

Hatha Yoga for Holistic Health

According to yoga philosophy, health is the balance and proper functioning of all physical, mental, and energy systems. Asanas were conceived in ancient times to promote holistic health by stimulating and balancing the internal body systems and maintaining homeostasis.

As yoga became popular, the focus of the practice started to shift. As a result, some of its original principles began to become diluted. The original purpose of yoga asanas was to keep the internal physical body and the energy body healthy and in balance. Asanas were specifically developed for this reason. These days, though, yoga practices generally focus on toning and stretching the musculoskeletal system. It is important to remember that the changes in bodily appearance through regular practice of yoga asanas are side effects and should not be mistaken for the main goal. The main difference between a Hatha Yoga practice and a modern yoga asana practice is how the asanas are performed. Classically, asanas are defined as steady, comfortable, poses. As soon as the asanas are performed in a dynamic way, without steady holds, we enter the realm of modern asana practice. Ancient scriptures define asanas with the words *sthira sukham asanam*, which defines the state where body and mind are steady and comfortable in a pose.

To sum it up, an asana practice according to Hatha Yoga principles

aims to keep the internal body healthy and in balance rather than focusing on weight loss, toning, and shaping the exterior physical body and

performs asanas with long, comfortable, and steady holds, rather than in a vigorous or dynamic manner.

Hatha Yoga and Your Body's Systems

In this chapter we will see how—according to Hatha Yoga principles—a yoga asana practice affects the systems of your body. We will also discover if and how these effects differ from the effects seen from regular exercises or dynamic yoga asana practices.

Hatha Yoga and the autonomic nervous system

The autonomic nervous system is also known as the involuntary nervous system. It maintains homeostasis in your body. Homeostasis is the maintenance and balance of relatively stable conditions within your body's internal systems, despite changes happening inside and outside your body. The autonomic nervous system branches into the cardiac muscles, smooth muscles, and various endocrine and exocrine glands. It therefore influences most tissue and organ systems in your body.

Your autonomic nervous system consists of two subsystems: the sympathetic and the parasympathetic nervous systems. Your sympathetic nervous system prepares your body for action. It is famous for its fight-or-flight response. For example, if a dog attacks you, your heartbeat will quicken, your pupils will dilate, and the majority of blood will be sent to your muscles to prepare you either to fight or flee. All your body's systems are put into emergency mode in order to manage and survive the immediate situation. Meanwhile, all your internal functions not related to the threat, such as regular functions for growth and healing of your body, are put on hold.

Your other subsystem is the parasympathetic nervous system. It brings your body into a rest-and-digest mode. It counterbalances your sympathetic nervous system, restoring your body to a state of calm and activating regular functions such as the secretion of saliva in your mouth or digestive enzymes in your stomach. *Part II – Hatha Yoga and Your Body's Systems 19*

Only one of these two subsystems can be active at a time. They alternate according to the need and situation. The balance between these two systems is of utmost importance. In a healthy person, the transitions between the two systems are regular, smooth, and swift.

Apart from external and psychological factors, the sympathetic nervous system also gets activated by using your muscles or breathing more heavily. More vigorous and dynamic yoga asana styles will trigger your sympathetic nervous system.

Comfortable exercises as well as slow and conscious breathing, on the other hand, will engage your parasympathetic nervous system. Likewise, a Hatha Yoga practice—with steady and comfortable postures and calm, conscious breathing—will bring you into resonance with your parasympathetic nervous system. In this state the proper functioning of all your internal organs and glands is ensured. They will receive an abundant blood supply.

We all know that stress is unhealthy. It triggers the sympathetic nervous system, which then creates more stress. This stress-induced cycle causes most common chronic diseases. After all, when your sympathetic nervous system is active, your body is in survival mode. Your heart rate increases, the blood supply to your

internal organs is cut and redirected to your major muscles, and your respiration becomes quick and shallow. At the same time the stress hormone cortisol floods your bloodstream. Over time, this can lead to various vascular disorders such as hypertension and a depressed immune system.

With today's busy and stressful lifestyle, most of us receive little benefit from stimulating the sympathetic nervous system through vigorous exercise. At least not exclusively. If you are already too often and too long in a state of sympathetic arousal, you need to train your body and mind to easily relax into and stay within a parasympathetic mode more frequently.

