LESSON 4

# Neuromuscular Pathology Treatment Options

**In this lesson:**

- Conventional treatment methods
- BioPods technologies and related complementary treatment modalities
- The BioPods clinical protocol

# 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 Presenter**


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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

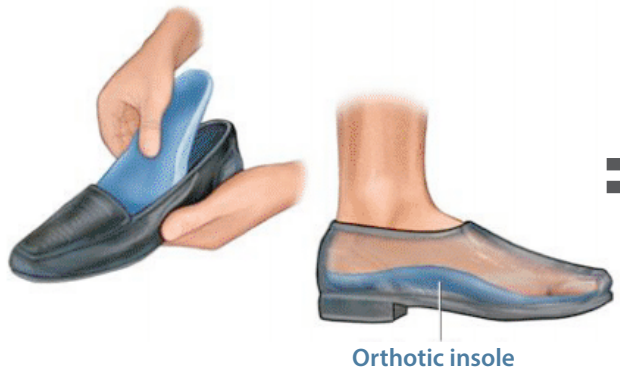
# **Conventional** treatment methodologies




| Palliative | Therapeutic |
|---|---|
| Ice | Chiropractic manipulation/adjustments |
| Heat | Acupuncture |
| Creams, ointments and rubs | Deep tissue massage/Ultrasound |
| Compression wraps and braces | Shock wave therapy |
| Electrotherapy | Laser |
| Exercise | A.R.T./Graston Technique® |
| Oral anti-inflammatories and/or analgesics | Exercise |
| Cushioning or supportive insoles (custom orthotics) | Stimulating/rehabilitative insoles (BioPods) |

Long-term support, bracing, or cushioning

**is not recommended.**

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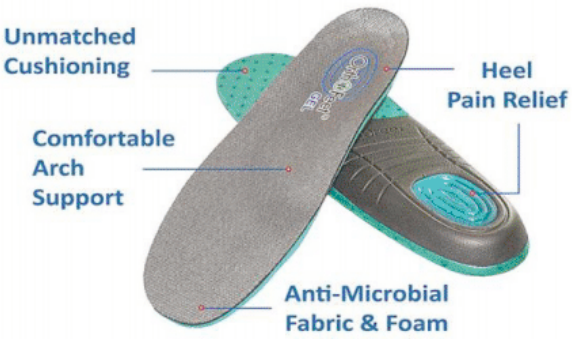


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Conventional treatment methodologies:

# post-knee surgery options

**Old School:**
Plaster cast, leg casted
for at least six weeks

**Today:**
Mobility splint, mobility exercises
begin a day or two after surgery

Conventional treatment methodologies:

# rehabilitative exercise programs

**Rehabilitative exercise programs have been the recommended first treatment option in virtually all areas of musculoskeletal medicine—except for feet, until now.**

## Post Operative Rehabilitation

- Rapid post-operative mobilization
- Range of motion exercises started
- Continuous Passive Motion (CPM)
- Passive extension— by placing pillow under foot
- Flexion— by dangling legs over the side of bed
- Muscle-strengthening exercises
- Weight-bearing is allowed on first post-op day

How effective are

# foot rehab exercises?

**Common foot rehab exercises have little relevance for restoring ideal gait mechanics because they focus on the toe flexors and don't engage the extensors.**

## Some of the most common foot rehabilitation exercises:

- Roll a ball or cylinder under arches
- Plantar-flex the toes
- Grasp an object or towel with toes

## What therapeutic exercise should include:

- Multidirectional movement
- Condition "automatic" movement memory
- Condition real-life responses
- Condition for flexibility, strength, endurance, agility, coordination and balance

# The inadequacies of
# conventional supportive insoles

As a form of treatment, supportive, cushioning, and custom made insoles are palliative at best.

With Orthotic

Without Orthotic[1]

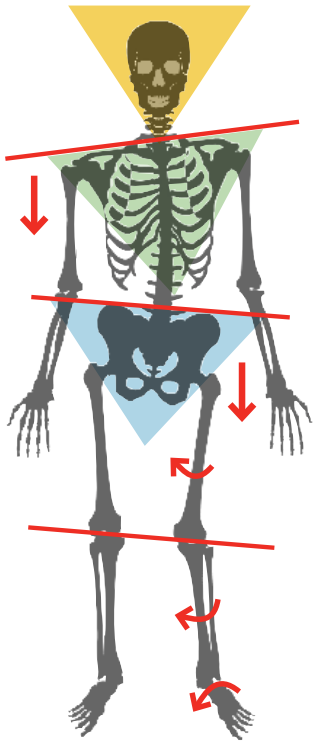
| THE CLAIMS | The alleviation of symptoms by correcting pronation. |
|---|---|
| THE PROCESS | Casting or force plate measurements of a dysfunctional foot, in fact, "modeling" it. |
| THE THEORY | Rear or forefoot "postings" create "subtalar neutral." |
| THE REALITY | At best, creates a new foot/ground interface angle. |
| THE RESULT | Possible symptom relief, but with a new "wrong" foot alignment destined for further maladaptation. |

Arch geometry adjusted for orthotic height

* 1 - Same subject in same footwear.

The inadequacies of

# conventional supportive insoles



Most importantly, while products that support and/or cushion the feet may provide some temporary relief, they further dampen the Right Stimulus to the soles of the feet that is required by the brain for healthy neuromuscular function throughout the feet, legs, hips, and back.

The resulting maladaptive function becomes the functional norm.

BioPods are designed to re-create a

# "barefoot-like sensory experience."

**BioPods achieve this by integrating the two essential parameters of a shod "barefoot-like experience"**

- **Right Stimulation** – Varied stimulation of the soles of the feet as if barefoot on natural terrain
- **Right Movement** – A shoe environment that permits the natural dynamic movement of the foot (use of the loosest, softest, most supple footwear possible)

Optimal results are achieved with footwear that allows the unimpeded pre-ground contact raising of the arch and toes needed to create the Windlass Effect.

