

**Anterior, middle and posterior insular cortex – an archipelago to be discovered:
a scalp EEG-SEEG study**

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Introduction: Epilepsy originating in the insular cortex is an increasingly highlighted and diagnosed type of intractable epilepsy. As the insula is responsible for a great number of functions and has a widespread network of connections, insular seizures may feature a vast variety of clinical manifestations. Rapid propagation to the contralateral insular cortex and to other neural nodes and the depth of the location of the insular cortex reduce the role of scalp electroencephalography (EEG) in the diagnostic process (lateralization and location).

Material and methods: We present a short-review of the current literature and scalp EEG and stereo-EEG electroclinical reasoning reports of patients suffering from intractable epilepsy who were explored and managed in the Epilepsy Monitoring Unit of the Bucharest Emergency University Hospital.

Results: Stereo-EEG revealed anterior, middle and posterior insular cortex as main seizure generators. Functional cortex and ictal-implicated cortical areas were delineated by means of direct cortical electrical stimulation. The video, scalp-EEG and stereo-EEG synchronized recordings that we performed helped complete the whole electroclinical reasoning hypothesis. Correlations could thus be inferred between scalp electrodes and depth electrodes recorded electrical activity regarding lateralization, sequence of hubs involvement and their moment in time-locked expression as semiological feature.

Conclusions: Even though non-invasive work-up in cases of insular epilepsy patients is rarely eloquent, careful electroclinical reasoning can establish a favourable basis on which invasive exploration can be performed that can help identify the epileptogenic network. Synchronized video, scalp-EEG and stereo-EEG recordings prove that each and every detail matters in solving intractable epilepsy cases, particularly involving deep and extensively connected brain nodes.

Key words: insular epilepsy, stereoelectroencephalography, synchronized