Some elements within a Hatha Yoga practice promote rest and rejuvenate your system, and others raise your heartbeat, challenge you, and bring you into a sympathetic state. This is one reason Hatha Yoga is so important for your body. By consciously relaxing from the sympathetic nervous system into your parasympathetic nervous system during Hatha Yoga, you effortlessly begin to accomplish these transitions.

The Sun Salutation in the beginning of the practice serves as a good example. This cycle of asana-like steps is meant to warm up your body. Through the dynamic performance of the Sun Salutation, the sympathetic nervous system perks up. After 5 to 10 minutes of Sun Salutations, though, you lie down in Shavasana (Corpse Pose) and allow your breathing and heartbeat to calm down. This is the important shift when the parasympathetic nervous system takes over. Similarly, a dynamic Kapalabhati breathing (a form of pranayama breathing also known as Shining-Skull) excites the sympathetic nervous system, whereas the more calming Anulom Vilom (also known as Alternate Nostril Breathing) engages the more calming qualities of the parasympathetic nervous system.

For this reason, long holds during Hatha Yoga practice are essential. Holding an asana with comfort and ease for a certain duration brings you into rest-and-regenerate mode. Not all asanas are easy and effortless, though. Challenging asanas raise your heartbeat and respiration rates. When followed by a relaxation pose such as Corpse Pose, Child's Pose, or Crocodile Pose, however, your body learns how to shift from sympathetic to parasympathetic modes.

A good yoga practice, involves poses and exercise that cycle through the accelerator and the brake so the autonomic nervous system gets a thorough workout. This is why a true Hatha Yoga practice does three things. First, it often challenges the body in order to warm up or in order to learn different postures and exercises and therefore activates the sympathetic nervous system. Second, it always includes elements that bring your body and mind back into a parasympathetic state. Third, it develops an awareness between the contrasting states of relaxation and excitement. Through understanding this, you increase your capability to shift from one state to the other in your daily live as well. Therefore Hatha Yoga helps to prevent imbalance between the sympathetic and parasympathetic systems. As you realize your energetic flexibility, you develop abilities to achieve states of inner balance and harmony as well as improved health for your entire body. *Part*

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How Hatha Yoga prevents and removes stress

Stress is a reaction to an internal or external stimulus. This stimulus disturbs your physical or mental equilibrium. It leads to an overly activated sympathetic nervous system and floods your body with adrenaline. Meanwhile, your respiration rate, heart rate, muscle tension, and blood pressure increase. This in turn increases stress and anxiety, making it a vicious circle.

Often stress can become such a habitual part of life that you do not even recognize it anymore. And as discussed above, long-term stress will eventually have damaging effects on your health. You may not always be able to control the sources of stress, but you can learn to modify your reactions to it. Through the calm and mindful practice of Hatha Yoga you can re-establish healthy breathing patterns and learn to relax. By learning to relax and consciously experiencing relaxation, you can recognize early signs of stress in your daily life and learn to respond more calmly and consciously. Through this natural growth, you will gain relief from stress and stressful situations.

This is important both for mental health and for physical well-being. When stressed, all bodily functions such as digestion, excretion, sleep, and so on are thrown out of balance. When stress becomes a chronic condition, we can suffer from a wide variety of bodily effects. Indigestion and hyperacidity are just two. In fact, many studies have proven the direct link between stress and most of the common ills such as diabetes, depression, anxiety, heart disease, high blood pressure, immune system diseases, and more.

One study explains the effects of yoga as being brought about by yoga reducing accumulated, stress-related wear and tear on the body. This subsequently restores your body's optimal balance, or homeostasis. Mel Robin, author of the acclaimed *A Physiological Handbook for Teachers of Yogasana*⁷, agrees. He believes that the practice of yoga can increase control of the vagus nerve—which increases integration in the shifts in between the parasympathetic and sympathetic nervous systems. This integration lessens the effect of stress on your body and mind. Certain yoga asanas, especially inverted ones, or any when the forehead rests on the floor, may shift the autonomic nervous system toward parasympathetic dominance, through stimulation of the vagal nerve.