Introducing

# BioPods disruptive technologies

Easily incorporated into insole and footwear products


BioPods Disruptive Technologies

BioPods rehabilitate and restore

# "natural" neuromuscular function

**Here's what they do that others don't:**

- Provide varied, subtle, sensory stimuli to the sole of the foot
- Safely stimulate and retrain "natural" protective reflex responses throughout the feet, legs, hips, and back for
  - a stronger, more stable arch structure
  - improved alignment and muscle function
  - efficient management of activity-related loading forces
  - enhanced performance.
- Work like an exercise program for the feet, legs, hips, and back
- Address the cause of the majority of structural dysfunction and associated pathologies.

# BioPods enhance performance and **reduce risk of injury**

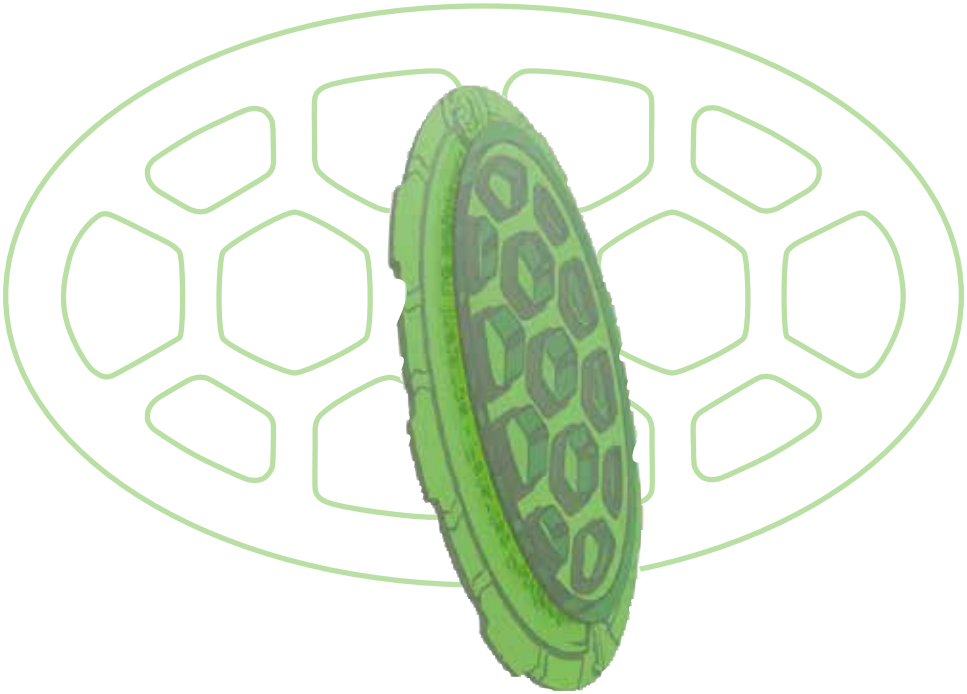
**BioPods reduce stress at joints and lever-arm mechanics and improve neuromuscular function**

- Improve structural alignment
- Enable more efficient muscle use –energy is directed to performance instead of compensating for poor alignment
- Enable efficient structural dynamics for an optimally aligned and more efficient stride
- Reduce oxygen consumption

# Recommendations
# **for using BioPods**

- All the time: All ages and during all gait-related activities
- As a "first step therapy" for treatment of most foot-related pathologies
- As complement for virtually all lower extremity rehabilitative therapies, including pre- and postsurgery
- To rehabilitate before bracing

# BioPods features

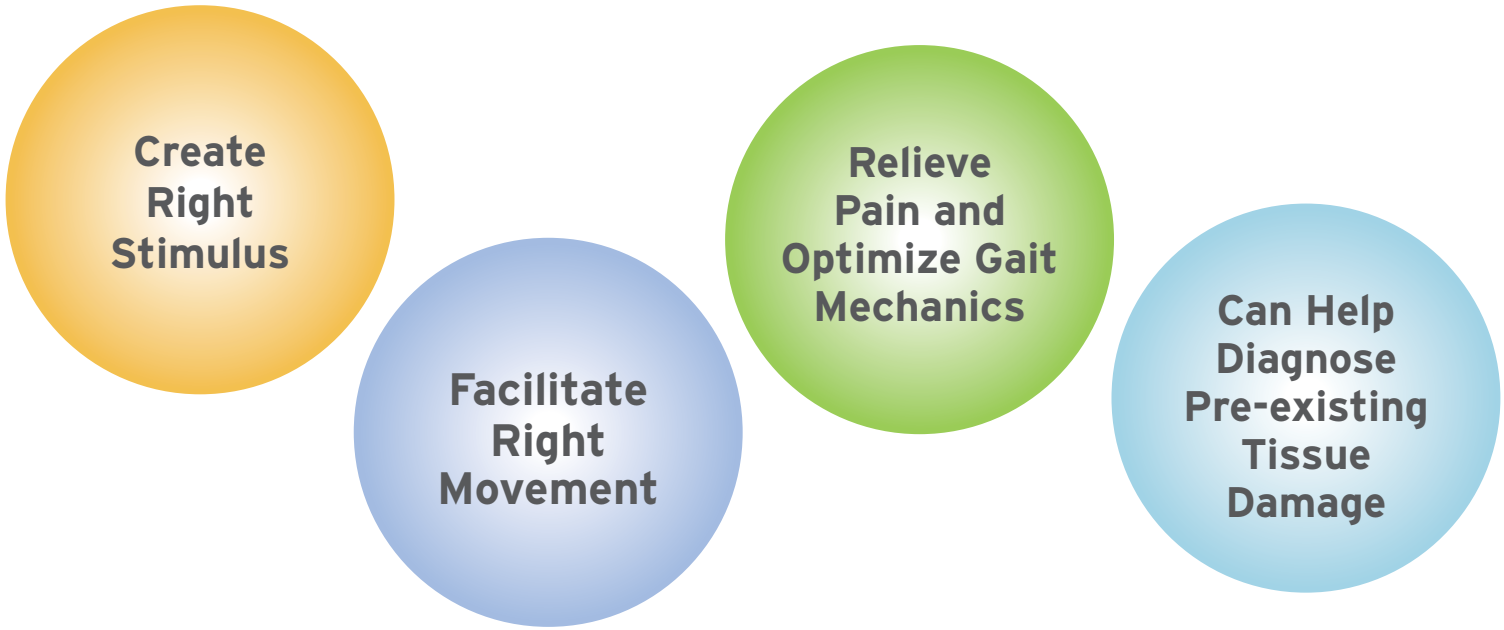


- Easily incorporate into insole and footwear products
- Patent-pending Variable Reflex Technology (VRT) stimulation mechanisms provide subtle, varied stimulus to the sole of the foot
- Proprietary materials

