

Reference

Lura DJ, Wernke MM, Carey SL, Kahle JT, Miro RM, Highsmith MJ.

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Crossover study of amputee stair ascent and descent biomechanics using Genium and C-Leg prostheses with comparison to non-amputee control

Gait & Posture 2017; 58: 103-107.

Products

Genium vs C-Leg

Major Findings

With Genium compared to C-Leg:

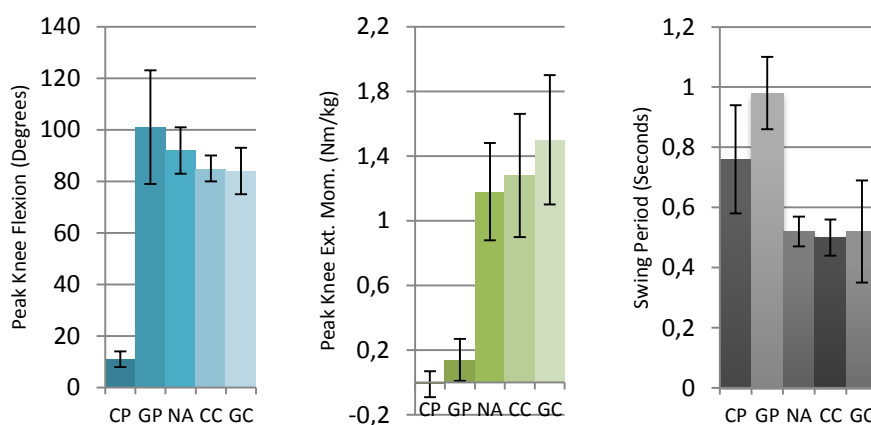
- **Deficiency in gait patterns for stair ascent decreased overall (peak flexion angle and swing period increased significantly).**
- **Ability and preference to use a step-over-step gait increased significantly.**
- **With Genium, 41% of subjects who were able to use a step-over-step (SOS) pattern prefer it to step-to-step (ST); with C-Leg, only 5% subjects would prefer step-over-step (SOS), likely due to comfort and stability of their previous gait pattern.**

Stair ascent step-over-step (SOS)* gait, mean values

Genium (GP) and contralateral (GC, n=17); C-Leg (CP) and contralateral (CC, n=4);

non-amputees (NA, n=10)

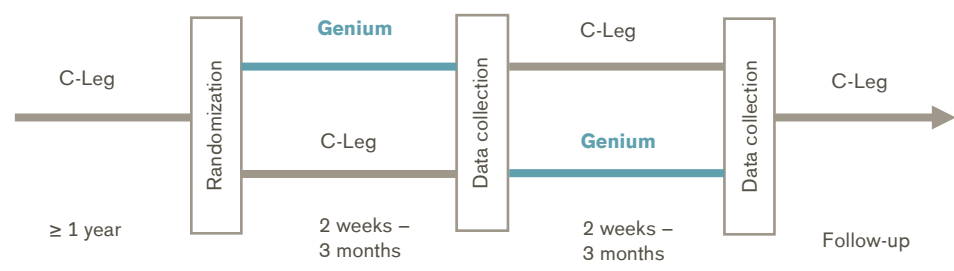
(n = subjects who were able to use SOS gait).



**[...] since participants were not asked to perform the ST gait if they preferred the SOS gait, and not all participants were able to perform the SOS gait, each grouping did not have the same number of trials. For the descent trials, since only one participant preferred the ST gait for descent with the Genium there was not a sufficient sample to perform statistical analysis with for study outcomes for ST descent" (Lura et al., 2017)

Population	Subjects:	20 unilateral, transfemoral amputees, 5 non-amputees
	Previous prosthesis:	C-Leg
	Amputation causes:	70% trauma, 20% malignancy, 10% vascular disease
	Mean age:	Patients: 46.5 yrs (± 14.2 yrs), Controls 57.2 (± 15.7 yrs)
	Mean time since amputation:	17.7 yrs (± 15.6 yrs)
	MFCL:	K3

Study Design Interventional, randomized crossover design:



Results

Activities								Participation	Environment
Level walking	Stairs	Ramps, Hills	Uneven ground, Obstacles	Cognitive demand	Metabolic energy consumption	Safety	Activity, Mobility, ADLs	Preference, Satisfaction, QoL	Health economics

Category	Outcomes	Results (compared to non-amputees)		
		C-Leg	Genium	
Stairs	Descent			
	Peak flexion angle			
		prosthetic to contralateral side	--	--
		contralateral side to non-amp.	--	--
	Peak extension moment			
		contralateral to prosthetic side	++	++
		prosthetic side to non-amp.	++	++
		Prosthetic side to non-amp.	0	0
	Swing duration			
		prosthetic to contralateral side	+	+
		prosthetic side to non-amp.	+	+
		contralateral side to non-amp.	+	+
		C-Leg to Genium	+	
	Ascent (step-over-step pattern)			
	Peak flexion angle			
	prosthetic to contralateral side	--	++	
	prosthetic side to non-amp.	--	0	
	contralateral side to non-amp.	0	0	
	Genium to C-Leg		++	

Category	Outcomes	Results (compared to non-amputees)	
		C-Leg	Genium
	Peak extension moment		
	prosthetic to contralateral side	--	--
	prosthetic side to non-amp.	--	--
	Genium to C-Leg prosthetic		+
	Genium to C-Leg contralat.		+
	Swing duration		
	prosthetic to contralateral side	++	++
	prosthetic side to non-amp.	++	++
	contralateral side to non-amp.	0	0
	Genium to C-Leg		++

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

Author's Conclusion

"Use of the Genium knee enabled the majority of the participants to use a reciprocal SOS gait pattern for stair ascent, increased knee flexion during swing phase of stair ascent, and generally contributed to a more symmetric gait. However, there was not a significant change in gait parameters for participants while descending stairs, and the swing duration while using the Genium for stair ascent was marginally longer than while using the C-Leg." (Lura et al., 2017)

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