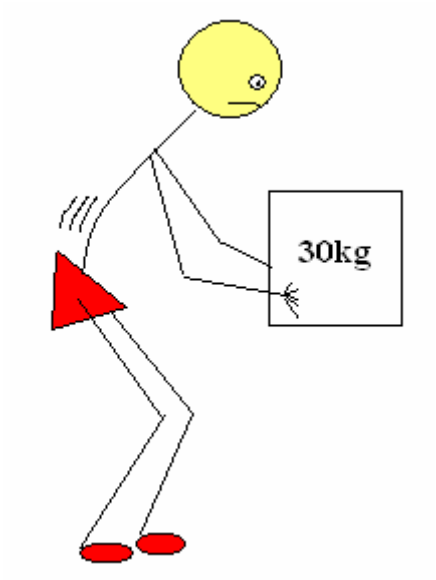
Backassist Technologies – Strength Soles

INTRODUCTION

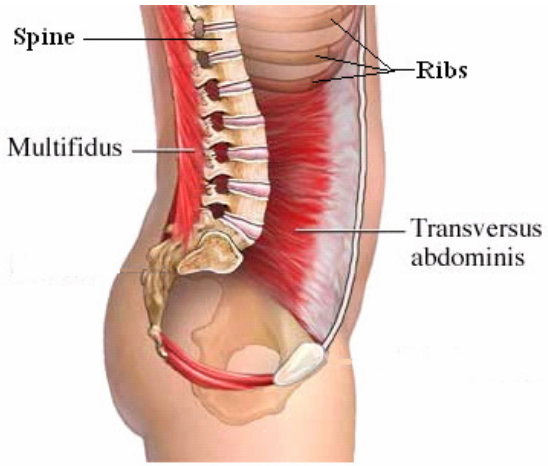
In an ideal world every workplace would be ergonomically perfect – we wouldn't need to bend or twist nor lift heavy items or maintain certain positions for long periods of time. Ideally we would take long breaks from repetitive work and be able to lie flat to rest our backs. Unfortunately this does not occur and although we know the risks of bending, twisting and heavy lifting, it still occurs frequently in the workplace. It has been shown that more than 70% of people in developed countries will experience low back pain (LBP) in their lifetime, and it is the main cause of work absence and disability in industrialised societies. Back pain is one of the most prevalent and most expensive single disease in Australia costing the health insurance industry millions of dollars per year (Australia's health 2000, Bogduk 2004). LBP is a persistent problem, especially in the nursing, hospitality and blue collar industries due to the manual nature of these professions.



CURRENT SOLUTIONS

Research by Hodges and Richardson (1996) demonstrated that people who suffer chronic back problems often have a delayed response in activating specialised protective muscles in the back prior to participating in activities. This then places the spine at a high risk of injury as normally the muscles would be contracted, forming a type of "corset" around the trunk and spine, increasing intra-abdominal pressure (IAP) which in turn reduces forces placed through the spinal discs, joints and ligaments. As a result it is now well recognised that protection of the back through ergonomic improvements and retraining of the stabilising muscles which protect the spine, can avoid or reduce LBP problems. Current physiotherapy treatments therefore target the large group of muscles within the trunk, referred to as the 'spinal stabilising muscles', educating clients to "switch on" these muscles prior to participating in tasks that put the spine at risk of injury i.e. when lifting heavy objects or when bending and twisting. This integral group of muscles include the Transversus Abdominus (TA), Multifidus (MF), the Obliques

(Internal (IO) and External (EO)) and Erector Spinae (ES) muscles. Often biofeedback equipment, including real-time ultrasound, is utilised to ensure this musculature is being efficiently recruited and activated on demand (Ferreira et al 2004). Pilates, Gym ball exercises and Tai Chi are also popular methods of improving the strength and capabilities of this area of muscles. Unfortunately, most people lack the commitment required to follow through with these activities and to apply the principles gained to everyday life, be it at work or home, thus benefits are often short-lived.

