

Cutting edge core control:

a PERFECT PRACTICE™ article



Anna-Louise Bouvier, BAppSc (Physio)

Named Australian Fitness Network's 2004 Presenter of the Year, Anna-Louise is an accomplished author and creator of audio resources addressing back pain. The developer of a back specialist program called Physiocise, she runs a private physiotherapy practice and is an injury prevention consultant to the NSW Rugby Union team.

Lisa Champion, MSc (ExSc)

*Lisa is a multi-talented exercise specialist. In her role as a director of the Australian Fitness Network, she has had a positive influence on the development of the fitness industry in Australia for nearly 20 years. Lisa has shared her expertise and knowledge as an instructor trainer, program developer, convention presenter and author. She works as a personal trainer, teaches pilates and children's movement classes and inspires equestrian athletes through her book *Riding from the Inside Out*. With Anna-Louise she is the co-creator of the PERFECT PRACTICE™ training system.*

Picture this – you walk into a gym and see three clients with their personal trainers.

Trainer 1 (photo 1) has her client lying on the floor, breathing softly and concentrating on slowly elevating her pelvic floor as she breathes out. Trainer 2 (photo 2) has her client doing a series of prone holds, side bridges and bird dog (or swimming) exercises while focusing on maintaining a neutral spine. Trainer 3 (photo 3) has her client performing a squat and encourages him to maintain perfect form and alignment.

Which of these clients is activating his or her deep core? Astoundingly, if their technique is maintained, they all are – and there is research there to verify it. Trainer 1's technique probably stems from the work of Professor Paul Hodges,



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THE CORE CONTROL DEBATE RAGES

In November 2004 the World Congress on Low Back and Pelvic Pain was held in Melbourne, Australia. Two thousand delegates from around the world came to listen to over 100 of the world's most recognised scientists and researchers into low back and pelvic function and, more importantly, dysfunction. At the end of seven days of lectures it was clear the answer to what constitutes optimal core control is not straightforward. The optimal level varies according to myriad factors, including:

- load
- environment
- intent
- accuracy of performance
- pre-existing injury
- underlying incompetence in the local muscle system
- fatigue

It's not surprising that those of us on the ground, both in the world of fitness and the world of physiotherapy, struggle to know how to give our clients the right methods to develop and maintain core control. If you're feeling confused, you're not alone, but we hope this article will help put some of the relevant science into perspective. If you are interested in looking further into this fascinating area of core control and its relationship to lower back pain, a series of references is listed on the online version of this article.

Professor Gwen Jull, Dr Julie Hides and their many colleagues at the University of Queensland and, more recently, the work of Dr Peter O'Sullivan and his colleagues in Perth. Their groundbreaking research was initially focused on the forces that stabilise the spine at a local or 'spinal' level. The techniques of Trainers 2 and 3 are more likely to come from the research of the prolific Dr Stuart McGill PhD and his colleagues in Canada.

Now, Trainer 1 is likely to look over at Trainers 2 and 3 and think their clients are doing too much to ever activate the deep core effectively, while Trainers 2 and 3 may wonder if Trainer 1's client is ever going to get off her back and exercise! Yet, if all these techniques involve core activation and are supported by impeccable research, which one do we choose and when?

To combine all these different concepts into a user-friendly system which can be used by trainers to grade and select their exercise, we have developed a grading scale called the

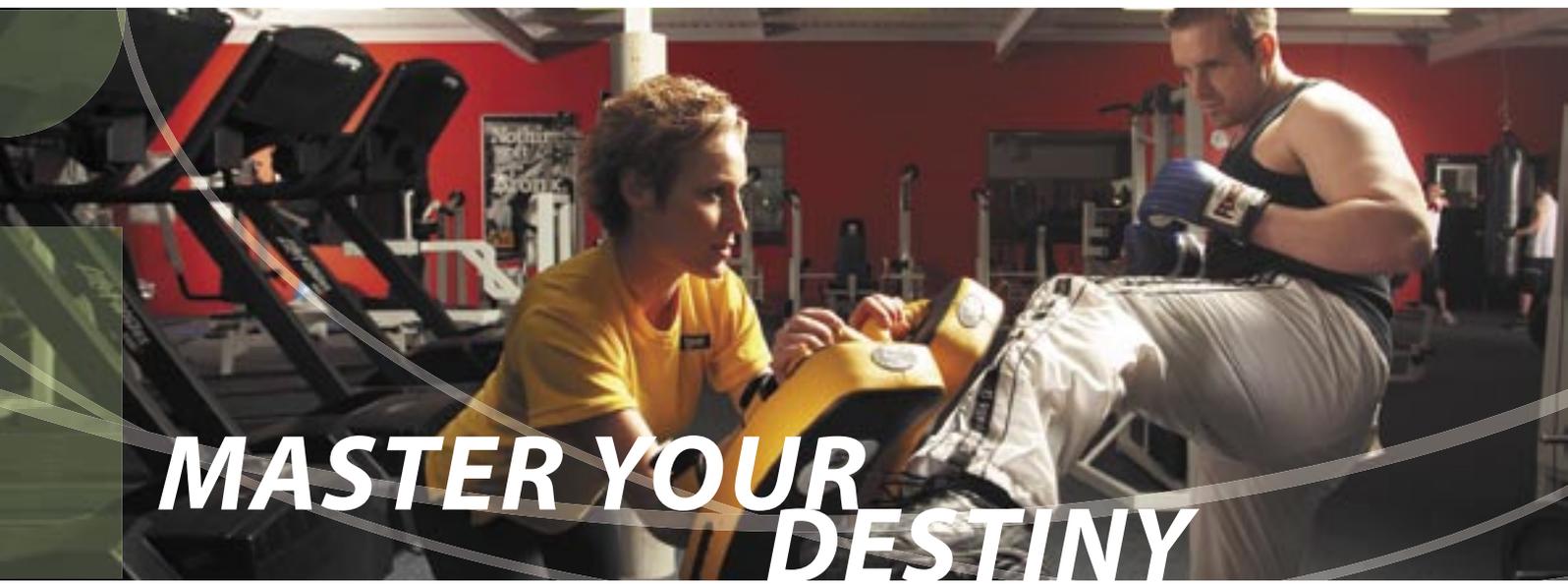
CIRCLE OF CONTROL™. In order to have perfect core control you need to recruit the right response for the right load. This principle rests on a foundation of efficient, well-established core control.



