Objectives

• Introduce the Human Movement System

• Introduce transitional movement assessment

• Discover dysfunctional movement pattern

• Create a systematic approach to eliminate movement dysfunction.
The Future of Athletic Training...
...is Integrated Training

• General Guidelines:
  • Identify all kinetic-chain imbalances.

• Correct all kinetic chain imbalances

• Develop proper structural integrity of the kinetic chain before activity-specific training.

• Integrate functional movements in the plane of motion, range of motion and speed of motion that replicates the training activity.
Corrective Exercising

- Systematic approach designed to identify common movement dysfunctions.

- Accomplished through movement assessments, such as the overhead squat and single leg squat test.

- Understanding normal movement allows identification of abnormal movement.
Look at the whole picture

- All too often we target one specific area without looking at the larger picture.
Today’s Society

- 33.5% of Adult Americans are obese.
- 65% of Adult Americans are overweight.
- 100,000 non-contact ACL injuries occur each year.
- 2 million ankle sprains are treated in the ER every year.
- 80% of Americans have low back pain, 50% experience it in any given year.
Understanding the Human Movement System

- Human Movement System
  - How does the Human Movement System operate as an integrated functional unit?
  - What do our muscles do when we move in everyday life?
  - Functional movements are multidimensional and multiplanar in nature
Solving the Problem

• In order to solve the problem we must have a good understanding of the Kinetic Chain.

  Kinetic Chain

    Myofascial

    Articular

    Neural

    Sensorimotor Integration

    Neuromuscular Control
Current Concepts in Human Movement Science

- Two distinct yet interdependent muscle systems
  - Stabilization System (Stabilizers)
    - Primarily involved in joint support
    - Broad spectrum of attachments
    - Prone to inhibition and weakness
  - Movement System (Mobilizers)
    - Superficial muscles associated with extremity movement
    - Prone to overactivity and tightness
    - Categorized into four common sub-systems
Understanding Muscle Function

• Stabilizers
  - Joint Stabilization
  - Sensory Function
  - Postural Control
  - Isometric/Eccentric

• Mobilizers
  - Joint Movement
  - Angular Rotation and Torque Function
  - Concentric
Understanding Muscle Function

• Stabilizers
  - Gluteus Medius
  - Transverse Abdominus
  - Internal Oblique
  - Multifidus
  - Lower Trapezius
  - Serratus Anterior
  - Rotator Cuff
  - Deep Neck Flexors

• Mobilizers
  - Gastrocnemius
  - Quadriceps
  - Hamstrings
  - Adductors
  - Hip Flexors
  - Rectus Abdominus
  - Erector Spinae
  - Latissimus Dorsi
Understanding Muscle Function

• Stabilizers
  - Delayed recruitment
  - Reacts to pain and pathology with inhibition
  - Loss of joint stabilizations
  - Leads to synergistic dominance

• Mobilizers
  - Become overactive
  - Reacts to pain and pathology with spasm
  - Develops myofascial adhesions which alter (LTR, ATK)
What are Contributing Factors?
Foot & Ankle: Foot Turns Out

Foot Turns Out: Note the 1st MTP Joint in relation to the medial malleolus. In a normal foot the 1st MTP joint will appear along the same plane as the medial malleolus. However in a foot that is turned out the 1st MTP joint will appear lateral to the medial malleolus.
Foot & Ankle: Foot Flattens

Foot Flattens: Note the height of the longitudinal arch of the foot. It should be in a neutral position with a slight curve distinguishable and if the foot flattens it will appear to be flat along the floor. Another indicator of the foot flattening is the Achilles tendon. Note in the neutral picture how the tendon is straight, however when the foot flattens note the lateral angle that is produced by the Achilles tendon.
Foot & Ankle: Heel of Foot Rises

**Heel of Foot Rises:** Note the heel of the foot rising off of the floor. If the heel stays firmly planted on the floor then there is no abnormality. However any rise of the foot from the floor indicates an abnormal movement pattern.
**Knee Moves Inward**: Note a line drawn from the patellar tendon which bisects the ankle. This line should be perpendicular to the ground. If the line is leaning toward the midline of the body then the knee is moving inward.
Knee: Moves Outward

Knee Moves Outward: Note a line drawn from the patellar tendon which bisects the ankle. This line should be perpendicular to the ground. If the line is leaning away from the midline of the body then the knee is moving outward.
LPHC: Low Back Rounds

**Low Back Rounds:** Take notice of the area from approximately the mid back through the Sacral Complex. If the area is rounding then this area will appear as a thoracic or convex curve.
**LPHC: Low Back Arches**

**Low Back Arches**: Take notice of the area from approximately the mid back through the Sacral Complex. If the area is arched then this area will appear with an excessive lumbar or convex curve.
LPHC: Excessive Forward Lean

