

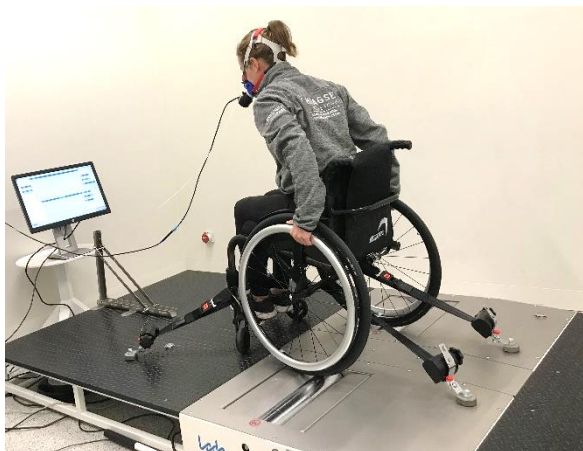
Determining the difference between wheelchair adaptations, i.e. hand rim types, by using propulsion wheelchair tests on a wheelchair ergometer

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Background

Wheelchair adaptations are mainly based on expert opinion obtained from observation. The Lode Esseda wheelchair ergometer provides objective data and may therefore support clinical decision-making.



Objective

To determine if differences in wheelchair adaptations, i.e. hand rim types, on physiological and propulsion technique outcomes can be detected with a wheelchair ergometer.

Methods

- 19 able-bodied participants.
- Two hand rim types were tested twice during a 30-seconds sprint and a four-minute submaximal test.
- Kinematic data and spirometry data were collected.
- Differences between the two hand rim types were determined with Wilcoxon Signed-Rank tests.



Conventional
aluminum



Gekko from
CarboLife

Results

Six out of seven propulsion technique outcomes during 30-seconds sprint differ significantly in favor of the more ergonomic Gekko hand rim ($p \leq .02$).

Outcome:	Median (IQR) Aluminum hand rim	Median (IQR) Gekko hand rim	Exact sig. (2-tailed)
Distance 10 sec (m)	21.28 (18.63-22.81)	22.26 (20.34-23.70)	.00
Distance 20 sec (m)	45.77 (39.85-47.45)	46.59 (42.68-50.72)	.00
Max speed (m/s)	2.73 (2.41-2.86)	2.76 (2.50-3.17)	.00
Mean speed (m/s)	2.23 (1.97-2.38)	2.27 (2.09-2.59)	.00
Max power (Watt)	241.12 (196.55-260.88)	248.67 (212.52-371.34)	.02
Mean power (Watt)	56.15 (46.72-62.18)	61.23 (47.94-73.57)	.01
Asymmetry (%)	6.51 (2.61-8.97)	8.38 (3.35-14.02)	.32

No significant differences were found between the hand rim types during the submaximal test.

Discussion and conclusion

Significant differences were measured between the wheelchair adaptations: performances with the Gekko hand rim were better than with the conventional hand rim.

Differences in wheelchair adaptations (tested with able bodied participants) seem to be best captured by a 30-seconds sprinttest.

Clinical message

Objective wheelchair ergometer data provide insight in manual wheelchair propulsion and may therefore help with substantiate decision-making about wheelchair adaptations.