

# A COMPREHENSIVE APPROACH TO THE ASSESSMENT OF SPASTICITY

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## INTRODUCTION

Assessment of spasticity is complex due to its various manifestations, difficulties to distinguish between neural and non-neural components, and different characteristics during passive and active movements.<sup>1,2</sup> Additionally, there is often a discrepancy between outcomes of objective tests and the patients' perception.

## OBJECTIVE

Development of a comprehensive set of tools for the assessment of spasticity, to support clinical decision making concerning the choice and dosage of spasmolytic therapy.

## METHODS

The following set of tests, based on the WHO ICF framework<sup>3</sup>, was defined:

### 1. Body Functions and Structures:

(standardized) Ashworth scale, Spasm scale, Clonus scale; Surface electromyography (sEMG) recordings during standardized test situations, including the pendulum test (PDL), passive movement (PM), and - if possible - active extension of the knee (in semi reclined position; see figure 1).

### 2. Activities and Participation:

Visual Analogue Scale (VAS)\* and Borg Scale\*\*; Functional tests like 10 meters walk test, Timed Up and Go test and the Timed Transfer test; Long-term sEMG monitoring of muscle activity during daily life activities or during social activities like working, driving a car, shopping etc. (in combination with diary) (see poster GE Voerman et al.).

\* VAS: 10 cm line used for the subjects' perceived amount of spasticity during a given period of time (varying from "no spasticity" to "as much spasticity as possible")

\*\* Borg Scale: 10 points Likert scale used for the subjects' perceived amount of discomfort due to spasticity during a given period of time (varying from "no discomfort at all" to "maximum discomfort")



Figure 1  
Equipment and positioning of the subject during standardized spasticity measurement, with goniometer, EMG electrodes and recording device.

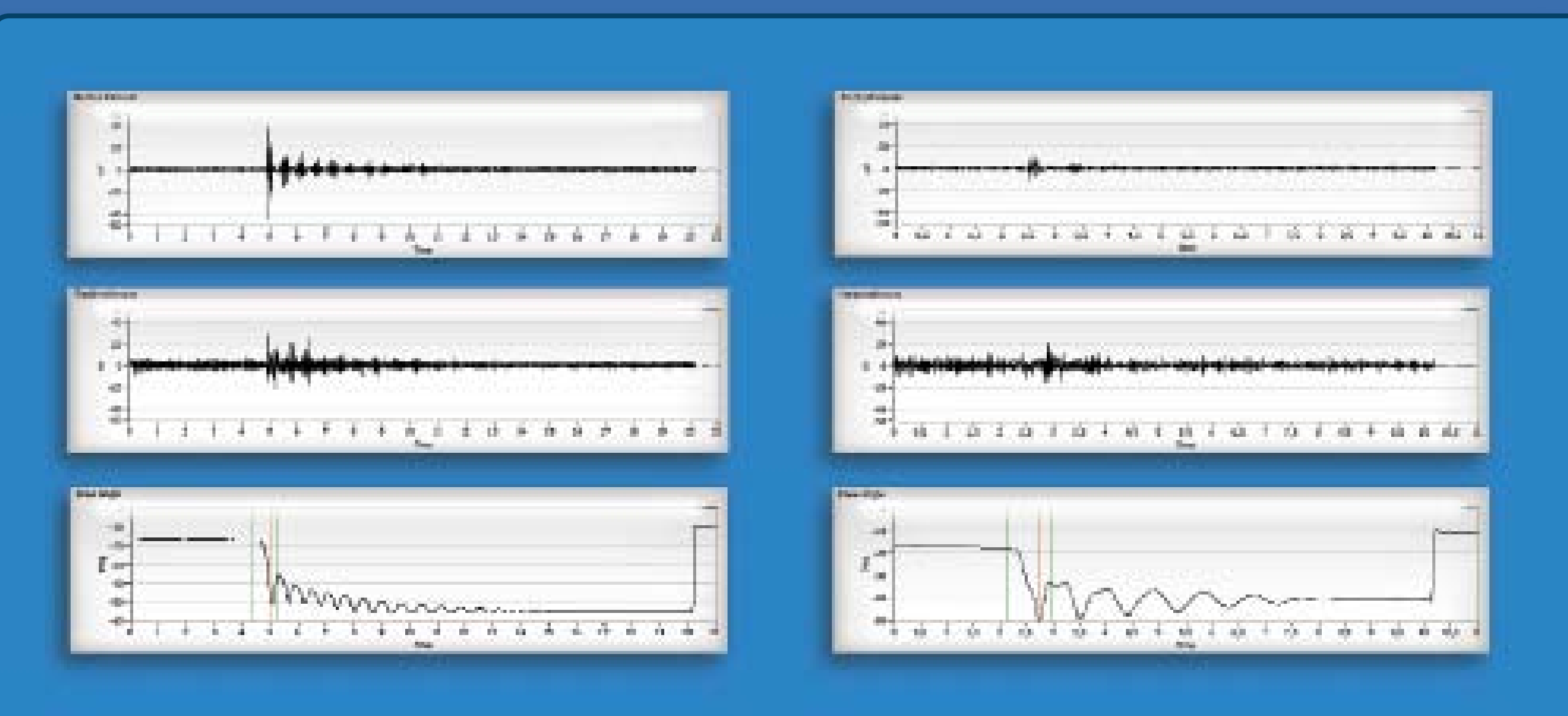


Figure 2  
Example of the pendulum test of subject 2 before (left) and with ITB (right).

The Relaxation Index is the ratio between the angle of the first drop and the resting angle (with the initial angle as 0 degrees)

Subject	Instrument	Pre ITB	With ITB
1	AS	3	0
	VAS	6.6	1.3
	Borg	10	0.5
	Relaxation Index (PDL)	1.4	1.9
	RFstretch (PM)	1.5	1.7
2	AS	4	1
	VAS	7.6	0.8
	Borg	10	2
	Relaxation Index (PDL)	1.0	1.5
	RFstretch (PM)	2.6	1.6

Table 1  
Abbreviations:

AS, Ashworth score knee extensors;

RFstretch, Rectus Femoris activity during stretch ( $\mu$ V)

## RESULTS

Completing the set of tests takes about 2 hours (apart from the long-term sEMG monitoring). It has been used in 5 patients treated with intrathecal baclofen (ITB) and 3 patients treated with oral medication. Summarized outcomes of pilot testing of the first two patients treated with ITB are presented in figure 2 and table 1.

## DISCUSSION

This comprehensive set of spasticity assessment tools contributes to the improving insight into the various aspects of the spasticity syndrome, and can be completed within reasonable time limits. Therefore it helps the process of clinical decision making regarding the choice of therapy and monitoring the effects of the therapy.

### References

<sup>1</sup> Burridge JH, Wood DE, Hermens HJ et al. Theoretical and methodological considerations in the measurement of spasticity. *Disabil Rehabil* 2005; 27(1-2):69-80.

<sup>2</sup> Marino RJ, Stineman MG. Functional assessment in spinal cord injury. *Topics in spinal cord injury rehabilitation* 1996.

<sup>3</sup> www.who.int/classifications/icf/en/



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