### Terms To Know

- **Joint Stability**
  - The ability to maintain or control joint movement or position. Stability is achieved by the coordinating actions of surrounding tissues and the neuromuscular system (ACE 2011).
- **Proprioception**
  - The sense of the relative position of neighboring parts of the body and strength of effort being employed in movement (Wikipedia).
- **Balance**
  - The ability to maintain center of mass over its base of support.
- **Perturbation**
  - A deviation of a system, moving object, or process from its regular or normal state of path, caused by an outside influence.

### Why Train For Balance?

- Balance training is crucial for fall prevention, but is not limited to senior exercise.
- Balance training should be incorporated to improve fitness in any population:
  - Improves neuromuscular coordination
  - Reduces ankle sprains and improves knee stability
  - Improving athletic performance
Reducing Injuries

- According to the AJSM (2016) balance training significantly reduced athletes’ ankle sprains.
- 6% ankle injuries vs 9%
- For those without balance training with a previous ankle injury, their risk increased two-fold.
- Dynamic balance training improved landing forces, reducing knee injuries, as significantly as plyometric training (JSCR 2016)

Improving Performance

- Balance in conjunction with other performance training techniques enhances athletic skill
- Proposed mechanism by improving motor skills is through increasing rate of force development
- Balance training has shown to increase vertical jump, agility, shuttle run time, and speed.
- Correlation between balance and higher level athletes in certain sports.

Improving Neuromuscular Control

- Balance training improves functional performance.
- Improvements in postural sway and intermuscular coordination
- Improvements in lower body strength
- Effective for improving jumping, sprinting, and agility
- Improves response of mechanoreceptors and CNS reflexes.
Where Balance Comes From

- Three systems responsible for balance:
  - Visual System
  - Vestibular System
  - Somatosensory System
- A disruption in any or all will impair balance.
- Training programs should alter different systems to enhance balance completely.

The Visual System

- Visual signals sent to the brain about body's position in relation to surroundings.
- Compared to information from the vestibular and somatosensory systems.
- Vestibulo-ocular reflex
  - Vestibular sends signals to the muscles of the eyes to stabilize gaze when head is moving.

The Vestibular System

- The vestibular apparatus is an organ located in the inner ear.
- Responsible for maintaining equilibrium.
- Receptors detect head movement and direction changes.
- Sends information to the brain to correct position or posture.
Somatosensory System

- Receptors in the skin, muscles, and joints provide information about stretch or pressure to the nervous system.
- Helps our brain determine where our body is in space.
- Skin sensitivity is reduced with increasing age leading to lack of input from tactile, pressure and vibration receptors.

Our Balance Systems At Work

Balance Progressions

- Progress from more points of ground contact to less.
- Progress from stable to unstable surfaces.
- Once drills have been mastered, add visual and vestibular challenges.
- Goal is to find your tipping point and challenge it.
Floor Based Balance Challenge

• Not all balance drills need to be standing
• These can be an option for those how cannot balance standing.
• Also, helps improve core stability necessary for higher level drills.

Bird Dog Balance Challenges

Try this concept with planks & bridges too!

In Line Kneeling Challenges
Kneeling Monster band Balance

Standing In Place Drills

- Static balance drills are great for assessing and introducing balance challenges.
- Once adequate static balance is demonstrated, progress to more dynamic balance challenges.
- Dynamic = Functional Balance

Single Leg Sagittal Plane Challenge
Single Leg Frontal Plane Challenge

Single Leg Transverse Plane Challenge

Star Excursion
Monster Band Battles

BOSU MB Toss
*Can be done on any unstable surface*

Perturbation Drills
* Thomas et. al. (1998) found greater core activation with perturbation vs. constant external load.
* Challenge different postures and positions by placing random external loading with a partner.
* Eyes close prevents clients from seeing where the disturbance is coming from.
Dynamic Balance Challenges

Walk The Line
*Try this with a kettlebell too!*

Circle Hops
Monster band Walking Drills

Monster Band Lunge Drills

The Mine Field