Other studies have shown that yoga practices correct under-activity of the parasympathetic nervous and GABA systems (in part through stimulation of the vagal nerves) in addition to reducing accumulated stress-related wear and tear. GABA is a major neurotransmitter in the mammalian central nervous system and it plays the principal role in reducing neuronal excitability throughout the nervous system. Many reports have linked stress and depression to low GABA levels. Scientists have measured GABA levels of yoga practitioners both before and after an hour-long yoga session focused on Hatha Yoga and related breathing. There were no extensive periods of meditation or pranayama. The study guidelines demanded at least 55 minutes of common yoga postures and exercises, such as inversions and backbends, twists and Sun Salutations. The scientists compared the eight yoga practitioners to a control group of 11 individuals who did no yoga but instead read magazines.

The results, published in 2007, were stunning. They showed that the brains of yoga practitioners displayed an average GABA rise of 27 percent. By contrast, the comparison group experienced not the slightest change. A follow-up study looked at subjects with no prior knowledge of yoga. They learned the Iyengar style from scratch and practiced it for three months. The findings, published in 2010, showed that even beginning yogis experienced major rises in the neurotransmitter, along with improved moods and less anxiety. The average GABA rise was less than in the previous study—13 percent versus 27 percent—or about half as much. Still, the new yogis did better than the walkers (the control group).

This suggests that the practice of asanas and related breathing is more efficient in reducing stress and its long-term effects than exercise (moderate or vigorous) or any other leisure activities. The main influencers of yoga asana practice on stress are, as shown above, the activation of the rest-and-relax mode (the parasympathetic nervous system) and the direct increase of GABA neurotransmitters in the brain. *Part II – Hatha Yoga and Your Body's Systems* 23

Hatha Yoga and the circulatory system

Improved blood circulation

The heart is the most important organ of the circulatory system. Its foremost role is to pump blood throughout your body. An effective blood flow to all the tissues in the body is essential for the proper functioning of internal organs and processes. Most people do not realize that blood flow to most parts of the body depends partially on gravity and posture. Therefore a sedentary lifestyle, poor posture, and imbalanced movement patterns obstruct blood circulation. Luckily, Hatha Yoga offers a proven, effective cure.

Continuous slouching, for instance, can chronically compress your internal organs between the heart and large intestine. This obstructs blood circulation because the channels of blood flow tend to collapse. When this happens, the blood cannot properly carry out its functions of supplying tissues with oxygen, hormones, nutrients, and enzymes. Hatha Yoga poses, though, help to increase blood circulation, especially in areas prone to sluggish blood flow.

With poor circulation, also many immune corpuscles (small blood cells that float freely and carry immune system cells) become stuck to the walls of the blood vessels. This weakens your body's ability to fight off disease. When the blood circulation increases due to the practice of Hatha Yoga, the number of circulating immune corpuscles increases and the amount of harmful germs decreases.

In this way, Hatha Yoga, by improving and varying blood circulation, helps to keep all internal organs functioning optimally by

ensuring a proper supply of oxygen, nutrients, and enzymes to cells and tissues and

What about blood circulation during conventional exercise? Conventional exercise and vigorous asana practice raise the heart rate, forcing the heart to pump more blood per minute. Although the blood flow increases, the overall circulation of the blood does not. During conventional exercise, about 88 percent of the cardiac output ends up feeding the major muscles. At the same time all the other organs and tissues must get by on less fresh blood. In dynamic asana practice too, as soon as the sympathetic nervous system kicks in and stays in charge, the majority of the blood floods toward major muscle and blood circulation, leaving little fresh blood supply for the internal organs.

Improved blood circulation to the brain

Most traditional yoga books state that Headstand is the king of asanas because of its immense health benefits, especially for the brain.

This ancient wisdom still applies. Inversion therapy uses inverted poses to increase blood flow to the brain. Naturally, then the brain receives a boost of oxygen and glucose. These immensely stimulate the productivity of the brain. In fact recent studies state that inversions can improve the brain's performance by 14 percents. Inversions performed regularly over a certain period of time will improve concentration, memory, observation, and clarity of thought. They will also counteract depression and anxiety. Furthermore, inversion therapy may even play a serious role in arresting the brain's "aging process,"⁹ even preventing or delaying dementia.

