

Original Concept

Yogapathy: Meditation Science and Practice, for Psychosomatic Health, Neuroplasticity and Well-being — An Insight

Dhanjoo Ghista¹, Vinithasree Subbhuraam^{2*}, Michael Towsey³

¹University 2020 Foundation, San Jose, California, USA

²The Egoscue Foundation, San Diego, California, USA

³Queensland University of Technology, Brisbane, Australia

*Corresponding author Email: svinithasree@gmail.com

ABSTRACT

The objective of this paper is to open a new frontier in (i) the science and practice of meditation, (ii) the physiological and spiritual benefits of meditation, and (iii) how meditation enables us to become global citizens and become dedicated to promoting progressive living for all the people in the world. We first present the new science paradigm of Cosmic Consciousness to cosmology, to life origin and evolution. Then, we explain how meditation ideating on Consciousness promotes psychosomatic health and wellbeing. Subsequently, we present the morality foundation of spirituality. Morality comprises Yama (controlling our actions) and Niyama (self-regulation), which are moral guidelines for human development. Morality and spirituality are intertwined. Without morality, we cannot develop spirituality. Meditation strengthens our morality.

We then present how to do meditation, involving three lessons: (i) Ishvara Pranidhana: ideating on the divine entity pervading around us, (ii) Pranayama: breathing pranah — divine vital energy, and (iii) Cakra Shodhana: stimulating and purifying the chakras by which the surrounding endocrine glands release hormones into the organs. We then provide the means to validate the physiological benefit of meditation by presenting our work on electroencephalogram (EEG) response to meditation, showing a shift of the EEG energy state to a lower frequency band, associated with decreased mental tension, increased relaxed state, and tranquility, and then even to intuitional development.

We then describe how meditation affects the brain regions and promotes higher learning capability. We then discuss the benefits of meditation for the spirit, body, and mind. What is important is that meditation involves us with the divine entity, whereby we can lift ourselves above narrow sentimentality in our thinking and actions. This enables us to become global citizens and develop a world without borders. When we recognize how this noble thinking and acting on our part has a big impact on human society, we can become committed to becoming pioneers in developing a new spiritual civilization in this world.

KEYWORDS: Meditation, EEG, Psychosomatic health, Consciousness

ABBREVIATIONS EEG: Electroencephalogram

IP: Intuitional Practice

1. Introduction: Yogapathy connects the mind and chakras, endocrine and neurological systems, thereby influencing mental and physical health, and promoting wellbeing

Meditation involves energizing our mind with ideation on Consciousness, for psychosomatic health, wellbeing, neurological care, and spiritual development. The mind and brain are interrelated. Neurological disorders affect the mind, and psychic disorders affect our thinking and the brain. Yogapathy connects the mind and brain and is associated with mind-brain development and medicine. In this way, Yogapathy opens up a new concept of neurology care, regarding how neurological disorders can be addressed and cured by meditation into higher Consciousness.

The nervous system is linked to the endocrine system. The hypothalamus of the brain connects these two important communication systems, and is responsible for regulating basic needs and stress responses. Linking the mind and the physical body (or the organ systems) are subtle psychic energy centers or chakras, which control our mental propensities and behavioral expressions (as well as the body's organs through the endocrine glands, as indicated later). The chakras are connected by subtle energy channels (or *nadis*), through which the vital (bioplasmic) energy (or *pranah*) is conceived to reach every part of the body. Both mental and physical health and behavioral response of the individual depend on the proper energy balance between the chakras, and thereby the functions of the endocrine and nervous systems. Disease is caused by an imbalance in this energy flow between the chakras, and the dysfunctions of the endocrine and nervous systems. Meditation on the chakras affects the endocrine glands, especially the pineal and pituitary glands, and thereby the brain and the neurological system. How? This article explains this mechanism.

However, this article goes beyond that. **We first present in Section II**, the new science paradigm of the cosmological cycle, involving (i) Cosmic Consciousness devolving into the cosmic mind, expressing the five fundamental factors to form the cosmology (or the universe), (ii) microvita converting matter into the primitive mind and life structures, (iii) the process of organic evolution from primitive life structures to simple plants and animals, and eventually to self-consciousness human beings. This enables us to understand how the physical universe develops from Cosmic Consciousness, how life develops and evolves from the primitive mind into higher mind states, and how human beings can develop higher Consciousness by doing meditation. This sets the stage for presenting Yogapathy. **So, in Section III**, we describe the science of meditation, involving (i) energization of the chakras by which the associated endocrine glands secrete hormones affecting the health state of the organs, and (ii) mentally ideating on Consciousness by which the embedded impressions in the subconscious mind (due to reactions of past actions) get defaced, leading to enlightenment. This explains how meditation involving

ideation on Consciousness promotes psychosomatic health and wellbeing and also helps to liberate the mind for progress to enlightenment.

In Section IV, we present the morality foundation of spirituality. Morality comprises Yama (controlling our actions) and *Niyama* (self-regulation), which are moral guidelines for human development. Morality and spirituality are intertwined. Without morality, we cannot develop spirituality. Meditation strengthens our morality, enabling more progressive and harmonious communities and a more evolved society. **Then in Section V**, we present the fundamentals of meditation practice. Therein we describe three Lessons: Lesson 1. *Ishvara Pranidhana*, meaning offering one's mental self to God (or Divine Entity) and making union with God. Lesson 2. *Pranayama*, the science of *Pranah* (vital energy), by which every part of the body becomes filled with the cosmic vital energy, and Lesson 3. *Chakra Shodhana*, literally meaning purification of the chakras, by which the chakras get energized, and the associated endocrine glands release hormones into the organs for their curing. **We then present in Section VI**, the physiological characterization of the meditative state, using EEG to manifest its therapeutic value. When a regular practitioner does meditation, the EEG response to meditation shows a shift of the EEG waves to a lower frequency band, associated with decreased stress, and increased relaxed state and tranquility.

Subsequently, in Section VII, we describe how meditation affects the brain and promotes better learning, by whole brain synchronization, which enhances the learning ability. **Then in Section VIII**, we discuss the meditation's benefits for the spirit, body and mind. **Section IX** takes on a new spiritual paradigm, as to how meditation can promote humanism and global citizenship, by enabling us to rise above the binding dogmatic sentiments of (i) race and religion (which has divided the world), by adopting humanism as the guiding principle, (ii) being capitalists and communists, into being spiritualists, (iii) national superiority (which has caused colonization and empire-building), into being world citizens.

Finally, Section X emphasizes that the evolution of humanity depends on transforming our Consciousness to develop a more heightened civilization conducive for the progressive living of everyone living here.

2. New Science Paradigm: Cosmic Consciousness to Cosmology, to Life origin and Evolution

In the last seventy years, the theory of Relativity has altered our views of space and time, while Quantum Physics theory has necessitated a new conception of the nature of matter and energy. Yet, even earlier than that, Max Planck had indicated that he regarded Cosmic Consciousness as fundamental, and matter to be a derivative of Cosmic Consciousness. According to him, we cannot get behind Cosmic Consciousness; everything we talk about, everything we regard as existing, postulates Cosmic Consciousness¹.

In this context, Paul Davies, editor of the book *The New Physics*², has suggested that the role of Cosmic Consciousness in a quantum observation still remains an unresolved issue and that it may be that this frontier-the interface of mind and matter-will turn out to be the most challenging legacy of the New Physics². In a similar vein, Nick Herbert has pondered, in his book review paper *On the End of Physics in the New Scientist*³, that among the successes of modern physics may lurk some tiny murkiness destined to become the seed of the next scientific revolution, just as the quantum behavior of light turned out to be the seed which overthrew classical physics.

There is indeed an increasing concern that the strictly objective, quantitative, and reductionist methodology of the natural sciences is inadequate to investigate the dynamics of mind and Consciousness^{4,5}. By contrast, the science of yoga has evolved as a system to expand the mind and Consciousness, and offers an appropriate methodology to investigate the so-called 'problem of Consciousness'. Clearly, the time for propounding a new paradigm of science, in the form of a Unified Theory of Mind, Matter, and Consciousness, is overdue.

In this New Science paradigm, the first and foremost is the concept of Absolute Consciousness (or Cosmic Consciousness), as the fundamental entity, incorporating the Cognitive and Operative principles. The integration of body and mind in human psychic development (as well as in holistic medicine) is based on this new science paradigm. Starting from here, we will now embark on the trail of the Cosmological cycle (as illustrated in Table 1 and Figure 1), as explained by Prabhat R. Sarkar, in his book *Idea and Ideology*⁶.

