

# The Mollii-suit® - A novel method using reciprocal inhibition on children with cerebral palsy, GFMCS IV-V. A 6 month prospective study.

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## Background:

Spasticity is a common characteristic in children with cerebral palsy (CP) - affecting patient's quality of life and daily activities. Treatment for spasticity consists of surgery, exercise and spasticity relieving drugs, which might not always be as effective. Furthermore, treatments are often time-consuming and there is only few treatments which can be performed without a presence of a therapist.

This warrants new treatment for relieving and modifying their spasticity, without further impact on other daily activities. Mollii® is a two pieces suit with integrated 58 electrodes for multifocal transcutaneous electrical stimulation (TENS) computed by personalized evaluation and utilizing the concept of reciprocal inhibition.

### AIM OF STUDY

THE PURPOSE WAS TO INVESTIGATE WHETHER A NOVEL METHOD USING RECIPROCAL INHIBITION AFFECTS RANGE OF MOTION AND SPASTICITY ON CHILDREN WITH CEREBRAL PALSY.

## Materials & Methods:

Participants were recruited from three schools for children with special needs in the isle of Zealand, Denmark. Thirty-one participants, 19 boys (7y-17y) and 12 girls (7y-16y), with predominantly spastic disease were included in the study and twenty completed. The participants suits were individualized in regards to targeted muscles and treatment intensity to their specific pattern of spasticity in the trunk and extremities.

They wore the suit for one hour at school settings or at home every second day in the trial period of 6 months.

Measurements were performed before and 4, 12, and 24 weeks after the treatment had started. Passive range of motion (pROM) were measured using a goniometer. Spasticity were tested by the modified Ashworth scale and modified Tardieu Scale in all treated joints and muscles by the same rater. Furthermore, treatment goals were set and evaluated afterwards by the participant's primary physiotherapist and occupational therapist with the goal attainment scale (GAS).

A one sample Wilcoxon Signed Ranks test were performed for GAS, pROM and spasticity, with a p-value at 0.05 (SPSS Ver.22).

## OUTCOME PARAMETERS

- Passive Range of Motion (pROM)
- Modified Ashworth Scale
- Modified Ashworth Tardieu
- Goal Attainment Scale (GAS)

### Passive Range of Motion

| Extremity          | Number(n) | Median_Baseline | Median, 24 weeks | P=    |
|--------------------|-----------|-----------------|------------------|-------|
| Dorsal Flexion_SIN | 12        | 72,5°           | 70°              | 0.054 |
| Quadriceps_DXT     | 6         | 55°             | 80°              | 0.066 |
| Straight Leg_SIN   | 7         | 92.5°           | 100°             | 0.074 |

### Modified Ashworth Scale

| Extremity      | Number (n) | Median_Baseline | Median, 24 weeks | P=           |
|----------------|------------|-----------------|------------------|--------------|
| Hamstrings_DXT | 11         | 4               | 3                | <b>0.015</b> |
| Hamstrings_SIN | 13         | 4               | 3                | <b>0.014</b> |
| Quadriceps_DXT | 5          | 3.5             | 3                | <b>0.046</b> |
| Quadriceps_SIN | 6          | 4               | 2,5              | 0.059        |

