

## BRAIN GREY MATTER ABNORMALITIES ASSOCIATED WITH MYOCLONIC SEIZURES

**Autors:** Vataman Anatolie<sup>1</sup>; MD, PhD Ciolac Dumitru<sup>2,3</sup>; MD, PhD Chiosa Vitalie<sup>1</sup>  
**Scientific Advisers:** Prof. Groppa Stanislav<sup>1</sup>, MD, PhD, academician; Prof. Groppa Sergiu<sup>3</sup>, MD, PhD

<sup>1</sup>Department of Neurology no. 2, USMF „Nicolae Testemitanu” <sup>2</sup>Institute of Emergency Medicine, Chisinau, Republic of Moldova, <sup>3</sup>Department of Neurology, Neuroimaging and Neurostimulation, University Medical Center of the Johannes Gutenberg University Mainz, Mainz, Germany

### Introduction

Epilepsy as a network disorder typically involves widespread abnormalities, existing evidence suggests that frontal lobe and thalamus are the key structures involved in generation of myoclonic seizures.

### Purpose

However, data indicating clear morphometric alterations of other grey matter structures in this seizure type is limited. Our purpose was to characterize the cortical and subcortical volumes in patients with myoclonic seizures.

### Material and methods

Cortical and subcortical grey matter volumes were extracted from 3T MRI scans across 40 patients (mean age ± standard deviation: 25±7 years; 14 males) with myoclonic seizures and 40 healthy subjects (23±5 years; 14 males, **Table 1**) by using FreeSurfer pipeline. Statistical maps were corrected by Monte Carlo permutation cluster analysis at a threshold of  $p < 0.05$  ( $Z = 1.3$ ).

**Table 1.** Demographical, clinical and MRI-derived parameters of the patients with myoclonic seizures and healthy subjects.

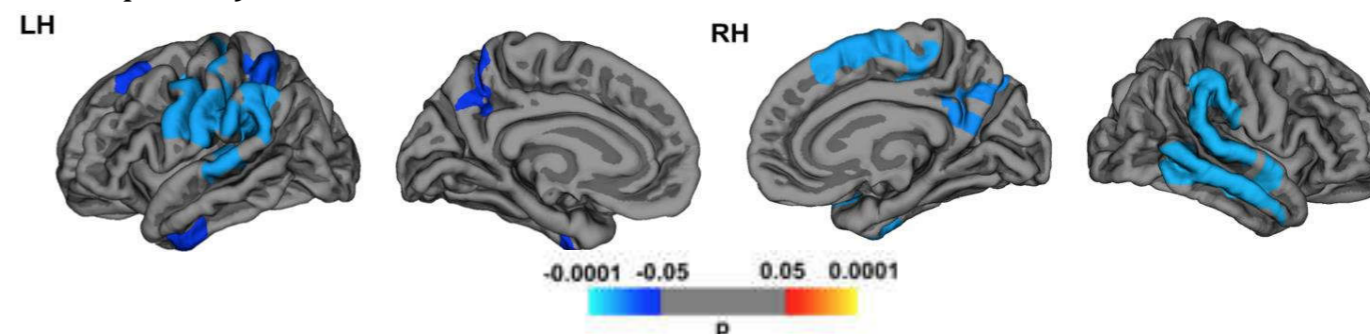
		Patients	Healthy controls
Number		40	40
Age: mean		25 ± 7 years	23 ± 5 years
Age at seizure onset: mean		14 ± 7 years	-
Epilepsy duration: mean		10.4 ± 7.4 years	-
Cortical volume: mean	Left	232 620.8 mm <sup>3</sup>	256 891.7 mm <sup>3</sup>
	Right	234 410.5 mm <sup>3</sup>	262 007.0 mm <sup>3</sup>
Thalamic volume: mean	Left	7697.9 ± 1045.5 mm <sup>3</sup>	9205.4 ± 1151.4 mm <sup>3</sup>
	Right	7043.8 ± 921.8 mm <sup>3</sup>	8148.6 ± 720.4 mm <sup>3</sup>
Caudate volume: mean	Left	3536.6 ± 575.2 mm <sup>3</sup>	3960.0 ± 438.9 mm <sup>3</sup>
	Right	3542.9 ± 598.1 mm <sup>3</sup>	3817.4 ± 451.1 mm <sup>3</sup>

### Keywords

Myoclonic seizures, cortical volumes, subcortical volumes.

### Results

A statistically significant difference of cortical volumes between patients and controls was found in: superior parietal, postcentral and fusiform of the left hemisphere; middle temporal of the right hemisphere and bilateral precentral, superior frontal and precuneus (**Figure 1**). Analysis of subcortical volumes revealed smaller volumes of bilateral thalamus in patients (right 7043.8±921.8 / left 7697.9±1045.5 mm<sup>3</sup>) compared to controls (right 8148.6±720.4 / left 9205.4±1151.4 mm<sup>3</sup>,  $p < 0.05$ ) (**Figure 2**) and reduced volumes of bilateral caudate in patients (right 3542.9±598.1 / left 3536.6±575.2 mm<sup>3</sup>) compared to controls (right 3817.4±451.1 / left 3960.0±438.9 mm<sup>3</sup>,  $p < 0.05$ ).



**Figure 1.** Statistical surface maps representing the clusters of significant differences in cortical volumes between patients with myoclonic seizures and healthy controls ( $p < 0.05$ , Monte Carlo corrected).



**Figure 2.** Lower volumes of left and right thalamus in patients with myoclonic seizures compared to healthy subjects ( $p < 0.05$ ).

### Conclusions

These findings of reduced bilateral thalamus volumes as well as selected cortical volumes support the hypothesis of aberrant cortico-thalamic networks in epilepsy with myoclonic seizures. c