The SAFE Practice of

The Headstand and Shoulderstand positions, Sirsasana and Sarvangasana, have long been known as the king and queen of the asanas. By reversing the body's usual relationship to gravity, these asanas produce numerous beneficial changes in the body's physiological systems. Because there are also many additional physical, psychological and emotional benefits that come with the practice of these poses, they are often considered the core of a complete asana practice. However, to truly experience their benefits and prevent injury, they must be done correctly.

What are the effects of reversing the gravitational pull on the human body and why is it desirable? Recently, a whole raft of devices — hanging or inversion boots, the pelvic sling, the anti-gravity frame, among others — has been created to give those with no Hatha Yoga training the experience of inversion. How do these passive inversions compare with the more traditional active asanas? Are there dangers and precautions to working with inversions, and what are the safest ways to work with gravity? These are questions all of us may have asked, and with the recent backlash against inversions, they deserve a full discussion.

All posture and movement must take into account the constant downward pulling force of gravity. Our bones provide some support and resistance, but fluids, which ~~compromise~~ comprise 75-80 percent of our mass, are at the mercy of the "big G." Just as water always flows downhill, the liquids in our body flow down the gravitational gradient, and the circulatory system must constantly adjust to gravity's effects.

In "Effects of Inverted Poses on Cardiovascular Physiology," *IYTE Review*, Vol. 3, #3, Marcia Stefanick, Ph.D., details these adjustments. As the body changes its relationship to gravity, she writes, "profound changes occur in the distribution of blood in the vessels and the return of blood to the heart, as well as in the heart rate and blood pressure." The cardiovascular system is composed of the heart and blood vessels. The heart consists of two separate pumps. One pumps blood *into* the lungs where carbon dioxide is exchanged for oxygen. This fresh blood returns to the heart and the second pump squeezes it *out* to the body. The blood flows outward through large vessels known as arteries, which in turn branch and subdivide into the smaller and smaller vessels that wind their way to every organ and tissue in the body. At the level of the smallest vessels, the capillaries, the oxygen and other nutrients and messengers leave the blood stream and are transported to the cells. At the same time, carbon dioxide and other metabolic wastes are absorbed into the blood stream. This deoxygenated blood flows from the capillaries into larger vessels (venules), which lead to the still larger veins that return the blood to the heart, where the cycle begins again. Because some of the unwanted cell waste material is too large to be absorbed through the tiny pores in the walls of the capillaries, a second set of vessels, the lymphatic system, transports excess cellular fluid as well as large protein molecules, dead cell matter, bacteria and other material. Before being recycled back into the blood stream near the heart, this fluid is filtered by the lymph nodes, which are located at critical junctures along the lymphatic system network. At these points, dead cells and particles are absorbed, bacteria are attacked and digested, and toxins are neutralized. Thus, the lymphatic system plays a key role in guarding the body against infection and in maintaining overall health.

One of the most important functions of the cardiovascular system is to deliver fresh blood to the brain. In lying-down positions, the heart is at the same level as the brain, and gravity has a minor effect on the movement of blood between these two organs. In sitting or standing, however, the brain is obviously above the heart and the heart muscle must work intensely to pump against the pull of gravity. In an inverted position, the brain is below the level of the heart and gravity pulls blood into the brain. In these positions, the brain receives the proper blood supply with the minimum effort

Figure 1. A simple partial inversion. Keep the spine perpendicular to the wall, roll the shoulderblades down to the waist and out to the sides of the body, and relax completely.

Figure 2. Supported Boat Pose. Similar to Figure 1, but the upper body is elevated to relieve pressure in the head.

INVERSIONS

BY ARTHUR KILMURRAY

of the heart. The neck and chest areas, including the important thyroid and parathyroid glands, also receive the benefit of improved blood circulation.

Tests done by Shanker Rao, as described in *Science Studies Yoga* by James Funderburk, show how the heart rate varies with gravity. His subjects, medical students with some experience in yoga, exhibited an average heart rate of 67 beats per minute in the supine position, rising to 84 beats per minute upon standing. In the Headstand position, these subjects displayed a 69 beats-per-minute average. This heart rate variation was accomplished by a variation in fluid pressure in the arteries, veins, glands and organs. The regular increase in pressure in the head, neck and chest regions brought about by inversions maintains the elasticity of the vessels and tissues, and it is this elasticity that is a key factor in maintaining health.

