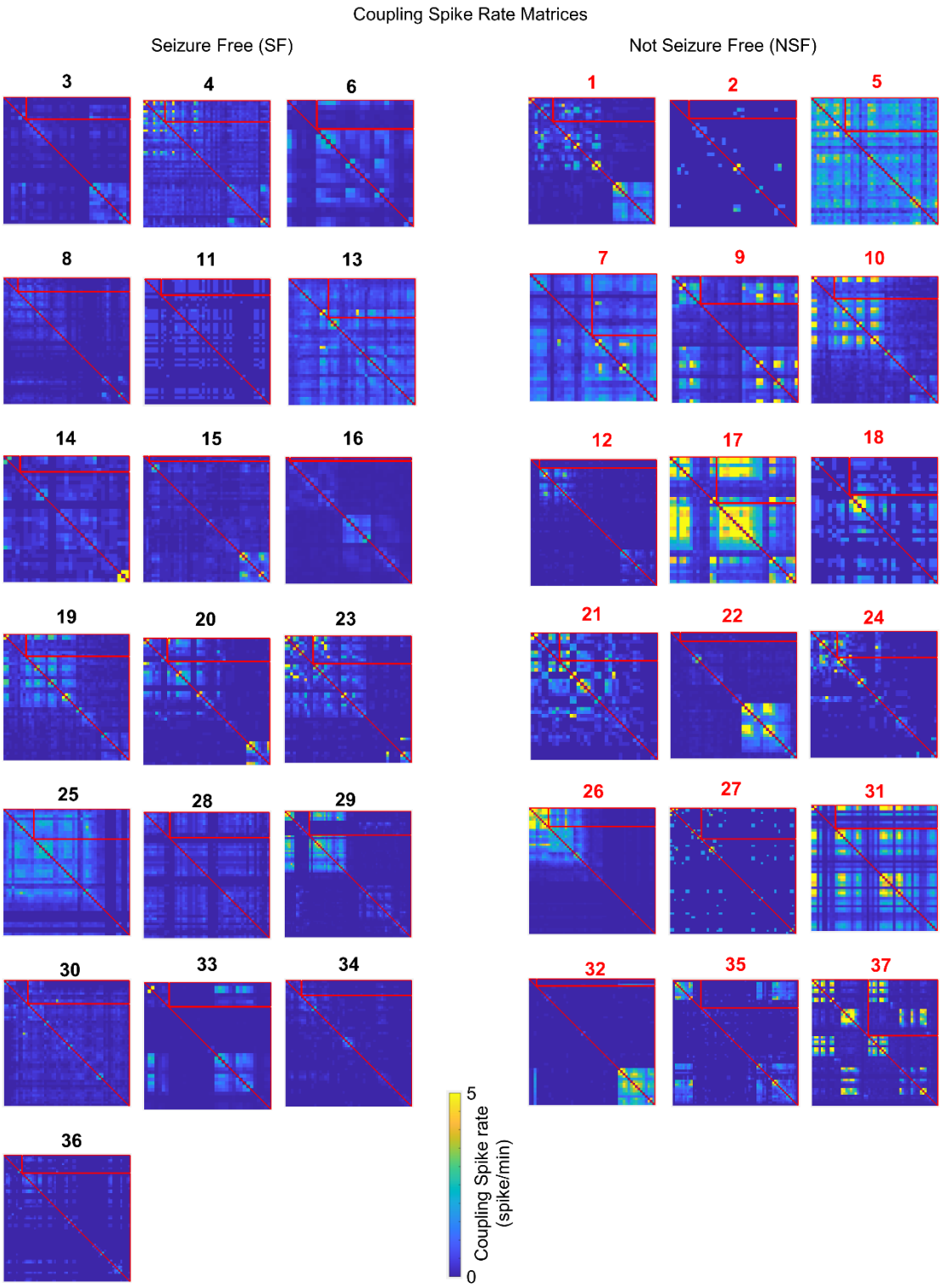
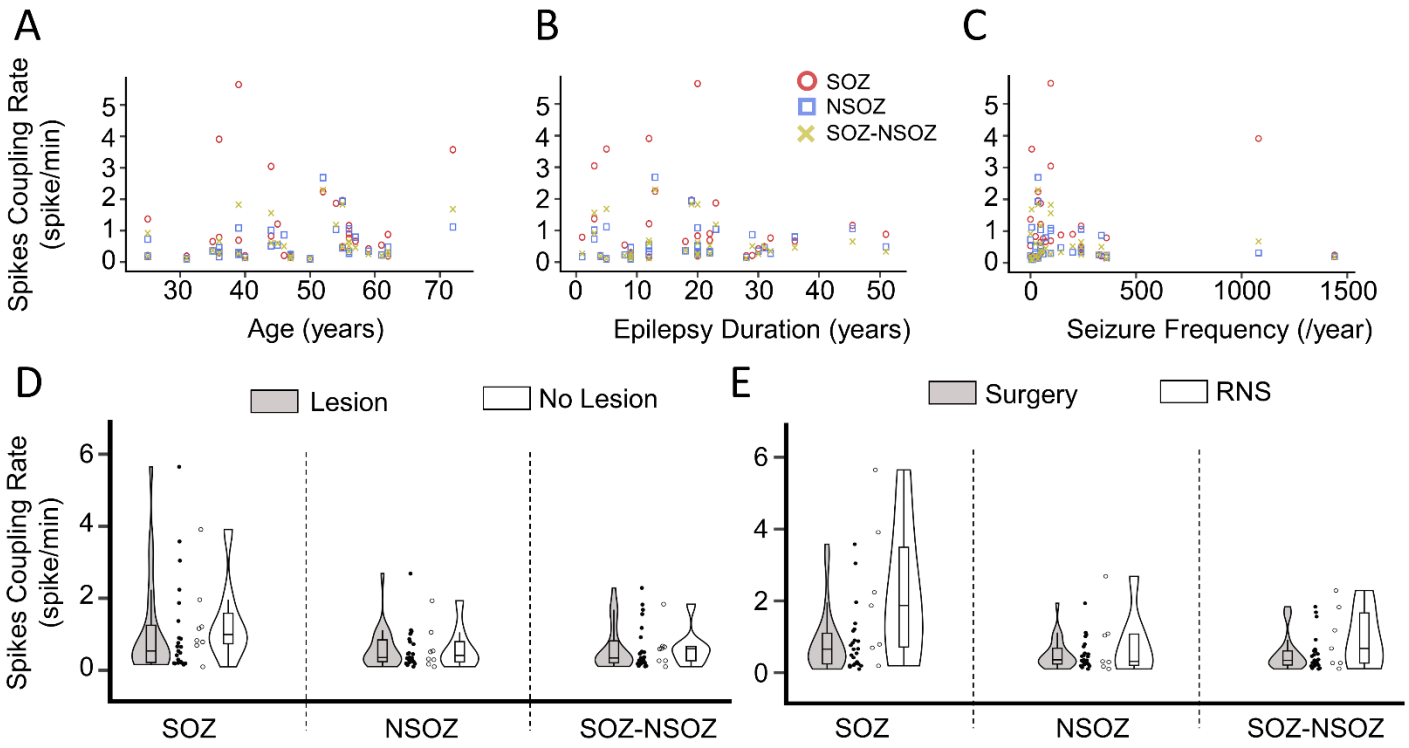
