



Beverly Cusick, PT, MS, COF  
Progressive GaitWays, LLC  
305 Society Drive, Suite C-3, Telluride, Colorado 81435  
PH: (970) 239-0209; FAX: (866) 8986-1736  
Email: [billi@gaitways.com](mailto:billi@gaitways.com)

## Developmental Orthopedics and Muscle Balance Theory: The Sciences of Rehabilitation Using TheraTogs Live-In Therapy Systems

### A 4-DAY PROGRAM IN 2 PARTS - LEVEL: INTERMEDIATE

#### PART 1: DIDACTIC SESSIONS

#### PART 2: LABS (*Limited Participant Enrollment - Others May Audit*)

**TARGET AUDIENCE:** Ms Cusick is committed to the fostering of collaborative and educated team management of people with complex neuromotor problems. Therefore, this course is open to a range of clinicians who are likely to work together to maximize physical function as a rehabilitation team, including physical therapists, orthotists, occupational therapists, rehabilitation physicians, and orthopedists.

---

### Course Description:

---

The first 3 days of this intermediate-level program feature a review of skeletal modeling mechanisms and influences, followed by a detailed discussion of the developmental features of the trunk and lower extremity. The content pertains primarily to the body segments proximal to the foot. The instructor emphasizes the use of accurate nomenclature and plane-based views in the identification of characteristics of joint alignment and bone configuration.

Normal developmental events are related to:

1. The process of physiologic adaptation of Bone, soft tissues, and the sensorimotor cortex in the presence of a history of use.
2. Skeletal modeling errors in the presence of ligament laxity and premature birth without the skeletal alignment and motion constraints imposed by uterine confinement after full-term gestation.
3. Problems of postural control and distribution of the body center of mass over the feet in children with neuromotor disorders
4. The principles of Muscle Balance Theory as proposed by Shirley Sahrmann, PhD, PT
5. The role of the ankle and foot as the body-ground interface in standing and gait
6. Findings obtained by undertaking selected musculoskeletal assessment
7. Therapeutic management featuring the principles and precautions inherent in the individualized use of the TheraTogs™ Orthotic Undergarment and Strapping System. The relevance of the findings obtained in the musculoskeletal assessment is made evident in a review of videotaped cases.

Part attendees will engage in a clinical problem solving workshop in which they apply the principles and concepts covered in the lectures to a presented (videotaped) case to the design of a prioritized management plan that includes TheraTogs system design. The same attendees will complete the program in a TheraTogs "Try-On" lab session.

On Day 4, lab participants will execute 6 musculoskeletal assessments under supervision: Hip rotation ROM, Modified Ryder's Test, hip abduction ROM, hamstring length test, thigh/foot angle, and ankle dorsiflexion ROM with knee extended. During the TheraTogs "try-on" lab session, participants will learn to apply, and to appreciate by experience, the potential influences of a variety of strapping applications.

These participants will complete the program in a clinical problem solving workshop in which small groups review and categorize the findings acquired from past cases, and apply the principles and concepts covered in Days 1 and 2 to the design of a prioritized management plan that includes TheraTogs system design.

---

## Course Objectives

---

Participants completing this course are expected to be able to:

- Identify these features of immaturity of skeletal structure and alignment: increased medial femoral torsion, medial leg and foot rotation biases, genu varum, tibial slope, and ankle valgus.
- Discuss the influences of normal neonatal soft tissue constraints on skeletal and motor development.
- Distinguish between strain and load, and apply this distinction to the skeletal modeling process.
- Describe the modeling effects of functional history of experiencing compression, tension, cantilever flexure, and loaded, torsional torque strains, and relate this information to intervention strategies.
- Explain the kinematics and related kinetics of the 3 rockers and the swing-limb torque generator in gait, and apply this information to existing – and more appropriate orthotic designs for the ankle and foot.
- Describe the source of postural symmetry in supine and prone positions at age 4 months.
- Explain the impact of Level 1 (basic) direction-specific postural responses on the development of common contractures in ambulatory children with cerebral palsy.
- Explain the objective of inserting a heel lift under a plantarflexed ankle in children and adults with equinus deformity, and describe strategies for improving sensory input through the heels.
- Referring to the active and passive muscle length-tension relationships, differentiate between muscle dominance and muscle strength.
- Explain the principle of relative flexibility in the presence of soft tissue contracture, and provide 2 examples of this phenomenon.
- Distinguish between anteversion and antetorsion of the femur, and explain the clinical significance of this distinction in terms of lateral rotation strapping across the hip joint.
- Distinguish between “hip” medial rotation and excessive medial femoral torsion in swing and stance phases of gait.
- Describe tibial plateau alignment in the sagittal plane – i.e. anteversion and retroversion – and discuss modeling influences as they pertain to the safe use of AFOs or TheraTogs strapping applications to reduce knee hyperextension or excessive knee flexion.
- Describe the components of the thigh-foot angle, and relate the assessment findings to foot progression angle in gait.
- Relate the findings obtained by undertaking a battery of presented musculoskeletal assessments to age-related ideal findings, to postural and gait deviations, to modeling potential as it is currently understood, to foot segment loading, and to TheraTogs™ strapping applications.
- Acquire novice skill level in donning and doffing a TheraTogs garment and torso-alignment strapping system.
- Experience the sensory and postural effects of wearing TheraTogs garments (over clothing) and Stage 1 strapping applications to improve torso postural alignment and weight distribution through the heels.

### **Participants completing the lab sessions on Day 4 are expected to be able to:**

- Acquire novice-level skill in executing 6 LE musculoskeletal assessment procedures; hip rotation in extension, Modified Ryder’s Test, hip abduction ROM, hamstring muscle length test, thigh/foot angle, and passive Ankle DFROM with knee extended.
- Acquire intermediate-level skill level in donning and doffing TheraTogs garments and strapping applied for weight loading, hip stability, and functioning limb joint alignment, with principles of muscle balance theory and skeletal modeling prospects in mind.

- Observing 2 case presentations, explain the assessment process, the attention to orthoses where applicable, and the rationale supporting the use of TheraTogs garments and selected strapping strategies.

---

## Course Schedule

---

Start	Day 1	Contact Minutes
8:00	Register / Continental breakfast	
8:30	Introduction – Practicality of Cardinal Planes	30
9:00	Skeletal Modeling Mechanisms - The Role of Movement in Shaping the Lower Extremities	30
9:30	Overview of Skeletal Modeling Events	30
10:00	Break	00
10:30	Skeletal Modeling Events, continued	45
11:15	Development of Postural Control	45
12:15	Lunch	00
13:15	Muscle Pathophysiology – The Ongoing Debate	45
14:00	Muscle Balance Theory - Management Implications	60
15:00	Break	00
15:30	Developmental Events and Related Assessment Procedures in the Sagittal Plane: Spine & Pelvic Alignment, Hip Flexion & Extension ROM - Management Implications	60
16:30	Videotaped Case Presentation - Emilia	20
16:50	<b>DEMO:</b> Donning TheraTogs – Strapping for Sagittal-Plane Postural Alignment / Hip Motions	40
17:30	Adjourn	Day1 (Didactic) Contact Minutes: 405
		Day 1 (Didactic) Contact Hours: 6.75

Start	Day 2	Contact Minutes
8:00	Sign in / Continental breakfast	
8:15	Review of Ideal Components of Gait – Focus on the Ankle Joint & Kinetics	90
9:45	Short Break	00
10:00	Ankle DFROM – Assessment with Clinical Application - Sagittal-Plane “Tuning”	30
10:30	Videotaped Case Presentation: Matthew	30
11:00	<b>Demo &amp; LAB:</b> TheraTogs DF-Assist systems for gait & sleeping	60
12:00	Lunch - Adult-Sized TheraTogs available for Try-On from 12:30-12:55 today	00
13:00	Sagittal-Plane Events / Assessments, <i>continued</i> : Hamstring Muscle Length, Patella Angle,	45
13:45	Developmental Events & Related Assessment Procedures in the Frontal Plane: Pelvis, Leg Lengths, Hips & the ITB complex: Management Implications	60
14:45	<b>Demo:</b> Toggling for Frontal-Plane Alignment & Stability; Unilateral Weight-Loading	15
15:00	Short Break	00
15:15	Review and <b>DEMO:</b> Strategies for Positioning – Prone, Sitting, Sleep	45