PHOTOS BY ROSS MADDEN Model: Don Tuttle

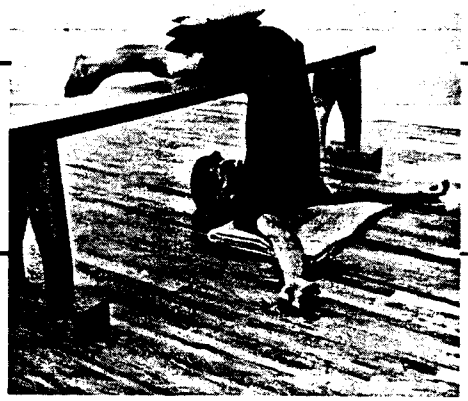

Figure 3. Viparita Karani. Elevation of the pelvis allows the lower body to drain while the upper body remains in a very relaxed position.

Figure 4. Supported Plough Pose. Support the body at the top of the thighs just where they join the body. Weights on the legs will provide stability.

Just as it affects arterial blood flow, gravity affects the flow of venous blood *back* to the heart. There are three ways in which the deoxygenated blood can be returned to the heart. The first is gravity, which will drain the region *above* the heart of the venous blood and lymphatic fluid, but will resist the return of fluids from the lower body. The second two mechanisms, the respiratory pump and the skeletal musculature, must do all the work of returning the fluids *below* the heart. The changing pressure in the thoracic cavity, which pulls air into the lungs, pulls fluids toward the heart. Exhalations are quite important in this respiratory pumping action. Also, the contraction and releasing of the skeletal muscles serve to pump the venous and lymphatic fluids through their respective vessels. These vessels are equipped with a series of one-way valves that allow blood to flow toward the heart only, thus preventing backflow.

Unfortunately, these two mechanisms cannot compete against gravity for long periods of time. During the course of a typical day, most humans will spend 16 or more hours with the head above the heart and the legs and the pelvic area below. Thus, gravity has a negative effect on the venous and lymphatic return from most of the body, and if the muscles of the legs are not continuously contracting and releasing, fluid begins to accumulate in the lower body. This will almost always occur where there is not much opportunity for movement. Because the veins and lymphatic vessels are quite elastic, they can expand to hold large quantities of fluid, but, if not given periodic relief from this pooling, the vessels eventually lose their resilience to become permanently distended. The one-way valves then break down from over-stretching and varicose veins result. (Inversions can alleviate the problems of varicose veins, and, if begun in time, can prevent them.) Periodic inversions allow gravity to drain the lower body, relieving pressure and recycling the lymphatic fluid and venous blood. This in turn gives the cells a continuous supply of fresh nutrients and cleanses them of metabolic wastes. An efficient circulatory system, so important to health, is thus maintained and improved by inversions.

Just as plants and trees are shaped by the direction of sunlight and wind, our bodies are shaped by the pull of gravity. Inversions help us retain our balance and symmetry. Dr. R. Manatt Martin, originator of the gravity guidance systems and inventor of many inversion devices, describes the cumulative effects of *not* using gravity in his book *Cum Gravity* (Essential Publishing Co., San Marino, CA, 1975). "Most people start out with youthful appearing broad shoulders and a small waist," writes Martin, "but by 35 years of age, far too many develop narrow shoulders, broad hips, and a protruding abdomen. With the procession of time, many of the elderly appear pear-shaped." Long-term degeneration described by Martin includes: distortion of the shape and function of the eyes; compression and flattening of the cells and blood vessels of the brain; collapse of the top lobes of the lungs; and stresses and strains on the ligaments, blood vessels and organ tissues of the

abdominal cavity. Periodic inversions, says Martin, will help reverse all of these trends. The large intestines are especially responsive to the relief from gravitational compression, and inverted poses are an effective treatment for constipation.

As we have seen, there are many tremendous benefits to be gained by inverting the body. However, it is equally important to be aware of the potential dangers involved in inverted positions. Needless to say, everyone should check with his or her doctor before beginning any physical regimen. Furthermore, it is always wise to be cautious and work into things slowly.

Certain groups of people should avoid all inversions except when working under the most expert guidance. Those with high blood pressure are one such group, since the cardiovascular changes of inversions are potentially damaging to them. Under the supervision of a physician or an experienced yoga teacher, some people with high blood pressure may be able to do some inversions, but this is not an area to be explored by the average student or teacher. Other people who should avoid inversions are those who suffer from eye problems — such as glaucoma or detached retina—hiatal hernia, heart or stroke problems, epilepsy, seizures or other brain disorders, and spinal injury (except when inversions are used as part of a supervised therapy program).

