

C-Leg vs NMPCCKs

Metabolic energy consumption

Major Findings

With C-Leg compared to NMPCCKs:

→ Improved efficiency while walking

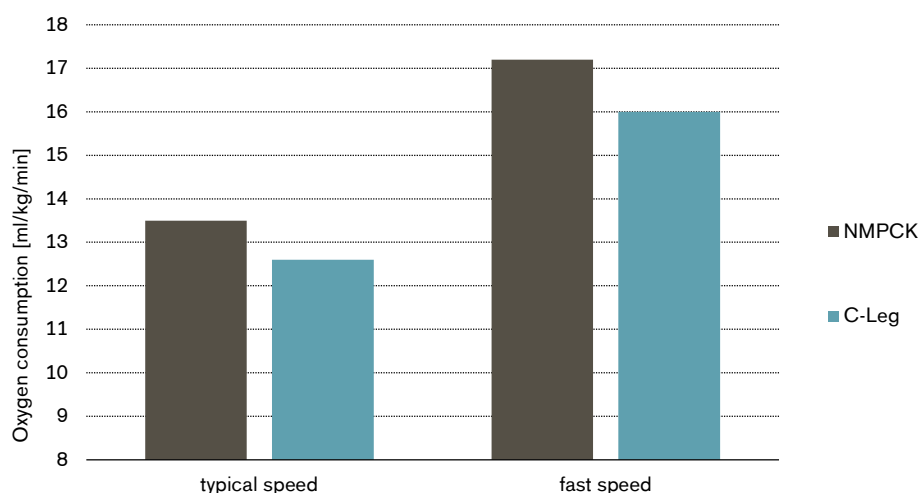
Oxygen consumption at slow walking speed reduced by 6.2%

Oxygen consumption at medium walking speed reduced by 6.0%, respectively 6.7%

Oxygen consumption at fast walking speed reduced by 7.0%

→ Walking with C-Leg is perceived by subjects as easier

Decreased oxygen consumption with C-Leg



Oxygen consumption was measured when subjects walked with self-selected typical and self-selected fast velocities on a treadmill, each for three minutes. Seymour et al (2007)

Clinical Relevance

As transfemoral amputees are less efficient ambulators the difference in energy expenditure between the use of different knee prosthesis is of interest. There are different methods measuring energy expenditure: oxygen cost, heart rate, carbon dioxide production as well as perceived exhaustion while walking.

Summary

Oxygen consumption was measured to be decreased with C-Leg compared to NMPCCKs when walking at typical and fast velocity (Seymour et al 2007). Another group measured oxygen consumption to be decreased by 6.2% at slow walking speed and by 6.0% at self-selected walking speed (Schmalz et al 2002). Two further studies showed that oxygen cost tends to be decreased over a range of walking velocities with C-Leg compared to NMPCCKs (Johansson et al 2005, Orendurff et al 2006). Even though Kaufman et al (2008) measured a slight increase in energy expenditure by 2% with C-Leg compared to NMPCCKs, subjects perceived walking with C-Leg easier.

A group measuring metabolic energy consumption of a bilateral knee disarticulated amputee during walking, found that the rate of oxygen consumption (level of physiological effort) as well as oxygen cost (use of oxygen for the speed of walking) was both reduced when walking with C-Leg compared to NMPCCKs (Perry et al 2004).

References

Year	Author	Title
2008	Kaufman	Energy expenditure and activity of transfemoral amputees using mechanical and microprocessor-controlled prosthetic knees
2007	Seymour	Comparison between the C-leg microprocessor-controlled prosthetic knee and non-microprocessor control prosthetic knees: a preliminary study of energy expenditure, obstacle course performance, and quality of life survey
2006	Orendurff	Gait efficiency using the C-Leg
2005	Johansson	A clinical comparison of variable-damping and mechanically passive prosthetic knee devices
2004	Perry	Energy Expenditure and Gait Characteristics of a Bilateral Amputee Walking With C-Leg Prostheses Compared With Stubby and Conventional Articulating Prosthesis
2002	Schmalz	Energy expenditure and biomechanical characteristics of lower limb amputee gait: The influence of prosthetic alignment and different prosthetic components

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