Longitudinal evaluation of the hand function in patients affected by Charcot-Marie-Tooth (CMT) neuropathy with a Sensor Engineered Glove Test (SEGT)
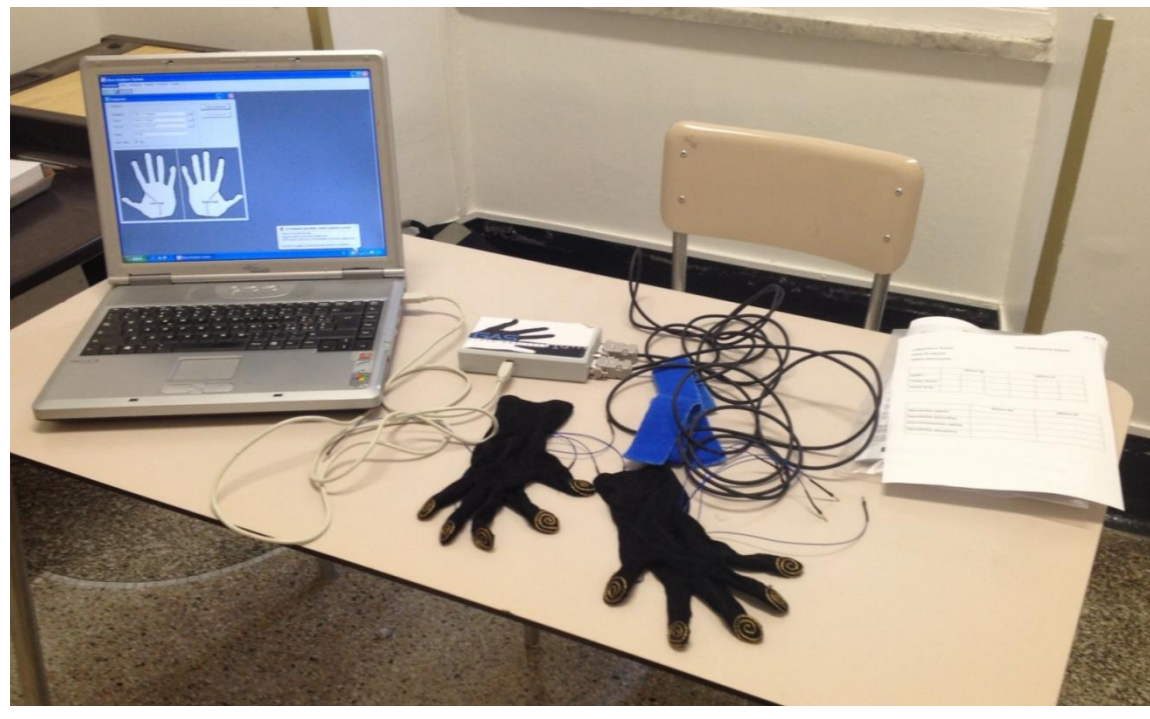
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INTRODUCTION

The SEGT is an engineered glove, easy to wear and tailored not to hinder the fingers movements. The sensors on the palmar surface of the distal phalanx register the contact during the opposition movements between thumb and the opposite finger. We previously demonstrated that the SEGT is not only effective in the discrimination of normal controls from patients affected by CMT, but also identifies a significant trend between healthy controls, CMT patients with clinically normal hand and patients with impaired hand, underscoring its sensitiveness to measure severity of hands dysfunction. The ability of SEGT to detect changes over time is unknown, yet. The aim of this study is to evaluate the sensitiveness of the SEGT to time changes, in patients affected by different types of CMT.

