

STABILIZATION SENSIBILITY

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Introduction

We all appreciate the crucial role the abdominals, back and stabilizers play. Let's review the anatomy, and look at additional effective ways to target this important area in an aquatic exercise class.

Abdominal Muscles

When referring to the abdominal muscles, the rectus abdominis, the transversus abdominis, the external obliques, and the internal obliques are the focus muscles.

The **rectus abdominis** is the most superficial of the four muscles. It forward and laterally flexes the spine. Examples of some exercises that activate this muscle to varying degrees during an aquatic exercise session are: abdominal curls, pelvic curls, double knee tuck crunches, rock n' rolls, and curl downs.

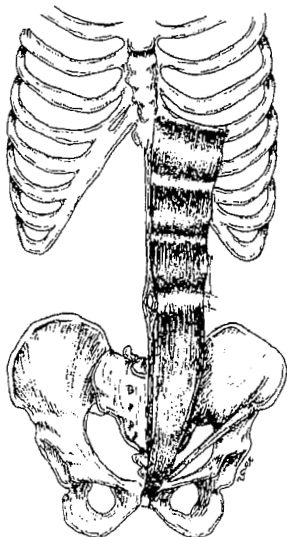
The **transverse abdominis** is the deepest of the four muscles. Forced expiration pulls the abdominal wall inward, and activates this muscle. Examples of some exercises that activate this muscle during an aquatic exercise session are: standing, water walking, drawing contents of the torso to the spine, and most abdominal exercises that focus on breathing.

Strengthening the obliques is important because they create a supportive 'corset' or 'girdle of strength'

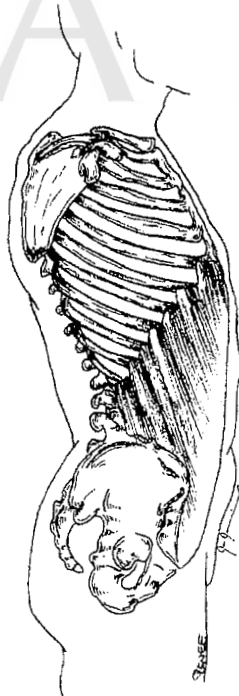
The **external obliques** are located on the left and right sides of the abdomen. The external obliques flex the trunk, right side to left side, and left side to right side. Examples of some exercises that activate the external obliques during an aquatic exercise session are: anything that involves twisting, lunges, cross water pulls, cross kicks, ski bounces, pendulums and lateral rock n' rolls.

The **internal obliques** are located on the lateral side of the abdomen, underneath the external obliques. The action of this muscle is to flex the trunk, right side to right side and left side to left side. Examples of some exercises that activate this muscle during an aquatic exercise session are: lateral reaches, lateral push downs, karate kicks and lateral scoops.

