

**S. Pirker<sup>1</sup>, C. Flamm<sup>2</sup>, A. Graef<sup>2</sup>, M. Deistler<sup>2</sup>, T. Czech<sup>3</sup>, C. Baumgartner<sup>1</sup>**

<sup>1</sup> Hospital Hietzing with Neurological Center Rosenhügel and Karl Landsteiner Institute for Clinical Epilepsy Research and Cognitive Neurology, Vienna, Austria

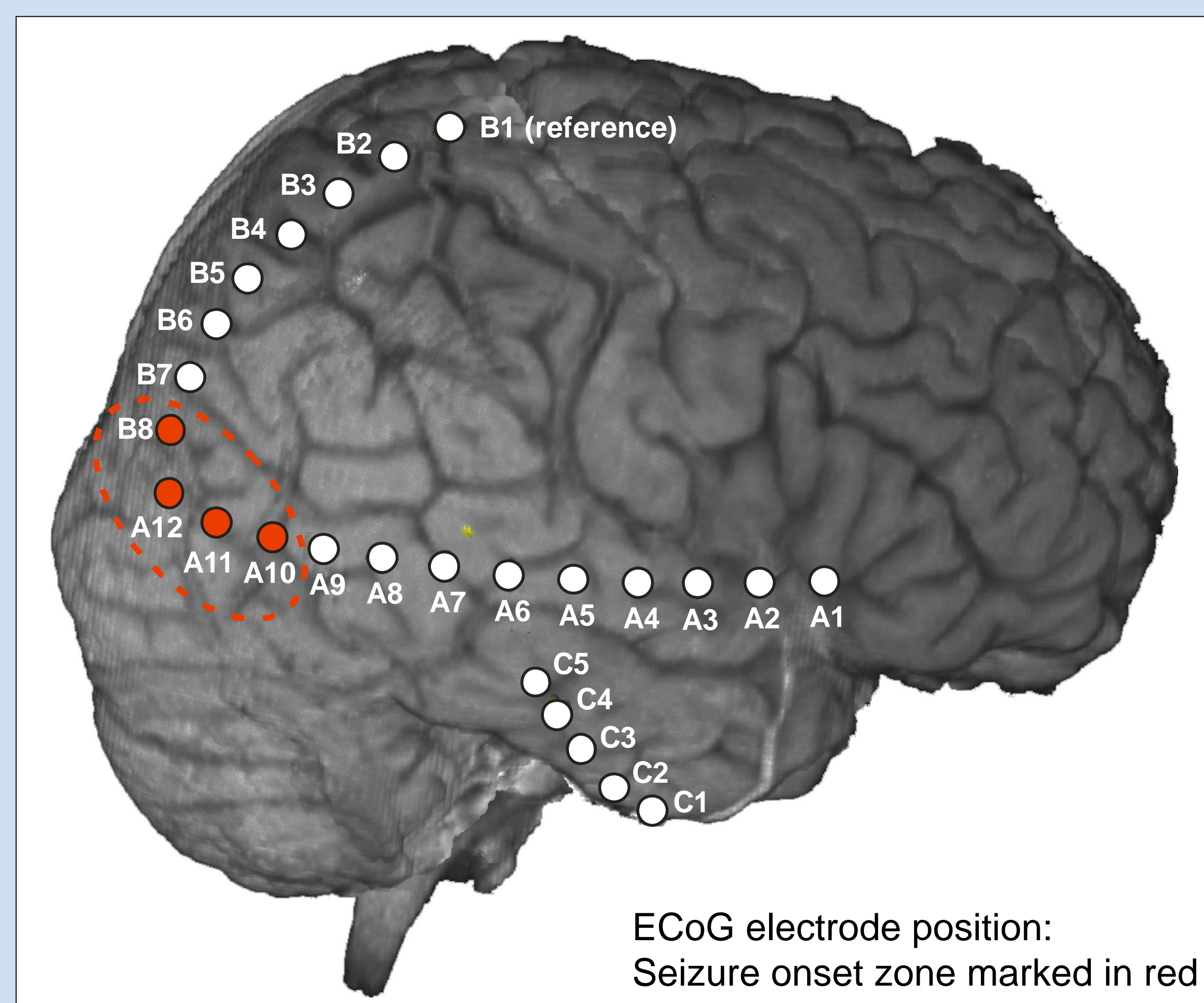
<sup>2</sup> Vienna University of Technology, Vienna, Austria; <sup>3</sup> Dep. of Neurosurgery, Medical University of Vienna, Vienna, Austria

## Introduction

Surface EEG is often limited by movement artifacts, suppression of high frequencies and low spatial resolution. Therefore non-invasive recordings do not always reveal a precise identification of the seizure onset zone especially in patients with non-lesional epilepsy. Invasive subdural strip electrodes allow for a better identification of the seizure onset zone. A semi-automatic evaluation of ictal activity and propagation may support clinicians performing video EEG monitoring.

## Method

Invasive subdural strip electrodes were implanted to record electrocorticograms (ECoGs) during video EEG monitoring in a drug-resistant patient with focal epilepsy. The patient suffered from four seizures during invasive recording. A novel software was designed for automatic analysis.



