 years of follow-up of a middle-aged to elderly population those high in "distress proneness" had twice the risk of developing Alzheimer's Disease than those low in "distress proneness". "Proneness to experience psychological distress is a risk factor for AD, an effect independent of AD pathologic markers such as cortical plaques and tangles."<sup>517</sup> The causal link is not exactly known but it may have to do with the wear and tear on the CNS mentioned previously which is associated with stress and perhaps due to mechanisms involved with DNA damage and repair.<sup>518</sup> It has also been found that amyloid levels – the protein implicated in Alzheimer's Disease – are much higher in the brains of people with depression.<sup>519</sup>

With dementia looming as such a major problem in an aging population increasing attention will need to go towards the means of prevention. The above-mentioned research has many implications for structuring work, leisure and social life in such a way that the risk of dementia is reduced although any benefits of constructive change might take generations to be felt. If current trends in work, leisure and social life are anything to go by we could have a dementia epidemic of far greater than we ever dreamed.

A range of lifestyle factors have been implicated as causes of dementia. A major longitudinal (16 year) study<sup>520</sup> undertaken in Dubbo, NSW, found that any intake of alcohol was associated with a 34% lower risk, daily gardening with a 36% lower risk, daily walking with a 38% lower risk in men, poor respiratory function with an 84% higher risk and depression

with a 50% higher risk. Obviously many of these risk factors are avoidable or treatable. Other studies have consistently indicated that exercise not only halves the risk of dementia but can also stimulate neuronal growth.<sup>521 522 523 524</sup> Particularly useful may be omega-3 fatty acids, possibly because of their anti-inflammatory

effects. "There is a growing body of evidence from biological, observational and epidemiological studies that suggests a protective effect of omega-3 PUFA against dementia."<sup>525</sup> "A healthy life both physically and mentally may be the best defence against the changes of an ageing brain."<sup>526</sup>

**Psychosocial factors affecting risk of dementia<sup>527</sup>**

Risk factors	Protective factors
<ul style="list-style-type: none"> <li>• Major psychiatric illness (3-4 times risk)</li> <li>• High stress</li> <li>• Television watching and passive leisure activities</li> <li>• Living alone, living with a dominant spouse and having no close social ties</li> <li>• Unproductive working style</li> </ul>	<ul style="list-style-type: none"> <li>• Physical exercise</li> <li>• Diverse leisure activities</li> <li>• Intellectually stimulating activities</li> <li>• Marriage and social contact</li> <li>• Stimulating work</li> </ul>

**Sleep**

Quality sleep is vitally important to our mental and physical health. Sleep disturbance, unfortunately, is extremely common either as primary insomnia or as a secondary effect of other health problems. The majority of people if they do present with insomnia tend to only receive sedatives. A review of 24 studies<sup>528</sup> however showed that adverse events were more 4.78 times common with sedatives than with placebo. Common problems like falls were 2.61 times more common in those receiving sedatives and daytime fatigue was 3.82 times more common. Any improvements in sleep patterns with sedative use are small. "The increased risk of adverse events is statistically significant and potentially clinically relevant in older people at risk of falls and cognitive impairment. In people over 60, the benefits of these drugs may not justify the increased risk, particularly if the patient has additional risk factors for cognitive or psychomotor adverse events."

hormone and other stress hormones which have negative impact upon sleep patterns.<sup>531</sup>

In a study of 14,915 European subjects aged from 15 to 100 years<sup>532</sup> it was found that in mood disorders insomnia appeared before (>40%) or at the same time (>22%) as mood symptoms. In anxiety disorders insomnia appeared at the same time (>38%) or after (>34%) the anxiety disorder. Thus sleep frequently precedes psychological problems. Studies of the association of insomnia with depression and mortality<sup>533</sup> have found that insomnia in women predicted subsequent depression (OR = 4.1) but unexpectedly was not related to higher mortality. Insomnia in men predicted mortality (OR = 1.7) but not after adjustment for other risk factors but men with depression at baseline had death rate 1.9 times higher than non-depressed men.

The long held assumption that sleep disturbance is secondary to mood disturbance may be typically the other way around i.e. poor sleep is a major etiological factor in mood disorders.<sup>529 530</sup> Therapeutically, if people with mood disturbance undertake effective strategies to improve sleep, depression frequently lifts. There are, of course, strong physiological links between mood, anxiety and sleep quality. Low mood and anxiety produce effects on corticotrophin releasing

Non-pharmacological solutions to sleep disorders are many and include not going to bed unless sleepy, no stimulants before sleep, not napping for significant periods during the day and the rationalisation or cessation of sedatives.<sup>534</sup> From 24 studies looking at the effects of sedatives in the elderly it was found that, at best, sleep quality was marginally improved but adverse events were more 4.78 times common with sedatives than with placebo. Falls were 2.61 times more common, daytime fatigue was 3.82 times more common and improvements in sleep with sedative use are small. "The increased

risk of adverse events is statistically significant and potentially clinically relevant in older people at risk of falls and cognitive impairment. In people over 60, the benefits of these drugs may not justify the increased risk, particularly if the patient has additional risk factors for cognitive or psychomotor adverse events.”<sup>535</sup>

If pharmacological measure are needed there might be better options than benzodiazepines, for example, the administration of 2mg of melatonin for people with Seasonal Affective Disorder (SAD) has been found to not only improve the quality of sleep but also vitality, addressing a common problem with the more conventional sleeping pills.<sup>536</sup> Perhaps more promising from the point of view of not needing to be reliant on medication is that melatonin can be stimulated endogenously in a number of ways such as using meditation<sup>537 538</sup> and is also stimulated by certain tryptophane-rich foods including milk and sea-weed products.

