Scuola Medica Salernitana

Exploring the role of Motor Unit Number Index (MUNIX) as a biomarker of disease progression in Myasthenia Gravis

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Background

- In Myasthenia Gravis (MG) no objective biomarker of disease progression currently exist and routine electrophysiological tests (RNS, SFEMG) are crucial for diagnosis but play a limited role in follow-up.
- Despite the neuromuscular junction (NMJ) being able to regenerate, there is a conspicuous body of literature that points out the presence of secondary neurogenic damage in muscles of MG patients[1].

Aims

This cross-sectional pilot study evaluates the role of the motor unit number index (MUNIX) as biomarker of motor unit function and disease monitoring in MG, by comparing MUNIX values between patients and healthy controls (HCs), alongside correlations with clinical and electrophysiological measures.

Materials and Methods

Subjects were enrolled at the MG center of the University Hospital of Salerno from December 2023 to October 2024. Compound motor action potential (CMAP), MUNIX, and motor unit size index (MUSIX) were assessed in the abductor pollicis brevis (APB) and orbicularis oculi (OO) muscles in the symptomatic side, according to latest guidelines[2]. Clinical severity was evaluated using MGCS, MG-ADL, and MGFA classification. Statistical analyses included ANOVA, Spearman correlations, and multivariate analysis ($p<0.05$).

Results

42 MG patients and 21 age-matched HCs were enrolled. Demographic features of the population are summarized in **Table 1.**

MUNIX values from OO were significantly lower in MG patients while MUSIX was higher **(Figure 1).** No significant differences were found in MUNIX variables from ABP. Univariate analysis revealed a significant negative correlation between the MUNIX value for the OO muscle and disease duration. When testing this association with logistic regression analysis, MUNIX value for the OO muscle was a significant predictor of disease duration **(Figure 2).**

MG patients

Demographics	N (%)
Males	28 (66%)
Age (years)	63.1 ± 12.7
Disease duration (months)	92.6 ± 46.8
Age at onset	
Early onset (< 50 yo)	18 (42%)
Late onset (> 50 yo)	24 (58%)
Serotype	
AChR	32 (76%)
MuSK	2 (4%)
Double seronegative	8 (20%)
MGFA class	
MGFA I	12
MGFA IIA	8
MGFA IIB	10
MGFA IIIA	6
MGFA IIIB	6
Clinical scales	
MGCS	15 ± 6
MG-ADL	6 ± 3

HCs

Demographics	N (%)	p.
Males	11 (52%)	0.409
Age (years)	59.7 ± 8.7	0.028

Table 1. Demographic features MG patients and HCs.

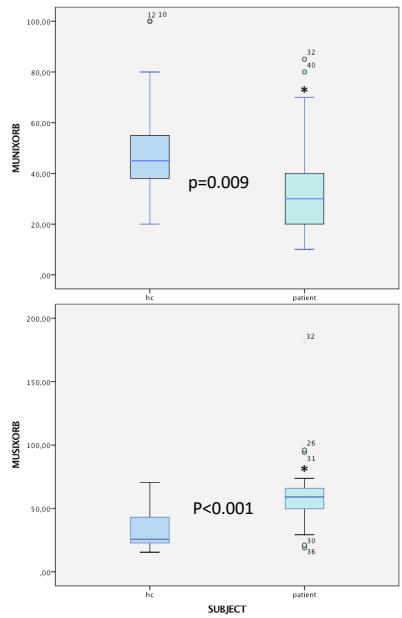

Figure 1. Comparison of MUNIX and MUSIX values from OO.

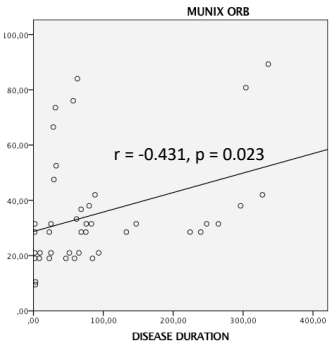

Figure 2. Logistic regression anaysis of predictors of disease duration.

Conclusions

MG patients showed reduced MUNIX values, indicating motor unit loss and impaired neuromuscular transmission, while higher MUSIX suggests compensatory remodeling. Correlations with disease duration and clinical severity underscore MUNIX's potential in disease monitoring.

Further studies with larger cohorts and longitudinal designs are warranted to validate these findings and explore the predictive value of MUNIX in MG progression.

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2. Nandedkar SD, Barkhaus PE, Stålberg EV et al. Motor unit number index: Guidelines for recording signals and their analysis. Muscle Nerve 2018; 58(3):374-380.

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