Supplementary material

Figure legends

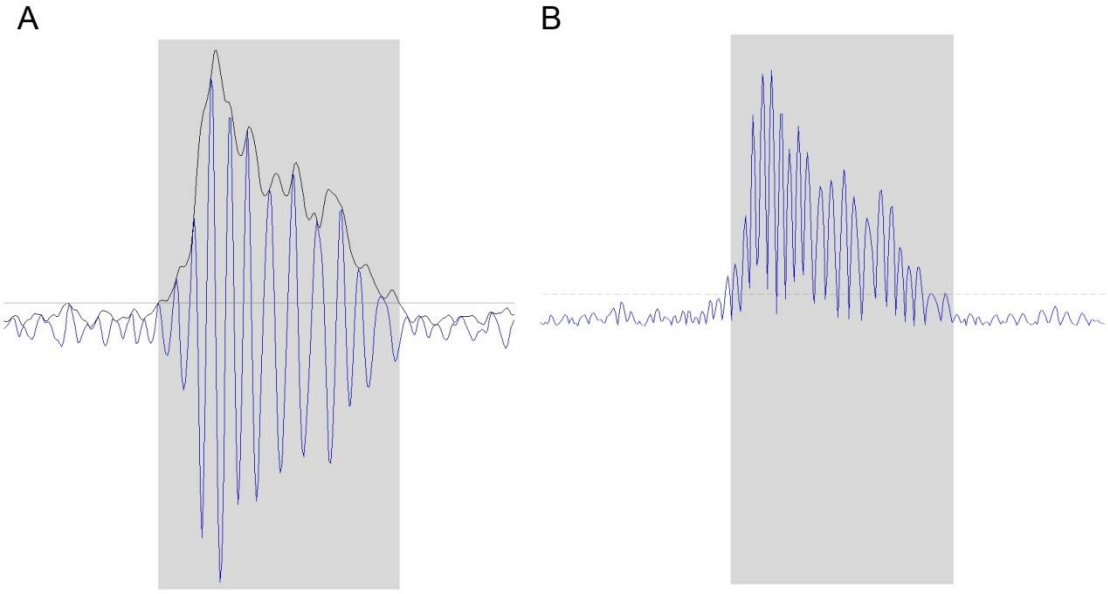

Figure S1. Hilbert transform. (A) Raw EEG waveform (blue), representing a high-frequency oscillation (HFO) and its Hilbert envelope (black). The solid horizontal line is the threshold above which the mean Hilbert signal will be marked as a candidate HFO. (B) Rectified EEG signal. The dotted horizontal line is the threshold that the rectified signal has to cross to qualify as a peak to be eventually classified as an HFO.

