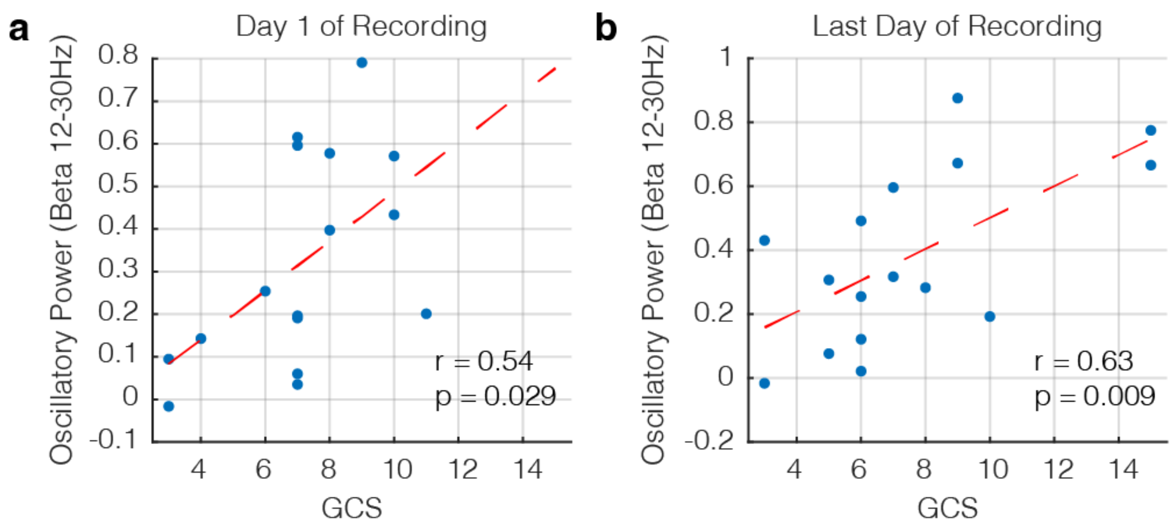
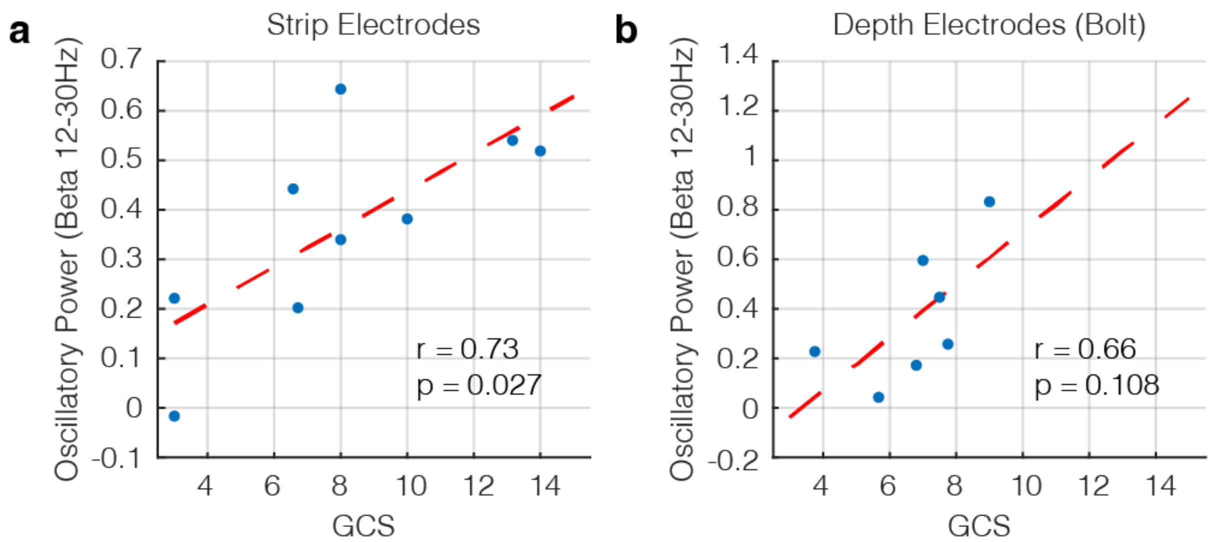
Supplementary

