# Efficacy of an internet-based program (MS Intakt) to promote physical activity after inpatient rehabilitation in persons with multiple sclerosis a randomized controlled study

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### Background

Multimodal rehabilitation improves symptoms in persons with multiple sclerosis (PwMS), but these effects diminish with time, despite the well-known positive impact of exercise on fatigue and mobility.

We evaluated the efficacy of a 3-month, internet-based e-training program ("MS Intakt")1 on fatigue, quality of life and mobility in PwMS after inpatient rehabilitation.

- Inclusion criteria:
  - > PwMS admitted to inpatient rehabilitation
  - > No relapse / steroid therapy within the last 30 days
  - Fatigue (WEIMuS score ≥ 32)
  - > Age ≥ 18 years
  - > EDSS ≤ 6.0

# Control group (CG): usual care alone

E-Training group (EG): 3-month home training program, supervised via internet by sport therapists directly after rehabilitation

### Primary outcome:

Fatigue after 3 months (WEIMuS questionnaire<sup>2</sup>)

# Secondary outcomes:

- Quality of life (MSIS-29, EQ-5d)
- > Mobility (2min walking test, 10m WT, Tinetti score)
- > Neuropsychological parameters (alertness)
- > Physical activity (standardized questionnaires)
- Willingness to pay

### Measurements:

- T0: within the first week after admission (Baseline)
- T1: end of rehabilitation (Discharge)
- T2: follow-up after 3 months (Month 3) ⊳
- > T3: follow-up after 6 months (Month 6, via mail)

#### Patients

84 PwMS were included, of whom 64 completed the study:

	Control	E-Training
n	30	34
Female (%)	17 (57 %)	22 (65 %)
Age [years]	$46.4 \pm 12.2$	$47.6\pm9.2$
EDSS (median) (range)	4.0 (1.5 – 6.0)	<b>4.25</b> (1.0 – 6.0)
Disease duration [years]	9.0 ± 7.5	13.4 ± 7.9
RR-MS (%)	20 (67 %)	19 (56 %)

EDSS: Expanded Disability Status Scale. RR-MS: Relapsing-remitting MS Data are given as mean ± standard deviation, unless otherwise indicated.

# Results

At baseline, median WEIMuS scores were higher (indicating a higher degree of fatigue) in EG than in CG, but decreased similarly at discharge in both groups. However, WEIMuS scores increased again in CG at both follow-up measurements, whereas in the etraining group, fatigue further improved at 3 and 6 months (fig 1).

Similarly, MSIS-29 scores were improved in both groups at discharge, but remained stable at month 3 only in the e-training group (fig 1). The improvements in gait parameters were also more pronounced in EG, particularly for the 2-minute walking test (fig 2).



Figure 1: WEIMuS scores (above) and MSIS-29 (below) in 30 PwMS without (Control Group, blue columns) and 34 PwMS with a 3-month internet-based training (E-Training Group, red columns).

\*\*p< 0.005, \*\*\* p< 0.001, repeated measures ANOVA on ranks with Tukey method.



Figure 2: Gait parameters (2 minute walking test, above: 10 meter walking test, below) in 30 PwMS without (Control Group, blue columns) and 34 PwMS with a 3-month internet-based training (E-Training Group, red columns). n.s. = not significant, \*p< 0.05, \*\*p< 0.005, \*\*\* p< 0.001, repeated measures ANOVA on ranks with Tukey method.

The results of our study demonstrate that the effects of rehabilitation on fatigue, quality of life and mobility can be maintained with an internet-based home training program for up to 3 - 6 months. Further studies are needed to investigate whether longer-lasting programs may have more sustained effects on these disabling symptoms in PwMS.

#### References

- Tallner A, Streber R, Hentschke C, Morgott M, Geidl W, Mäurer M, Pfeifer K. Internet-supported physical exercise training for persons with multiple sclerosis a randomised, controlled study. Int J Mol Sci 2016;17:E1667 1.
- Flachenecker P, Müller G, König H, Meißner H, Toyka KV, Rieckmann P. "Fatigue" bei Multipler Sklerose. Entwicklung und Validierung des "Würzburger Erschöpfungsinventars bei MS". Nervenarzt 2006;77:165-174

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