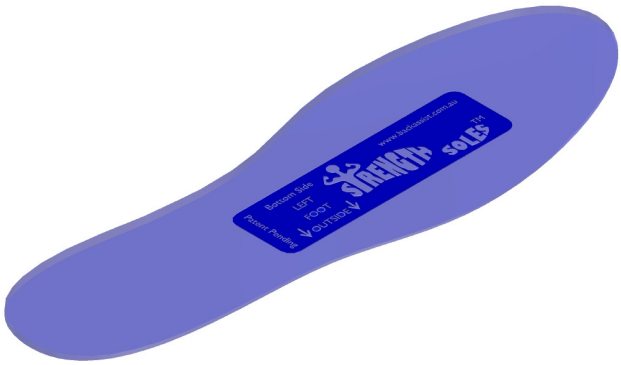


Even if you can limit the amount of bending, twisting and movement you allow your spine to do this does not provide a good solution to prevent back problems. The spine actually needs movement, as without it the intervertebral discs lose fluid, ligaments become slack and lose tone, postural muscles switch off and spinal stability is lost. Thus movement is required to facilitate hydration of the intervertebral discs, stimulate production of synovial fluid in joints and provides important loading and unloading stress on tissues which promotes appropriate strengthening (adaptation) of tissues.

Studies have shown that repetitive or prolonged bending and twisting causes the spinal stabilising muscles to switch off. Even after a ten minute rest period it has been demonstrated that these muscles DO NOT effectively improve their function and become reactive again (p.38, Cailliet 2003). As a result many people, especially those who work on their feet all day who have to bend, twist or lift, even after a short break, are at risk of causing long term problems for their low back resulting in pain and injury, a poor, often slumped posture and potentially chronic back problems.

So you can't stand still and you can't move continuously. What can you do? Well, through improved strength and recruitment of the spinal stabilising muscles, the spine and associated structures are protected to the best ability allowing normal movement with limited impact on the spinal structures. Unfortunately training these muscles to switch on at the appropriate times is difficult, time consuming and often quite expensive (Maher et al 2005).

A NEW, EASIER SOLUTION

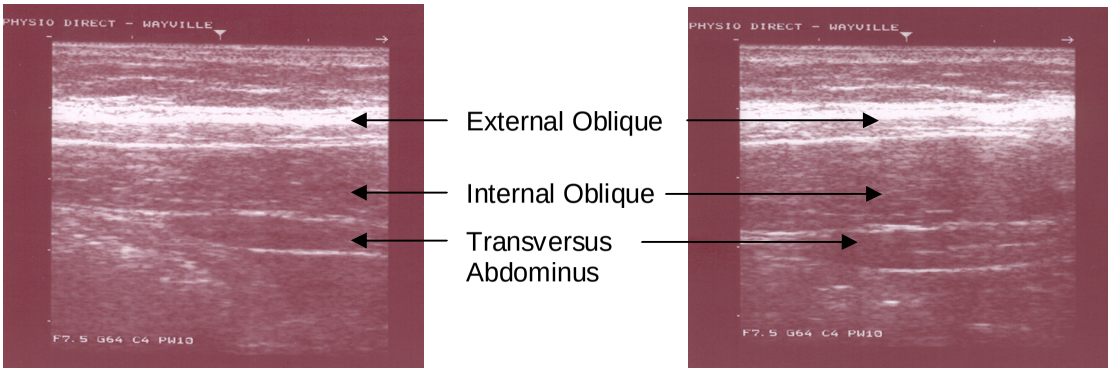


Backassist Technologies have developed and patented a simple, unique and inexpensive way for people on their feet to automatically "switch on" these important spinal stabilising muscles. Keeping in mind the principles of Tai Chi and Pilates we have worked out that we can activate this group of muscles using scientifically developed **Strength Soles**.

HOW DO THEY WORK?

Once cut to fit (using the supplied template) the Strength Soles can be placed inside most pairs of shoes, preferably ones which will be worn regularly and when standing at work or at home. The Strength Soles are slightly angled therefore the brain, through proprioceptive receptors in the feet and ankles, recognises that the body is no longer standing on a flat surface. This causes a reactive message to be sent to the spinal stabilising muscles, activating them in preparation for maintaining balance and an upright posture when moving and standing. Thus by activating this muscle group spontaneously the strength of the back is also inherently increased, posture is often improved and balance has been found to be enhanced. The Strength Soles are the only innersoles which use a patented slope to create this effect.

Through independent real-time ultrasound testing we can see that when the Strength Soles were worn, multifidus, internal oblique and transverse abdominus were recruited more effectively and displayed increased activation compared to when not wearing the strength soles (see pictures below).