Start	Day 2	Contact Minutes
16:00	Using TheraTogs for Sensory Processing Disorders, Ataxia, & Autism Spectrum Disorders	30
16:30	Videotaped case presentation – Chloe, Hannah	30
17:00	Videotaped case presentation - Kylie	30
17:30	Adjourn	
	Day 2 (Didactic) Contact Minutes	465
	Day 2 (Didactic) Contact Hours:	7.75

**Lab Enrollees (24): Arrive dressed for lab sessions today: biking shorts; thin, snug-fitting stretch pants.**

Start	Day 3 –	Contact Minutes
8:00	Sign in / Continental breakfast	
8:15	Developmental Events & Related Assessment Procedures in the Transverse Plane: Pelvis, Hip & the ITB complex, & Femur: Implications for Management & Precautions	60
9:15	Short Break	00
9:30	Assessing Femoral Torsion, continued	30
10:00	Transverse-Plane Developmental Events/ Assessments: Knee, Leg, Foot	30
10:30	Short Break	00
10:45	Transverse-Plane Knee, Leg, Foot: Management Implications	30
11:15	<b>DEMO:</b> Toggling to Address Transverse-Plane Problems at Pelvis & Lower Extremity	45
12:00	Lunch - Adult-Sized TheraTogs available for Try-On from 12:30-12:55 today	00
13:00	Using TheraTogs for the Upper Extremity - Brachial Plexus Injury at Birth	60
14:00	<b>Demo:</b> Toggling for Scapular Stability, Arm & Wrist Alignment	30
14:30	Research – Done and Needed	30
15:00	Short Break	00
15:15	Clinical Application – Videotaped Case Study#1 - Sam - with a Review of Musculoskeletal Assessment Findings & Setting Management Goals	30
15:45	Clinical Application – Videotaped Case Study # 2: Geno – Adult with Hemiplegia	30
16:15	<b>LAB:</b> 24 Attendees (Groups of 3) Don TheraTogs Garments and Stages 1 and 2 Strapping on Each Other – Auditors are welcome to observe this lab.	75
17:30	Adjourn	Day 3 (Didactic) Contact Minutes: 405
	Day 3 (Didactic) Contact Hours:	6.75
	Day 3 (Lab) Contact Minutes:	75
	Day 3 (Lab) Contact Hours:	1.25

<b>Start</b>	<b>Day 4</b> – Participation in all lab sessions is limited to 24. Others are welcome to audit the lab sessions at a reduced tuition fee.	<b>Contact Minutes</b>
8:00	Sign in / Continental breakfast	
8:15	<b>LAB:</b> Assessment Procedures: "Hip" Rotation ROM, Modified Ryder's Test, Hamstring Length Test. Participants work in groups of 3.	105
10:00	Short Break	00
10:15	<b>LAB:</b> Assessment Procedures: Thigh/Foot Angle, Ankle DFROM. (Work in groups of 3.)	60
11: 15	<b>LAB:</b> TheraTogs Try-On - Stages 2 (posture) & 3 (extremities)	75
12:30	Short Lunch on premises	00
13:15	<b>Case Presentation #1</b> – Assessment – Infant - <age 12 months) with hypotonia or CP.	60
14:15	Break ( <i>Begin packing up, please</i> )	00
14:45	<b>Case Presentation # 2</b> – Ambulatory child with CP– age 3 thru 7 yrs – GMFCS I, II, or III	150
17:15	Present Certificates of Completion	00
17:30	Adjourn - Pack up, Clean up if you can	Day 4 (Lab) Contact Minutes: 450
		Day 4 (Lab) Contact Hours: 7.50
		Total (Didactic) Contact Hour - Days 1-4: 21.25
		Total (Lab) Contact Hours - Days 1-4: 8.75