For many generations we have adopted the idea that 8 hours sleep is optimal but this seems not to be entirely accurate. From long term follow-up of over 1 million people it seems that 7 hours sleep is associated with best long-term health as measured by mortality. More than 8 hours and less than 6 hours were associated with higher mortality as was long-term sleeping pill use.<sup>539</sup> The assumption that more sleep is better is not necessarily well advised notwithstanding the fact that there will be some individual variation and differing needs for sleep depending on age and illness. Sleep might be one more proof of the old adage that one should have all things in moderation. You can have too much of a good thing. These findings were confirmed in a study which found that 9 or more or 6 or less hours was associated with significantly higher mortality due to heart disease in women controlled for other risk-factors. The risk was nearly doubled for those who had less than 5 hours sleep and nearly 60% higher for those who had more than 9 hours.<sup>540</sup>

So as one of the foundations of good health and vitality, the value of quality sleep cannot be over-estimated.

#### **Spirituality and health:**

Albert Einstein is quoted as saying that,

**“Science without religion is lame, religion without science is blind.”<sup>541</sup>**

It seems unusual that such a noted scientist should have such a strong conviction that religion was essential to the pursuit of knowledge and the betterment of the community when the far more common trend is for science to ignore, deride or pathologise religious and spiritual issues, a trend which seems to be well advanced in the medical and psychiatric realms.

Religion and spirituality are rarely mentioned in medical education nor are they generally seen as an integral part of a medical history or therapy, perhaps with the exception of a person with a terminal illness. Considering the evidence we have thus far about how related to health they are, this may be an oversight. Some of this evidence will be referred to below. It should be said that there is also a trend gathering momentum in some circles for scientists such as physicists (Einstein, Oppenheimer and Capra are good examples) to ask deeper questions relating to philosophy and meaning as well as merely mechanistic ones. Similarly, there are movements within psychology and psychiatry, perhaps more so since the time of Jung, to reestablish connections with the spiritual dimension of the psyche. Physical medicine, however, seems to be still far from making any such shifts although promising fields of study like mind-body medicine and psychoneuroimmunology are challenging our materialistic ways of viewing health and illness and asking us to think a little more metaphysically.

Spirituality and religiosity are not the same although they are intimately related. Rigid definitions are fraught with danger but, generally speaking, spirituality refers to a range of things including ‘having a belief in a higher being’, ‘a sense of purpose or meaning’, ‘connectedness to nature and humanity’ and perhaps even ‘altruism’. Religiosity, on the other hand, generally refers to things which are easier to measure such as ‘participating a religious group’, ‘adhering to a religious creed or set of beliefs’ or merely ‘attending church’.

‘Religious commitment’ is far more often referred to in the research because it is easier to measure than the less tangible

'spirituality.' Spirituality obviously closely overlaps with religiosity although it is not difficult to conceive of a person being religious without being spiritual or spiritual without being religious. Related terms are 'intrinsic' and 'extrinsic' religiosity referring to a person's core beliefs and attitudes compared to their group affiliations and attendance at church.

The word 'religion' and 'religious commitment' will be used throughout this paper because they are the terms most often referred to in the medical literature, but in many ways they could be used interchangeably with spirituality.

It would seem that the ignoring of religion and spirituality in health circles is not consistent with the evidence. Although other papers are coming out all the time, one comprehensive analysis of 77 references in 1998 demonstrated consistently that religious commitment was protective for both physical and mental health.<sup>542 543</sup> It mattered little if the studies were prospective, retrospective, controlled for other lifestyle and socioeconomic factors or looked at prevention of, coping with or recovery from illness. Neither do the benefits seem to be restricted to any particular mainstream religion. Religious experience is among the hardest fields of psychology and sociology to study because it is so hard to define isolate and measure. Can religious and spiritual experience simply be reduced to chemical and electrical changes in the brain? The tension between religion and science is probably nowhere more keenly felt than in this domain. The identification of biological and neural correlates of spiritual experiences and the ability to artificially induce them through drugs or electrical stimulation raises many questions. "During religious recitation, self-identified religious subjects activated a frontal-parietal circuit, composed of the dorsolateral prefrontal, dorsomedial frontal and medial parietal cortex."<sup>544</sup> Activity in temporal lobes of the brain is also associated with a number of religious and psychological phenomena including blurring of interpersonal boundaries.<sup>545</sup> Whether the biological changes are caused by psychological or spiritual phenomena or the effect of them is a source of ongoing debate. Religiousness is generally "associated with lower levels of depressive symptoms ... whereas

negative interpersonal religious experience was associated with higher levels." The analysis found that interpersonal religious experience had a particularly strong relation with depressive symptoms emphasizing the importance of social support during adolescence.<sup>546</sup>

To illustrate, it was recently shown that religious commitment was associated with significantly quicker recovery from depressive illness. Every ten-point increase on the scale of religiosity increased the speed of recovery by 70%.<sup>547</sup> A variety of reviews in the psychiatric journals have consistently confirmed that the vast majority of studies show a positive correlation between religion and mental health. Notwithstanding this fact, some people with psychosis religion may play a prominent role in their delusions. Furthermore, many people may well have had negative experiences with organised religion or institutions at some stage of their lives nevertheless, the effect overall seems to be significantly positive. Other data suggests that religiosity protects against drug and alcohol abuse<sup>548 549</sup>, is associated with a four-fold reduction in suicide risk for adolescents,<sup>550</sup> and also for the elderly.<sup>551</sup> Reduced risk for hypertension, heart disease<sup>552</sup>, cancer<sup>553</sup> and other medical conditions have also been found. The protective effect of religious behaviour with relation to HIV/AIDS has already been mentioned.

