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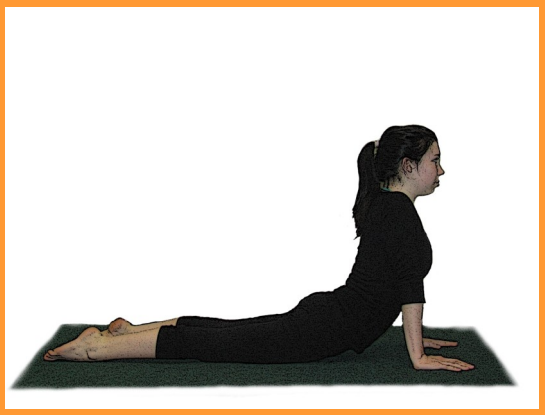

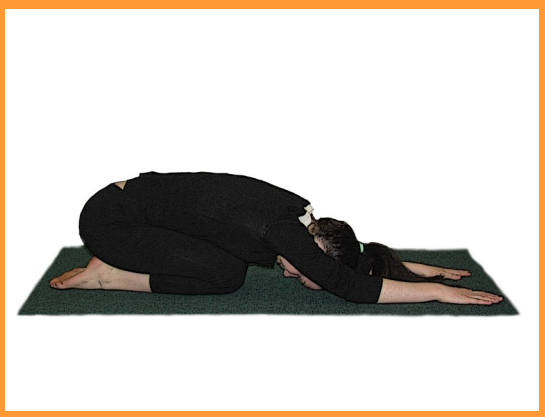

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Philip Stevens (Swami Samnyasananda) Holds Science degrees in Psychology and Physiology, with an Honours degree in Physiology completed at the Centre for Sleep Research at The Queen Elizabeth Hospital in South Australia. He explores the effects of yoga on the heart, brain and autonomic nervous system. A Certified Yoga Teacher, Life Member and Fellow of the "World Society For Clinical Yoga" (India). M.B.T.I. Accredited. Currently teaching Clinical Yoga, meditation and relaxation techniques as part of the MBBS course for medical students at Monash Medical School in Melbourne.

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Brian Thomson (Rishi Vivekananda) Has been a physician since 1960, and a consultant psychiatrist since 1965. During most of that time, he has taken a keen interest in ways to integrate the ancient eastern techniques of yoga with the modern knowledge of the mind, the functioning of the body, and healing. He has also studied yoga in its role as a system of evolving the quality of the human personality. He spent most of his professional years as a consultant psychiatrist in private practice in Australia, but between 1977 and 1986 he travelled the world, especially India and the Americas teaching and learning about the synergy between yoga and science. Since March 2002, he has been on a world lecture/seminar tour, especially in Australia, India, Europe & the Americas.

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Ruth Burgess (Swami Omteertha) ND (BHSc) is a Naturopath and accredited yoga teacher, and has been teaching yoga since 1981. As a naturopath she formerly specialized in the treatment of clients living with HIV as well as conducted yoga sessions with the Queensland Aids Council. As a yoga teacher she has taught in many different contexts and situations, including: drug and alcohol rehab, hospitals, schools, university, children, over 50's, prenatal. With academic awards for excellence in herbal medicine and nutritional medicine, over the past decade she has been a course developer and lecturer at the Satyananda Yoga Academy with an interest and focus on the Health Sciences. She has also lectured overseas participating in International Yoga Conferences in Beijing and Guangzhou (China). Currently completing Bachelor of Nursing at Newcastle Uni, NSW.

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Coralie Properjohn (Agnimudra) Conjoint Lecturer, Affiliated and Honorary Staff member in the Faculty of Education and Arts, University of Newcastle. She has a Diploma of Satyananda Yoga Teaching and is an accredited Level 2 teacher and taught Yoga for over 9 years. A regular trainer for Yogic Studies and the Teacher Training Program both in Australia and the USA.

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Editor's overview
This issue we present Clinical Yoga literature reviews submitted as part undergraduate MBBS training through the Medical School at Monash University, Melbourne Australia. Medical Students learn clinical applications of yoga techniques such as asana, breathing and meditation as part of course content for personal and professional benefit. Meditation is part of core curriculum as an integrated, evidence-based, scientific process. The Clinical Yoga course is one of several electives held over 12-weeks and applies neurophysiology of yogic breathing, meditation & relaxation to:

- understand the basic principles of evidence-based yoga practice.
- explore the use of evidence-based yoga techniques for personal benefit and for use in in healthcare and clinical settings.
- relate those evidence-based yoga practices to effects in human physiology and psychology that are both meaningful and effective.
- consider, evaluate and practice certain basic principles and techniques of yoga, in particular the controlled breathing, meditation and relaxation techniques for less stress and increased wellbeing.
- provide a grounding in Clinical Yoga practice to encourage further study and interest in clinical application of evidence-based yoga in medicine.

Yoga Theory: Functional Neurophysiology and Neuropsychopharmacology applied to yoga in managing stress, improving health, increasing Melatonin, involved in sleep plus principles of evidence-based yoga in Clinical settings.

Yoga Practice: Yoga asana to facilitate mental focus, enhance lymphatic flow and improve the ability to sit comfortably; sleeping positions that affect sleep; gentle, slow-rate yogic breathing interventions and meditations that relax the mind & body as well as facilitate and promote better quality sleep.

Clinical Yoga: Evidence-based, client-specific yoga-practices applied in a clinical setting using anatomy, physiology, neurophysiology, chronobiology, human circadian-rhythms, neurocardiology and psychoneuroimmunology to evaluate and apply appropriate yoga practices for health and well-being.

http://www.monash.edu.au/news/monashmemo/stories/20090527/yoga.html

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Next issue we will have an interactive "Letters to the Editor" section, please email your letters, questions, comments, feedback etc to editor@srijyoti.org

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The annual SRI research grant has been operating for several years now. The grant is awarded each year to encourage research into the field of yoga, to develop understanding of its practices and its implications for physical and mental health, healthy lifestyle, mental and spiritual development. See www.swanresearch.net

SRI Research Scholarship
SRI offers a national Research Scholarship through the Satyananda Yoga Academy (SYA) intended for those with an academic background or enrolled in higher study wanting experience in yoga research in areas of prevention of various diseases such as obesity, diabetes, heart and cardiovascular diseases, depression, hypertension, anxiety etc. We particularly encourage those in remote communities; financial difficulty; adversity or some physical or other disability to apply.

Both the Diploma and new Voc Grad Dip are eligible courses as both have a research component and successful applicants will be assisting SRI in researching promising areas such as using yoga for asthma, diabetes, cancer, depression and other mental illnesses, anxiety, drug addiction, hypertension, high blood pressure and cardiovascular disease etc. See www.swanresearch.net

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The Fellowship will be applied directly towards research in an area that satisfies SRI's aims of exploring and better understanding the various practices and techniques in the science of yoga such as: asana, pranayama, meditation, kriyas, shat karmas, yogic lifestyle, yogic chanting, yogic and ayurvedic diet, mantras, yogic physiology, yogic psychology etc. See www.swanresearch.net

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Yogic Practices and Asthma

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Asthma – originating from the Ancient Greek word for "panting" – is a chronic respiratory condition affecting some 300 million people worldwide (World Health Organisation, 2008). It is a burden carried by both developed and developing countries, restricting the activities of individuals and their families due to its recurrent and unpredictable nature. Although asthma can be effectively managed with medication, it is nonetheless important to consider lifestyle factors and habits which may influence the condition. Hence, several studies have been conducted to assess the efficacy of yogic practices in improving asthmatic conditions – particularly focussing on breathing techniques and meditation. Used in conjunction with prescribed medication and the practitioner's advice, asthma can be successfully controlled and individuals can potentially achieve a better quality of life.

Introduction

Asthma

Breathing is an essential part of life – bringing oxygen in to the body and releasing carbon dioxide out – for the normal functioning of the brain and other bodily systems. The respiratory system involves the lungs, heart, blood and most importantly, the diaphragm; a strong muscle of the abdomen which facilitates the contraction and dilation of the lungs.

Mediated by the autonomic nervous system, breathing is an unconscious process that can be affected by the sympathetic and parasympathetic branches; the former inducing a "relaxation response" to slow breathing and the latter creating a "fight or flight" response that increases breathing rate. The average healthy individual will breathe 14 breaths per minute at rest – adjusting their rate according to physical demand (Saladin, 2007).

Asthmatics suffer from attacks involving the bronchial and air passages through the trachea, leading from the mouth/nose to the lungs. These attacks are characterised by breathlessness and wheezing due to a severe narrowing of the bronchial tubes which causes a reduced flow of air in and out of the lungs. Since the fundamental causes of asthma are not fully understood, it is difficult to develop a truly effective cure. However, several triggers have been identified including allergens (dust, pollen), smoke, chemical irritants, cold air, emotional arousal, physical exertion and certain medicinal drugs. As a result, treatment plans can be developed – including the integration of yogic practices into the asthmatics lifestyle to manage their chronic condition (Kumar & Clarke, 2007).

Yogic Techniques

According to yogic philosophy "a calm mind produces regular breathing and a relaxed body" (Sheng, 2007). In the case of asthma, therapeutic yoga (focusing on breathing and meditation techniques) can increase lung capacity and reduce stress (Parker-Pope, 2002).

