



## *Why Is Tai Chi Good For You?*

*by Dr. Alistair Nunn*

### **Introduction**

The benefits of Tai Chi can be intuitively obvious, but are sometimes clouded by new age mysticism and probably, by the occasional “lost in translation” from the Chinese. The clue, however, is to be found in many books written by masters past and present: although health benefits can be accrued by practicing to any level, the maximum is usually obtained when one reaches sufficient proficiency to use it as a martial art. In a sense, it is an example of a truism based on real wisdom; no pain, no gain – which has its roots in evolution by natural selection. In order to improve, life has to be challenged. Modern thinking and science is now bearing this out.

When Tai Chi was being evolved it was clear that the strongest, smartest, fittest and healthiest martial artists were also the best. Thus it could be said that Darwinism was at work within the arena of combat, as natural selection slowly selected those characteristics essential for survival. But unlike natural selection through genetic selection, many individuals through the ages realised there was a very important link between health, exercise, fitness, meditation, intelligence and longevity – and the art of combat. Hence, the art of self-defence intellectually evolved through trial and error and encompassed an ancient principle forged through the fires of evolution.

Compared to untrained folk of the time, and before guns, professional body guards were simply in a different league. Legends abound of these super heroes living longer and being very wise and calm, while being capable of astonishing feats of strength and agility. Many thought it was magic or that they had been given special powers. The truth was far more down to earth; the exponents and masters themselves knew that it was down to training and “eating bitterness”. In effect, they realised that we become smarter and stronger in response to challenges that stretch the mind and body. Although modern man has created for many a very benign and safe environment, in doing so he has removed the very things that kept our ancestors fit and strong. Training in Tai Chi helps to restore some of these lost challenges.

### **Move the body, move the brain**

In today’s world, most people in the developed nations are basically overweight and sedentary. We cannot delude ourselves because the consequences are all around us: the rising tide of diseases related to obesity and a sedentary lifestyle are accelerating the aging process [1]. Furthermore, it is making us less smart; one of the markers of this modern lifestyle, something called the metabolic syndrome that forewarns of developing diabetes, has been clearly shown to be associated with reduced cognitive powers [2]. Globally, it is estimated that 30% of the population do not meet even basic exercise targets; in the UK, this figure is more than 50%, and is even worse in the over 60s [3]. Globally, inactivity could be causing 9% of premature mortality – and is equivalent to smoking [4].



One of the key markers of this sedentary lifestyle, and thus the metabolic syndrome, is increased inflammatory tone throughout the body [5]; chronic inflammation is well described to accelerate the aging process – especially in the brain [6,7]. On the contrary, not only does exercise suppress inflammation [8], but it improves intelligence and has been shown to increase neurogenesis (induce more brain cells) – even improving cognition in the elderly [9-11]. Everyone one knows that exercise makes you stronger and more robust, but not everyone realises that it makes you smarter. One of the reasons is that to move efficiently, the brain has to be fit and strong as well, because it coordinates it all – so when you exercise your body, you exercise the brain.

Another way to look at this is that intelligence has been key in the evolution of longevity, as it enables an organism to better adapt to its environment and so survive longer. Thus, anything which stresses it will tend to enhance the function of the central nervous system. This is not only restricted to exercise. Data also suggest that mild calorie restriction is neuroprotective [12], and can increase the will to exercise as a response to find food [13]. So evolution has ensured (because we evolved in a tough environment), that exercise and smartness went hand in hand, because it meant you were more likely to find food and survive.

### **Calm the brain, calm the body**

Another well described technique for surviving in a modern world is mindfulness meditation – and is often used as an antidote to high levels of psychological stress. However, it is actually a very old practice that has been helping people live longer and healthier lives for millennia; it has always been at the core of many high level martial arts. Critically, science is now proving why.

Meditation takes many forms, but at its core is the ability to control the mind and quieten it down – and this is a learnt skill that enables people to be “in the moment” and control their “monkey brain”. The benefits are that it controls stressful thoughts and enables the participant to listen to their body and relax, and improve focus. Modern science is now showing that it is associated with changes in brain function and pathways; a modern definition is that “mindfulness is simultaneously a process of cognitive control, emotional reappraisal or reduced judgement, and existential insight” [14].

One of the important observations is that meditation/mindfulness can control pain, and pain is intimately involved with inflammation. In fact, our brains can directly control our immune systems, and it appears that meditation can actually suppress over-active inflammatory pathways at the molecular level – including those induced by psychological stress, which itself can invoke inflammatory reactions (neurogenic inflammation) [15,16]. However, inflammation can also, in turn, suppress brain function and reduce the will to do anything [17], as well as inhibiting muscle function [18], which suggests that it may be possible to get into downward spiral.