Figure S1



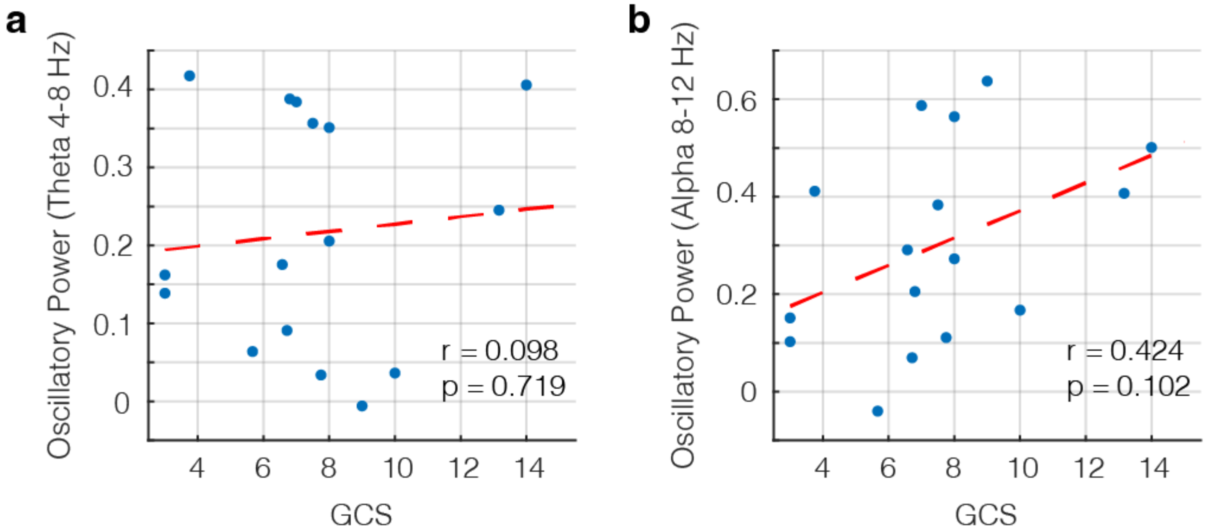
Relationship between beta oscillatory power and GCS is the same regardless of the recording day of interest. a) Scatter plot showing the correlation between beta oscillatory power and GCS for the first day of recording (r = 0.54, p = 0.029). Each dot represents the average values for one patient, and the red dashed line shows the line of best fit. b) Scatter plot showing the correlation for the last day of recording (ie. the last day before hardware was removed; r = 0.63, p = 0.009).

Figure S2



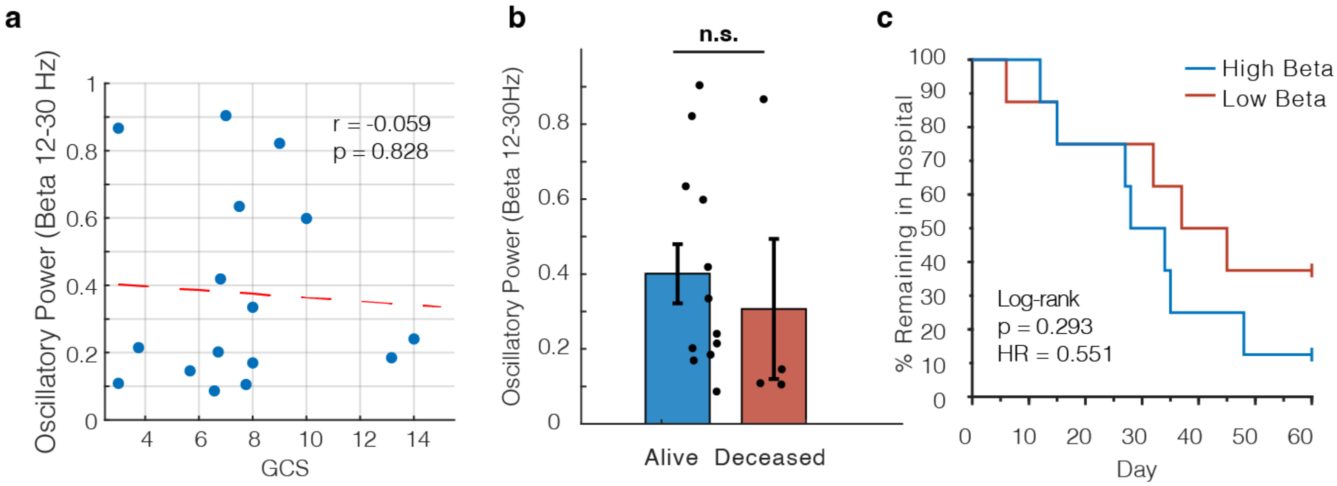
Replication of main results separately using strip or depth electrodes. a) Scatter plot showing the correlation between beta oscillatory power and GCS for patients implanted with strip electrodes after craniotomy for evacuation of acute subdural hematoma ($n = 9$; $r = 0.73$, $p = 0.027$). Each dot represents the average values for one patient, and the red dashed line shows the line of best fit. b) Scatter plot showing the correlation for patients implanted with depth electrodes via quad-lumen intracranial bolts after blunt TBI ($n = 7$; $r = 0.66$, $p = 0.108$). We note here that the overall correlation is not significant ($p > 0.05$), but clearly trending towards significance.