Stages 1 and 2: As depicted in **Figure 1**, the Cosmic Consciousness first devolves into Cosmic Mind ('Consciousness Devolution' in Figure 1), and the Cosmic Mind devolves into matter ('Devolution into fundamental factors' in Figure 1). How? Through the Operative principle, the Cosmic Mind expresses itself into the five fundamental factors (ethereal, aerial, luminous, liquid, and solid), providing the constituents of the physical universe and the basis of cosmology.

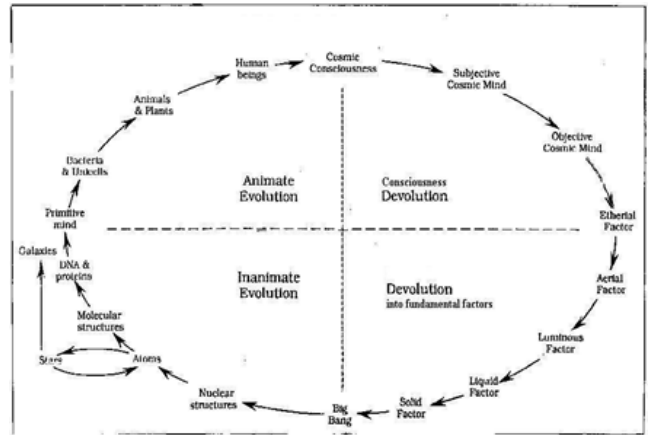


Figure 1: (i) From Cosmic Consciousness to Cosmic Mind, to Big Bang and universe development, (ii) From the development of primitive life, to plants and animals, to human beings^{7,8}

Table 1. Cosmological Cycle^{7,8}

1.	Cosmic Consciousness
2.	Cosmic Mind
3.	Five Fundamental Factors
4.	Primitive Mind
5.	Mind Development through the unfolding of Consciousness in organisms
6.	Complex organisms, plants, and animals
7.	Human beings (Unit Mind)
8.	Cosmic Consciousness

Stage 3: The third stage is that of the development of the primitive mind ('Inanimate Evolution' in Figure 1). In the earlier stage of the Cosmological cycle, the Cosmic mind emanates microvita, which energize matter to form an ectoplasmic mind. Under the influence of microvita, matter evolves into subtler structures through synthetic reactions, thereby providing the templates of primitive life structures, represented by primitive states of mind (and Consciousness), as illustrated in **Figure 2**. The positive feedback keeps the forward reaction going, causing more and more development of ectoplasmic mind material.

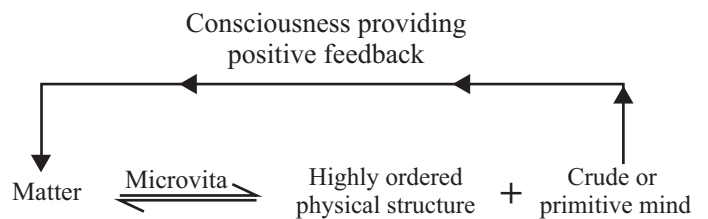


Figure 2: Emergence of a primitive mind and life-structure, through energization of matter by microvita^{7,8}

Stage 4: From this point onwards, the process of organic evolution begins and constitutes the fourth stage ('Animate Evolution' in Figure 1), whereby primitive unicells and bacteria give rise to simple plants and animals, and eventually to self-consciousness human beings. From primitive organisms to complex organisms, there is an unfolding of Consciousness due to the increasing reflection of Consciousness, with a corresponding increase in psychic dilation of the mind and concomitant increase in complexity of the nervous and anatomical structures. Increasing psychic dilation of a living being's unit mind leads to intellectual development, and eventually to parapsychic and intuitional development. The psychic dilation of the mind eventually culminates in its achieving mental liberation, from its psychic propensities embedded in the subconscious mind, based on our interactions and thinking. Eventually, the human mind becomes subtle enough to merge back into Consciousness — how, by doing meditation. Simply expressed, the Cosmological cycle is completed when human beings develop cosmic Consciousness^{7,8}.

3. Meditation: Ideating on Consciousness, promoting Psycho-Somatic Health, and Wellbeing, leading to Enlightenment

3.1. Consciousness pervading all around us, is the focus of meditation

In the previous section, we have explained how Cosmic Consciousness devolves into the Cosmic Mind, which then keeps devolving into the universe (both luminous and physical universes) through the Operative principle. Now we need to recognize that the Cosmic Mind is all-pervading around us here on this Earth, and in the universe surrounding the galaxies. So, for our unit minds to expand and evolve, we need to ideate on the Cosmic Mind. For convenience, let us call the Cosmic Mind as the Divine Entity or Consciousness.

In meditation, we become aware of the presence of the Divine Entity or Consciousness around us, and we address it in the form of a 2-syllabus mantra (to rhyme with our breathing). In this process, we are requesting the Divine Entity to put divine energy (i) into our bodies, by which we get psychosomatic wellness, and (ii) into our minds, by which we can become liberated from our psychic propensities, and become enlightened. So then what is meditation? It is being mindful of the divine presence around us, and our taking time out of our worldly involvements to be with the Divine Entity or Consciousness. So, enlightenment is not an abstract term but is a subjective term by which one feels the divine light within. This can even be validated through auras, using Kirlian Photography⁹.

So now we will proceed to describe meditation in terms of (i) energizing the *chakras* by ideating on Consciousness at these *chakras*, to promote psychosomatic health, and (ii) mentally ideating on Consciousness, to obtain liberation from the embedded impressions in the subconscious mind (or *samskaras*).

3.2. Energy Centers (or Chakras) and Endocrine Glands, linking the Mind and Body

As indicated earlier, the mind and the physical body are linked by subtle energy centers called the chakras. The chakras are associated with and control specific endocrine glands, as depicted in Figure 3. The chakras regulate organ function through these glands, by stimulating their hormonal secretions; this is how the chakras influence the body. In the human mind, various thoughts are constantly emerging and dissolving. Behind these psychic phenomena are the underlying propensities (formed according to the past-psychic impressions on the mind). The propensities are expressed by the vibrational expression of the chakras, which in turn affect the endocrine glands through their hormonal secretions (Figure 3).

Both the expression as well as the control of these propensities is dependent upon the chakras. Emotional stresses (such as anxiety and insecurity) are known to be co-responsible for diseases, such as coronary heart disease and even schizophrenia. When subject to stress, the endocrine glands release hormones into the bloodstream, which affect blood vessel caliber, digestion, metabolism, etc. For instance, when a person becomes extremely afraid, it affects the *Anahata Chakra* (refer to Figure 3), which results in palpitations, inability to act decisively, and even a heart attack.

Both mental and physical health and the behavioral response of the individual depend on the proper energy balance between the chakras and between the endocrine glands to which they are related. Disease is caused by an imbalance in the energy flow to and from one or more chakras.

In meditation, we can energize the chakras by ideating on Consciousness at these chakras, using an appropriate (two-syllable) mantra (which synchronizes with breathing). This in turn energizes the associated endocrine glands (as depicted in Figure 3) to secrete hormones into the organs. In this way, the organ systems get affected and cured of their ailments. For example, energizing the *Anahata chakra* can help to promote the healthy functioning of the heart.

3.3. Mental Pain and Organ Dysfunction

In this era of increased mental (as opposed to physical) involvements and preoccupation, there is a rise in the prevalence of psychic ailments, neurological diseases, and mental depression. Just as excessive mental interactions and endeavors stress the corresponding physiological system, so also excessive mental interactions and endeavors stress the portions of the mind that perceive and do the work of perception. The ego associated with the "I exist portion" of the mind is what makes the 'doer' portion of the mind perform actions, which can result in outcomes that are either pleasant or painful and subsequently disappointing.

