



W•E•B•I•N•A•R

## **Stance-control braces**

**With Abbey Downing, Katy Eichinger, and  
Kathy Senecal**

**June 8, 2019**



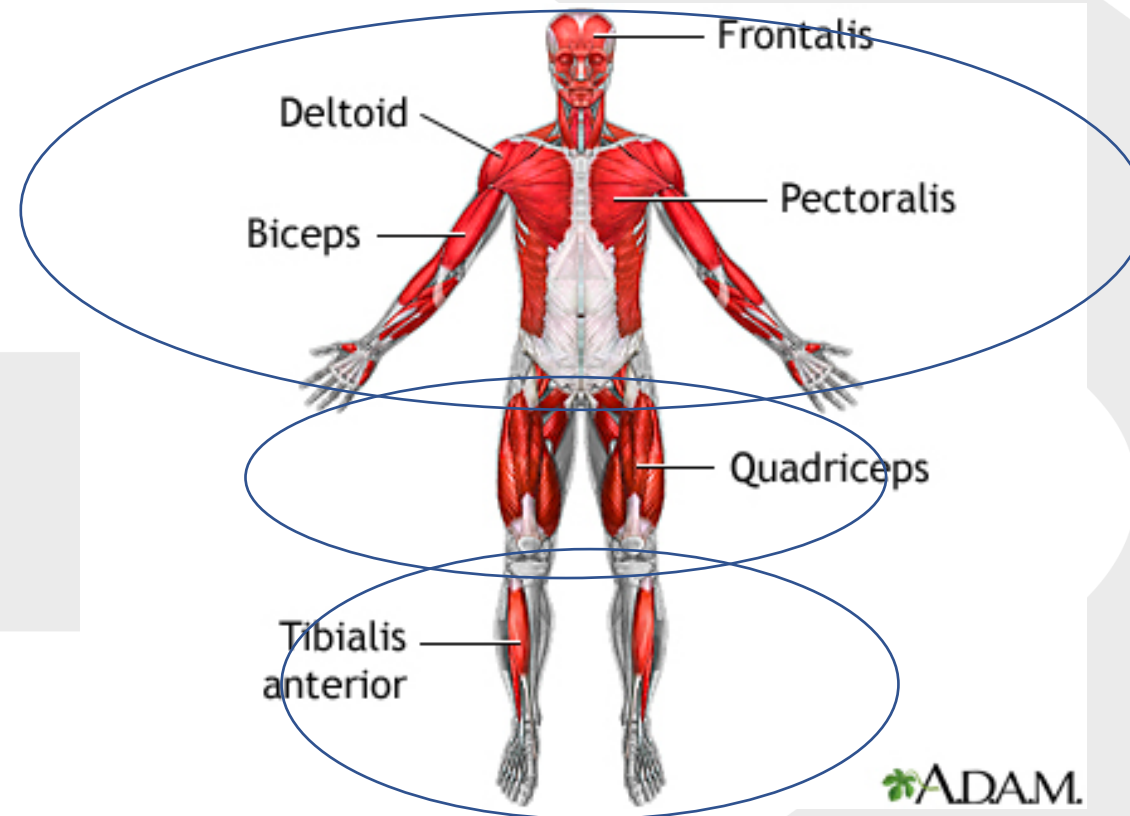
# ORTHOTIC MANAGEMENT FOR FSHD

*Abbey Downing, CPO*  
*Saturday June 8, 2019*



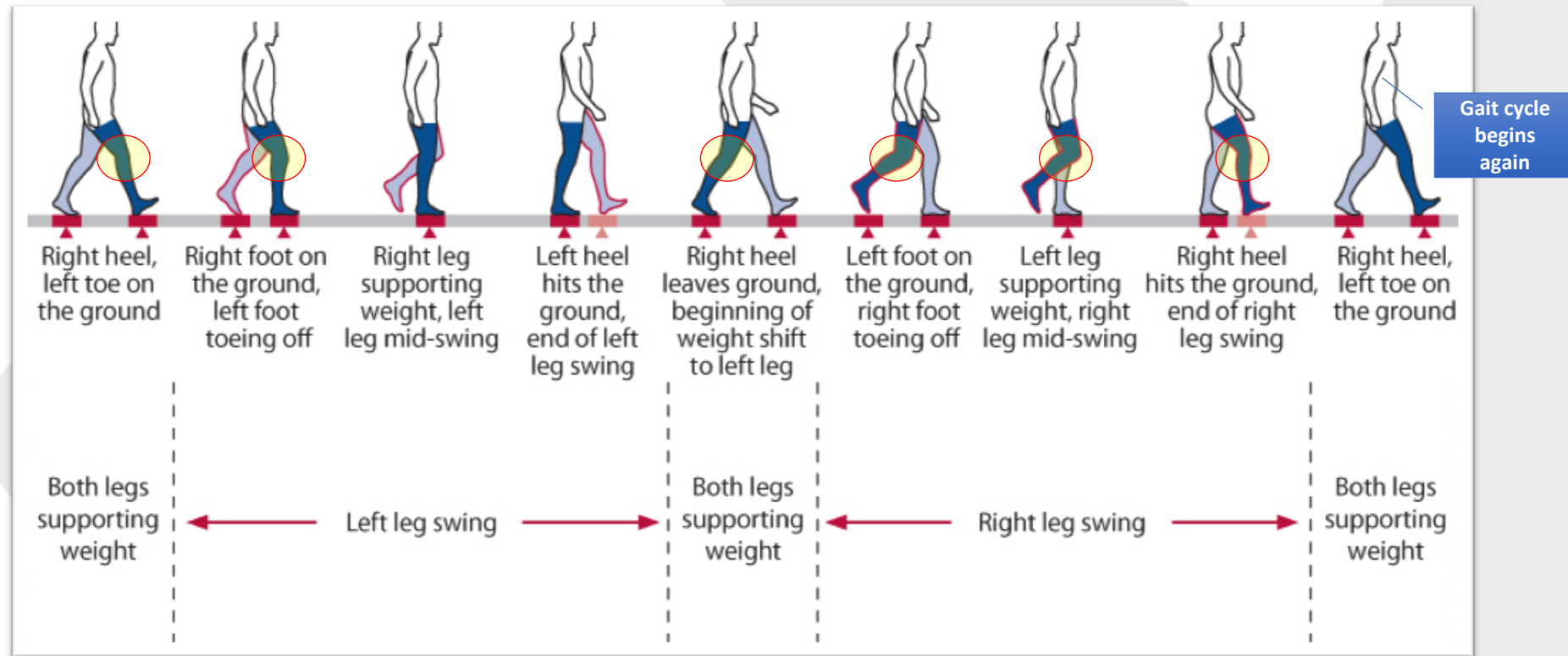
# MUSCULAR PROGRESSION OF CONDITION

Weakness affecting initially the face, shoulder, and arms, followed by the distal and then proximal lower extremities later in the disease course.



# GAIT CYCLE AND INVOLVEMENT OF KNEE

During normal walking, the knee is continuously moving from extension to flexion (and repeated) throughout the entire gait cycle.

