Differences in Exercise Effects from Static versus Dynamic Standing in Non-Ambulatory Children with Cerebral Palsy

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Conclusion

- A highly statically significant difference was found in the metabolic adaptation, described as oxygen consumption, carbon dioxide production, and ventilation, to static standing versus dynamic standing.
- Static standing and dynamic standing represents different exercise modalities.
- Dynamic standing through robotic walking offers new possibilities to design different exercise regimes to non-ambulatory children with cerebral palsy.

Introduction

The recommendations for non-ambulatory children with cerebral palsy include static standing in standing frames for 45-90 minutes daily. Earlier studies have shown extremely low physical activity in this group.

The aim was to compare the metabolic adaptive effects to four months of static standing versus dynamic standing in the motorised medical device Innowalk, on cardiopulmonary and metabolic parameters

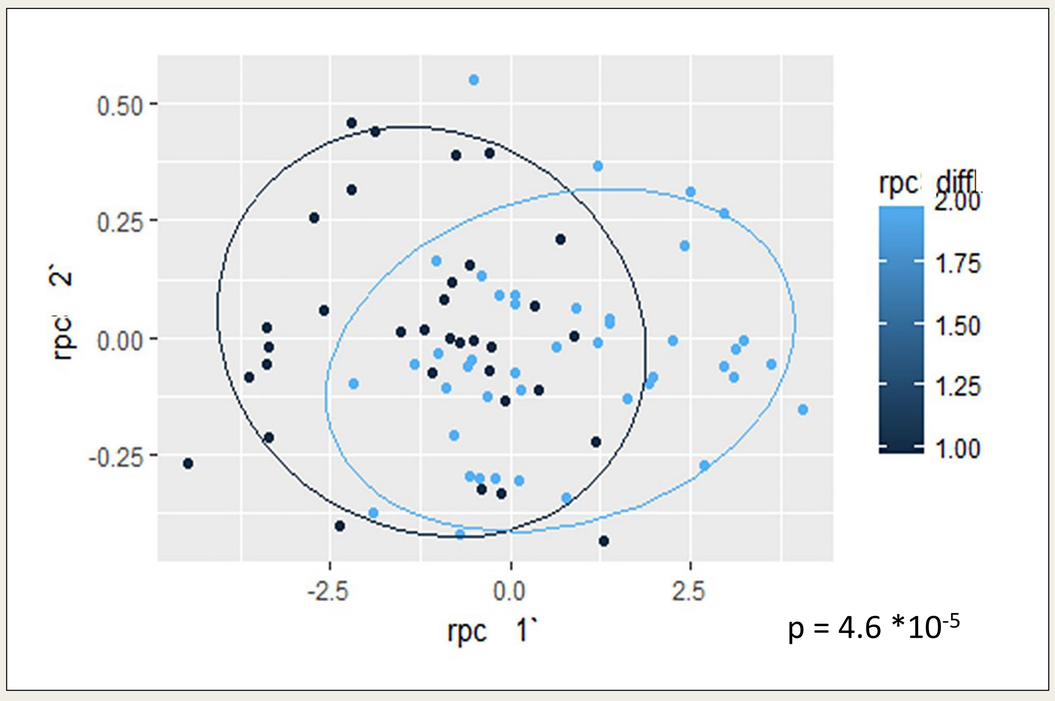
Patients and methods

Eighteen non-ambulatory children with cerebral palsy participated in an exercise intervention study with a crossover design, comparing four months of static standing to four months of dynamic standing.

Adaptive effects from the exercise programs through indirect calorimetry were assessed during 30 minutes of static standing and dynamic standing. An airtight mask covering mouth and nose was worn in order to measure breath-by-breath oxygen consumption, carbon dioxide production, and ventilation. Heart rate was recorded continuously throughout the test.

As many of the variables were linearly correlated, robust Principal Component Analysis (rPCA) was used to determine the components carrying most information. A multidimensional Shapiro-Wilk test indicates that the data can be well described as being multivariate normal distributed, allowing the use of a Hotelling T^2 test.

Results



In a multidimensional statistical analysis of metabolic exercise effects, oxygen consumption, carbon dioxide production, and ventilation were concluded to carry most information and additionally, seen to be statistical different between static standing and dynamic standing reviling a p-value for the two groups having different means of $4.6 * 10^{-5}$.

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