Figure S3



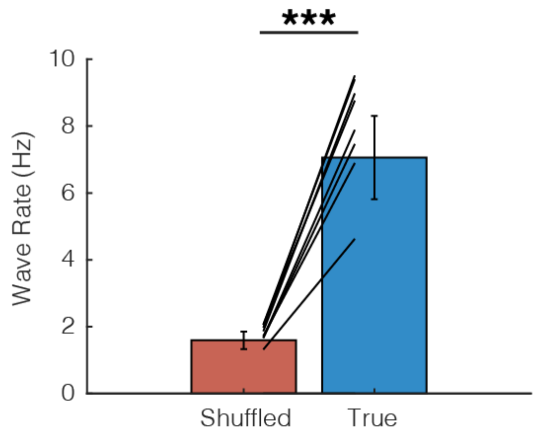
Correlation between GCS and oscillatory power is not observed in the theta or alpha frequency bands. a) Scatter plot showing the correlation between theta (4-8 Hz) oscillatory power and GCS (r = 0.098, p = 0.719). Each dot represents the average values for one patient, and the red dashed line shows the line of best fit. b) Scatter plot showing the correlation between alpha (8-12 Hz) oscillatory power and GCS (r = 0.424, p = 0.102).

Figure S4



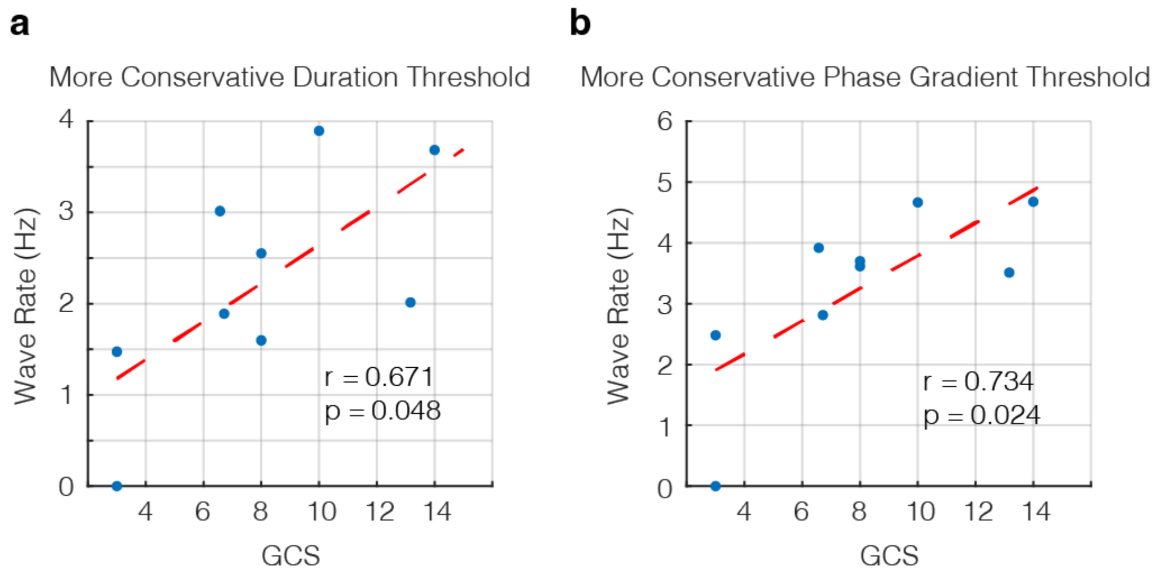
Scalp EEG beta oscillatory power does not significantly correlate with GCS or predict mortality or length of in-hospital stay. a) Scatter plot showing correlation between beta oscillatory power and GCS (r = -0.059, p = 0.828). Each dot represents the average values for one patient, and the red dashed line shows the line of best fit. b) Comparison of average beta oscillatory power for patients who survived their TBI versus those who died within 2 months of injury (p > 0.05). c) Kaplan-Meier curve showing % of patients remaining in the hospital where patients were split into two groups based on the median beta oscillatory power (log-rank test, p = 0.293).

