

Reference

Highsmith MJ, Kahle JT, Miro RM, Cress ME, Lura DJ, Quillen WS.

School of Physical Therapy and Rehabilitation Sciences, University of South Florida, Tampa, FL.

Functional performance differences between the Genium and C-Leg prosthetic knees and intact knees

Journal of Rehabilitation Research and Development 2016; 53(6): 753-766.

Products

Genium vs C-Leg (vs Nonamputees)

Major Findings

With Genium compared to C-Leg:

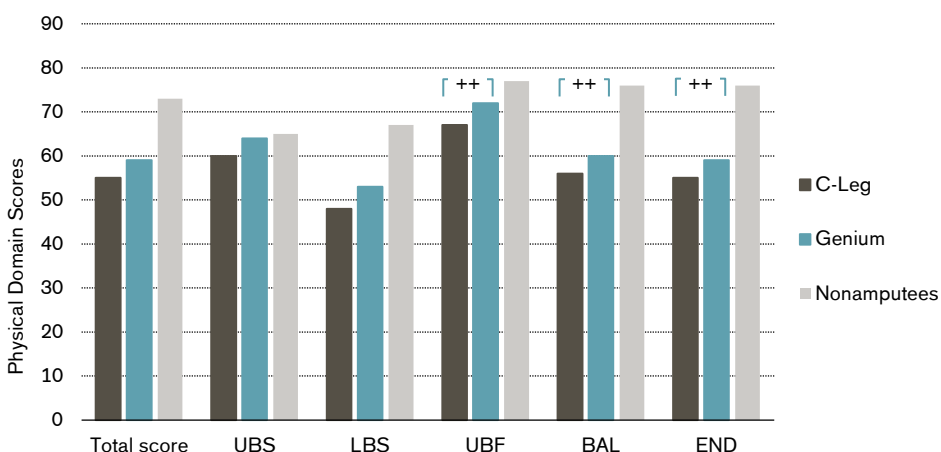
→ **Genium scores significantly higher than C-Leg**

in the upper-body flexibility (UBF), balance (BAL) and endurance (END) domains

→ **Genium scores higher than C-Leg**

upper-body and lower-body strength scores

Genium scores higher than C-Leg in Physical Functional Performance



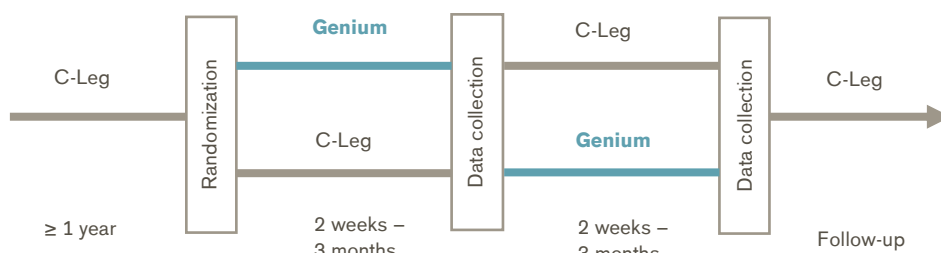
UBS = upper-body strength; LBS = lower-body strength; UBF = upper-body flexibility; BAL = balance; END = endurance; ++ $p < 0.05$ (significant)

Population

Subjects: 20 unilateral transfemoral amputees (AMP), 5 nonamputee controls (NAMP)
Previous prosthesis: C-Leg
Amputation causes: Trauma (75%), Malignancy (20%), PVD (5%)
Mean age: 46.5 ± 14.2 yrs (AMP); 57.2 ± 15.7 yrs (NAMP)
Mean time since amputation: 17.7 ± 15.6 yrs
MFCL: MFCL 3

Study Design

Interventional, randomized crossover design:



Results

Functions and Activities						Participation			Environment
Level walking	Stairs	Ramps, Hills	Uneven ground, Obstacles	Cognitive demand	Energy	Safety	Activity, Mobility, ADLs	Preference, Satisfaction, QoL	Health Economics

Category	Outcomes	Results for Genium vs C-Leg	Sig.*
Activity, Mobility, Activities of Daily Living (ADLs)	CS-PFP10 (Continuous-Scale Physical Functional Performance 10)	The total score showed a trend of improvement by 7.4%.	+
		The upper-body flexibility score was significantly improved by 7%.	++
		The balance score was significantly improved by 7.6%.	++
		The endurance score was significantly improved by 8.4%.	++
		The upper-body and lower-body strength scores showed a trend of improvement (+5.4% and +8.1%).	+
Category	Outcomes	Results for Genium vs nonamputees	Sig.*
Activity, Mobility, Activities of Daily Living (ADLs)	CS-PFP10 (Continuous-Scale Physical Functional Performance 10)	Nonamputees scored higher in all five domains but only significantly higher in the endurance domain (+22.4%) .	+
			++
Category	Outcomes	Results for C-Leg vs nonamputees	Sig.*
Activity, Mobility, Activities of Daily Living (ADLs)	CS-PFP10 (Continuous-Scale Physical Functional Performance 10)	Nonamputees scored significantly higher in the total score (-24.4%) and lower-body strength (-27.6%), upper-body flexibility (-13.4%), balance (-27.1%) and endurance (-28.9%) domains but not significantly higher in the domain upper-body strength.	--
			-

* no difference (0), positive trend (+), negative trend (-), significant (++/--), not applicable (n.a.)

Author's Conclusion

"There were no significant differences in functional UBS between nonamputees and persons with TFA regardless of knee condition. Compared with the C-Leg, Genium use improved the UBF, BAL, and END domains of functional performance, likely because of improved confidence, willingness to lift and carry greater mass, and

ability to move faster during activity. These benefits may be technologically due to the incorporation of a faster processing speed and axial load data assisting in regulating knee resistance and offering new functions such as stance locking and backward stepping. In the LBS, UBF, BAL, and END domains, C-Leg use resulted in significantly lower scores compared with nonamputees. Genium use significantly reduced the magnitude of impairment. The only domain in which persons with TFA performed significantly lower than nonamputees regardless of knee condition was the END domain. In terms of total CS-PFP10 performance, C-Leg use resulted in significantly lower function compared with nonamputees, whereas Genium use was not significantly different from nonamputees. Nonetheless, regardless of knee condition, persons with TFA did not equal or surpass nonamputees in any functional performance domain, suggesting room for improvements in TFA integrated functional performance. Further, the CS-PFP10 test was able to detect statistically significant differences of small effect size between prosthetic knee conditions, which should be interpreted with caution because the test has not been formally assessed in persons with TFA." (Highsmith et al., 2016)

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