



The weekly recap of what is going on in the world of biomechanics.

## **Comparison of powered robotic exoskeleton gait with normal and slow walking**

Robotic exoskeletons designed for the lower limb are typically used in gait rehabilitation. Yet it is not quite clear how well the biomechanical aspects of the robotic exoskeleton's gait resemble the gait during comfortable walking of able-bodied individuals.

A group of scientists from the UK gave their attention to this issue and published their results in 'Clinical Biomechanics' last week.

To compare gait parameters with and without an exoskeleton, the group made eight healthy, able-bodied individuals walk a 12-m distance once with, and twice without the exoskeleton (slow & comfortable speed). They captured 3D whole-body kinematics during these trials and determined temporal-spatial parameters as well as sagittal joint kinematics for all three conditions.



Sample Image by the Cleveland Clinic. The exoskeleton model might not be the one addressed in the study discussed.

Source:

<https://consultqd.clevelandclinic.org/piloting-a-powered-exoskeleton-for-gait-training-in-multiple-sclerosis/>

And they did find some interesting differences: During exoskeleton walking (0,44 m/s), compared to slow walking (0,41 m/s), time in swing was significantly greater and, therefore, double support was significantly lower. The gait parameters in exoskeleton-condition, namely the stance-to-swing-ratio, more closely resembled the ones captured at comfortable walking speed. Furthermore, ankle and knee angles were reduced, and also upper body angles differed significantly.

In summary, using an exoskeleton in gait rehabilitation has to break down barriers before we rely completely on it. If we teach the bodies of our patients gait patterns that might be atypical for the movement velocity, we might create problems in the long run.



However, as there are multiple exoskeletons available on the market and the research in this field is still quite young, we are quite optimistic about the future development of robot-assisted rehabilitation.

Hayes, S. C., White, M., White, H. S. F., & Vanicek, N. (2020). A biomechanical comparison of powered robotic exoskeleton gait with normal and slow walking: An investigation with able-bodied individuals. *Clinical Biomechanics*, [105133](#).