So, in some ways, mankind can be hindered by having a big brain, as it enables us to think and get engrossed in worrying about stuff, which could result in a downward spiral. However,

when the brain engaged in the right way, it has the power to focus and suppress potentially damaging pathways, and so prevent the downward spiral.

### **The mind-body connection**

The above suggests that by both physically moving and engaging the brain in the correct way it might be possible to induce a virtuous cycle that could result in optimum health. In fact, it is possible that mindfulness is an evolved biological function that engages focus to optimise survival. If we did get injured, or infected, the brain was effectively subjugated to make us lie down and heal while vital resources were directed to fix the damage. However, as soon as we recovered, hunger drove us to move and find food and the virtuous cycle was restored.

Unfortunately, in today's world as previously indicated, most of those environmental challenges have been removed and replaced by constant psychological stress. The science certainly supports the possibility that a psychologically stressed, sedentary and overfed lifestyle can induce life-shortening inflammation. Furthermore, in this weakened state, the body is far more likely to get damaged, which can induce further inflammation and reduce movement. One of the reasons is that most of the joints in the body rely on having sufficient muscle strength and coordination to work properly; without challenge, they slowly atrophy – so making the joint weaker. If damage is done, pain can cause a muscle to stop working for a while; this is normally a protective mechanism, but it can lead to a longer term imbalance if the rest of the system cannot compensate and it becomes chronic. This can lead to downward negative spiral – a vicious cycle of inflammation and suppressed function.

So the truth is that the mind and body are intimately connected, as they must be, to ensure survival; in effect, all the muscles are connected into the brain, and they work as a unit. So stimulating one induces adaptation in the other, and vice versa. The more complicated the movements, the harder the brain works, but to do this most effectively, it has to be as relaxed and focussed as possible. This is why mindfulness, even when standing, produces huge benefits, as it induces the mind to focus on the task in hand and allows the practitioner to improve the synergy by putting the mind in the body.

### **Summary**

The origins of Tai Chi were firmly rooted in the martial aspects, as exemplified by the Chen style, but encapsulate wisdom developed over millennia about the importance of mindfulness and fitness. This ancient wisdom is now being supported by modern science. This would explain the health benefits of Tai Chi; in a largely sedentary and distracted population, it encourages people to exercise and be mindful. This combination leads to a more positive attitude and increased confidence in movement, which in turn will encourage activity as strength and relaxation improve. In effect, this is positive upward spiral - a virtuous cycle.

The ultimate health benefits probably come from reaching a level where it can be used as a martial art, as it implies that the exponent has become strong, fit and smart, with a level of mindfulness that enable very good control of their body and emotions. Indeed, it is now clear

that high fitness, strength and intelligence are directly correlated with longevity [19-22]. This would explain why Tai Chi, in its various less athletic forms, has been adopted as a healthy past time for many today. This was exemplified in China by the evolution of styles with higher stances and shorter forms, which were ideal for the largely sedentary higher social classes.

In modern medicine, it is very clear that weakness, inflammation and reduced life expectancy go hand in hand; regularly practiced, Tai Chi can go a long way to slowing the inevitable down – one of the ways it may do this is by suppressing excessive inflammation. Properly done, either just standing in Zhan Zhuang, or doing the “form”, will encapsulate all these important principles. The sensation of “sinking” with soft knees is simply a feeling that comes from relaxation and allowing all the joints to correctly align; this is a true sign of mind-body integration and evidence that the mind is focussing – but it does require that the correct muscles to be strong enough to support the structure. So here is another example of the positive cycle: as we relax, we align better, but it loads up the muscles more. As the muscles strengthen, then we can relax better, and the more efficiently we can move.

There are thus notes of caution here, which are extolled in the clear wisdom of how Tai Chi is practiced and taught; it is essential to start at your own level and progress at a rate that your body allows you to. If you have been sedentary most of your life, and perhaps suffer from severe monkey brain, or are recovering from an injury, then you will not have the muscle tone/strength/coordination or focus to do certain things. In particular, many people will simply not have the strength in their backs & leg muscles (the so called “posterior chain”) or core, which is essential to align the backbone, to begin with. With time, relaxation, awareness and focus, and the development of strength and flexibility, one can improve. A muscle can only relax properly if it is strong enough and allowed to do so by the mind. In concert with other muscles, it can then hold a joint in the correct position with a minimum of force, enabling the correct posture to be obtained. This suggests that although Tai Chi is good on its own, it is enhanced by cross-training – which will be the subject of another article. It also explains why it is a very good adjunct to other sports.