The mind has to always have something to ideate on; it has to have objectivity. In daily life, the objectification of the mind

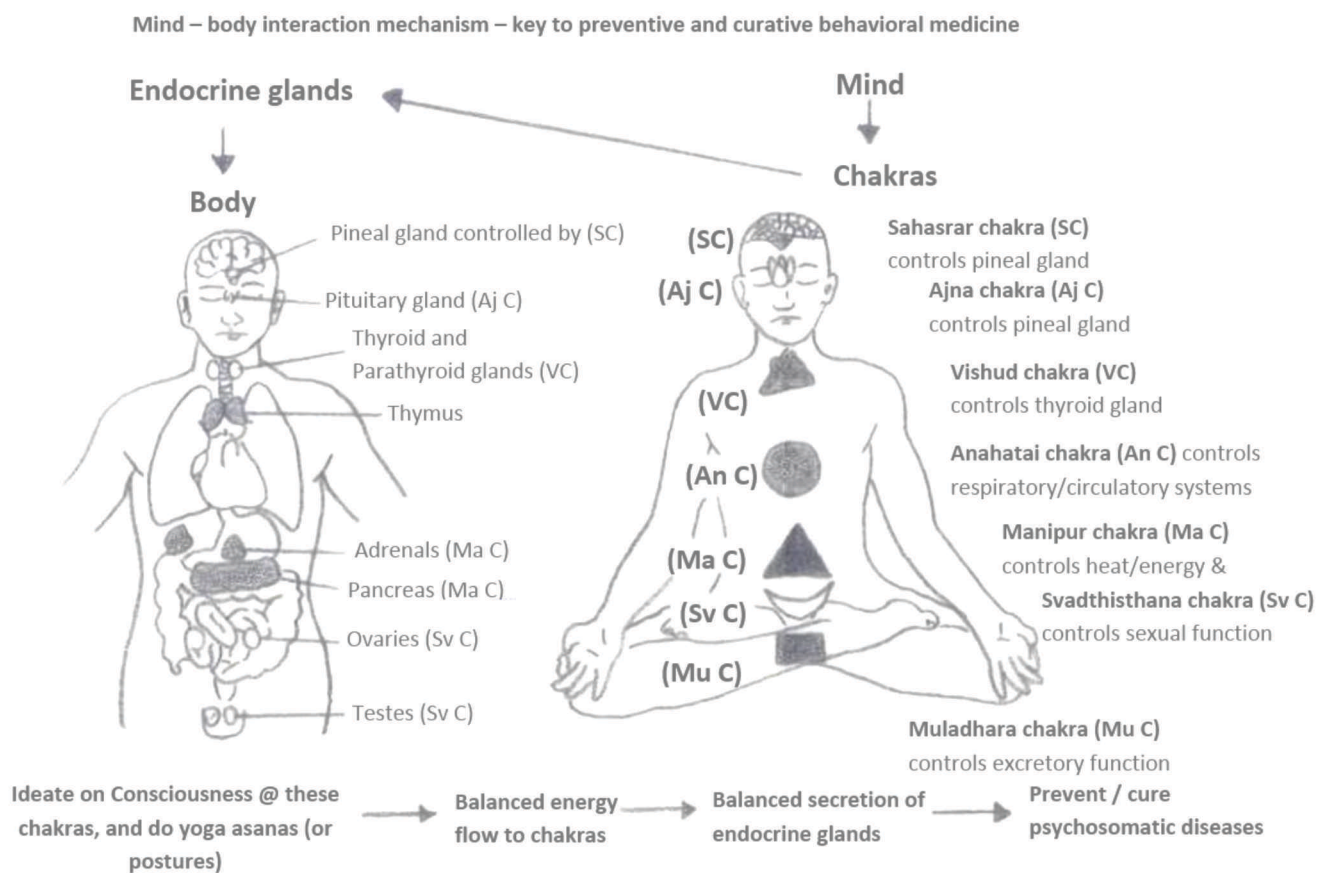


Figure 3: Chakras or Energy Centers and their association with the Endocrine Glands^{7,8}

resulting from harsh interactions and painful situations produces deformations of the mind. At times, these situations persist and the resulting feeling of helplessness, at not being able to alleviate or cope with the resulting painful deformations of the mind, produces mental pain and psychic ailments (due to imbalance in energy states of the chakras), also resulting in dysfunction of certain organ systems (due to imbalanced secretions of the endocrine glands).

So then, what is the remedy for the acute and chronic pain states of the mind, and concomitant physiological ailments, resulting from inimical interactions?

3.4. Psychic Forces on the mind

The human mind can be divided into three layers: that which perceives, that which does the work of perception, and that which gives the feeling of existence. The psychic force on the mind, causing deformations of the mind, is thought to result from its interaction with the environment, and also due to the reactive moments of the impressions of the mind caused by one's past interactions and behavior.

These deformations and impressions lend a conditioning property to the mind, which influences the mental/ emotional/ behavioral make-up of a person, and dictates the nature of the response to a certain stimulus from the environment. This response creates additional impressions on the mind, and it creates a centrifugal psychic force (involved with materialistic thinking) on the mind. Such impressions and preoccupations of the mind (such as arrogance of success and disappointment of failure) preclude the mind from being receptive to the attractive centripetal force of Consciousness on the mind (as depicted in **Figure 4**).

3.5. Influence of Consciousness on the mind

By effacing the previously acquired psychic impressions in the subconscious mind and by preventing the formations of new impressions, the mind becomes more amenable to the attractive influence of Consciousness. How? The erasing of past impressions (or samskaras) can be affected by ideating on Consciousness. This elicits positive microvita into the mind, which in turn intensifies the attractive influence of Consciousness on the mind.

How to prevent new psychic impressions? If the perceiving portion of the mind were to ascribe Consciousness to the object of its perception, and if the 'doer' portion of the mind also ascribes the 'doer' activity to Consciousness, then the mind does not acquire new impressions (which are essentially painful because they are only temporarily pleasant).

Thus, by effacing old psychic impressions and preventing new psychic impressions on the mind, the attractive force of Consciousness is felt on the mind, which now starts moving centripetally in the ectoplasmic field of Consciousness, as schematically shown in Figure 4. This provides transcendence to the mind, rejuvenates the mind, and constitutes the basis of psychic expansion (or evolution) of the mind, progressing to enlightenment.

Meditation is termed as '*Dharana*', meaning the concentration of the mind at a specific point. In the basic lesson of Tantric

interactions. This not only relieves stress but verily brings a peaceful feeling of oneness with divinity, recognized as enlightenment or self-realization (realization of the divinity within oneself).

4. Basic concepts of Morality, as the foundation of Spirituality

The goal of meditation is complete happiness and the method for attaining it lies in the full development of the mind and body. Meditation practice leads to spiritual development. However, Morality is the foundation of spirituality, and they are intertwined. Morality comprises *Yama* and *Niyama*, which are moral guidelines for human development. The idea of morality here is that by controlling our behavior we can achieve a higher state of being and be in perfect equilibrium. In his book, *A Guide to Human Conduct*, Shrii Shrii Anandamurti has

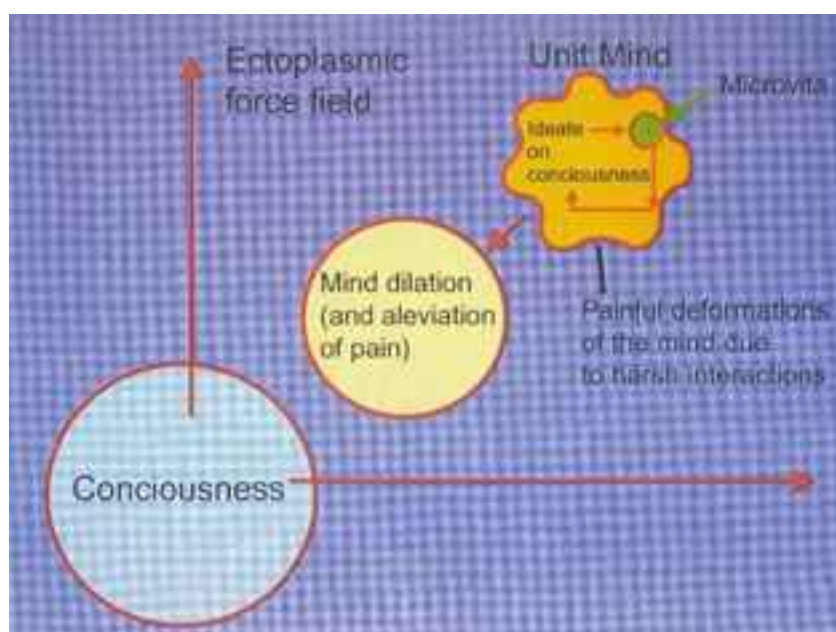


Figure 4: The Consciousness field and the presence or location of mind in it. It is schematized that when a person (or her/his mind) ideates on Consciousness (by meditation), the mind dilates i.e., develops in ectoplasmic density. This, correspondingly, enhances the Consciousness-field force on it and alleviates the mental pain. The mind keeps dilating until it merges into Consciousness, to attain enlightenment leading to salvation or nirvana^{7,8}

meditation, the aspirant brings her or his mind to a specific chakra which is her or his spiritual and psychic nucleus. This point (called the *Ista Chakra*) varies from person to person and is indicated by the teacher of meditation at the time of initiation. When the mind is well concentrated on the point, then the process of repeating the mantra begins. If the concentration is lost, the aspirant must again bring his or her mind back to the point of concentration. This practice of bringing one's mind to the point of concentration is a form of *Dharana*

By this process, over time, one's mind gets cleared from its embedded impressions formed by one's actions and

clearly explained the different aspects of *Yama* and *Niyama*¹⁰. Herein, we will briefly review the five parts of *Yama* and the five parts of *Niyama*, which are part of *Ashtanga Yoga*.