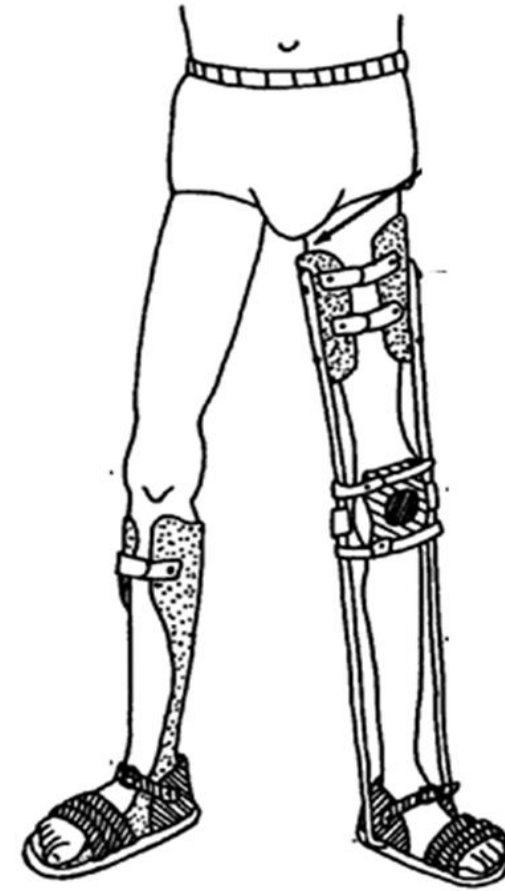


# OBSTACLES ASSOCIATED WITH LOSS OF QUADRICEP FUNCTION

- Increase in falls
- Decrease in mobility
- Decrease in independence
- Increase in overuse conditions



**A KNEE ANKLE FOOT ORTHOSIS (KAFO)** IS A CUSTOM MADE BRACE USED TO SUPPORT MUSCLES, IMMOBILIZE JOINTS, AND/OR CORRECT THE POSITION OF YOUR KNEE, FOOT, AND ANKLE. IT MAY BE MADE OF METAL, THERMOPLASTIC, OR A COMBINATION OF MATERIALS.



PLASTIC BRACE

METAL BRACE

# ORTHOTIC OPTIONS TO PREVENT KNEE BUCKLING

- Methods to mechanically lock the knee have been around for hundreds of years.
  - Locked
  - Unlocked
  - Offset alignment
- Most recent methods to stabilize the knee
  - Automatic lock/unlock (Stance Control)
  - Computer regulated stance and swing controlled orthosis (SSCO)



