SC109. A neuropsychological profile-based classification outperforms ICHD-3 in terms of disability: exploratory analysis with anatomical correlates

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Introduction
Migraine patients are not all equally affected by the condition. Recognizing the degree of impairment is fundamental to personalize treatment. The International Classification of Headache disorders recognizes two types of migraine with regards to severity (i.e. episodic and chronic), separated according to the frequency and characteristics of headache attacks. Although cumulative evidence supports the usefulness of this classification, it is well established that migraine is more than a headache. Therefore, it remains to be determined whether novel strategies could provide better outcomes. In this study, we compared migraine-related disability between patients classified according to the ICHD-3 or classified using a neuropsychological profile-based classification system, and performed a supplementary gray matter (GM) volume analysis to better understand our findings.

Materials and Methods
Neuropsychological evaluations of 135 migraine patients were included. The evaluation protocol included Wechsler Word Pair memory, Wais forward and reverse Digits attention, and Wais processing speed Digit-Symbol subtests, and Trail Making Test A and B. Episodic or chronic migraine ICHD-3 diagnoses were performed by neurologists based on paper diaries filled by patients. For neuropsychological profile-based classification, results from the evaluation protocol were introduced in an automated k-means clustering algorithm. Headache Impact Test (HIT-6) and Migraine Disability Assessment (MIDAS) results were compared between groups. Voxel-based Morphometry (VBM) supplementary analysis included a subgroup of 48 patients. Differences in GM (p<0.001 unc) are presented.

Results
Seventy-five patients were diagnosed as episodic and 60 were diagnosed as chronic. Non-supervised clustering allocated 49 participants to cluster 1 and 86 to cluster 2. Age and gender proportions were similar between groups (overall mean age 39±12, 92% female). Statistically significant differences in HIT-6 results were observed between neuropsychological-driven groups (cluster1 65 ±9 vs cluster2 62 ±8; p=0.006) but not

between ICHD-3 episodic and chronic patients (episodic 64 ±8 vs chronic 63 ±10; p= 0.73). Differences in MIDAS results were also more pronounced between neuropsychological-driven groups (cluster1 81 ±70 vs cluster2 60 ±61; p=0.034) compared to the ICHD-3 (episodic 64 ±67 vs chronic 72 ±64; p= 0.27). VBM analyses showed greater GM volume in the left superior temporal, left parahippocampal, right inferior temporal, and right superior frontal gyri of chronic patients compared to episodic, and increased GM in the right precuneus and left superior parietal lobe of patients in cluster1.

Conclusions
Our results suggest that a neuropsychological profile-based classification system that could be readily implemented in the clinic would provide a better insight into migraine severity. Differences in gray matter volume between episodic and chronic patients were found in regions involved in nociception and analgesic dependence. In contrast, neuropsychological profile-based clustering segregated patients with different gray matter volume close to a region recently determined to be the hub of a common migraine network. If corroborated in larger cohorts, these findings have implications not only at the single patient level, but also for epidemiological, pharmacological and pathophysiological studies.