Because yoga involves physical and mental engagement – incorporating Asanas (body postures), Pranayama (the art of breathing control) and several other practices – the individual can simultaneously improve the physical being whilst undergoing mental development for more effective management of their asthma.

Sahaja Yoga

One particular yogic technique for dealing with asthma is known as Sahaja – which refers to "natural" or "simple". Sahaja is more specifically a religious movement that utilises unregimented meditation techniques to achieve self-realisation (Kundalini awakening) by entering a state of "thoughtless awareness".

By assimilating the mind with this state, the individual's attention is purified so that spiritual development can progress (Sahaja Yoga Meditation, 2008).

In a 2000 study conducted at the Natural Therapies Unit of the Royal Hospital for Women (Manocha et al, 2002), application of Sahaja Yoga showed beneficial effects for asthma patients resistant to steroids. Participants showed a significant reduction in asthma severity and responsiveness to chemical triggers compared to a control group. Although the mechanism of action was not fully understood, the yogic explanation proposes that the inner benevolence and peace created by the meditative experience lends itself to a highly therapeutic state of being which has the potential to improve almost any condition.

Other explanations involve the slowed velocity of smooth muscle use in the bronchial passage due to decreased tidal volume of breathing, thus reducing the risk of hyper-reactive responses to triggers. This explanation, though more rational in a physiological sense, requires further research for true confirmation (Manocha et al, 2002).

Pranayama & Asanas

Breathing is a fundamental basis of yoga and it believed that life expectancy and breathing are directly related. Therefore, from the yogic perspective it is important that asthmatic patients are able to harness their breathing patterns and inner respiratory musculature.

Pranayama is utilised in almost all forms of yogic meditation and practice, in particular Asanas. The process of exhaling is most beneficial to asthmatics when done in the opposite order of normal breathing. This is because the opposite motion facilitates the opening of the chest passage for an increased amount of time. However, there may be an unwanted effect on the heart and nervous system due to increased thoracic load and reverse nature of the process (Stevens, 2009).A number of clinical trials conducted on the use of Pranayama for bronchial asthma found that breathing exercises focusing on prolonged expiration and opening airways were useful in increasing lung capacity (Saxena & Saxena, 2009).

Another study randomised asthmatic patients into four groups by introducing yoga breathing (Pranayama), physiotherapy, breathing exercises and no intervention. After a follow-up period of 4 months, results showed that yoga and breathing exercises improved the subjects' mental state of wellbeing and hence enabled better coping with stress and lung function (Steurer-Steya, Russib & Steurerc, 2002)

Possible physiological explanations suggest that these breathing techniques aid in opening up the bronchial airways – especially during expiration since tubes are narrowed significantly in this phase of breathing. Moreover, asthmatics tend to become "anxious" as expiration deepens and are thus more inclined to inhale prematurely using muscles other than the diaphragm (Goyeche, Abo & Ikemi, 1982). Diaphragmatic breathing draws the most oxygen into the lungs and is the most efficient way of breathing – enabling therapeutic effects to be brought forth and hence it is important to train asthmatics to increase proprioceptive awareness of their respiratory system and utilise the diaphragm for more beneficial effects on the physical and mental self. Furthermore, the psycho-physiological effects induced by Pranayama include feelings of relaxation and peacefulness, enabling patients to escape from unintentional anxiety and associated muscle contractions (Breese, 2005)

MEDITATION

Similar to the psychological effects of Pranayama, meditation requires intense mental application to achieve a state of heightened awareness that is free from external distractions or thoughts. This is especially beneficial in correcting distorted or impaired breathing patterns and settling the mind. Meditation incorporates several components of yoga into one practice with elements ranging from breathing technique, to mental application, to body posture.

Body posture is an essential factor for proper breathing – a stabilised sitting posture naturally increases abdominal pressure and diaphragmatic breathing. Thus, lower respiration rates can be achieved and concentration is facilitated by the relaxation of surrounding muscles. For example, the half-lotus or full lotus sitting position enables straightening of the spine and hence easier access of the air passage through the body (Stevens, 2009).

In 1986 a study on the Integrated Approach of Yoga Therapy for Bronchial Asthma: a 3-54 month Prospective Study was published (Nagendra & Nagarathna, 1986), incorporating breathing exercises, yoga practices to loosen joints, Asanas, Pranayama, meditation, Kriyas (nose-stomach washes) and discussions on yoga therapy. One particular finding of the study was the decreased responsiveness of bronchial receptors to noradrenalin released during normal asthmatic stress. The calming effects of yoga have been suggested as a possible explanation for the reduced levels of noradrenalin in the hypothalamus, but it is clear that the integrated approach of yogic practices has a beneficial effect on the management of asthma (Nagendra & Nagarathna, 1986).

AYURVEDA

From the Sanskrit words "Ayur" meaning life and "Veda" meaning knowledge, Ayurveda is a traditional Indian health system that deals with diet, treatment of disease and the individual's relationship with the Earth and planets. According to Ayurveda, asthma originates from the gastrointestinal tract – not the lungs, and is a result of an imbalance of the "kapha and vata doshas" of the body – various combinations of the 5 essential elements: panchamahabhuta. Hence, Ayurveda therapy focuses on restoring these balances through nutrition and breathing techniques (Halpern, 2009).

Depending on the type of asthma and cough experienced by the individual, certain elements must be restored or reduced. In Govindan et al's (1998) pilot study on bronchial asthma, the two herbs *Solanum xanthocarpum* and *Solanum trilobatum* both resulted in improved pulmonary functions – especially significant in patients suffering mild-moderate asthma. It is thought that relief from the symptoms of an asthma attack were due to a bronchodilator effect causing a reduction in swelling of the mucosal layer and mucus secretions.

Ultimately, the aims of Ayurveda techniques in the management of asthma are to cleanse the body of pathological mucus and to restore balance of the "doshas" to achieve a state of purity. Pharmacological explanations are not fully understood but are perhaps directed at the broncho-dilatory and relaxant effects of certain herbs, thus enabling management of asthma.

Conclusion

Asthma is a chronic respiratory condition which can be managed by yogic practices in several different ways. Because yoga encompasses such a broad range of routines, individuals suffering from asthma are thus offered a range of alternatives with which to incorporate into their lifestyles – depending on their personal preferences. Whether it be meditation, Ayurveda, Pranayama or complex Asanas, the calming and beneficial effects of yoga can potentially improve asthmatic conditions significantly.

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Yogic Lifestyle and Its Importance in Sleep And Circadian Rhythms

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Yoga, in a modern western context, is often associated with the physical poses as shown in many advertisements and texts. This essay looks at the wider spectrum of a yogic lifestyle and the ways in which certain lifestyle adjustments can be medically beneficial. It discusses chronobiology in relation to circadian rhythms and their influence on melatonin levels which, among other things, influence sleep. Of particular focus will be the role and impact of a yogic lifestyle in managing insomnia..

Yoga involves the use of relaxation techniques such as breathing exercises, meditation and physical poses to free the mind and body from tension and stress. In lay terms, in the modern, western world, yoga is often viewed in the limited context of the physical poses of the Asanas but this is only one aspect of yoga. There is much more to living a yogic lifestyle and practicing yoga than merely learning the physical poses seen in books or as taught by an instructor.

The main aim of a yogic lifestyle is to live life in balance, particularly in relation to the three Doshas of the body; Vata (Ether and Air), Pitta (Fire and Water) and Kapha (Water and Earth) (Stevens 2009). The idea of doshas is a part of Ayurvedic principles, or the Indian 'science of life' ('Ayur' meaning life, 'veda' meaning science or study). Each person is considered to have their own personal mix of these three doshas, sometimes called one's *prakriti* (Sevadevi, 2008). Physical elements such as diet and exercise together with the psychological aspects of yoga should be tailored to bring one's unique *prakriti* into balance.

Balance of the three doshas can be achieved by practicing the eight "limbs" or "paths" of yoga as outlined by Patanjali. These are Yamas or "restraint", Niyamas or "discipline", Asanas or "Physical Poses", Pranayama or "Breathing Exercises", Prathayara or "Sensory Withdrawal", Dharana or "Concentration", Dhyana or "Meditation", and Samadhi or "Enlightenment" (Yogalinks, 2007). Yamas and Niyamas focus mainly on attitude and can be incorporated into various aspects of daily life, whereas many of the latter "limbs" can be practiced and are more likely to be taught, in order to achieve direct mental or physical benefits. As mentioned above, yoga is sometimes considered to be merely the Asanas, but following a yogic lifestyle relies on utilisation in some part of all eight branches.

Certain lifestyle adjustments that are useful in helping to treat or manage acute and chronic illness can be viewed within the context of a yogic lifestyle. Some acute and chronic illnesses can relate either directly or indirectly to a person's diet, exercise, sleep and stress levels. Different branches of yoga can address each of these and in this way be of therapeutic benefit. For example, since the Niyama path of yoga focuses on discipline, it can involve adjustments in one's diet, exercise and sleep in order to keep the body in good condition. A variety of studies have shown yoga to be an effective therapy for complaints both physiological and psychological; ranging from epilepsy (Arias et al, 2006), cardiovascular and muscular disease (Raub, J 2002), arthritis and diabetes (Vera et al, 2009) to depression and anxiety (Smith et al, 2007). Prathayara, Dharana and Dhyana are thought to improve mental calm and clarity, as well as having measurable neurological benefits (Rubia, 2009).