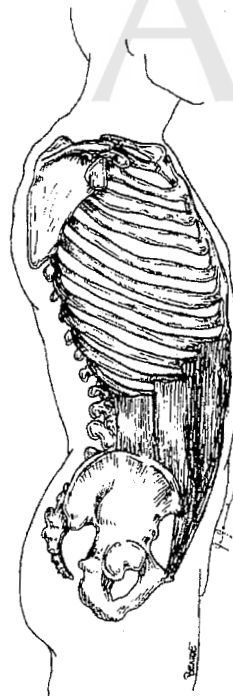
Rectus
Abdominis



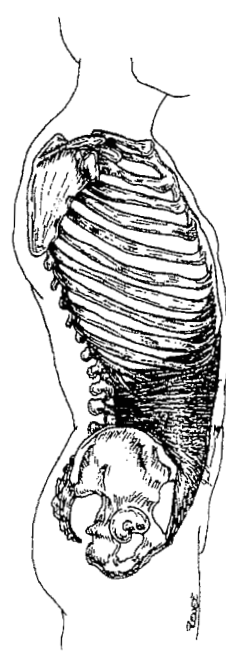
External
Obliques



Internal
Obliques



Transversus
Abdominis



Abdominal Strengthening - Key Points

1. Include more abdominal compression exercises. These exercises are important because compression is used in standing, sitting, and while lifting to help stabilize the lower back.
2. Emphasize oblique work in aquatic exercise sessions, this includes lateral bending and twisting. Too much emphasis is placed on working the rectus abdominis in classes in general. It is important to remember that the rectus abdominis tends to be a very overworked muscle, as it already gets a lot of work during daily activities.
3. Remind participants to maintain good posture throughout all exercise sessions.
4. Engage the pelvic tilt position and when finished an abdominal exercise, return to a natural lower back curve to be used with other activities. This isometric contraction aids trunk stability greatly as buoyancy is always trying to offset this position. The pelvic tilt also aids the correct concentric contraction, and will make it more difficult for clients to perform hip flexion.
5. Focus on 'breath', exhale on the effort or curling action.

Pelvic Floor Muscles

Even though the pelvic floor is not part of the abdominal muscle region, it is a very important area, which recently has received a lot of research focus. Researchers estimate that 8% of adults, including between 10% and 30% of women, aged 15 to 64 years of age, suffer from incontinence. Women are mainly affected by incontinence, but incontinence can affect older men.

The pelvic floor is a thin band of muscle that runs in a horizontal plane from the edge of the spine, underneath the bladder, womb and bowel. It is a like a trampoline, 'bounced upon' by everything above it. The pelvic floor can lose its elasticity and is prone to collapse.

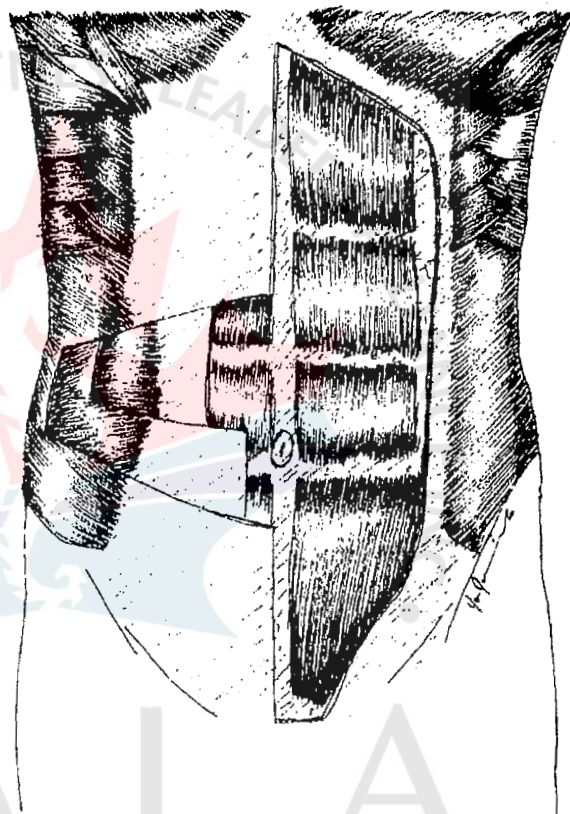
Pelvic floor muscles can be damaged by heavy lifting, high impact activities, being overweight, pregnancy, "holding on" (not going to the toilet often enough), chronic coughing and strenuous abdominal exercises.

A recent study, by Norwegian researchers, concluded that pelvic floor exercises are the best treatment for incontinence. Specialists acknowledge that any muscle you exercise regularly is going to be stronger than one you do not exercise. When performing a pelvic floor contraction in class, cue participants to contract the gluteal muscles at the same time. This seems to help some participants

perform the muscle action more effectively. Remember the *internal elevator*. Visualize the pelvic floor area as the entrance to an elevator, then visualize the elevator car going up inside the body, as the muscles are activated. This also helps clients get in touch with the muscles in this area, and increases the strength of the contraction.

A useful tip for any client that suffers from incontinence is to remind them to tighten their pelvic floor muscles before lifting anything, and if possible before coughing, sneezing or laughing.

Abdominal Muscles



Spinal Column Muscles

There is a significant difference between the thoracic and the lumbar spine. The thoracic spine is primarily involved with the scapular area. The lumbar region relates to everything from L1 (the first lumbar vertebrae) and down the spine. A well-balanced exercise program can help clients build strength and stability in this area. When discussing the back and torso in this article, the area of focus is primarily the lumbar spine/lower back region.