BioPods:

# A New Paradigm

Products that incorporate BioPods Technologies:



# A BioPods-trained practitioner

## Essential clinical characteristics of a BioPods-trained practitioner

- Can easily identify a maladapted foot (via FDIs)
- Understands that a maladapted foot is the cause of most nontraumatic kinetic chain symptoms and pathologies
- Uses BioPods technologies as part of a comprehensive rehabilitation program
- Anticipates and understands the emergence of latent tissue damage sites and will alleviate them accordingly

# The BioPods Clinical Protocol

## BioPods Foot Dysfunction Indicators

1. Bunions
2. Bunionettes
3. Callus & corns
4. Hammer Toes
5. Claw Toes
6. "Flat" Feet
7. Pes Cavus (excessively high arch)
8. Genu Valgus
9. Genu Varus
10. "Pigeon-Toed"
11. Hallux Valgus
12. External Hip Rotation
13. Forefoot Splay
14. Longitudinal Toe Rotation
15. Overlapping Toes
16. Loss of Toe Gaps
17. Misaligned Subtalar Joint Alignment
18. Pronated Forefoot with Inverted Calcaneus
19. Supinated Forefoot with Everted Calcaneus
20. Everted Calcaneus
21. Inverted Calcaneus
22. Bony Protuberances of the Foot (multiple sites possible)
23. High Iliac Crest
24. Pelvic Torsion
25. "Pump Bumps"
26. Fifth Toe "Flail"
27. Excessive Ankle Plantar flexion (when non-weight-bearing)

| Foot Dysfunction Indicator (F.D.I.) | Pathomechanics of the F.D.I.'s |
|---|---|
| Bunion | Non-rigid lever propulsion, with inefficient Windlass, and a consistently restricted toe box creates a valgus/compressive force onto the distal joint of the hallux; over sufficient time, bone, joint, and connective tissues remodel themselves according to the prevailing forces applied |
| Bunionette | Rigid upper material, compressing the 5th metatarsal, during toe off that has a torsional component; due to inefficient Windlass and 1st ray non-rigidity for propulsion; varus stress over sufficient time will induce bone and soft tissue remodeling with a varus angle, upon the distal joint of the 5th ray |
| Callus & Corn | Tight rigid footwear, combined with inefficient Windlass and non-rigid 1st ray lever, results in non linear propulsion; torsional stress will induce multiple opportunities for friction – the cause of callus and corn |
| Hammer Toe | When the absence of "Right Stimulus" fails to activate proper firing of many muscles of the foot and/or when footwear restricts toe movement (dorsiflexion), the toe flexor muscles can overpower their extensor counterparts, thereby causing "hammer toe" |
| Claw Toe | Absence of "Right Stimulus" fails to activate proper firing of many muscles of the foot; inappropriate flexor muscle activity with no extensor muscle activity to balance the forces, causes the "claw toe" |
| "Flat Feet" | Habitual, inefficient, Windlass Effect cannot create any functional arch (let alone an Optimal Arch Apex) and eventually stays flat (i.e., habitually pronated) |
| Pes Cavus | Tight rigid footwear, from a very young age, creates an environment in which the tibialis anterior and the peroneus longus are in simultaneous contracture, a permanent state of a high, rigid Windlass Effect results |
| Genu Valgus | A chronic state of pronation, due to inefficient Windlass Effect, will readily lead to internal rotation of the tibia and femur with contracture of the iliopsoas, and will put the ipsilateral knee into a valgus position |

# The BioPods Clinical Protocol

**Virtually everyone who walks on two feet and wears shoes will benefit.**

- Benefits of Stimsoles
  - Preventative
  - Therapeutic
  - Performance enhancing
  - All while providing optimum comfort

# Clinical Protocol – **Step 1**

## **Evaluate** your patient based on BioPods Inclusion Criteria

**A**

A nontraumatic presenting complaint of a weight-bearing body part

**B**

At least one Foot Dysfunction Indicator confirmed

**C**

Palpation confirmation of tissue damage and/or pathology at site of pain

**D**

Maladapted foot function/physiology

If any of the following criteria is observed, BioPods should be a therapeutic component of a rehabilitation plan:

**A** + **B**

| | |
|---|---|
| **A** + **C** and/or **D** | **B** alone |
| **B** + **C** and/or **D** | **D** alone |