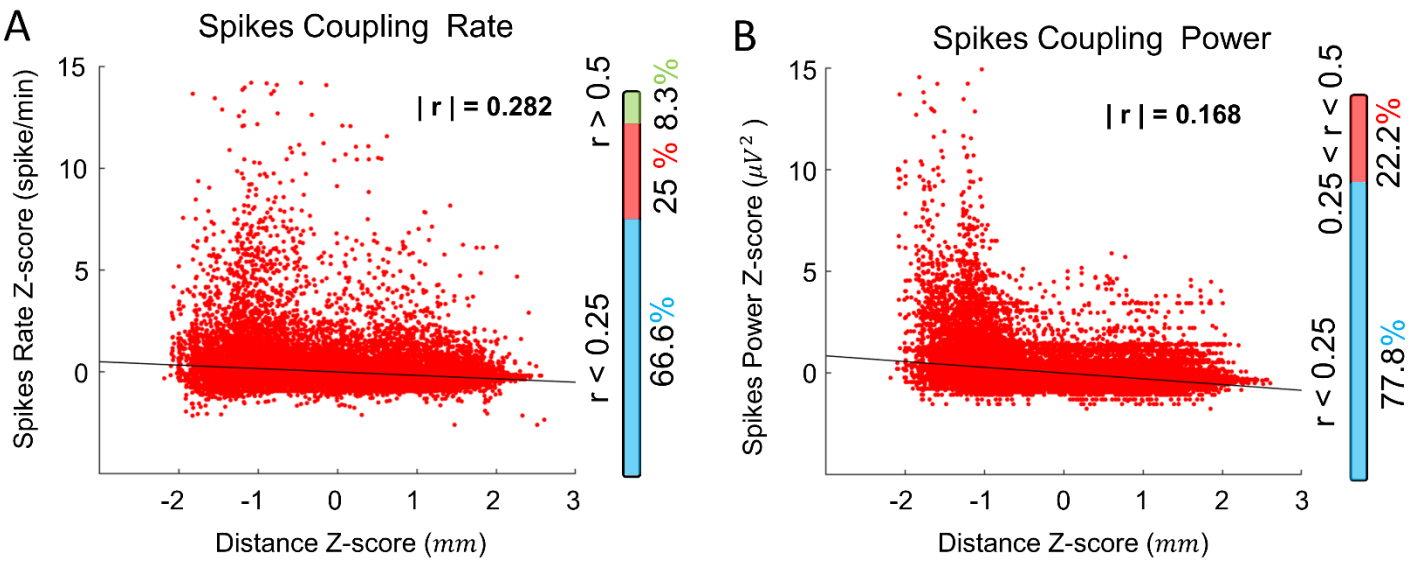
# Supplementary Material