A few large muscles and numerous smaller muscles are found in the lower back area. The largest muscle is the *erector spinae* (sacrospinalis), which extends on each side of the spinal column from the pelvic region to the cranium (skull).

continued on page 6

- The erector spinae is divided into three muscles: spinalis, longissimus and iliocostalis.
- From the medial to the lateral side it has attachments in the lumbar, thoracic and cervical regions. Therefore, it is said that the erector spinae is made up of nine major muscles.
- The action of the erector spinae is to extend the spine and incline the head backward. It also laterally flexes the spine, assisting the abdominals.
- Back extension and pelvic tilts also activate the erector spinae muscle.

The *quadratus lumborum* is another important muscle.

- It extends between the inner lip of the iliac crest and the upper two lumbar (L1 and L2) vertebrae.
- The action is lateral flexion, but importantly it stabilizes the pelvis and lumbar spine.
- Trunk twisting and lateral flexion activate this muscle.

There are numerous other small muscles found in the spinal column region. Many of them have their origin on one vertebra and insertion on the next vertebra. These are important muscles, but the knowledge of these muscles is of limited value to most individuals.

So why is it important to strengthen the back and abdominal muscles if I am not going to lose my belly?

Back problems are a huge Australian, American and Canadian problem. It is estimated that 80% to 85% of the population, (approximately eight out of ten people), will experience lower back pain at some time during their lives. Of these, 30% of back injuries happen to those under 30 years of age. It has been identified in Australia and America, that back pain is actually the most frequent cause of limited activity in those under 45 years of age.

There is a direct correlation between back health and abdominal fitness. Strong rectus abdominis muscles counteract short or tight hip flexors, which may be responsible for an exaggerated anterior pelvic tilt (excessive arch of the back or lordosis). Strong oblique muscles reinforce the erector spinae fascia, and pull it laterally resulting in less strain on the back extensor muscles and spinous ligaments.

What is trunk stabilization and why is it important?

Trunk stabilization is all about ensuring muscle balance, trunk stability and strength. The torso muscles work as a team to control movement within the torso, and give more power for other activities.

These activities include sitting up in bed, sitting in a chair, swimming, playing tennis, lifting or chasing a dog (activities of daily living, 'ADL').

Strengthening the rectus abdominis and the back extensors will reinforce correct posture. This is achieved by reduced stress on ligaments, intervertebral discs, and joint structures. Also space is provided inside the torso for the internal movements required for breathing, digestion, and organ function. Strengthening the obliques is important because they create a supportive 'corset' or 'girdle of strength'.

How do I achieve trunk stabilization?

Trunk stabilization can be achieved by addressing four components in an aquatic exercise session including:

1. Strength

- Address trunk extensor, flexor and lateral structures, as well as the pelvic floor.
- Cue correct posture at all time.
- Include isometric exercises and compound exercises. Determine when, how and where to include these exercises. Consider speed of motion, which and how much equipment is appropriate, water depth, body position, buoyancy and what exercises are appropriate for the attending population group.

2. Stretching

- Keep the lumbar region both strong and flexible to encourage lumbar stabilization. Muscle length tension is one of the keys of muscle balance.
- Include stretches for the hamstrings, abdominals and lower back.
- Use buoyancy to aid stretching – for example put a flotation belt under the thigh when performing a standing hamstring stretch.

3. Alignment and Posture

- Adapt the stretch according to the needs of the attending group. Due to the magical properties of water (turbulence, viscosity and buoyancy), alignment and posture can be difficult to maintain with dynamic exercises. This may be an advantage for stronger, more advanced groups or difficult for weaker, more inexperienced groups.

4. Aerobic Conditioning

- Research regards aerobic exercise as being very beneficial for trunk stabilization.

- Focus on the aerobic component of aquatic exercise to achieve improvements in cardiovascular and muscular endurance, strength and posture.

Torso Strengthening Key Points

Water walking and running is excellent for strengthening and stabilizing the abdominals and lower back. If the client stands up straight, the abdominal muscles work isometrically and co-contract with the back muscles. If the client leans forward, stress is put on the back muscles, and the abdominal muscles work minimally, if at all.