Yama is the first part of Ashtanga Yoga. It means “that which controls”, and the practice of *Yama* means to control actions related to the external world.

In *Yama*, the first principle is Ahimsa. Ahimsa means not to harm others in thought, words, and actions. To the best of our capacity, we should never inflict injury on another living being. This principle is sometimes interpreted to mean complete non-violence, but if carried to an extreme it becomes very

impractical. For example, in selecting our diet we should choose the food where Consciousness is less developed before killing highly developed creatures. Another problem is the question of self-defense. Here we can say that to defend oneself against an aggressor or an anti-social person is justifiable.

The second principle of *Yama* is called *Satya*. The definition of *Satya* is "action of mind and the use of speech in the spirit of welfare". It means to tell the truth and act in a straightforward and honest way that will promote the welfare of all. In cases where telling the exact truth will harm others, then *Satya* means to say what is best for the welfare of others rather than to tell the exact facts. Adherence to *Satya* brings about tremendous strength of mind and is extremely important for spiritual success.

The third principle is *Asteya*, which means not to take possession of things that belong to others. This means not committing actual theft. Also stealing should not be done mentally. Those who want to steal but who refrain from doing so out of fear of being caught are 'mentally' stealing. *Asteya* means to refrain from both mental and physical stealing.

The fourth principle is *Brahmacarya* and it means to remain attached to Brahma or Divine Entity (the Cosmic Consciousness) by treating all beings and things as an expression of the Cosmic Consciousness. The mind takes the shape of the object of our thought. If we are thinking in a materialistic manner, seeing all things only as material objects, then the mind will gradually become dull. If we can perform all actions remembering that everything in this world is Cosmic Consciousness in a transformed state, then the mind will move towards a state of oneness with Cosmic Consciousness.

The fifth part of *Yama* is *Aparigraha*, and it means not to hoard wealth that is superfluous to our actual needs. It means to live a simple life with only as much physical wealth as is necessary. This amount is variable according to time, place, and person. It is an important principle in both individual and collective life, because if one person or one nation hoards wealth, it may result in starvation and misery for other people. It is an important part of spiritual practice, because if one is always preoccupied with physical objects, then one cannot think about the Divine Entity present all around us.

The second part of *Ashtanga Yoga* is called *Niyama*. *Niyama* means self-regulation. Without self-regulation, it is impossible to attain higher states of Consciousness.

The first principle of *Niyama* is *Shaoca*, which means Purity of mind and body. It includes cleanliness of one's external world such as the body, clothing, and environment, as well as the internal world of the mind. External cleanliness can be achieved by regular cleaning of the body and the environment, while internal purity of mind can be attained by good thoughts. That is, one must substitute a good thought in place of destructive thought. For example, if one feels greedy, one should think about it and then perform a generous action.

The second part of *Niyama* is *Santosa*. It means maintaining a

state of mental ease. When the mind hungers for something, it is in a state of uneasiness. Those people who can maintain a state of contentment are following *Santosa*. The achievement of *Santosa* is linked with *Aparighraha* (mentioned previously).

The third principle of *Niyama* is *Tapah*. It means to undergo hardship on the path of personal and collective development. An act that is done in the spirit of service helping others, without expecting anything in return, is *Tapah*. Service should be rendered to people who really need help; let there be no one starving and homeless.

The fourth principle is *Svadhya*. It means having a clear understanding of a spiritual subject. One should read and assimilate the meaning of great books and scriptures written by spiritually advanced people. The importance of *Svadhya* is that it gives one contact with great personalities, and inspires one to continue on the path of self-realization.

The fifth part of *Niyama* is *Ishvara Pranidhana*. It means to make Cosmic Consciousness the goal of our life. This is done through a process of meditation in which the meditator thinks only of one thought, ideating on the Divine Entity or Cosmic Consciousness. As previously explained, in Tantric meditation the meditator repeats a mantra that reminds her or him of her or his relationship with Cosmic Consciousness. Part of this meditation process also includes steps where the mind is detached from other objects and is focused on the Cosmic Consciousness or God. Here we start our journey into meditation.

We would like to mention here another aspect of *Yoga* which is *Asana*. An *asana* is a posture that is comfortably held. It is the most well-known part of yoga, but it is often misunderstood as well. *Asanas* are not normal exercises such as calisthenics or gymnastics. *Asanas* are special exercises that have specific effects on the endocrine glands, joints, muscles, ligaments, and nerves.

Thousands of years ago sages used to observe the animals in the forest. They noticed that each animal had certain qualities and that the animals often assumed different poses. By imitating these poses, they began to notice important effects on the human body. For example, the peacock is a bird with a powerful digestive system capable of digesting even a poisonous snake. The ancient sages developed a posture for humans, imitating that of the peacock, which strengthens the human digestive system. Other postures were also developed that exercise other organs and glands.

The most important effect of *asanas* is on the endocrine glands which secrete hormones directly into the bloodstream. The endocrine glands include the pancreas, thymus, thyroid, parathyroid, adrenals, and reproductive glands (testes and ovaries). If the secretion of any gland is too much or too little, then there will be malfunctioning in the body. For example, if the thyroid gland, located in the throat, secretes too much fluid, a person will become thin. If the gland secretes too little fluid, the person will become obese. The reason is that thyroxin, the hormone secreted by this gland, regulates metabolism or the

rate at which the body converts food into energy. *Asanas* can correct the malfunctioning of the thyroid and other glands by putting pressure on the gland, which in effect massages the gland and regulates the amount of blood flowing to that gland.

Asanas also help to keep the spinal cord flexible which is important in retarding the effects of aging on the body. As people grow older the spinal column usually becomes rigid. Proper performance of *asanas* can prevent this process.

Another important effect of *asanas* is that they help various organs of the body to function properly. For example, several *asanas* massage the stomach and intestines and the organs involved in the digestion of and elimination of wastes. Problems such as indigestion, constipation, gastric ulcer, liver malfunction, etc. can be checked and corrected by performing certain *asanas* in combination with a proper diet.

Let us return to meditation, by *Dharana*, meaning the concentration of the mind at a specific point. In the basic lesson of Tantric meditation, the aspirant brings her or his mind to a specific *chakra* which is her or his spiritual and psychic nucleus. This point (called the *Ishta Chakra*) varies from person to person and is indicated by the teacher of meditation at the time of initiation. When the mind is well concentrated on the point, then the process of repeating the mantra begins. This practice of bringing one's mind to the point of concentration is a form of *Dharana*.

5. Fundamentals of Meditation Practice

5.1. Introduction

Our meditation practice involves the process of ideating on the Divine Entity by recognizing the divine presence around us. This brings in divine energy flowing into one's mind, flooding it with blissful feelings and literally lighting it up. This gives one immense happiness, based on the feeling of being taken care of by the Divine Entity. Through this process, over time one's mind gets cleared from its embedded impressions (or *samskaras*) formed by one's actions and reactions. This not only relieves stress but verily brings a peaceful feeling of 'oneness with Divinity', as enlightenment. In simple terms, meditation is taking the time off one's worldly involvements and spending time being with the Divine Entity, who is awaiting this union.

5.2. Goal of Meditation

The goal of meditation is total happiness through union (or *yoga*) with Cosmic Consciousness or God. Meditation is taught in two forms: Group Meditation and Personalized Lessons. Group Meditation involves teaching the process of how to come in contact with and feel one with the Divine Entity or God, and thereby realize the feeling of extreme happiness and peace. Personalized Lessons involve initiation into the process of meditation, with the assignment of personalized *Ishta Chakra* and mantra. A spiritual seeker

begins the path of self-realization by receiving initiation into the process of meditation. It is an important event in the life of a *sadhaka* (spiritual practitioner). One learns her or his personal technique of meditation, and thereby the latent spiritual potential within is awakened. It is said that when the disciple is ready, the Guru appears. Meditation used to be taught directly by the Guru, but today for practical reasons it is taught by trained teachers called *acharyas*.