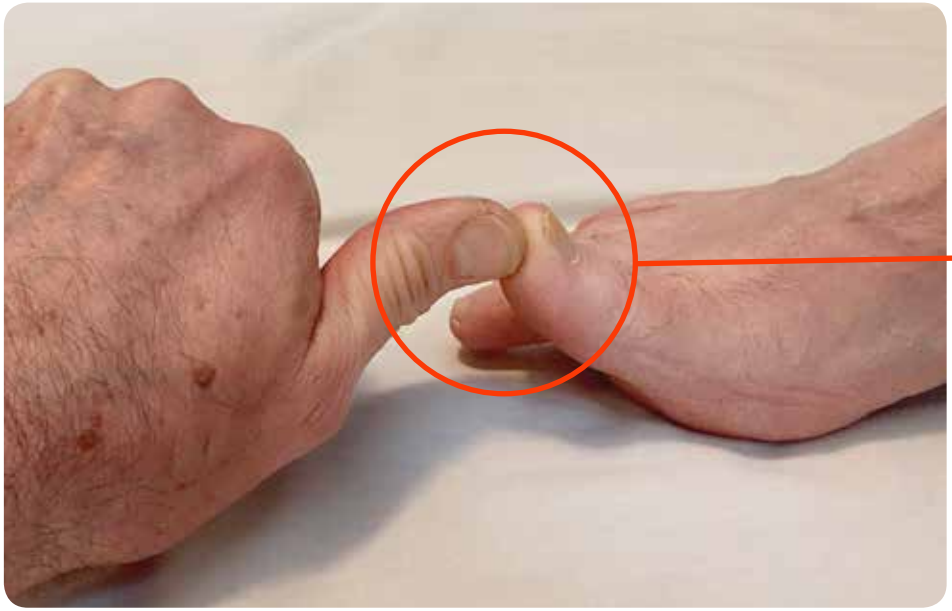
# Contraindications

**One absolute contraindication: Hallux rigidus, or complete immobility of the hallux due to genetics, arthritic, traumatic, or surgical fusion.**

Verify complete immobility by attempting to move the great toe by passively challenging the hallux into its extended position.

If the great toe is completely rigid, BioPods Stimsoles will have little or no benefit and may be uncomfortable.

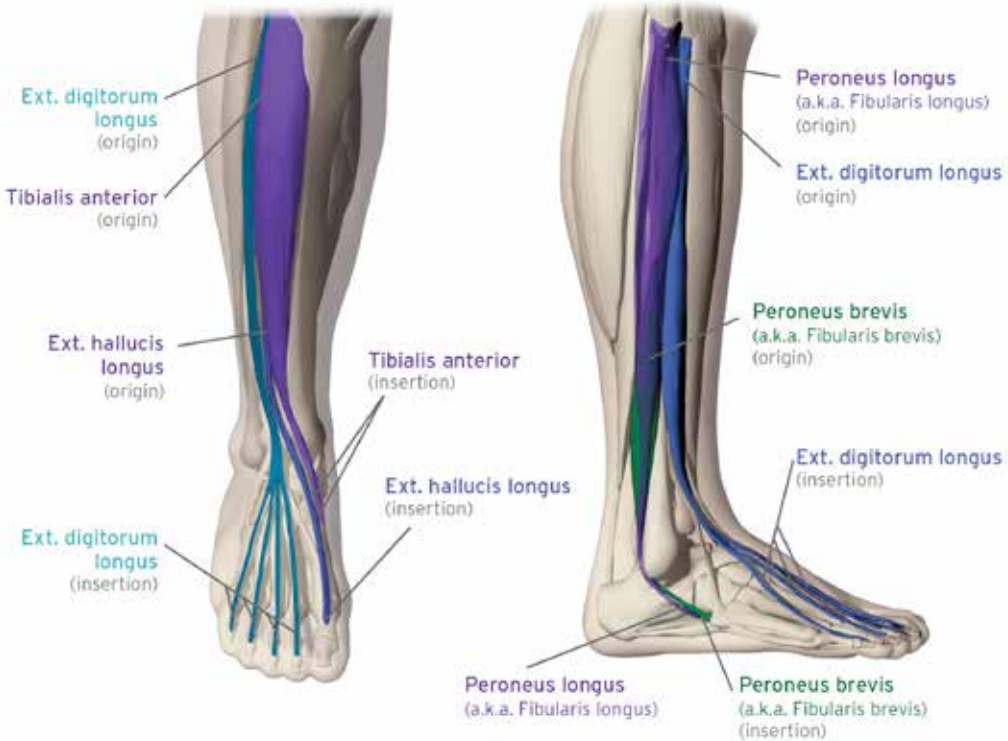
# Challenging applications



If you can demonstrate at least moderate, passive extension in the great toe, BioPods Stimsoles may be employed.

# Challenging applications requiring additional considerations

**1. Absence of voluntary neurologic control of extensor hallucis longus muscle activity offers an unpredictable outcome. Success will depend on the cause** (e.g., peripheral neuropathy, MS, ALS, Parkinson's).

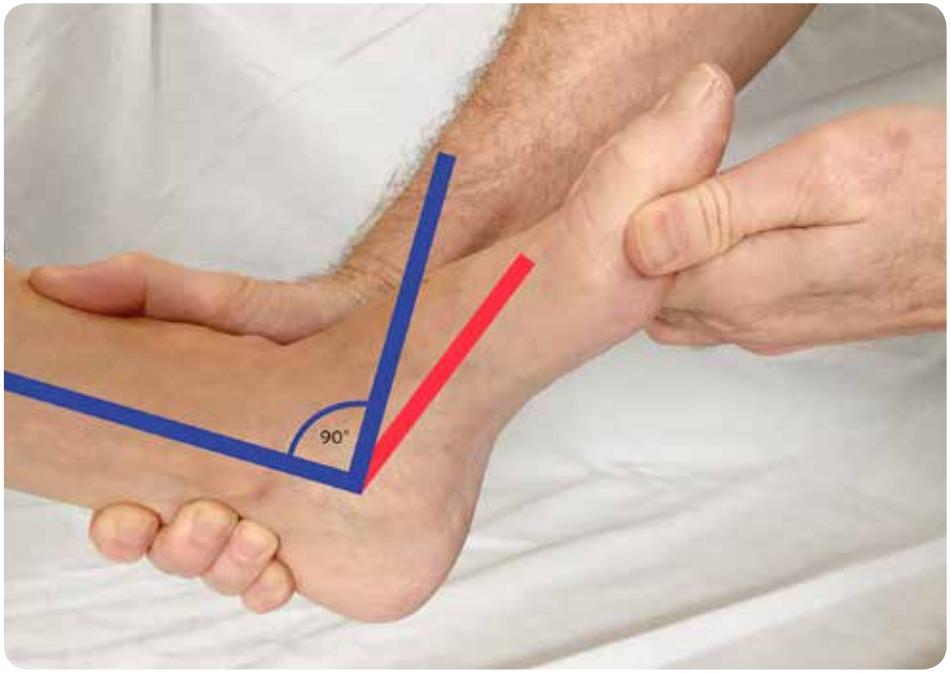



Because, in some cases, they may induce reflex activation of the extensor hallucis longus, BioPods Stimsoles are a clinical trial worth pursuing.

