Dynamic Chiropractic

SPORTS / EXERCISE / FITNESS

Functional Exercise and Joint Movement

Perry Nickelston, DC, FMS, SFMA

Fundamentally, exercise is about movement, and lots of it. The base foundation of functional movement is proper joint mobility and stability. Without adequate mobility and stability of joints in the kinetic chain, you end up with dysfunctional movement. Physical fitness and exercise that is built on dysfunctional movement patterns results in compensation, injury and decreased performance. Cumulative microtrauma ensues and the body starts to break down and become riddled with chronic pain. Microtrauma results from small amounts of stress imposed on the body over time that are caused by poor biomechanics or exercise overtraining.

Poor biomechanics are movement mistakes in which the body compensates and uses suboptimal joint alignment, muscle coordination and posture. To preempt injury, you can assess four key areas of biomechanics and joint mobility that may be weak links in the kinetic chain: ankle mobility, hip mobility, thoracic spine mobility and upper cervical mobility.

To understand the relationship between mobility and stability, we must look at the "joint by joint" approach to human movement. In terms of human movement, *mobility* is a measure of the ability of a joint or series of joints to move through a range of motion. *Stability* represents body control through strength, coordination, balance and efficiency of movement, while stabilization is the control of mobility.

Mobility must first be established before you can have adequate stability. Every joint has a little of both. However, some joints are meant to be more mobile and some more stable. There must be a cohesive relationship between these two patterns for optimal performance. The joint-by-joint approach, pioneered by Gray Cook, PT, and Mike Boyle, CSCS, focuses on the body's compensation mechanism up the kinetic chain when a joint loses its primary role. The table below features a partial list of joints and their primary respective roles in movement patterns.

Joint	PrimaryMovement
Ankle	Mobility (sagittal)
Knee	Stability
Hip	Mobility (multiplanar)
Lumbar spine	Stability
Thoracic spine	Mobility
Scapula	Stability
Upper cervical	Mobility

The first thing you should notice is that the joints alternate between mobility and stability. There is a basic alternating series of joint movements whereby a loss of function in the joint below will affect the joint above. Compromised kinematic chain mobility secondary to a joint's relative immobility often results in compensatory movement patterns in order to recover lost function. This

is referred to as a *compensatory* or *dysfunctional movement pattern.*

Starting from the ground up, let's take a closer look at how joint movement dysfunction in the ankle and hip can cause compensatory pain-related symptoms. After an injury, the body tries to splint and guard movement. It wants to immobilize you as a protective mechanism for healing, not focusing solely on the location of the pain. Ankles lose mobility, knees lose stability and hips lose mobility. For example, when mobility is lost at the ankle, the body takes mobility from the knee, which is supposed to be stable. The result is knee pain from overuse and lack of stability. The hip loses mobility and locks down, and the body takes movement from the lower back and pelvis. The result is lower back and sacroiliac joint pain.

If a patient comes to you with a loss of hip mobility, the complaint will generally be one of lower back pain. But loss of hip mobility can also cause knee compensation pain. This is why you should always be evaluating the joints above and below the site of pain. The fix usually involves increasing the mobility of a nearby joint.

However, the hip can be both immobile and unstable. How can a joint be both? Good question - let's take a look. Weakness of the hip in either flexion or extension causes compensation at the lumbar spine, while weakness in abduction (prevention of adduction) causes stress on the knee. Remember, a muscle has two actions in terms of joint movement: initiation and resistance. For example, the gluteus medius initiates hip external rotation, but also prevents hip internal rotation. In order to fully optimize muscle function, you must exercise that muscle in both movement actions and training vectors. Poor psoas and iliacus strength or activation will cause lumbar flexion as a substitute for hip flexion. Poor strength or activation of the glutes will cause compensatory extension recruitment of the hamstrings and lumbar spine to replace the motion lost in hip extension.

The observation of whole movements may redirect and broaden the clinical focus by revealing limitations unrelated to the medical diagnosis, but pertinent to restoration of normal function. Look outside the proverbial box for other causes of dysfunction. The source of pain is rarely located at the site of pain. If you are going to help restore spinal function, ensure patients can withstand the mechanisms of force that will be applied to their specific movement patterns.

As you can see, there are many changes that happen during a loaded movement pattern, and failure to recognize the underlying restrictions can lead to future injury. Take the necessary time to evaluate symmetrical mobility in the ankles, hips, thoracic spine and upper cervical on all of your patients. Ensuring proper movement will make a substantial change in their performance and durability. Lifelong chiropractic patients leading healthy, active lifestyles is what we should all strive for in practice. When you move smarter and better, you perform better.

References

1. Boyle M. *Advances in Functional Training. Training Techniques for Coaches, Personal Trainers and Athletes*. On Target Publications, 2010: 5-10.
2. Kiesel K, Plisky P, Cook G. The Selective Functional Movement Assessment: An Integrated Model to Address Regional Interdependence. Course brochure, 2010.
3. Hubbard TJ, Kramer LC, Denegar CR, Hertel J. Correlations among multiple measures of functional and mechanical instability in subjects with chronic ankle instability. *J Athl Train*, July-Sep 2007;42(3):361-6.
4. Wainner RS, Whitman JM, Cleland JA, Flynn TW. Regional interdependence: a musculoskeletal examination model whose time has come. *J Orthop Sports Phys Ther,* Nov 2007:37(11):658-60.