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**MUSCLE IMBALANCES
SUGGESTED EXERCISES**
CHAPTER 4

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By Andrea Leonard
BA, CES, PES, CPT

If we injure ourselves, it is safe to assume that the particular injury will heal itself in a reasonable amount of time.

When someone comes to you with chronic musculoskeletal pain it may suggest that the problem lies within the muscle, or group of muscles. More often than not, it will not stem from the bones, joints, and ligaments. Most muscle pain is the result of a muscle spasm and the resulting ischemia (inadequate circulation to a local area due to blockage of the blood vessels in the area) from the prolonged muscle contraction.

This will ultimately lead to fatigue and result in a decreased ability to meet normal postural and movement demands. In the acute phase of pain, the muscles may respond by altering movement patterns to compensate for the injured area. As time passes, the CNS will adapt this altered movement pattern. Our bodies have a protective adaptation to pain in which the flexor response is activated to protect the injured area. Not only will this affect movement patterns, it will also result in decreased range of motion. These altered movement patterns will ultimately lead to altered joint position which will cause more stress on the joints. This can also be caused by **altered reciprocal inhibition**. This is the process by which a tight muscle causes decreased neural drive and, therefore, optimal recruitment of its functional antagonist is not achieved. Altered reciprocal inhibition may lead to **synergistic dominance**. This is the process in which a synergist compensates for a prime mover to maintain **force production** (the force generated by a muscle action).

It is paradoxical that the muscle imbalance may be the source of the pain or it may be the result of the pain.

Vladimir Janda observed three distinct stereotypical patterns of muscle tightness/weakness that cross between the dorsal and ventral sides of the body. The first, and perhaps most common is **upper-crossed syndrome**. Tightness in the levator scapulae and upper trapezius on the dorsal side crosses with the tightness of the pectoralis major/minor. Weakness of the deep cervical flexors on the ventral side crosses with weakness of the middle and lower trapezius. This pattern of muscle imbalance creates joint dysfunction that results in forward head, cervical lordosis, elevated and protracted (rounded) shoulders, winged scapulae, and thoracic kyphosis. This combination wreaks havoc on the glenohumeral joint by decreasing joint stability, which

then leads to increased activation by the levator scapulae and upper trapezius, in an effort to maintain the integrity of the joint.

Individuals who present with upper-crossed syndrome typically exhibit rotator cuff impingement, shoulder instability, biceps tendinitis, thoracic outlet syndrome, and headaches.

Lower-crossed syndrome manifests when the tightness in the thoracolumbar extensors on the dorsal side crosses with the tightness of the iliopsoas and rectus femoris. Weakness of the deep abdominal muscles ventrally crosses with weakness of the gluteus maximus/medius. Look for increased lumbar lordosis, lateral lumbar shift and leg rotation, and knee hyperextension. There are two variations of LCS; anterior tilt and posterior tilt. The client with an anterior pelvic tilt will usually present with slight hip and knee flexion and hyperlordosis of the lumbar spine and hyperkyphosis of the upper lumbar and lower thoracolumbar areas. Those with a posterior pelvic tilt present with locked out knees, hypolordosis (flat back), thoracic hyperkyphosis and head protraction. More than likely they will also have tight hamstrings and dynamic movement patterns may be affected. Individuals who present with lower-crossed syndrome typically exhibit anterior knee and low back pain, posterior tibialis (shin-splints), and plantar fasciitis.

Layer syndrome is the combination of LCS and UCS where clients display impairment with motor skills and have a poorer prognosis because of the longer duration of their impairment. You are more likely to see this in the elderly.

Chronic muscle imbalance can lead to altered patterns of movement. There are several factors that can affect muscle balance:

- **Repetitive movement** - can result in overuse or injury and can lead to a change in elasticity of the muscle. It may be as simple as bad posture and lack of regular daily activity. Muscle that is repeatedly placed in a shortened position (psoas complex during sitting, or pectorals following a mastectomy/radiation), will eventually adapt to that new position and it will become its new "norm."
- **Acute injury** - an individual may alter their movement patterns to avoid pain, or to perform an activity out of desire or necessity. Because of the newly established "norm," an individual may need to re-train their body back to their more normal motor pattern. Injury can also result in tissue that becomes **hypomobile** (restricted) from splinting or self-immobilization due to pain.
- **Surgery** - scar tissue can alter tissue alignment and pull on the fascia. This will alter muscle and joint function. It is critical to assess ROM and posture and develop a corrective strategy to return to a normal motor pattern and correct imbalances.