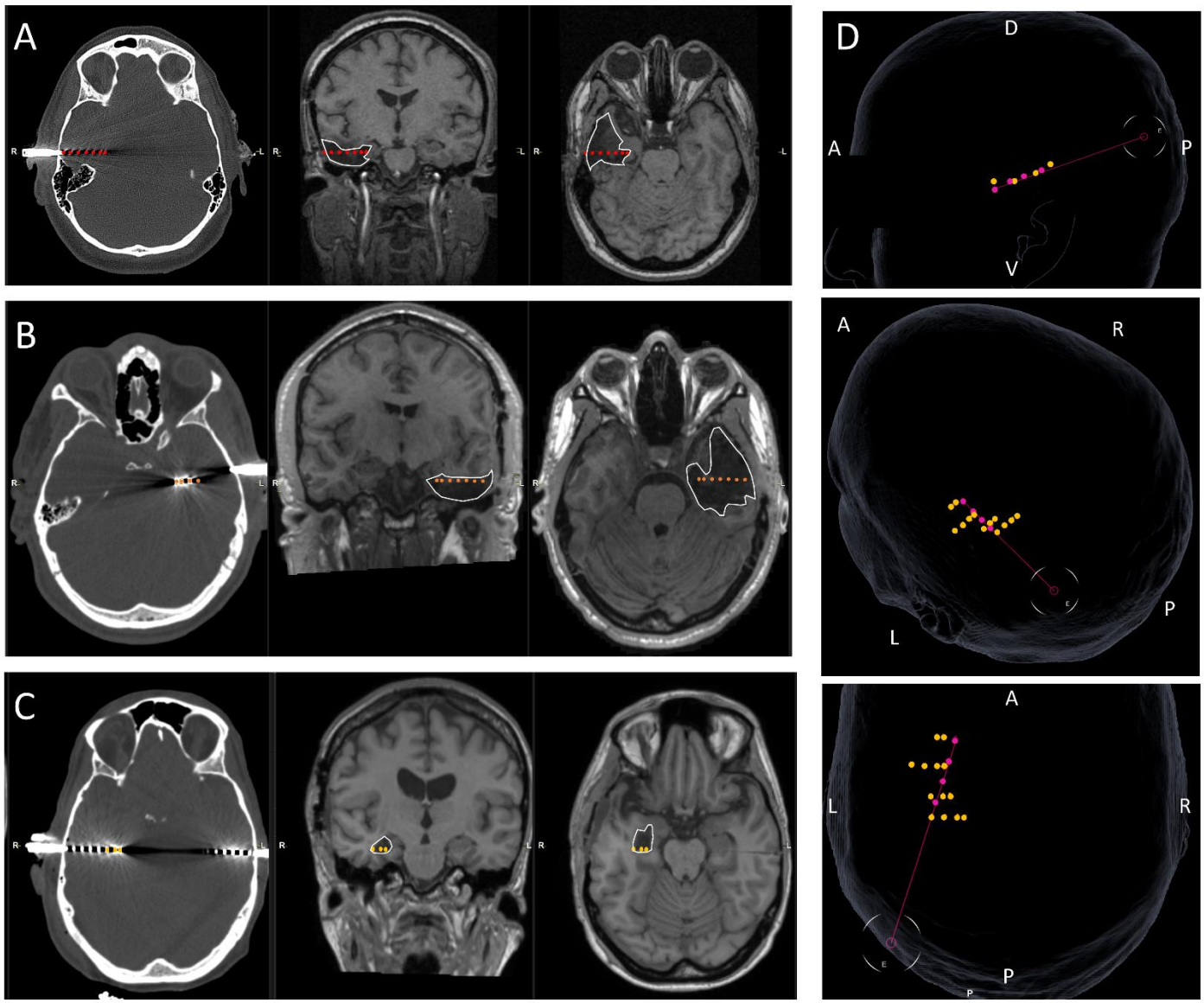

**Supplementary Figure 1.** Coupled spike rates matrices. Coupled spike rates matrices for all seizure free patients (n= 19, left) and not-seizure free patients (n=18, right). The matrices are divided into 3 networks: in the seizure onset zone (SOZ, upper triangle), in non-SOZ (NSOZ, lower triangle) and between the SOZ and NSOZ (rectangle) networks.




**Supplementary Figure 2. Coupled Spikes Rate as a function of clinical features of epilepsy. (A)** Scatter plot of coupled spike rates as a function of Age. Different colors represent different zone networks, each patient is represented by an average of all pairs in 3 networks: when both contacts are part of the seizure onset zone (SOZ , red, Pearson correlation r = 0.046, p_value = 0.806), when both contacts are outside of the SOZ (blue, r = 0.258, p_value = 0.162) and when one is inside and the other outside (yellow, r = 0.189, p_value = 0.309). **(B)** Same as (A) but as a function of seizure frequency, the correlation coefficients and p-values for all 3 networks are (-0.142, 0.445), (0.063, 0.737) and (-0.124, 0.508). **(C)** Same as (A) but as a function of patients age, the correlation coefficients and p-values for all 3 networks are (0.051, 0.785), (-0.213, 0.251) and (-0.185, 0.320). **(D)** Violin plots comparing the average coupled spikes rates for three different zone networks between patients with MRI lesion (white, n = 8) and those without a lesion (grey, n = 29). The p_value for Wilcoxon test are 0.232, 0.992 and 0.484 for SOZ, NSOZ and SOZ-NSOZ respectively. **(E)** Violin plots comparing the average coupled spikes rates for three different zone networks between patients who had surgical resection (white, n = 30) and those without a lesion (grey, n = 7). The p_value for Wilcoxon test are 0.0861, 0.992 and 0.281 for SOZ, NSOZ and SOZ-NSOZ respectively. In all plots, each datapoint corresponds to a measure from a single patient.