- STAND UP STRAIGHT
- AVOID LEANING FORWARD
- MAINTAIN NEUTRAL PELVIS

The double concentric contraction facilitated by the resistance of water allows the lower back to generally receive strengthening in the abdominal component of a class.

- MAINTAIN CORRECT POSTURE THROUGHOUT

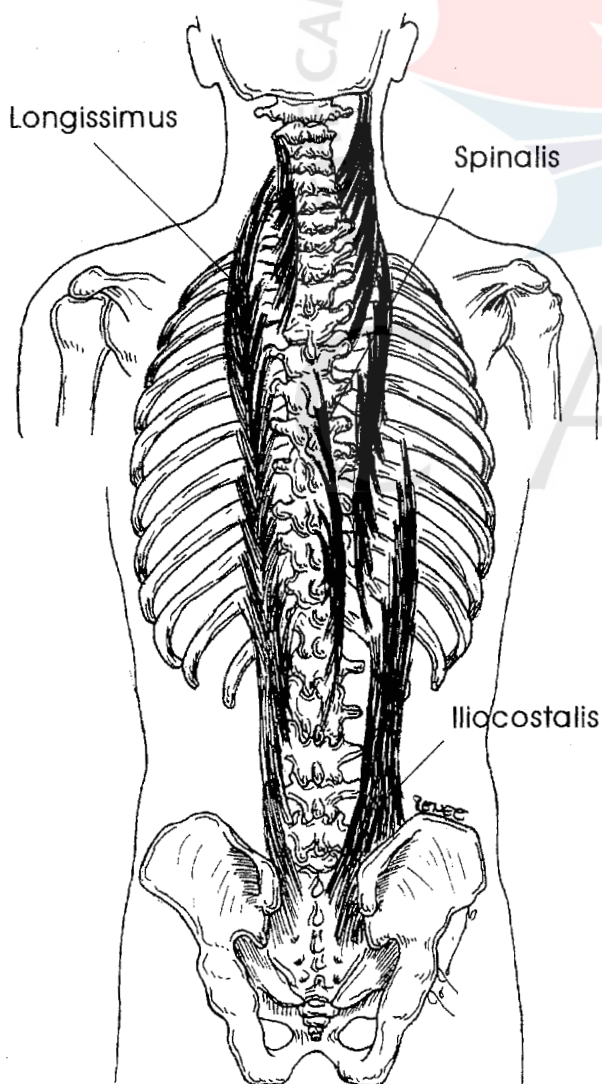
Hip Flexor Paradox

The hip flexors are the iliopsoas muscles, a group of muscles originating on the inner surface of the ilium, base of the sacrum and sides of the bodies of the last thoracic, and all the lumbar vertebrae. The action is to flex the hip and outwardly rotate the femur.

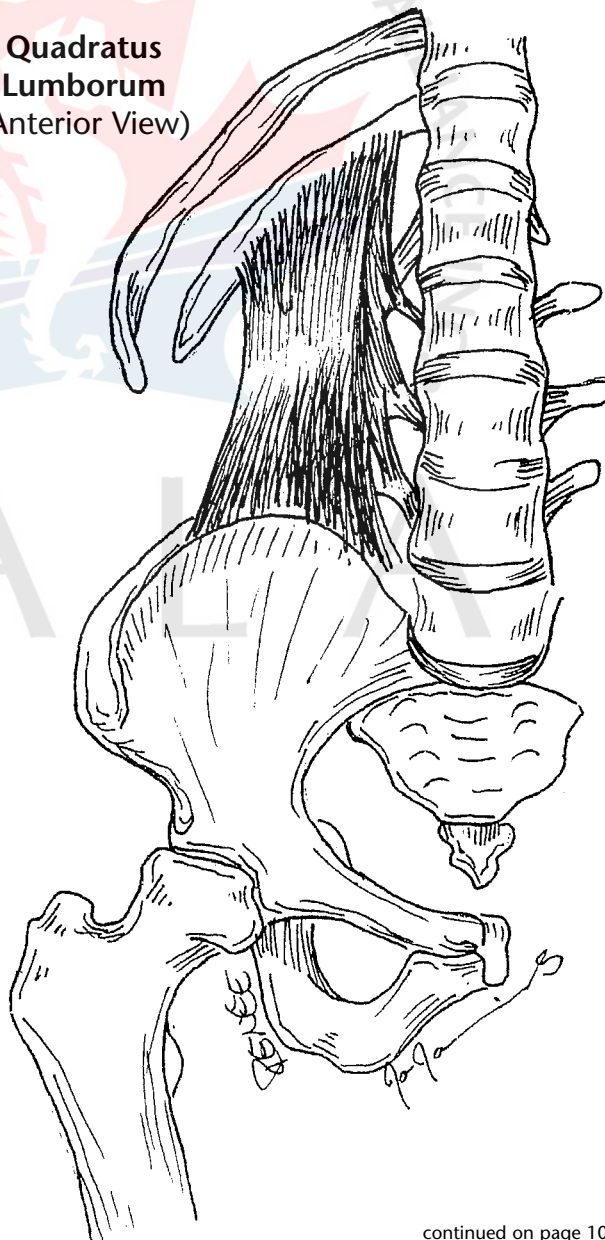
Be aware of what activates the hip flexors when performing abdominal exercises. If focusing on strengthening abdominals, place the hip flexors into a position that will limit activation. Here are some points that will decrease the hip flexor involvement when working the abdominal muscles.