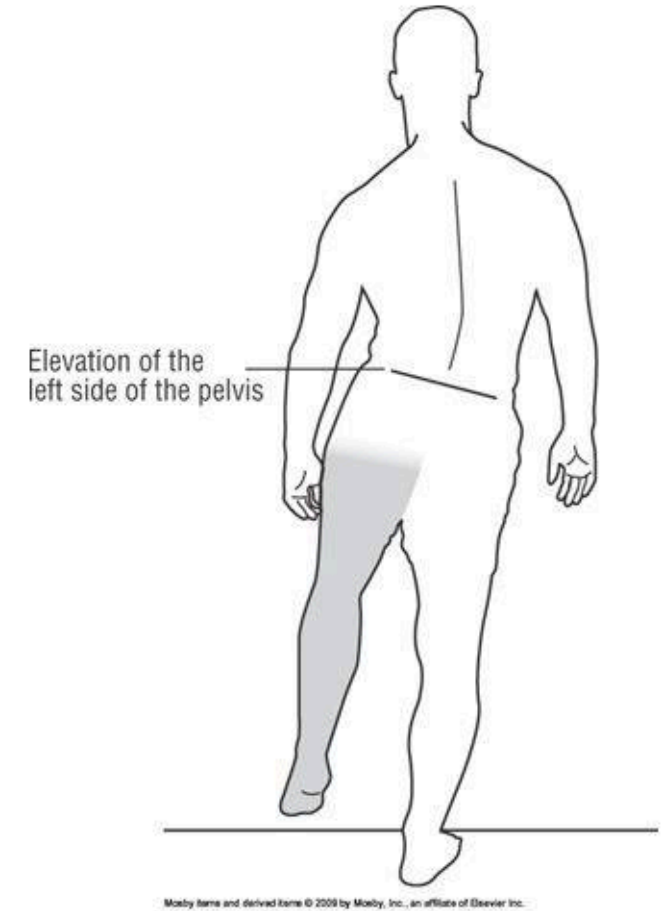
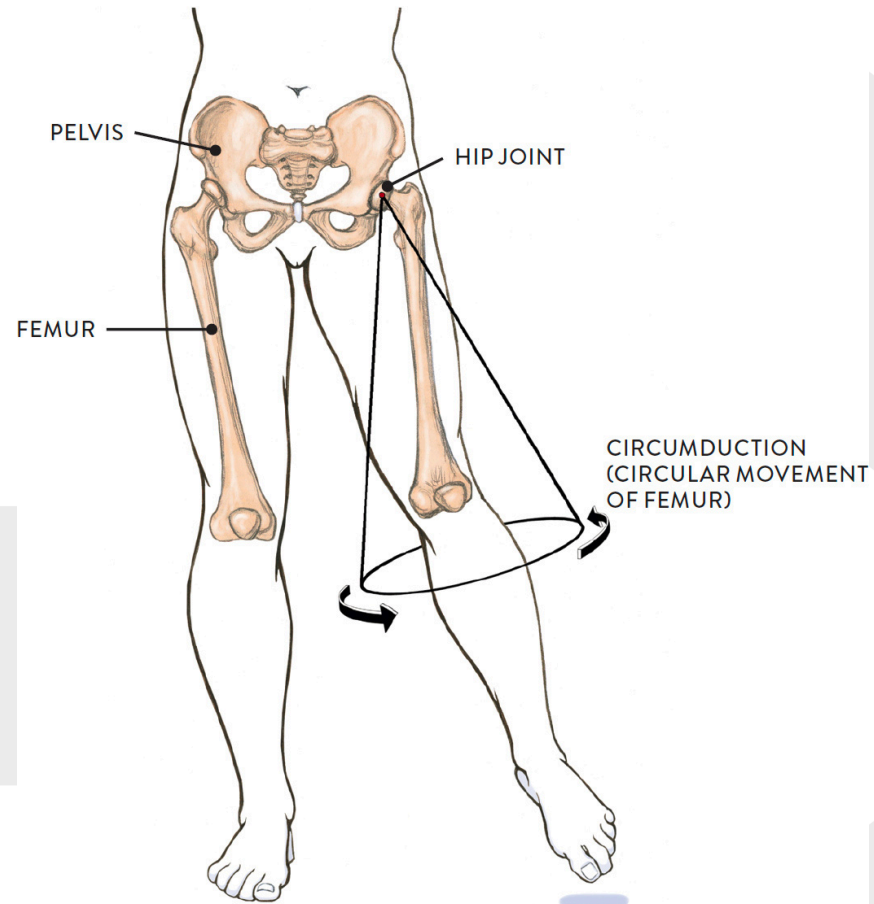
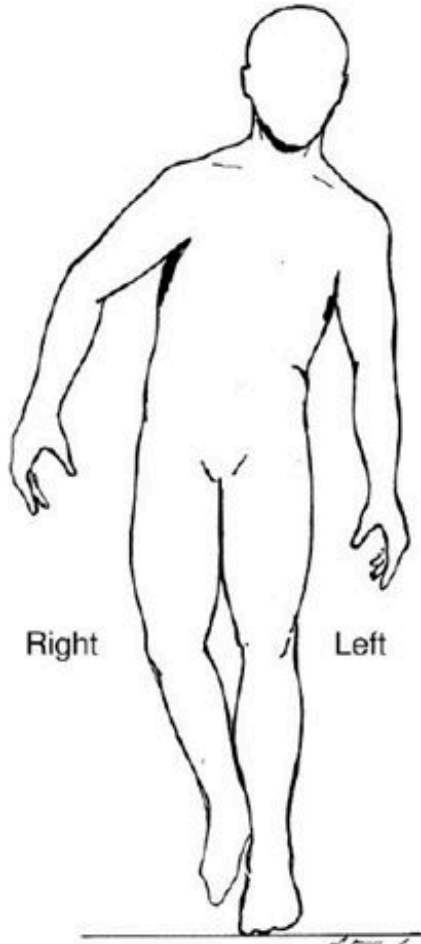
# LOCKED KNEE ORTHOSIS

