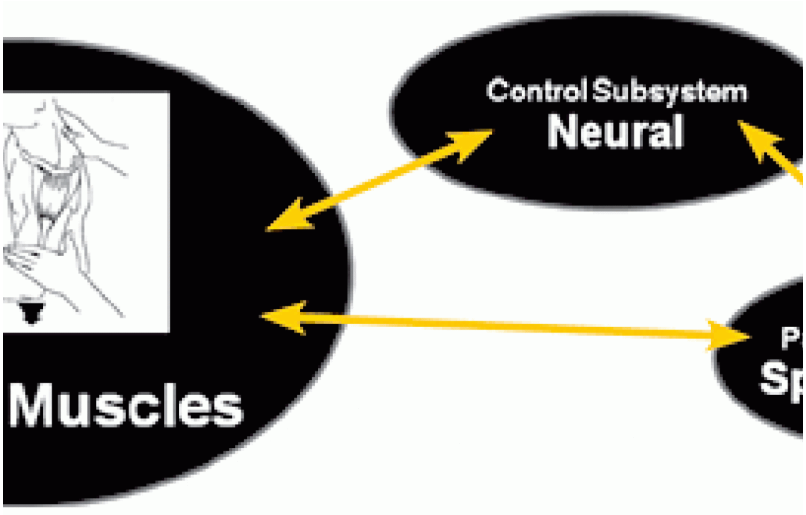


CHRONIC / ACUTE CONDITIONS

What Are You Doing About Muscle Weakness?

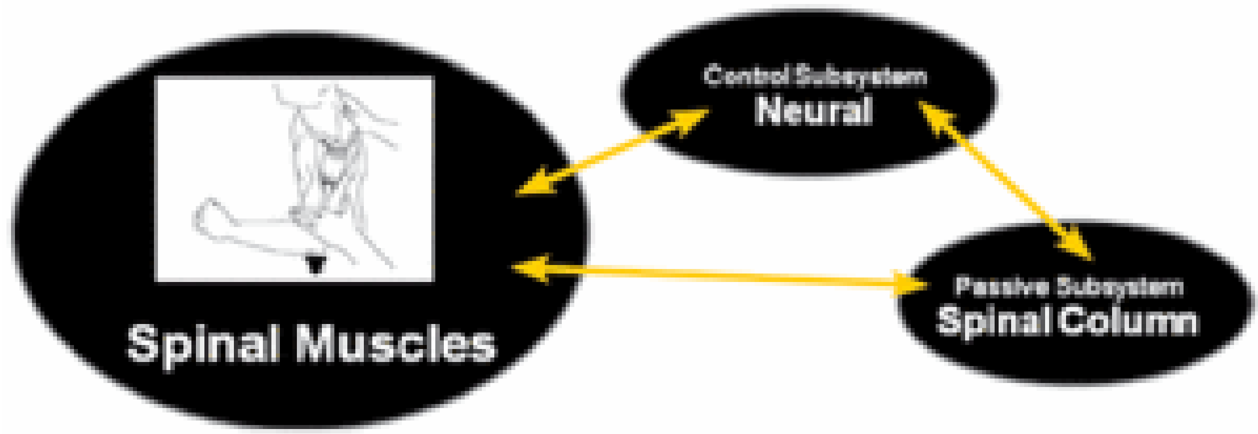
Scott Cuthbert, DC

Terms such as *muscle tension headache* reflect the traditional view that tonically elevated activity of the muscles of the head and neck are responsible for headache pain. Muscle tension itself has been considered synonymous with various forms of back pain. However, evidence suggests this concept will neither lead to an understanding of the actual etiology of these conditions, nor even to descriptions of the functional pathology that causes the pain.

For at least 50 years, it has been declared that most forms of chronic musculoskeletal pain were due to abnormal patterns of muscular activity, but the research has usually been limited to attempts to confirm various versions of the hyperactivity-causality model. The research evidence is now suggesting the demise of the hyperactivity-causality model for musculoskeletal pain.[1-3]

For chiropractors, the importance of expertly assessing the functional state of the motor system is emphasized by studies suggesting faulty motor control is the most likely source of at least half of low back pain syndromes.[4] The evidence now shows with greater clarity than ever that inflammation or injury produces specifically identified inhibited muscles. Controlled clinical studies have shown that dysfunction and pain specifically in the ankle, knee, lumbar spine, temporomandibular joint and cervical spine will produce inhibited muscles.[5-16] These data indicate that the body's reaction to injury and pain is not increased muscular tension and stiffness. Instead, muscle inhibition is often more significant.