You may need to have your patient test various stimulus intensity levels.

# Challenging applications requiring additional considerations

**2. Inability to dorsiflex one or both talonavicular joints beyond the 90º position indicates that mobilization or manipulation would be of benefit.**

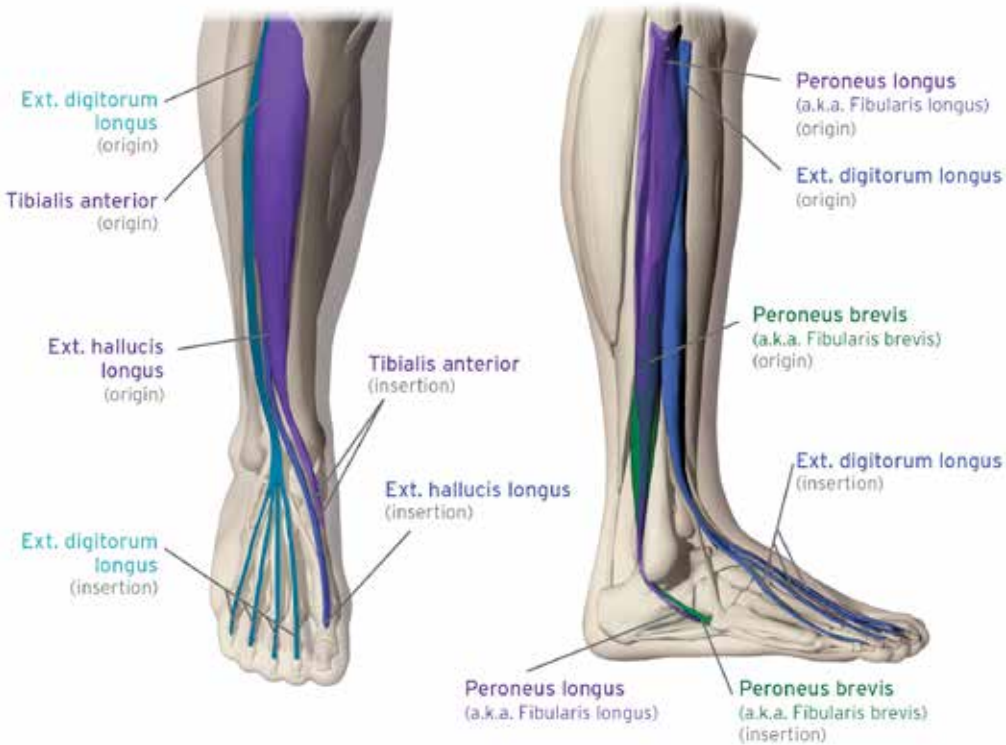



Select the most appropriate therapy.

Also recommend self-therapy concurrent with regular use of BioPods Stimsoles during gait, including heel walks and/or repetitive, full-range dorsiflexion with the heel resting on the floor.

# Challenging applications requiring additional considerations

**3. Neurologic loss of voluntary control of either or both tibialis anterior or peroneii muscles may offer an unpredictable outcome after implementation of BioPods Stimsoles. Success will depend on the cause** (e.g., peripheral neuropathy, MS, ALS, Parkinson's).

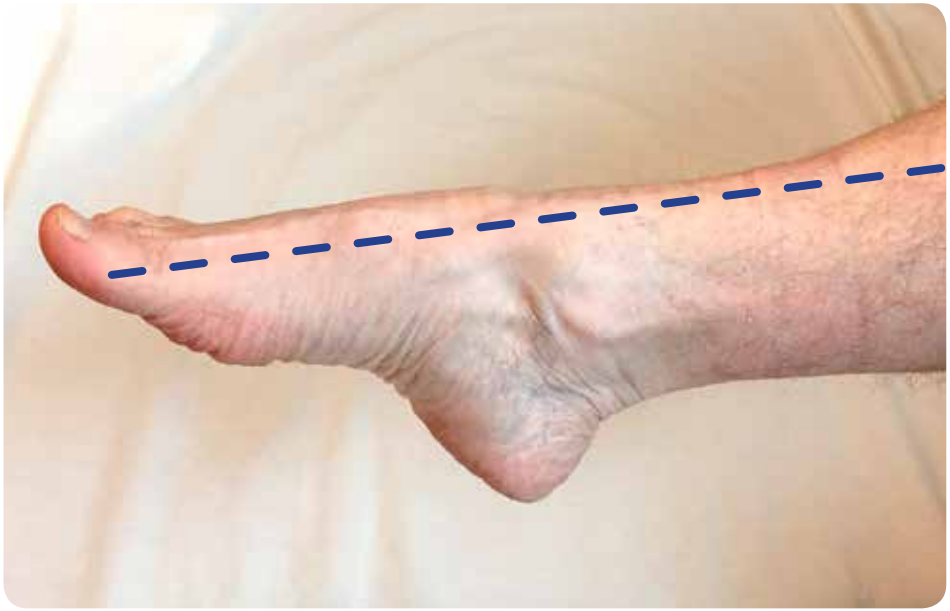



Because, in some cases, they may induce reflex activation of the tibialis anterior or peroneii, BioPods Stimsoles are a clinical trial worth pursuing.

You may need to have your patient test various stimulus intensity levels.

# Challenging applications requiring additional considerations

**4. Ballerina ankle configuration is a condition in which there is a virtual straight line down the tibia and foot dorsum when lying supine. This may indicate weak dorsiflexors and insufficient dorsiflexion at the talonavicular joint.**



Employ mobilization or manipulation therapies before or concurrent with implementation of BioPods Stimsoles to restore mobility to the talonavicular joint.

Also recommend self-therapy that includes heel walks and/or repetitive, active, full-range dorsiflexion with the heel resting on the floor.