POSTURAL ANALYSIS TEST PROTOCOL

Purpose: *to determine muscle imbalances; which may cause unnecessary stress on the bones, joints, ligaments, and muscles. This may prove to be the most critical component for proper exercise prescription.*

Equipment: *none*

Procedures: a thorough postural analysis is essential to get a clear understanding of symmetry, contour, and tone of the muscles as they are observed in **static posture**. The postural analysis is done with the participant wearing minimal clothing, standing erect, naturally, with the arms hanging downward at their sides, and bare feet. Have client march in place with their eyes closed for a few seconds, making sure that they are standing naturally. Have them stop marching, hold their position, and open their eyes. Ask them to stand as still as they can so that you can conduct the assessment.

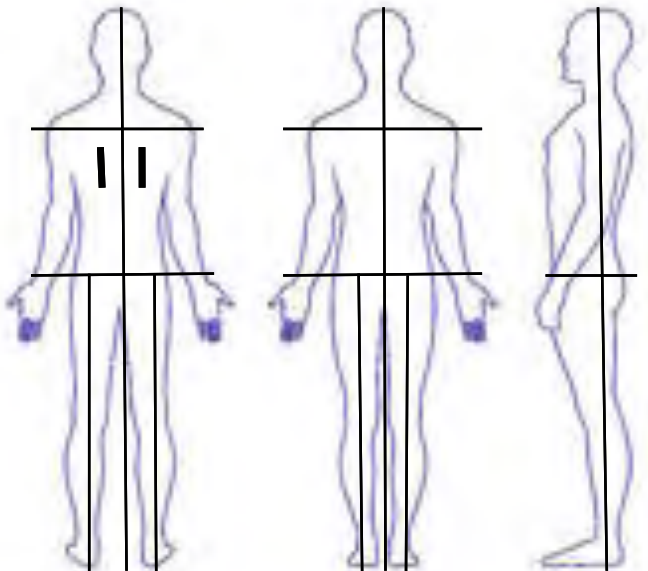
Begin by looking posteriorly at spinal curves; excessiveness, scoliosis, leg-length discrepancy, or other orthopedic deviations. From there you should evaluate the pelvis; as this is where most dysfunctions of the lumbar spine, SI joint, and lower limbs will originate. Not only can the pelvic tilt affect lumbar lordosis, it can also influence the orientation of the head and other parts of the body.

The position of the pelvis should be evaluated by locating the iliac crests and the anterior and posterior iliac spines. Locating the posterior/anterior superior iliac spine:

The ilium is the most superior part of the innominate bone and articulates the pelvis with the spinal column through the sacrum. At the most anterior and posterior aspects of the ilium are bony prominences known as the **anterior superior iliac spine** (ASIS) and **posterior superior iliac spine** (PSIS). The ridge of bone that runs between the ASIS and PSIS, and is a major source of muscle attachments, is known as the crest of the ilium or **iliac crest**. Place your hands on your clients' hips and feel for the iliac crests. While you are doing so, follow the crest to its anterior and posterior ends and those will be the ASIS and PSIS.

After identifying the aforementioned structures, there are several things you will want to look for:

- Lateral tilt
- Rotation
- Anterior tilt
- Posterior tilt



Looking at the subject from the *back*:

- Head should be erect and not tilted to either side
- Shoulders should be level and one should not be higher than the other
- Shoulder blades should not be “winged” and they should be at the same height
- Curvatures of the spine are minimal (no scoliosis)
- Hips should be at the same level; one should not be higher than the other
- Legs are vertical
- Arches of the feet should not be excessively flat or raised, but should appear normal

- Heels should be equal distance apart
- Body weight should appear to be evenly distributed on both feet

Looking at the subject from the *front*:

- Head should be erect and should not be tilted to either side
- Shoulders should be level and one should not be higher than the other
- Arms and hands should face toward the body. If there is considerable round shoulderedness, it will cause the hands to rotate so that the palms face backward
- Hips should be at the same level; one should not be higher than the other
- Legs are vertical and kneecaps should face forward and be centered
- Toes should be in a straight line
- Feet should be turned out at about ten degrees
- Arches of the feet should not be excessively flat, or raised, but should appear normal
- Heels should be equal distance apart
- Body weight should appear to be evenly distributed over the feet

Looking at the subject from the *side*:

- Head should be erect and should not be pulled back or extended forward
- Shoulders should be level and should not be rounded
- Curvatures of the spine should be minimal
- Arms and hands should face towards the body
- Chest should be lifted and should not appear depressed or protruding
- Abdominals should be flat
- Knees should not be over flexed or hyperextended, but should appear straight
- Toes should be in a straight line



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