

BRAIN ACTIVITY IN INTERICTAL, ICTAL AND CHRONIC MIGRAINE

Filipchuk M.¹, Castro Zamparella T.^{1,2}, Carpinella M.¹, Conci Magris D.M.¹, Lisicki M.¹

¹Neuroscience Unit, Conci-Carpinella Institute, Córdoba, Argentina

²Psychological Research Institute, Faculty of Psychology, National University of Córdoba (UNC) - National Council for Scientific and Technical Research (CONICET)



INTRODUCTION AND OBJECTIVE

Migraine is a fluctuating disorder. Analyzing changes in cerebral activity throughout migraine variations has contributed to the understanding of the pathophysiology of this condition in the past. Exact Low Resolution Electromagnetic Tomography (eLORETA) is an EEG-based approach that allows to reconstruct cortical electrical activity, providing explicit information regarding neural activations, and not their indirect markers. The objective was to compare cortical activity between interictal, ictal and chronic migraine patients and healthy controls.

MATERIALS AND METHODS

1 minute EEG:

- 22 EEG channels.
- 1 EKG channel.
- 100 subjects:
- 25 healthy.
- 25 interictal.
- 25 ictal.
- 25 chronic.

Pre-processing:

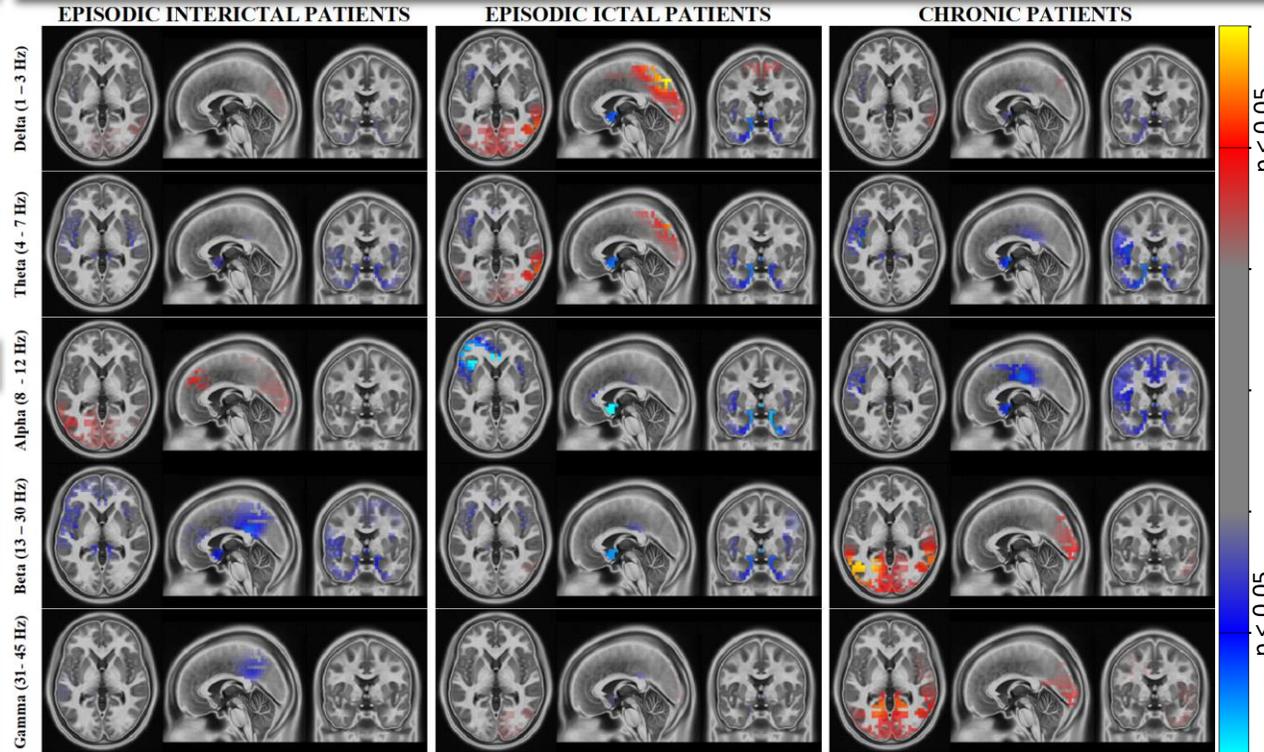
- 1 Hz low band-pass filter.
- Line noise removal.
- Artifact removal with ICA.
- Re-referenced to linked mastoids.

Cortical generators:

- 1-45Hz activity.
- Subject-normalized.
- Group comparisons for each frequency band.

Obtained eLORETA cortical generator maps were used for statistical comparisons (whole brain, voxel-wise) against healthy controls.

RESULTS



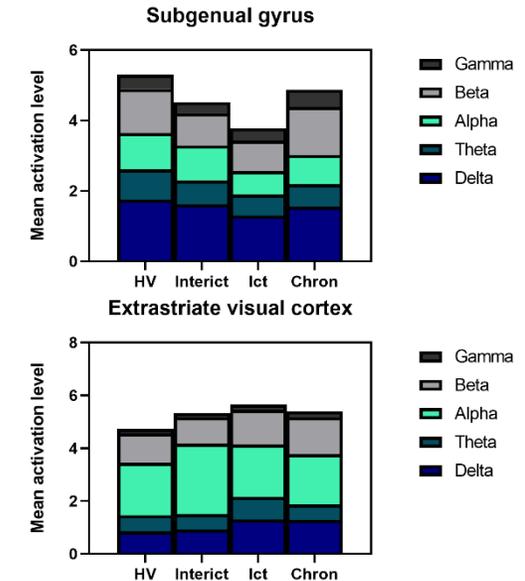
In the left extrastriate visual cortex higher alpha activity was observed in the interictal group.

The subgenual and right dorsal entorhinal gyrus presented significantly lesser activity in ictal migraine patients compared to the other groups.

The ictal and chronic groups exhibited lower and higher frequency activity, respectively.

6 regions of interest emerge:

- Bilateral subgenual gyrus (BA25)
- Left extrastriate visual cortex (L-BA7)
- Right inferior temporal gyrus (BA20)
- Right dorsal entorhinal gyrus (R-BA34)
- Bilateral supramarginal gyrus (BA40)
- Bilateral posterior cingulate cortex (BA31)



CONCLUSIONS

- Brain activity tends to vary in relation to migraine phase and severity.
- Key regions exhibiting variations include the subgenual gyrus, tightly connected to the hypothalamus and brainstem, and a portion of the extrastriate visual cortex (BA7), which harbours V3a, known of its implications in migraine aura.
- Our findings of reduced neural activity in the subgenual gyrus in ictal migraine patients suggest that the increased blood flow observed in this region during

spontaneous migraine attacks in seminal studies might, in fact, reflect increased inhibitory neuron activity. Similarly, the phase and severity-dependent band-specific alterations in the visual cortex that we found expand our knowledge about migraine electrophysiology, particularly the thalamocortical dysrhythmia commonly described.