If you observe a significant muscle imbalance, you may need to recommend these therapies before implementing BioPods Stimsoles.

# Challenging applications requiring additional considerations

**5. Notably fibrotic regions — especially at the myotendonous junction and/or insertions of the tibialis anterior and/or peroneii — may become painful as a result of the stimulus intensity of BioPods Stimsoles.**

After evaluating the severity, thickness, and chronicity of the fibrotic regions, you may opt to employ one or more soft tissue mobilization therapies (e.g., therapeutic ultrasound, A.R.T., Graston Technique®, deep tissue massage) to reduce or eliminate the fibrotic tissues prior to or during implementation of BioPods Stimsoles.

Your patient may require a lower stimulus intensity level until the fibrotic tissue has been sufficiently reduced or eliminated.

# Clinical Protocol – **Step 2**

## Assess your **patient's foot mobility.**


When using BioPods, we are most concerned about foot mobility – the ability to easily raise the arches and toes.

# Clinical Protocol – **Step 3**

## Identify your patient's **arch type**


- BioPods Stimsoles are available in 3 stimulus intensity levels* to meet the requirements of different foot and footwear types
- A higher-intensity stimulus level does not necessarily produce a better result
- Typically, higher arches are most comfortable with a lower stimulus level

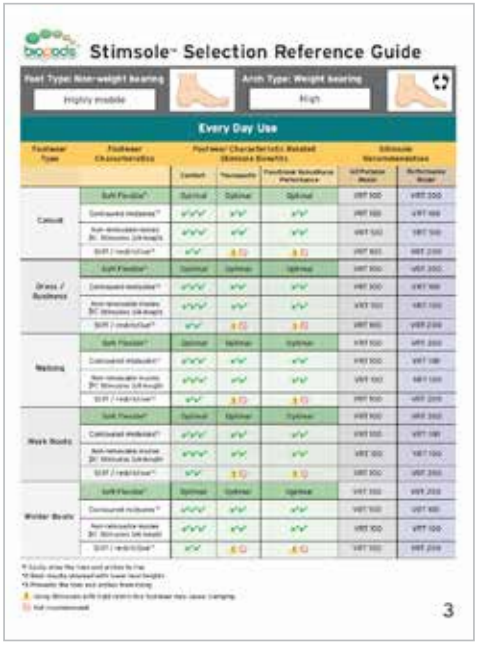
*VRT 100:
Lowest stimulus intensity level

VRT 200:
Medium stimulus intensity level

VRT 300:
Highest stimulus intensity level

# Clinical Protocol – **Step 3**

# Match your patient's **foot mobility and arch type** with the appropriate BioPods stimulus level.




**Absolute contraindication for BioPods implementation:**

Hallux rigidus, or complete immobilization of the hallux of any cause – genetic, arthritic, traumatic, or surgical.

# Clinical Protocol – **Step 4**

## Match your patient's **activity** with the appropriate BioPods stimulus level.

**Static Foot-Related Activities**

**Static foot-related activities** include skiing skating, cycling, snowboarding, and rowing.

**Low and Moderate Intensity Dynamic Gait-related Activities**

**Low and moderate activities** include daily activities and sports such as gol  working out, hiking, and jogging.

**High-Intensity Dynamic Gait-related Activities**

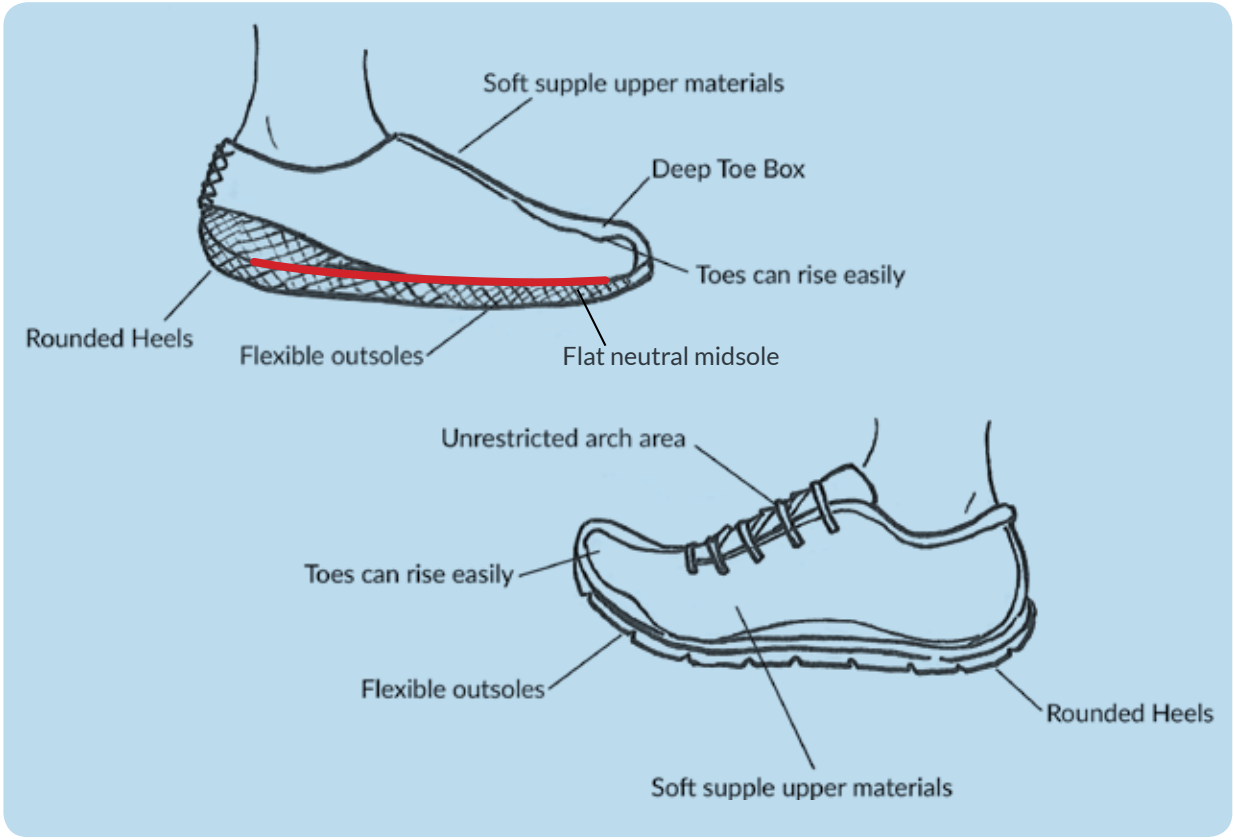
**High-intensity activities** include running, soccer, football, and tennis.

