METHODS
A single female patient with a 15-year history of CMT affecting bilateral lower extremities was tested in 3 different bilateral conditions. The custom-fit dynamic carbon composite AFO designs included 1) without adjustment; 2) with increased rigidity without adjustment; 3) same rigidity as condition 2 with an adjustment to customize the orthosis for the heel height of the shoe. Temporal-spatial and pelvic motion data was collected utilizing a BTS G-Walk Portable Gait Analysis System placed at the L5 vertebral level. Speed, percent of double-limb support, and pelvic kinematics were compared across the conditions and to normal values for women.

INTRODUCTION
Charcot-Marie-Tooth (CMT) is one of the most common inherited neurological disorders, affecting approximately 1 in 2,500 people in the United States. The neuropathy of CMT is a slowly degenerative process with symptoms often starting in adolescence or early adulthood and typically results in weakness of dorsiflexors, plantarflexors, and the intrinsics of the feet. CMT is not considered a fatal disease and people with most forms of CMT have a normal life expectancy; however, they typically require physical therapy, orthotic intervention, and assistive devices to maintain mobility during their lifetime. Identifying maximal functional outcomes is often limited to visual gait analysis and subjective patient commentary, making difficult to know if an adjustment or change of design has made a difference to function. Utilizing a portable computerized gait analysis system, we are able to use quantified measures of gait to modify our components, designs, and gait training to maximize functional outcomes of orthotic intervention.

PATIENT PROFILE
VM is a 39-year-old female, 5’0”, 113 lb, with Charcot-Marie-Tooth disease. She was diagnosed about 15 years ago with prominent symptoms of bilateral parasthesia and weakness in hands and feet. She does not have the typical cavus foot profile; instead, she has bilateral midfoot pronation and calcaneal valgus. Currently, she presents with bilateral dorsiflexion strength of 3+/5, plantarflexion strength of 4/5, and knee extension strength of 4/5. She was initially fit with bilateral custom posterior leaf spring AFOs (approximately 7 years ago). She rejected the custom orthoses because they caused sores on her feet and she felt that it took more effort to walk with the orthoses than it did without. One year ago, she started wearing the Allard ToeOFF® AFOs and felt that they assisted her with activities involving long distances, but for day-to-day wear, she used an elastic ankle support. She also had tried the BlueROCKER™ AFOs and the Ypsilon™ AFOs. She uses each Allard USA orthosis for a variety of activities and changes to give her more or less support and propulsion based on the activity. Currently she walks, runs, trail hikes, and practices yoga on a regular basis.

RESULTS
Comparing objective measured values provides guidance for providing the orthotic design with maximum functionality for the patient. Utilizing the G-Walk system, functional outcomes due to changes in orthotic design and customiztion can be measured and documented. The orthotic intervention that provides the maximum function for this patient allowed for increased speed and decreased pelvic motion, which happened to be the more rigid design customized for shoe heel height. By utilizing a portable computerized gait analysis system, changes in gait function can be monitored over time and with changes to orthotic intervention as well as physical therapy treatments.

DISCUSSION
Comparing objective measured values provides guidance for providing the orthotic design with maximum functionality for the patient. Utilizing the G-Walk system, functional outcomes due to changes in orthotic design and customization can be measured and documented. The orthotic intervention that provides the maximum function for this patient allowed for increased speed and decreased pelvic motion, which happened to be the more rigid design customized for shoe heel height. By utilizing a portable computerized gait analysis system, changes in gait function can be monitored over time and with changes to orthotic intervention as well as physical therapy treatments.

REFERENCES
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DISCLOSURE
Vincent DeCataldo, BOCPO, NJ LPO is employed by Allard USA, manufacturer of dynamic carbon composite AFOs.