
**eMethods.** Seizure spread.

This supplementary material has been provided by the authors to give readers additional information about their work.
eMethods.

Seizure Spread

Intracranial EEG (iEEG) studies consisted of a combination of grids and strips for neocortical analysis and depth electrodes to sample the medial structures. Raw iEEGs were read by an epileptologist (PF) blinded to patient outcome. Seizure spread was defined as a definite ictal pattern at electrode contacts occurring at least 2cm from the seizure onset region. When more than one seizure was recorded for a patient in a 24hr period the first seizure of that day was reviewed for analysis. In this cohort of isolated AMTR without extratemporal resections, 30 patients underwent intracranial monitoring, of whom iEEG traces were available for review in 20. These (total n = 20) patients were included in time-to-first-spread analysis (Figure 4 A), as well as the Kaplan-Meier analysis (Figure 4 B) of rapid-spread (n=11) versus slow-spread (n=9).

High resolution MRI was performed after surgical implantation of subdural electrodes, from which electrode position was determined. To better delineate networks involved in seizure spread, 3D reconstructions of patients’ brains were constructed with power data mapped onto positions of intracranial electrodes. These reconstructions were used to attain detailed documentation of where electrodes were located with respect to surgical margins and allowed for correlation of visual EEG analysis with area of spread (Figure 3 & Figure 4 A). To analyze seizure spread outside surgical resective margins in Figure 3 and Figure 4 A, brains were segmented into AMTR resection area¹ (AMT), ipsilateral lateral temporal lobe outside resective margins (LaT), ipsilateral orbitofrontal cortex (OF) and extratemporal (excluding orbitofrontal) areas (ExT), based on previously described anatomical boundaries². Data was missing for 3D reconstruction and power analysis for 4 of the 20 patients included in the Kaplan-Meier analysis,
so these were excluded from the power analysis in Figure 3 (total n=16; recurrent seizures n = 7; seizure-free n=9).

Fast Fourier transform analysis was carried out on EEG signals for all electrodes. 1 s signal segments and signal power were calculated for each electrode for delta (0.4 to <4Hz), theta (4 to <8Hz), alpha (8 to 13Hz), beta (>13 to <25Hz) and gamma (25 to 50Hz) frequency bands\(^3\). 3D reconstructions of patients’ brains were constructed based on T1-weighted, high resolution MRI using BioImage Suite 3.0 (New Haven, CT). The resulting triangular mesh surface was imported into MATLAB (MathWorks, Inc.) software, as previously described\(^3\), with the percent fractional beta power \([\text{[(ictal power)]/[baseline power]}}*100]\) relative to baseline projected onto electrode locations to visualize seizure-spread. Analysis of iEEG power was conducted using baseline power for each electrode as the average of 4 seconds prior to the second before seizure onset (seconds -5 to -2, inclusive, relative to seizure onset at time \(t = 0\)). For quantitative analysis of early seizure spread, ictal power was calculated as the mean percent baseline power of each electrode during the first 10 seconds of the seizure. The average ictal percent beta power of each electrode was averaged within each anatomical segment to create one data point per anatomical segment for each patient, with values for recurred vs. seizure-free patients compared using unpaired t-tests with threshold for significance of \(\alpha = 0.05\).