INTRODUCTION
Following amputation, an amputee must re-learn how to walk in the presence of an altered neuromuscular system. A goal of prosthetic rehabilitation is to reduce asymmetries between the prosthetic and sound leg to potentially decrease the negative effects of long term exposure to increased force and work demand on the sound leg (Burke et al., 1978; Ephraim et al., 2005). An amputee-specific physical therapy program provides structured motor learning to aid in developing proper gait mechanics, yet such practice is not standard potentially due to limited evidence showing improved gait. The purpose of this study was to determine whether amputees undergoing an amputee-specific physical therapy rehabilitation have improved gait symmetry, assessed through common kinetic measures of gait (Winter 2009).

METHOD
Subjects: Two groups of individuals with unilateral transtibial amputation, divided according to whether they had previously undergone the amputee-specific therapy program (AmpPT group: n=12; age: 56.67 ± 11.14 yrs; ht: 177.04 ± 7.96 cm; mass: 107.57 ± 14.65 kg; yrs since amputation: 5.9 ± 5.1 yrs) or not (No-AmpPT group: n=11; age: 48.64 ± 11.01 yrs; ht: 179.10 ± 9.03 cm; mass: 94.94 ± 21.08 kg; yrs since amputation: 8.7 ± 6.7 yrs) consented to participate in this University IRB approved study. All subjects were previously classified as either K3 or K4 level by their prescribing physician and/or prosthetist.

Procedures: A retrospective analysis was performed on a group of individuals previously recruited to a different study. Due to the retrospective nature of the analysis, subjects were not randomly assigned to each group but were divided based on history. The therapy group received 2-3 sessions per week for 3 months. Subjects walked overground at a self-selected pace while kinetic and kinematic data were collected.

Data Analysis: Asymmetries were determined through dependent t-tests (α=0.05) comparing sound and prosthetic leg kinetic variables.

RESULTS
Of the 23 kinetic variables tested, 17 measures showed significant difference between the sound leg and the prosthetic leg for the group that did not receive the amputee-specific physical therapy (Table 1). For the group that had previously received therapy, only 4 variables showed significant differences between the sound and prosthetic leg.

DISCUSSION
Individuals that previously underwent an amputee-specific physical therapy program have a more symmetrical gait. Increased symmetry in kinetic measures indicates less force and energy demands on the sound leg in order to effectively walk. An amputee-specific physical therapy program designed to improve lower limb strength, core strength, range of motion, center of mass shifts, sound limb deviations, and static and dynamic balance leads to improvements in gait compared to traditional amputee therapy models that focus more on walking. If a symmetrical gait is considered better, then it is possible to deem that amputees undergoing an amputee-specific physical therapy program walk better with likely decreased long term complications to the sound leg.

CONCLUSION
A physical therapy program designed specifically for individuals with amputation can improve gait symmetry. Large emphasis is placed on tasks beyond standard repetitive walking.

CLINICAL APPLICATIONS
Prosthetists should encourage patients to receive physical therapy. Therapists should be trained in aspects of therapy focused on pre-prosthetic exercise, proprioceptive neuromuscular re-education, and normal gait.

REFERENCES