- Advantages
  - Highly Stability
  - Facilitate Mobility
- Disadvantages
  - Uses a lot of energy to walk
  - Changes to gait pattern/deviations
  - Functionally longer affected limb
  - Secondary medical complications due to compensatory motions and excessive “wear and tear” of joints on the other leg





# EFFECTS OF A LOCKED KNEE DURING GAIT



## EFFECT OF LOCKED KAFOS VS SCOS ON PATIENT COMPLIANCE

- 58% to 79% of locked KAFOs patients are not compliant.  
*\*\*The energy cost (oxygen volume increase, cardiac stress) is not offset by the benefits of ambulation.*

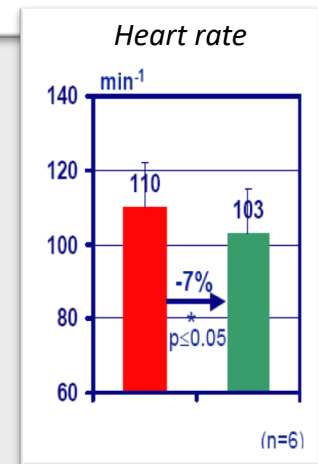
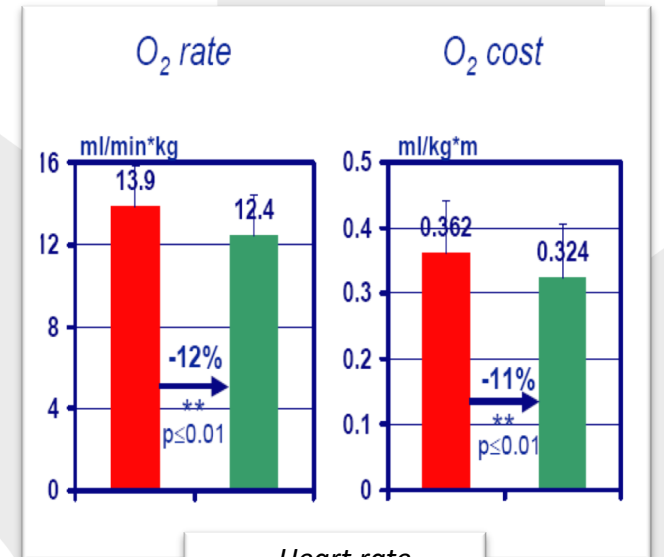


*Predictors of Assistive  
Technology Abandonment.*  
Phillips B, Zhao H., *Assistive  
Technology*, 5:36-45

# EFFECTS OF LOCKED KAFOS ON USER PHYSIOLOGY

- Increased pulmonary stress
- Increased cardiac stress

- Locked Knee joint
- SCO



# ALTERNATE OPTION FOR ORTHOTIC KNEE JOINT

- Free motion joint with posterior offset
  - Advantages
    - No actual lock
    - Obtain stability through alignment
    - Easy to put on
  - Disadvantages
    - Can be unpredictable
    - Knee can still buckle
    - Will most likely still require support from assistive device



# INTRODUCTION OF STANCE CONTROL DEVICES

## ORTHOSIS THAT AUTOMATICALLY LOCK AND UNLOCK

- Benefits:
  - Allowing **free knee motion** during the swing phase **increases gait efficiency**
  - Allowing **free knee motion** during the swing phase **decreases energy cost**
- Studies:
  - “Effects of the Stance Control Orthosis on Functional Walking Abilities and Heart Rate Response.” Amy Gross McMillan, PT, PHD, et al.
  - “The energy expenditure of normal and pathologic gait.” Robert Waters, MD
  - “Energy-Efficient Knee-Ankle Foot Orthosis: A Case Study.” Kenton Kaufman PhD, et al.

