LESSON 2

biopods™

Optimal "Natural" Foot and Lower Limb Function

In this lesson:

- Sensory input, Right Stimulus, Right Movement
- The Windlass Mechanism
- Dynamic arch system
- Cuboid Pulley Mechanism
- Functional dome-shaped system
- Barefoot gait mechanics
- Barefoot gait and the shock myth

Your Critical Connection Resources

To download the resources, visit biopodsmedical.com

Slide Deck
guides you through the presentation. A good place for you to take notes.

Coursebook
provides more in-depth coverage of each lesson's topics.

Monograph
provides a deeper dive into all of the lessons.

Introducing **Your Instructor**

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Master Strength Coach and Human Performance Specialist; Integrated Health, Wellness, and Sports Medicine Educator; Multi-Award Winning Carleton University Faculty, Retired; Television Commentator and Sports Analyst; Drug-Free Strength Athlete; Martial Arts Instructor

Barefoot gait mechanics: Let's look at what happens when we walk or run barefoot on natural terrain.

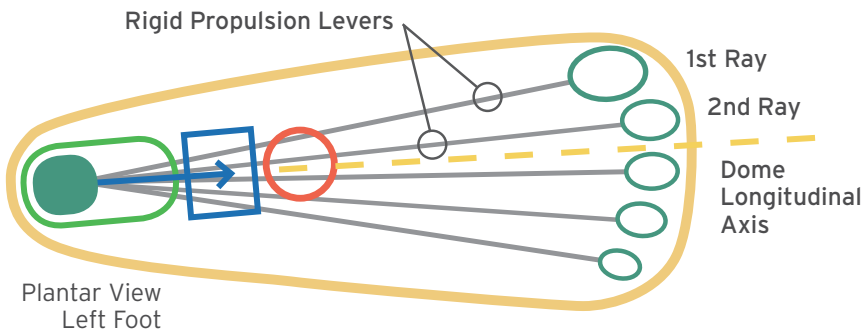
With each step, the soles of the feet experience subtle variations in terrain.

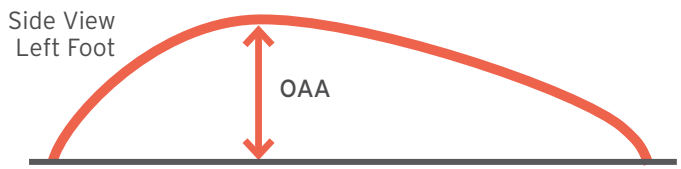
- Our body's protective reflex mechanisms are on high alert
- Before the feet hit the ground, preventive muscle activations are triggered throughout the feet, legs, hips and back
- Muscle activations align and stabilize our skeletal structure and create muscle efficiency throughout our feet, legs, hips, and back
- Our bodies adapt to the contours of the terrain and manage contact, weight-bearing, and propulsion forces

A dynamic **dome-like structure**

Functional Foot 'Dome'

- Ground Contact Points
- Calcaneus
- OAA **Optimal Arch Apex**
- **Talus** (showing trochlear/tibial plane of glide)
- **Navicular** (in a fixed position within the propulsion Lever, and thus can act as the pivot point for its 'universal-joint-like' capacity via its multiple articulations



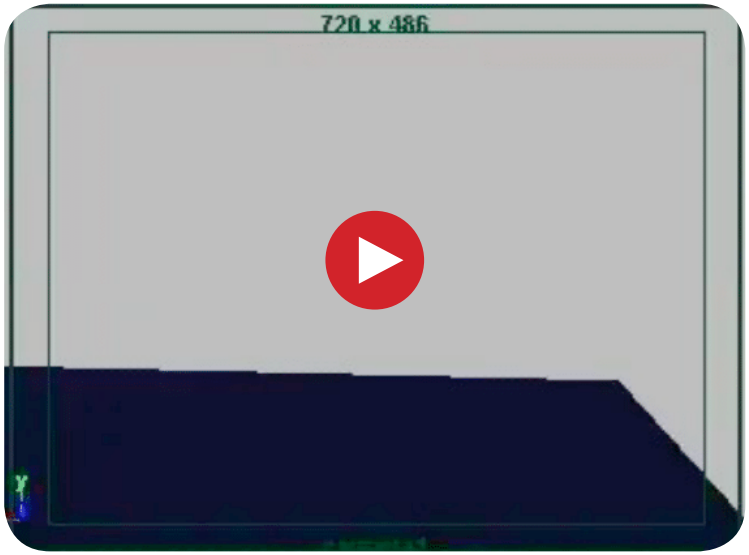


Optimal "natural" foot and lower limb

Before the feet contact the ground, in anticipation of "uncertain" forces, the body is in a high alert state. Preventive muscle activations are triggered throughout the feet, legs, hips, and back to facilitate safe and efficient locomotion