Religion may well be associated with greater longevity. A recent review of 22,000 people over 9 year follow-up showed that the all-cause mortality was significantly reduced for regular church attenders. Life expectancy was 75 years for non-church attenders, 79 years for those who attended less than once per week and 82 years for those who attended at least once per week. The study controlled for other lifestyle and social variables and these only explained a smaller part of the differences.<sup>554</sup> This is consistent with other data showing lower mortality over 28 year follow-up (Relative hazard 0.64 and 0.77 when controlled for other lifestyle and demographic factors)<sup>555</sup> and better life expectancy and quality of life for those with the religious part of their lives active.<sup>556</sup> That having been said, it would seem that not all forms of religiousness are healthy. We may well

view 'religious struggle' as an indication of questioning and an active search for meaning, which is a good thing. When that struggle is underpinned, however, by thoughts such as "Wondered whether God had abandoned me" (RR for death, 1.28; 95% CI, 1.07-1.50), or "Questioned God's love for me" (RR for death, 1.22; 95% CI, 1.02-1.43), and "Decided the devil made this happen" (RR for death, 1.19; 95% CI, 1.05-1.33) then it was a predictor of mortality over two-year follow-up.<sup>557</sup>

If religion can play an important role in enhancing mental health then it is probably through mechanisms delineated by mind-body medicine which explains how these psychological benefits translate into physical health benefits.<sup>558</sup> Research is clearly showing that stress and negative emotional states are powerful catalysts for illness. Obviously, used wisely, religion can be a powerful source of healing for negative states of mind and emotion. Used unwisely it probably ingrains them.

Harder to explain, however, are things such as the effects of prayer on health. Certainly there is a great deal of research on contemplative practices such as meditation suggesting that they are enormously beneficial for the health probably because of their anti-stress effects. Other studies on intercessory prayer, however, are a little more challenging. For example, the only two large scale well-controlled studies<sup>559 560</sup> looked at the number of complications for patients in a coronary care unit who were prayed for from a remote location and compared them to controls who were not prayed for. Both studies showed significantly fewer complications in the group who were prayed for. Interestingly, in both studies the patients and staff were 'blinded', that is, they didn't know if they were in the group being prayed for or not. The third and most recent study on this subject found a trend towards lower complications of heart disease in the prayer group but due to the numbers in this study it was not a statistically significant finding.<sup>561</sup> A systematic review of the medical literature<sup>562</sup> on prayer determined that evidence was still inconclusive because of the limited number of studies and further research was required in the field. The authors also concluded that because of the nature of the subject under investigation scientific

understanding "*may be beyond any such trials to prove or disprove.*"

Another review of "distant healing"<sup>563</sup> showed that, despite a lack of larger well controlled trials there was some evidence, albeit a little inconsistent, for other forms of healing including therapeutic touch, faith healing and Reiki. Most of the results demonstrated so far, however, are reductions in pain and anxiety and improvements in function. Grander claims such as tumour regression through prayer, therapeutic touch and faith healing have not been rigorously investigated thus far but some promising evidence on the role of meditation for cancer and other life-threatening illnesses is coming forth again probably mediated through reduction of the stress response.<sup>564 565</sup> Even more challenging again is to explore is the phenomena of near-death experiences although even here there are some very interesting trials being published in top quality medical journals such as the Lancet suggesting that there may be much more to investigate here.<sup>566</sup> Trying to distinguish, however, between what is potentially a metaphysical and transcendent experience and what is a biochemical effect of anoxia of the brain will present ongoing methodological challenges to future researchers.

There seems to be a steady increase of studies since the review in 2000. A study on the wellbeing effects of giving and receiving Johrei, a spiritual energy healing practice which also originated in Japan, was carried out in 2005.<sup>567</sup> There are similarities to Reiki and therapeutic touch. In 236 participants it was found that receivers experienced a significantly greater decrease in negative emotional state than givers but givers and receivers experienced a comparable increase in positive emotional state and overall wellbeing

Studies on Reiki are also showing interesting outcomes. In one study the HR and BP decreased significantly in the Reiki group compared to both placebo and control groups. "The study indicates that Reiki has some effect on the autonomic nervous system. ... The results justify further, larger studies to look at the biological effects of Reiki treatment."<sup>568</sup> Other studies have demonstrated a reduction in pain<sup>569</sup> and improvements on

depression and self-perceived stress which were maintained even 1 year after the treatment.<sup>570</sup> Reiki has been found to also produce objective measures of relaxation as well as subjective ones. These include drops in BP, muscle tension and skin temperature and elevations in S-IgA.<sup>571</sup> In a study on stroke patients it was found that although there was a modest improvement in mood and wellbeing there was no improvement in functional status for the patients receiving Reiki compared to sham Reiki.<sup>572</sup>

Other more conventional forms of therapeutic touch such as massage can also play a significant role in reducing stress and improving mood as indicated by one recent study.<sup>573</sup> Massage produced significant decreases noted in cortisol levels (av. 31%) and increases in the activating neurotransmitters, serotonin (av. 28%) and dopamine (av. 31%).

With all that might seem to be positive about the relationship between religion and health there are also some negative aspects and these would tend to attract far more media scrutiny than the positive aspects. Religion and spirituality have had some bad press over a number of years which is understandable when one considers some of the unenlightened things that are done in the name of religion. It is not difficult to observe that people can be misled by false or dishonest religious leaders and that organised religion can be the source of great bitterness and intolerance between peoples of different cultures and denominations. Here there is possibly identification with the more particular, individual and superficial aspects of the religion rather than the essential, universal and deeper nature of it. Another example in the medical sphere of the negative application of religion is illustrated by a review of a series of preventable paediatric deaths where the parent's religious views played a significant role in delaying access to necessary medical care.<sup>574</sup> Religious faith, especially when strong and unsupported by reason, can indeed be harmful to oneself and others. Such observations, however, are more likely to be anomalies of human behaviour, superstition, dogma and prejudice rather than the fault of the established religious teachings and wisdom traditions themselves. These far more often exhort

people to compassion, tolerance and empathy. Despite such problems in religious interpretation and expression, religion still plays a positive and enduring role in many people's lives.

The fact that religion and spirituality are pursued so universally would have to suggest that they are meeting a core human need for meaning and connectedness. They may also play an important role as potential remedies for painful psychological and emotional states, as a means of transcending illness and grief and as a way of explaining the inexplicable. There are probably as many ways to explore and express spirituality and religion as there are people and societies, although it may also be true to say that not every way works as well as every other. Many who might not otherwise consider themselves as spiritual may nevertheless express something of their spirituality in a philosophical or scientific search for knowledge, in humanitarian and altruistic pursuits or perhaps through the search for beauty and creativity. Who knows, maybe there is something of our search for connection, unity and the individual merging in something larger than themselves expressed where ever people gather in communities, even at football matches or political gatherings. Heaven knows, there is no greater religious fervour than one is likely to see at a football ground.