5.3. Our system of Meditation

Herein we will explain three lessons: Lesson 1 called *Ishvara Pranidhana*, meaning offering one's mental self to God (or Divine Entity) and making union with God. Lesson 2. *Pranayama*, the science of *Pranah*. Lesson 3. *Chakra Shodhana*, literally meaning purification of the chakras¹¹.

Lesson 1. *Ishvara Pranidhana*

The goal of this lesson is to obtain liberation from *samskaras* or embedded psychic impressions in the subconscious mind. Herein, the aspirant is taught how to ideate on and feel one with God or Divine Entity. This gives one immense happiness, based on the feeling of being taken care of by God. This is done by concentration on one's "I feeling" or *Ishta Chakra* (mind center), and the use of a general mantra (or personal or "*Ishta mantra*" given according to one's individual psychic vibration), to ideate on the Divine Entity. Three steps are required to reach this stage.

Meditation Steps:

Step 1 consists of recognizing and manifesting the presence of the Divine Entity around us in the form of mellow light. In this step, the meditator is only feeling a divine presence and is not aware of surrounding people or structures. This process of mind withdrawal from the surroundings is referred to as *bhuta suddhi*.

Step 2 involves developing a spirit body, to enable ideation on and union with the Divine Entity. In this step, by a special method, the mind or "I feeling" of the meditator is brought very carefully from its disassociation with the external surroundings, and then from the physical body feeling, to where the "I" sits or the location of one's mind center. At this stage, one is only aware of oneself or one's mind and the Divine Entity (or Cosmic Mind) surrounding it. *This process of mind withdrawal from body feeling is referred to as a'sana suddhi*.

Step 3 now involves the mind ideating on the Divine Entity using a 2-syllable mantra. The Mantra has a specific meaning and an acoustic sound. The general meaning of all mantras is "You are my Guide, and with your guidance, I can become divine". This 2-syllable mantra is repeated mentally in

consonance with one's in-breath and out-breath. This brings divine energy flowing into one's mind, flooding it with blissful feelings. At in-breath, the Divine Entity is infusing divinity into the mind. Then in response to this, at out-breath, one's mind expands into divine Consciousness and even gets lit up, giving a feeling of being divine.

Through this process over time, one's mind gets cleared from its embedded impressions formed by one's actions and interactions. Clearing the mind from its embedded impressions is referred to as Liberation. During this process of liberation, one's entire mental thinking gets transformed, one's personality and character get elevated, and one's interactions with others enter a new phase. Over time, this brings a peaceful feeling of oneness with divinity known as enlightenment. This is the purport and goal of this meditation lesson.

Lesson 2. *Pranayama*

Concept: The Cosmic vital energy of *Brahma* is around you. You need to take it within you to keep you physically, psychically, and spiritually rejuvenated.

Psycho-philosophy: The cooperative activity of the ten *vayus* (five internal and five external) is known as *pranah* (vital energy), which functions as the direct cause of life and controls the activities of the physical structure. The collective name of the ten *vayus* (vital airs or energies) is *pranendriya*. It is a "psychic organ", which categorizes and analyzes perceptions received from the sense organs. Its position is in the middle point of *anahata chakra*.

Pranandriya plays the most vital part on the physical and psycho-physical levels. Every activity of *pranendriya* is pulsative, and it is during the state of pause and potentiality that the *citta* (Consciousness) is able to take the form of incoming *tanmatras* (perception). If *pranendriya* is in a state of pause, it creates calmness throughout the psycho-physical structure, to assist the *citta* to perceive the *tanmatras* correctly.

This is the psycho-philosophy behind the practice of *pranayama*, entailing *pranandriya* to remain in a state of equipoise, thereby merging the unit mind into the ocean of Consciousness, to enable the experience of the supramental stratum.

When we concentrate and consciously regulate our breathing, we can store up a great amount of *pranah* in the various nerve centers or *chakras*. Through *pranayama*, every part of the body becomes filled with vital energy, and all diseases can be destroyed from the root.

Performing *Pranayama*: The practitioners are instructed to do *bhuta suddhi* and *a'sana suddhi* withdrawal phases, as explained in the First Lesson. Then, with the first syllable of *Ishta mantra*, one visualizes that the Vital energy (*pranah*) is entering you through the prescribed *chakra*. This Vital energy

is being used to replenish oneself physically, psychically, and spiritually. Then, as one exhales (with the second syllable of your *Ishta mantra*), one visualizes that after the Vital energy has been thus utilized, it is now going out through the *chakra*; after this, the *pranah* is replenished again during inhalation.

Proper control of breathing can alleviate many diseases— such as heart disease, high blood pressure, asthma, and tuberculosis, among others. Breath control dissolves emotional tensions and relaxes the mind, and increases willpower, concentration, and self-control. Finally, if the Divine Entity's *pranah* is infused, one can get totally sanctified and one's ideas will be divine ideas.

Lesson 3. Chakra Purification (*Chakra Shodhana*)

Background: Chakras are sub-stations of the mind, as illustrated in **Figure 3**. Body and mind depend on the activeness of the chakras. By Chakra Shodhana, the mind and body get purified, and the whole being is elevated.

Concept: The chakras are imbued with our *vrittis* (embedded sentiments or propensities), which are potential seeds of *samskaras* formation. Hence, we need to 'purify' our 'defective' chakras by stimulating them (at their central point of *ksiti piitha*) with the 'sacred idea' and *bhava* of our *ishta mantra*. Ideas imposed on chakras are propagated through it to the body regions, and the body thereby gets consecrated.

Herein, the practitioners are aware of the chakras and the divine light (of the Divine Entity) around them. Then they primarily concentrate on the controlling point of the *Piitha*. For example, in the case of the *manipur chakra* (triangular in shape and red in color), they can concentrate at its centroid and then stimulate it with the divine light by means of their *Ishtamantra*; this helps the digestive system, and also the pancreatic hormonal secretion gets affected. All chakras are thereby brought into the rhythm of the *ishta mantra*, to create one tune leading to *Paramapurusa*.

Process: The practitioners first place their mind at the central point of *muladhara chakra* and stimulate (or energize) it with their *ishta mantra* 2 to 3 times, with the feeling that in this process the divine light is purifying the *chakra* by wiping off its embedded *vrittis*. Then, they raise their mind to the *svadhisthana chakra* and likewise 'purify' it. They thus keep purifying each *chakra* up to the *sahasrara chakra*. They can now descend, purifying each *chakra* up to the *muladhara chakra*. This constitutes one trip. Like that, they can complete two to three trips.

By ideating at the controlling points of the *chakra* with the *ishta mantra*, the practitioners will reach *anandam* and spiritual bliss in the corresponding region. They will reach a stage of divine composure, and when they will reach the *sahasrara chakra*, the divine nectar secreted from that point will make them realize complete peace pervading their body.

Energizing *chakras* to regulate the organs: The *Chakras* also link the mind and body through their association with the endocrine glands. By this linkage, they also affect the organs and have a physiological curative role. Linking the mind and the physical body (or the organ systems) are these subtle psychic energy centers or *chakras* (depicted in Figure 3), which control our mental propensities and behavioral expressions, as well as the body through the endocrine glands. The *chakras* are connected by subtle energy channels (or *nadis*), through which the vital (bioplasmic) energy (or *pranah*) is conceived to reach each and every part of the body.

The *chakras* are also associated with and control specific endocrine glands, as depicted in Figure 3. The *chakras* regulate organ function through these glands, by stimulating their hormonal secretions; this is how the *chakras* influence the body. So, by spiritually energizing the *chakras* with the *ishta mantra*, the associated endocrine glands can secrete hormones into the organs. In this way, the organ systems get affected and cured of their ailments. For example, energizing the *Anahata chakra* can help to cure hypertension, and energizing the Manipur chakra can help to cure diabetes.

