Kinetic Chain Assessments

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There are a lot of effective techniques and exercises that can be used to address pain and injuries, but the KEY lies in an accurate assessment.

Why do we assess?

- Establish a baseline/starting point
- Create realistic expectations
- Discover specific GOALS and NEEDS
- Create individualized treatment plans that are systematic and progressive
- Help to ensure accountability

If you are not assessing, you're guessing

Using the SOAP acronym is a good way to determine the most appropriate treatment plan. SOAP stands for:

- Subjective
- Objective
- Assessment
- Plan

Subjective

Information gathered by taking a thorough health history. This can help to identify pertinent information such as:

- Occupation
- Lifestyle
- Medical history
- Past injuries
- Surgeries
- Medications
- Dietary habits
- Exercise history

Objective

Data that we can quantify and use to evaluate progress. This can include:

- Weight/Height
- Vital signs (blood pressure and pulse)
- Body composition
- Circumference measurements
- Static posture analysis
- Movement screen
- Range of motion
- Muscle testing
- Upper body strength endurance (e.g., push-up test)
- Lower body strength endurance (e.g., wall squat test)
- Imaging
- Lab tests

The **Assessment** will be based on the data collected from the **Subjective** and **Objective** information, which will ultimately be used to design a **Plan**.

Kinetic Chain Assessments

A kinetic chain assessment is designed to identify dysfunction within the human movement system:

- Altered length-tension relationships of soft tissues (muscles, ligaments, tendons and fascia)
- Altered force-couple relationships (compensatory movement)
- Altered arthrokinematics (joint dysfunction)

Dysfunction in the Human Movement System will lead to:

- Altered sensorimotor integration
- Altered neuromuscular efficiency
- Tissue fatigue and breakdown (cumulative injury cycle)

A streamlined assessment of the Kinetic Chain should include:

1. Static postural assessment
2. Dynamic movement screen
3. Range of motion testing
4. Manual muscle testing

Static Postural Assessment

Janda, a Czech neurologist, identified predictable patterns of muscle imbalance where some muscles become shortened/overactive and others become lengthened/underactive. He labeled these as: Upper Crossed Syndrome, Lower Crossed Syndrome, and Pronation Distortion Syndrome.

Upper Crossed Syndrome

- **Characterized by:** Rounded shoulders and a forward head posture. This pattern is common in individuals who sit a lot or who develop pattern overload from uni-dimensional exercise
- **Short Muscles:** Pectoralis major and minor, latissimus dorsi, teres major, upper trapezius, levator scapulae, sternocleidomastoid, scalenes
- **Lengthened Muscles:** Lower and middle trapezius, serratus anterior, rhomboids, teres minor, infraspinatus, posterior deltoid, and deep cervical flexors
- **Common injuries:** Rotator cuff impingement, shoulder instability, biceps tendonitis, thoracic outlet syndrome, headaches

Lower Crossed Syndrome

- **Characterized by:** Increased lumbar lordosis and an anterior pelvic tilt

- **Short Muscles:** Iliopsoas, rectus femoris, tensor fascia latae, piriformis, adductors, hamstrings, erector spinae, gastrocnemius, soleus
- **Lengthened Muscles:** Gluteus maximus, gluteus medius, VMO, transversus abdominis, multifidus, internal oblique, anterior and posterior tibialis
- **Common injuries:** Hamstring strains, anterior knee pain, low back pain

Pronation Distortion Syndrome

- **Characterized by:** Excessive foot pronation, genu valgus and poor ankle flexibility
- **Short Muscles:** Peroneals, gastrocnemius, soleus, iliotibial band, hamstrings, adductors, iliopsoas
- **Lengthened Muscles:** Posterior tibialis, flexor digitorum longus, flexor hallucis longus, anterior, tibialis, posterior tibialis, vastus medialis, gluteus medius, gluteus maximus
- **Common Injury Patterns:** Plantar fasciitis, posterior tibialis tendonitis (shin splints), anterior, knee pain, low back pain

(Page, 2010)

Dynamic Movement Screen

The Overhead Squat Assessment is designed to assess dynamic flexibility, core strength, balance and overall neuromuscular efficiency. As with the static postural assessment, this should be a systematic process observed from the anterior, lateral and

posterior positions, noting compensations at each of the five major Kinetic Chain Checkpoints (Feet and ankles, knees, lumbo-pelvic-hip complex, shoulders and neck). These compensations can signify over and under active muscles, abnormal force-couple relationships and joint dysfunction.