**Supplementary Figure 3. Correlation between coupled spikes rates, power and electrodes distance. (A)** Scatter plots illustrating the z-score of coupled spikes rates for all patients in relation to Euclidean distance between channel pairs. The black line represents the linear least-squares fit. The vertical bar to the right shows the percentage correlation coefficients for individual patients. High r>0.5 (shaded green), medium 0.25 < r < 0.5 (red), and low correlation r < 0.25 (blue). **(B)** same as A but for z-scores of coupled spikes power. Each datapoint corresponds to either spikes coupling rate or coupling power for each single channel pair.




**Supplementary Figure 4. Resection or Responsive NeuroStimulation (RNS) therapy in the seizure onset zone (SOZ)**. **(A)** Resection of tissue corresponding to SOZ in patient 24. Postimplant CT (left, axial) registered with postsurgical MRI in coronal (middle) and axial planes (right). Red dots denote contacts of depth electrode with distal contacts positioned in right entorhinal cortex. Area outlined in white indicates the margins of resection in the plane of view. **(B)** Same as panel A, but patient 25 and orange dots denote contacts of depth electrode positioned to sample left entorhinal cortex. **(C)** Same as panel A, but patient 34 and yellow dots denote contacts of depth electrode positioned to sample right middle hippocampus. **(D)** RNS therapy of the left mesial temporal lobe SOZ in patient 37. Full-head model illustrates trajectory of RNS probe (magenta line) with entry (E) from occipital cortex with contacts (magenta dots) positioned in left amygdala, hippocampus, and parahippocampal gyrus. Yellow dots denote depth electrode contacts of the left SOZ involving amygdala, entorhinal cortex, middle hippocampus, and parahippocampal gyrus. Sagittal view (top), clockwise-rotated posterolateral view (middle), and axial view (bottom). A=anterior, P=posterior, D=dorsal, V=ventral, L=left, and R=right.

| Patient | Electrode | Detected Spikes | True Positives | False Positives | False Negatives | Sensitivity | False Negative Rate |
|---|---|---|---|---|---|---|---|
| Patient 1 | RA1 | 75 | 69 | 6 | 8 | 92% | 10.39% |
| | REC2 | 119 | 114 | 5 | 4 | 96% | 3.39% |
| | RAH4 | 19 | 18 | 1 | 3 | 95% | 14.29% |
| | RPG6 | 11 | 10 | 1 | 1 | 91% | 9.09% |
| | LEC1 | 34 | 32 | 2 | 1 | 94% | 3.03% |
| Patient 3 | RA2 | 17 | 14 | 3 | 0 | 82% | 0% |
| | RAC1 | 10 | 10 | 0 | 0 | 100% | 0% |
| | LA2 | 43 | 36 | 7 | 2 | 84% | 5.26% |
| | LAH6 | 178 | 168 | 10 | 5 | 95% | 2.51% |
| | LEC5 | 57 | 50 | 7 | 1 | 88% | 2% |
| Patient 6 | RA1 | 68 | 60 | 8 | 2 | 88% | 3.23% |
| | RAH2 | 70 | 70 | 0 | 4 | 100% | 5.41% |
| | LAH3 | 38 | 31 | 7 | 3 | 82% | 8.82% |
| | LOF4 | 1 | 1 | 0 | 0 | 100% | 0% |
| | LEC2 | 20 | 18 | 2 | 2 | 90%% | 10% |
| Patient 7 | REC3 | 12 | 12 | 0 | 1 | 100% | 7.69% |
| | RAH2 | 426 | 425 | 1 | 0 | 99.7% | 0% |
| | RPG1 | 8 | 8 | 0 | 0 | 100% | 0% |
| | RPG6 | 28 | 27 | 1 | 2 | 96% | 6.90% |
| | RPST2 | 48 | 47 | 1 | 4 | 98% | 7.84% |
| Patient 10 | REC1 | 224 | 222 | 2 | 15 | 99% | 6.33% |
| | REC5 | 90 | 87 | 3 | 6 | 97% | 6.45% |
| | RMTG3 | 117 | 117 | 0 | 3 | 100% | 2.5% |
| | ROF3 | 2 | 2 | 0 | 0 | 100% | 0% |
| | LA4 | 81 | 78 | 3 | 9 | 96% | 10.34% |
| Patient 12 | RA5 | 20 | 20 | 0 | 2 | 100% | 9.09% |
| | RMH1 | 31 | 31 | 0 | 1 | 100% | 3.13% |
| | RPSMA1 | 4 | 4 | 0 | 4 | 100% | 0% |
| | LA3 | 34 | 29 | 5 | 0 | 85% | 0% |
| | LAC2 | 15 | 13 | 2 | 0 | 87% | 0% |
| Patient 15 | RMH2 | 11 | 11 | 0 | 3 | 100% | 21.43% |
| | RPHG1 | 21 | 20 | 1 | 3 | 95% | 13.04% |
| | LAH5 | 14 | 12 | 2 | 1 | 86% | 7.69% |
| | LOF3 | 7 | 6 | 1 | 1 | 86% | 14.29% |
| | LOF4 | 4 | 3 | 1 | 0 | 75% | 0% |
| Patient 30 | LEC2 | 54 | 51 | 3 | 3 | 94% | 5.56% |
| | LPHG1 | 9 | 7 | 2 | 0 | 78% | 0% |
| | LPHG4 | 6 | 5 | 1 | 0 | 83% | 0% |
| | LOF2 | 5 | 4 | 1 | 0 | 80% | 0% |
| | LEC1 | 61 | 59 | 2 | 4 | 97% | 6.35% |
| Patient 35 | LEC1 | 54 | 49 | 5 | 2 | 91% | 3.92% |
| | LEC2 | 55 | 45 | 10 | 2 | 82% | 4.26% |
| | LAH1 | 62 | 54 | 8 | 2 | 87% | 3.57% |
| | LPHG1 | 17 | 17 | 0 | 1 | 100% | 5.56% |
| | LSTG4 | 0 | 0 | 0 | 0 | 100% | 0% |
| Patient 37 | RMH4 | 153 | 153 | 0 | 14 | 100% | 8.38% |
| | RPHG1 | 337 | 336 | 1 | 11 | 99.7% | 3.27% |
| | LEC2 | 426 | 420 | 6 | 3 | 98.5% | 0.71% |
| | LAH5 | 42 | 38 | 4 | 9 | 90.48% | 19.15% |
| | RA2 | 294 | 281 | 13 | 6 | 95.57% | 2.09% |
| | **Total** | **3532** | **3394** | **138** | **148** | **96%** | **4.17%** |