6. Physiological Characterization of the “Meditative State” by EEG, showing its Therapeutic Value

6.1. Association of EEG waves with mental state

States of rest, sleep, and mental activity have been characterized through the frequency analysis of electroencephalographic (EEG) data^{12,13}. Electrical activity from the brain is displayed in the form of brainwaves on an EEG waveform. There are four predominant categories of brainwaves based on the level of activity. Beta waves (12 to 38 Hz) are predominant during the normal waking state when one is engaged in cognitive tasks being alert and engaged in problem-solving or decision making. Alpha brainwaves (8 to 12 Hz) are dominant when the mind is quiet, and sometimes during meditation when the mind is in the here and now, i.e. the present moment. Theta brainwaves (3 to 8 Hz) occur mostly in sleep and deep meditation. During this state, the senses are withdrawn from the external world and focused on the internal mind. Delta waves (0.5 to 3 Hz) are present in the deepest state of meditation and during dreamless sleep. It has been noted that a mentally-disturbed person (with a primarily beta EEG pattern) has a lesser proportion of alpha waveforms when compared to one with a calmer mental state.

Characterization of subjective states of feeling indicates that (i) the lack of alpha activity is interpreted as indicating states of alertness, attention, orienting, and anxiety, (ii) the 'beta' state is associated with worry, anger, fear, and frustration, (iii) the alpha state has been noted to be associated with pleasant feeling, wellbeing, tranquility, relaxation, (iv) abundance of alpha-wave activity is considered to represent a state of rest (not sleep), relaxation and relief from concentration, (v) progressive lower frequency states (from beta to alpha and more pronounced increased alpha-activity shift to lower

frequency alpha states) are associated with increased relaxation and tranquility, culminating in a deep 'internalized' state (of warmth, love, and contentment) in the theta state, (vi) the 'theta' state is characteristic of the meditative state^{14,15}.

In the *Ananda Marga* system of meditation or Intuition Practice (IP), in Lesson 1 (explained above) the practitioner concentrates on a particular *chakra* and mentally incantates a two-syllable mantra (which has the connotation of uniting one's unit mind with Consciousness), synchronous with her/his breathing. Both the *chakra* and mantra are specific to a subject and correspond to her/his intrinsic rhythm and psychic state. In the next section, we now present some physiological characterizations of the meditative state by using EEG.

6.2. EEG Response Characterization of the Meditative State

In our research experiments^{16,17}, the subjects (four meditators and one non-meditator) sat quietly in an electrically shielded room. An 8-channel Grass EEG, machine was used for recording outputs from the scalp electrodes. The first six channels were used for recording bipolar signals in the order FP₂-C₄, C₄-O₂, T₄-O₂, F₁-C₃, C₃-O₁, and T₃-O₁. The seventh channel was used for recording the ECG, and the eighth for the oculogram.

For each subject, the EEG was recorded for 15 minutes with the subject in a relaxed but mentally active state, with the eyes closed. Then, the meditator was asked to 'meditate' and the non-meditator was asked to 'concentrate', and their EEG was recorded during this period, which normally lasted for 30 min. A recording of the post-meditative or post-concentration period was also taken for 15 minutes. Frequency spectral analysis of the EEG data was carried out to determine the percentage of waves corresponding to each frequency band, as histograms.

6.3. Results

In all the studied subjects, the EEG pattern showed the absence of sleep spindles that are characteristic of drowsiness. Meaning, the monitored subjects did not sleep, rather they were meditating/concentrating. This was also confirmed by the absence of Rapid Eye Movement (REM) sleep in the oculogram.

Since the occipital leads show the variations in alpha activity prominently, the frequency analysis was carried out for the C₄-O₂ leads only, for this experiment. The EEG analysis of an IP practitioner Subject 1 (a regular practitioner of meditation) is shown in **Figure 5**. The figure shows the percentage of waves corresponding to each frequency band, as histograms. It can be seen that for Subject 1, there is a pronounced shift to a lower frequency spectrum during meditation. **Figure 6** shows the wave distribution for Subject 2, who is another IP practitioner and instructor. Again, there is an abundance of waves at various frequency bands, but especially there are more waves in the

lower theta frequencies. **Figure 7** shows the wave distribution for the non-meditator subject. For this subject, the frequency spectrum in a normal state was in a higher frequency band compared to that of regular meditators. Also, when this subject 'concentrated' there was no shift in the EEG frequency distribution. The distribution is grouped around the intrinsic frequency of 10Hz.

For intuitional practice (IP) or practitioners of meditation, we noted that the amplitude/frequency distribution peaked at a lower frequency band during an IP session compared with the

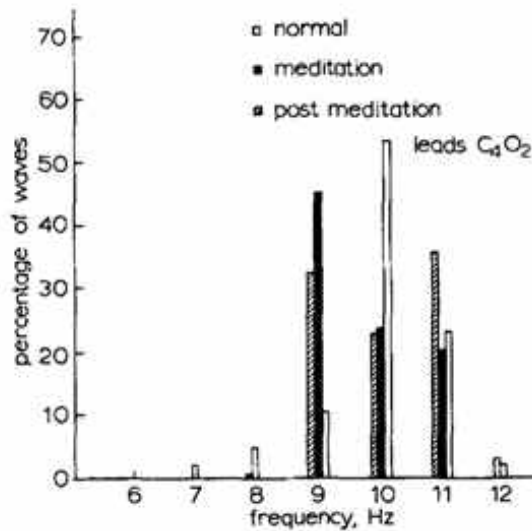


Figure 5: The relative abundance of waves at various frequency bands of Subject 1 who is a regular practitioner of IP, before, during, and after meditation. Adopted from ¹⁷.

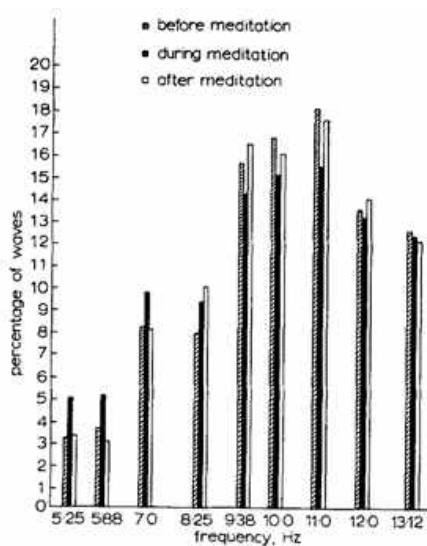


Figure 6: The relative abundance of waves at the various bands for Subject 2 before, during, and after a session of IP. The subject is an adept and an instructor of IP. Adopted from ¹⁷.

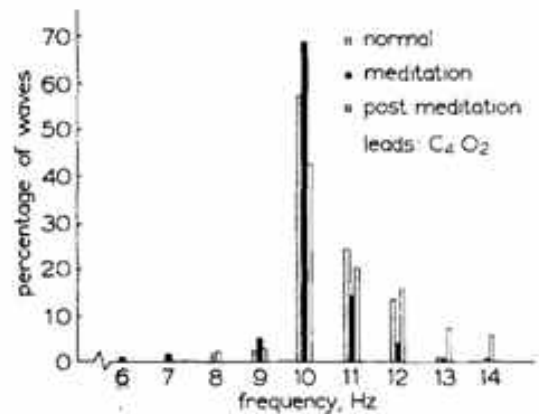


Figure 7: The relative abundance of waves before, during, and after meditation for a non-meditator. Adopted from ¹⁷.

distribution before the IP session. Now a shift of the EEG energy state to a lower frequency band is associated with a decreased mental tension and increased relaxed state and tranquility^{14,15}. For Subject 1, a 15 ml sample of venous blood was taken before and after meditation to determine the levels of pyruvate, lactate, citrate, and glucose. It was observed that the glucose, lactate, and pyruvate levels reduced by 25% during meditation. A decrease in lactate level indicates a decrease in the metabolic rate. The transformation of the EEG state during meditation, resulting in an energy predominance in the lower frequency band, is an index of the efficacy and therapeutic value of the Intuitional Practice (IP) of meditation.

In other words, the effectiveness of meditation can be characterized in terms of the enhancement of the percentage of (i) EEG alpha waves (8–12 Hz) relative to beta waves (12.5 and 30 Hz), associated with a more relaxed mental state, and (ii) theta waves (4–8 Hz) relative to alpha and beta waves, associated with deeply relaxed mental state and higher consciousness feeling.

7. Effects of meditation on the brain – benefits for students

We will now discuss how meditation influences the brain and the reasons why meditation can help students' learning.

1. Meditation puts one in the best brainwave state for “super learning”

Meditation boosts the alpha brainwaves, the predominant state for learning, studying, memorizing, and recollecting large sums of information. You can summon this highly creative and super-enhanced learning state, with meditation.