Because of Sherrington's Law of Reciprocal Inhibition, these two functional states in muscles are related.[17] Sherrington's Law states that decreased activity of certain muscles leads to facilitation, and thus increased activity and tension, of their antagonist muscles. Poor motor control goes hand in hand with decreased joint stability and may be the fundamental force creating and perpetuating spinal dysfunction.[9-16] Later works report that muscles predictably respond to pain, inflammation and/or injury with weakness.[18-27] These researchers have demonstrated that - to use Lewit's phrase - functional pathology of the muscle system is the most common clinical finding in pain patients presenting to chiropractors and other musculoskeletal physicians.18 However, this disorder of the muscle system is routinely ignored in the diagnosis and treatment of these patients because physicians do not have a tool in their offices to diagnose it.



The chiropractic subluxation involves not only altered biomechanics, but also motor control errors and muscular dysfunction that are part of the nervous system's response to pain and dysfunction. Several hundred studies have shown that musculoskeletal pain produces muscle weakness, the detection of which makes the manual muscle test invaluable in clinical practice.

There is no clinical tool available for testing specific muscle strength and function as reliable, easy-to-use, inexpensive and valid as the manual muscle test (MMT).[28] MMT presents a clinical strategy to assess these muscular impairments that have been shown to drive so many of the clinical conditions affecting chiropractic patients. Assessing the function of muscles with MMT pre- and post-treatment can also help assess the benefit of your therapeutic intervention. This assessment process is the basis of applied kinesiology (AK) and a family of associated chiropractic techniques that investigate muscle dysfunction using MMT.

Several hundred studies that used age- and sex-matched controls are available for review at the International College of Applied Kinesiology Web site. These studies show that the level of muscle activity is not higher than normal in most of the common musculoskeletal conditions, but actually is reduced.[29] These studies are part of the reason for the demise of the hyperactivity-causality model of musculoskeletal pain. In the older hyperactivity-causality model, if "muscle tension" or "muscle hyperactivity" are pathognomonic of these conditions, EMG and maximum voluntary contraction levels should be higher in this patient population compared to other similarly matched groups.

The research instead demonstrates that pain does *not* cause muscles to become tonically hyperactive. The ability to contract them forcefully is reduced by pain, rather than increased. These results are more in line with the common impression that pain makes muscles difficult to use and less powerful.[31]

Most measurements of force output of the lower back flexor and extensor muscles when they act as agonists indicate that the maximum voluntary contraction of chronic-LBP patients is less than that of matched controls.[3,29] These pain-adaptations are designed to protect the injured part of the body.[30] Motor programs control the premotor nociceptive interneurons to agonist and antagonist motoneurons in a reciprocal way (Sherrington's Law), meaning that pain creates muscular weakness and hypertonicity in combination.[17] Because there is a direct relationship between the tone of a muscle and the relative hypertonicity in its antagonist muscle, imbalances develop that lead to postural fatigue, structural distortion and articular pain with movement.

Dishman, et al., have shown that spinal manipulative procedures lead to an increase in central motor excitability, rather than overall inhibition.[1] Specifically, there is post-synaptic facilitation of alpha-motoneurons and corticomotoneurons that may be unique to chiropractic SMT.

Previous work has demonstrated that there is an immediate strengthening effect upon the peripheral muscles after SMT.[32-37] This factor has been consistently demonstrated in AK and other manipulative systems that use MMT. Measuring the effect of manipulative treatment upon the motor system can be made after every intervention. Manipulative procedures that are specifically designed to improve the function of muscles during daily life should improve spinal function and reduce disability.

Virtually every condition chiropractors face involves some form of muscle dysfunction and inhibition. MMT, when properly taught and executed, gives practitioners the unique ability to diagnose these problems. A major reason that MMT for all of the peripheral muscles should be added to standard diagnostic methods and taught in the chiropractic colleges is that most parameters of dysfunction identified in low-back and neck pain patients have not been shown to precede the pain. Rather, the dysfunction only *accompanies* the pain. An important exception is muscle strength, which can predict future low back and neck pain in asymptomatic individuals.[9-16,38-42]

The muscle weakness revolution that is now occurring in the scientific literature requires the use of a clinical tool like MMT that is uniquely designed to detect this important neuromuscular impairment in the patients whom chiropractors treat. A new paper published in *Chiropractic and Osteopathy* described clinical guidelines for the use of MMT, which will help perfect the precise diagnosis of this fundamental problem in our patients.[43] If we miss a fundamental component of their dysfunction, treatment of complex neuromusculoskeletal disorders is that much more difficult.

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