Certain temporary conditions also prohibit the practice of inversions. Acute infections of the ear or sinus cavities are likely to spread to other areas when the body is inverted. Women are advised not to practice inversions during the menstrual period (see accompanying article by Dr. Mary Schultz), and inversions during pregnancy should be practiced only by experienced students working with an experienced teacher. Active inversions should also be avoided by older people with osteoporosis, especially postmenopausal women with a history of vertebral fractures. Overweight students should work with passive inversions until sufficient strength, flexibility and awareness are developed.

With these precautions fully in mind, we can now compare the active and passive inversions and look at how we can use them in our practice. In a passive inversion, an external device provides the support, allowing the body to hang suspended in the upside-down position. Active inversions require the person to maintain the position with his or own effort. Practitioners of both of these forms will experience the venous and lymphatic draining of the pelvic area and legs, and receive the increased blood flow to the cervical and head regions. All of the organ tissues will be decompressed from their usual configurations and the downward pressure on the ligaments and muscles of the abdominal area and pelvic floor will be relieved. However, there are many differences as well. In a passive inversion, the arm and shoulder muscles can hang and relax. In an active inversion, these muscles must be constantly working, which aids the venous return of blood from the upper body. There is a tendency for the blood to pool in the upper body during a totally passive inversion, and it is recommended to work the upper body muscles at these times.

Active inversions will cultivate a sense of balance and self-control in a way that passive inversions cannot. The sense of lightness in a well-executed Headstand and the exhilaration of the lift and extension of a good Shoulderstand cannot be experienced in a passive inversion. However, the complete release and extension of the spine *can* be experienced by beginners with the aid of anti-gravity props. The same release and extension will take years and years of practice to achieve in the active poses. Thus, the benefits of total inversions can be realized very quickly with the use of passive inversions.

It will take time, effort and patience before the timings of the Headstand and Shoulderstand reach a similar level. But the long-term effects of these poses on the spine place them at the top of the asana hierarchy. These poses awaken the intelligence of the spinal column and nervous system, and an intelligent spine is in tune with gravity, using it to stretch all of the vertebral joints evenly. In sitting or standing the legs and pelvis usually provide the major lifting force, and the spine, although it must obviously work to some extent, is forgotten. In the Headstand and Shoulderstand however, the spine itself is so close to the floor that it must become involved. The lift generated by the arms must flow directly into the spine to prevent collapse, and it is this direct channeling of energy into the spine that makes it come alive. Eventually, the spine will learn to respond to the sitting and standing positions in the same fashion, but it is in

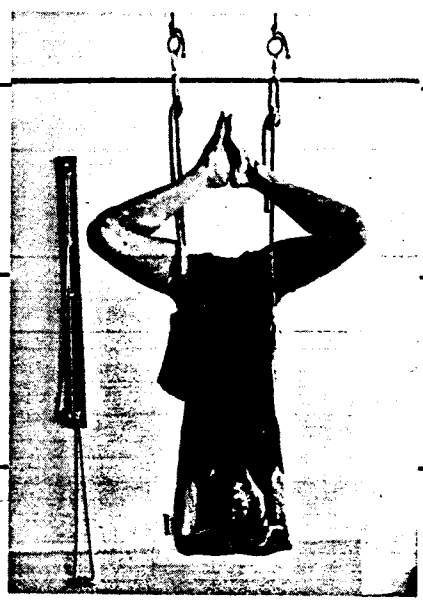

Figure 5. The Pelvic Sling. This offers a full passive inversion. A blanket can be used if the rope is uncomfortable.

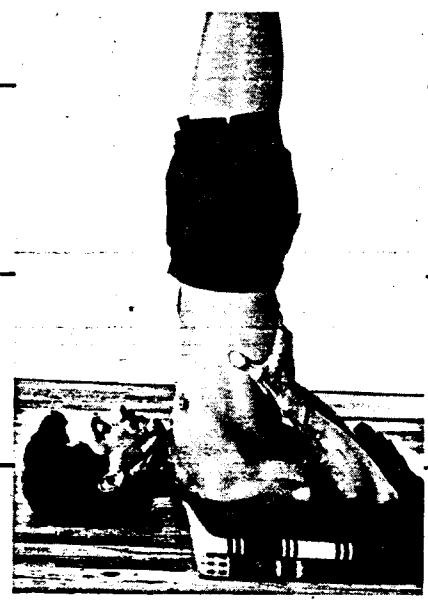

Figure 6. Shoulderstand. The tops of the shoulders come to the edge of the blanket, and the back of the head touches the floor. The neck is lifted away from the floor.

