

## LUMBAR STABILIZATION USING UCT AND PNF

David Ogden, PT

### LUMBAR STABILIZATION USING UCT AND PNF-David Ogden, P.T.

A common characteristic that presents with clients who have chronic lower back pain and/or debilitation is loss of reliable awareness/control of the trunk musculature combined with a functional imbalance favoring one side. The latter can be observed when the client consistently shifts the weight over one leg during static standing or favors one leg when ascending/descending steps. Such clients are usually unaware of how to maintain lumbar stabilization while performing functional movements with the arms and legs.

An example of this is the client moving from sitting to standing and complaining of onset or increased low back pain doing so. Often this is an indicator of poor trunk control, i.e., the abdominal musculature is not successfully countering the back extensor musculature during performance to prevent the spine moving into excessive extension with resultant pain increase/onset. Also contributing to lumbar instability is over reliance on one of the lower extremities during functional performance.

Inadequate lumbar stabilization can also be observed is when the client is asked to extend a leg at the hip. Poor awareness of and control of the trunk musculature/lumbar spine will result in client demonstration of increased extension of the lumbar spine and/or the trunk angled forward with resultant pain onset/increase as the leg moves backward.

Still another instance is the client demonstrating increased extension of the lower back while raising the arms forward and toward the ceiling. Lack of lumbar stabilization is usually evident as the arms pass shoulder level on their way up and the lower spine increases in extension.

The following is a simple technique the aquatic practitioner can employ to facilitate client awareness and control of the lumbar spine and requisite trunk musculature during leg extension at the hip. The client stands in mid to upper chest deep water and sideways to the pool wall with the near hand on the deck/underwater railing, the outermost hand holding a flotation device such as a dumbbell. The aquatic practitioner is positioned sideways to the client. One hand is placed lightly on the client's abdomen just below the naval. The other hand is over the sacrum. (*Note: The client is advised in advance about the hand placement and why before the aquatic practitioner does so to avoid any misunderstanding. Verbal consent from the client is appropriate*).

The purpose of this hand placement is to give the client tactile feedback of what is taking place (or not taking place) in the trunk/lower back when the outermost leg is extended back and behind. If there is a lack of control compromising lumbar stabilization, the pressure of the aquatic practitioner's hand over the sacrum will increase from the back extending and pushing the pelvis/sacrum backward in the process. This feeling of increased pressure from the aquatic practitioner's hand on the sacrum cues the client he/she has lost control, i.e., insufficient countering the abdominals to contracting back extensors is not occurring and allowing lumbar instability.

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During performance, the aquatic practitioner also notes and cues the client if they're compensating for stance leg weakness by leaning the trunk toward the pool wall and/or twisting the pelvis. These compensatory strategies are, for the most part, done without the client realizing they're occurring. If the client is not aware of what they're doing (or not doing), improved control and resulting positive change cannot be achieved.

Once the client has mastered controlling the lumbar spine during lower extremity flexion and extension, their program can be progressed to performing PNF diagonals with the outermost leg. Emphasis of a gross PNF pattern is done at first: D1-forward and to the opposite side and back and behind to the same side; D2-starting from behind and on the opposite side, forward and to the same side and then back and behind to the opposite side.

With increasing client competency, fine-tuning of the PNF pattern can be undertaken. Use of ankle weights is helpful maintaining foot placement of the stance leg on the pool bottom during performance and increasing the workload on the performing leg. As the client continues to progress, elastic tubing can be placed around the outermost performing leg's lower thigh and varying vectors and intensities of force applied during performance to increase the challenge and further enhance client awareness and control of the lumbar spine/trunk musculature during performance.

When the client is performing PNF diagonals with the outermost leg, the stance leg will also be working isometrically with varying gradations of emphasis to maintain trunk positioning.

With the client demonstrating increasing competency, the aquatic practitioner can use one hand to apply varying vectors and degrees of force to the client's outermost arm as it is maintained in position extended down by and slightly away from the side, or with the elbow bent. This can be done simultaneously with resistance to using elastic tubing applied to the client's outermost leg's thigh during its movement.

