

## **EEG markers for early detection and characterization of vascular dementia during working memory tasks**

### **ABSTRACT**

The aim of this study was to reveal markers using spectral entropy (SpecEn), sample entropy (SampEn) and Hurst Exponent (H) from the electroencephalography (EEG) background activity of 5 vascular dementia (VaD) patients, 15 stroke-related patients with mild cognitive impairment (MCI) and 15 control healthy subjects during a working memory (WM) task. EEG artifacts were removed using independent component analysis technique and wavelet technique. With ANOVA ( $p < 0.05$ ), SpecEn was used to test the hypothesis of slowing the EEG signal down in both VaD and MCI compared to control subjects, whereas the SampEn and H features were used to test the hypothesis that the irregularity and complexity in both VaD and MCI were reduced in comparison with control subjects. SampEn and H results in reducing the complexity in VaD and MCI patients. Therefore, SampEn could be the EEG marker that associated with VaD detection whereas H could be the marker for stroke-related MCI identification. EEG could be as a valuable marker for inspecting the background activity in the identification of patients with VaD and stroke-related MCI.

**Keyword:** Electroencephalography; Hurst exponent; ICA-WT; mild cognitive impairment; Sample entropy; Spectral entropy; Vascular dementia