- optimal alignment and stabilization of the skeletal structure throughout the feet, legs, hips, and back,
- optimal muscle efficiency throughout the feet, legs, hips, and back,
- optimal adaptation to the contours of the terrain, and
- optimal management of contact, weight-bearing, and propulsion forces

The Windlass and Cuboid Pulley Mechanisms

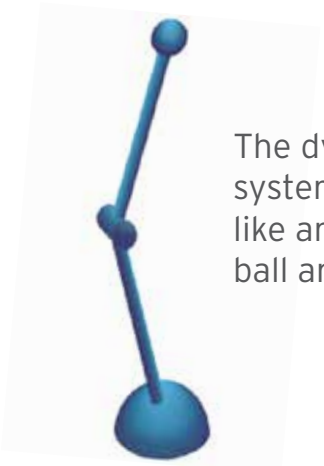


The Windlass Mechanism works with the Cuboid Pulley Mechanism to transform the foot from a loosely packed bag of bones to a rigid spring-like lever that manages the loading forces during gait.

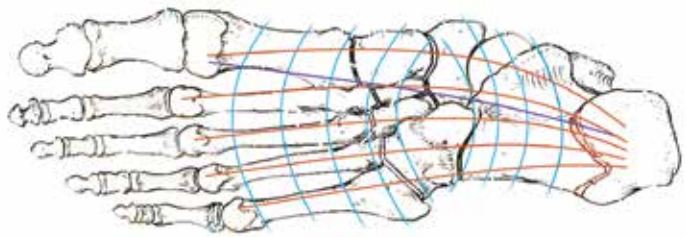
These mechanisms are integral to the protective neuromuscular activity that occurs during healthy optimal gait. Prior to the foot touching the ground, in anticipation of the unexpected, the toes and arches rise synergistically and remain raised throughout ground contact. The height of their rising is proportionate to the activity intensity protective reflex response.

Freedom of movement of the toes and arches is essential for effective Windlass function in the foot.

How the **dynamic arch system** functions



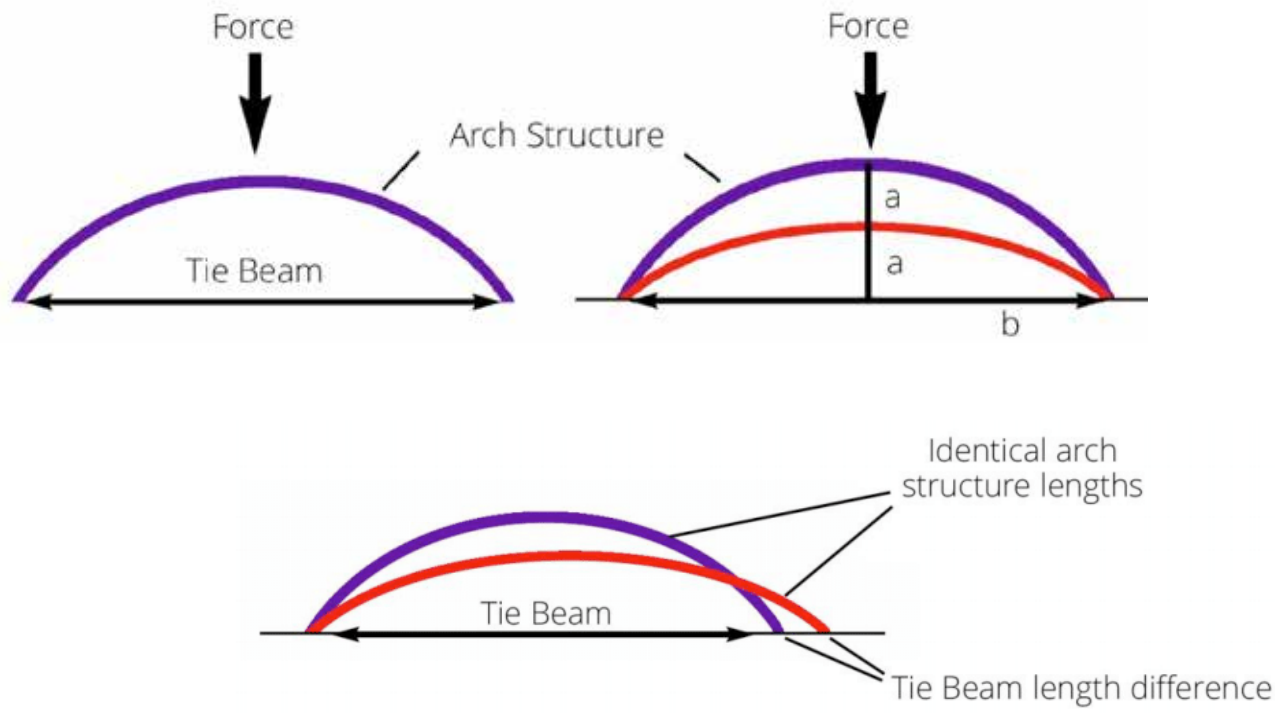
The dynamic arch system functions like an imaginary ball and socket joint