Use the Stimsoles Reference Guide to match the appropriate stimulus level for a respective activity

Clinical Protocol – **Step 5**

Educate your patient about

# BioPods-compatible footwear




- Patients should use Stimsoles in soft, loosely laced, flexible footwear with removable insoles
- Stimsoles work best when placed on a neutral flat surface, not in footwear with unremovable arch supports or built-in motion control features
- Low, rounded heels are preferred

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Stiff restrictive footwear that inhibits the natural raising of the arches and toes**


**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Some improvement | Poor | Poor | Poor |

**Stimsole Recommendation: Not recommended**

See Stimsole Reference Guide for stimulus recommendations

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules

- Footwear with built-in arch supports

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Some improvement | Poor | Poor | Poor |

**Stimsole Recommendation:** **If the arch supports cannot be removed the shoes are not compatible with Stimsoles - Do not use**

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear with built-in motion control features**

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Some improvement | Limited | Limited | Poor |

**Stimsole Recommendation: Not recommended**

See Stimsole Reference Guide for stimulus recommendations

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear with raised heels**

Heels lower than
2 inches/6 centimeters

Heels higher than
2 inches/6 centimeters
**Do not use Stimsoles**

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Some improvement | Poor | Poor | Poor |

**Stimsole Recommendation: Lower heels are better**

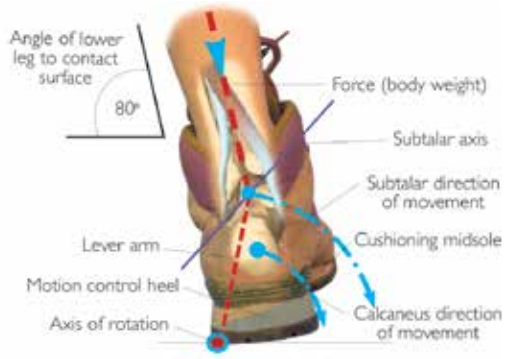
See Stimsole Reference Guide for stimulus recommendations

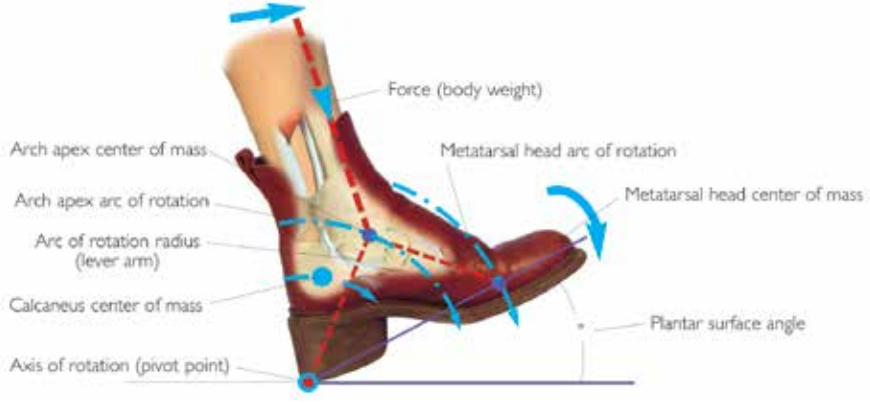
# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear with flared heels – significantly increase ground contact stresses**




**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Some improvement | Moderate | Moderate | Poor |

**Stimsole Recommendation: Not recommended**

See Stimsole Reference Guide for stimulus recommendations

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear with concave surface areas under the forefoot**

Midsole forefoot cross-section

- These features destabilize foot mechanics and cause the maladapted neuromuscular function and maladapted forefoot body geometry that contribute directly to foot-related pathologies, such as metatarsalgia and Morton's neuroma. BioPods Stimsoles cannot fully overcome these destabilizing effects.

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Poor | Poor | Poor | Poor |

**Stimsole Recommendation: Not recommended**

See Stimsole Reference Guide for stimulus recommendations

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear with contoured midsoles**

- Contoured midsoles can significantly increase the Biopods Stimsoles' level of stimulus.

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Good | Good | Good | Good |

**Stimsole Recommendation: Require lower stimulus levels**

See Stimsole Reference Guide for stimulus recommendations

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear with contoured midsoles or with solid rigid heels –**

with an inflexible ridge where the heel transitions into the lateral aspect of the midfoot


- When footwear with inflexible ridges are worn with Biopods Stimsoles, the ridges may cause a bruising or jamming of the cuboid or surrounding area. The symptoms may appear on the dorsal, lateral, or plantar aspects of the foot.
- These symptoms may manifest in a short period of time, if the ridge is more prominent; or after some time, if the ridge is less prominent. Often these ridges are virtually imperceptible unless you are looking for them. You can feel the ridges if you run your fingers over the lateral side of the shoe from the heel towards the forefoot.

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Painful | Poor | Poor | Poor |

**Stimsole Recommendation: Not recommended**

See Stimsole Reference Guide for stimulus recommendations

# Clinical Protocol – **Step 5**

## Educate your patient about **unhealthy footwear**

**Footwear designs that should be avoided or require additional consideration when using BioPods Stimsoles – the exceptions to the aforementioned rules**

- **Footwear that is uncomfortable when using BioPods Stimsoles**

- Footwear that is uncomfortable when using BioPods Stimsoles typically indicates that either the shoes are too tight, or they incorporate design features that conflict with the foot's optimal dynamic movement.
- Therefore, in a way, BioPods Stimsoles are teaching the feet what is good for them and what isn't.
- Most people with BioPods educated feet will make healthy footwear choices.