MATERIALS & METHODS

Patient:
- Eyes closed
- Relaxed
- Alternating Hands

Duration: 30 sec
Protocols:
- FT at max velocity (MV)
- Sequence (IMRL) @ max velocity (MV)

  Parameters evaluated:
  - Touch Duration (TD) in ms
  - Inter-tapping Interval (ITI) in ms
  - Movement Rate (MR, 1/TD+ITI) in Hz

Patients enrolled in the baseline:
- n: 56 (28 M; 28 F)
- CMT1A n:21
- Age range: 22 – 79

Tests Performed (every 3 months)
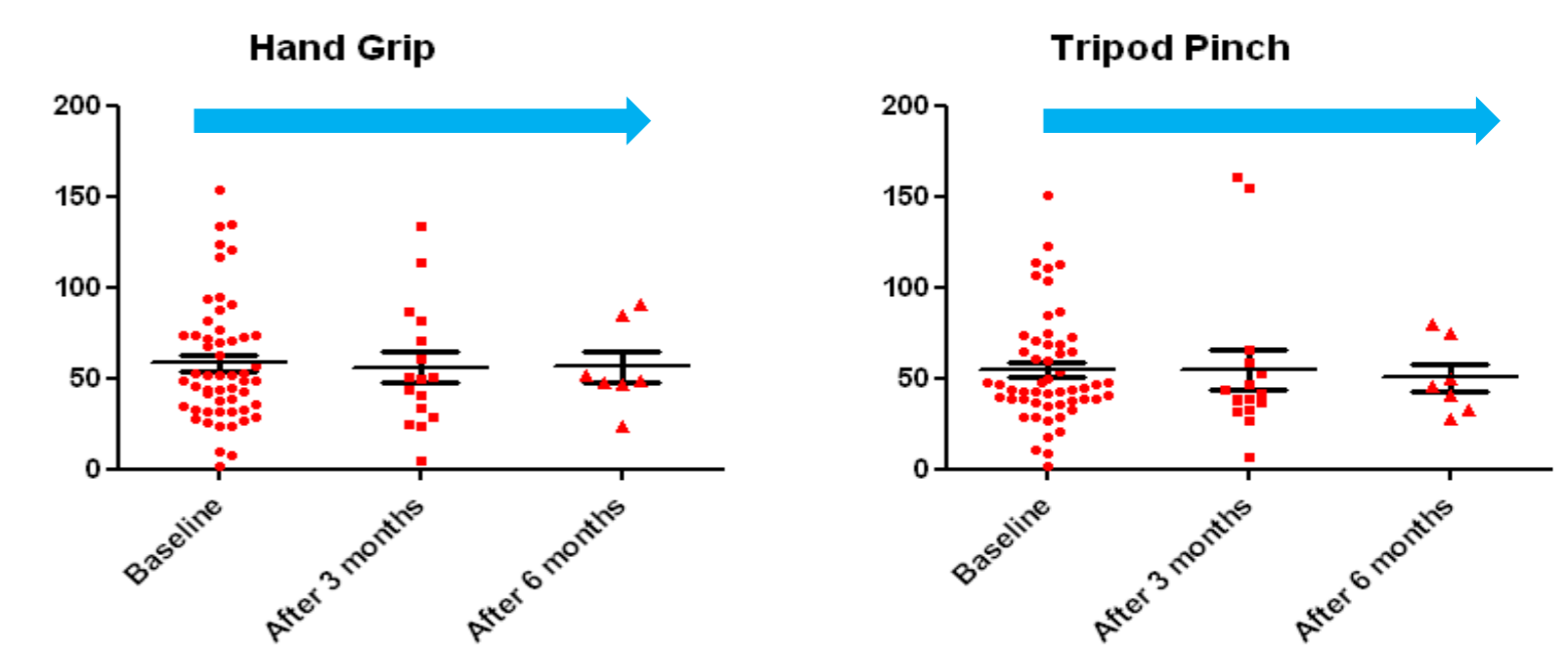- Thumb Opposition Test (TOT)
- Dynamometer (tripod pinch & hand grip)
- Sollerman test
- SEGT (FT & IMRL @ MV)

PRELIMINARY RESULTS

SEGT RELIABILITY
SEGT is a reliable tool and the obtained data are stable and consistent.

	TD	ITI
Correlation	0,987110994	0,98943969
Δ Mean	0,219311172	-2,87396577
Limits of agreement		
Low	-9,27120203	-6,59088747
High	9,709824368	0,842955928
Intraclass correlation coefficient	0,97	0,99

SEGT VALIDITY
SEGT parameters correlate significantly with Sollerman test in every task proposed.

