Activity Based Rehabilitation May Preserve Function in Multiple Sclerosis

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OBJECTIVE
To examine the effect of activity based restorative therapy (ABRT) on disability in progressive multiple sclerosis.

BACKGROUND
Progressive multiple sclerosis (MS) is associated with gradual decline in physical function mostly secondary to spinal cord dysfunction. Activity based restorative therapy (ABRT) interventions include functional electrical stimulation (FES), locomotor training, weight loading, patterned and non-patterned motor and sensory activation above and below the level of spinal lesions.

METHODS
Study design: Retrospective cohort study
Patients: MS patients undergoing ABRT between July 2007 to August 2011, n=40: Primary progressive MS (PPMS) – 12, Secondary progressive MS (SPMS) – 14, Relapsing remitting MS (RRMS) – 14.
Follow-up: 15.1 months (mean)
Inclusion: At least 2 American Spinal Cord Injury Association (ASIA) impairment evaluations
The ASIA Scale is an internationally recognized clinical and research tool in spinal cord injury with high content validity.
Exposure: Activity based restorative therapy (ABRT) including RES and non-FES interventions
Outcome: Improvement in disability
Response in functional domain defined as an increase or stabilization in ASIA scores.

RESULTS

Fig. 1: Mean EDSS change after 15.1 month follow-up.

![Fig. 1: Mean EDSS change after 15.1 month follow-up.](image)

**Fig. 2: Proportion showing response in ASIA functional domain, mean 15.1 month follow-up.**

![Fig. 2: Proportion showing response in ASIA functional domain, mean 15.1 month follow-up.](image)

**Fig. 3: Mean change in ASIA functional domain scores for PPMS, SPMS, and RRMS responders.**

![Fig. 3: Mean change in ASIA functional domain scores for PPMS, SPMS, and RRMS responders.](image)

**Fig. 4: Proportion showing response in ASIA functional domain by FES use, 15.1 month follow-up.**

![Fig. 4: Proportion showing response in ASIA functional domain by FES use, 15.1 month follow-up.](image)

**Fig. 5: Mean change in ASIA functional domain scores among responders in SPMS, PPMS, and RRMS.**

![Fig. 5: Mean change in ASIA functional domain scores among responders in SPMS, PPMS, and RRMS.](image)

**Fig. 6: Proportion of patients showing response to ABRT by functional domain ASIA scores by FES use:**

![Fig. 6: Proportion of patients showing response to ABRT by functional domain ASIA scores by FES use](image)

**Table 1: PARTICIPANTS BASELINE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
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<td>30.000</td>
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REFERENCES

DISCUSSION
Activity based restorative therapy (ABRT) was associated with significant motor, sensory and functional response in our population with severe neurologic deficits. ABRT with FES interventions showed better response. The ASIA impairment scale may be more sensitive to motor and sensory function in this population. Our findings may be limited by lack of a control group and a small sample size. However, the observed response to ABRT with FES interventions holds promise in managing progressive MS which is associated with accrual of disability.

CONCLUSIONS
Activity based restorative therapy (ABRT) may help preserve or improve neurological function in progressive MS. The use of functional electrical stimulation (FES) may play an integral part in neurological recovery. Randomized clinical trials administering higher doses of ABRT and FES are needed to help clarify this question.