**Stimsole Benefits**

| Comfort | Therapeutic | Performance Enhancement | Injury Prevention |
|---|---|---|---|
| Poor | Poor | Poor | Poor |

**Stimsole Recommendation: Not recommended**

See Stimsole Reference Guide for stimulus recommendations

Clinical Protocol – **Step 6**

# Trim BioPods Stimsoles

to fit footwear and advise on proper usage.



**Stimsoles come with instructions and Lacing Guide**

- The Lacing Guide helps patients understand the importance of loose lacing
- Stimsoles can be used in shoes with and without removable insoles
- Please review our online "How to use" videos to learn how to properly fit Stimsoles into your patient's footwear. [insert link to videos]

You can also direct your patients to these videos or the videos can be downloaded for use in your clinic

Clinical Protocol – **Step 6**

# Trim BioPods Stimsoles

to fit footwear and advise on proper usage.

**Advise patients that they should:**

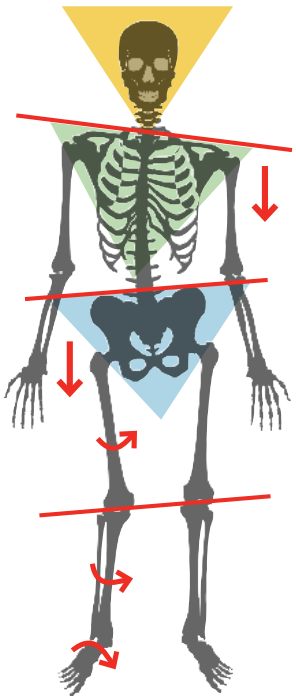
- Read instructions carefully
- Use Stimsoles regularly
- Avoid using orthotics in some shoes and Stimsoles in others
- Anticipate the possibility of aches and pains as the body readjusts
- Consult you if pain increases
- When first dispensing BioPods to your patients, it is also advisable to inform them that:

  – they may have preexisting nonpresenting fibrotic tissue that may become symptomatic with BioPods use and

  – this is beneficial because these areas can then be easily treated and optimal functional elasticity can be regained

# Clinical Protocol - Using BioPods as a **diagnostic tool**

**Stimsoles can help identify patients with fibrotic tissue resulting from previous injuries that have since been forgotten.**



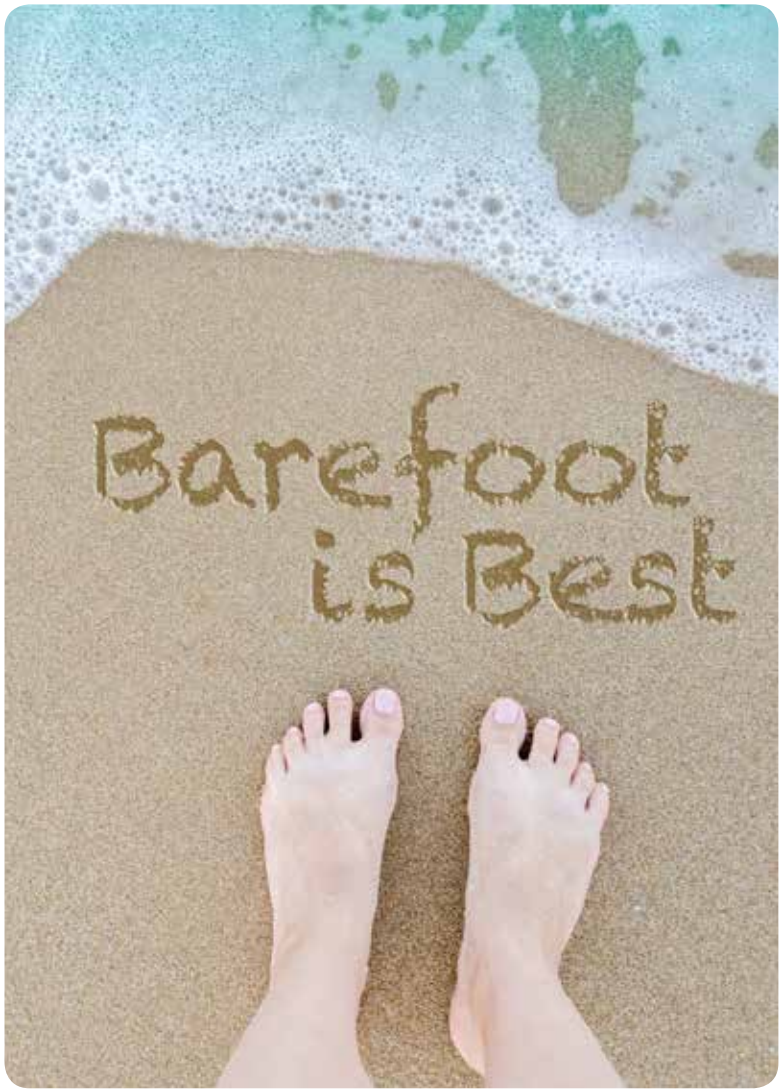
Poor functional alignment due to non-presenting fibrotic tissue, before BioPods use

With BioPods use, restrictive fibrotic tissue becomes symptomatic

With BioPods use and soft tissue mobilization therapies

**BioPods Stimsoles can be a diagnostic tool:**

- With regular use of BioPods, preexisting non-presenting inelastic fibrotic tissue can become symptomatic as the body's neuromuscular system adjusts towards healthier function.
- Once identified, the symptomatic fibrotic tissue can be easily treated using a wide variety of soft tissue mobilization therapies.




Regular barefoot activity promotes optimal neuromuscular protective reflex function throughout the feet, legs, hips, and back. This optimal function effectively eliminates the underlying cause of most foot-related pathologies.

BioPods are the next best thing to being barefoot.