

## **Gait Analysis of Adults with Lower Limb Amputations**

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### **Abstract:**

**Background:** Nearly two million Americans in the United States are living with limb loss. Fresno County has a lower limb amputation rate, almost 50% higher, than the national average. Dysvascular disease is the most common cause for amputation and risk factors include prior history of smoking, obesity, and comorbidities such as diabetes. 65% of all amputations are lower limb amputations. Changes in the lower limb occur as a result of amputation contributing to abnormal changes in the gait cycle. Individuals with lower limb amputation experience decreased gait propulsion, altered gait velocity, and impaired balance control.

**Objective:** The purpose of this research project was to identify if an individual with a transfemoral amputation (TFA) would demonstrate significant differences during the gait cycle when compared to an individual with transtibial amputation (TTA). Results: TFA subject: 76 y.o. male, BMI 22.9, time since amputation 51 years. TTA subject: 60 y.o. male, BMI 29.9, time since amputation 32 years.

**Procedure:** Mean step length measured using Zenomat with average over three walking trials. Ground reaction forces (GRF) were measured on force plates to analyze gait cycle after completion of three successful trials and the average of the three trials were calculated for each plane. Average forces were collected for coronal plane (Fx), vertical plane (Fy), and anterior/posterior plane (Fz). GRF was collected for both limbs (intact and prosthetic) and analyzed for average forces at heel strike (HS), mid-stance (MS), and toe-off (TO). PCC was used to analyze GRF within and between subjects for Fx, Fy, and Fz.

**Conclusion:** The subject with TTA was found to have lower GRFs in the involved limb in all planes at HS and TO, and Fz plane at MS. The subject with TFA was found to have lower GRFs in the involved limb in all planes at HS, Fx plane at MS, and Fy and Fz planes at TO. PCC for within subject comparison demonstrated a lack of correlation. This supports existing literature that the intact vs. prosthetic limb are asymmetrical in Fy and Fz planes. Individuals with TFA demonstrate greater asymmetries than those with TTA throughout the gait cycle.