This medical proof is encouraging. It again demonstrates the timeless truth of what had been perceived thousands of years ago by the sages in ancient India. Inversions, and especially Headstand, promote prolonged agility, health, and mental vigor. But why should we make the effort to do Headstand? Why not simply lie on an inversion table, hang upside down, or lean inverted against the wall? When practicing Headstand with tools and a wall, we tend to invert the body for longer than it might be comfortable handling the change in blood pressure and the weight on the neck and head. Furthermore, in propping up our Headstand, we will not develop the coordination and strength required to safely perform inversions. It is for these reasons that Headstand is recommended as part of a balanced Hatha Yoga routine. Even though inversion therapy may be beneficial for certain conditions and purposes, a balanced yoga asana practice including inversions will, in the long term, be more effective and beneficial for holistic health. As always, in order to reap the benefits of inversions, hold the posture steadily and comfortably so that your body becomes exposed to the effects on the internal systems. *Part II – Hatha Yoga and Your Body's Systems 25*

Regulation of blood pressure

Normal blood pressure is important for good health. When it drops too low, the brain receives insufficient blood, and we become so dizzy and weak that we faint. In extreme cases organs can fail, producing breakdowns such as heart attacks. High blood pressure has its own hazards—mostly long term rather than immediate. It stresses the heart and artery walls. In doing so, it may lead to an increased risk of stroke, heart attack, and kidney failure. Fortunately, there are sensors in your body called "baroreceptors". These take pressure readings of the blood vessels and make suitable adjustments in blood pressure.

Your baroreceptors' sensitivity and responsiveness indicate your state of health. When the baroreceptors are more sensitive, they sense and respond earlier. Slow and controlled breathing¹⁰ increases the sensitivity of these sensors. This results in a more fine-tuned control of heart rate and blood pressure.

Also, inverted asanas, typical in Hatha Yoga, increase the sensitivity and responsiveness of these baroreceptors, which in turn can lead to prolonged improvements in blood pressure. For example, Shoulderstand stimulates one particular kind of sensor. This sensor lies in the carotids, major arteries running through the front of your neck. Their job is to carry blood to the brain. The carotid sensors help this process along. They make sure the brain receives enough blood. During Shoulderstand, the chin presses deeply into your neck and upper chest, clamping down on the carotids and making the local pressure very high. When this happens, the sensors embedded in the arterial walls monitoring the changes in blood pressure set off alarm bells within your body. Your body thinks that the delicate tissues of the brain are under too much pressure from too much blood. They order the heart to pump less often and less hard. So the blood vessels expand and relax and blood flows at a more leisurely pace.

Something similar happens within the right atrium of your heart during any inversion pose. In this right upper chamber of the heart, blood enters from the veins. A sensor located here determines the atrium's

fullness. When pressure is low, the sensor signals the heart to beat faster, increasing blood flow. When pressure is too high, the heart slows down. Inversions dramatically increase the blood flow to your right atrium from the feet, legs, and lower torso. This activates the sensor, and the heart slows down.

However, this happens only if the pose is held steadily for at least 30 seconds—easily and comfortably. Beginners learning inversions such as Headstand or Shoulderstand often feel nervous or unbalanced. So they use a lot of muscular tension to hold themselves up. Because this activates the sympathetic nervous system, blood pressure does not decrease, but instead increases. This is why those who already suffer from high blood pressure should not do inversions altogether, or build them up very slowly under the supervision of their physician. Their blood pressure can rise even more, which can be problematic. Teachers should be aware that beginning students will not experience the full benefits of the inverted poses until they can practice them with ease. As soon as your practice advances to that stage, you will harvest the full benefits of inverted poses.

Research has shown that conventional exercise, performed moderately, decreases blood pressure as well. Similarly, vigorous yoga asana practices can lower blood pressure because of the aerobic workout they provide. However, an aerobic workout has one main side-effect. It revs up the sympathetic nervous system. And this, as we now know, can lead to its own problems.

Hatha Yoga and the lymphatic system – Detoxification

The lymphatic system plays important roles. It removes wastes and toxins while maintaining your body's immunity against pathogens. It does this by circulating lymph—a transparent fluid containing white blood cells and proteins. Lymph circulates around your body and drains fluid from the spaces in between cells. These are spaces where the cells dump their wastes and where other toxins and debris can accumulate. If these wastes build up, you begin to feel stiff, swollen, heavy, and lifeless.