Standing **without** STRENGTH SOLES – notice the relative thin cross section of Transversus Abdominus indicating <u>poor activation.</u>

Standing **with** STRENGTH SOLES – notice the thicker cross-section width of Transverse Abdominus indicating <u>increased activation.</u>

This was highly evident when in specific postures and when completing specific movements including when squatting and lifting a 5kg box from the ground, when standing and leaning forwards at the ankles e.g. like when washing dishes etc, and when standing, slightly rotated and lifting a 5kg box from a waist high bench (Davies 2007).

BENEFITS

If worn regularly these Strength Soles may:

1. improve recruitment and increase strength of spinal stabilising muscles
2. increase intra-abdominal pressure which decreases pressure on spinal discs and ligaments
3. improve posture
4. increase ability to carry heavier loads without placing increased pressure on the spinal structures
5. improve balance and reactions to challenges to balance
6. reduce likelihood of back injury as protective muscle responses are heightened

They also allow people to strengthen these muscles in a more natural and practical environment rather than on their back with knees bent as is the traditional way of initially teaching TA strengthening exercises.

People most likely to benefit:

1. People who work on their feet and who are required to complete bending, lifting or twisting like movements as part of their duties for example nurses, waiters, factory workers, tradesmen and allied health practitioners
2. The elderly with balance problems who still have good proprioception in their feet
3. People with weakened spinal stabilising muscles i.e. post injury, who have been advised to strengthen this group of muscles by their health practitioner to prevent and/or reduce chronic LBP.

FREQUENTLY ASKED QUESTIONS

- WHAT TYPE OF SHOES CAN I USE THEM IN?

Can be worn in all types of shoes, however they must not have internal arch support as this disrupts the scientifically developed angle on which the foot rests. Enclosed, supportive, lace up shoes are ideal. Shoes can also be slightly heeled (i.e. sloped front to back). It is important to note that the entire foot (including toes) must be in contact with the Strength Soles for them to work effectively and none of the foot should be supported or padded by other shoe inserts e.g. gel pads.

- HOW ARE THEY DIFFERENT TO NORMAL ORTHOTICS?

Orthotics are specifically designed shoe inserts which correct a foot dysfunction i.e. flat feet, often increasing the foot arch however maintaining the foot on a flat surface. The Backassist Technologies Strength Soles are designed to create a different plane on which you are standing, ultimately stimulating the brain to recognise that it is no longer on a flat surface and activate the protective spinal stabilising muscles in the trunk.

- CAN I WEAR THEM WITH ORTHOTICS?

The Strength Soles will not usually work with Orthotics or innersoles designed to conform to the under surface of the foot or stabilise the heel.

- HOW OFTEN SHOULD I USE THEM?

Strength Soles need to be worn regularly. Some benefits of wearing these inserts can be seen straight away however, like going to the gym and lifting weights you can not do it just once and see long term gains. It may take up to 2-6 weeks, wearing the Strength Soles daily for 6-7 hours a day for significant benefits to be achieved.

THE DOWN SIDE

● Initial soreness

Wearing the Strength Soles may be like starting out at the gym. If you have weak muscles to start with you may initially find wearing these innersoles for long periods difficult as muscles will fatigue and become sore e.g. like lifting weights in the gym you can only do so many repetitions to start with. The key is to build up to wearing the Strength Soles. We recommend wearing them for short periods of time (this depends on initial strength of muscles however may be as short as 20-30 minutes) and slowly build up to as often as possible to gain maximum benefit. There may also be some associated discomfort or delayed onset muscle soreness (DOMS) initially due to working muscles differently and for longer periods of time than what they are used to e.g. within the feet, legs, abdomen and back.

● You must have good proprioception

As proprioception is a key element for the Strength Soles to work it is important that this sensory component is working well in the feet and ankles. Although these inserts have a tremendous benefit in helping improve balance, potentially in older clients, these people must still have adequate proprioception in their feet for the inserts to work effectively. Also diabetics may have proprioceptive problems in their feet limiting the usefulness of the inserts in this client group.

PRECAUTIONS

If pain persists after trialling the Backassist Technologies Strength Soles then consultation with the appropriate health professional is advised to rule out other possible causes of LBP e.g. pain or discomfort may be a result of infection, tumour, osteoporosis, Rheumatoid Arthritis, fracture or inflammation. If pain increases unexpectedly then it is important to cease wearing the Strength Soles and seek medical advice.

REFERENCES

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