---

## Instructor Bio - Beverly Cusick, MS PT COF

---

As of this writing, Beverly (a.k.a. "Billi") has practiced physical therapy for 37 years. She has guest lectured at 80 conferences and meetings, and conducted more than 350 courses in the USA and around the world. She has written or co-authored more than 30 publications, dating back to 1979, including:

- *Serial Casting and Other Equinus Deformity Management Strategies for Children and Adults with CNS Dysfunction (2010)*
- *Foot Talk: A Classroom Presentation on the Fundamentals of Functional Foot Anatomy and Biomechanics. A 2--disk Set: DVD (Lecture) + CD (Handout & References). (2009)*
- *Serial Casting for the Restoration of Soft Tissue Extensibility in the Ankle and Foot (2007)*, a monograph.
- *Pediatric Orthopedics*, a series of 4 articles for the NDTA NETWORK (2006-2007).
- *Legs & Feet: A Review of Musculoskeletal Assessments*, an instructional videotape, revised and adapted to DVD in 2005.
- *Lower Extremity Developmental Features (2000)*, a home study monograph for the APTA's Orthopedic Section
- *Cast Fabrication Techniques #1: The FlexCast Preparatory AFO (1997)*, a videotape & manual set.
- "Assessment of lower-extremity alignment in the transverse plane: Implications for management of children with neuromotor dysfunction" *Physical Therapy* 72(1):13-25.
- "Prescribing orthoses for children with cerebral palsy - an overview of components and current concepts" In: Condie D (Ed): *Proceedings: Society of Prosthetics and Orthotic Consensus Conference: Orthotics for Cerebral Palsy*. Published by the Int'l Soc. Prosthetics and Orthotics - Dundee, Scotland. Consensus conference - Duke University, Durham NC, 11/94.
- *Progressive Casting and Splinting for Lower Extremity Deformity in Children with Neuromotor Dysfunction (1990)*, published by Therapy Skill Builders, San Antonio, Texas (*went out of print in 2009*).
- *Serial Casts: Their Use in the Management of Spasticity-Induced Foot Deformity (1990)*, published by Therapy Skill Builders, San Antonio, Texas (*went out of print in 2009*).
- "Splints and casts: Their changing role in management of foot deformity in children with neuromotor disorders." *Physical Therapy*, 1988. 68, 12:1903-1912.
- *Aquaplast Orthotics: A Guide to Indication and Fabrication of Aquaplast AFO's and Heel Stabilizers for the Neurologically Impaired Patient (1985)* - An instructional manual. Published by WFR/Aquaplast Corp., Ramsey, NJ.

Between 1977 and 1988, Ms. Cusick was on staff for 9 years with Children's Rehabilitation Center (now, Kluge Children's Medical Center) in Charlottesville, VA; helped to launch a developmental disabilities clinic and was on faculty with the Physical Therapy Education Program at the Medical University of South Carolina in Charleston for 3 years; and completed her master's degree at the University of Kentucky in Lexington.

From 1989 to 1993, she was a clinical specialist and consultant for Children's Hospital at Stanford in Palo Alto, CA, and maintained a private practice.

In 2006, she was appointed Associate Professor for the Post-Graduate Physical Therapy Program of Rocky Mountain University of Health Professions in Provo, Utah.

Since 1993, Ms. Cusick has been consulting and practicing privately in Telluride, Colorado. There, she devotes most of her professional effort to generating literature and educational materials, and to developing therapeutic products – including her invention, TheraTogs™ Orthotic Undergarment and Strapping Systems.

A curriculum vita is available upon request.