**Supplementary Table 1. Quantitative validation of spike detector performance.**

| | Temporal Lobe | | | | | | | | | | Frontal Lobe | | | | | | Cingulate Cortex | | | Parietal Lobe | | | | Occipital Lobe | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| patient | A | EC | MH | AH | PH | PHG | STG | TP | PT | FG | OF | SMA | FP | FO | F | SS | AC | MC | PC | IP | AP | PTB | SG | OT | O |
| 1 | RL | RL | | RL | | RL | | | | | | | | | | | | | | | | | | | |
| 2 | | | RL | | R | | R | | | | | RL | | | | | R | | | R | R | | | | |
| 3 | RL | L | | L | R | L | | | | | L | | | | | | R | | | | | | | | |
| 4 | RL | RL | | RL | | RL | | | | | RL | | | | | | | | | | | | | | |
| 5 | RL | R | | RL | RL | | | | | | RL | | | | | | | | | | | | | | |
| 6 | RL | RL | | RL | | | | | | | RL | | | | | | | | | | | | | | |
| 7 | RL | R | | RL | | R | RL | | | | | | | | | R | | R | | | | | | | |
| 8 | RL | RL | | RL | | | | | | | RL | RL | | | | | RL | | | | | | | | |
| 9 | L | L | | RL | | L | | L | | | RL | | | | | | L | | | | | | | | |
| 10 | RL | R | | RL | | | R | | | | RL | | | | | | R | | | | | | | | |
| 11 | RL | RL | | RL | | RL | | | | | RL | | | | | | RL | | | | | | | | |
| 12 | RL | RL | RL | | | | | | | | RL | RL | | | | | RL | | | | | | | | |
| 13 | RL | RL | | RL | | RL | | | | | RL | | | | | | | | | | | | | | |
| 14 | R | RL | RL | | | | | | | | RL | | | | | | | | | | | | | | |
| 15 | RL | RL | RL | | | | | | | | RL | | RL | | | | L | | | | | | | | |
| 16 | R | | RL | | | | RL | | | | | | | | | R | | | | RL | | | | | |
| 17 | RL | RL | RL | | | | | | | | RL | | | | | | | | | | | | | | |
| 18 | R | | R | | R | R | R | | | | RL | | | | | | | | | | | | | | |
| 19 | RL | RL | RL | | | RL | | | | | RL | | | | | | | | | | | | | | |
| 20 | RL | RL | RL | | | RL | | | | | RL | | | | | | | | | | | | | | |
| 21 | R | RL | L | | | R | R | | R | | | | | | | R | | | | | | | | | |
| 22 | L | RL | | | | R | | | | L | | | | | | | | | | | | | | RL | |
| 23 | RL | RL | R | L | | RL | | | | | RL | | | | | | | | | | | | | | |
| 24 | R | RL | RL | | | | | | | | RL | RL | | | | | R | R | | | | | | | |
| 25 | RL | RL | R | L | | L | | | | | RL | RL | | | | | | | | | | | | R | |
| 26 | R | RL | L | RL | R | | | | | | | | | | | | | | | | | | | RL | |
| 27 | RL | RL | RL | | | RL | | | | | | | | | | | | | R | | | | | R | |
| 28 | L | RL | L | R | | RL | L | | | | R | | | | | | | | | | | | | | |
| 29 | RL | RL | | RL | | RL | | | | | RL | | | | | | | | | | | | | | |
| 30 | L | RL | | R | L | L | | | | | L | | | L | | | | | | | | | L | | |
| 31 | RL | RL | | RL | | L | | | | | L | | | | | | L | | | | | | | | |
| 32 | RL | RL | | RL | | | | | | | RL | | | | | | RL | | | | | | | | |
| 33 | L | RL | RL | | | L | | | | | L | | | | | | | | | | | | | | |
| 34 | | RL | RL | | | | L | | R | | | | | | | | | | L | R | | | | | R |
| 35 | RL | RL | | RL | | L | L | | | | RL | | | | | | | | | | | | | | |
| 36 | RL | R | | | | RL | | | | | RL | | | | R | | | | | | | RL | | | |
| 37 | L | RL | R | L | | RL | | | | | RL | | | | | | | | | | | | | | |