Including the unpredictable command technique (UCT) as the aquatic practitioner changes/varies forces applied to the outermost leg's movement also facilitates improved client somatic awareness and control in the trunk and lower extremities.

Another example of changing vectors and degrees of force unpredictably to client performance is the use of elastic tubing held by the client at arms length and shoulder width apart, the arms positioned slightly lower than the shoulder. The client holds the middle portion of the tubing. The aquatic practitioner faces the client and grasps the ends of the tubing, one in each hand. Applying tension to the tubing, the aquatic practitioner directs the client to maintain arm position in front, shoulder width apart and slightly below shoulder level as the direction of pull on the elastic is gently and slowly changed. The aquatic practitioner can pull up and forward, down and forward, push back, pull forward, or to one side or the other, diagonally up or down, pull more on one side than the other, etc. The goal is to challenge the client to maintain their arm position. At the same time the client's arms are serving as levers to facilitate trunk muscular contractions

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that vary as the vector and degree of force being applied is changed. This is challenging for the client and hones their awareness of and control of the trunk musculature to maintain lumbar stabilization as the vector and degree of force change unpredictably. The force applied to the tubing should not be so great that the client cannot maintain arm positioning or causes pain. Forces applied by the aquatic practitioner using the elastic tubing are not necessarily the same for both client arms, i.e., one arm might be subjected to a force trying to pull it out to the side while the other is resisting a force trying to pull it up; also, the degree of force applied to one arm might be less or more than the force applied to the counterpart arm. Both vector of pull and degree of force are continuously and unpredictably changing.

As the client resists the varying vectors and degrees of force applied to the elastic tubing, the next step for the aquatic practitioner is to give unpredictable verbal commands for performing activities such as: sidestepping, forward and backward walking, diagonal walking, standing/partial squatting, forward lunges, and side to side lunges. As the walking activities are performed with the client resisting successfully forces applied to the elastic tubing, the aquatic practitioner can also perform performance with the client's eyes closed and/or turning the head in different directions.

Application of these simple techniques accomplishes several things:

- a) increased client awareness and control throughout the trunk and lower extremities;
- b) graded strengthening activities for improved functionally balanced and safer dynamic/static standing balance;
- c) decreased pain/fatigue onset/increase during ADL performance.

The therapeutic goal is to increase lumbar stabilization during functional performance by integrating the techniques of proprioception (PNF), random commands and forces (UCT) and the stimulating the tactile system in order to facilitate:

- a) proprioceptive awareness;
- b) activate the central nervous system to take the information of the body position with the use of touch (hand placement). This facilitates more body awareness. (Note: the proprioceptive system and the tactile system working together are referred to as somatosensory processing);
- c) PNF, UCT work synergistically with the tactile system by facilitating increasing body awareness, motor control and motor planning, grading of movement, postural stability, and emotional security;
- d) use of the UCT technique improves lumbar stabilization for better and safer ADL performance by enhancing static and dynamic standing balance.

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### Definitions: PNF, UCT and Tactile System

The proprioceptive neuromuscular system provides information on motion or positions that arise as a result of movement. It tells us where we are in space, our body position, the timing of our movements, how much force our muscles are exerting and how much they are being stretched.

The Unpredictable Command Technique (UCT) uses familiar and unfamiliar movements in random patterns to improve somatic awareness, voluntary movement, balance, coordination, agility and reaction time. Rather than using only one motor skill at a time, UCT uses multiple movements simultaneously. Rather than repeating a movement a set number of times in a consistent sequence, UCT uses a random sequence and unpredictable repetitions.

The tactile system is the discriminative system what is stimulated by touch. As the individual matures neurologically, the discriminative system emerges. The tactile system takes information to the central nervous system and provides the individual with awareness of touch and their physical relationship to the environment.

*The PNF and UCT educational materials by David Ogden and Terri Mitchell are available at <https://squareup.com/store/ruth-sova>. There are discounted UCT and PNF package prices October 15 – 30.*