

## R4: **Advanced Mobility Modeling** to Improve Function and Longer Term Transitional Care of Children with Orthopaedic Disabilities

**(LE plans for Year #2 of the RERC)**

## R4: LE Advanced Mobility Modeling

**Hypotheses:** A) **Fluoroscopically-based** talocrural and subtalar kinetics at baseline will differ significantly following **arthroereisis** (Sta-Peg), B) Joint kinetics at the **hip and knee** at baseline will differ significantly following arthroereisis.

Activity	YR 1	YR 2
Technical system setup and implementation		
Inverse dynamics model development, testing, and integration		
Patient recruitment, screening and baseline assessment	10 Patients Identified	Identify Patients
Subject testing of 48 children using assistive mobility devices and 20 children with pes planovalgus	Planovalgus Foot Deformity	11/20
Administration and assessment of outcomes tools		11/20
Musculoskeletal model development, testing, and integration		
Mechanical testing of cadaveric specimens		
Quantitative data review, ongoing power analysis, and statistical analysis		11/20
Research dissemination		Abs./Sh. Paper

## R4: LE Advanced Mobility Modeling

Test 20 Subjects from MCW Orthopaedics and Shriners, Chicago

- Pes Planovalgus Foot Deformity
- Inter-lab Reliability Study
- AOFAS, FFI-Revised, CHQ, and PODCI / Functional Outcomes
- Fluoroscopy / 2-D and 3-D over course of project
- SIMM and Musculoskeletal Modeling



## R4: LE Advanced Mobility Modeling

- 3D motion analysis with Vicon / Whole body gait
- Lower extremity inverse dynamics model / MFM & self-centering hip
- Fourier Motion Model:  $f(\omega) = \alpha_0 + \sum \{ \alpha_i \cos[2\pi j \omega / 100] + \beta_i \sin[2\pi j \omega / 100] \}$
- Talocrural and subtalar kinetics
- Biomechanics and function of arthroereisis - (Sta-Peg)
- Baseline, 1 Year and 2 Year Post – **Impact:** treatment options, implant designs and rehabilitation strategies