The lymphatic system relies on the intrinsic muscle contractions of the lymph channel walls. It also depends on large muscle activity in your body. In fact, contracting any muscle helps move lymph along. Yoga asanas, though, because they work every part of your body, are especially effective. Attention to your breath and to the compression and expansion of the solar plexus region during asanas further distinguish asana practice from other forms of exercise. The breath is a lymphatic pump in itself. Conscious breathing helps direct lymph through the deep channels of the chest.*Part II – Hatha Yoga and Your Body's Systems 27*

Yoga asanas work in three ways to increase the flow of lymph and relieve lymphatic congestion.

Inversions reverse the effect of gravity and drain lymph and used blood from your legs.

Twists (as well as forward, backward, and side bends) stimulate the flow of lymph up through the core of your body.

Contracting and releasing large muscles move lymph through your body.

To eliminate toxins is one of the key qualities and purposes of Hatha Yoga. Practicing asanas steadily and comfortably promotes this because it increases blood and lymph flow. Does this apply to a more dynamic and vigorous asana practice as well? To a certain extent, yes. This is because of the varied movements of your body.

However as soon as a practice or exercise becomes strenuous, the production of lactic acid increases. As your body performs strenuous exercise, you begin to breathe more rapidly. This is because you are attempting to get more oxygen to your working muscles. Your body likes to get most of its energy from oxygen, but when the oxygen supply is too low to fuel what the muscles need, your body finds another way. It burns glucose, which produces lactic acid as a waste product. As the muscles continue to work, lactic acid accumulates. When your body cools down after practice or exercise, your lymphatic system has to work hard to carry away the lactic acid. After strenuous exercise your body might even feel stiff, swollen, and heavy because of the built-up load of lactic acid.

In Hatha Yoga, though, you avoid this build-up of lactic acid. After all, you perform asanas easily, so that your muscles get enough oxygen. For this reason, even when you work on challenging asanas, it is important

to sequence the practice well. You need to make sure to include sufficient moments of relaxation. For example, when the heart rate becomes too high and you begin to breathe fast and perspire, it is time for a relaxing asana. This will normalize the heart rate, allow your breath to calm down and minimize the

Hatha Yoga and the respiratory system – Oxygenation

Proper oxygenation of your cells is another important aspect of good health. Cells need oxygen to generate energy. To get enough oxygen to your cells, you must improve the blood's absorption of oxygen. Research has shown that deep breathing into the lower part of the lungs increases this oxygen absorption. This in turn is beneficial because even with fewer inhalations per minute, the blood receives more oxygen. The blood then is able to better supply oxygen to all tissues of your body. A study on yoga practitioners showed that they adapted better to lower oxygen levels due to high altitude than did the control group, which did not practice yoga. The deep and conscious breathing that is typical in yoga seems to aid efficient ventilation: the amount of oxygen reaching the heart per minute.¹¹

In daily life we often breathe too shallowly and therefore use only a small fraction of our lung capacity. After each normal exhalation, more than four times the amount of air we move with every inhalation and exhalation stays in the lungs. That stagnant air pooling at the bottom of the lungs dilutes and pollutes each fresh, oxygen-rich inhalation. You can easily imagine how this decreases the efficiency of each ventilation. Through deep, steady, and slow breathing during asana practice and breathing exercises, the old air pooling in the lungs is pushed out. This results in a more efficient blood oxygenation. This effect is more pronounced with breathing exercises where the emphasis is on exhalation, as with Anulom Vilom and Kapalbhati.

Another effect of slow and deep breathing is that the ratio between oxygen and carbon dioxide in the blood changes. By slowing down breathing, the relative level of carbon dioxide increases. Higher carbon dioxide levels in the blood dilate the blood vessels in the brain, leading to more generous blood flow. So the calm and comfortable practice of Hatha Yoga leads to an increase of blood supply to the brain, which in turn allows the brain to absorb more oxygen.

Through increased respiration, the ratio of oxygen to carbon dioxide is changed in such a way that there is too little carbon dioxide in the blood. As a result, the small arteries and arterioles of the brain become constricted, which restrict its blood supply. At the same time, the red blood cells, responsible for transporting oxygen to all cells of your body, create a greater affinity to the oxygen. So heavy breathing not only causes blood vessels to constrict, but also causes the red blood cells to become *Part II – Hatha Yoga and Your Body's Systems 29*

more reluctant to release oxygen to the cells. As a result, the brain receives less oxygen, even though the blood is oxygenated sufficiently.

