

## Acute Intermittent Hypoxia and UE Strength and Function changes in Multiple Sclerosis: A Case Report



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### Background

- Recovery of upper extremity (UE) function is a priority for individuals with multiple sclerosis (MS) whose disease sequelae often results in impaired UEs.
- **Acute Intermittent Hypoxia (AIH)**: an individual breathes bouts of air with low oxygen which may induce neuroplasticity and improve motor function.
- Purpose: to assess the ability of a single-bout AIH protocol to improve UE strength and function in an individual with chronic, relapsing-remitting MS.

### Methods

- A 30-year-old, right-handed female with a 10-year history of MS (Expanded Disability Status Scale score 3.0), with LUE weakness and increased LUE tone underwent two treatment sessions.
- First session: sham intervention delivered normal room air through the hypoxia generator.
- Second session: the following week she received AIH.
- 9-Hole Peg Test immediately before and after the intervention.
- Hand-held dynamometry (HHD) immediately before and after intervention as well as 30 minutes after AIH.

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### Results

After a single bout of AIH, patient demonstrated:

- A 26% **increase in left wrist flexion** immediately after intervention, and a 30% increase 30 minutes later.
- An 8% **increase in left shoulder abduction** strength immediately after intervention, and a 21% increase 30 minutes later.
- No other comparable changes in other LUE, RUE, or BLE joint motions.
- **Decrease in left-sided 9-Hole Peg Test time, from 44.9 secs to 41.4.**

