



Lateral inhibitory mechanisms within the somatosensory cortex in chronic migraine: correlations with clinical features



Gianluca Coppola¹, Francesca Cortese², Davide Di Lenola², Ilaria Bove², Cherubino Di Lorenzo³, Francesco Pierelli^{2,4}

1. G.B. Bietti Foundation IRCCS, Research Unit of Neurophysiology of Vision and Neurophthalmology, Rome, Italy
2. "Sapienza" University of Rome Polo Pontino, Department of medico-surgical sciences and biotechnologies, Latina, Italy
3. Don Gnocchi foundation-IRCCS, Milan, Italy
4. INM-Neuromed IRCCS, Pozzilli (IS), Italy

BACKGROUND

■ We previously observed reduced somatosensory lateral inhibition and habituation, but normal sensitization, mechanisms, in episodic migraineurs between attacks. During the attacks, after an initial transient sensitization, both delayed habituation and lateral inhibition normalized (Coppola et al., 2010, 2013, 2016).

■ Here, we have studied lateral inhibition and habituation/sensitization in the somatosensory cortex of patients evolved from episodic to chronic migraine (CM), and we searched for possible correlations with clinical features.

DESIGN & METHODS

■ Fifteen patients with CM without medication overuse, and 17 healthy volunteers (HV) underwent SSEPs elicited by electrical stimulation of the right median (M) and ulnar (U) nerve at the wrist separately and simultaneously (MU).

■ We measured parietal N20-P25 amplitudes and we calculated the percentage of lateral inhibition by using the formula $100 - ((MU/(M+U)) * 100)$.

■ Sensitization and habituation were calculated on the median nerve responses as the 1st N20-P25 amplitude block and as the slope of the linear regression between the 1st and the 2nd block of 100 averaged sweeps respectively.

RESULTS

■ In CM patients, percentage of somatosensory lateral inhibition was comparable to that of HV. Patients had a generalized increase of SSEP amplitudes than HV, and habituated normally.

■ Percentage of lateral inhibition negatively correlated with monthly days with headache, and positively with severity of headache attacks.