Pranayamas in particular can have an advantageous effect on pulmonary conditions such as chronic bronchitis and asthma (Raub, J 2002).

Asanas can also have a positive impact on physical and mental wellbeing by bringing a harmonious balance between body and mind; relaxing, rejuvenating and energising the body.

A number of the abdominal exercises are thought to improve abdominal strength, thus improving posture and lessening lower back pain, as well as aiding digestion and thus reducing or even eliminating such medical issues as indigestion, constipation and loss of appetite (Stevens, 2009).

A person's wellbeing relies on the correct balance between a number of biochemical, physiological and behavioural processes. Chronobiology is the study of cyclical rhythms or happenings in living organisms and their adaptation to solar and lunar related rhythms. These cycles are known as biological rhythms.

One of the most important rhythms in chronobiology is the circadian rhythm, a roughly 24 hour-cycle shown by biochemical, physiological and behavioural processes in all living organisms. This biological clock affects the daily rhythm of many physiological processes such as "sleep-wake cycles, hormone release, body temperature, and other important bodily functions" (NIGMS, 2008).

At present, plasma melatonin levels are considered to be the best marker of circadian timing in humans (Arendt, J 2009), as melatonin plays a major role in the sleep-wake cycle. Secretion of melatonin from the pineal gland is regulated by levels of light entering the eye, and can thus alert the body to the fact that it is nearly time to go to bed. Disruption to circadian rhythms usually has a negative effect; a number of disorders, for example some sleep disorders, are associated with irregular or malfunctioning of circadian rhythms (Harinath et al, 2004).

Sleep is a major part of any healthy lifestyle, but where inadequate sleep occurs, a multitude of other problems can arise. Lack of sleep has been linked with a number of diseases including depression, diabetes, hypertension and a number of other cardiovascular diseases (Access Economics, 2004) and, if considered a risk factor in its own right, has been said to cause "more ill health than well known risks to health such as alcohol or unsafe sex" (Access Economics 2004, pp ii).

Of course, inadequate sleep itself can have a multitude of causes; from melatonin deficiency, to fear and anxiety, to poor sleeping conditions, medications or chronic pain (Plesman, J 2008). In the latter cases, insomnia is likely to be transient or acute and will disappear when the cause does. However, where insomnia is the result of melatonin deficits or due to stress and anxiety, the benefits of yoga may be realised. Yoga can play a constructive part in aiding sleep as certain branches of yoga can increase melatonin levels as well as aiding in reducing stress and anxiety levels, both of which are helpful in the treatment of insomnia (Khalsa, 2004).

Plasma melatonin levels have been shown to increase after a variety of yoga techniques including Transcendental Meditation Sidhi (Tooley et al, 2000) and Hatha yoga coupled with Omkar meditation (Harinath et al, 2004). Yoga thus allows the body to reap all of the benefits associated with increased melatonin secretion; not only improved quality and quantity of sleep (Arendt, 2005), but also antioxidant and anti-cancer properties (Tooley et al, 2000).

Cyclic mediation has also been found to improve sleep quality, both objectively through polysomnograph readings and subjectively through participant feedback (Patra et al, 2009), though whether this is due to melatonin levels is uncertain.

The timing of treatment in coordination with a person's circadian rhythm, or body clock, may significantly increase effectiveness of the treatment. For example, appropriate use of yoga to increase melatonin levels towards the evening may reduce insomnia by returning melatonin levels to the required level or achieving the necessary mental calm through relaxation.

Yoga, with its potential for influencing melatonin levels and achieving greater mental calm and relaxation, is one of the techniques worth investigating further in the treatment of insomnia.

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Clinical Yoga in the Management of Hypertension

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Yoga has long been shown to provide many health benefits including lowering blood pressure (Yang, 2007) and whilst evidence to support this claim abounds, the exact mechanism by which the lowering of blood pressure occurs has not been well understood or explained. The research available today is beginning to illuminate the physiological basis for yoga's proven positive effects on cardiac health with potential avenues being its ability to increase baroreceptor sensitivity (something which is often decreased in hypertension), its effect on autonomic nervous system activity through relaxation and biofeedback and in particular the effects of specific breathing practices (slow, abdominal and alternate nostril) on decreasing sympathetic arousal. While the research has clinically proven yoga's beneficial effect on hypertension, more specific studies on the exact postures and breathing techniques would need to be conducted with detailed physiological analysis of the changes in participants to explore its effect on the autonomic nervous system.

Hypertension is the most common risk factor for cardiovascular and cerebrovascular disease across the world (McCaffrey et al, 2005). As a result of the adverse side effects associated with conservative pharmacological treatments for hypertension (Jayasinghe & Satyajit, 2004), the practice of yoga is being used ever more commonly as an alternative or complementary treatment. While books, commercial yoga magazines and websites will claim its benefits for hypertension with little or no reference to clinical evidence, this article will assess the validity of certain claims with the use of scientific, medical literature and scholarly research.

Hypertension is caused when there is sustained higher pressure put on vessel walls by circulating blood (Saladin, 2007). There is a natural variation in pressure which occurs normally as the heart contacts (giving us our pulse), measured as systolic - when the heart is at peak contraction, exerting the maximum pressure on the arteries, over diastolic - the pressure in the arteries as the heart relaxes and refills with blood.

The normal readings for blood pressure should be around 120/80 mmHg (systolic/diastolic) but if higher pressure is maintained - this is termed hypertension (betterhealth.vic, 2008). In people with narrowed arteries, for a variety of reasons such as hyperlipidemia, blood pressure increases because the heart has to pump the same amount of blood but with more power to force the blood through narrowed vessels (ABC Health and Wellbeing, 2006).

'Yoga in cardiac health (A Review)' (Jayasinghe & Satyajit, 2004) sought to evaluate the physiological health-benefits of yoga, and in particular its effect on cardiac health. The review describes the yogic practices of asanas: postures to be held for 5 to 20 pranayamic breaths - a method of extended, deep breathing using primarily the diaphragm and abdominal muscles with a pause between breaths. High quality studies only, from the period 1991-2003 were used, ensuring the credibility and validity of the evidence. A consensus from the studies was that yoga often offered comparable results to antihypertensive medication.

Furthermore, Jayasinghe and Satyajit (2004) state that specifically, it is the exercise and relaxation experiences that come with the practice of asanas and pranayamas in yoga that produced its 'beneficial effects on the autonomic neurological function'. That is, its promotion of parasympathetic dominance in which heart rate and blood pressure are naturally reduced in order to 'rest and digest'.

It is likely that the slow, pranayamic breathing, such as used in Anuloma Viloma (alternate nostril breathing), Bhramari (humming in throat with lips closed) and Ujjayi pranayama (slow-rate abdominal breathing with slightly closed glottis, filling the lungs using first the diaphragm then the thorax), is a major influence in this shifting of autonomic dominance (Jareth et al, 2006). It is proposed that the shift results from slower rhythmic activation of stretch receptors in lung fibroblasts which consequently fire less often and cause a slowing of brain wave activity causing parasympathetic shift. However further studies are needed to confirm the hypothesised physiological basis for these results (Jareth et al, 2006).

Deep breathing forces use of the diaphragm as the chest cavity can only fill to a certain extent, and this is beneficial as deep breathing transports air into the lungs that is oxygen rich. As a result, gas exchange in the lungs is more efficient, because of the high availability of oxygen, the heart will not have to pump as fast to supply tissues with adequate oxygen (Saladin, 2007). Length and depth of breath has also been found to influence baroreceptor regulation of heart rate and sympathetic arousal (Van de Borne et al, 2000). It follows that pranayamas using rapid breathing or conversely, held breaths, are contraindicated for hypertensives (Stevens, 2008).

One potential way of manipulating the autonomic nervous system (ANS) is forced unilateral nostril breathing, specifically left nostril breathing for increased parasympathetic activity, as opposed to right nostril breathing which had an opposite and active effect on sympathetic dominance (Telles et al, 1994 and 1996). This has been attributed to the afferents arising from the nasal mucosa being associated with both the ANS (via the hypothalamus), and the cerebral cortex; however, these anatomical associations have not been well mapped (Telles et al, 1994).

In the blood vessels of most viscera and the heart, nerve fibres of both divisions of the ANS terminate at the same muscle cells and have antagonistic effects, so inhibition of the sympathetic will directly influence parasympathetic dominance. However, blood vessels of skeletal muscle, as well as many other blood vessels, and sweat glands receive only sympathetic innervations, (Saladin, 2007) so it can be assumed that activation of parasympathetic NS will have no direct impact on these structures, only inhibition of the sympathetic division will produce opposite effects, passively. This supports the claim that to inhibit descending sympathetic pathways is much more effective than simply enhancing the parasympathetic nervous system's effect (Stevens, 2008).