The therapeutic potential of the deeper search for meaning and connectedness should not be lost whether one is overtly spiritual or simply searching for pragmatic solutions to practical problems. The principles and applications may well be the same by whatever name we call it.

Why is there an all too common rejection or at least suspicion of the religious and spiritual in health care and medical education? It may represent a healthy, cautious and methodical scientific approach which bases conclusions on evidence rather than revelation, experience or intuition. As Alastair MacLennan<sup>575</sup> said, "*You need to keep an open mind but not so open that your brain falls out.*" Good advice! On the other hand, it is very easy for science to disregard what it finds difficult to quantify or the rejection may be symbolic of an increasingly fractured, dispirited, and



cynical community. Whatever the reason, and noting that one must be careful with generalisations, it would seem that mainstream healthcare and psychiatry has tended over a number of years to pathologise religious and spiritual issues.

***“Mainstream psychiatry in its theory, research and practice, as well as its diagnostic classification system, has tended to either ignore or pathologise the religious and spiritual issues that clients bring into treatment.”<sup>576</sup>***

Much of this may have started with Freud who saw religion as “a universal obsessional neurosis” and felt that the spiritual and mystic perception of unity was a “regression to primary narcissism.” It

could be hotly debated as to whether Freud actually had any substantial insight into the deepest aspects of human nature or that there is practical merit in psychoanalysis based on his views but this will not be gone into at length here suffice to say that some rather interesting but debated figures have come up from research done on the longer term outcomes of psychoanalysis. What was shown was that Freudian psychoanalysis may actually be harmful for people’s health. The conclusion of the research done by Eysenck and his team was that “psychoanalysis is shown to have a significantly negative effect on survival after seven years follow-up.”<sup>577</sup> Some of the data from this large control trial are given in the table below.

Therapy	Status	Type 1	Type 2	Type 3
<b>(1) Up to 2 years analysis</b>	Living	<b>83.7%</b> (162)	<b>83.7%</b> (90)	<b>83.6%</b> (109)
<b>(2) &gt;2 years analysis</b>	Living	<b>74.2%</b> (102)	<b>69.5%</b> (46)	<b>77.8%</b> (108)
<b>(3) Control for Gp 1</b>	Living	<b>96.1%</b> (162)	<b>94.1%</b> (90)	<b>95.2%</b> (109)
<b>(4) Control for Gp 2</b>	Living	<b>96.9%</b> (102)	<b>88.8%</b> (46)	<b>95.1%</b> (108)

The data suggest that patients with personality types 1 and 2 had significantly negative effects on health if they underwent psychoanalysis and the further they went with treatment the worse it was for their health and for their level of autonomy. Having behavioural therapy seemed to reverse the negative effects of the psychoanalysis. These are controversial findings and one would have to be wary about drawing a causal relationship between psychoanalysis and ill health because the study did not control for every other factor nevertheless there are some serious questions which this research raises. As Carl Jung did, one must question Freud’s ideas about therapy, the view of human nature on which it is based. Who knows, maybe Freud got it wrong?

Jung, on the other hand, believed that humans and all other living things had a central and divine core of goodness, as did Plato thousands of years before. An approach to therapy which looks at individuals and groups in this light will approach issues quite differently and also use different modalities as adjuncts to therapy. It becomes not a matter of

suppressing or subverting base instinct with a veneer of civilisation but more a matter of drawing out what is innately good but latent within the person. After all, the Latin for education is ‘educare’ which means ‘to draw out.’ Drawing out, in this way of thinking, is a matter of removing the impediments to this innate goodness. Incorporation of such philosophical principles into practice are in fact finding greater credence and producing very interesting results.<sup>578 579</sup>

How far, clinically and ethically, should a therapist become involved in the spiritual life of their patients or clients is hotly discussed.<sup>580</sup> Helpful encouragement to consider issues of meaning might be helpful but imposition or forcing an agenda on an unwilling patient is likely to be very unhelpful. Without being over-zealous, gauging a person’s spiritual awareness and sense of meaning in life may well form an important part of a thorough medical, social and psychological history taking care to broach the subject in a sensitive, tolerant and non-dogmatic way. In broad terms, for suitably aware practitioners and educators and motivated patients, therapeutic communities or students,

giving information about the relevance of spirituality to mental and physical health might form an important foundation for a holistic approach. But to have better informed individuals and communities we need better informed therapists and policy makers so education may well be the first issue which needs attention.

Each person or group would naturally explore such issues a way which suited their needs, culture, upbringing, language and natural disposition. Imposing a prescribed approach seems to work less and less well especially considering the questioning nature of this present age and the diversity which exists in communities. More specialised questions of a spiritual and religious nature should probably be referred to culturally appropriate 'experts'.

The ways of making such an approach practical and relevant will be accordingly many and varied. It would seem, however, that there is little excuse to ignore the spiritual, religious and existential issues which people express in their search for healing of community,

body or mind. Because of the potential for spirituality to help a person cope with stress, transform negative emotional states, provide social support and foster healthy lifestyle change it may well help in the management of many medical and non-medical conditions. Ultimately one is unable to avoid physical illness and death and so ultimately one is left with the option of learning to transcend the adversity associated with illness. Transcendence may be the final hope of us all. So it may be a useful and even necessary thing for healthcare professionals to help individuals and communities to explore spiritual, religious and philosophical issues in a way which suits their particular needs in as non-dogmatic and tolerant way as possible. Part of this will be inviting questions, testing possibilities and reflecting on experience.

But however we view these issues, it may be that we will never find practical and lasting solutions to pragmatic concerns until we attend to the deeper issues underlying them.

