

Foot & Ankle Deformity Management for Children & Adults with CNS Dysfunction: Orthoses & Serial Casting: Why & How

A 4-Day Program

Course Description

The seminar portion of this course features a study of the sciences of muscle physiology, pathophysiology, kinesiology, and pathokinesiology related to - and in support of - the safe and effective use of serial casting and other nonsurgical interventions to reduce foot and ankle deformities that commonly develop in the presence of central nervous system (CNS) dysfunction. Topics include foot and ankle anatomy, biomechanics, pathomechanics, and minimum soft tissue extensibility requirements for efficient lower extremity functional mobility. Instructor addresses body weight distribution on the foot as a causative factor in contracture formation. Musculoskeletal assessment procedures are reviewed in seminar and in supervised lab sessions, as the findings apply to proper documentation of casting results and lead the clinician to a systematic approach to clinical decision-making process regarding alignment and posting in casts and orthoses.

The lab sessions feature closely-supervised reviews of several ankle and foot assessment procedures, and several below-knee cast fabrication techniques. Participants must qualify for participation in the lab sessions by either completing the seminar portion of this course. If space is available in Lab after meeting the needs of seminar portion attendees, additional lab enrollees may be recruited from the alumni of a comparable course taught by Beverly Cusick, PT, MS, since December 31, 2005.

Rationale for various conservative hypoextensibility management interventions is supported by a current literature review regarding muscle transformation secondary to chronic recruitment and the role of mechanoreceptors and cutaneous proprioceptors in maintaining balance. Spasticity is distinguished from tone and from soft tissue pathophysiologic adaptation, with clinical implications. Discussion includes Elaine Owen's Tuned AFO/Footwear Combinations, heel lifting and loading, orthotic posting and packaging principles and strategies, positioning, stretching, and serial casting.

This course is designed for the practitioner who has experience in working with children [and/or adults] with CNS neuromotor dysfunction, including physical therapists, orthotists, pediatric orthopedists, physicians in physical medicine and rehabilitation, physical therapy assistants, and orthopedic technicians (the latter two accompanied by a therapist from their team). We believe that team education fosters more effective teamwork.

Course Objectives

Participants completing the *seminar portion* of this course are expected to be able to:

- Describe, in plane-based terminology, the motions of the joints and various bones of the foot in the open and closed kinetic/kinematic chains.
- Discuss the relationship between joint alignment and related muscle function in terms of joint axis inclination, muscle and loading force vectors, lever arms, and resultant moments.
- Relate the principles of Muscle Balance Theory, presented by S.A. Sahrman, to the management of foot and ankle deformities.
- Identify the deformities of the foot and ankle that occur most commonly in children or adults with CNS upper neuromotor dysfunction, and describe the components of illustrated deformities at each joint in plane-based terms.
- Explain the clinical rationale for using specific assessment techniques to identify features of soft tissue extensibility, joint mobility, and structural alignment in the ankle and foot.
- Discuss the physiology and functional significance of R₁ (first-catch) end range of motion encountered on assessing passive extensibility in healthy muscle groups.
- Explain the physiologic and structural changes that occur in chronically over-recruited muscle and its surrounding connective tissues, relative to the active length-tension relationships and EMG output.
- Explain the physiologic rationale for undertaking serial casting gradually and without force.
- Associate the principles of orthotic posting and kinetics with below-knee cast design and cast fabrication.
- Discuss the role of weight line training in foot and ankle deformity management.
- Determine whether a deformity meets the criteria for intervention with heel-posting in ankle plantarflexion, serial casting, an R-wrap© orthosis, stretch splinting, and/or positioning.
- Explain the rationale for instituting strengthening and range-maintenance measures after restoring soft tissue extensibility.
- Discuss the limitations of casts as a management tool.

Participants completing the *lab sessions* of this course are expected to be able to:

- Achieve novice skill level in musculoskeletal assessment of the ankle and foot in the open and closed chains.
- Bring the principles of orthotic posting to below-knee cast design and cast fabrication.
- Achieve novice skill in fabricating at least 1 of 3 types of below-knee cast for contracture reduction: the plaster and 3M™ SoftCast combination cast and the Flexcast© Preparatory AFO, the latter with or without a posted footbed insert.

