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REHABILITATION AND CORE STABILITY

Pilates and the "powerhouse"—II

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Abstract Part one of this article described the key principles of the Pilates Method of body conditioning and then went on to investigate in detail the principle of centering. Further, the concept of the powerhouse was presented and described and the major effects of Pilates exercises upon the powerhouse were analysed. The sum total of these effects is to create what may be termed the *Pilates Powerhouse Posture*. Part two relates the concept of having a strong powerhouse to the concept of core-stabilization and describes some of the benefits of core-stabilization. While many Pilates exercise may not seem to be directed toward affecting the powerhouse, the powerhouse is always foremost in the mind of the Pilates instructor when the client is performing each and every Pilates activity. A number of Pilates exercises are shown and the focus upon the powerhouse is described for each one. These exercises are divided into two categories: (1) those exercises whose sole purpose is to attain and create the Pilates Powerhouse Posture by directly addressing and working the muscles of the powerhouse, and (2) those exercises that may seem to be focusing on another part of the body where motion is being directed to occur, but meanwhile the underlying focus and intent is directed just as much, if not more so, toward the stabilizing contractions of the muscles of the powerhouse.

The powerhouse and core-stabilization

The powerhouse is the core of the body. Therefore, having a strong powerhouse creates a stabilized core from which muscles can contract. Most muscles of the body can be said to have a proximal attachment and a distal attachment; often these proximal attachments are onto the spine. The essence of the muscular system is that when a muscle contracts, it creates a pulling force upon both of its attachments that is directed toward its center. Even though either attachment may move, in most instances, movement of the distal attachment is desired. For the distal attachment to move efficiently and with maximal strength, the proximal attachment must be fixed or stabilized. This is the essence of core-stabilization: strengthen the core of the body so that the proximal attachment is well stabilized; as a result, the distal attachment can move strongly and efficiently. When the core of the body is weak and not well stabilized, not only will the strength of the movement of the distal body part be diluted, but damage will tend to occur proximally as well (Chaitow and DeLany, 2002). This is due to the fact that when the core is less stable, the pulling force of the contracting muscle will generate greater movement at the proximal

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attachment. In the case of the spine, these repeated movements over time create a wear and tear that can lead to increased stress upon the joints and concomitant degeneration of the spinal joints.

A strong and healthy powerhouse improves the body's health in another manner. The greater the curves of the spine become, the less efficient the spine becomes at bearing the weight of the body through it. Further, as the curves of the spine increase, the apexes of the curves become weaker points in the chain of vertebrae; greater stress is borne upon them and degeneration occurs more rapidly. The effect of lengthening the spine decreases the degree of spinal curves and counters this tendency toward early degeneration.

The Pilates method of attaining the Pilates Powerhouse Posture

Pilates exercises have one factor in common; they all strengthen the powerhouse because all Pilates exercises constantly work the powerhouse (Siler, 2000). Indeed, every Pilates exercise that is done, even the exercises that seem to have nothing to do with the powerhouse of the body, are done with a focus and intent on working the powerhouse. Brooke Siler calls this "Integrated Isolation" and explains this concept as follows: "It is commonly thought that the areas of the body that are in motion during an exercise are the areas in which the mind should be focused; this is known as 'isolating' a particular group of muscles. The problem with this ideology is that it ignores the other areas of the body that are not in motion…it is most effective to think of focusing on stabilizing, or anchoring, the area of the body that is not in motion" (Siler, 2000, p. 21). This area that is not in motion that the Pilates method focuses upon is the powerhouse. This concept is very important if one is to understand and appreciate what is happening during a Pilates workout. For example, it is too simple to view a Pilates exercise that is being done in which the arms are the only body parts moving and believe that the only reason for doing this exercise is to strengthen the arms (see Fig. 1).