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## The Practice

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***“The faculty of voluntarily bringing back a wandering attention over and over again, is the very root of judgment, character, and will. No one is compos sui if he have it not. An education which should improve this faculty would be the education par excellence. But it is easier to define this ideal than to give practical instructions for bringing it about.”***

**William James, Principles of Psychology, 1890**

### **Eliciting the ‘relaxation response’:**

The human body has an immense capacity to heal itself given the right conditions. Unfortunately stress and other factors can interfere with this healing taking place naturally. In order to facilitate healing, therefore, one needs to remove the impediments. This can be done in a number of ways the most powerful of which seems to be by eliciting the relaxation response. It is important to note, however, that although meditation is often called a relaxation exercise it is a distinctly different physical and mental state from simple physical relaxation.<sup>581</sup>

Music and regular physical exercise are commonly used methods of eliciting the relaxation response and they have wide ranging beneficial effects for mind and body. Gaining wider popularity in Western culture are long tried techniques from the East like Tai Chi and Yoga. In more recent times other techniques are used such as hypnosis and biofeedback. There are also significant benefits which many experience through prayer, self-expression, confession, creativity, good communication, effective time management and in many other ways.

Probably the most studied stress reduction techniques are the variety of relaxation and meditation exercises. They are not the total answer in themselves but they can be a cornerstone of a total approach which may include counseling, CBT, mindfulness-based stress management etc. Such exercises are like a training ground for the mind to learn to ‘wake up’ and to work more consciously and effectively. The practice one does on a twice-daily basis is not just meant as a nice time-out in an awful day but rather as something which better

prepares body and mind to be able to meet the demands of the day.

### **Meditation**

Meditation as a contemplative practice has many interpretations and varieties and there are many misunderstandings about it. In essence it relies on a combination of concentration and relaxation, attentiveness and calmness. Most techniques will rely on the attention being focussed or rested on a focal point. In the process one learns *not to struggle* with unnecessary and distracting mental activity which is so often full of anxieties, fears, negativity, criticism and the rest. One quickly learns in experience that this reactivity feeds and strengthens the distractions and anxieties. Instead one cultivates the ability to be aware of them but to be less reactive to them. One learns to let go of them and they soon go of their own accord. Our thoughts, often like angry and barking dogs, do not give us much peace and one will note the quickest way to be free of them is to ignore them or be unmoved by them. Fighting or running only leads them to bite us or chase us. As the old saying goes, “resist not evil.” What one practices is not denial or suppression. What one learns is a simple freedom which comes from finally understanding that we can choose to take up thoughts and emotions or not. To use another analogy, like being in a market, we can choose to buy what we wish but we need to learn to take the better and leave the worse.

In a manner of speaking, everyone meditates on something or other. What one gives one’s attention to is what we meditate upon, for better or for worse, and in due course this is ‘what we become’. As the saying goes, ‘as a man (or woman) thinketh, so he (or she) becomes.’ If one feeds a lot of angry thoughts then one is practicing anger and we can soon become expert at it. Unfortunately, this process is going on all the time unconsciously and we lose the ability to stop even when we choose. The following table lists some meditative practices which are widely in use. There are many more variations on these and many organizations offering their own styles of meditation.

### Varieties of meditation and relaxation exercises

1. concentration on the **breath** found in many mindfulness and some yoga exercises or focussing on one or all of the **five senses**, for example listening. The mental clarity and focus often produced is echoed in phrases such as "coming to our senses" or "getting in touch". Such exercises bring the mind into a state of greater perceptiveness in the present moment (ie cultivate presence of mind) and are often called **mindfulness** meditation.
2. **progressive muscle relaxation**. Physical muscle tension is a direct result of a mental tension or "holding on".
3. **mantra meditation** has been practiced in most cultures throughout history.<sup>iv</sup> The mantra, as the focus of attention, is a word or phrase repeated silently in the mind and is given preference to the usual mental agitation and distraction so that it is gently allowed to settle.
4. a **visualisation, affirmations and imagery** can help to settle a distracted or anxious mind to some extent and also encourage attitude change. They are also sometimes used to tap into unconscious thought patterns and memories.

The first three are more aimed at finding a peacefulness and stillness 'beneath the mental activity' whereas the last is more directly aimed at 'reconditioning' the mind. One of the problems with the mind's tendency to visualise and imagine is that it is at the source of much of our stress and maladaptive coping strategies as discussed in the first section of the article. This visualisation takes many forms but includes 'catastrophising', 'awfulising' and prejudging events. It tends to go on habitually and unconsciously as we slowly lose the ability to distinguish between reality and imagination. This form of unconscious and habitual mental activity is of a different nature to the conscious use of creative imagination as used by many artists, composers and inventors.

Different forms of meditation suit different people but whichever form is chosen they all need practice and perseverance in order to be effective. There is little use in thinking in terms of success, criticism or failure, but just practice. With experience comes learning how to meditate more deeply and anxiety about results or progress impedes

<sup>iv</sup>Transcendental Meditation (TM) and the Christian Meditation Network both use mantra meditation as well as many other groups.

the process. Meditation should be simple and easy, and where it is becoming difficult or complicated then one should seek guidance.

Meditative techniques are finding increasing use in clinical practice for both groups and individuals.<sup>582</sup> Fortunately benefits can be just as marked for the therapist as they are for the patients. Unlike many pharmacological and surgical treatments, the side-effects are beneficial. Of the various forms of meditation the most researched and used in the contemporary scientific and therapeutic contexts are mindfulness meditation and mantra meditation. As a stress reduction technique mindfulness meditation has also been clearly shown to be powerfully therapeutic including for the medical profession and medical students.<sup>583</sup> Unfortunately there is not nearly enough literature on stress management for medical students and doctors.<sup>584</sup> Some of the advantages demonstrated are found in table 2.