A pranayama and asana yoga program was used in a clinical trial (McCaffrey et al, 2005) to determine the effect of the relaxation

element of yoga on stress (sympathetic arousal) and in turn hypertension. Results found that stress scores significantly decreased, along with blood pressure, heart rate and to a lesser degree BMI (body mass index). The study also excluded possible confounding factors such as external sources of stress such as intense emotional or physical stress, from the study sample.

Whilst yoga's effects have been consistently supported by physiological changes noted in participants of epidemiological studies (Yang, 2007), little long-term follow-up evidence is available, in regards to patient adherence to the therapy or its long-term capacity to maintain lower blood-pressure (Yang, 2007). While not all studies in the above-cited literature review detailed the type or content of the yoga classes, Hatha yoga was commonly used, a popular style in the west (Innes and Vincent, 2006). The claim that there is a lack of high quality long-term evidence for yoga's ability to lower blood pressure is supported in other studies (e.g. Innes and Vincent, 2006).

The effects of the relaxation aspects of yoga have also been studied using biofeedback (Patel, 1975) alerting a person to their inner physiological functions in real time through monitoring equipment (National Institute of Mental Health, 2008). Instruments that give a continuous audio signal, with falling pitch as the patient relaxes, were used, which encouraged further relaxation by confirmation of the relaxed physiological state. This allowed participants a certain amount of control to be held over the ANS (compared to controls on anti-hypertensives) (Patel, 1975), however this finding is likely to be more apparent *during* the exercise.

Arterial baroreceptors located most significantly in the carotid sinus and aortic arch, are stretch-sensitive mechanoreceptors in arterial walls that detect the pressure of blood flowing through them. They function by signalling the heart to increase or decrease blood pressure to the brain accordingly via their cranial nerves which travel through the nucleus tractus solitarius in the medulla of the brainstem - the autonomic controller of the heart and blood vessels. Thus blood pressure can be maintained with postural changes in from standing to lying, to ensure tissues are receiving the right amount of blood (Klebunde, 2008).

Descending sympathetic pathways also influence blood pressure via vasoconstriction as a survival mechanism (Saladin 2007). In hypertension, impaired baroreflex sensitivity has been postulated to be a major primary cause as it resets to a higher resting level (Musallo et al, 2002). Yoga has been found to increase the sensitivity of baroreceptors, especially asanas that are 'equivalent to head-up or head-down tilt' on a tilt table (Jayasinghe & Satyajit, 2004). However, some asanas are contraindicated for hypertensives. Inverted asanas that require the head to be at or below the level of most or all of the rest of the body, especially those such as cycling-lying on your back with feet raised and performing a pedaling motion that require strenuous activity while the head is at the lowest altitude, are generally not recommended for hypertensives (Stevens, 2008).

In conclusion, it is apparent that the practice of both the physical, relaxation and breathing aspects of yoga for the effective treatment of hypertension have significant support in scientific, medical literature such as epidemiological studies, literature analysis and peer reviewed journal articles. However, while there is considerable evidence to suggest that this relates to certain yoga practice's promotion of baroreceptor sensitivity and encouragement of parasympathetic dominance (in which blood pressure is naturally lower), the direct mechanism by which such results are produced is still not well understood and further specific studies need to be conducted to confirm the hypothesis.

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Medical Benefits of Meditation

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This article discusses the effectiveness of the use of two different meditative techniques for reducing stress, anxiety and depression. The two meditation techniques considered are mindfulness-based meditation and Sudarshan Kriya yoga. The article considers clinical applications of the two techniques and the physiological and psychological models involved.

Mindfulness is characterized by a moment-to-moment, non-judgmental focus on the present moment. It involves an awareness of internal sensations, thoughts and feelings and external experiences. The objective of mindfulness is to develop a detached appreciation of the contents of one's mind. This can be understood as a form of meta-cognition wherein one is conscious of the workings and activity of the mind. The focus is not changing the content of thoughts but rather adjusting the way in which one relates and responds to internal states.

The non-judgmental element of mindfulness involves noting thoughts without attributing them with a label of 'right' or 'wrong'. Once the thought has been noted, the attention is simply redirected to an object of focus such as the breath. This moment-to-moment state of awareness is developed through sustained practice of mindfulness meditation.

Clinical applications of mindfulness are mindfulness-based stress reduction (MBSR); (Kabat-Zinn, 1990) and mindfulness-based cognitive therapy (MBCT); (Segal, Williams, & Teasdale, 2002). MBSR uses mindfulness meditation as the basis of the program. MBCT builds on MBSR by integrating cognitive techniques.

Sudarshan Kriya yoga (SKY) involves a sequence of specific, consciously controlled breathing techniques (pranayama). It also includes the use of yoga postures (asana) and sitting meditation. The focus of this article is the yogic breathing sequence of SKY, namely ujjayi, bhastrika, and Sudarshan Kriya.

Ujjayi is a three-stage breathing routine involving breathing at a slow rate, using airway resistance and the holding of the breath. Bhastrika is characterized by the forceful inhalation and exhalation of breath at an elevated rate, using the muscles of the abdomen. Finally, Sudarshan Kriya is a cyclical breathing exercise in which three different rates of breath are followed.

The use of breath in SKY must be differentiated from the use of breath in mindfulness. The natural flow of breath is commonly used as a point of focus for the attention in mindfulness meditation. The breath is not, however, consciously altered in mindfulness as it is in SKY.

Brown and Gerbarg (2005) have outlined a neurophysiologic model relating the effects of Sudarshan Kriya yoga to the autonomic system and, in turn, a person's mental state. Under this model vagal stimulation is seen to increase the activity of the parasympathetic system. Simultaneously, the cortical areas of the brain become less active. This involves a reduction of the activity of the executive functions of the brain, including rumination and worry.

In turn, this is seen to quiet the 'fight or flight' stress response of the sympathetic nervous system. The end product is hypothesized to be a state of calm alertness. As Brown and Gerbarg (2005, p. 199) write, "the stress response system and the parasympathetic nervous system respond like an orchestra to the breath rhythms set by SKY".

The affective states being investigated in this article are anxiety, depression and stress. Anxiety can be understood as persistent, intense and excessive worrying that interferes with daily living. Depression centers upon persistent sadness, a loss of motivation and tiredness. Finally, the term "stress" encompasses a number of various psychological and physiological states. It can include worry, negative affect and over-arousal. It occurs when the demands being made on a person are greater than their ability to cope.

Numerous studies have investigated the use of mindfulness meditation to treat anxiety, depression and stress. One such study, which has received significant publicity, is that of Teasdale, et al (2000) which found MBCT to be effective in preventing the relapse of successfully treated depression.

Another small, cross-sectional study (Evans et al, 2008) reported a significant decrease in anxiety and depressive symptoms in participants who completed an eight-week group course of MBCT.

An Australian study conducted in 2006 (Schreiner & Malcolm, 2008) involved a ten-week mindfulness meditation course. The findings suggested a significant decrease in anxiety, depression and stress. The decreases were more pronounced in those with severe rather than those with moderate symptoms.

The mechanism by which mindfulness meditation alters these affective states is not fully understood. Roemer and Orsillo (2002) suggest worry – a significant component of stress and anxiety – is often future-directed. As such mindfulness is attributed therapeutic potential for treating these conditions since it seeks to cultivate present-moment awareness.

Similarly, it has been suggested (Schreiner & Malcolm, 2008) that since mindfulness is, in essence, training in attention regulation it should consequently decrease ruminative tendencies. Rumination upon dysfunctional attitudes is a significant part of depression and a decrease in this tendency would hold therapeutic value.

More trials, however, are needed before a conclusive relationship can be established between mindfulness meditation and the reduction of anxiety and depression. A report published by the Chocrane Institute (Krisanaprakornkit, Krisanaprakornkit, Piyavhatkul, & Laopaiboon, 2006) concluded that current studies are insufficient to assess the effects of meditation for treating anxiety. Similarly, a review of current controlled research by

Toneatto and Nguyen (2007) into the effects of mindfulness meditation on anxiety and depression found that MBSR has an equivocal effect.

The evidence for the therapeutic value of mindfulness-meditation appears to be strongest in relation to its use in preventing relapse of successfully treated depression (Teasdale et al, 2000). Toneatto and Nguyen (2007) conclude that mindfulness meditation may be more effective as an adjunctive treatment rather than a primary treatment strategy.

Current evidence also points towards Sudarshan Kriya yoga being used successfully as an adjunct for the treatment of stress, anxiety and depression. Brown and Gerberg (2005) reported anecdotal evidence suggesting that SKY had achieved decreases in depressive symptoms in patients within five days. In some cases this change had enabled the discontinuation of medication. These anecdotal findings are supported by a study (Janakiramaiah et al, 2000) that found significant reductions in patients' depressive symptoms following a one week training program and three weeks of practice of SKY. Indeed, another study (Naga Venkatesha Murthy PJ et al, 1998) found the antidepressive effects of SKY to be comparable to the tricyclic antidepressive medication Imipramine.

Brown and Gerbarg (2005) note that caution must taken when using the rapid-cycle breathing techniques with patients suffering from anxiety . The increased breathing rate has similarities to hyperventilation and can induce a panic attack. Controlled clinical trials of SKY are needed to validate its use in treating stress, anxiety and depression.