This misjudgement of the underlying purpose of this exercise is easy to make because the average lay person, as well as a number of professionals in the health and fitness field, have become inculcated by the fitness world's focus on "isolating" certain muscles and/or muscle groups that are moving during an exercise. The result is that focus has been lost on the other muscles that are working as stabilizers, the Pilates Powerhouse Muscles. It is these key muscles at the core of the body that ultimately prove to be the key to health and stability.

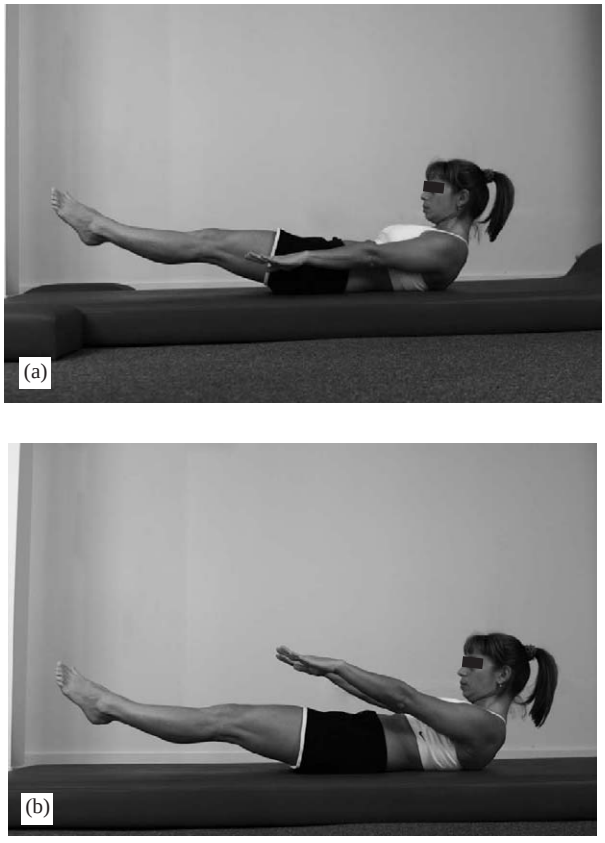

Figure 1 *The Hundred*: (a) demonstrates the starting position of The Hundred; (b) illustrates the upward movement of the arms that is done during The Hundred. *The Hundred* is an indirect Pilates Mat exercise for the powerhouse. In *The Hundred*, the client moves her arms up and down sequentially (between the position seen in (b) and the position seen in (a). These movements of flexion and extension of the arms at the shoulder joints are done while maintaining a static posture of neck flexion at the spinal joints and thigh flexion at the hip joints. These arm movements are repeated 100 times, hence the name. This is a Pilates mat exercise that is usually done at the beginning of a workout. While the intent seems to be to concentrically and eccentrically work the sagittal plane muscles of the arm at the shoulder joint (along with isometrically working the anterior neck and hip joint muscles, as well as being a cardiovascular warm-up); strict attention is always being paid to isometrically maintain the Pilates powerhouse posture. Toward this end, the focus is on isometrically engaging the abdominals, pressing the navel to the spine and lengthening up in a cephalad direction. This exercise may also be done using apparatus, and there are alternate versions of the hundred that are easier to perform.

