

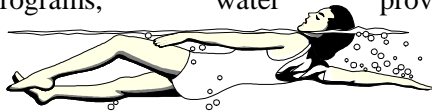
# PHYSICAL THERAPY

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## THE VERSATILITY OF AQUATIC PHYSICAL THERAPY

When it comes to total rehabilitation, water is a valuable tool used by physical therapists to maximize function in their patients. Aquatic physical therapy is an active procedure that allows individuals to regain strength, flexibility, power, balance, posture and cardiovascular endurance when movement on land, under the effects of gravity, is limited secondary to pain or deconditioning. Water-based procedures are incorporated into an overall treatment strategy that includes traditional land-based procedures and patient education.

Many pre- and postoperative orthopedic conditions can be effectively managed in shallow water. In the rehabilitation of shoulder, knees and hips the advantages of using water stem from its buoyancy. Buoyancy allows the limb to be supported, assisted, or resisted. Support occurs at the surface of the water. Assistance occurs as the limb moves toward the surface of the water. Resistance occurs as the limb moves away from the surface of the water. Unlike the types of resistance used in land-based strength training programs, water provides a



uniform load that spreads out over the entire length of a limb. This property alone may be soothing to a painful joint. As the limb moves through the viscosity of water, resistance increases in proportion to the speed at which the limb moves. Resistance can be further increased by augmenting the surface area at the most distal level of the limb, i.e. hand or foot.

Dynamic open and closed-kinetic chain patterns of movement are possible in shallow water, with the primary advantages being that water slows motion and allows for progressive weight-bearing. Slowed motion allows the body to react appropriately to quick starting, stopping and changing directions. Progressively lowering the depth of water prepares an individual for transition back to land. At the level of C7 (the base of the neck) the percentage of weight-bearing is approximately 8%, at the level of the Xiphisternum (the lowest level of the breast bone) the percentage of weight-bearing is approximately 30%, at the level of the ASIS (the hips) the percentage of weight-bearing is approximately 50%. The transition through these weight-bearing levels is observable and measurable, making reimbursement from insurance companies a likely possibility.

In deep water, where the effects of gravity are eliminated, individuals with low back pain (LBP) may benefit the most. Spinal unloading is believed to occur in deep water. Without shear and compressive forces acting down on the spine, pain-free movement is possible increasing the likelihood that individual will maintain a satisfactory level of physical conditioning, improve posture and gain a sense of accomplishment.

Another advantage to deep water exercise is that posture and stability are achieved through the activation of the trunk musculature. Posture and stability are developed through a system driven by feedback received by the brain about the body's position in relation to its environment. While standing on land, the

brain receives feedback generated from the pressure exerted on the soles of the feet. In response to the feedback it receives, the brain signals muscles that cross the ankles, knees and hips to contract in order to maintain a standing position. This type of feedback system is referred to as proprioception, or position sense. An injury to any part of the lower extremity can interrupt proprioception and affect the normal pattern of muscle contraction required to stand upright. Thus, in the case of a lower extremity injury, proprioception training is a critical component of the physical therapy protocol. Training for proprioception involves challenging the body to maintain the posture, or stance it has the most difficulty with. In deep water, where there is no foot-to-ground contact, or ground reaction force, posture and stability is believed to occur through contractions in the trunk musculature. In a situation where proprioception in the trunk musculature is altered, as in the case of a spinal injury,

deep water exercise would address this problem.

Try this simple deep water test the next time you're in the pool: While wearing a floatation device around the waist, float vertically with your legs together and arms crossed over the chest. Make sure to keep your buttocks under your hips. You will discover that upright posture is finely or crudely tuned; depending on how untrained your muscles are, through quick, random contractions in the abdominal, back and gluteal muscles. Developing postural muscles through deep water exercise may lead to an increased awareness of the body sense and help to improve lumbar stabilization.

With most orthopedic problems, an aggressive early intervention progression can take place in water. Check with your physician before beginning any exercise program.