There are a number of compensations characterized by potentially over and underactive muscles. By integrating range of motion and manual muscle testing, the precise muscles and joints can be isolated, streamlining the process and helping to make the program design more accurate and effective.

Range of Motion Testing

Range of motion assessment looks at the amount of motion available at a specific joint. Active range of motion occurs through voluntary contraction. Passive range of motion is performed without assistance and provides information about joint play and end feel.

Range of motion testing in a clinical setting often involves using a device such as a goniometer or inclinometer in order to quantify joint motion by measuring degrees.

An alternative would be to evaluate motion at the major joints as follows:

- **Functional Non-Painful (FN)-** Normal pain free motion
- **Functional Painful (FP)-** Normal motion that is painful
- **Dysfunctional Painful (DP)-** Abnormal motion that is painful
- **Dysfunctional Non-painful (DN)-** Abnormal motion that is not painful

Regional Interdependence

Regional interdependence is the concept that seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with an area of pain. For example, a patient who complains of low back pain or discomfort may actually be suffering from dysfunction at the ankle, hip or knee joints. By focusing therapies at the most Dysfunctional Non-Painful movement impairments many common problems affecting the foot and ankle, lower back, knees, shoulders and neck can be effectively treated at the source.

(Wainner, 2007)

Manual Muscle Testing

Muscle testing is an art and a science. There are a number of factors that can cause a muscle to test weak. Essentially, muscles must be properly activated by the nervous system in order to produce internal tension to overcome an external force. Muscle testing can help to isolate underactive muscles, that need to be strengthened.

An optimum treatment plan should include:

1. Inhibiting short/overactive muscles
2. Lengthen short/overactive muscles
3. Activate underactive muscles
4. Integrate new movement patterns with multiplanar compound (e.g. Full Body) movements

Key Take-Home

An Optimum treatment plan is only as good as the assessment. Using the SOAP format is an effective way to identify the source (not symptoms) of a problem and specific areas to focus treatment.

References

Clark,M.A., & Lucett, S.C. (Eds.). (2010). *NASM Essentials of Corrective Exercise Training*. Baltimore, MD: Lippincott Williams & Wilkins.

Clark, M.A., Sutton, B.G., Lucett, S.C. (2014). *NASM Essentials of Personal Fitness Training*. 4th Edition, Revised. Burlington, MA: Jones and Bartlett Learning.

Page, P., Frank, C., & Lardner, R. (2010). *Assessment and Treatment of Muscle Imbalance: The Janda Approach*. Champaign, IL: Human Kinetics.

Wainner, R. S., Whitman, J. M., Cleland, J. A., & Flynn, T. W. (2007). Regional interdependence: a musculoskeletal examination model whose time has come *Journal of Orthopaedic & Sports Physical Therapy*, *37*(11), 658-660.

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Dr. Lecovin is a chiropractor, naturopathic physician and acupuncturist. He graduated from the Los Angeles College of Chiropractic in 1990 with a Bachelor of Science in Biology and Doctor of Chiropractic, earned a Masters in Nutrition from the University of Bridgeport in 1992, and then went on to complete the Doctor of Naturopathic Medicine and Masters in Acupuncture programs at Bastyr University in 1994. Dr. Lecovin completed another Masters in Exercise Science from California University of Pennsylvania in 2015. He holds additional certifications in exercise from the National Strength and Conditioning Association (CSCS), International Society of Sports Nutrition (CISSN- ISSN Diploma) and National Academy of Sports Medicine (CPT CES PES FNS WLS), where he is also an Master instructor.

Dr. Lecovin specializes in treating musculoskeletal pain and sports injuries by integrating trigger

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