

## Reference

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# A Comparison of Energy Expenditure in People With Transfemoral Amputation Using Microprocessor and Nonmicroprocessor Knee Prostheses: A Systematic Review

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## Products

### C-Leg, Rheo Knee and Intelligent Prosthesis (IP) vs NMPKs

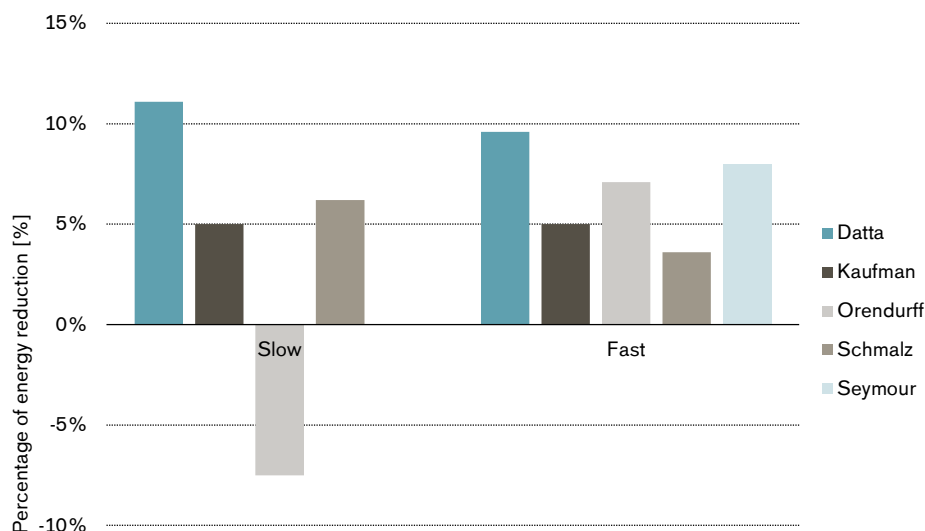
## Major Findings

With C-Leg compared to NMPKs:

### → Improved efficiency while walking

Oxygen consumption may be reduced in particular at slow and fast walking velocities

### Energy reduction when using C-Leg



Energy consumption measured when walking at slow (0.5 – 0.8 m/s) and fast (1.0 – 1.4 m/s) velocity.

## Population

Subjects:	60 subjects
Previous prosthesis:	not reported
Amputation causes:	6 articles nonvascular, 1 article mixed
Mean age:	26–75 yrs
Mean time since amputation:	not reported
MFCL:	6 articles K3–K4, 1 article K4

## Study Design

Review Article:

### Included publications: 7

**Quality assessment:** average PEDro rating of 3.7 points (range 2 – 5 points)

**Inclusion criteria:** experimental design, comparative study between NMPK and MPK prosthesis use, an outcome measure of oxygen consumption.

## 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	Results for MPKs vs NMPKs			Reference
	Slow v**	Self-selected v**	Fast v**	
Metabolic energy consumption	Reduction of mean volume of oxygen consumption per unit of time in 2 out of 3 subjects (n.a.)	No difference (n.a.)	Reduction of mean volume of oxygen consumption per unit of time in 2 out of 3 subjects (n.a.)	Buckley (IP)
	<b>Reduction of net oxygen consumption by 6.2% ++</b>	<b>Reduction of net oxygen consumption by 6.0% ++</b>	Reduction of net oxygen consumption by 3.6% +	Schmalz (C-Leg)
	Reduction of oxygen consumption by 11.1% (n.a.)	Reduction of energy cost by 8.1% (n.a.)	Reduction of energy cost by 9.6% (n.a.)	Datta (C-Leg)
	-	<b>Reduction of energy cost when using Rheo Knee ++</b>	-	Johansson (C-Leg and Rheo Kne)
	Increase in energy cost by 7.5% -	Reduction of oxygen costs by 4.5% +	Reduction of oxygen costs by 7.1% +	Orendurff (C-Leg)
	-	<b>Reduction of oxygen consumption by 3.3% ++</b>	<b>Reduction of oxygen consumption by 8.0% ++</b>	Seymour (C-Leg)
Reduction of energy consumption by 5.0% +	No difference	Reduction of energy consumption by 5.0% +	Kaufman (C-Leg)	
Reduction of energy consumption during walking with an MPCK was more apparent at speeds other than the self-selected walking speed.				
Energy reduction higher than 5% is assumed as clinically significant.				

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

\*\* walking velocity

## Author's Conclusion

"Some evidence suggests that MPK use may reduce energy consumption for high-functioning individuals with nonvascular amputations. However, there is insufficient evidence to suggest that MPK use decreases energy consumption, in general, for adults with unilateral transfemoral amputation compared with non-MPK use." (Wong et al. 2012)

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