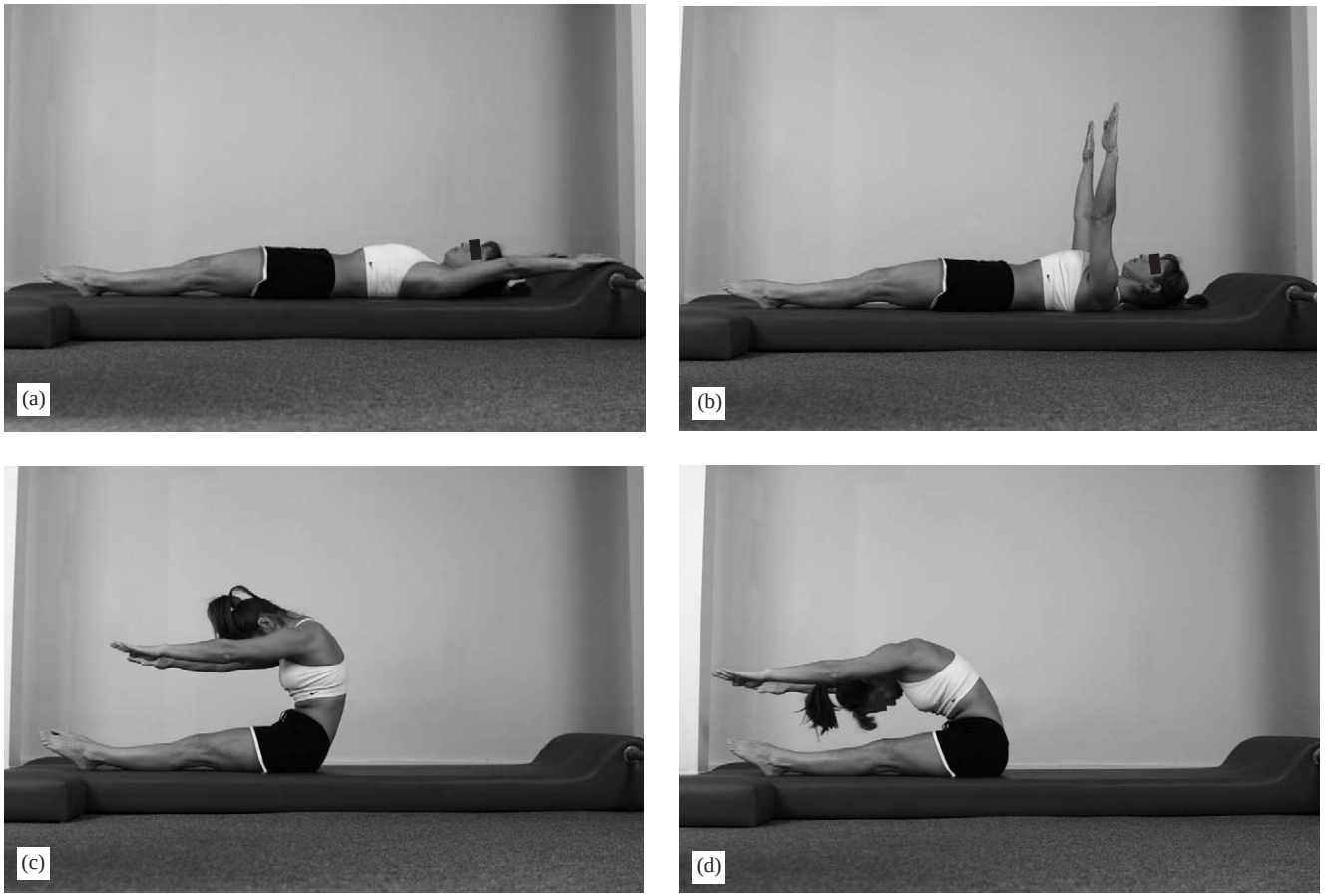

Figure 2 *The Roll Up*: (a) demonstrates the starting position of The Roll Up; (b) shows the next step in which the arms are brought to a vertical position; (c) and (d) illustrate the roll up itself. The second phase of the exercise would be to return to the starting position. The *Roll Up* is a direct Pilates Mat exercise for the powerhouse. In the first phase of The Roll Up, the client concentrically contracts her abdominal muscles to bring her upper body over her lower extremities; this action is flexion of the trunk at the spinal joints (anterior tilt of the pelvis at the hip joints is also occurring). In the second phase of the exercise, the client eccentrically contracts her abdominal muscles to carefully control her descent back to the mat; this action is extension of the trunk at the spinal joints. This exercise is similar in nature to the traditional sit-up/curl-up. However, beyond the simple objective of bringing the upper body toward the lower extremities, the client focuses on maintaining the Pilates powerhouse posture of keeping the navel to the spine. On the way back down, the client is careful to lower her body back to the mat "one vertebra at a time". Additionally, keeping the arms parallel and the head straight is necessary as part of the precise control of this exercise.

