

It is for good reason that University of Waterloo kinesiology professor Dr. Stuart McGill has come to be known as “Dr. Spine.” In addition to his hundreds of articles and books on spine biomechanics, a series of presentations of his research findings has recently turned up in the popular electronic world, including YouTube.

McGill and his colleagues and students are clearly committed to ensuring that their research results aren't buried in academic papers or scientific journals but get disseminated among organizations and health professionals where they will have some practical application. A good example of the McGill team's efforts to make their research discoveries accessible to practitioners and their patients is a number of YouTube videos focusing on some of the myths encountered about back pain and exercises to relieve it.

Here are some of the messages Stuart McGill wants health professionals and back pain sufferers to hear about diagnosing and dealing with “troubled spines.”

The “Flexible” and the “Strong” Back

“Troubled backs” (chronically painful backs with recurrent episodes) are caused by variables other than mobility or strength. Having a flexible spine is not protective and those who have more range of motion in their backs actually have a greater risk of future back disorders. The muscles of the legs, arms, shoulders and hips are designed to create force throughout a range of motion resulting in movement, but the muscles of the spine or core or torso are designed to do precisely the opposite – they stop movement.

Debunking Back Pain Myths

The Work of Dr. Stuart McGill

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Having a very strong back is also not likely to prevent back injury. McGill's research indicates that those who have chronic and/or recurrent episodes of disabling back pain are different from those performing similar tasks who are symptom free. People with recurrent back pain often have stronger backs, not weaker, and they use their backs more than their pain-free colleagues. They walk, sit, stand and lift using mechanics that increase spine loading, and they often have poor hip mobility, which is also linked to back pain. When measured, the "bad backs" have less torso muscle endurance – the ability to repeat movement without the flaws that come with fatigue – and it turns out that endurance is more important.

Causes of Back Pain

A typical approach has been to look for the common injury pathways in which the back is hurt in a specific incident. Compensation boards have required clinicians to name the "event" that caused the "injury." While this might have been the "culminating event," few back injuries actually occur this way. Statistics compiled from epidemiological approaches ignore the large role of cumulative loading or trauma, which usually accumulates with little indication to the patient. For example, the damaging mechanism leading to disc herniation (or prolapse) is repeated lumbar flexion requiring only modest accompanying compressive loads.

Selecting the Right Exercises

Back problems bring large numbers of people to their physicians, where the diagnosis of "non-specific back pain" is a default, often leaving the patient in despair. For example, for back muscles chronically contracted to the point of persistent muscle pain caused by poor posture, too often the doctor's only treatment is to prescribe muscle relaxants, which fail to work. The clinician, on the other hand, addresses the postural cause and corrects standing to remove the associated crushing load from the spine. Then the client exclaims, "You're magical – you just took the ache out of my back!"

The first step in any exercise progression is to remove the cause of the pain, namely the perturbed motion and motor patterns. A critical question is whether patients report having better and worse days. If so, an interview coupled with provocative testing will reveal which activities help them and which cause pain. For example, if sitting is not tolerated, avoidance of flexion with a lumbar support in the chair will help, together with organizing tasks to eliminate prolonged sitting. Specific exercises designed to combat the cumulative stresses of sitting can then be prescribed.

Prescribing generic exercise for back patients is not helpful and may even be harmful. The unstable back needs stability as well as mobility in the hips. The stiff back, not to be confused with a back splinted with muscle contraction, needs another approach. The older arthritic and stenotic back patient needs yet another kind of therapeutic exercise.

Many yoga and Pilates exercises may be appropriate for some but replicate the cause of pain for others. Each individual has a loading tolerance, which, when exceeded, will cause pain and ultimately tissue damage. Capacity is the cumulative work that an individual can perform before pain or troubles begin. Determining the tolerance and capacity of each individual is paramount to ensure the therapy is matched to the patient. Then exercise becomes therapeutic rather than adding to the cumulative grief.

Patients who can walk only 20 metres before pain begins have a low capacity. They will not benefit from therapeutic exercise performed three times a week, but have a better chance with three sessions a day. Corrected walking in three short sessions per day, never exceeding their current tolerance and capacity, is an alternative approach to building capacity. Typically they will progress to one session per day with increasing pain-free capacity.

The flexion-intolerant back is common and prescribing stretches such as pulling the knees to the chest may give the perception of relief (via the

stimulation of erector spinae muscle stretch receptors). But this approach only guarantees more pain and stiffness the following day as the underlying tissues sustain more cumulative damage. Eliminating spine flexion, particularly in the morning when the discs are swollen from the osmotic superhydration of the disc that occurs with bed rest, has proven effective with this type of patient.

Flexing the spine in an abdominal crunch or sit-up stresses the posterior part of the annulus, which will eventually cause damage in the form of a disc bulge. The spine discs only have so many bends in them before they damage, so we should reserve the bends for essential tasks such as tying shoes rather than using them up in abdominal crunches. Similarly, efforts to spare the back by squatting and bending the knees to lift things eventually cause arthritis in the knees. Proper lifting mechanics require lifting with the hips, not with the knees.

Therapeutic exercise must follow a progression. Since perturbed motion and motor patterns are both a cause and consequence of back troubles, these must be

addressed with corrective exercise first. The next stage is to create muscle patterns that enhance spine stability. Endurance of the muscles is then enhanced to ensure that the patterns are maintained throughout the day. Only with this base can strengthening begin. //

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The science of therapeutic exercise design as well as many examples of the stages of exercise progression are documented in Stuart McGill's textbook, *Ultimate Back Fitness and Performance*. Other similar resources can be found on his website, www.backfitpro.com.



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