A UNILATERAL SOFT EXOSUIT FOR THE PARETIC ANKLE CAN REDUCE GAIT COMPENSATIONS IN PATIENTS POST-STROKE

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MOTIVATION
- Abnormal ankle kinematics and kinetics are characteristic of hemiparetic gait commonly leading to the development of ambulatory compensations such as hip circumduction and hiking to advance the limb during swing phase [1].
- Hip compensations are mechanically inefficient and energetically costly, which can have a negative impact on functional walking [2-4].
- Devices such as ankle foot orthoses (AFO) provide support to the ankle but have been shown to reduce ankle push-off and gait adaptability [5].
- The development of adaptive wearable assistive technology that enhances the function of the paretic limb during both swing and stance phase is warranted.

RESULTS & DISCUSSION

Reductions in paretic hip circumduction (−20 ± 5%) and hip hiking (−27 ± 6%) were observed when comparing exosuit unpowered to powered conditions.

These findings highlight the modifiability of non-desirable kinematic behaviors when deficits in key paretic limb biomechanical functions are targeted.

A reduction in compensatory motions may explain the observed reductions in metabolic cost (−32 ± 9%) when wearing the exosuit.

The immediate compensatory and metabolic reductions observed are an assistive effect of the exosuit. Further research should focus on understanding the potential therapeutic benefits from translating and integrating this technology into gait rehabilitation.

CONCLUSIONS
- Reduced compensatory behaviors and increased walking efficiency while wearing the exosuit during treadmill walking are desirable findings which help inform future development. The exosuit presents an exciting opportunity for soft wearable robots in post-stroke rehabilitation.
- Future developments in the exosuit technology that allow for direct assistance of knee and hip flexion may contribute to greater reductions in frontal plane compensations, warranting investigation.

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REFERENCES