AIH Left Upper Extremity HHD

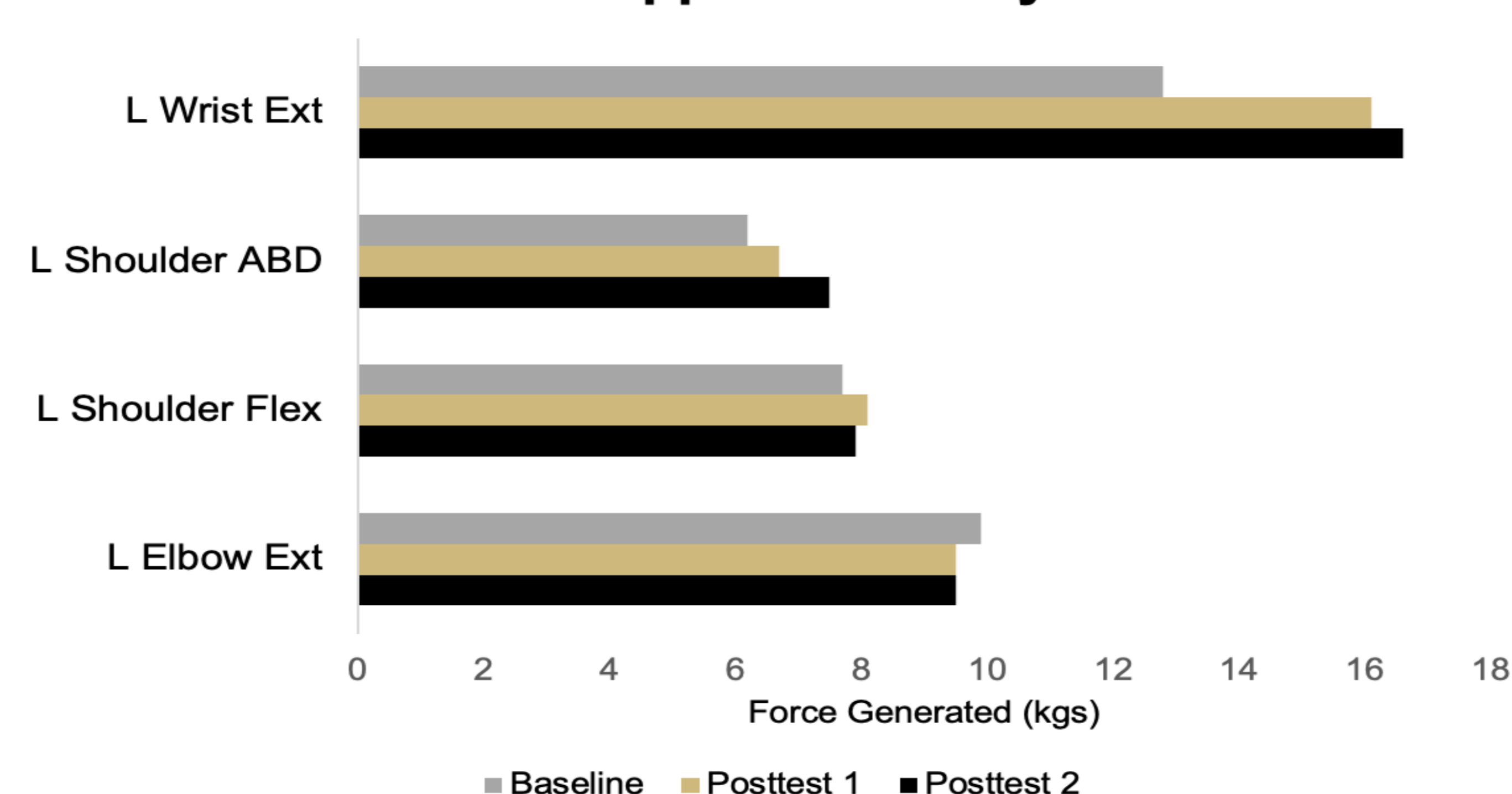


Figure 1: Left upper extremity strength assessment pre and post acute intermittent hypoxia (AIH) treatment

AIH Right Upper Extremity HHD

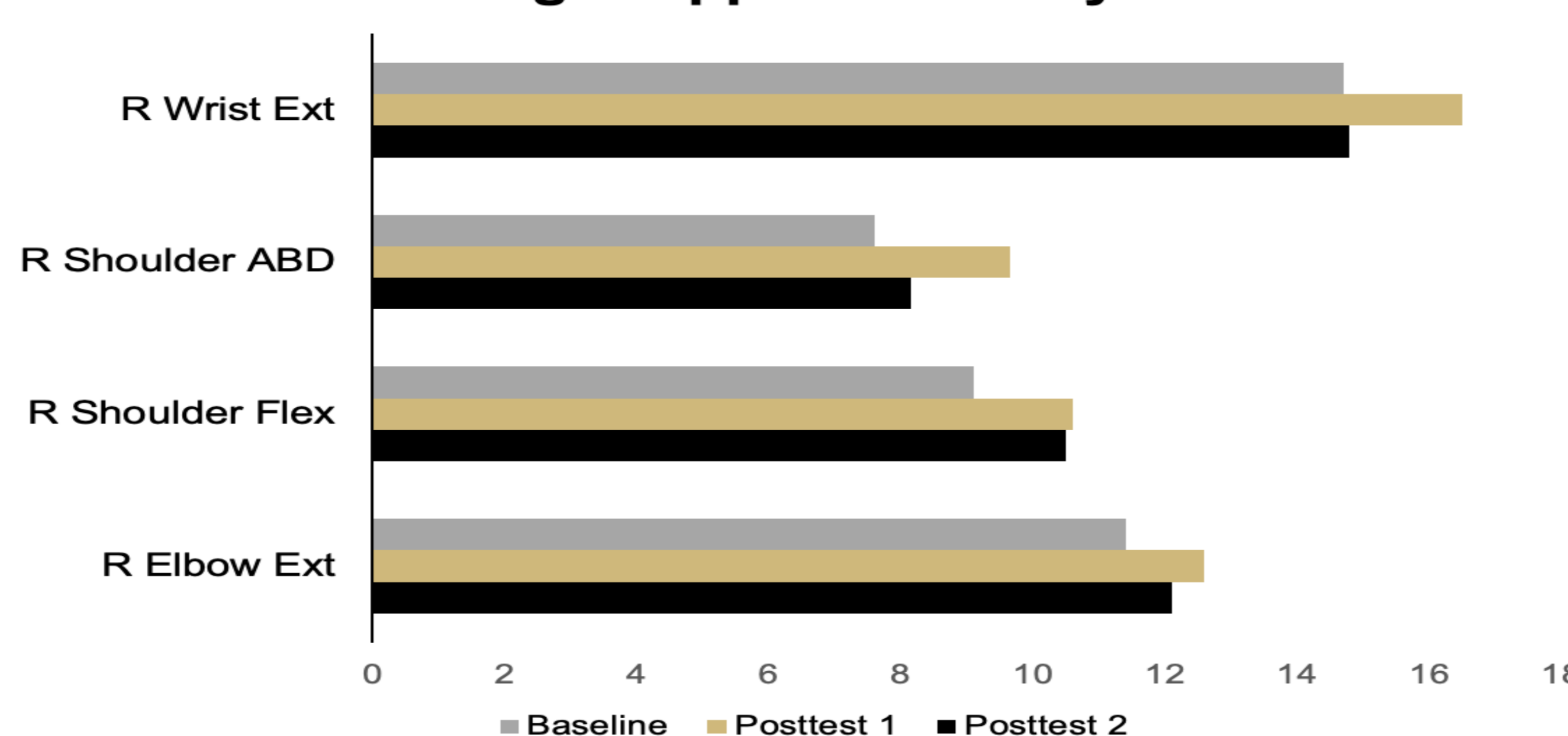


Figure 2: Right upper extremity strength assessment pre and post acute intermittent hypoxia (AIH) treatment