↑↑ score @ Sollerman test   ↑↑ SEGT FT MV performance

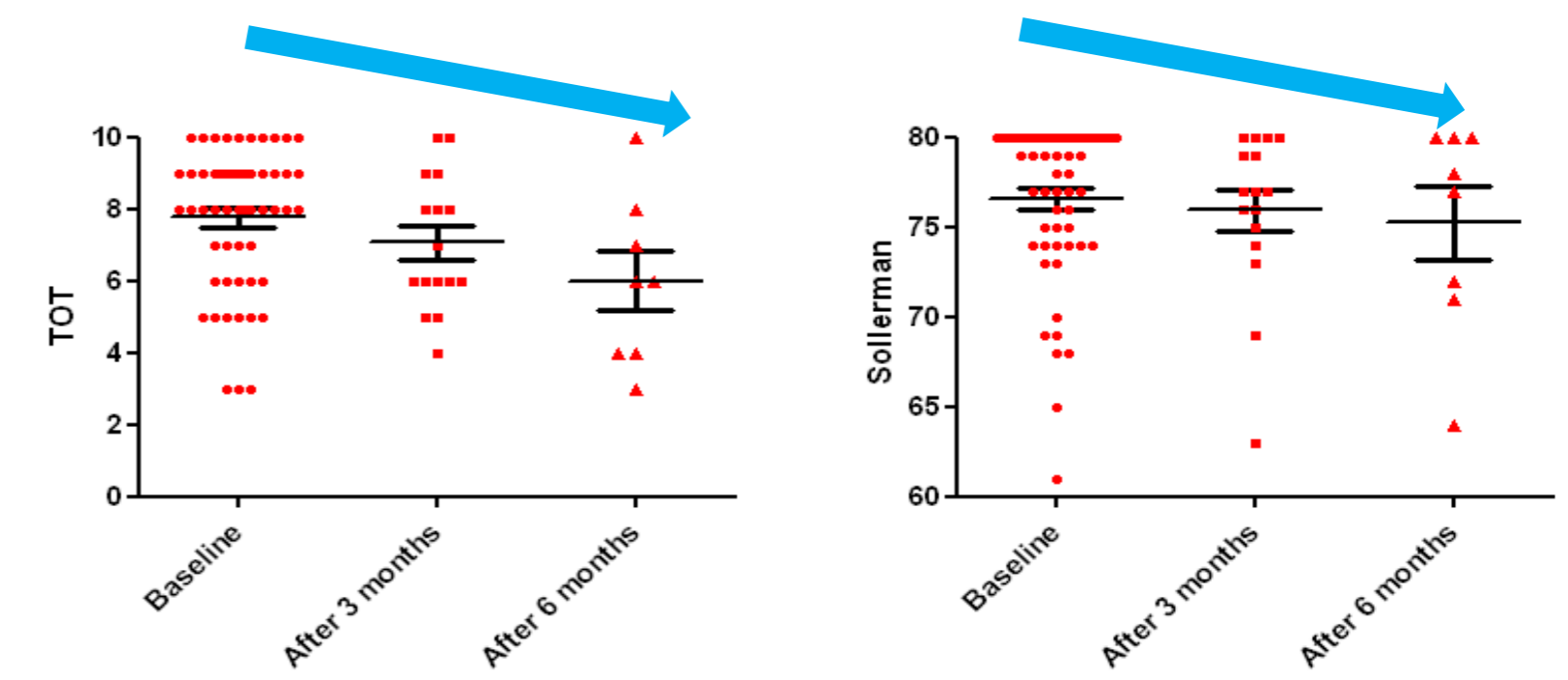↑↑ score @ Sollerman test   ↑↑ SEGT IMRL MV performance