#### Reference List

1. Nunn AV, Bell JD, Guy GW: **Lifestyle-induced metabolic inflexibility and accelerated ageing syndrome: insulin resistance, friend or foe?** *Nutr Metab (Lond)* 2009, **6**: 16.
2. Yates KF, Sweat V, Yau PL, Turchiano MM, Convit A: **Impact of metabolic syndrome on cognition and brain: a selected review of the literature.** *Arterioscler Thromb Vasc Biol* 2012, **32**: 2060-2067.

3. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U: **Global physical activity levels: surveillance progress, pitfalls, and prospects.** *Lancet* 2012, **380**: 247-257.
4. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT: **Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy.** *Lancet* 2012, **380**: 219-229.
5. Dandona P, Aljada A, Bandyopadhyay A: **Inflammation: the link between insulin resistance, obesity and diabetes.** *Trends Immunol* 2004, **25**: 4-7.
6. Salminen A, Huuskonen J, Ojala J, Kauppinen A, Kaarniranta K, Suuronen T: **Activation of innate immunity system during aging: NF-kB signaling is the molecular culprit of inflamm-aging.** *Ageing Res Rev* 2008, **7**: 83-105.
7. Zhang G, Li J, Purkayastha S, Tang Y, Zhang H, Yin Y *et al.*: **Hypothalamic programming of systemic ageing involving IKK-beta, NF-kappaB and GnRH.** *Nature* 2013.
8. Petersen AM, Pedersen BK: **The anti-inflammatory effect of exercise.** *J Appl Physiol* 2005, **98**: 1154-1162.
9. Dregan A, Gulliford MC: **Leisure-time physical activity over the life course and cognitive functioning in late mid-adult years: a cohort-based investigation.** *Psychol Med* 2013, 1-12.
10. Guiney H, Machado L: **Benefits of regular aerobic exercise for executive functioning in healthy populations.** *Psychon Bull Rev* 2013, **20**: 73-86.
11. Voss MW, Erickson KI, Prakash RS, Chaddock L, Kim JS, Alves H *et al.*: **Neurobiological markers of exercise-related brain plasticity in older adults.** *Brain Behav Immun* 2013, **28**: 90-99.
12. Maalouf M, Rho JM, Mattson MP: **The neuroprotective properties of calorie restriction, the ketogenic diet, and ketone bodies.** *Brain Res Rev* 2009, **59**: 293-315.
13. Guisinger S: **Adapted to flee famine: adding an evolutionary perspective on anorexia nervosa.** *Psychol Rev* 2003, **110**: 745-761.
14. Zeidan F, Grant JA, Brown CA, McHaffie JG, Coghill RC: **Mindfulness meditation-related pain relief: evidence for unique brain mechanisms in the regulation of pain.** *Neurosci Lett* 2012, **520**: 165-173.
15. Saatcioglu F: **Regulation of gene expression by yoga, meditation and related practices: a review of recent studies.** *Asian J Psychiatr* 2013, **6**: 74-77.
16. Rosenkranz MA, Davidson RJ, Maccoon DG, Sheridan JF, Kalin NH, Lutz A: **A comparison of mindfulness-based stress reduction and an active control in modulation of neurogenic inflammation.** *Brain Behav Immun* 2013, **27**: 174-184.

17. Dantzer R, O'Connor JC, Freund GG, Johnson RW, Kelley KW: **From inflammation to sickness and depression: when the immune system subjugates the brain.** *Nat Rev Neurosci* 2008, **9**: 46-56.
18. Frost RA, Lang CH: **mTor signaling in skeletal muscle during sepsis and inflammation: where does it all go wrong?** *Physiology (Bethesda)* 2011, **26**: 83-96.
19. Calvin CM, Deary IJ, Fenton C, Roberts BA, Der G, Leckenby N *et al.*: **Intelligence in youth and all-cause-mortality: systematic review with meta-analysis.** *Int J Epidemiol* 2011, **40**: 626-644.
20. Gremeaux V, Gayda M, Lepers R, Sosner P, Juneau M, Nigam A: **Exercise and longevity.** *Maturitas* 2012, **73**: 312-317.
21. Metter EJ, Talbot LA, Schrager M, Conwit R: **Skeletal muscle strength as a predictor of all-cause mortality in healthy men.** *J Gerontol A Biol Sci Med Sci* 2002, **57**: B359-B365.
22. Ortega FB, Silventoinen K, Tynelius P, Rasmussen F: **Muscular strength in male adolescents and premature death: cohort study of one million participants.** *BMJ* 2012, **345**: e7279.