Figure 3: Acute intermittent hypoxia (AIH) treatment and monitoring set-up

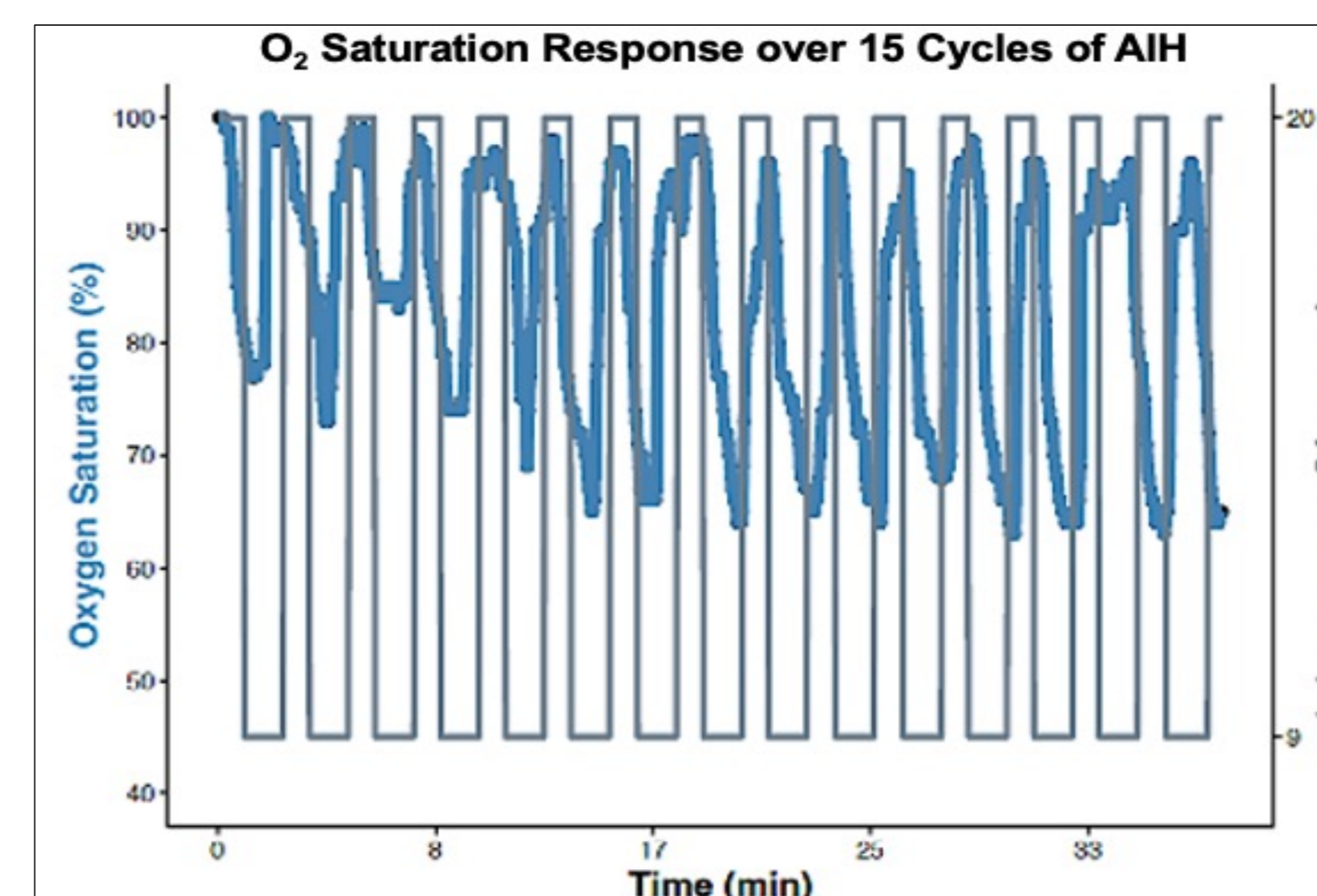


Figure 4: O<sub>2</sub> Saturation response during acute intermittent hypoxia (AIH) treatment

### Conclusions

- A single-bout AIH treatment was **well tolerated**.
- Participant with MS and moderate disability, and a single bout of AIH resulted in **positive changes in UE strength and function** on her more involved side.
- There were no significant changes in LE strength and function.
- These **results are promising**, given the change seen after a single-bout of AIH.

### Implications

- Further research is required to assess safety, feasibility, and potential efficacy of AIH in individuals with MS.
- Potential to see LE changes when following other commonly used dosing protocols (5 days of AIH treatment).
- Potential for clinical use of AIH with proper dosing.

### Funding

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### References

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