**Supplementary Table 2: Intracerebral electrodes positions in all 37 patients**

**Abbreviations**:

**TP:** Temporal Pole
**A:** Amygdala
**FP:** Frontal Pole
**OF:** Orbitofrontal

**EC**: Entorhinal Cortex
**AH:** Anterior Hippocampus
**MH:** Middle Hippocampus
**PH:** Posterior Hippocampus
**PHG:** Parahippocampal Gyrus
**FG:** Fusiform Gyrus
**PT:** Posterior Temporal
**STG:** Superior Temporal Gyrus
**PTB:** Parietal-Temporal Border
**O:** Occipital Lobe
**OT:** Occipital-Temporal Border

**F:** Frontal Lobe
**FO:** Frontal Operculum
**AC:** Anterior Cingulate
**MC:** Middle Cingulate
**PC:** Posterior Cingulate
**SMA:** Supplementary Motor Area
**SS:** Supra-Sylvian
**AP:** Anterior Parietal Lobe
**IP:** Inferior Parietal Lobe
**SG:** Supramarginal Gyrus

| Patients | Sex/age | Epilepsy duration | Seizure frequency (/month) | Site(s) of SOZ | MRI | Resected area | Surgical outcome/ follow-up | Pathology | IIS sites |
|---|---|---|---|---|---|---|---|---|---|
| **1** | F / 38 | 36 | 6 | RA, RAH, REC, RPHG | R/L HA | R AMTL | IIIB / 73 | HS, gliosis | RAH, RA, REC, RPHG, LA |
| ***2*** | F / 17 | 8 | 90 | RIP, RAP, RMH | Normal | R parietotemporal neocortex | IIC / 126 | Subcortical WM ectopic neurons | NA |
| ***3*** | F / 42 | 30 | 20 | LA, LEC, LAH | L HA | L AMTL | IB / 51 | FCD Ia | NA |
| ***4*** | F / 39 | 32 | 5 | RAH, RPHG, RA, REC | R/L HA | R AMTL | IA / 43 | Gliosis | RA, REC, RAH, RPHG, LA, LEC, LAH, LPHG |
| ***5*** | F / 28 | 20 | 2 | RA, RAH, REC, RPHG | Normal | R AMTL, temporal neocortical | IVB / 72 | Subcortical WM ectopic neurons | RAH, RA, RPH, LAH, REC |
| ***6*** | F / 30 | 29 | 28 | LA, LAH | L HA | VNS | IA / 12 | NA | NA |
| ***7*** | M / 21 | 9 | 4 | REC, RAH, RPHG | R FCD, PNH | R AMTL, temporooccipital | IIIA / 84 | FCD Ic, IIa | RA, REC, RAH, RPHG, RSTP, RMC, LAH |
| ***8*** | F / 25 | 20 | 27 | RAH, RA, REC | R/L HA | R AMTL | IB / 60 | None | LA, LAH, LEC, RA, RAH |
| ***9*** | M / 42 | 22 | 16 | LEC, LPHG, LA, LAH, RAH | R/L Hippocampal Hyperintensity | L AMTL | II / 36 | None | NA |
| ***10*** | F / 48 | 32 | 9 | RAH, RA | Normal | R AMTL | IIIC / 42 | HS | NA |
| ***11*** | M / 40 | 5 | 1 | LA, LEC, LAH | L Caudate Nucleus Atrophy | L AMTL | IA / 24 | None | LAH, LA, LEC, RAH, RA, REC |
| ***12*** | F / 20 | 9 | 12 | LA, LEC | Normal | L AMTL | IIB / 51 | FCD IIa | NA |
| ***13*** | F / 46 | 46 | 6 | LA, LEC, LAH | L HA | L AMTL | IB / 9 | HS | NA |
| ***14*** | F / 53 | 51 | 12 | LEC, LMH, LA | L Hippocampal Hyperintensity | L AMTL | IA / 86 | None | LEC, LMH |
| ***15*** | M / 45 | 5 | 8 | LEC, LMH | L HA | L AMTL | IA / 58 | None | REC, RMH, LEC, LMH |
| ***16*** | F / 50 | 24 | 2 | RSTA, RSTP | R Perisylvian polymicrogyria | R temporoparietal neocortex, STG | IB / 2 | Gliosis | RSTA, RSTP |
| ***17*** | F / 49 | 19 | 3 | RA, REC, RMH, LA, LEC, LMH | Normal | R AMTL | IIA / 61 | FCD Ic | REC, RMH, LA, LEC, LMH |