### Some conditions found to be responsive to mindfulness therapy

- improved immunologic functioning<sup>585</sup>
- reduced anxiety<sup>586</sup>, distress and depression<sup>587 588 589</sup>
- increased empathy and spiritual experiences<sup>590</sup>
- enhanced knowledge of alternative therapies<sup>591</sup>
- improved knowledge about stress<sup>592</sup>
- improved sensitivity towards themselves, their peers and patients and reduced perception of isolation<sup>593</sup>
- greater use of positive coping skills and less use of negative coping skills<sup>594</sup>
- resolution of professional role conflicts<sup>595</sup>
- coping with cancer<sup>596</sup>
- improved sleep<sup>597</sup>
- as a treatment for fibromyalgia<sup>598</sup>
- reduction of chronic pain<sup>599</sup>
- as an adjunct to the management of eating disorders<sup>600</sup>

In studies on undergraduate students<sup>601</sup> it has been found that mindfulness is negatively correlated with depression, anxiety and neuroticism and positively related to emotional intelligence. Two of the main hallmarks of EI are 'self-awareness' and 'self-regulation' and so a connection between mindfulness and EI would not be surprising. Self-discipline, IQ and performance are all closely related, as is self-regulation. Self-discipline predicted

final grades, school attendance, achievement-test scores, and selection into competitive educational program.<sup>602</sup> A 'behavioural delay-of-gratification' task, questionnaire on study habits, and group-administered IQ test were added to this study and revealed that "Self-discipline accounted for more than twice as much variance as IQ in final grades, high school selection, school attendance, hours spent doing homework, hours spent watching television (inversely), and the time of day students began their homework. ... These findings suggest a major reason for students falling short of their intellectual potential: their failure to exercise self-discipline."

One of the most attractive aspects of this simple form of 'therapy' is that the side-effects, be they physical or psychological, seem to be so beneficial. When coming to such practices ourselves or in introducing them to others it is important to deal with the relevant agenda whether it is learning to relieve anxiety<sup>603</sup>, to help prevent relapse in depression<sup>604</sup> <sup>605</sup> or cope with cancer<sup>606</sup>, fibromyalgia<sup>607</sup> and chronic pain,<sup>608</sup> learning to study better, using it as an adjunct to the management of eating disorders<sup>609</sup>, hypertension or asthma etc. Often times the positive side-effect profile can be put to good use as illustrated by a study on cancer patients demonstrating improved psychological health and quality of life in response to mindfulness-based stress reduction but also concomitant improvement in immunity.

There is still an enormous need for further research to more fully test the application, efficacy and safety of practices like mindfulness. Most interesting are the studies utilizing neuro-imaging techniques which show that long-term mindfulness meditation is associated with thickening of brain regions associated with attention, interoception and sensory processing compared to matched controls. Meditation might offset age-related cortical thinning and there is now "evidence for experience-dependent cortical plasticity associated with meditation practice."<sup>610</sup>

Mindfulness can be used by itself, as in MBCT, or as an adjunct to individual psychotherapy. For example, when it was used as an adjunct to psychotherapy it resulted in more rapid alleviation of symptoms, increased achievement of

therapeutic goals, and a decrease in number of therapy sessions sought by clients.<sup>611</sup> At the conclusion of MBSR training, the groups showed a comparable significant decrease in psychological distress but the MBSR group's gains on goal achievement were significantly greater than those of the comparison group and they terminated therapy at a significantly greater rate than the comparison group.

Suicidal thoughts are a feature of depression and tend to be "reactivated as part of a suicidal mode of mind whenever sad mood reappears".<sup>612</sup> In MBCT non-reactivity to such thoughts, as potentially disturbing as they might be, helps one to cultivate a moment-by-moment awareness and approach ongoing experience with an attitude of nonjudgment and acceptance being able to see thoughts as mental events rather than facts. This is called metacognitive awareness.

Possibly the ultimate aim of meditative and contemplative practices are the more spiritual, philosophical and self-knowledge aspects which become obviously relevant as time goes on. But always, a person proceeds at their own pace and in their own way. One may find over time that what was originally of central importance, such as the side effects of meditation, becomes of more peripheral importance, and what was originally of peripheral importance becomes more central but at every stage the process should be relevant to the person's needs, it should be offered and never imposed on someone and it needs to be in a form appropriate to the person's culture and beliefs.

Occasionally a person can find that, like turning on a light, the greater awareness generated by meditation can initially make more obvious and disturbing certain thoughts, memories and fears which may be lying just below conscious awareness. Some of these can be quite strong and so one needs some courage and patience. It is best to proceed gently and never to force a person to proceed unwillingly. It is important to be quite clear in reminding the person to see the thoughts as they are, images and feelings rising and falling on the surface of their awareness. In this way a person learns self-control by staying with the awareness rather than being reactive to what they are aware of, much like learning

to watch the movie while remembering that it is just a movie. With patience one learns to have considerable control through detachment from them and they can soon lose their emotive power.

There are few contraindications to meditation but states of acute psychosis would probably be one. In such states the person has little insight and objectivity about what is in the mind. There is little evidence about the use of meditation for psychosis in remission and so one should exercise caution if it is to be used and it should not be seen to replace the appropriate use of necessary medication in such cases. Careful supervision should be exercised if it is used. Although meditation can help with depression it is generally better to use it in conjunction with other therapies as required. In time the meditation may help to get closer to the thoughts which cause and aggravate depression in a much deeper way than the medication can do.

#### **Mindfulness meditation:**

Mindfulness meditation is about learning to concentrate in a restful way and so deal with daily stressors and internal anxieties in a more effectively. It is practical and one of the best validated methods of meditation and if taught well does not need to clash with cultural background.

It is recommended that it be practiced initially for 5 minutes twice daily (before breakfast and dinner are good times). Sleep can predominate more easily after food. This can be built up to 10 to 30 minutes or longer if required depending on a person's motivation, needs and commitment. Regular short **pauses** at other times during the day can help to reinforce the meditation practice if needed, even if one only pauses only for long enough to take a couple of deep breaths, just to help break the build-up of tension and mental activity throughout the day. If one could use an analogy these are like the full-stops and commas with which we punctuate our day.

#### **Preparation**

It is helpful, wherever possible, to have a quiet place to practice without interruption. This is not to say that it cannot be practiced anywhere, any time.