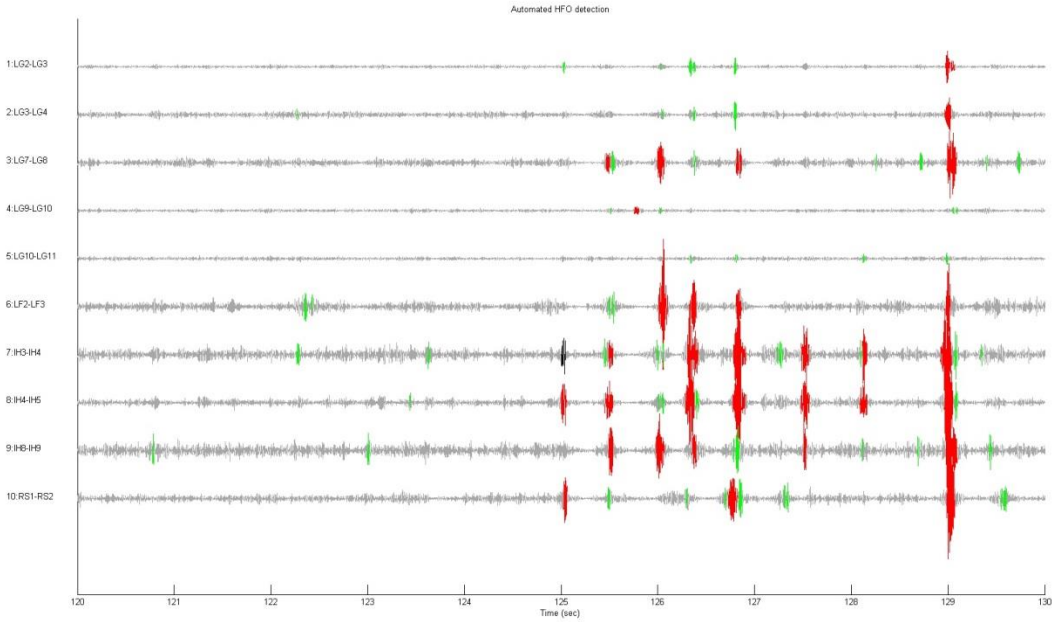

Figure S2. Automated detection of the interictal high-frequency oscillations (HFOs). A 10-second EEG segment is shown. The red highlights indicate the definite HFOs that satisfied the frequency, duration, and peaks criteria. The green highlights indicate the rejected HFOs that satisfied only the threshold criterion but did not have the required number of peaks. The black highlights indicate the rejected HFOs that did not satisfy the frequency criterion.