Course Schedule

Day One - Seminar

Start Time	Description	Contact Hours
8:00	Register / Pretest / Continental breakfast	0.0
9:00	Review of Anatomy and Closed-Chain Function of the Subtalar and Midtarsal Joints Using Plane-Based Terminology	1.5
10:30	Break	0.0
11:00	Biomechanics of the Closed Kinetic Chain - continued	1.0
12:00	Lunch and Library Time	0.0
1:00	Ideal Ankle, STJ and MTJ Function in Gait	1.0
2:00	Kinesiologic and Physiologic Requirements for Optimum Muscle Function	0.5
2:15	Short Break	0.0
2:30	Pathophysiology: Muscle Transformation in the Presence of Chronic Recruitment.	0.5
3:00	Muscle Balance Theory: Implications for Foot Deformity Management	0.5
3:30	Short Break	0.0
3:45		1.0
4:45	Questions and Discussion	0.25
5:00	Adjourn - Independent Study	0.0
Total Contact (Didactic) Hours:		6.25

Day Two - Seminar *Lab participants, bring shorts tomorrow.*

Start Time	Description	Contact Hours
7:45	Independent Study / Library review / Breakfast	0.0
8:15	Breakfast and settle in	
8:30	Assessing the Foot and Ankle - Review of Open-Chain Assessments	1.5
10:00	Short Break	0.0
10:15	Pathomechanics of Triceps Surae Hypoextensibility and Various Foot Design Problems: Implications for Posting Casts and Follow-up Orthoses	1.75
12:00	Lunch, library, and videotaped casting case (at 12:30 PM)	0.0
1:00	Hypoextensibility Management: Positioning, Orthotic Interventions (Owen's Tuned AFO/Footwear concepts; the R-Wrap AFO; Weck's weight-line training approach.	1.5
2:30	Short break	0.0
2:45	Serial Casting: Precautions, Contraindications, Limitations, Guidelines, and Principles of Management; Fabrication options (Combination cast, FlexCast®, contoured footboard)	1.0
3:45	Short break	0.0
4:00	Videotaped Case Presentations	1.0
4:45	Questions and Discussion	0.25
5:00	Seminar-only attendees turn in evals,; adjourn - Independent Study	0.0
Total Contact (Didactic) Hours:		7.0

Day Three – Lab *Lab participants, bring shorts today and tomorrow.*

<i>Bring shorts today and tomorrow.</i>		
Start Time	Description	Contact Hours
7:15	Independent Study	
8:15	Breakfast and settle in	
8:30	LAB: Open-Chain Assessments of the Foot and Ankle	1.5
10:00	Short Break	0.0
10:15	LAB: Resume Open Chain Assessments	1.75
12:00	Lunch, library time	0.0
1:00	LAB: Closed-Chain Assessments of the Foot	1.5
2:30	Short Break	0.0
2:45	LAB: Resume Assessments	.25
3:45	LAB: Positioning the Patient and Rehearsing the Cast Molding Grip	1.0
4:15	Review of Casting Materials	1.25
5:00	Adjourn - Independent Study	0.0
	Total Contact Hours:	7.25

Day Four – Cast Fabrication Lab

<i>Wear clothes you don't mind getting plaster on!</i>		
Start Time	Description	Contact Hours
8: 00	Breakfast (<i>snacks available all day – graze at will.</i>)	0.0
8:30	Demo: Plaster/Soft Cast Below-Knee Cast Fabrication	1.0
9:30	LAB: BK Combo Cast Fabrication - first team makes this one	1.5
11:00	DEMO: Insole posting	0.5
11:30	DEMO: FlexCast Fabrication Demo with or without the insole	0.5
12:00	Lunch on premises	0.0
12:30	LAB: Participants make cast of choice: plaster/Soft Cast combo, and/or FlexCast®, as time permits.	4.75
5:30	Clean up, turn in evals, and adjourn at 6:00PM	
	Total Contact Hours:	8.25