This method consists of three steps:

- 1. Segmentation** of individual ECoG channels on the basis of power changes in selected frequency bands.
- 2. Classification:** Each segment was evaluated automatically with regard to the predominant frequency. Segments with a predominant theta frequency were categorized as ictal activity by this program.
- 3. Seizure Propagation:** This was defined as propagation of rhythmic theta-activity (marked as red ECoG segments)

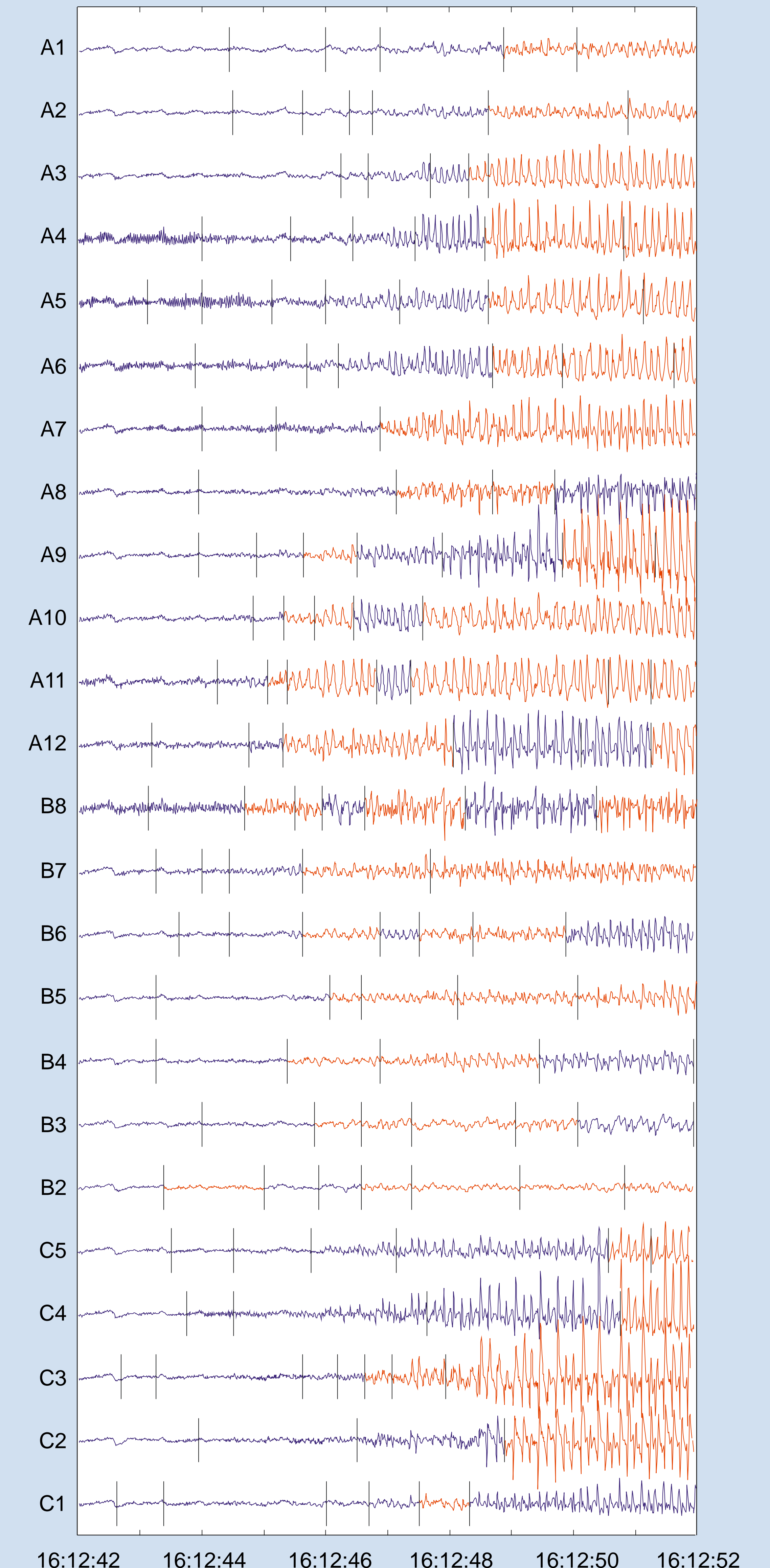
## Results

Three seizures were analyzed using this novel segmentation method. Seizure onset on individual channels and propagation as detected with this method was well correlated with the visual analysis of ECoGs:

Seizure	Investigator	Initial electrodes	Close follow-up
1	Algorithm	B8	A10, A11, A12
	Expert 1	B8	A10, A11, A12
	Expert 2	A11, A12, B8	A9, A10, B7
	Expert 3	A10, A11, A12	B8
2	Algorithm	A10, A11, A12	B6, B8
	Expert 1	A11, A12	A9, A10
	Expert 2	A11, A12	A10
	Expert 3	A11, A12	B8
3	Algorithm	A10, A11, A12	B6, C1, C2, C5
	Expert 1	A9, A10	A8, A11, A12, B6, B7, B8, C1, C4, C5
	Expert 2	A9	A1, A2, A3, C2, C3
	Expert 3	A8, A9	A1, C3, C4, C5

## Conclusion

This pilot study shows promising first results in tracking the initial propagation of ictal theta-activity as an indicator for seizure propagation.



ECoG of seizure 1:  
Ictal activity as classified by the software is highlighted in red