Control vs stability and the super-computer

We use the word control rather than stability as

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the process of stabilising the spine to undertake an action must be initiated by the brain. Electrical pathways in our brain establish movement patterns for all our muscular activities, from cleaning our teeth to performing a back flip on a beam. Despite their importance to everyday functioning, we are usually happily oblivious to these brain-to-muscle connections. Dr Peter O'Sullivan puts it beautifully when he says, 'The brain thinks of performing a task – not of contracting a muscle.' (O'Sullivan, 2005, p. 5)

In a way, the brain is the 'controller' for the output. Because it provides the stimulus for our movement without us giving it any attention, it is like a computer's operating system. Think of it as the Windows of your spine. And just like Windows it never completely shuts down, even when you sleep. The brain retains a stand-by mode that provides your spine with some inherent stability to allow it to move in a stable way when you roll over in bed or get up. Technically, this is called tonic activity.

Each morning when you 'boot up' for the day, you don't have to think about turning your deep core on – your brain just makes sure it is. When you want to perform an activity, such as sitting down on a chair, your super-computer brain allows you to run the 'Sit in a chair 1.1' program so your muscles know how much, and in what order, they need to turn on and off to allow you to complete the action. When your physical Windows is running properly it recognises this is a relatively low load activity, which requires only a low load response from your deep core in order to keep your spine stable. Your breathing should remain relaxed, your stomach wall should not splint or

MARATHON MUSCLES VS SPRINTERS

Skeletons need two kinds of muscles for movement and stability: *

1. The local muscle system (LMS)
2. The global muscle system (GMS)

The LMS is made up of the postural muscles. They have to turn on for long periods of time without getting tired, so let's think of them as marathon muscles. Many postural muscles that govern control are situated deep in the torso around the low back. We refer to these as the deep core.

The GMS is made up of the 'moving' muscles. They position the skeleton and, when necessary, put on the gas for higher load activities. The important thing is that the two systems work together in synergy. The LMS is on tonically all the time with the GMS coming in as the load increases.

** This classification system came largely from the work of Bergmark, A. in 1989 but has been extensively refined over the last few years especially in the work of Dr Peter O'Sullivan at Curtin University in Perth.*

bulge, your pelvic floor should not drop and your spine should stay neutral.

When the task is more demanding, such as doing a clean and jerk lift, your super-computer brain activates a more comprehensive stability output, 'Olympic lift 3.1', requiring different strategies. It will splint your thorax to your pelvis, make your breathing much higher and harder, bring in your outer core muscles, such as the external obliques, and other global muscles, such as the lat dorsi and erector spinae, to help control the load.

(DIAGRAM 1)

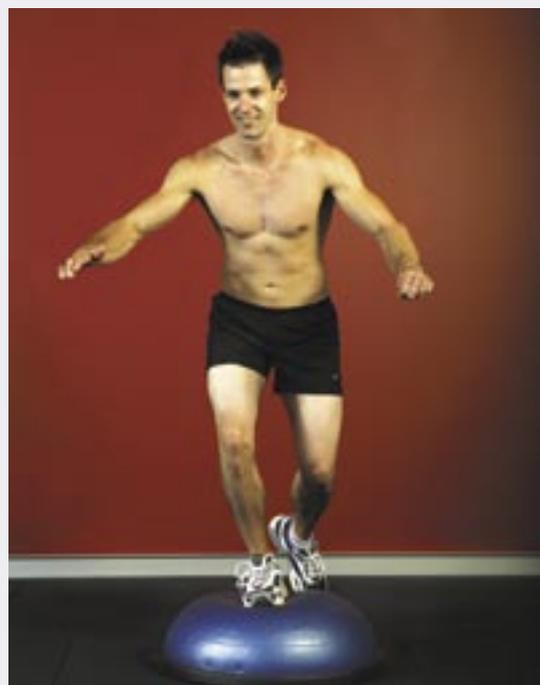
← LOW LEVEL CORE CONTROL:

involves the LMS working at a low level without getting tired. Usually requiring little general movement of the skeleton so GMS recruitment is minimal. Involves low cardio response. For example, think body stable with only one limb moving.