So sometimes, vigorous exercise and breathing exercises without proper preparation can lead to a deprivation of oxygen in the brain, which can result in dizziness, light-headedness, panic attacks, and even fainting. We try to breathe even faster, increasing the carbon dioxide deficiency even more. This effect is commonly referred to as "hyperventilation." It can be helped by breathing into a plastic or paper bag, so that the carbon dioxide expelled with exhalation gets reabsorbed by the lungs and enters the blood to balance the levels of carbon dioxide and oxygen again.

If you incorrectly practice some yogic breathing exercises with active inhalation, rather than only active exhalation, you may trigger these same effects of hyperventilation. Kapalbhati (Skull Shining Breath) is an example of this. If practiced incorrectly it becomes a different kind of pranayama, the so-called Bhastrika (Bellows Breath). Bhastrika is an advanced pranayama exercise, which is suitable only for experienced practitioners, and if practiced by beginners these same effects of hyperventilation may occur.

In Hatha Yoga, the lungs' capacity to absorb oxygen and the blood's capacity to distribute oxygen optimally improve. In conventional exercises or vigorous asana practice, even though the respiration rate increases, the oxygenation of the cells is less efficient, causing us to breathe even more rapidly in attempting to provide enough oxygen.

The relation between inhalation and exhalation also has a direct effect on the autonomic nervous system. Whereas inhalation activates the sympathetic nervous system, exhalation activates the parasympathetic nervous system. Thus, breathing patterns and exercises that focus on exhalation and retention have the

inherent quality of activating the parasympathetic nervous system. They therefore have a calming and rejuvenating effect on your body and mind.

When your body and mind are at ease, you breathe (one inhalation and exhalation) 13 to 15 times per minute. This means your body breathes around 22 thousand times per 24 hours. Whenever your respiration increases

due to physical or mental stimulation, the flow of blood and other vital fluids increase as well. This in turn increases neuromotor activity. And neuromotor activity causes your body to utilize more energy. Subsequently, you need to absorb more glucose through food. These demands on your body do not affect your body as you grow up. After reaching maturity, however, they manifest as wear and tear. As this wear and tear continues, repair mechanisms and energy levels slow down. This results in stress and strain on your body.

According to the ancient Tantric scriptures Shiva Swarodaya and Gyan Swarodaya, the human lifespan is measured not in years, but in number of breaths. At the rate of 15 breaths per minute, a human life is made up of 946,080,000 breaths—a full 120 years.¹² By slowing down our breathing and maintaining a normal breathing rate of no more than 15 breaths per minute, we can conserve energy, increase our vitality, and maybe even live longer.

Hatha Yoga and the metabolism

One of the many myths about yoga is that it stimulates the metabolism and causes weight loss. Nowadays health is often measured and defined by the level of fitness, and fitness is measured as the ability of the heart to pump an increased amount of blood per beat. According to ancient Indian sciences such as Ayurveda and Hatha Yoga, though, health is the balance of all bodily systems.

The purpose of asanas, then, is not to increase cardio fitness levels or metabolism. In fact, the intention and the effect of Hatha Yoga prove to be the exact opposite. In 2006, a study in Bangalore¹³ showed that regular Hatha Yoga practice reduces the basal metabolic rate. This is the minimum number of calories your body burns whether at rest, working out, or lying down. This metabolic rate differs from person to person, and these calories are the absolute minimum amount of energy that your body needs to stay alive and to execute all involuntary activities such as digestion, respiration, circulation, waste removal, and temperature regulation.

A team of scientists studied more than 100 men and women. They prescribed a diverse Hatha Yoga routine. The men and women—their average age 33 years— followed the prescribed routine for at least six months. The team reported that a regular yoga practice cut the basal metabolic rate by an average of 13 percent. The results were even more pronounced when broken down by sex. On average, the men decreased their resting energy by 8 percent. The women showed reductions of 18 percent—more than double the metabolic declines of the males. *Part II – Hatha Yoga and Your Body's Systems 31*

At first sight, this metabolic slowdown might seem like a negative effect. After all, a lower metabolic rate means burning less calories. Does this mean, that by practicing asanas, one will gain weight? That will depend on eating habits, physical activity, and lifestyle. If you look closely, you will observe that in general, yoga practitioners are lean. Many of them practice only yoga. The secret of weight loss or maintaining an ideal weight has nothing to do with a fast metabolism, but with mind and psyche. The regular practice of asanas affects the mind and desires. These in turn help to curb overeating and stress-related eating.