Bones of the foot form a dome-like shape with a multiplicity of arches

The dynamic arch system:

Enhanced structural integrity



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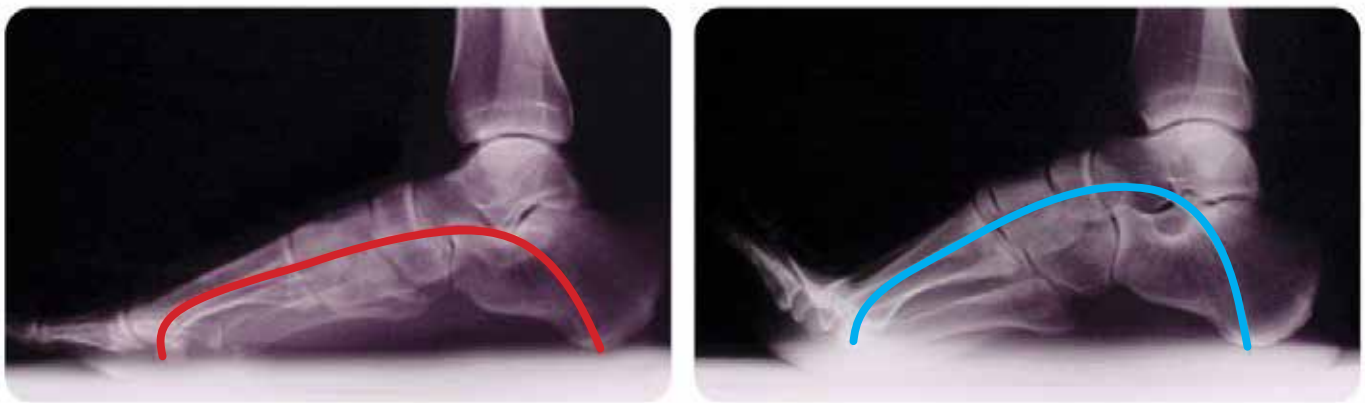
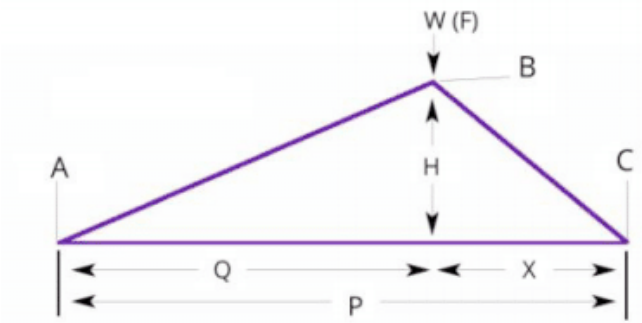
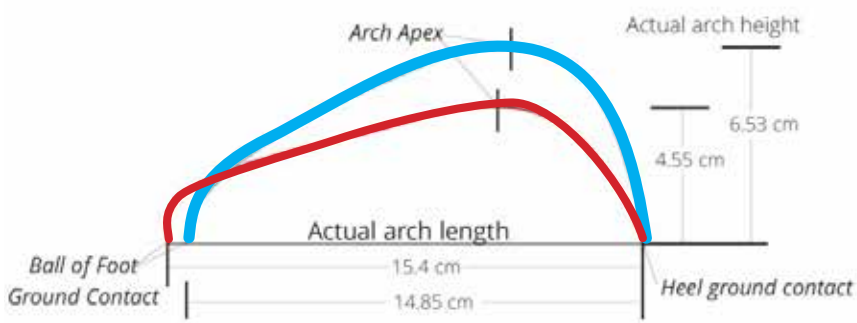
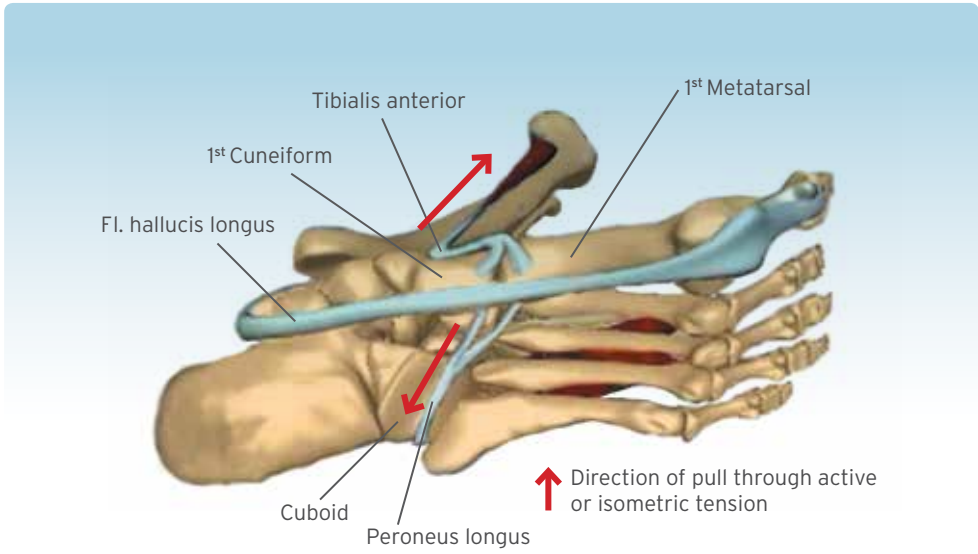