# STANCE CONTROL DEVICES

- **ADVANTAGES**
  - ALLOW FOR MORE NORMAL WALKING PATTERN
  - PROVIDE LOCK WHEN FOOT IN CONTACT WITH GROUND
  - DECREASES CARDIAC & PULMONARY STRESS
- **DISADVANTAGES**
  - REQUIRE PRACTICE AND PHYSICAL THERAPY
  - MECHANICAL- SEVERAL MOVING PARTS
  - COVER ENTIRE LEG





# Literature Review of Benefits of SCO vs. locked KAFO

There is reasonable evidence to assume that patients who have the capabilities to use a stance control orthosis benefit in comparison to a locked KAFO:

- improved (more physiologic) gait kinematics and kinetics
- reduced compensatory movements
- more physiologic muscle activity
- improved walking efficiency
- improved patient satisfaction

However, identifying the most appropriate system for an individual patient remains to be a challenge to the clinician.

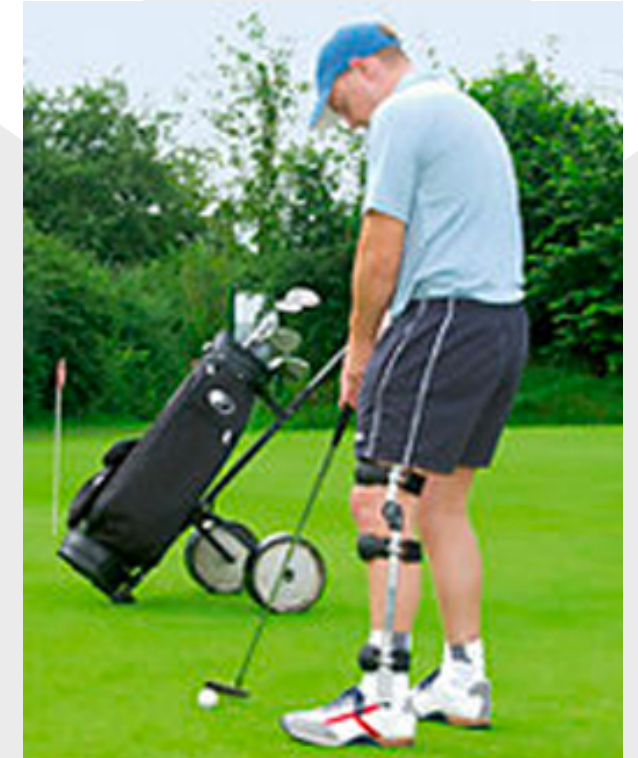
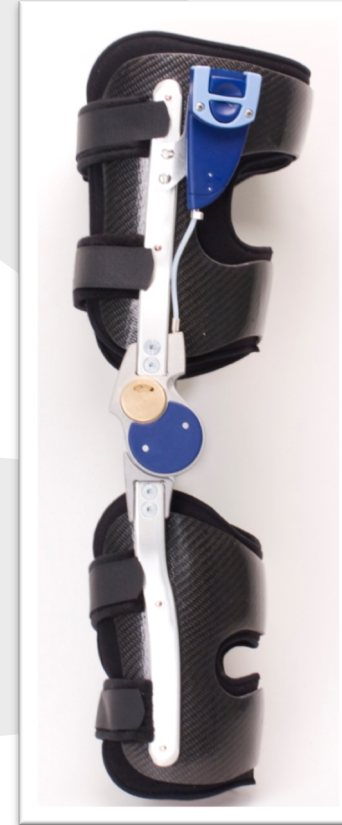
Zacharias B, Kannenberg A: Clinical benefits of stance control orthosis systems: An analysis of the scientific literature.