At present, both mindfulness-meditation and Sudarshan Kriya yoga show potential for being used therapeutically in the treatment of stress, depression and anxiety. While there is presently more research supporting the use of mindfulness-meditation, further clinical trials are necessary. Research into the use of Sudarshan Kriya yoga is minimal however present findings point towards a potentially beneficial application, particularly in terms of treating depression (Janakiramajah et al, 2000)

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Circadian Physiology & Chronobiology: Yoga for Better Sleep

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Yoga-based physiological practices and lifestyle routines such as physical positions (asanas), breathing techniques (pranayamas) and meditation have been known to improve the quality and length of an individual's sleep, even though the neurophysiology behind its effects have not been extensively researched. In this essay, the physiological signs and mechanisms of sleep and the physiological effects of yoga-based practices can be compared to find correlations and possible explanations as to why yoga has been found to improve sleep.

The control centres for sleep lie within the hypothalamus, a major part of the brain controlling the autonomic nervous system (ANS). More specifically, the caudal area of the hypothalamus (also part of the reticular formation) controls our circadian rhythms via a neural network called the suprachiasmatic nucleus (SCN). The SCN acts as a biological clock, regulating bodily functions and cycles over a 24-hour period, the most significant one being the sleep-wake cycle.

Throughout the night our sleep cycles through a number of stages. Stages 3 and 4 of NREM (Non-Rapid Eye Movement) are the stages associated with the deepest quality of sleep and are marked significantly by physiological signs such as drops in heart rate and respiratory rate, as well as changes in blood pressure, body temperature and relaxation of the muscles. The majority of these changes are brought about by the parasympathetic nervous system which is responsible for decreasing heart rate and force as well as bronchoconstriction. It is well documented that NREM sleep involves a decrease in sympathetic activity with an associated increase in parasympathetic activity (Kuo et. al. 2008).

Asanas are physical postures practiced in yoga that can aid physical health as well as cultivate, relax and strengthen the mind along with associated breathing techniques (Stevens, 2006). *Asanas* for relaxation are adopted to release tension from the muscles of the body, and are often accompanied by meditation (Sivananda, 1987). There have been studies investigating the effects of various physical positions on the autonomic nervous system, one of them being '***The effect of the lateral decubitus position on vagal tone***' (Chen & Kuo, 1997).

Results of this study suggest that when the right lateral decubitus position is adopted (that is, lying on your right side whilst in bed) levels of cardiac vagal activity are at their highest, compared with the left lateral decubitus or supine positions. The vagus nerve (cranial nerve #10) makes up roughly 90% of all preganglionic fibres in the parasympathetic nervous system, and gives off fibres to the heart, lungs and gastrointestinal tract. An increase in cardiac vagal activity corresponds with decreases in heart rate and blood pressure, an increase in parasympathetic activity, which in turn relates to the physiological changes observed during NREM sleep. Thus, assuming the right lateral position in bed can provide the greatest quality of sleep through maximal systemic innervation of the parasympathetic nervous system.

Some reasons for the benefits of the right lateral position proposed by the study includes compression and greater gravitational pull on the heart in the left lateral or supine positions, causing greater levels of sympathetic activity, and enhanced innervation of the sino-atrial nerve and greater venous return to the heart while in the right lateral position. Neither of these reasons are validated. Another reason that can be further explored involves the asymmetrical pressure generated on the right side of the body, such as when practicing right-sided Flapping Fish pose as a sleeping position, causing right nasal congestion and consequently forced unilateral left-nostril breathing, which stimulates the right hemisphere of the brain which also increases vagal activity (Stevens, 2008a).

Pranayama involves the control of breath through the regulation of inhalation, exhalation and retention of breath, and is used in yoga to steady and lessen the velocity of the mind, and assist in concentration and meditation (Sivananda, 1987). One beneficial aspect of *pranayama* is nostril breathing, and has been researched in studies such as '***Immediate Effect of Specific Nostril Manipulating Yoga Breathing Practices on Autonomic and Respiratory Variables'*** (Raghuraj & Telles, 2008). The study investigated left, right and alternate nostril breathing and found that while right nostril breathing significantly increased systolic, diastolic and mean blood pressure, systolic and mean pressure decreased in alternate nostril breathing and systolic and mean pressure decreased in left nostril breathing. This suggests that left nostril breathing is related to parasympathetic activity; it can be concluded that adopting the right lateral decubitus position aids in unilateral left nostril breathing, the effects of which can increase parasympathetic activity and subsequently increase sleep quality.

Melatonin, a hormone secreted by the pineal gland, is secreted at night and is associated with increased sleepiness. It also appears that increased parasympathetic activity affects melatonin production, as the pineal gland is innervated in part by fibres from the parasympathetic nervous system (Stevens, 2008). Melatonin in clinical treatment has been shown by studies to be effective in reducing sleep latency and increasing sleep duration, for example in a sample of children with neurological disabilities (Wasdell et. al. 2007).

Meditation in yoga is an important and powerful tool used to disconnect the mind from its usual state of busyness and mental alertness in life and to achieve a deep, relaxed altered state of consciousness that refreshes the mind and body (Stevens, 2006). In the study '***Acute increases in night-time plasma melatonin levels following a period of meditation***' (Tooley et. al. 2000), a group of experienced meditators were asked to practice meditation between the hours of 12 and 1 am, the time when melatonin levels begin to peak, and were found to have increasing levels of plasma melatonin during and after the meditation period, as compared to their control night. While the methods behind how meditation

induces higher levels of melatonin are not clear, the study refers to previous studies proposing that meditation is linked to reduced hepatic blood flow, which may slow the metabolic rate of melatonin catabolism and that meditation may increase levels of noradrenaline in the blood, which may interact with the beta-adrenergic receptors of the pineal gland to stimulate higher melatonin production. Meditation, in general, tends to be associated with lowered sympathetic activity and increases in parasympathetic activity, which can lower stress and increase melatonin levels (Stevens, 2008).

Since it has been demonstrated that meditation increases plasma melatonin levels and it seems that melatonin effectively improves sleep quality, we can draw parallels between the studies to conclude that meditation can improve our quality of sleep, particularly if done in the evening before rest.

There have been multiple studies that have combined the many aspects of Yoga into general Yoga sessions in order to investigate its effects on sleep. Participants who undergo these Yoga sessions are often reported to experience significantly greater quality of sleep (Cohen et. al. 2004). On example is the study '***Treatment of Chronic Insomnia with Yoga: A Preliminary Study with Sleep-Wake Diaries***' (Khalsa, 2004). Subjects suffering from chronic insomnia practiced the Kundalini Yoga style, involving postures, meditation and breathing techniques for 30 or 45 minutes daily and also recorded their sleep-wake patterns daily throughout the 8-week intervention. Analysis of their sleep-wake diaries found that sleep efficiency, total time asleep, the sleep onset latency and wake time after onset of sleep were all improved significantly.

These studies not only demonstrate the effectiveness of Yoga such as Flapping Fish in improving sleeping patterns, but also suggest that Yoga can also be used effectively in a clinical setting to combat symptoms of insomnia and other sleep disorders, some of which may result from the effects of stress and chronic illnesses.

The mechanisms in the brain that induce sleep are still unclear; our sleep cycles are "…*controlled by complex interaction among nuclei in the hypothalamus, reticular formation, thalamus and cerebral cortex*." (Saladin, 2007) However, clinical research into the yogic practices of *asana*, *pranayama* and meditation all indicate that there are great benefits from practising yoga for the improvement of sleep.

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Yoga as a Treatment for Menopausal Symptoms

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Yoga is now being investigated as a non-aerobic form of exercise with the potential to alleviate symptoms associated with menopause. There are reports and studies emerging which substantiate claims that yoga can regulate sympathetic activity, which is believed to be the cause of vasomotor symptoms [hot flushes] many women world wide experience. The regulatory impacts on respiration, cortisol activity, heart rate variability and blood pressure, combined with yoga's meditative and mindfulness aspects all appear to have positive results for women navigating their menopausal period. More controlled, effectively designed research studies will be required to further substantial these facts but yoga is emerging as a safe alternative to Hormone replacement therapy and other pharmaceutical therapies for menopausal symptoms.

Over the years yoga has continually spread around the world and been developed to help people cope with various health conditions, including menopause. Many researchers are investigating the possibility of yoga as an alternative to hormone replacement therapy [HRT] for vasomotor symptoms [hot flushes] associated with menopause and various other health conditions. This essay will compare information from trials and studies relating to the effectiveness of various yoga techniques in treating the symptoms associated with menopause, compared to more aerobic exercise and current treatments.

According to the website Managing Menopause (2009) menopause usually occurs between the ages of 48 and 55 years and is a natural process of changes in a woman's body which results in infertility once menstrual periods end. During the 'perimenopausal' or menopausal period a woman's periods will 'fluctuate' until ending and menopausal symptoms can arise gradually two to six years before this point and end around 12 months afterwards.