- Avoid going beyond 35° to 40° of hip flexion.
- Avoid more than 20° to 30° of trunk flexion.
- Avoid more than 9° to 10° of a pelvic tilt.

**Spinal Extensors
(Erector Spinae)**



**Quadratus Lumborum
(Anterior View)**



continued on page 10

- Avoid including the legs in exercises designed to target the abdominal region. This is strengthening an already strong muscle, the iliopsoas.
- Too large a 'range of motion' when performing abdominal exercises increases hip flexion and pulls the sacrum forward, causing the pelvis to tilt excessively forward.

Examples of Standing Aquatic Exercises for Torso Strengthening and Stabilization

a) curling combination

- woggle/noodle placed on abdomen and cross arms to hold in place
- use the abdominals to push the woggle/noodle down, not the arms
- curl down x 1, curl up x 1 and combine x 2
- focus: rectus abdominis, erector spinae, pelvic floor (on curl up) and stabilization
- CALA alternative included without the use of a woggle/noodle - stand in chest deep water, stay anchored, place flat hands side by side in front of the abdomen, palms facing pool floor for maximum surface area – perform exercise as described above

b) oblique pushdown

- place woggle/noodle around the back
- lateral pushdown alternatively and/or lateral pushdown x 3, return to midline and repeat other side
- focus: internal obliques, quadratus lumborum and stabilization
- CALA alternative - stand in chest deep water, stay anchored, place flat hands side by side at the side of your waist, palms facing pool floor for maximum surface area – perform exercise as described above (or do CALA 'side kayak arms' with a focus on the push down phase of the movement)

c) oblique twist

- place woggle/noodle around the back
- oblique twist with deep squat, alternating singles
- introduce combination of single, single and double, repeating each side
- focus: external obliques, quadratus lumborum and stabilization
- CALA alternative - stand in chest deep water, place flat hands one on top of the other, in front of abdomen and pelvis, palms facing pool walls for maximum surface area – perform exercise as described above (CALA 'tai chi arms' with or without narrow swivel)

d) tumble weed


- place woggle/noodle around the back
- sit, kick both legs forward and stand up, pushing the woggle behind the body
- focus: transverse abdominis and stabilization
- CALA alternative - stand in chest deep water or deep water, using a flotation belt, perform a unison narrow quad kick/ narrow tuck combo, with arms doing a unison tricep kick back on the kick and a unison hammer hands on the tuck. Take your time, counts as follows:

- Count #1: narrow tuck with unison hammer hands
- Count #2: return to vertical position (standing)
And: get into sitting position
- Count #3: sitting unison narrow quad kick with unison tricep kickback arms
And: into tuck position
- Count #4: return to vertical position (standing)

Diagrams courtesy of J. Jasinskas from The CALA Basics About Aquafitness Leadership Training Manual.

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