

## Transversus Abdominis

### Thoughts about Transversus Abdominis

By Kari Niemi

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#### What does the research tell us? DID YOU KNOW THAT...

In 2007 and 2008 two RCTs were published by Tsao and Hodges that finally showed how we should try to retrain Transversus Abdominis (TrA) in people with back pain.

The first papers that showed that a timing delay in the feedforward properties of transversus abdominis was consistently linked to low back pain were published by Hodges in 1992-3. This timing delay is still the ONLY reliable and consistent pain related change measured in transversus abdominis. However, the first RCTs to show what sort of retraining is able to result in a measureable improvement in this timing delay were published in 2007-8. During the 15 years in between literally hundreds of different types of exercises were developed to train transversus abdominis ... and in 2008 about 70% of transversus abdominis exercise used worldwide become invalid for correcting the timing delay.

The RCTs demonstrated particular exercises became 'best practice' to train recovery of TrA.

- Cognitive
- Non-functional
- Unloaded (low force + trunk supported)
- Consistent (constant tension during relaxed breathing)
- Isometric (static – without moving)
- Low abdominal hollowing
- Using feedback to monitor for:
  - a fascial response from TrA activation without significant thickening of the other abdominal synergists (IO, EO, RA) and without movement of the pelvis or thoracic spine

Exercise that tries to activate TrA during movement and loading of the trunk, such as functional movements, low force core stability exercise and high force core strengthening exercise ... do not change the timing delay in the short term.

These exercises have many positive effects (e.g. train the oblique abdominals to control painful rotation or extension) but they do not recover the pain related impairment in transversus abdominis.

Therefore, the recommendations for 'best practice' for recovering the TrA impairment in low back pain is to perform the non-functional low abdominal hollowing exercise to activate TrA and produce a 'fascial corset' response. BUT, do not move, or do functional activities, or loaded exercise (e.g. weight training or Pilates) at the same time. Hold the TrA exercise consistently during relaxed breathing for 2 minutes (e.g. 10 seconds x 10 repetitions) 2-3 times a day. Train in different functional static postures, with the trunk supported.

*It is good to see that good research evidence is still updating and improving best practice.*

References:

Tsao H, Hodges PW 2008. Persistence of improvements in postural strategies following motor control training in people with recurrent low back pain. J Electromyogr Kinesiol, Aug;18(4):559-6

Tsao H, Hodges PW 2007. Immediate changes in feedforward postural adjustments following voluntary motor training. Exp Brain Res, Aug;181(4):537-46

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Transversus Abdominis (TrA) is a well-known muscle for every physiotherapist. I think there is still some unclear understanding or misinterpretation regarding Transversus Abdominis. Below there are some issues about normal function of Transversus Abdominis and what happens to its function with pain. Also there are ideas about how we can retrain and recover Transversus Abdominis function.

- ◆ Transversus Abdominis controls excessive intersegmental displacement (translation) in all postures and movements
- ◆ Transversus Abdominis activates prior to the initiation of all movements (feedforward)
- ◆ Patients with low back pain have TrA timing delay (feedforward failure)
- ◆ This timing delay is only present at the initiation of a functional movement or change in posture
- ◆ This timing delay at the initiation of movement is the only consistent measured impairment in TrA related to back pain
- ◆ Transversus Abdominis is always active while moving
- ◆ Although pain may go away, the Transversus Abdominis dysfunction can still persist and that may predispose to next pain episode (insidious recurrence)
- ◆ TrA thickness (or a change in TrA thickness is not related to back pain)
- ◆ You have to stop breathing to get any significant atrophy in TrA
- ◆ There is no advantage in trying to strengthen or stretch TrA for the management of back pain
- ◆ It is not appropriate just to measure the amount of EMG activity of TrA in a patient with low back pain (more muscle activity and force is not the answer). The answer lies in correcting the timing delay! The timing delay is related to the threshold of automatic activation as you initiate a movement. Assessing the quality of voluntary low threshold recruitment efficiency is a way of evaluating change in the activation threshold.
- ◆ Measurement studies have demonstrated that cognitive, non-functional, low threshold motor control retraining, can more effectively recover the timing delay in the short term. (Functional exercises or trunk muscles co-contraction exercises do not recover the timing delay in any measurement studies)

## Transversus Abdominis... continue

- ♦ Specific motor control retraining can reduce symptoms and recurrence of low back pain
- ♦ Corrective changes of Transversus Abdominis motor control can be retained in at least six months with specific motor control retraining strategies

### References

Hodges PW, Richardson CA 1996. *Inefficient muscular stabilization of the lumbar spine associated with low back pain. A motor control evaluation of transversus abdominis. Spine, Nov 15;21(22):2640-50*

Hodges PW, Richardson CA 1997. *Contraction of the abdominal muscles associated with movement of the lower limb. Phys Ther, Feb;77(2):132-42*

Hodges PW, Richardson CA 1997. *Feedforward contraction of transversus abdominis is not influenced by the direction of arm movement. EXP Brain Res, Apr;114(2):362-70*

Tsao H, Hodges PW 2007. *Immediate changes in feedforward postural adjustments following voluntary motor training. Exp Brain Res, Aug;181(4):537-46*

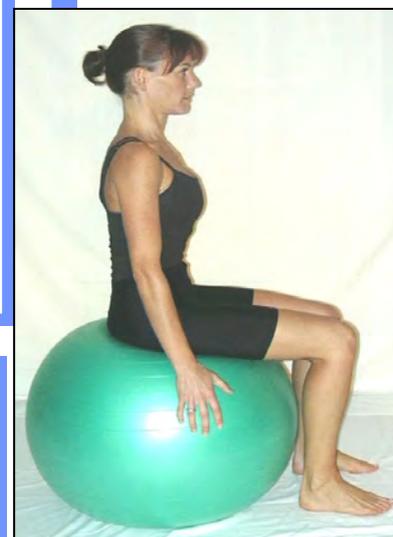
Tsao H, Hodges PW 2008. *Persistence of improvements in postural strategies following motor control training in people with recurrent low back pain. J Electromyogr Kinesiol, Aug;18(4):559-6*



TA training in standing

*A little is often*

*A lot*



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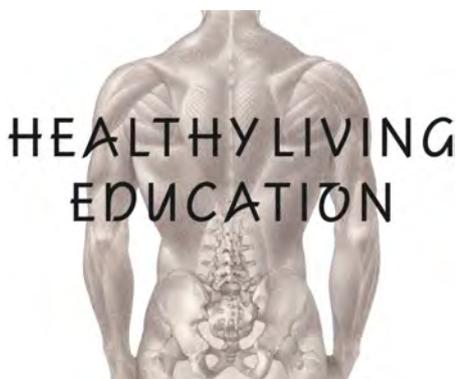
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