Sirsasana and Sarvangasana that this action is developed and refined. Because an intelligent spine is fundamental to the practice of pranayama and seated meditation, the mastery of these two important poses will lead to a deeper experience of the other limbs of Asthanga Yoga.

HALF-INVERSIONS

The simplest partial inversion is recommended for those people who are on their feet all day but are reluctant or unable to do a total inversion. In this position, the head and back are placed flat on the floor and the legs are set at an angle up against the wall. A right angle is ideal, although tight hamstring muscles may demand a less acute angle (Figure 1). If this creates excess pressure in the head, elevate the upper body to produce a supported boat position (Figure 2). A slightly more advanced version of the first position elevates the pelvis away from the floor. Known as Viparita Karani, this is one of the most therapeutic yoga poses (Figure 3). Another very beneficial partial inversion is the supported Plough (Figure 4). A more elaborate setup is required, but the experience is well worth the trouble.

FULL PASSIVE INVERSIONS

The most popular devices for passive inversions are hanging boots, the anti-gravity frame and the pelvic sling. Hanging boots were created by Dr. R. Manatt Martin, a physician, surgeon and gymnast from southern California, to allow the average person to experience the benefits of inversions. These boots are firmly attached to the ankles and can be hooked onto a secure rod such as a chin-up bar or high bar. The person then hangs, much like a bat, from the bar. Dr. Martin designed these boots not for passive hanging but rather for exercise in the inverted position. Beginners are advised to come down as soon as discomfort is felt and to stay no more than a minute for the first two weeks. Timings are slowly increased over a period of months. Exploration of movement in this position is encouraged, and at least two to three minutes of exercise are recommended before any passive hanging is attempted. Possible exercises include sit-ups, inverted squats, twists, back extensions and full-body swinging. Weight lifting while upside down is also suggested. Because hanging boots apply traction at the hip joints, they are beneficial for releasing the compression often felt there. However, since one does not hang from the center of the ankle joint but rather from the front of the ankle, a pelvic tucking action is needed when hanging passively. This will keep the spine in its proper alignment.

The anti-gravity frame or Gravity Guider is another of Dr. Martin's creations. With this piece of equipment, one can work more slowly into an inversion. The major feature of the Gravity Guider is its oscillation movement activated by simply raising and lowering the arms while strapped into the frame. The body oscillates around the horizontal position, moving from the partially upright to the partially inverted position and back again in a slow, steady rhythm. The degree of movement is controlled by the action of the arms. Dr. Martin feels that this movement stimulates the circulation of the blood, lymphatic and cerebrospinal fluids. When first working with this device, it is important to begin with short durations and slowly increase them over time. There is the possiblity of motion sickness because of the effect on the inner ear, although this should go away in time. It is also helpful to have an empty stomach before attempting the oscillations.

One of the many props designed by B. K. S. Iyengar, the pelvic sling applies traction directly to the lumbar spine and is an effective way to relieve tension in the lower back muscles. It is essentialy a loop of rope, secured at two points on the ceiling, that wraps around the pelvic bone (Figure 5). The sling requires a minimum amount of hip flexibility to correctly position the pelvis. (However, by inserting a small board approximately 1″ x 4″ x 2′ between the thighs and the rope, a stable position can be secured with limited pelvic mobility.) There may be an element of fear involved in getting into the sling for people with no inverted experience. A certain degree of body awareness is therefore recommended before attempting to work with the sling. Just as with the boots, movement is suggested while hanging. Twists and backbends feel especially good with the extra length and relaxation the spine receives. Pelvic hanging is recommended over ankle hanging for people with unequal leg length or knee or ankle problems.

With all forms of passive inversions, tremendous care must be taken when coming out of this position. Because relaxation often diminishes awareness, injuries from a sudden faulty movement are most likely to occur at this time.