2. Meditation makes the left and right brain hemispheres work together

It is known that one side of the brain is more mathematical and

scientific (left), while the other half is more creative and intuitive (right). Most people use one-half of their brains more than the other, creating an imbalance. Scientists have found that highly successful people use both brain hemispheres in harmony. By meditation, one can achieve “whole brain synchronization” (Figure 8), and enhance the learning ability.

3 Meditation stimulates learning-associated brain regions

The two parts of the brain that are highly active during memory

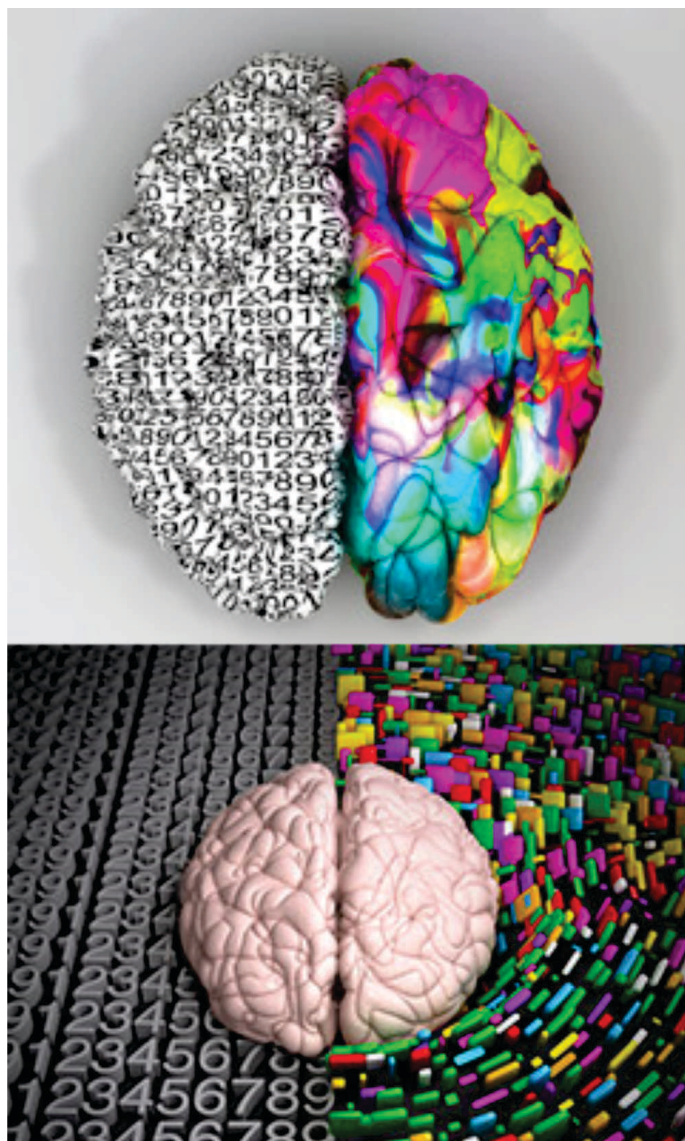


Figure 8: Meditation helps one achieve “whole brain synchronization” and enhances learning ability.

storage and recall, the Hippocampus and frontal lobe, are particularly stimulated during meditation. By energizing this part of the brain, meditation multiplies the ability to memorize, store, and recollect large sums of information.

8. Meditation Benefits for the Body, Mind, and Spirit

8.1. Body

Reduces Pain. Several studies have identified a connection between meditation and pain. One Journal of Neuroscience study, for instance, showed that after four 20-minute meditation sessions for four days, a group of volunteers rated the same burning pain as 57 percent less unpleasant and 40 percent less intense¹⁸. Plus, a review of 47 studies published in JAMA Internal Medicine showed that meditation may help ease pain (although it was difficult for the researchers to identify exactly what type of pain)¹⁹.

Boosts immune system. One 2003 study²⁰ showed a link between an eight-week mindfulness meditation program and better immune function, and another research²¹ suggested that meditation could improve the immune system.

Lowers blood pressure. A study co-directed by Dr. Randy Zusman at Massachusetts General Hospital took patients being treated with typical high blood pressure medication, and taught them a technique called the relaxation response; more than half the patients experienced a drop in blood pressure, sometimes even resulting in reduced medication²². Even the Mayo Clinic reports that research suggests that meditation could help manage the symptoms of high blood pressure²³.

Eases inflammation. In 2013, at the University of Wisconsin-Madison and the Center for Investigating Healthy Minds in the Waisman Center, scientists identified a possible link between mindfulness meditation and the relief of inflammatory symptoms among people who suffer from chronic inflammatory conditions²⁴. Another small study suggested that mindfulness meditation may reduce loneliness and inflammatory disease risk in older adults²⁵.

Reduces heart risk. A 2012 study published in the journal *Circulation: Cardiovascular Quality and Outcomes* showed a link between Transcendental Meditation and a reduction in heart attack, stroke, and early death from heart disease in a group of African Americans²⁶. After five years of follow-up, the study concluded that meditation reduced the overall risk of heart attack by 48% in the study group. The American Heart Association also states that the stress-busting benefits of different types of meditation can be a boon to heart health²⁷.

8.2. Mind

Increases brain gray matter. Meditation may just be the right exercise for the brain. A 2009 study showed that MRI scans of long-time meditators revealed that their certain parts of their brains were larger than those of a control group, particularly in regions known for emotion regulation²⁸. Another small study

published in 2011 in the journal *Psychiatry Research: Neuroimaging* showed that an eight-week mindfulness-based stress reduction program resulted in increases in gray matter in the hippocampus and in the areas of the brain tied to compassion and self-awareness²⁹.

Cultivates willpower. Stanford health psychologist Kelly McGonigal, Ph.D. told Stanford Medicine's SCOPE blog in 2011 [30] that both physical exercise and meditation can help train the brain for willpower: Meditation training improves a wide range of willpower skills, including attention, focus, stress management, impulse control, and self-awareness. It changes both the function and structure of the brain to support self-control. For example, regular meditators have more gray matter in the prefrontal cortex. And it doesn't take a lifetime of practice – in fact, brain changes have been observed after even eight weeks of brief daily meditation training.

Builds focus and concentration. A 2010 study published in *Psychological Science* showed that Buddhist meditation improved focus and attention on a task that was designed to be both boring and demanding³¹.

Boosts cognitive function. Another *Psychological Science* study identified a link between mindfulness training and increased standardized test scores, as well as improvements in working memory³². Dr. Sara Lazar, a neuroscientist at Massachusetts General Hospital, who studies mindfulness meditation, told Huff Post that regular meditation may stave off the thinning of the brain's prefrontal cortex, which in turn helps slow down the cognitive function decline that happens later in life³³.

8.3. Spirit

Builds self-knowledge. According to a 2013 article published in *Perspectives on Psychological Science*, mindfulness (defined as "paying attention to one's current experience in a non-judgmental way") can help people to understand their own personalities³⁴.

Helps relationship satisfaction. Several studies the practice of mindfulness meditation enables practitioners to have more satisfactory relationships by improving their ability to handle relationship stress and communicate well with their partners^{35,36}.

Increases compassion. A 2013 study from researchers at Northeastern and Harvard Universities suggested that meditation may be the key to unlocking compassion. The findings, which were published in the journal *Psychological Science*, showed that volunteers who underwent eight-week training in two types of meditation reacted more compassionately than those who hadn't meditated. Specifically, researchers set up a waiting room where an actor with crutches appeared to be in pain; while other actors ignored her, 15 percent of the non-meditators helped the person in pain, compared with 50 percent of those in the meditating group³⁷.

Enhances empathy. A small study from Emory University showed that a compassion-based meditation program, called Cognitively-Based Compassion Training (CBCT), might help people to read others' facial expressions³⁸. It was suggested that CBCT may hold promise for enhancing empathic abilities, by increasing activity in parts of the brain that are of central importance for our ability to recognize the emotional states of others.

9. How meditation can promote Humanism and Global citizenship

In meditation, we are developing and recognizing our involvement with the Divine Entity. This will enable us to rise above the binding dogmatic sentiments of

- i. Race and religion (which have divided the world), by adopting humanism as the guiding principle.
- ii. Being capitalists and communists, into being spiritualists.
- iii. National superiority (which has caused colonization and empire-building), into being Global citizens.