On average around 20% of women experience severe symptoms, 60% mild symptoms and 20% may have no symptoms at all (Managing Menopause, 2009). These can include; mood changes, bloating, aches and pains, headache and migraine, hot flushes and sweats, reduced capacity to cope with daily activities, tiredness, insomnia, weight gain, forgetfulness, irritability, depression, urinary frequency and a lack of concentration (Managing Menopause, 2009). These symptoms can vary between individuals.

The nature of these symptoms makes this transition very significant, causing many changes to individual's lifestyle and everyday life. Many people are searching for ways to retain regularity and minimise the inconvenience and discomfort during this period of life. The most commonly experienced physiological symptom of menopause are hot flushes and associated night sweats, it is estimated to effect 2/3 of American women (Cohen et al, 2007). The secondary affects can include disrupted sleep patterns and interruptions to daily life which can result in fatigue and reduced quality of life, HRT is currently the most effective treatment but more women are becoming aware of the serious side effects. This is leading more women to investigate alternative treatments such as yoga. While it is generally still a refined, pure and balanced way of life in India, it has been commercialised and simplified in many western societies. The physical aspect has become the main focus and the very essence of yoga, the mindfulness component with which every breath and movement should be conducted, is often lost. Never the less yoga does have the potential to provide physical, mental and emotional health benefits to those who practice it while properly guided.

Yoga has been shown to *"increase heart rate variability and decrease oxygen consumption, heart rate and blood pressure"* (Cohen et al, 2007, p.199) through the control of breathing, different postures and meditation techniques. An hypothesis regarding the cause of hot flushes outlines that it may be partly caused by an "increased sympathetic nervous system" which an article by Cohen et al (2007), speculates may be decreased by yogic activities. The results are based on *an uncontrolled pilot study of 14 post-menopausal women* and involved them participating in a 90 minute yoga session per week for 8 weeks as well as at least three, 1h sessions at home per week. The sessions were designed by two experts who both have appropriate experience dealing with peri- and postmenopausal women and are certified yoga instructors.

The postures were chosen based on effectiveness in relieving hot flushes and included; Balasana (Child's Pose), Adho Mukha Svanasana (Downward facing dog), Baddha Konasana (Seated bound angle pose), Upavistha Konasana (Seated wide angle pose), Viparita Karani (Supported legs up the wall), Setu Bandha Sarvangasana (Supported Bridge pose), Supta Bandha Konasana (Supported lying down bound angle pose) and Savasana (Corpse pose), all derived from restorative yoga. This 'section' of yoga focuses on deep relaxation and uses props to provide total body support, very important for women of this age group who have limited prior experience partaking in yoga. The nature of these poses and the associated deeper and slower breathing patterns would physiologically reduce women's oxygen consumption, while stabilising blood pressure and heart rate as claimed in the results.

A conflict of information arises if any of these women are currently menstruating; as this list of poses includes "inversions" which some people believe should not be carried out by women during this stage of their cycle. This is addressed by Schatz (2002), many of the ideas about concerning this exclusion are false but some, like the Hindu belief that the 'energy flow' through the body should be helped and not hindered, seem to have more logical foundations. Schatz (2002) focused on the increase of menstrual bleeding and the logical physiological reason that energy levels are usually significantly lower during this time. This would affect an individual's balance and strength, possibly resulting in injury. This though is compensated for in the choice of the 'supported' versions of some poses, resulting in yoga being deemed a treatment with no *"adverse effects"* in Cohen et al (2007, p.201)

In the trial outlined above the frequency of hot flushes had decreased by 28% at the 4 week mark and by week 8 participants had experienced a decrease from baseline of approximately 30.8% (Cohen et al, 2007).

This very positive result and other studies such as Gold (2000) and Guthrie (2005) have found positive correlations between physical activities and reduced symptoms, but Slaven (1997) is one smaller observational study among many which concluded there was no such connection. Some studies found that when using exercises such as running and cycling the number of hot flushes actually increased (Daley et al, 2009), indicating the physical activity may have been too strenuous and the effectiveness of yoga may be due to the patterned breathing and meditative aspects. Questionnaires revealed that participants felt most improved in terms of the physical area, 46% in sleep, 46% in 'aches and pains' and maybe a result of *"decreased sympathetic tone"* (Cohen et al, 2007, p.202) but the study states that there is not enough 'power' to measure this conclusively. It can be found that 85% of 'available studies' regarding yoga, concluded that it reduced sympathetic activity including; heart and respiratory rate, cortisol levels and skin conductance. Other trials which recorded blood pressure found regular yoga practice could lead to significant reductions; out of 12 randomised control trials 75% found improvement over the control groups, a change to more 'yogic' would have had some impact on these improvements as well as the physical activity.

Yogic lifestyle is a way of living which aims to improve the body, mind and day to day life of individuals. Patanjali described the '8 limbs of yoga' as a practical way to evolve mind, body and spirit to achieve a balance and harmony. The 2nd limb of which is called Niyamas which refers to "how you treat yourself or your attitude towards yourself" (ABC of Yoga 2003-2008), this is an important aspect of yogic lifestyle which may significantly benefit women going experiencing menopause. Commonly women experience a lack of self esteem and self-belief, the feeling of having no control over their lives, while dealing with considerable hormone changes. While the yoga practices may provide a *"source of distraction or 'time out' strategy from daily life...and enhancement of self esteem"* (Daley et al 2009, p.177) helping women focus on the simplicity of movement and forget about demands, work, responsibilities and thus reduce stress, depression and anxiety, possibly even help to balance mood and emotions. The place of Niyama is to help direct people to be 'clean' in body, mind and environment, practice contentment with what and who they are and look after their body. This aspect of yoga can help indirectly to dampen emotional spikes and restore more normality to an individual's life, thus reducing stress and increasing self esteem and quality of life.

Reduced self esteem and self image is a hurdle that most women dealing with menopause would encounter and find difficult to over come. Yoga is emerging as tool to improve this problem which is exacerbated by the increased hormone changes. As a form of exercise it is appropriate that yoga should be used to help combat this issue as shown in the trial by Elavsky and McAuley (2007), although no significant direct improvement was found in terms of the participants 'global or physical self-esteem' it was found that 'body attractiveness' was elevated by the yoga classes. Over the short period of 4 months it is far more likely that the improvement was due to a renewed perspective, the women were more aware of their bodies and able to appreciate the strength, balance and harmony contained within them as they performed the asana. As mentioned above the mindfulness of the practice would provide a distraction for the individuals from dwelling on insecurities, while *"decreasing stress levels and improving cognitive functioning"* (Daley et al, 2009, p.179). The results while not definitively proving that yoga will solve women's self esteem and self image problems appear to agree that the benefits of less aerobically active exercise are central in helping people to deal with changes and stress, as well as reducing the risk of chronic diseases in future.

These are significant, positive implications that yoga can offer women. By addressing all aspects of their lives, no matter how indirectly it occurs, yoga is helping women to feel they are improving their situation, mental and physical health. These articles and many others outline and contradict each other on how effective yoga is in reducing the occurrence of hot flushes and other menopausal symptoms, but the general consensus appears to be that yoga does influence many physiological systems within the body. Combined that with the mindfulness and lifestyle impacts and professionally designed yoga practices can be classified and promoted as reducing the frequency and severity of menopausal symptoms; mental, physical and environmental.

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What is Meditation?

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Meditation is often thought of as sitting quietly and stilling all the thoughts or contemplating the navel while keeping the spine erect and hands in the lap in any number of classical mudras. But what is actually going on inside? Is it sufficient to just sit there and do nothing? Is it important to use a mantra to keep the mind occupied or is it better to empty the mind of thoughts?

According to Swami Satyananda (1974) there are two types of meditation: Active and Passive. Passive meditation is where you sit for some time and practice some form of contemplation or introspection such as TM, Siddha yoga, Raja yoga, or any one of the many meditational practices commonly known these days. The aim in passive meditation is to help still the mind and to make it one pointed. There are 4 stages of proficiency:

Stage1: Pratyahara:
This is where the mind is fixed on a meditational practice or technique such as a sound, a mantra, a visual picture etc. It can even involve an asana or a movement. This process is designed to occupy and calm the mind, and to make it more introverted, rather than constantly distracted by external events and signals coming in all the time.

Stage 2: Dharana:
The free flow of thoughts, visions, memories etc. from the unconscious is the hallmark of this stage of meditation and the purpose is to rid the mind of the subconscious clutter. The idea is to simply observe the thoughts and impressions but at the same time, subtly detach yourself from the machinations and goings on inside. It is like waiting at a bus stop for your bus to come along. Many cars and trucks pass by, they are noticed but not acted upon. This traffic scenario in a way represents the very real and constant flow of thoughts, impressions and feelings that are often blurring a clear flow of conscious awareness.

Stage 3: Dhyana:
Real meditation only really begins when the mental clutter is no longer in constant focus or is a source of distraction and the mind can start to focus on and contemplate the higher aspects of consciousness. It never actually goes away. The mind does not actually become empty or silent. One simply ignores the clutter and ongoing noise of life and "tunes in" to the cosmos or collective consciousness and then you start to have a spontaneous awareness of the higher aspects of self and knowledge of a higher order. A sense of connectedness to all life and all things unfolds and this connectedness allows for the possibility of absorption into the whole.