Figure S5



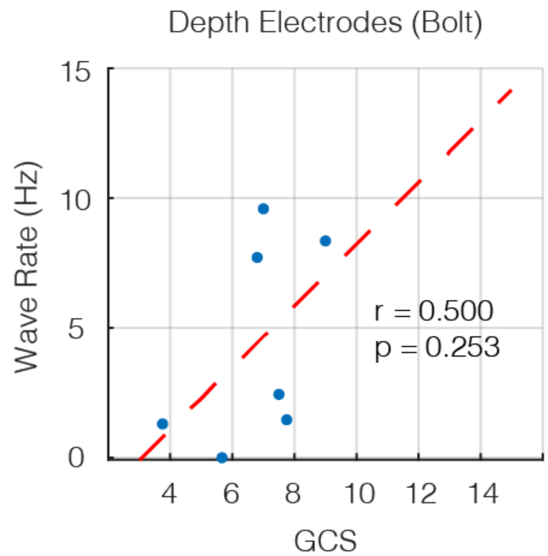
Control analysis comparing true wave detection rate versus chance. Shuffled distributions were generated by randomizing phase values in time and recalculating the wave detection as in the true case. In all patients (except in one patient where no waves were detected in either case), wave rate was higher in the true data than in the shuffled distribution, indicating that our wave detection methodology detects genuine oscillatory phenomena ($t(8) = 6.74$, $p < 0.001$).

Figure S6



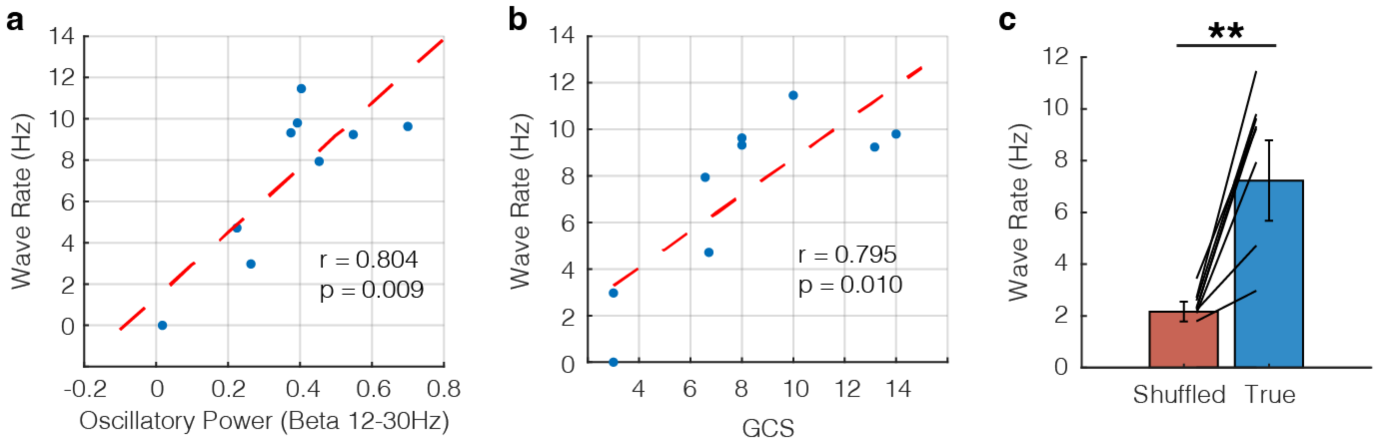
Replication of wave rate results with more conservative detection thresholds. a) Correlation between wave rate and GCS with wave detection threshold increased to 8 time points (31.25 ms, roughly equivalent to one cycle at 30Hz; $r = 0.671$, $p = 0.048$). Each dot represents the average values for one patient, and the red dashed line shows the line of best fit. b) Correlation between wave rate and GCS with wave detection threshold increased to $|Z| > 1.5$ ($r = 0.734$, $p = 0.024$).

