

Current Concept of Kinematics and Kinetics

AFO-FC - Ankle Foot Orthoses Footwear Combination

by Robert Steinmann

Children with certain neuro-physiological impairments resulting in movement and balance problems, such as toe-walkers, may benefit from the use of an AFO plus customized outer footwear combination (referred to as AFO-FC) in addition to therapy.

Our treatment goals are:

- to help a child stand upright, walk with a comfortable gait
- to maximize their stability and mobility
- help increase proprioceptive feedback by teaching the child how to keep weight off the toes

The key is to help the child to “feel” their heel and encourage heel strike using an AFO-FC.

The AFO-FC is custom-built for the child:

1. The articulating AFO is aligned to the floor with 10-15 degree tibial inclination and with motion limiter and a check strap to keep the ankle solid.
2. The outer footwear is modified with a heel lift for a final angle of 90 degree neutral position to achieve normal alignment for gait.
3. The angle of the shank (tibia) relative to the horizontal surface when standing in an AFO-FC, with heels down and weight equally distributed between heel and toe, provides the most effective and stable gait.

As the child starts to respond, we manipulate the AFO/shoe combination and how it reacts with the floor:

- We decrease the heel height and adjust the AFO-FC to keep the foot at a 90 degree neutral position.
- We encourage heel strike and range of motion.
- We observe for compensations and provide an opportunity for physical therapists to address issues previously obscured by compensations.

For night-time, we may provide a dynamic Knee Ankle Foot Orthosis (KAFO) to maintain and increase muscle length of the hamstrings and the gastroc-soleus muscles, and maintain full range of motion.

These kinematic concepts may not be well known but are very promising in the pediatric population, as discussed at the annual meeting of the Association of Children’s Prosthetic-Orthotic Clinics (ACPOC). They have been documented by highly-regarded practitioners such as Donald McGovern, CPO at the Rehabilitation Institute of Chicago, Elaine Owen, MSc, SRP, MCSP in Scotland, and Beverly Cusick, PT, MS, COF in Colorado.