#### **Position**

A position where one is less unlikely to go to sleep is best for meditation so sitting in an upright position, with the back and neck straight, is recommended. Lying down can also be useful but the ease of going to sleep may not always be desirable unless it is late at night. Make sure the position is balanced and relaxed, with no strain or undue muscle tension. Let the eyes gently close.

#### **Progressive muscle relaxation**

Be conscious of the body and let it fall still. Now, become aware of each part of the body and release muscle tension patiently, consciously and methodically. Start with the feet and then move to the legs and so on to the stomach, back, hands, arms, shoulders, neck and face. If one becomes aware of any tension coming back into the body just practice letting it go again. The important thing to remember is that one does not have to make oneself relax, it is more a matter of 'allowing'.

#### **Breathing**

Now for a time feel the breath as it passes in and out of the body, by simply letting the attention rest right where the air passes enters and leaves. Again, no force is required. If distracting thoughts and feelings come into the mind, carrying the attention away with them, just be aware of them but let them go. There is no need to try and stop these thoughts coming into mind, nor to try and force them out. Trying to force them out just feeds them with attention and makes them stronger so one learns to be less reactive to them. It is like standing back from, observing and letting go of the thoughts, even letting go of the thought of 'getting the right result' from the meditation practice. It sometimes helps to just see the mental activity as images on a movie screen or passing traffic which one does not need to engage in whether they be pleasant or unpleasant.

### **Listening**

Now, practice the same restful attentiveness with the listening by being conscious of the sounds in the environment both near and far. Let them come and go and let any thoughts about the sounds come and go. Once again let go of the distracting thoughts which prevent us from both resting and coming into the here and now.

### **Finishing**

After practicing for the allotted time slowly go backwards through the steps, i.e. being aware of breathing then the body and then slowly allow the eyes to open. After remaining settled for a few moments move into the activities which need your attention.

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## The Philosophy

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### Science, Spirituality and Philosophy:

***“Intuition is a sacred gift and rationality its faithful servant.” Albert Einstein***

Science and philosophy explore knowledge in different ways. One way in which this difference could be expressed is that the former looks at that which is measurable and the latter at that which cannot be measured. One seeks knowledge by looking from the outside in, and the other seeks knowledge in the form of wisdom by looking from the inside out. One seeks knowledge as information and the other explores knowledge via intuition and revelation. Both draw on experience.

Great scientists like Einstein are often very philosophical in their reflections and sympathetic with the notion that knowledge is ‘latent in the soul’. Being latent it need to be drawn forth or delivered. Plato, for example, said that all knowledge was ‘recollection’ and the teacher’s help in delivering that knowledge is like ‘midwifery’. Although modes of expression may vary, one finds that the more one explores the more one finds that similar themes are expressed in the great philosophical traditions of East and West.

### The Holistic model:

One thing which many great healers feel intuitively is that a person must be treated as a whole. Analogies help to explain the holistic relationship between various aspects of ‘self’, i.e. consciousness, mind and body. Some describe it as similar to the relationship between the conductor and the orchestra. If the conductor is out of harmony it affects the coordination and harmony of the orchestra. It is also likened to a driver and a vehicle where the driver directly affects the way the vehicle drives, its efficiency, maintenance etc. Careful drivers obviously get the best out of their cars, have the fewest accidents and need the help of the mechanic the least.

**“The body is the shadow of the soul:”<sup>v</sup>**

A more holistic view of health begs a

number of metaphysical questions and one cannot really begin to explain mind-body medicine without asking such questions. In Western philosophy Plato possibly gave such a view its most eloquent expression. At length in ‘The Republic’ he constructs the great allegory of the ‘underground cave’. He says that in this cave, which is illumined by the sun shining through its mouth, we sit chained, forever condemned to see only the shadows cast on the wall of the cave. We never know, because we never turn our heads, the objects behind us that cast the shadows, nor do we see the source of light. Here he depicts the plight of those who see only the physical world, the world of shadows. This is materialism. To the materialist, the physical world is the real world and there is nothing deeper than it. Einstein had another view, as did Plato. For them, that which is illuminating and powering the whole show is the most central or primary aspect of ourselves; consciousness. The realm of mind relates to the objects, and the shadows are the physical world. This metaphysical view of the human being also included his view of the whole universe. On this view, nothing happens in the physical world without happening in the mental world first. The ascent of the soul from the temporal world of the physical to the spiritual world of consciousness is symbolised by moving towards the light, the Good. It is the rugged path of the mind towards enlightenment or wisdom through the use of reason.

***“The prison-house is the world of sight, the light of the fire is the sun, and you will not misapprehend me if you interpret the journey upwards to be the ascent of the soul into the intellectual world ... In the world of knowledge the idea of good appears last of all, and is seen only with an effort; and, when seen, is also inferred to be the universal author of all things beautiful and right, parent of light and of the lord of light in this visible world, and the immediate source of reason and truth in the intellectual; and that this is the power upon which he who would act rationally, either in public or private life must have his eye fixed.” Plato: Republic; Book 7***

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<sup>v</sup>Marsilio Ficino (1433-99) was the great Platonic philosopher of Renaissance Florence.



The conception which Plato describes in this allegory is very similar to that described in other traditions and sources of literature. Analogy and metaphor are often used to describe that which the mind finds hard to grasp.

***“For in and out, above, about, below, ‘tis nothing but a magic shadow show, played in a box whose candle is the sun, round which we phantom figures come and go.” Omar Khaayam***

***“Life is but a walking shadow, a poor player who struts and frets his hour upon the stage and then is heard no more. It is a tale, told by an idiot, full of sound and fury, signifying nothing.” Shakespeare: Macbeth***

The ‘intellectual world’ as described by Plato includes the ‘forms’. These forms are like the concepts or blueprints in the mind which are used in the process of creating something in the physical world. It is like the seat of intelligence, whether we see it as human or divine, and tapping into it is similar to what Einstein described as intuition. It is deeper than and therefore causal to the physical world. Anyone who creates something may find there is an initial mental ‘flash’ of creativity or insight which then formulates itself and is enacted in a physical sense. Mozart in some of his letters describes this in some detail. Thus, people over the millennia have used attention regulation as a creative wellspring.