LONGTERM EVALUATION RESULTS

Patients evaluated at the baseline are 56, after 3 months are 14, after 6 months are 7. There is a global slightly decrease of performance in every tested field, but currently the number of patients is too low and interpatient variability is too high to obtain statistically significant data.
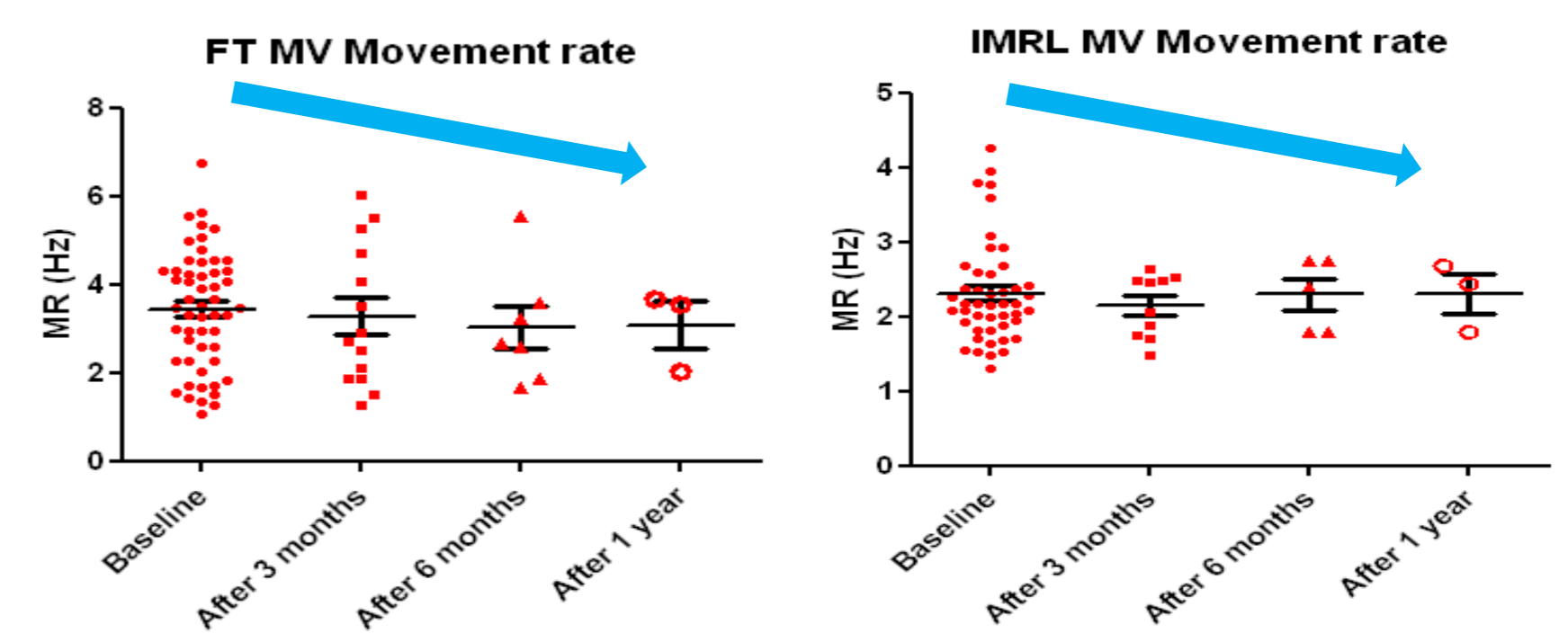
STRENGHT EVALUATION