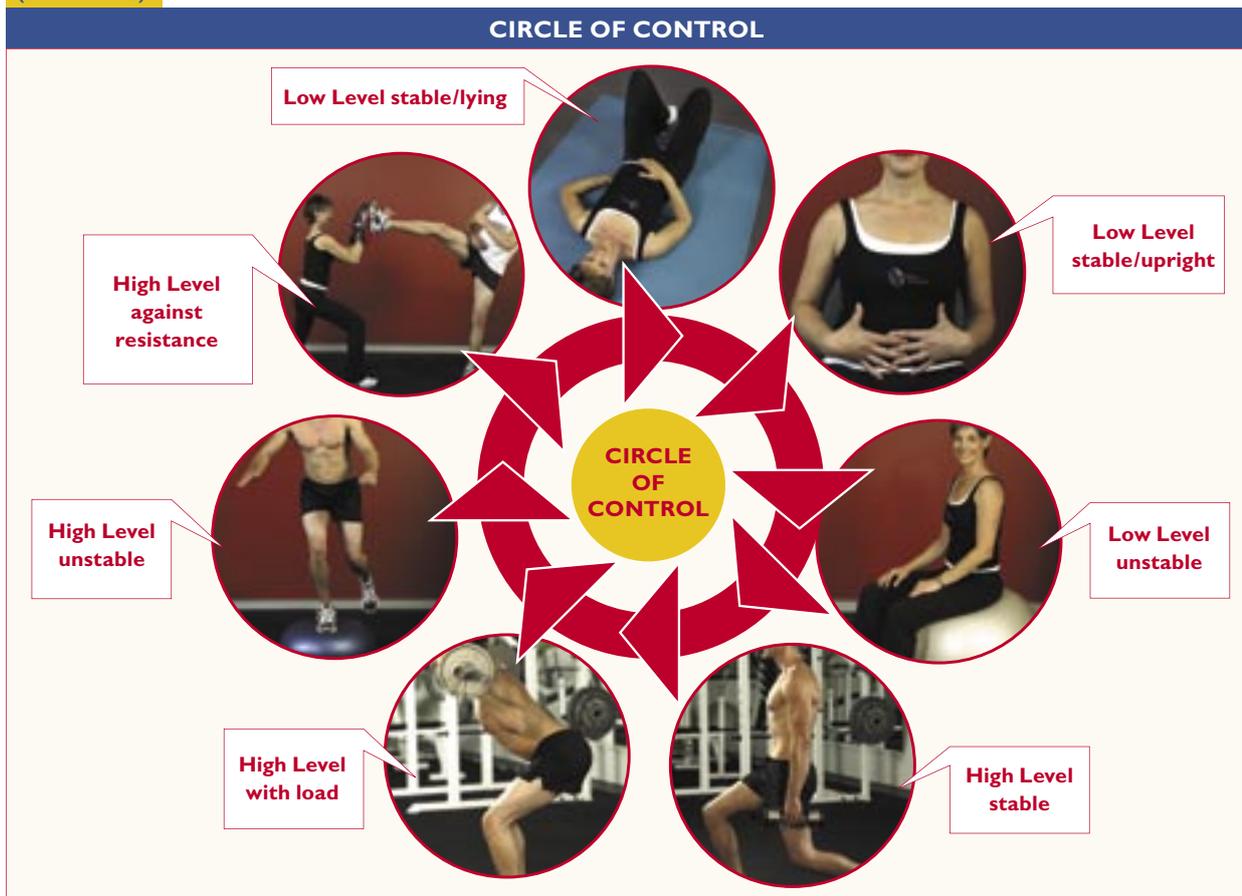


→ HIGH LEVEL CORE CONTROL:

requires the LMS to maintain neutral spine while the GMS drives and controls the direction and force of the movement. High cardio load as working muscles demand peak volume circulation, for example, think explosive deadlift; boxing; balancing on a bosu.



(DIAGRAM 2)



However, this can only happen if your physical Windows is working efficiently. If it is not engaged through the automatic activation of efficient movement patterns you lose the feedback/feedforward mechanism so vital for adjusting and responding to load. This vastly increases the chances of injury.

First to fourth gear

Most of us would like to think of ourselves as Ferraris. If your brain is the operating/electrical system, then your

core is the gear box. If you are going to push yourself like a Ferrari you have to be able to get that gearbox working at the right revs for the right challenge. The trouble is, most of us want to go straight to third and fourth gear, but for great function you also need to be able to work smoothly in first and second. Perhaps, most importantly, you also need to be able to go into neutral as well, something most fitness professionals find impossible!

So, when it comes to optimal core control in exercise, you need two elements:

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