DISCUSSION

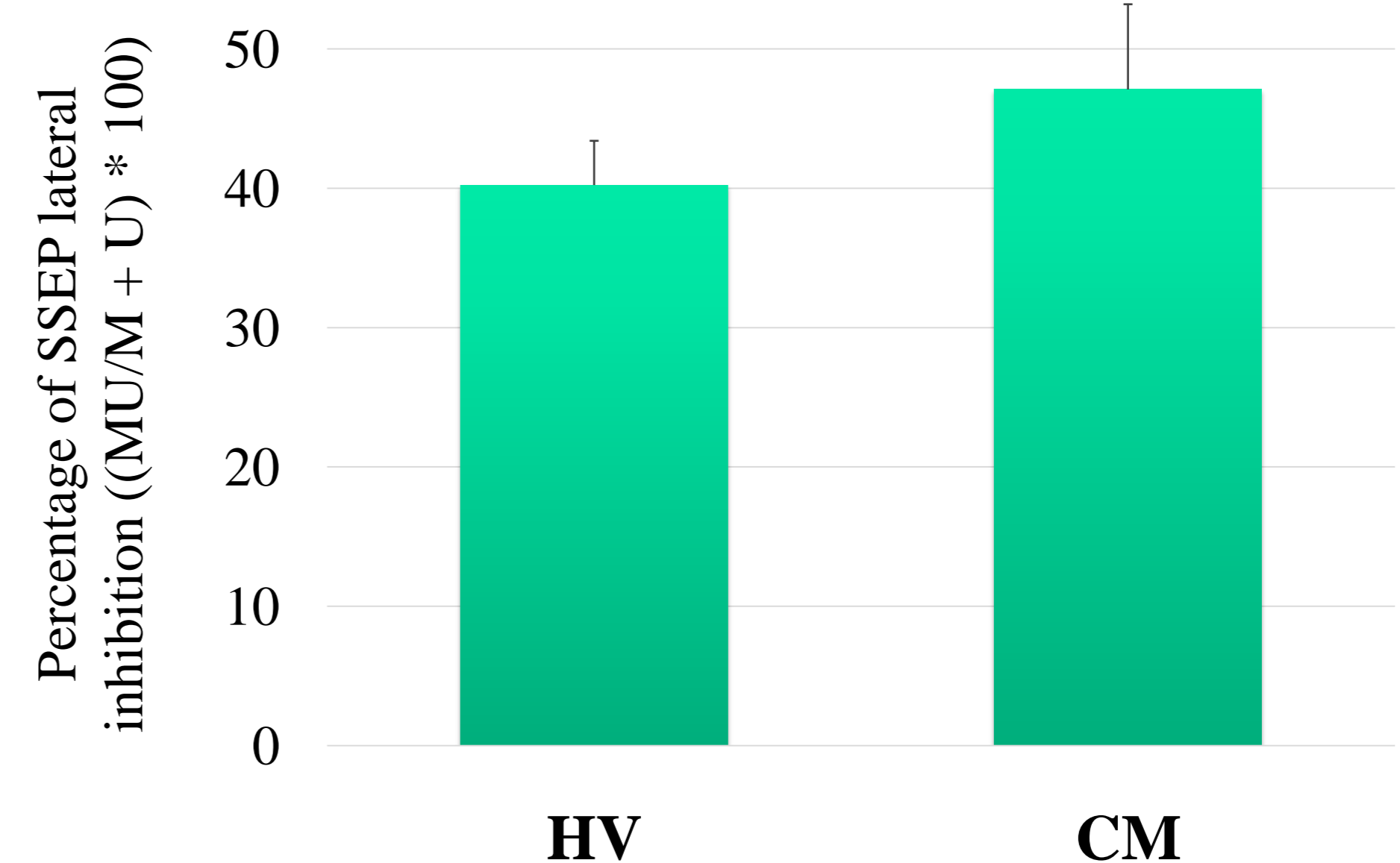
■ In CM patients, we show a pattern of somatosensory response similar to that found in episodic migraine patients during a migraine attack.

■ Moreover, in the transformation process from episodic to chronic migraine, lateral inhibition may contribute to clinical characteristics of CM.

