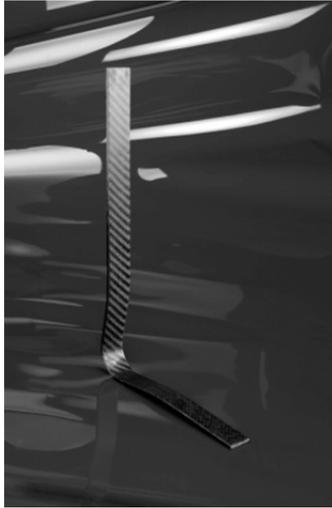


## Carbon Ankle Seven

### Justification for Gait Deviations due to Weak Soleus Muscle

Effective: January 1, 2015



<sup>1</sup>L2999 Addition to Lower Extremity Orthosis, Carbon Fiber Spring, Energy Return

An ankle-foot-orthosis (AFO) is a medical mechanical device used to support and align the ankle and foot, to suppress spastic and overpowering ankle and foot muscles, to assist weak and paralyzed muscles of the ankle and foot, to prevent or correct ankle and foot deformities, and to improve the functions of the ankle and foot.

For patients with a weak or absent soleus muscle, the Carbon Ankle Seven is often prescribed. Patients with weak soleus muscles develop gait deviations that may include crouched gait, excessive pelvic drop, absent heel-off by loss of the 3<sup>rd</sup> rocker,<sup>3</sup> excessive knee flexion at terminal stance, and a pathologic drop in the center of gravity. These gait deviations translate into loss of preservation of momentum, excessive energy expenditure to raise the center of gravity to physiologic levels, and flexion contracture deformities of the knee and hip on the affected side. In patients with immature skeletons, the deviations will cause bony deformities of the articular surface of the joints of the lower limb if left untreated.

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During normal ambulation, the soleus begins an eccentric contraction during mid-stance through pre-swing. In patients with a weak or paralyzed soleus the tibia cannot be stabilized and the knee exhibits excessive flexion and the heel cannot rise during the 3<sup>rd</sup> rocker. This causes a drop in the center of gravity as the involved limb becomes functionally shorter. The opposite limb now must raise the center of gravity back to and above the physiologic level for the affected limb to complete the swing phase and not have the patient trip and fall. This in turn causes the patient to fatigue and eventually the patient will trip and fall or will injure the connective tissues of the joints of the lower limb as they become dependent on these tissue to maintain joint stability.

A best orthotic practice/standard of care, prior to the Carbon Ankle Seven, was to fit the patient with a Solid Ankle AFO or a Ground/Floor Reaction AFO. Both styles are rigid in nature and do not mimic normal gait mechanics or ankle motion. While they may restore the third rocker and allow the heel to rise at pre-swing, they do not completely return knee flexion to normal. As a result, while using the rigid AFO, the patient continues to fatigue, but at a slower rate.

Rigid AFO styles do not restore push-off or propulsion of the soleus muscle, thus contributing to unstable gait by restricting downward ankle motion into plantarflexion, which is needed to walk down a ramp or decline. In fact, rigid AFO's actually increase knee flexion from initial contact to foot flat at mid-stance; adding to patient fatigue and instability.

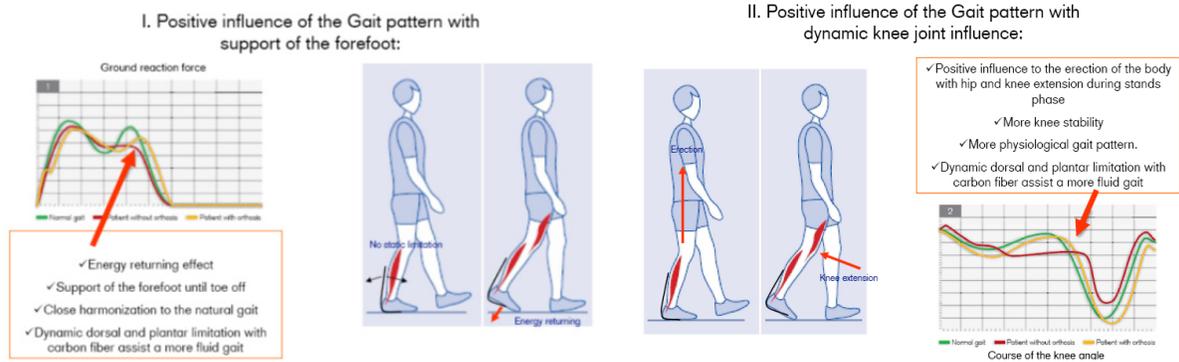
The Carbon Ankle Seven addresses all the deficiencies of these older styles of orthotic AFO treatment. The Carbon Ankle Seven provides the patient with dynamic response (ankle motion), excessive knee flexion resistance; to maintain proper height of the center of gravity, and energy storage and return (propulsion). The benefits of this form of carbon strut is well established for prosthetic patients who essentially present with the same problem; the lack of a soleus. Insurers have recognized this benefit by establishing the prosthetic code of L5981.

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Gait lab studies show that the center of gravity is maintained and knee flexion is returned to a near normal gait as illustration in the below graphs:



The addition of a Carbon Ankle Seven to a Ground or Floor Reaction AFO will decrease the possibility of falls and injury due to fatigue induced by gait deviations, joint misalignment, or rigid AFOs used on declines as seen in patients with a weak or absent soleus.

<sup>1</sup>The product/device “Supplier” (defined as an O&P practitioner, O&P patient care facility, or DME supplier) assumes full responsibility for accurate billing of Ottobock products. It is the Supplier’s responsibility to determine medical necessity; ensure coverage criteria is met; and submit appropriate HCPCS codes, modifiers, and charges for services/products delivered. It is also recommended that Supplier’s contact insurance payer(s) for coding and coverage guidance prior to submitting claims. Ottobock Coding Suggestions and Reimbursement Guides are based on reasonable judgment and are not recommended to replace the Supplier’s judgment. These recommendations may be subject to revision based on additional information or alpha-numeric system changes.

<sup>2</sup>Tecklin JS, *Pediatric Physical Therapy 3<sup>rd</sup>*. Philadelphia:Lippincott, Williams & Wilkens. 1998:263

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<sup>3</sup>Perry J, *Gait Analysis: Normal and Pathological Function*. New Jersey:Slack, Inc. 1992:63-66