Furthermore, slowing your metabolism through calorie restriction can possibly protect against cancer, cardiovascular disease, and diabetes. It can even help you live longer. How does calorie restriction prolong life? Some evidence suggests that your lifespan cannot be increased simply by preventing obesity and its consequences. Although preventing obesity by increasing physical activity does prevent premature death, it does not significantly extend lifespan. The possible increase in lifespan is believed to be a result of restricting calories.¹⁴

These positive effects seem intimately tied to the metabolic slowdown that occurs over time when you restrict your calories. Many animal studies show that calorie restriction can extend lifespan. Systematic reviews and studies involving human subjects also suggest that calorie restriction, and moderate physical activity, may dramatically slow down the aging process. Eating less glucose makes your cells function in ways that support health and longer life.¹⁵

In summary, recent studies suggest that lowering your metabolic rate, if combined with calorie restrictions, leads to longer life. Thus, combining Hatha Yoga, which has been shown to decrease the metabolism, and a calorie-restricted diet, seems to be a formula for better health and longer life.

Do conventional physical exercise and vigorous asana practice support this process as well? Because your body needs glucose for normal functioning, likewise when you exercise you need more glucose. You get

glucose mainly from your diet. The more vigorous the exercise, the more food you need to intake. Thus, contrary to Hatha Yoga, strenuous physical exercises or vigorous asana practices increase the dietary needs and metabolism.

Hatha Yoga and the spine and joints

Yoga keeps your spine young. And you are only as young as your spine is flexible. These are common statements in the yoga world. They are supported by science. According to medical studies, yoga can slow down the deterioration of spinal discs. Physicians in Taiwan¹⁶ reported on a study of 36 subjects. Half of the participants had taught Hatha Yoga for at least a decade. The other half were in good health. The two groups were of the same sex and similar in age. The physicians scanned all their spines and carefully inspected the discs for signs of damage. The results showed that the yoga teachers had significantly less degenerated discs than did the control group.

The intervertebral disc consists of an outer ring made up primarily of Type I collagen and fibrocyte/fibroblast-like cells. This composition gives the disc the ability to resist tensile forces. The inner core, because of its composition, increases the disc's stiffness. This provides resistance to compression. As you age, though, the disc becomes more fibrous, disorganized and starts to wear out and become thinner. You can no longer see the difference between the disc and its inner core.

Now, the intervertebral disc is poor in blood vessels. It gets indirect nutrients from two places: through diffusion from the bone marrow across the cartilaginous endplate, and through the outer ring, from the surrounding blood vessels. Scientists speculate that the various positions held by your spine during yoga practice delay disc degeneration by increasing the ability of nutrients to diffuse into the disc. It is also possible that the tension and compression of the disc during yoga exercises stimulate the growth and prevent the aging of discs. The difference in total disc scores between the yoga practitioners and the control group in the above mentioned pilot study, clearly shows that the long-term practice of yoga means fewer age-related changes in the intervertebral discs.

In addition to increasing the density and health of intervertebral discs, Hatha Yoga also greatly increases body awareness and improves posture. This has long-lasting effects on joint flexibility and health. Practicing asanas can prevent arthritis, which is the wear and tear of joints in the back, neck, hips, fingers, or knees. In a healthy joint, a well-lubricated lining of cartilage covers the ends of bones. This cartilage gets worn down most commonly by sports injuries, poor body posture, or dysfunctional movement patterns. Yoga asanas bring awareness to formerly unconscious postural habits. This new awareness provides the whole body with an entirely new range of *Part II – Hatha Yoga and Your Body's Systems 33*

movements. This in turn prevents joints from stiffening. By gentle and controlled movement, lubricating synovial fluid is distributed over the surface of the cartilage that covers the bones, keeping the cartilage well lubricated and healthy.

Hatha Yoga's varied movements keep your spine as well as joints well-lubricated. As a result, you remain younger, stronger, and more flexible. In conventional exercise, the variety of movements is less, and more often than not these movements are neither gentle nor very controlled. Therefore the joints experience wear and tear, and the aging process of your spine is not slowed down. Dynamic and vigorous asana practices are in this case better for your joints and spine than conventional exercise. They provide a large and varied range of motions for your spine and joints. Further, these motions are generally done in a controlled manner as well.