REFERENCES

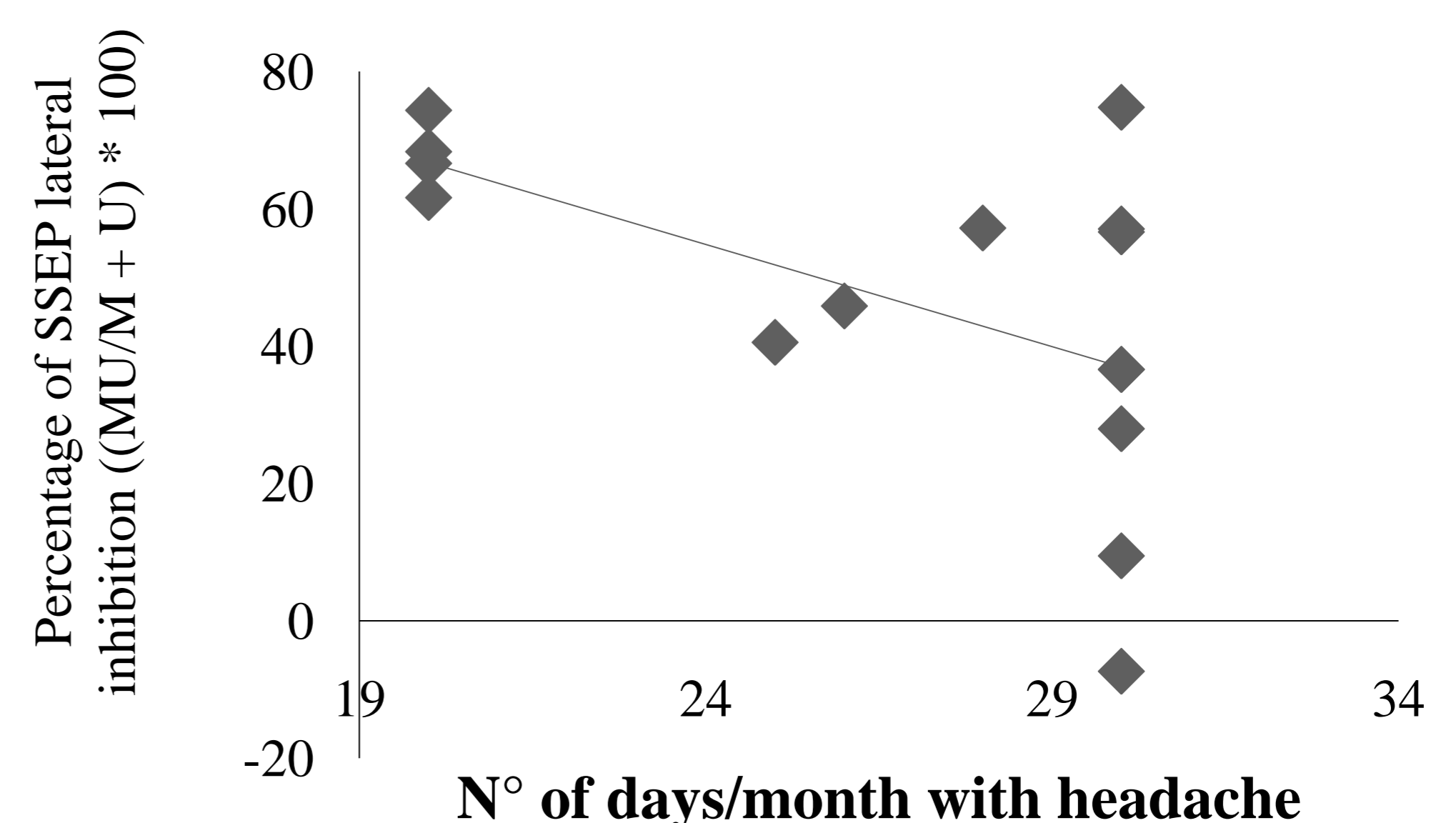
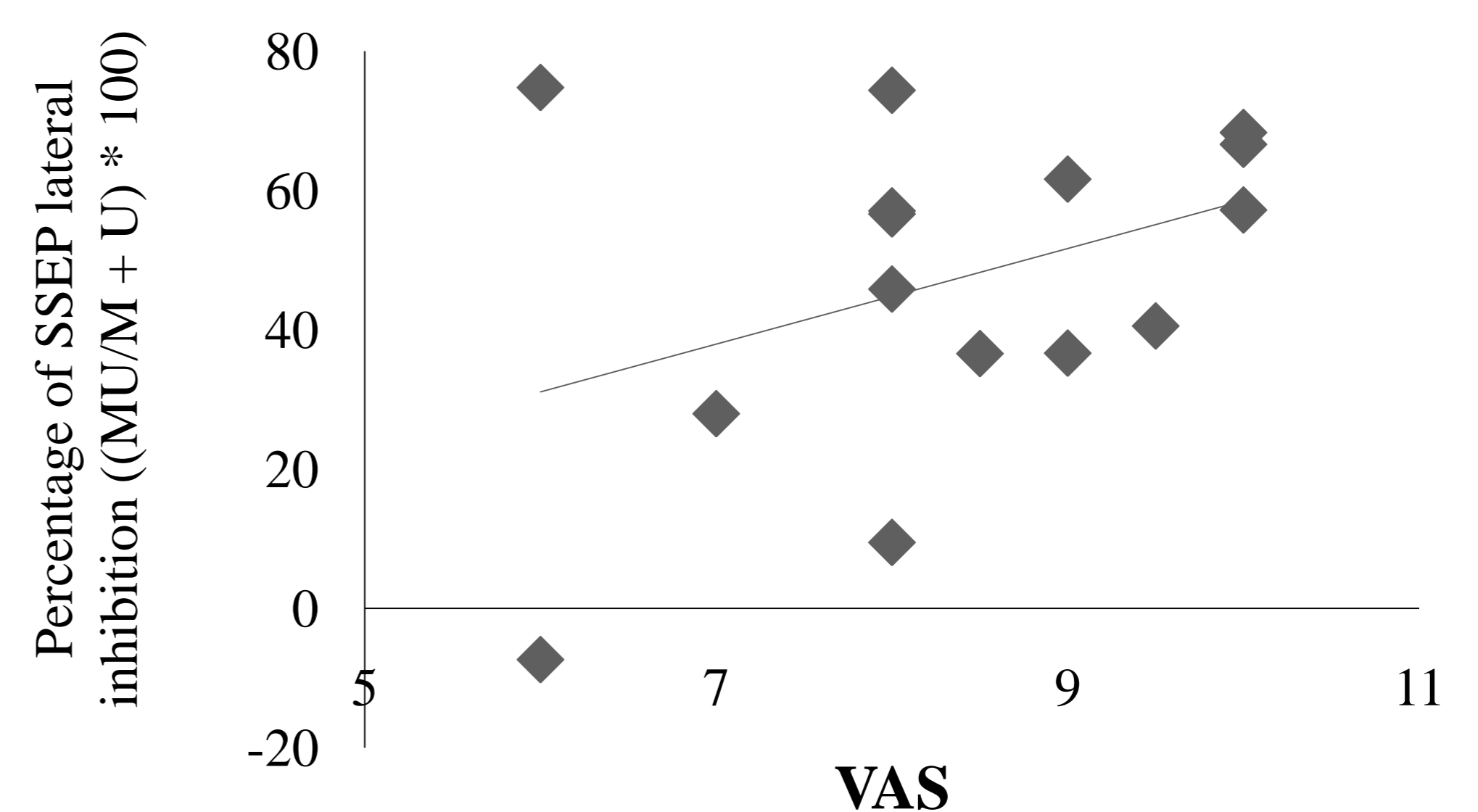
- Coppola G, Currà A, Di Lorenzo C, Parisi V, Gorini M, Sava SL, Schoenen J, Pierelli F. Abnormal cortical responses to somatosensory stimulation in medication-overuse headache. *BMC Neurol.* 2010 Dec 30;10:126.
- Coppola G, Iacovelli E, Bracaglia M, Serrao M, Di Lorenzo C, Pierelli F. Electrophysiological correlates of episodic migraine chronification: evidence for thalamic involvement. *J Headache Pain.* 2013 Sep 9;14:76.
- Coppola G, Bracaglia M, Di Lenola D, Iacovelli E, Di Lorenzo C, Serrao M, Evangelista M, Parisi V, Schoenen J, Pierelli F. Lateral inhibition in the somatosensory cortex during and between migraine without aura attacks: Correlations with thalamocortical activity and clinical features. *Cephalalgia.* 2016 May;36(6):568-78.

Results: SSEP lateral inhibition



Histogram showing the mean percentage of lateral inhibition ($100 - ((MU/M+U)*100)$) for the N20-P25 component in healthy volunteers (HV) and in chronic migraineurs (CM).

Results: Correlations with clinical features



Correlation between the mean percentage of lateral inhibition ($100 - ((MU/M+U)*100)$) for the N20-P25 SSEP component and severity of headache attacks [upper panel], as measured by a visual analogue scale (VAS), and mean number of headache days [lower panel] in chronic migraine patients.