

## ABSTRACT OF PAPER FOR FULL MEMBERSHIP AT THE ROYAL BELGIAN SOCIETY OF RADIOLOGY

### NEURORADIOLOGY

#### High resolution surface coil imaging in patients with refractory epilepsy

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**Introduction:** In up to 30% of patients with epilepsy, the disease becomes refractory to antiepileptic drugs or the side effects of the medications are intolerable. These patients may be referred for surgical resection. Patients with refractory epilepsy in whom the epileptogenic zone cannot be precisely identified using the currently available presurgical evaluation tools are not likely to undergo resective surgery and remain prone to uncontrolled seizures. The aim of this study is to assess the added value of surface coil imaging at 3-Tesla (3T SCI) with regard to their potential to locate the epileptogenic zone in order to increase the number of patients eligible for resective surgery.

**Methods:** So far, 17 patients with medically refractory epilepsy who were included in a presurgical epilepsy evaluation protocol underwent a surface coil MRI exam at 3 Tesla. Patients were scanned on a Siemens Trio system using a 4-channel Bitemporal Phased Array surface coil (NMSC-003, Nova Medical). 3D MPRAGE (0.9 mm<sup>3</sup>, TR 2530 ms, TE 2.3 ms) images were acquired as well as axial and coronal TSE T2-weighted images (slice thickness 3 mm, in plane

0.37 mm<sup>3</sup>, TR 6000 ms, TE 74 ms). In patients in whom a previous MEG-examination was available (n = 14), the surface coil position was determined by the location of the MEG dipole cluster. In the remaining patients, the position of the surface coils was based on seizure semiology (n = 2) and ictal-SPECT results (n = 2). On a previous epilepsy optimized MRI at 3T, the majority of patients had a negative MRI (n = 16). One patient had right hippocampal sclerosis (n = 1), but was included in the study as ictal-SPECT suggested an extratemporal epileptogenic focus.

**Results:** In 7 out of 17 patients (45%) 3T SCI showed a previously undiagnosed lesion. These lesions demonstrated the imaging characteristics of small cortical migration anomalies, consisting of blurring of the gray matter-white matter transition area, with or without increased signal intensity in the subcortical white matter, and thickening of the cortex. In one patient, the lesion could retrospectively be identified on standard epilepsy optimized 3T MRI. The remaining patients showed no structural anomalies on standard 3T MRI.

**Discussion:** In patients with refractory epilepsy, surface coil imaging at 3T has shown added value in the detection of subtle cortical lesions that were previously not visible or missed on 3T MRI. The location of the identified lesions correlated with the location of the MEG-

dipole cluster in all patients in whom MEG-data was available (n = 4). So far, only one patient has been operated and pathological examination confirmed the presence of focal cortical dysplasia in this patient. The remaining patients either achieved acceptable seizure frequencies following anti-epileptic drug changes (n = 3), are undergoing additional presurgical testing (n = 2) or are lost to follow-up (n = 1). Further follow-up of our current patient group and additional research in larger patient groups is needed to evaluate the exact value of the technique, especially in patients with a negative standard epilepsy optimized MRI in whom other examinations such as MEG suggest an extratemporal epileptogenic focus.

### References

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