Stage 4: Samadhi:
When the mind is totally transcended, one can, theoretically, achieve supreme consciousness and what is often known as enlightenment. This is when the person is totally immersed or absorbed in the meditation state at all times and is beyond "normal" everyday awareness. All things eventually become one. It is a very high state of being and not that easy to obtain but we can sometimes have glimpses and short experiences of this state from time to time if we persist.

Eventually "passive meditation", ie the sitting and trying part, is meant to fall away and "active meditation" takes over as a natural progression. This active meditation is where the participant continues in their daily activities and begins co-developing their self identity as well as practicing some form of passive meditation from time to time. There evolves a continuous state of meditation in one's life that stems from a realisation of higher consciousness. A knowing that we are all connected and that we all play a part in each other's reality. Active meditation then includes such things as walking, breathing, working, sitting, eating, toileting, learning and even includes longer term actions such as obtaining various qualifications over several years to achiever a higher purpose in life or bring about change in the collective consciousness that can only be done by applying constant effort over time. As we all belong to this collective consciousness, any awareness that we enhance (or pollute) in ourselves also eventually affects the whole in some way. Consciousness is more than the sum of its parts, however, despite some philosophers branding it as merely an epiphenomenon, the noise that comes from the machinations of the mind.

The word "consciousness" though has different meanings to different people. Dictionaries often define it as 'knowing of external circumstances.' A person in a dream, coma or under anaesthetic may appear "unconscious", yet on waking or under hypnosis may later report events and conversations that occurred during their 'unconsciousness' (Russell, 1983). According to Johnstone, (1973, pp. 79) "All consciousness is conscious of something. But this is not the only priory principle of specifying the scope of consciousness. There is also the principle of ownership: all consciousness is somebody's consciousness." It is intentionality that makes us human and gives us choice. Consciousness by itself is essentially impotent. It cannot act upon or impinge itself on matter without energy. That's how we get the Siva-Shakti dance of consciousness and energy to materialise and manifest intention via duality.

Unfortunately, there is an ongoing and inherent problem with the English language having essentially only one word to convey so many different meanings. Maslow thought there was just one mystical experience, he described it as "unitive consciousness" or cosmic consciousness. According to Rowan, (1983) however, there are at least 7 distinct mystical experiences. These are the peak experience, pure energy, real self, higher self, deity as substance, deity as process, and the ultimate consciousness. In Sanskrit, though, there are some twenty different words for consciousness, each with a specific meaning representing many concepts, which in the West are often barely heard of let alone be familiar and in common use. For example *CHITA* is the *mind stuff* or the experiencing medium of the individual; *CHIT* is the eternal consciousness of which the individual mind stuff is a manifestation; *TURIYA* is the experience of pure consciousness without an object;

DHYANA is consciousness focused on an idea; *PURUSHA,* the essence of consciousness (Russell, 1983). Whether the process of objectifying consciousness is more properly in the realm of physiology, psychology or philosophy is open, but the specific phenomenological method required for the study of consciousness is introspection (Dennett, 1978) and introspection is the first stage of passive meditation.

This process of introspection is utilised in the same manner as that used by practitioners of Transcendental Meditation (TM). TM consists of mental recitation of a mantra, given according to one's age (Maharishi Mahesh Yogi). This mantra is then used from then on until one reaches an advanced state when the addition of the mantra "nama" is added to then end of one's "personal" mantra, and is meant to be kept secret from others. The process of using a simple mantra allows the conscious mind to become sufficiently distracted and occupied so that stillness and quietude can ensue. There are many such simple introspections with and without mantras in may different lineages of yoga.

Woolfolk, (1975) and Corby et al., (1978) cite many therapeutic benefits of a TM style of meditation practice such as lowered blood pressure, greater relaxation response etc., and look at EEG and other correlates of TM and other Yogic meditation practices. They both essentially found that there are two distinct responses to meditation techniques that seem opposite in effect. TM and other similar contemplative meditation techniques such as Zen, Zazen produce a similar relaxation response with EEG's of subjects showing increased alpha activity that was usually blocked or interrupted by introducing an auditory or visual stimuli as an external distracter. Occasionally, theta waves were also found in the deeper states of this type of meditation.

However, in studies of other meditation styles such as a Tantric yoga meditation practiced by the Annada Margas, which is similar in substance to certain of the Kundalini Kriyas of Swami Satyananda, Corby et al. (1978) found the opposite effect, ie one of cortical or higher-brain arousal. They found that experimental subjects became more cortically aroused than their control counterparts as well as having a marked decrease in responsiveness from external stimuli. This means that they were not so easily distracted from their meditative state by external sights or sounds introduced specifically to test them. This style of meditation then was very different from the TM style of simple contemplation and mental recitation of a mantra. Ananda Marga Meditation is based on witnessing the breath and consciously "following" the breath up and down the spine whilst reciting a mantra with each breath.

It would seem, therefore, quite inadequate to describe meditation simply in terms analogous to the TM style of meditation only and, in fact, it seems very important to be aware of the effects of different styles and types of meditation practices and to choose one according to the desired physiological and/ or psychological outcome. It is no good going to the shop to buy a hammer when what you need is a pair of scissors. They are both tools and very effective at what they do best, but each has different actions and should be chosen according to the required outcome. Meditation is similar. It is a word that is often used in simplistic terms to describe generalised activities that look similar from the outside.

TM style meditation also has similar attributes in common with prayer yet differs in quality from prayer as discussed by Surwillo and Hobson, (1978). In prayer, subjects are certainly introspective, often repeating a verse or short collection of words with a focussed attention and intention. TM, though similar in introspection, is less directed and less focussed on the content and or meaning of the words used. People engaged in prayer have EEG patterns more similar to the Tantric Ananda Marga style of meditation, showing higher cortical arousal, than that of the TM practitioners. The faster EEG's during prayer were associated with deeper states of introspection and were not considered to be the result of cognitive activity or due to muscle activity either. It would seem then that there are two distinct effects of meditation, one of arousal and one of alpha style relaxation.

There are also, two distinctly separate modes of awareness, thought to be comprised of simultaneously existing functional modes (outer and inner) that are involved in and are necessary for perception. Sperry, (1984) considered whether split-brain patients possess these two separately co-conscious selves sharing the one cranium. He found that both hemispheres in commissurotomy patients (those who had the Corpus Callosum in their brain cut, often to stop uncontrollable epileptic seizures from migrating from one side of the brain to the other) still retain high levels of distinct mental functioning with the mute right hemisphere having an inner experience of much the same order as the speaking left hemisphere. The experience differs in quality, process and cognitive faculties, however, despite utilising different cognitive strategies to do so. The right side "knows" but cannot "speak", while the left can "speak" but does not "know" (it just thinks it knows).

The process of contemplation and meditation then allows us to explore the nature and substance of consciousness itself by turning consciousness inward upon itself. TM and mantra meditation tends to occupy the generally stronger and more dominant conscious mind with a mental sound or "mantra" so that the gentler and more passive subconscious mind can unfold and give up it's secrets. The conscious mind is so strong in analytical prowess and so often absorbed in maintaining the cognitive staus quo that it cannot see behind the veil of illusion that it builds for itself in order to make sense of this material world we live in. The more subtle things of life go unnoticed or overlooked in favour of an established reality that is re-created and sustained by endless thoughts and actions each waking day.

Consciousness in Western thought is generally signifying a state of the mind or brain activity and as such appears in the world only when the mind is functioning in a certain way or is in a certain state. A person is either conscious or unconscious and consciousness is either there or not there. In Eastern thought, however, consciousness constitutes a self-existent and autonomous principle of awareness itself as an entity or form that is self-luminous and self -transparent. Transpersonal experiences, rather than necessarily being illusory, can thus be valid insights into the nature of human consciousness. Meditation is that process of self witnessing, whether simply on a session by session basis that comes and goes or on a more stable and permanent basis that can only come from an increased and expanded awareness over time and with practice.

Yoga is an intricately detailed science that expounds both in theoretical and philosophical detail, and also in practical, physical methods, ways in which a person can become more aware of the true nature of the self. Yoga provides the groundwork and the basis for beginning the process of expanding awareness. The Vedantic philosophy upon which Yogic science is based treats the mind-body dynamic as an inseparable whole where the mental and the physical are regarded as illusory reflections of an implicit, transcendent, structural unity of consciousness binding all that exists.

Transcendence implies an intuitive realm that cannot be known intellectually, but can only 'be' (Paranjpe, 1985; Castillo, 1985). The Eastern Yogic perspective is also supported by Quantum Theory and Particle Physics:

> *"The soul is that cause, the presence of which keeps one alive and its absence reduces an animate being into an inanimate object... Though the presence of the soul is evident, it cannot be directly perceived by the usual five senses. The soul's manifestation is through a conscious mechanism... known as consciousness. The operational procedure of consciousness is through desire, (ie motivation) ... the motor action of the body starts and the mechanical work is done. Thus we see that desire [manifest] in a physical entity which, when it triggers the brain, electrochemico-physiological and other physical processes start operating... Desire is not essential for the demonstration of consciousness, although consciousness operates in the physical world through desire (Mitra, 1993).*

Consciousness is definitely a prerequisite for all perceived experience. We not only experience the world around and within us, by a process of observation, we are also conscious of ourselves in that world, whether its the inner world or the outer world that we are aware of, and we are also conscious that we are conscious. We can contemplate and even discuss the various states of consciousness with other conscious beings. You cannot get the qualitative aspects of consciousness though such as the experience of the colour red, subjective feelings of pain or intention from the quantitative computations of the brain and nervous system or electronic circuitry of a computer. Consciousness depends on the complexities of the brain and nervous system to express itself but not to exist. Computations do not explain consciousness (McGinn, 1991).