Excessive Forward Lean: Imaginary lines that are created by the shins and torso of the client if extended out should remain parallel. If these lines would cross immediately or shortly after extending them then the person does have excessive forward lean.
**LPHC: Weight Shift**

*Weight Shift:* Taking a line extending from the cervical spine through the thoracic and lumbar spine that is parallel to the ground should bisect the LPHC resulting in equal parts falling on either side of the line. If the LPHC is split unevenly resulting in a larger percentage on one side of the line then there is a weight shift on the side of the line that has the larger percentage of the LPHC.
Upper Body: Arms Fall Forward

**Arms Fall Forward:** A line bisecting the torso and head should be noted. If this line travels parallel along the arms and the arms cover the ears of the subject then there are no abnormalities present. If the line does not parallel the arms and you can see the ears then the arms have fallen forward.
Shoulder Elevation: In a normal movement observation the arms will maintain a relatively equal amount of distance from the arms. If there is a decrease of the amount of space from the ears to the arm in relation to the opposite side then there is an abnormal movement pattern indicating shoulder elevation on the side of the decreased ear to arm space.
Results from Human Movement System Impairment

- Reciprocal Inhibition
- Synergistic Dominance
- Arthrokinetic Inhibition
- Relative Flexibility
- Pattern Overload
Altered Reciprocal Inhibition

- Increased neural drive or decreased extensibility of an agonist will decrease the neural drive to the antagonist
  - Leads to synergistic dominance
Synergistic Dominance

• The NMS phenomenon that occurs when synergists and stabilizers compensate for prime movers during functional movement patterns.
Arthrokinetic Inhibition

- The process of inhibition that occurs from lack of proper joint arthrokinematics.
Pattern Overload

• Repetitive recruitment of the same muscle fibers, in the same ROM/Plane of motion and at the same speed creates tissue overload and eventually injury.
Returning the Body to Normal Alignment
ICE: Integrated Corrective Exercise

• Identify the kinetic chain imbalance responsible for the movement inefficiency and the biomechanical overload

• Correct the Imbalance
  – Inhibit the overactive
    • Self-Myofascial Release
  – Lengthen the overactive
    • Static Stretching
  – Activate the under-active
    • Active-Isolated Muscle strengthening
  – Integrate functional movement patterns
    • Dynamic Movements

• Empower your client
  – Give your client an individualized corrective exercise plan
  – Give your client an individualized Fitness and/or Performance Enhancement Program
The Overhead Squat

- Feet
- Knees
- Hips (Lumbar Spine)
- Shoulders
- Head
Corrective Exercise Strategy

1. Inhibit
2. Lengthen
3. Activate
4. Integrate
Normal Movement Assessment
Single-leg Squat Assessment
Can You Guess the Chief Complaint?
ICE: Integrated Corrective Exercise

- Identify the kinetic chain Imbalance responsible for the movement inefficiency and the biomechanical overload

- Correct the Imbalance
  - Inhibit the overactive
    - Self-Myofascial Release
  - Lengthen the overactive
    - Static Stretching
  - Activate the under-active
    - Active-Isolated Muscle strengthening
  - Integrate functional movement patterns
    - Dynamic Movements

- Empower your client
  - Give your client an individualized corrective exercise plan
  - Give your client an individualized Fitness and/or Performance Enhancement Program
Self-Myofascial Release

- **Self-Myofascial Release (SMR)** is another form of flexibility training that focuses on the fascial system in the body.
  - The gentle pressure applied with implements such as a foam roller will assist in releasing the knot by stimulating the Golgi tendon organ and thus creating autogenic inhibition.
  - Self-myofascial release is also suggested prior to static stretching for postural distortion patterns and/or activity as well as a useful cool-down.
Self-Myofascial Release
Static Stretching

- **Static Stretching** is the process of passively taking a muscle to the point of tension and holding the stretch for 20 seconds.
  - By holding the muscle in a stretched position for a prolonged period of time (minimum of 20 seconds), the Golgi tendon organ is stimulated, producing an inhibitory effect on the muscle spindle (autogenic inhibition).
Static Video
Activate

- Positional Isometrics
- Isolated Strengthening
Integrate

Integration consists of moving from training individual muscles (Activate) to initiating functional movement patterns.
Where are they going now?

• A comprehensive training approach that strives to improve all components necessary to allow each individual to achieve optimum performance (Clark 2000, Kraemer 2004)
  – Flexibility
  – Core Strength
  – Neuromuscular Efficiency
  – Power
  – Strength
  – Cardiorespiratory Efficiency
Corrective Exercise Specialist

NASM provides advanced credentials in both corrective exercising (CES) as well as performance enhancement (PES).

NASM has collaborated with California University of Pennsylvania to offer 12 month accelerated web based Masters of Science Degree in 3 separate tracks.

- Rehabilitation Sciences
- Performance Enhancement/Injury prevention
- Fitness and Wellness