| ***18*** | F / 41 | 12 | 30 | REC, RMH, RPHG, RSTG | Normal | R AMTL, R lateral TL | IIA / 17 | HS, gliosis | REC, RMH, RPH, RSTG |
| ***19*** | M / 49 | 31 | 20 | RA, REC, RMH, RPHG | Normal | R AMTL | IA / 1.5 | FCD Ic, gliosis | RA, REC, RMH, RPHG, LA, LEC, LMH, LPHG |
| ***20*** | F / 35 | 30 | 110 | LEC, LA, RA | L HA | VNS | IA / 10 | NA | RA, RMH, LEC, LMH, LA |
| ***21*** | F / 29 | 18 | 4 | REC, RA, RPHG, RSTP | R TPO polymicrogyria | R AMTL, STP | ID / 53 | FCD Ic, IIa, IIb | RSTP, REC, RA, RPHG, LEC, LMH |
| ***22*** | M / 56 | 20 | 2 | LA, LEC | L Posterior Comm. Artery Infarct | L AMTL | IIB / 27 | Subcortical WM ectopic neurons | LEC, LA |
| ***23*** | F / 40 | 12 | 4 | RA, REC, RMH, RPHG | R FCD Temporal pole | R AMTL | IB / 45 | FCD IIb, gliosis | RA, REC, RMH, LA, LEC, LMH |
| ***24*** | F / 34 | 22 | 8 | REC, RMH | Normal | R AMTL | IVC / 48 | Gliosis | REC, RMH, RA |
| ***25*** | M / 20 | 3 | 0 | LA, LEC, LAH | L TL Tuber | L tailored resection mesial & lateral TL, inferior TL | IA / 48 | TS | LA, LEC, LAH, LPHG, LEC, RA |
| ***26*** | F / 34 | 20 | 8 | RAH, RA, REC | R/L PNH | RNS RAH and REC | IVB / 45 | NA | RAH, RA, REC, RPHG |
| ***27*** | M / 27 | 9 | 1 | RA, REC, RPHG, LA, LEC, LMH, LPHG | R HA | RNS L/R EC | IIIA / 38 | NA | RA, REC, RMH, RPHG, LA, LEC, LMH, LPHG |
| ***28*** | F / 21 | 4 | 2 | LEC, LA, LMH, LPHG | L Temporal pole encephalocele | L AMTL | IB / 35 | HS, gliosis | LEC, LMH, RAH, REC, RPHG |
| ***29*** | M / 51 | 23 | 4 | LEC, LAH, LPHG, REC, RPHG | R HA, L FCD | RNS L/R medial TL | IB / 24 | NA | REC, RAH, RPHG, LAH, LPHG |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ***30*** | M / 58 | 8 | 1 | LPH, LEC, LA, RAH, REC | L HA | L AMTL | IB / 34 | HS, gliosis | LPH, LEC, LA |
| ***31*** | F / 49 | 13 | 3 | LA, LAH, LEC, LPHG | L Hippocampal Hyperintensity | RNS L medial TL and L EC | IIB / 28 | NA | LAH, LEC, LA, LPHG |
| ***32*** | M / 69 | 5 | 0.5 | LEC, LAH | L HA | L amygdalo-hippocampectomy w/ Visualase | IIIA / 55 | NA | LEC, LAH, REC, RAH |
| ***33*** | M / 41 | 3 | 8 | LMH, LEC, LPHG | LA hyperintensity | L AMTL | IA / 33 | HS, gliosis | LEC, LMH, LA, LPHG |
| ***34*** | F / 44 | 9 | 120 | REC, RMH | R/L PNH | R AMTL | IB / 31 | None | REC, RMH, RMNH, RPNH, RINH, LPC |
| ***35*** | F / 33 | 1 | 30 | LAH, LEC, LA, LEC | Normal | RNS L posterior and anterior border of the resection cavity, L posterior parietal lobe | IVB / 27 | None | LAH, LEC, LA |
| ***36*** | M / 38 | 28 | 3 | RPHG, REC, ROF, RFA | R Parietal Lobe, Middle Frontal Gyrus Atrophy | R AMTL | IB / 27 | HS, gliosis | RPT, RPS, ROF, RPP, RA, RPHG, REC |
| ***37*** | F / 34 | 12 | 90 | RA, REC, RMH, RPHG, LEC, LAH, LPHG, LA | Normal | RNS L/R longitudinal hippocampal leads, involving RA, RMH, REC and RPHG and LA, LAH, LPHG, LEC | IVB / 9 | None | RA, REC, RMH, RPHG, LEC, LAH, LPHG, LA |