If consciousness was dependent on computations, how then would TM and other styles of meditation and introspective analysis work, by witnessing the computations and machinations of the mind? And could we, even theoretically, construct a machine that would have "mental" states that could equate with human consciousness? Could it choose to meditate or to contemplate: "*I think, therefore I am*?" I think not! Could such a machine practice any form of meaningful contemplative meditation? I think not!

Meditation then, either active or passive, is a process whereby consciousness looks in and acts upon itself.

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Other Grants

(from http://australia.infoed.org subscribe at smarts@infoed.org)

Impact of Health Communication Strategies on Dietary Behaviours Sponsored by National Cancer Institute/NIH/DHHS. The sponsors provide support for research projects focused on the development and implementation of effective communication strategies related to diet and health, designed to promote interdisciplinary research, conducted at multiple levels (individual, community/environment, and policy) and across diverse populations, to evaluate effective communication approaches for changing dietary behaviours.

Deadline(s): 07/09/2010, 05/10/2010, 07/01/2011, 05/02/2011, 07/05/2011, 05/06/2011, 07/09/2011

Contact: Amy Yaroch, Ph.D.
Address: Division of Cancer Control and Population
6130 Executive Boulevard
EPN Room 4074, MSC 7335
Bethesda, MD 20892-7335 U.S.A.
E-mail: yarocha@mail.nih.gov
http://grants1.nih.gov/grants/guide/pa-files/PA-08-239.html
Tel: 301-402-8425 Fax: 301-480-2087

Nutrition and Physical Activity Research to Promote Cardiovascular and Pulmonary Health Sponsored by the National Heart, Lung, and Blood Institute/NIH/DHHS. The sponsors invite applications that propose research on the roles of nutrition and physical activity in the development, prevention, and management of cardiovascular diseases (CVD) or pulmonary diseases. In particular, knowledge of the contribution of diet and physical activity to these conditions and how sleep influences these relationships.

Deadline(s): 05/10/2010, 07/01/2011, 05/02/2011, 07/05/2011, 05/06/2011, 07/09/2011,05/10/2011

Contact: Catherine Loria, Ph.D.
Address: Division of Prevention and Population Sc
Two Rockledge Center, Room 10116
6701 Rockledge Drive
Bethesda, MD 20817 U.S.A.
E-mail: loriac@nhlbi.nih.gov
http://grants1.nih.gov/grants/guide/pa-files/PA-09-243.html
Tel: 301-435-0702 Fax: 301-480-1669

Research projects include, but not limited to, studies that: Identify dietary patterns, nutrients, or diet components to prevent CVD and pulmonary diseases or improve prognosis in CVD and pulmonary disease patients; Investigate relationships of nutrients/other dietary components or physical activity/exercise/fitness with the pathophysiology of atherosclerosis or COPD and possible pathways or mechanisms; Identify the mechanisms through which sleep affects diet and physical activity behaviours; Identify influences of the built, home, psychosocial, and sociocultural environments on dietary or physical activity behavior. Areas of specific interest to NCCAM are: Investigations to examine the contribution of exercise modalities associated with meditation such as yoga or tai chi on the improvement of symptoms, prognosis or adherence to medical therapy in patients with CVD and pulmonary disease.

Tasmanian Community Fund Grants to community organisations that make a difference by enhancing well-being and improving social, environmental and economic outcomes for the Tasmanian Community.

Contact: Mark Green, Senior Executive Officer
Address: GPO Box 1350, Hobart TAS, 7001
E-mail: admin@tascomfund.org
Web Site: www.tascomfund.org
Tel: 03 6233-2800 Fax: 03 6233 5690

The sponsor is committed to supporting projects that provide benefits to the Tasmanian community across the following areas: community welfare; sporting or recreational activities; youth issues; cultural and arts purposes; health; religious purposes; education; regional development; environment; and economic development and employment. The Board will consider an application for funding from an incorporated not-for-profit organisation: based in or proposing to undertake a project in Tasmania. Unincorporated not-for-profit organisations may also apply for a grant if an incorporated organisation is prepared to auspice the project. Individuals are not eligible to apply for a grant. A detailed business case/plan must be attached to an application requesting a grant near, or in excess of, $100,000.

Asthma Foundation of Victoria The sponsor funds research to support its mission of helping people manage their asthma all year round. In 2008 the Foundation will award the following grants: Helen Macpherson Smith Trust grant for general asthma research in the amount of $25,000 and The Asthma Foundation of Victoria Research Grant for children's/adolescent asthma research in the amount of $25,000 for research in Victoria.

Contact: Garry Irving, Services Manager
Address: 491-495 King Street, West Melbourne VIC 3003,
E-mail: girving@asthma.org.au
Web Site: http://www.asthma.org.au/Research.aspx
Tel: 03 9326 7088 Fax: 03 9326 7055

The University of Melbourne Australia's largest postgraduate scholarship program with 436 places valued at a total of more than $20 million. Melbourne Uni has the largest and most generous scholarship program covering the living expenses of postgraduate research scholars across a wide range of disciplines. University of Melbourne Deputy Vice-Chancellor (Research) Professor John McKenzie says the University is now calling on the best and brightest minds across Australia to apply to do their postgraduate research study at Melbourne.
See http://uninews.unimelb.edu.au/articleid_3798.html

The SATYA Foundation Grant (University of Adelaide)
The SATYA Foundation is dedicated to promoting research on yoga and associated studies such as anatomy, physiology, psychology, philosophy, Ayurveda Jyotish etc. SATYA provides grants, scholarships and prizes for university studies into the benefits of yoga to encourage proper scientific yoga research programs by independent research. This trust will also liaise with and/or support other persons and organisations with a similar purpose in order to mutually assist in the promotion and expression of the formal study of yoga in the wider community.
See www.yogalinks.net/SATYA/Research.htm for more information

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The ASI 'SMART Company' Scholarship Fund
Financial assistance in the form of scholarships and education subsidies up to $20,000 per year ($2,000 per individual). The study that the applicant intends undertaking must be directly relevant to professional education in the not-for-profit sector.
See http://www.communitybuilders.nsw.gov.au/funding.html

Australian Academy of Science Awards
See www.science.org.au/awards

Melbourne Research & Grants Bulletin
See www.researches.unimelb.edu.au/researchbulletin

More scholarship opportunities www.jason.edu.au

Journal of Yoga - Ontogenetic and Therapeutic Investigation

Journal [noun] a periodical dedicated to a particular subject

www.srijyoti.org

Yoga [noun] from Sanskrit "yug" meaning "to join" or "to bring together". A discipline involving body, mind & consciousness aiming for a balanced state of physical & mental health, well being, tranquillity and spiritual insight; a healing system of theory and practice through a combination of breathing techniques, physical practices, meditation skills and lifestyle adjustments.

Ontogenetic [adjective] pertaining to ongoing development of the individual, throughout the entire life cycle.

Therapeutic [adjective] to cure or restore to health; a restorative technique; having or exhibiting healing power: a therapeutic agent or process.

Investigation [noun] the work of inquiring into something thoroughly and systematically.

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Swan Research Institute (inc)

Aims & Objectives

1. To scientifically investigate systems, techniques, methods and processes which may have therapeutic benefits for, or may improve the quality of life for individuals, families and the community. These systems may include physiological, psychological and/ or philosophical inquiries.
2. To acknowledge, liaise, cooperate with and support, where appropriate, other organizations with similar aims and objectives.
3. To acknowledge and cooperate, where appropriate, with suitably qualified practitioners of other healing techniques including allopathic and natural sciences, complementary therapies and counselling modalities.
4. To publish in reputable, peer-reviewed journals. To also make information available for members and the general public and hold conferences, seminars etc. for the purpose of education of the community at large.
5. To establish and maintain a research and resource centre and broad based library for the collecting and dissemination of relevant information and research data.

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This category is for those who are actively involved in research for and on behalf of SRI. We hope to develop a talented pool of Research Fellows that can assist in getting several research projects up and running.

Friends of SRI

This basically covers everyone else who is interested in hearing about research, receiving email newsletters about yoga research, conferences etc. Friends can be supportive by volunteering their services at various times or just sit back and have access to SRI research.

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A Research Peer is a person of sufficient standing in the yoga and/or research community with significant knowledge and experience who is willing and able to conduct peer reviews for SRI's publications in order to make sure that we set and maintain a very high standard of work in research.

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A Patron is a person or an organisation that supports SRI with financial or other real support in the form of donations, bequests or gifts. We need Patrons to help us do the work that we plan to do. If you are interested in becoming a patron, please contact us by email for more information

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