



## **Functional Biomechanics for the Foot and Lower Extremity with Consideration for Orthotic Intervention**

**Date & time:** Friday, March 9, 2018 1pm-5pm

**Cost:** \$120 early bird; \$135 regular

**Where:** Stretch to Win Institute

Teacher: Derek Steveson, PT, DPT, FAFS, ASTYM Cert.

About Dr. Steveson:

In December, 2001, Dr. Derek Steveson founded the Functional Performance Center as a way to fill the need to provide high level professional health services to our community. He earned his Doctor of Physical Therapy degree from Creighton University in 1996. He served as the Official Rehabilitation Consultant to the Arizona Diamondbacks from 2001-2007, has had the distinct privilege of being the colleague of Dr. Gary Gray, PT, and closely associated with the Gray Institute since 1997.

Dr. Derek has mentored nearly 100 doctoral students and lectured all over the world on the principles, strategies, and techniques of Applied Functional Science and Functional Biomechanics from the Gray Institute. He has prescribed over 5,000 custom-molded biomechanical foot orthotics as well. Dr. Derek is an ASTYM-certified provider and trained in 3DMAPS Movement Analysis Screening.

In 2007, Derek invented what was known as the Core Stick and now known as the Core Momentum Trainer (CMTtm), which is a unique device that allows for the muscles of the core to be activated and strengthened in all planes of motion.

- I. Course Objectives
  - A. Obtain a cursory understanding of the basic foot types and basic function of the foot and ankle.
  - B. How to functionally test if a shoe insert or orthotic is indicated.
  - C. Gain a cursory understanding of chain reaction biomechanics when the foot hits the ground.
  - D. Perform a cursory lower extremity functional movement screen and basic principles to prescribe functional exercises.

Detailed course breakdown:

- I. Introduction (3D Biomechanics)
  - A. Functional Biomechanics – kinetic chain reaction review.
  - B. Human foot anatomy review
  - C. Foot types
    1. Flat feet – Pes Planus: The flat foot is found in nearly 30% of the population and is associated with midfoot laxity and tight heel cord/gastrocnemius. These feet don't pronate effectively because they hit the ground in an already pronated position. This foot type is more prone to medial tendon issues (i.e. Posterior tibial tendonitis and 2<sup>nd</sup> metatarsal stress fractures), as well as plantar fasciitis.

2. High arch feet – Pes Cavus: The high arched foot is more often associated with a rigid midfoot and excessive forces being distributed through the big toe joint. Often associated with sesamoiditis, lateral tendon issues (i.e. peroneal tendinitis) as well as ankle arthritis and lateral ankle sprains.
3. Neutral feet – Optimal arch height.
- D. Planes of Motion (for the foot and ankle) review
- E. Planes of Motion (for the body) review
- F. Motion vs. Static Position Terminology
- G. Foot Motions
  1. Pronation – The triplane movements of forefoot abduction, ankle dorsiflexion, and subtalar eversion.
  2. Supination – The triplane movements of forefoot adduction, ankle plantar flexion, and subtalar inversion.
  3. Foot Biomechanics during gait description
- II. Gait Considerations
  - A. Walking is a series of reciprocating collapsing events.
  - B. Assessing gait
    1. Speed
    2. Stride length
    3. Toes in/out
    4. Crouching
    5. Sideways/Backwards
    6. Toe walking
- III. Orthotic Intervention Assessment
  - A. Detailed History
  - B. Lower Extremity Functional Screen: includes 3DMAPS (Gray Institute); Quick Screen; Single leg mini-squat; Heel raise
  - C. Foot Screen
    1. Prone subtalar neutral (rearfoot varus, forefoot varus, forefoot valgus)
    2. Supine Midtarsal Joint Mobility – (invert the rearfoot – MTJ should lock up, if it doesn't then laxity exists. Evert the rearfoot – MTJ should move, if it doesn't then excessive stiffness exists.)
    3. Standing assessment – look for arch position and single leg tibia stance angle.
    4. Single leg squat with inner ½ of the foot on a folded towel for flat feet or under the lateral ½ of the foot for high arched feet. Optimally, the knee should move into a little valgus (move inward), balance and depth should improve and the knee moves over the 1<sup>st</sup>/2<sup>nd</sup> toes.
- IV. Functional Exercise Prescription
  - A. Integrated
  - B. Triplanar
  - C. Subconscious
  - D. Safety – Success – Challenging
- V. Wrap up
  - A. Break into groups to perform basic cursory foot/LE biomechanical screens
  - B. Putting the puzzle together.