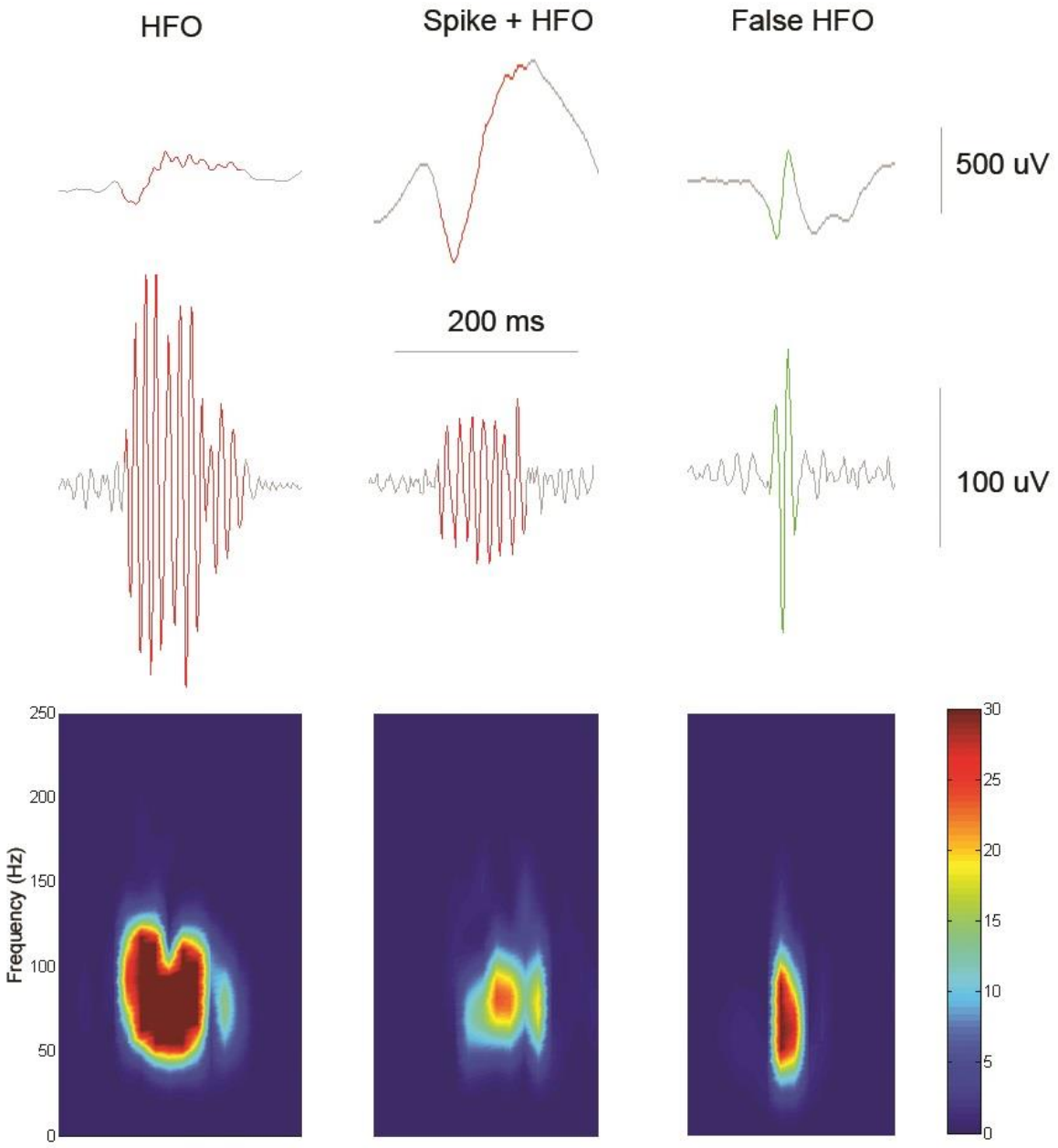

Figure S3. Detection of false high-frequency oscillations (HFOs). Examples of an HFO, a spike with HFO, and a false HFO are shown. Top panel shows the data at a bandpass filtre setting of 1-333 Hz. Middle panel shows the data at a bandpass filtre setting of 50-333 Hz. Bottom panel shows the power spectrogram of the detected oscillation. The number of peaks and the shape of the power spectrogram distinguish the true HFOs from the false HFO.

Table S1. Group level results for spatial differentiation of the SOZs and the HFO types.

	hSOZ		**HFO+&–SOZ**		**cSOZ**		**HFO type**	
	Inside	**Outside**	**Inside**	**Outside**	**Inside**	**Outside**	**HFO+**	**HFO-**
Density (ms/min)	255 (137-409)*	110 (53-216)	191 (117-356)*	94 (49-205)	208 (112-364)*	107 (53-208)	255 (137-409)*	153 (83-235)
Connectivity (/min)	0.57 (0.23-1.1)*	0.13 (0.07-0.29)	0.37 (0.16-0.91)*	0.11 (0.07-0.22)	0.43 (0.14-0.87)*	0.13 (0.07-0.26)	0.57 (0.23-1.1)*	0.22 (0.12-0.59)
Peak frequency (Hz)	90 (87-96)*	95 (90-101)	91 (87-96)*	96 (91-104)	91 (87-98)*	94 (90-101)	90 (87-97)†	92 (89-96)
Log power (μV^2)	2.4 (2.1-2.7)*	1.8 (1.5-2.2)	2.2 (1.9-2.6)*	1.7 (1.3-2)	2.2 (1.9-2.5)*	1.8 (1.4-2.1)	2.4 (2.1-2.7)*	2.1 (1.8-2.4)
Amplitude (μV)	15 (11-21)*	8.6 (5.5-12)	13 (9.8-19)*	7.7 (5-11)	13 (9.1-18)*	8.5 (5.2-12)	15 (11-21)*	11 (8.1-15)

Median (25th-75th percentiles) values are shown. *p* values obtained from Mann-Whitney U test: *$p<0.0001$; †$p<0.05$.

HFO: high-frequency oscillation; SOZ: seizure onset zone. See text for description of SOZ.

Table S2. F1 measures for the spatial prediction of the SOZ and HFO channels in the replication cohort.

Patient	Sample	hSOZ vs. non-hSOZ	hfo+&–SOZ vs. non-hfo+&–SOZ	cSOZ vs. non-cSOZ	HFO+ vs. HFO–
1R	1	0.57	0.61	0.53	0.86
	2	0.55	0.50	0.47	0.77
2R	1	0.69	0.86	0.41	0.60
	2	0.64	0.83	0.33	0.59
3R	1	0.53	0.76	0.27	0.67
	2	0.46	0.52	0.31	0.57

SOZ: seizure onset zone. See text for description of SOZs.