Figure 3 *Flat Back on the Short Box* Series: (a) demonstrates the starting position of The Flat Back exercise; (b) and (c) demonstrate the trunk being brought in a posterior direction with a straight (flat) back. The second phase of the exercise would be to return to the starting position. The *Flat Back on the Short Box* is a direct Pilates Apparatus exercise for the powerhouse. It is done on the apparatus called the Reformer. The actual movement is at the hip joints. During the first phase on the way down, the client posteriorly tilts her pelvis at the hip joint (working her hip flexors eccentrically); during the second phase on the way up she anteriorly tilts her pelvis at the hip joint (working her hip flexors concentrically). Just as in old-fashioned straight-leg sit-ups, the anterior abdominals must isometrically contract to hold her trunk straight (since gravity would otherwise collapse her trunk into extension). This is another direct powerhouse exercise. However, above and beyond the effort expended by the anterior abdominals to keep the trunk straight, the focus is on maintaining the powerhouse posture of navel to the spine and up. Indeed, a critical aspect of this exercise is to constantly be reaching up to the ceiling, lengthening the spine as the movement occurs.

Figure 4 *Swan Dive*: (a) demonstrates the starting and ending position of The Swan Dive; (b) shows the first step in which the back is arched posteriorly with the knees bent; (c) then illustrates the second step in which the body is completely straightened out. The *Swan Dive* is a direct Pilates Apparatus exercise for the powerhouse. It is done on an apparatus called the Ladder Barrel. The main movement occurring here is extension and then flexion of the trunk at the spinal joints. Therefore, the client must work spinal extensor muscles concentrically to arch her back (step 1), and then work the spinal extensor muscles eccentrically to control her descent to the straight position (step 2) and then to control her return to the starting position. Doing this directly works the powerhouse by strengthening the posterior abdominal muscles. Further, movements of the upper and lower extremities are also occurring which increase the difficulty of this exercise. The entire exercise must be done in a smooth, precise and controlled manner; the powerhouse posture must be maintained with the focus on lengthening the spine up toward the ceiling.

Figure 5 *Teaser 1*: (a) demonstrates the first part of The Teaser in which the thighs are raised; (b) illustrates the second part in which the trunk is flexed upward with the upper extremities brought to a position parallel to the lower extremities. The second phase of the exercise would be to return to the starting position. The *Teaser 1* is a direct Pilates Mat exercise for the powerhouse. The client begins flat on her back and then flexes her thighs at the hip joints to a 45-degree angle. She then rolls up to a "V" position, with her hands reaching toward her toes, all the time keeping the navel to the spine and lengthening upwards. She then returns to the mat, controlling her descent. To accomplish this exercise, concentric and then eccentric contraction of her anterior abdominal musculature is clearly required. The added difficulty is to create these movements with the lower extremities held at 45 degrees of flexion and the upper extremities held straight and perfectly parallel to the lower extremities. Of course, the powerhouse posture of navel to the spine and lengthening upwards along with accomplishment of this exercise in a smooth, precise and

Figure 6 *Footwork*: (a) demonstrates the starting position of The Footwork Exercise; (b) illustrates the extended position attained by pushing against the bar with one's feet. The second phase of the exercise would be to return to the starting position. The *Footwork* exercise is an indirect Pilates Apparatus exercise for the powerhouse. It is done on an apparatus called the Reformer. In the initial phase of the exercise, the client pushes her feet against a bar. The force that she creates pushes her body away from the bar. This movement occurs against the resistance of springs that are attached to the board that her body is lying on. In the second phase of the exercise, she then returns to the initial starting position in a controlled manner (resisting the force of the springs to pull her back to the starting position). This exercise requires concentric contraction of knee and hip joint extensors for the initial phase and then eccentric contraction of the same muscles for the second 'return' phase of the exercise. Again, the apparent purpose of this exercise seems to be to strengthen extensors of the hip and knee joint. However, constant attention is being