**Supplementary Table 3: Patients Cohort**

**Table Abbreviations:** R=right, L=left, A=amygdala, AH=anterior hippocampus, MH=middle hippocampus, PH=posterior hippocampus, EC=entorhinal cortex, PHG=parahippocampal gyrus, OF=orbitofrontal cortex, FA=anterior frontal, STG/A/P=superior temporal gyrus/anterior/posterior, AMTL=anteromesial temporal lobectomy, RNS=Responsive Neurostimulation, NA=not available, FCD=focal cortical dysplasia, HA=hippocampal atrophy, HS=hippocampal sclerosis, PNH=periventricular nodular heterotopia, TS=tuberous sclerosis

| Zone | Outcome | Region | N |
|---|---|---|---|
| SOZ | NSF | M | 81 |
| | | L | 97 |
| | | E | 36 |
| | SF | M | 60 |
| | | L | 47 |
| | | E | 33 |
| NSOZ | NSF | M | 194 |
| | | L | 295 |
| | | E | 167 |
| | SF | M | 213 |
| | | L | 286 |
| | | E | 179 |

**Supplementary Table 4:** This table summarizes the number of data points for each subcategory used in comparison in Figure 2A and 2B. (SOZ = Seizure Onset Zone, NSOZ = Not Seizure Onset Zone, NSF = Not Seizure Free, SF = Seizure Free, M= Mesial, L = Lateral, E= Extra-temporal)

| Zone | Outcome | Region | N |
|---|---|---|---|
| SOZ | NSF | M-M | 215 |
| | | M-L | 407 |
| | | M-E | 85 |
| | | L-L | 222 |
| | | L-E | 78 |
| | | E-E | 20 |
| | SF | M-M | 136 |
| | | M-L | 149 |
| | | M-E | 48 |
| | | L-L | 77 |
| | | L-E | 64 |
| | | E-E | 36 |
| NSOZ | NSF | M-M | 624 |
| | | M-L | 1616 |
| | | M-E | 537 |
| | | L-L | 1228 |
| | | L-E | 799 |
| | | E-E | 221 |
| | SF | M-M | 874 |
| | | M-L | 1957 |
| | | M-E | 755 |
| | | L-L | 1394 |
| | | L-E | 1231 |
| | | E-E | 431 |
| SOZ-NSOZ | NSF | M-M | 584 |
| | | M-L | 1509 |
| | | M-E | 449 |
| | | L-L | 746 |

| | | | |
|---|---|---|---|
| | | L-E | 481 |
| | | E-E | 106 |
| | SF | M-M | 499 |
| | | M-L | 1149 |
| | | M-E | 443 |
| | | L-L | 477 |
| | | L-E | 372 |
| | | E-E | 89 |

**Supplementary Table 5:** This table summarizes the number of data points for each subcategory used in comparison in Figure 2D and 2E. (SOZ = Seizure Onset Zone, NSOZ = Not Seizure Onset Zone, NSF = Not Seizure Free, SF = Seizure Free, M= Mesial, L = Lateral, E= Extra-temporal)

| | | SOZ | NSOZ |
|---|---|---|---|
| HRL Percentage | Age | 0.0171 **(0.9310)** | - 0.1331 **(0.5667)** |
| | Duration of epilepsy | 0.0660 **(0.7387)** | - 0.2711 **(0.1630)** |
| | Seizure Frequency | - 0.2874 **(0.1380)** | - 0.0882 **(0.6555)** |
| | Presence of lesion | **(0.2806)** | **(0.9981)** |
| | Surgery type | **(0.5506)** | **(0.6246)** |
| Spikes Rates | Age | 0.1454 **(0.3976)** | 0.1867 **(0.2755)** |
| | Duration of epilepsy | 0.1317 **(0.4439)** | 0.1380 **(0.4222)** |
| | Seizure Frequency | 0.0130 **(0.9398)** | - 0.0587 **(0.7339)** |
| | Presence of lesion | **(0.9998)** | **(0.6611)** |
| | Surgery type | **(0.0967)** | **(0.7333)** |

**Supplementary Table 6.** This table summarizes the correlation between demographic/clinical parameters and HRL percentage as well as spikes rates in both SOZ and outside of it (NSOZ). Correlation coefficient (r) and p-values are given in form of r **(p-value).**

**Abbreviation List:**

M-M: Mesial-Mesial Temporal Lobe

M-L: Mesial-Lateral Temporal Lobe

M-E: Mesial-Extra Temporal Lobe

L-L: Lateral-Lateral Temporal Lobe

L-E: Lateral-Extra Temporal Lobe

E-E: Extra-Extra Temporal Lobe