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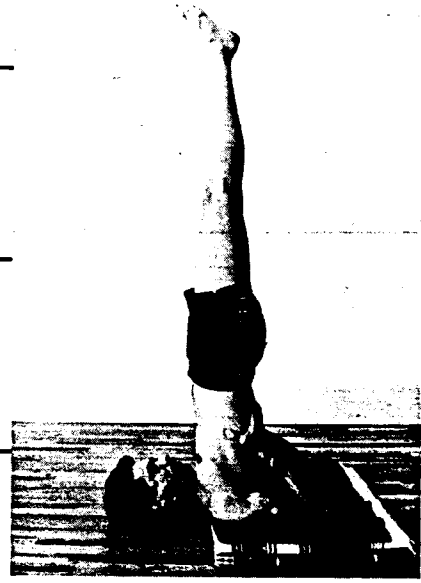

Figure 7. Incorrect Shoulderstand. Notice the collapse of the front of the body.

Figure 8. Correct Shoulderstand. The front of the body lengthens fully without collapsing the lower back.

FULL ACTIVE INVERSIONS

If there is a cardinal rule in the practice of Headstand and Shoulderstand, it is *to protect the neck*. It is absurd to risk injury to this delicate area of the body by doing sloppy poses — and it is incorrect practice, not the poses themselves, that brings yoga practitioners into the chiropractor's office, often giving inversions a bad reputation. Awareness of two key principles will allow you to practice safely: patience and precision. First of all, do not rush into the practice of a pose before the body is ready. This is especially true for Headstand. Everyone wants to stand on his/her head, since there is often a large degree of ego gratification involved. However, more and more yoga students are complaining of neck problems and most of these stem from incorrect Headstand and Shoulderstand practice. *It is dangerous to do the Headstand without the necessary strength and flexibility. When most of the body weight can be lifted off the neck, then it is reasonably safe.* Second, take the time to prepare the foundation of the pose before going up. The placement of the head, hands, arms, wrists and shoulders is of critical importance in protecting the neck from injury.

Gravity is an unrelenting force. We must steer it through the spinal column carefully. In the inverted poses the cervical vertebrae, the smallest and weakest of the spinal bones, are at the foundation level. If the head is placed off center or if the arms and shoulders are distorted and pressing unevenly, it is the neck that will suffer. In severe cases there will be an instant injury, but most of the time the damage will come slowly. Repeating the same misalignment continuously over long periods of time produces most yoga-related injuries. Every time you do Headstand, the symmetry must be checked, both before, during and after the pose. The body changes over time, and the adjustment that works one month may be an overcompensation the next month.

Several specific instructions common to both Sirsasana and Sarvangasana will also help protect the neck and spine. The first is to always move both legs together, going up and coming down. Beginners should keep the knees bent while more experienced students can work with straight legs. All movements should be done on an exhalation. *Do not hold the breath.* The leg muscles should be very active at all times, especially in the back, front and inner thighs, and should work with the same intensity required in standing poses. This strong action will lift much of the weight away from the neck. The thighs should roll in toward each other — do not let them rotate externally from the hip sockets. Remember not to tense the feet when trying to work the legs — a common mistake. The feet should be alive and intelligent, neither hard nor dull. Finally, move in and out of the poses carefully. The circulatory system cannot always adapt instantly to the changing demands of gravity.

The Shoulderstand, the first inverted pose one learns as a beginner to yoga, can be a very frustrating pose because the correct lift of the spine is difficult to learn. Yet the process of achieving this lift is an excellent preparation for the Headstand. Many teachers recommend that one be comfortable in a five-minute Sarvangasana before beginning to practice Headstand.

When first learning the Shoulderstand, start by lying flat with the legs up a wall for several minutes a day for a week or so (Figure 1). Then, as you start to practice the completed pose, hold the pose five seconds and add five seconds per day until one minute is reached. Remain at this level for about a month and then begin adding five seconds at a time until two minutes are reached. Continue in this way up to three, four and five minutes.

As previously emphasized, preparation for Shoulderstand is extremely important. Because the neck is vulnerable, a raised platform of firm blankets is used to lift the neck away from the floor. The edge of the shoulders comes to the edge of the blankets, the back of the head touches the floor and the neck retains its normal curve, arching between the head and shoulders (Figure 6). *The bones of the neck should not press into the floor.* Pushing the chin to the sternum will exaggerate this action and is to be avoided. As you place the shoulders on the mat, pull the upper trapezius muscle away from the neck by squeezing the shoulder blades together and pulling them toward the tailbone. The placement of the arms is equally important. The upper arms should be parallel to each other and the elbows should be shoulder-width apart. Because the shoulders are often tight, a belt or tie is recommended to hold the arms in the correct position. If holding the arms parallel is too painful, loosen the belt somewhat until a more comfortable position is found. Stretch the whole upper arms from the shoulders to the elbows, back away from the ears and neck, and press them firmly down into the floor. To come

Figure 9. Shoulderstand variation with folding chair. The chair is placed at the sacrum with assistance from a teacher.