Only then can we become engaged in promoting the UN Sustainable Development Goals³⁹:

GOAL 1: No Poverty

GOAL 2: Zero Hunger

GOAL 3: Good Health and Well-being

GOAL 4: Quality Education

GOAL 5: Gender Equality

GOAL 6: Clean Water and Sanitation

GOAL 7: Affordable and Clean Energy

GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 10: Reduced Inequality

GOAL 11: Sustainable Cities and Communities

GOAL 12: Responsible Consumption and Production

GOAL 13: Climate Action

GOAL 14: Life Below Water

GOAL 15: Life on Land

GOAL 16: Peace and Justice Strong Institutions

GOAL 17: Partnerships to achieve the Goal

10. Spiritual Progress for Everlasting Peace, and our Responsibility to evolve for the Greater Good

Let us imagine for a moment that the fate of the entire human race rested on our shoulders alone - that humanity's evolution depended entirely on our willingness to transform our Consciousness, and become an exemplar of humanity's highest potential for the world.

Imagine that, for us evolving became an evolutionary imperative. Would the quality of awareness and care with which we approached our interactions with others become more profound?

Where the spiritual path really begins to get interesting is when we recognize that transforming ourselves in the deepest possible way is in fact an evolutionary imperative, with profound consequences far beyond ourselves. If we begin to recognize that in everything we do, we are in fact accountable to the Whole, to God—the Divine Entity, then something truly miraculous can begin to happen in our dedication to developing a more heightened civilization on our planet Earth, for the progressive living of all the people.

CONFLICTS OF INTEREST: None

FINANCIAL SUPPORT: None

REFERENCES

1. Planck M. The Observer, January 25th, 1931
2. Davies P. The New Physics, Cambridge University Press, 1989
3. Herbert N. The End of Physics, New Scientist, 24 June 1989
4. Birch C. On Purpose, NSW University Press, Sydney, 1990
5. Rubik B. The Interrelationship between Mind and Matter, Center for Frontier Sciences Temple, 1992.
6. Sarkar PR. Idea and Ideology, Ananda Marga Publications, Tiljala, 1978.
7. Ghista DN, Towsey M. Consciousness and Evolution: Unified Theory of Consciousness, Matter and Mind, International Conference: Toward a Science of Consciousness, May 3-7, 2011, Stockholm University, Stockholm Sweden.
8. Ghista DN, Towsey M. Consciousness, Cosmology, and Evolution: Unified Theory of Consciousness, Matter and Mind, Gurukula Network, Issue 34, May 2012.
9. Kirlian Photography. <https://www.lightstalking.com/what-is-kirlian-photography-the-science-and-the-myth-revealed/>. Last accessed June 2022.
10. Shrii Shrii Anandamurti. A Guide to Human Conduct (originally titled Jivana Veda), by, Ananda Marga Publications (Denver, CO), 1980.
11. Ghista DN. Sadhana Theory and Lessons, Practice and Benefits, Prout Magazine, November and December 2020.
12. Cooper BG and Madsen F. European respiratory buyers guide. 2000; 3:40-43.
13. Cooper R and Mundy-Castle AC. Spatial and temporal characteristics of the alpha rhythm, a topographic analysis. *Electroencephal. & Clin. Neurophysiol.* 1960; 12:153-165.
14. Brown BB. Recognition of aspects of Consciousness through association with EEG alpha activity represented by a light signal. *Psychophysiology.* 1970;6(4):442-52.
15. Green BE, Green AM, Walters ED, Sargent JD, Meyer R. Autogenic feedback training. Psychotherapy and Psychosomatics What Is *Psychotherapy?*: *Proceedings of the 9th International Congress of Psychotherapy, Oslo, Norway.* 1973; 25:88:98.
16. Ghista DN., Nandagopal D, Srinivasan TM. Meditation and Biofeedback: Electrophysiological Studies and Clinical Applications. *Automedica* 1975;1(4).
17. Ghista DN, Nandagopal D, Ramamurthi B, Das A, Mukherju A, Krinivasan TM. Physiological characterisation of the 'meditative state' during intuitional practice (the Ananda Marga system of meditation) and its therapeutic value. *Med Biol Eng.* 1976;14(2):209-13.
18. Zeidan F, Martucci KT, Kraft RA, Gordon NS, McHaffie JG, Coghill RC. Brain mechanisms supporting the modulation of pain by mindfulness meditation. *J Neurosci.* 2011;31(14):5540-5548.
19. Goyal M, Singh S, Sibinga EM, Gould NF, Rowland-Seymour A, Sharma R, Berger Z, Sleicher D, Maron DD, Shihab HM, Ranasinghe PD, Linn S, Saha S, Bass EB, Haythornthwaite JA. Meditation programs for psychological stress and wellbeing: a systematic review and meta-analysis. *JAMA Intern Med.* 2014;174(3):357-68.
20. Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, Urbanowski F, Harrington A, Bonus K, Sheridan JF. Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med.* 2003;65(4):564-70.
21. Black DS, Slavich GM. Mindfulness meditation and the immune system: a systematic review of randomized controlled trials. *Ann N Y Acad Sci.* 2016;1373(1):13-24.

22. Bhasin MK, Denninger JW, Huffman JC, Joseph MG, Niles H, Chad-Friedman E, Goldman R, Buczynski-Kelley B, Mahoney BA, Fricchione GL, Dusek JA, Benson H, Zusman RM, Libermann TA. Specific Transcriptome Changes Associated with Blood Pressure Reduction in Hypertensive Patients After Relaxation Response Training. *J Altern Complement Med.* 2018;24(5):486-504.
23. Mayo clinic. <https://www.mayoclinic.org/tests-procedures/meditation/in-depth/meditation/art-20045858>. Last accessed June 2022.
24. 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(1):174-84.
25. Creswell JD, Irwin MR, Burklund LJ, Lieberman MD, Arevalo JM, Ma J, Breen EC, Cole SW. Mindfulness-Based Stress Reduction training reduces loneliness and pro-inflammatory gene expression in older adults: a small randomized controlled trial. *Brain Behav Immun.* 2012;26(7):1095-101.
26. Schneider RH, Grim CE, Rainforth MV, Kotchen T, Nidich SI, Gaylord-King C, Salerno JW, Kotchen JM, Alexander CN. Stress reduction in the secondary prevention of cardiovascular disease: randomized, controlled trial of transcendental meditation and health education in Blacks. *Circ Cardiovasc Qual Outcomes.* 2012;5(6):750-8.
27. AHA. <https://www.heart.org/en/healthy-living/healthy-lifestyle/mental-health-and-wellbeing/meditation-to-boost-health-and-wellbeing> Last accessed June 2022.
28. Luders E, Toga AW, Lepore N, Gaser C. The underlying anatomical correlates of long-term meditation: larger hippocampal and frontal volumes of gray matter. *Neuroimage.* 2009;45(3):672-8.
29. Hölzel BK, Carmody J, Vangel M, et al. Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Res.* 2011;191(1):36-43.
30. Stanford Scope Blog. <https://scopeblog.stanford.edu/2011/12/29/a-conversation-about-the-science-of-willpower/> Last accessed June 2022.
31. MacLean KA, Ferrer E, Aichele SR, et al. Intensive meditation training improves perceptual discrimination and sustained attention. *Psychol Sci.* 2010;21(6):829-839.
32. Mrazek MD, Franklin MS, Phillips DT, Baird B, Schooler JW. Mindfulness training improves working memory capacity and GRE performance while reducing mind wandering. *Psychol Sci.* 2013;24(5):776-81.
33. Meditation benefits. HuffPost. https://www.huffpost.com/entry/meditation-health-benefits_n_3178731 Last accessed June 2022.
34. Carlson EN. Overcoming the Barriers to Self-Knowledge: Mindfulness as a Path to Seeing Yourself as You Really Are. *Perspect Psychol Sci.* 2013 Mar;8(2):173-86.
35. May, CJ, Ostafin, BD, Snippe, E. Mindfulness meditation is associated with decreases in partner negative effect in daily life. *Eur. J. Soc. Psychol.* 2020; 50: 35– 45.
36. Winter F, Steffan A, Warth M, Ditzen B, Aguilar-Raab C. Mindfulness-Based Couple Interventions: A Systematic Literature Review. *Fam. Proc.*, 2021; 60: 694-711.
37. Northwestern University Research. <https://arch.library.northwestern.edu/downloads/tb09j574b?locale=en> Last accessed June 2022.
38. Mascaro JS, Rilling JK, Tenzin Negi L, Raison CL. Compassion meditation enhances empathic accuracy and related neural activity. *Soc Cogn Affect Neurosci.* 2013;8(1):48-55.
39. United Nations Sustainable Development Goals. <https://sdgs.un.org/goals> Last accessed June 2022.