

# C-Leg in limited community ambulators

## Level Walking

### Major Findings

With C-Leg and C-Leg Compact compared to NMPKs:

→ **Improved self-selected and fast walking velocity by up to 20%**

Cadence increased by up to 10%

Stride length increased by up to 14%

→ **Harmonized gait pattern (for 95% of subjects)**

→ **Subjects trust to load prosthesis more**

Knee flexion moments in terminal stance phase increased by 200% for free walking and by 350% for fast walking

Peak power generation at the ankle in pre-swing phase increased by 109% for fast walking

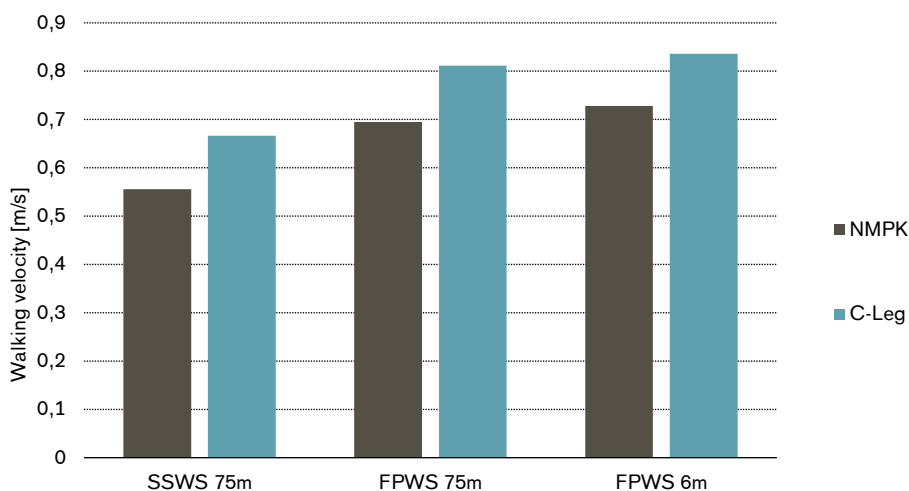
→ **Reduced anterior tilt of pelvis during stance phase**

→ **Increased walking velocity**

14-25% faster walking on level ground

Self selected walking speed increased by 0.1 m/s

### Improvements in walking velocity with C-Leg in K2 subjects



Self-selected walking speed (SSWS) and fastest possible walking speed (FPWS) was measured over 75 meters and 6 meters (Kahle et al. 2008).

### Clinical Relevance

The main aim of a prosthesis is the restoration of function. For lower extremities the most important function is ambulation. It has influence on the mobility, the participation and, therefore, general quality of life. Furthermore, a natural gait pattern is pursued since it prevents the sound side from higher or inappropriate loads due to compensatory movements.

### Summary

The fastest possible walking speed measured over 75 meters increased with C-Leg compared to NMPKs in K2 subjects by 14%. Furthermore, self-selected walking speed measured over 75 m and fastest possible walking speed measured over 6 meters tended to be increased (Kahle et al. 2008, Kannenberg et al. 2014, Hahn et

al. 2021). A later study found that walking speed increased by 20% in both self-selected and fast speed with C-Leg Compact compared to NMPKs. The improvements result from an increase in stride length and by an increase in cadence (Eberly et al. 2014).

An increase of walking velocity in the 2-minute walking test for MPKs in general (Davie-Smith and Carse 2021) and an increase of 0.1 m/s of the self-selected walking speed for C-Leg users was also investigated (Jayaraman et al. 2021, Hahn et al. 2021).

Wetz et al. (2005) conducted a motion analysis when subjects used NMPKs and C-Leg. They found that the improvements differ between mobility grades. K2 subjects mainly benefit from a reduction of hip and knee extension moments, reduction of asymmetry as well as improvement of step length (Wetz et al. (2005). Furthermore, knee flexion moments in terminal stance phase increased by 200% for free walking and by 350% for fast walking, and peak power generation in pre-swing phase at the ankle increased by 109% for fast walking with C-Leg Compact compared to NMPKs (Eberly et al. 2013) resulting from subjects' improved trust to load their prosthesis to a higher extent when releasing swing phase. Anterior tilt of pelvis is reduced in stance phase with C-Leg Compact due to an increase in thigh and hip extension angles during stance phase (Eberly et al. 2013).

Hahn et Lang investigated a harmonized gait pattern for 95% of the subjects (subject composition K2 38.4%, K3 39.2%, K4 6.5%) and the capability to vary gait speed in 93% of the subjects using C-Leg (Hahn et Lang 2015).

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## References of summarized studies

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