Figure 10. Correct Headstand. Lift the tailbone and stretch the backs of the legs. Pull the lower ribs back into the body without tensing the abdominal region.

up, swing the knees to the forehead, support the back with the hands, stretch the knees up and then straighten the legs. The hands should not only support the back but also lift the spine upward. The cervical spine moves *off* of the floor as the outer shoulders rotate into the floor.

In the Shoulderstand, the center of the pelvis tends to fall backward and the legs tend to hang forward (Figure 7). The front of the body then shortens. To correct for this, move the center of the pelvis forward by moving the coccyx bone toward the pubic bone and lift straight up from this point. Move the shin bones back and stretch the front of the body. The toes should be directly over the cheeks (Figure 8). By learning to feel each vertebra lifting independently, the pose will come alive. A variation with chair is shown in Figure 9.

The practice of headstand can begin when some proficiency in the Shoulderstand is reached. Teachers should notice an improvement over time in the practice of the Downward Facing Dog Pose as a gauge of their students' readiness. Again, as in Shoulderstand, the foundation of Headstand must be firmly established before going up. The elbows should be placed directly under the shoulders, the fingers interlocked at a point equidistant from the two elbows. Do not let the stronger hand distort the symmetry of the forearms. The wrists should not roll out. The little finger side of the wrists should elongate and press into the floor. The fingers should be parallel to the floor. Beginners should press the base of the thumbs together as this gives a more secure support. More experienced students can move the wrists apart to form a semi-circle with the hands. Do not tense the fingers, but keep the forearms very active. Place the head in the center of the mat with the back of the head lightly touching the wrists. Be sure that the head is not tilted to one side. The ears should be equidistant from the floor and the eyes parallel to the horizon. The line connecting the fronts of the elbows should be parallel to a line through the ears.

To come up into Headstand, press the forearms into the floor, lift the shoulders up away from the ears, and stretch the spine upward. Come onto the toes, walk the feet toward the head without collapsing the shoulders, lean back slightly and lift the feet up from the floor. Beginners come up with bent legs, more advanced students with straight legs. Stretch the whole body toward the ceiling. *Do not let the weight fall to the back of the head.* This will flatten the cervical curve. If there is some concern about this, keep the weight slightly to the forehead side. The weight in all cases should not collapse onto the neck but should be lifted away (Figure 10). To learn this, practice lifting the head off the floor while in the Headstand position. An easier way to practice this lift is to do the Downward Facing Dog Pose with the arms in the Headstand position (Figure 11).

Beginners can work against the wall until confidence and balance are developed. Be as close as possible to the wall to minimize the arching back. The best spot to practice is at an inside corner — here, right and left deviations can be corrected. Do not hold the breath while in the pose. Begin timings at five seconds and increase slowly, just as in Shoulderstand.

The tendency in Headstand, in contrast to the Shoulderstand, is for the center of the pelvis to be pushed forward while the legs fall backward, collapsing the back of the body (Figure 13). To correct this, move the lower ribs back into the body, move the pubic bone back to meet the coccyx bone and lift straight up from this point. Move the shins forward and stretch the backs of the legs up through the heels without flattening the feet. Find the balance on the bones and shoot the energy up to the ceiling.

Teachers should watch the face, neck and eyes of their students for signs of tension. There should be no strain in any of these areas.

Recently, some members of the medical profession have criticized certain yoga asanas, especially the Headstand and Shoulderstand. They feel that these positions damage the neck and should be avoided. Their point is valid if, and only if, these poses are done carelessly. *When practiced correctly, there is no strain on the neck because most of one's weight lifts away from its delicate structures.* If patience and precision are maintained, the results will all be positive. But the only way to ensure the safe practice of these asanas is to study with a qualified teacher who understands the correct action of the pose from direct experience. If this is impossible, use a mirror to check your alignment. Bad habits are easy to acquire and difficult to break. Show respect for the poses, understand the needs and requirements of the body, and your practice will be safe and joyous. ●

Figure 11. A Headstand preparation. In this variation of the Downward Facing Dog Pose, open the armpits and press the forearms, from the wrists to the elbows, into the floor.

Figure 12. Incorrect Headstand. Notice the collapsed lower back and the protruding lower ribs.

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