

# Towards a quantitative MS assessment

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## Introduction

The clinical assessment of persons with MS (pwMS) is currently mainly based on the EDSS [1]. In recent years, several scales incorporating quantitative assessment of sensorimotor and cognitive function have been established [2-5]. However, these tests are considered not sensitive enough to detect peculiarities in pwMS with subtle changes due to therapy or disease progression [2, 6]. Here, we introduce the Watzmann Severity Scale (WSS), a digitally assessed, quantitative sensorimotor estimate of disease severity in pwMS.

## Methods

We assessed grip force, index finger tapping, visuomotor control (drawing a figure of eight and following a moving target), simple reaction times (visual stimuli), and quality of gait (spectral arc length based approach [7]) in a total of 30 patients ( $51a \pm 10a$ , EDSS  $4.4 \pm 2.1$ , median: 4.0, range: 1.0-8.0) and computed the z-score based vector product of Glass' delta ( $G\Delta$ ) (both upper-limbs if applicable). 0% represented the mean of normative data from healthy, age-matched controls, negative values above average, and positive values impaired performance.

## Results

WSS scores ranged from -26% to 87% ( $34.0\% \pm 32.9\%$ , median: 31.2%) and were strongly correlated with the EDSS ( $R^2 = .76$ , 2<sup>nd</sup> degree polynomial). pwMS revealed impairments in all dimensions but reaction times (grip force  $G\Delta = .59$   $p < .01$ ; tapping  $G\Delta = .51$   $p = .02$ ; visuomotor  $G\Delta = 2.23$   $p < .01$ ; gait  $G\Delta = 3.8$   $p < .01$ ; reaction times  $p = .93$ ). During a  $16.5d \pm 7.1d$  in-hospital stay at Medical Park Loipl, scores of 19 patients improved significantly ( $p = .02$ , Cohen's  $d = .24$ ), with 47% positive ( $>3\%$  gain) and 11% negative responders ( $>3\%$  loss).

## Discussion

The WSS showed a strong, non-linear correlation with the EDSS, while being able to recognize even subtle changes of performance in different sensorimotor dimensions over the course of an in-hospital stay. pwMS revealed strongest impairments in visuomotor control and gait. The ongoing study aims to provide a quick, objective, reliable and low-cost assessment of impairment in pwMS.

## References

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