### Modified Tardieu Scale

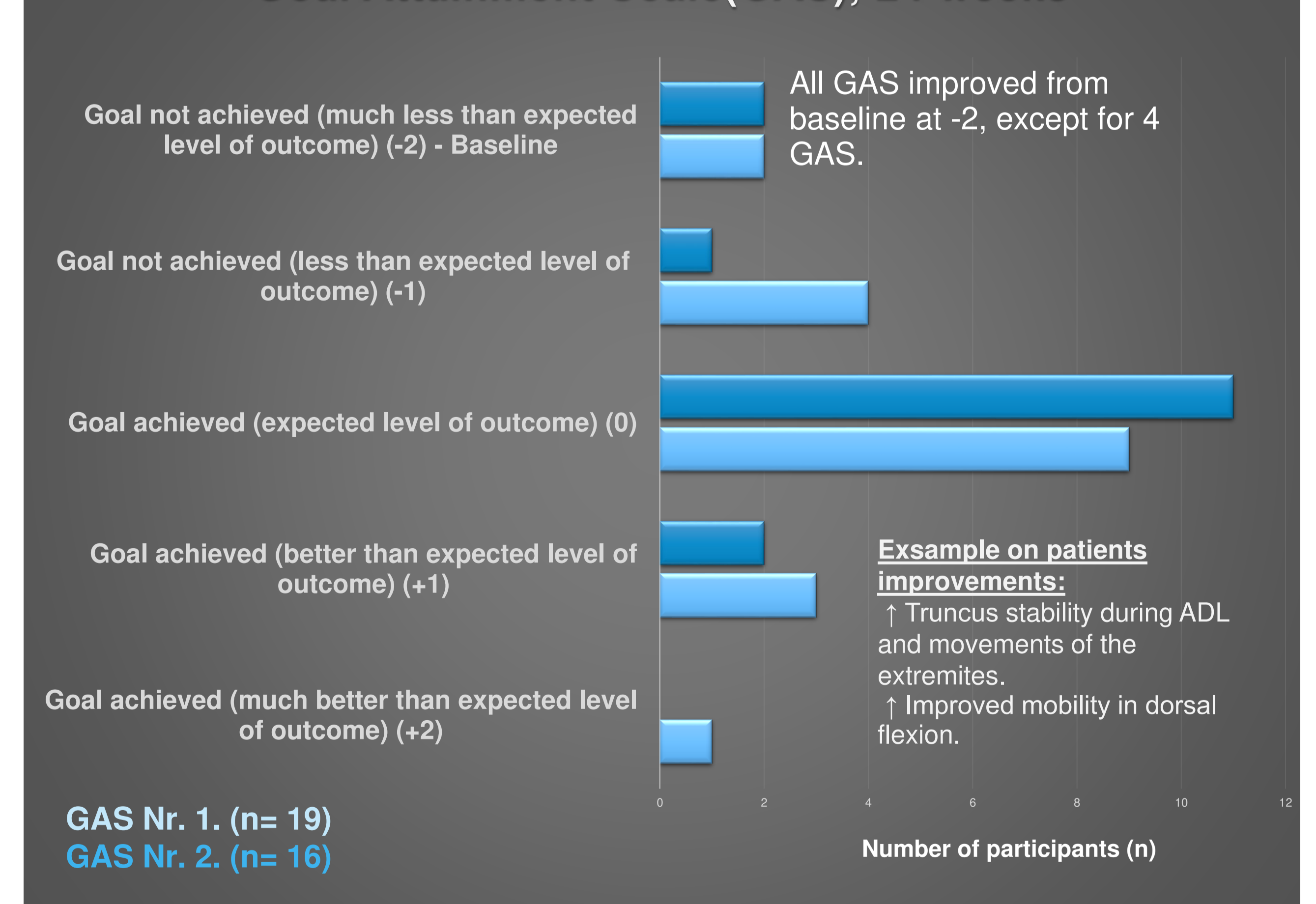
| Extremity      | Number(n) | Median_Baseline | Median, 24 weeks | P=           |
|----------------|-----------|-----------------|------------------|--------------|
| Hamstrings_SIN | 13        | 92.5°           | 100°             | <b>0.002</b> |



## Results and Conclusions:

A statistically significantly decreased change in spasticity was measured in m. biceps femoris and m. semitendinosus (p: 0.015 and 0.014), and in m. quadriceps femoris (p: 0.046). A significant increased modified tardieu scale was measured in m. biceps femoris and m. semitendinosus (p: 0,002). The pROM showed a suggestive trend towards statistically significance different in m. biceps femoris, m. semitendinosus and m. quadriceps. Individualized goals (GAS) related to function and mobility improved significantly throughout the intervention period at 24 weeks, except for 4 (p: 0,004).

### Goal Attainment Scale (GAS), 24 weeks



## CONCLUSIONS

The results of this study indicate the Mollii®-suit seems to affect spasticity in the individualized treated muscles, and have a positive effect on personalized therapeutic goals related to function and mobility.