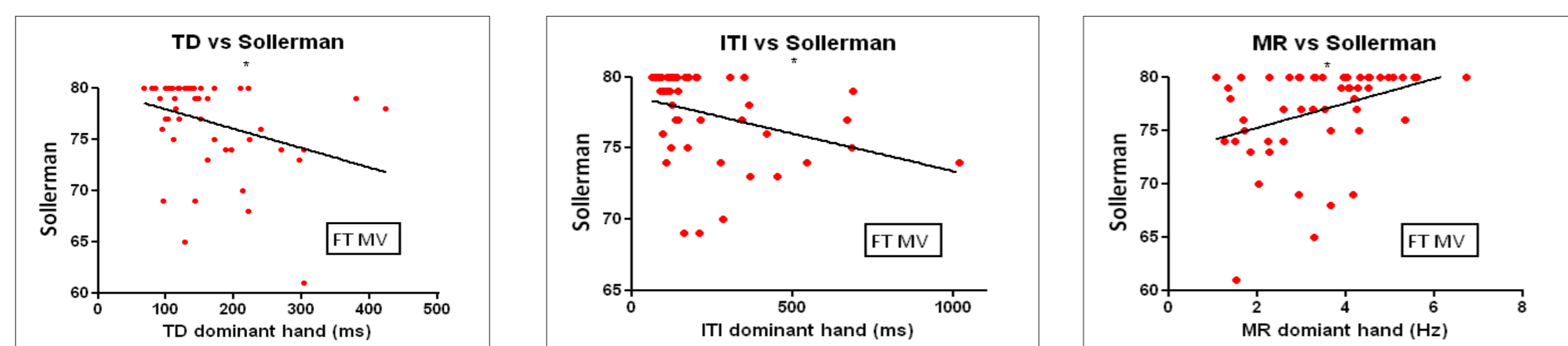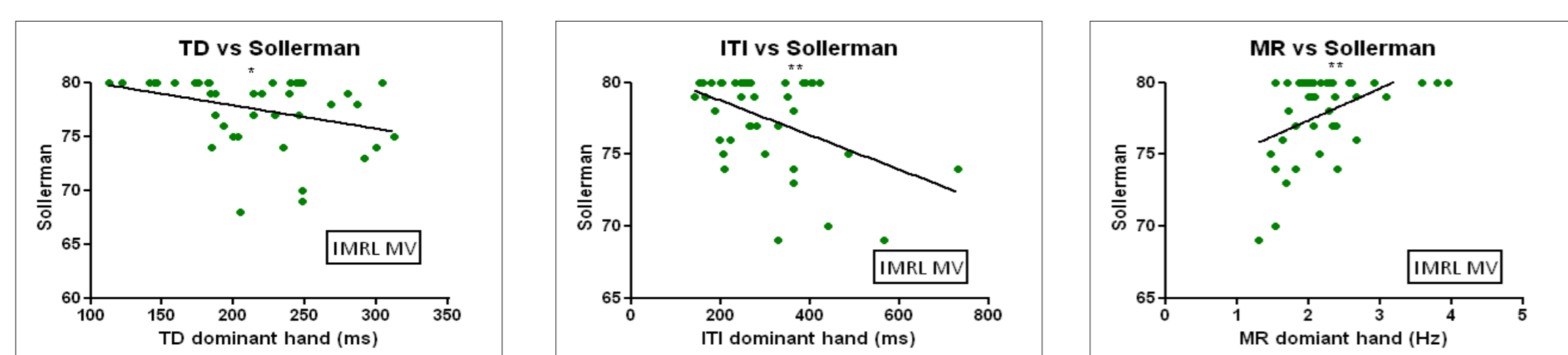### THUMB OPPOSITION TEST & SOLLERMAN TEST

SEGT

CONCLUSIONS

SEGT is a valid, reliable and responsive outcome measure of hands dysfunction.
This tool is able to precisely measure severity of hands dysfunction over the time.
There are no statistical differences at the established time points in mean FT and IMRL exercises.
The Sollerman scale, thumb opposition and muscle strength behaved in the same way, even if is possible to observe a decreasing trend.
The Sollerman scale significantly correlate with SEGT results at every time point.
In a short follow up of 6 months the hands dysfunction does not worsen in patients affected by CMT, even using an instrumental test for evaluation of hand function.

FUTURE PERSPECTIVES

We will increase the number of the patients and continue the follow up of the hand over time (new time points: at least 12 months and 18 months), we will apply a hand rehabilitation protocol created ad hoc for CMT patients and evaluate with SEGT and the other tools the efficacy of this therapy in slowing the course of the disease.
We extend the use of SEGT in the acquired neuropathies to evaluate the efficacy and the duration of the effects of the Ig therapy.