

## Reference

Highsmith MJ, Kahle JT, Lura DJ, Dubey RV, Carey SL, Quillen WS, Mengelkoch LJ.

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# Short and mid-distance walking and posturography with a novel microprocessor knee

Technology and Innovation 2014; 15(4):359-368.

## Products

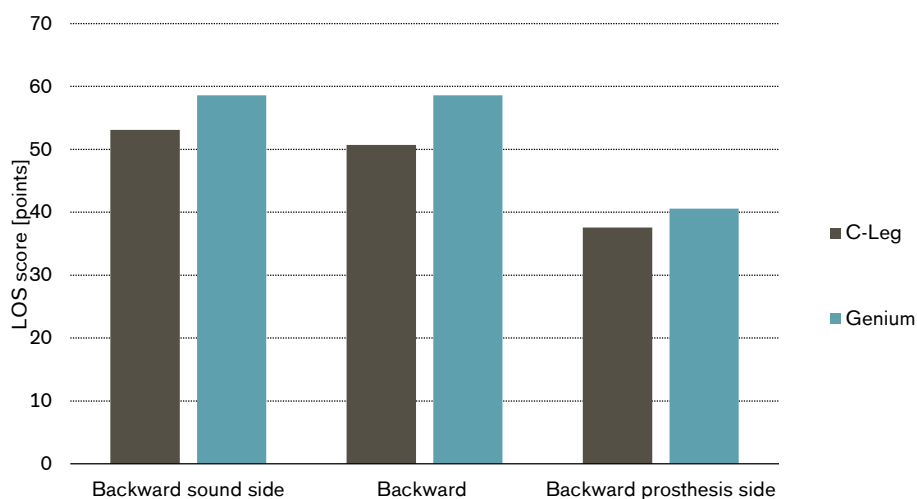
### Genium vs C-Leg

## Major Findings

With Genium compared to C-Leg:

- **Movement control in all three backward directions improved by up to 10%**
- **Walking velocities during short- and mid-distance are maintained whereas levels of perceived exertion tend to decrease**

### Improved limits of stability with Genium



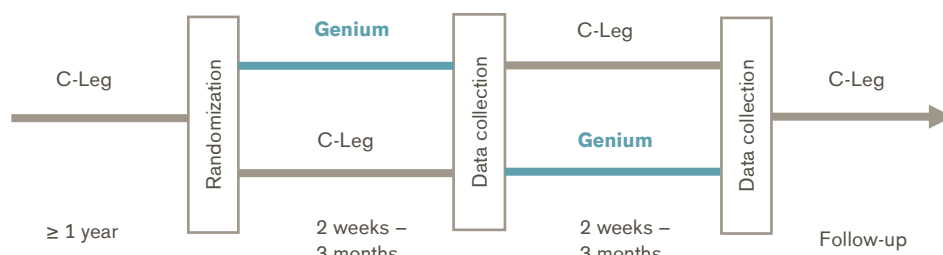
Limits of stability (LOS) was measured by Biodex Balance SD system.

## Population

Subjects:	20 unilateral, transfemoral amputees
Previous prosthesis:	C-Leg
Amputation causes:	70% trauma, 20% malignancy, 10% vascular disease
Mean age:	46.5 yrs (± 14.2 yrs)
Mean time since amputation:	17.7 yrs (± 15.6 yrs)
MFCL:	K3 - K4 (ambulate without assistive device within community)

## 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 for Genium compared to C-Leg	Sig.*
Level Walking	75 m self-selected walking speed (SSWS)	Walking velocity increased by 2% (1.17 m/s vs 1.15 m/s). Perceived exertion was rated lower.	+ +
	75 m fastest possible walking speed (FPWS)	No difference in walking velocity. Perceived exertion was rated lower.	0 +
	6 m fastest possible walking speed (FPWS)	No difference in walking velocity. Perceived exertion was rated lower.	0 +
Uneven Ground, Obstacle Course	38 m fastest possible walking speed (FPWS), sloping terrain over trimmed grass, sand, rocks, and small roots	No difference in walking velocity. Perceived exertion was rated lower.	0 +
Safety	Postural stability and limits of stability (LOS) both measured by Biodex Balance SD system	No differences in postural stability.	0
		<b>Movement control: Improved by 10% in backward sound side direction</b>	<b>++</b>
		Improved by 10% in backward direction	+
		Improved by 9% in backward amputated side direction	+
		Decreased by 6% in forward sound side direction	-
Improved by 8% in forward direction	+		
<b>Decreased by 12% in forward amputated side direction</b>	<b>--</b>		
Time to complete LOS test tended to be decreased by 2%.	+		

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

## Author's Conclusion

'During short to mid-distances, the Genium knee sustains the walking speed improvements realized by the C-Leg with a trend toward decreased levels of perceived exertion. In terms of directional control, TFAs demonstrate multidirectional impairment compared with nonamputees. However, C-Leg use results in improved anter-

olateral directional control compared with Genium, possibly due to the toe load requirement needed to initiate swing phase knee flexion. Conversely, Genium use results in a trend of movement control improvements in all three rearward directions compared with the C-Leg., (Highsmith et al. 2014)

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