Because body and mind are so intimately related they are one and the same and yet different. On one level there is a ‘Cartesian’ dichotomy, like the driver and the car, and yet in another way they are unquestionably a unit. One cannot function without the other. The body, including the brain, is physical and tangible. The mind is non-physical, subtle or intangible. A thought has no weight or shape; for example a thought of a circle is quite different to one drawn on a piece of paper though the latter symbolically represents the former. The architect can envisage a building before its physical manifestation. If given consciousness a thought will stimulate a physical response expressed all the way from the neurotransmitters to the skeletal muscle. These responses can be measured by

various means and our ability to measure such activity in the brain is becoming particularly sophisticated. But where a philosopher with a metaphysical view might diverge from a scientist with a more materialistic one is that the former sees that mind produces the electrical and chemical activity in the brain, not the other way around. Mind is the cause of what happens in the body and the physical is the condition or effect, not the cause. Plato put it this way.

***“There is surely a strange confusion of causes and conditions in all this. It may be said, indeed, that without bones and muscles and the other parts of the body I cannot execute my purposes. But to say that I do as I do because of them, and that this is the way in which mind acts, and not from the choice of the best, is a very careless and idle mode of speaking. I wonder that they cannot distinguish the cause from the condition, which the many, feeling about in the dark, are always mistaking and misnaming.” Plato: Phaedo***

In many ways, one is challenged to come to a metaphysical understanding of this relationship between consciousness, mind and body before one can begin to explain many of the unusual scientific observations made in mind-body medicine. If one tries to understand the world in purely physical terms one is liable to meet confusion and misunderstanding. Thus, the causes of illness lie deeper, and therefore it is natural that when illness arises the cures lie deeper also. This does not preclude the importance of physical factors or the application of physical treatments, but it merely suggests that they are dependent on deeper causes. The shift of emphasis from what happens on the surface in physical terms to what is driving the process, i.e. moving from looking at the condition to the cause, totally shifts the emphasis of treatment.

***“You ought not to attempt to cure the body without the soul; and this is the reason why the cure of many diseases is unknown to the physicians of Hellas, because they are ignorant of the whole, which ought to be studied also; for the part can never be well unless the whole is well. ... Let no one persuade you to cure the head, until he has first given you his soul to be cured by the charm***

***(fair words). For this is the great error of our day in the treatment of the human body, that physicians separate the soul from the body." Plato: Charmides***

#### **Natural intelligence:**

***"Every one who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the universe - a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble. In this way the pursuit of science leads to a religious feeling of a special sort, which is indeed quite different from the religiosity of someone more naive."***  
**Albert Einstein - The Human Side.**

One of the most notable ideas held by the ancients, and still expressed in theology and holistic health, is that there is an orderliness or intelligence permeating the whole of nature. One only has to look at the beauty and geometry of natural forms or the complexity in biological processes to have a sense that it must be the product of a conscious and intelligent creative process.

To Einstein it would have made little sense to suggest that a computer or a car is the product of design and intelligence and yet the human brain and body, which is vastly more complex, is the product of chance. He asserts that it is all the product of an intelligent and conscious process. This is not the same as the naïve view of 'creationism' or 'intelligent design' often associated with this concept. The body's

innate and natural tendency to spontaneously heal itself with great intelligence, precision and coordination is recognised by all ancient and traditional healing systems, whether they be indigenous, Hippocratic, Chinese Traditional Medicine, the Indian system of Ayurveda or any other. The tendency to move away from holism to reductionism is also an age old one dating back to ancient Egypt.

***"Medicine is practiced among them on a plan of separation, each physician treats a single disorder, and no more: thus the country swarms with medical practitioners, some undertaking to cure diseases of the eye, others of the hand, others again of the teeth, others of the intestines..."*** Herodotus

This is not to say that specialised knowledge is not extremely useful but, according to the holism, it should not be at the expense of an holistic perspective. Traditional healing systems tended to appreciate the holistic principle but contemporary science has certainly been able to elucidate the biochemical mechanisms in far more detail. The risk has always been, however, that the principle gets lost in the plethora of information. So perhaps one important principle that we need to be reminded of is that we do well to work with nature, not against her.

***"Thus the physician strengthens nature, and employs food and medicine, of which nature makes use for the intended end."*** Thomas Aquinas

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## Conclusion

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It is hoped that, in the course of reading this article, the simple principles of MBM and stress management have been apparent. The mechanisms are infinitely complex but this need not prevent us from intelligently utilising the principles.

There is a risk in all of this discussion about stress, emotions, personality factors and the rest, that we will become so 'stress conscious' and fearful of its effects that we will create a bigger problem than we started with. The key messages of effective stress management involve 'waking up' or focussing the mind and learning to let go or relax. The key message for healing is to primarily enlist the help of nature by observing natural principles. It is essential to cultivate awareness of both of self and environment. Through this awareness we can begin to cultivate better coping strategies and our behaviour can adapt more appropriately to events. The roles of perception and cognition are also vitally linked to stress and its management. It is often not what is happening around us but rather how we are seeing and responding to it which determines how stressful

something is and how much damage it causes therefore it makes sense to clarify perception and increase stress-hardiness.

Just observing the relationship between stress and illness is of limited value unless it is combined with useful therapeutic interventions and intelligent community health strategies. It is highly likely that the policy of investing huge amounts of resources and research into high-cost technology with diminishing returns is behind many of our present health-funding crises. If nature is intelligent and consistent with herself, as one suspects she is, then good health and good economics will work on the same principles. This does not mean doing away with the best that modern technology and pharmaceuticals have to offer but they must be used judiciously, wisely and in an holistic perspective. The notion of intervening only when illness strikes should possibly be placed upon preventing illness and cultivating wellness. In this way health, human flourishing and happiness can be seen as complementary goals.

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