J Prosthet Orthot 2012, 24 (1): 2-8



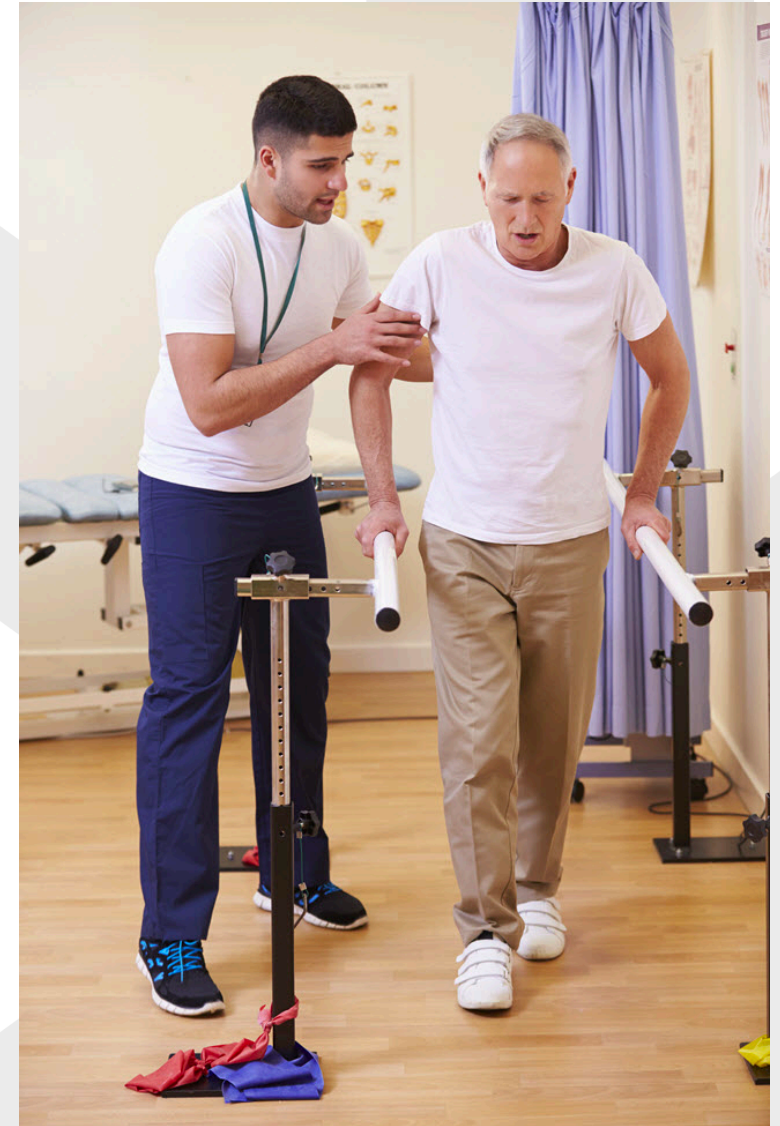
# HOW DO STANCE CONTROL DEVICES WORK?

- GAIT ACTIVATED
  - CAN BE USED WITHOUT FOOT SECTION
- ANKLE ACTIVATED
  - SOME OF THE LIGHTEST WEIGHT OPTIONS (~2 LBS)
- WEIGHT ACTIVATED
  - NO CURRENT OPTIONS IN UNITED STATES



# OBSTACLES TO OVERCOME

- NEED FOR PHYSICAL THERAPY/TRAINING
- SOCIAL IMPLICATIONS
- EMOTIONAL/MENTAL IMPACT
- WILLINGNESS TO WEAR LONG LEG BRACE



# CONCLUSION

- STANCE CONTROL BRACES CAN INCREASE SAFETY AND MOBILITY
- SUCESSFUL USAGE REQUIRES WILLINGNESS TO PARTICIPATE IN THERAPY AND A KNOWLEDGABLE CLINICIAN
- ABBEY DOWNING, CPO
  - HANGER CLINIC
  - WETHERSFIELD, CT
  - 860-529-3350
  - ADOWNING@HANGER.COM