The Cuboid Pulley Mechanism



The Cuboid Pulley Mechanism works with the Windlass Mechanism to transform the foot from a loosely packed bag of bones to a rigid spring-like lever that manages the loading forces during gait.

Freedom of movement of the toes and arches is essential for effective Cuboid Pulley mechanics.

As the foot touches the ground, the toes and arches are raised.

The sesamoid bones

The sesamoid bones act as a cam to increase Windlass Mechanism dynamics and to stabilize the arch system during loading. As the foot touches the ground, the toes and arches are raised.

Freedom of movement of the toes and arches is essential for effective Cuboid Pulley mechanics.

As the foot touches the ground, the toes and arches are raised.

Optimal dome dynamics

Functional Foot 'Dome'

- Ground Contact Points
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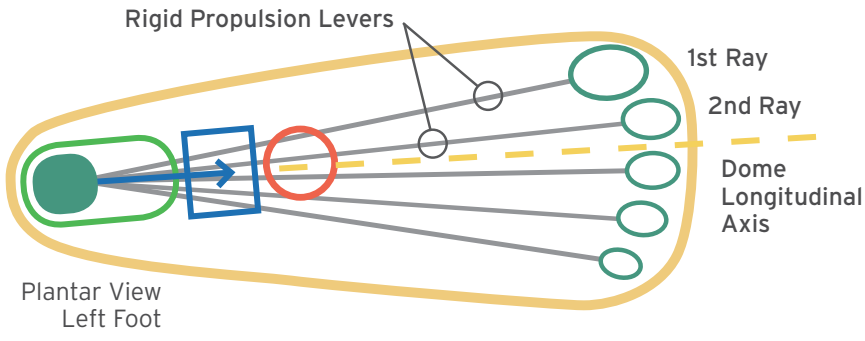

Barefoot gait mechanics

Extrinsic foot muscles are located in the shin and calf.

- Muscles in the shin raise the toes and arch
- Muscles in the calf in concert with muscles in the shin create, maintain, and control the stability of the foot and ankle during walking or running.

Small **Intrinsic** foot muscles are involved with fine motor control activities. When the extrinsic muscles fail to function properly, they will attempt to "pick up the slack" and become overworked and fatigued.

So, let's take another look at **barefoot gait.**

When we're barefoot, the soles of our feet experience the subtle variations in the terrain with each step. As a result:

- Our body's protective reflex mechanisms are on high alert
- Preventive muscle activations are triggered throughout our feet, legs, hips, and back in anticipation of the unknown experience with the next steps and preparing for safe and efficient locomotion before the next foot hits the ground
- So, our musculoskeletal structure is prealigned and stabilized with optimal muscle efficiency, optimal adaptation to the contours of the terrain, and demonstrates optimal management of gait-related forces.

How did you do?

Let's test your knowledge.

You'll need to answer a few questions.