Figure S7



Wave rate and GCS are not significantly correlated in patients implanted with depth electrodes via quad-lumen intracranial bolts. Each dot represents the average values for one patient, and the red dashed line shows the line of best fit (r = 0.500, p = 0.253). We infer that the lack of significant correlation is due to the difficulty in detecting traveling cortical waves along the course of depth electrodes that are inserted deep within the parenchyma.

Figure S8



Replication of wave rate results with phase gradient consistency. a) Correlation between wave rate and beta oscillatory power as detected with phase gradient consistency (r = 0.804, p = 0.009). Each dot represents the average values for one patient, and the red dashed line shows the line of best fit. b) Correlation between wave rate and GCS (r = 0.785, p = 0.010). c) Control analysis comparing true wave detection rate versus chance (as obtained by randomizing phase values in time). In all patients (except in one patient where no waves were detected in either case), wave rate was higher in the true data than in the shuffled distribution (t(8) = 4.94, p = 0.001).

Table S1

Patient	Age	Gender	Mechanism	Diagnosis	Surgery / Device	In Hospital Mortality
1	71	M	Found down	mICH	R frontal bolt, EVD	Yes Comfort care → Palliative Extubation Day 6
2	85	F	MVC	SDH	R craniotomy, subdural strip electrode	No Discharged POD15 GCS15
3	58	M	Fall	mICH	R frontal bolt	Yes Comfort care → Palliative extubation Day 5
4	30	M	GSW	mICH	Bifrontal craniectomy, EVD, subdural strip electrode	No Discharged POD34 GCS15
5	69	M	Fall	mICH	R craniotomy, Revision R craniotomy POD3 with strip electrode, bilateral MMA embolization	No Discharged POD12 GCS15
6	58	M	Found down	R SDH	R craniotomy, subdural strip electrode, L frontal bolt	No Discharged POD28 GCS15
7	30	M	Fall	L SDH / EDH	L craniotomy, R frontal bolt	No Discharged POD35 GCS15
8	68	M	Fall	mICH	R craniotomy, subdural strip electrode	No Discharged POD45 GCS14
9	59	M	Fall	L SDH	L craniotomy, subdural strip electrode	Yes Comfort care → Palliative extubation Day 2
10	65	M	MVC	mICH	L craniotomy, R frontal bolt, R frontal EVD	No Discharged hospital day 32 GCS14

11	33	F	MVC	mICH	R frontal bolt	No Discharged hospital day 27 GCS15
12	53	M	Fall	L SDH	L craniotomy, subdural strip electrode	Yes Comfort care POD2
13	28	M	GSW	mICH	R craniotomy, subdural strip electrode, later L frontal bolt	No Discharged POD37
14	33	M	GSW	mICH	L craniotomy, R frontal bolt	No Discharged POD48
15	74	F	Fall	L SDH	L craniotomy, subdural strip electrode	No Discharged POD6
16	27	F	MVC	L SDH / EDH	L skull fracture elevation, R frontal bolt	No Discharged POD15 GCS15

SDH - Subdural hematoma
EDH - Epidural hematoma
mICH - Multicompartmental intracranial hemorrhage
MVC - Motor vehicle collision
GSW - Gunshot wound
EVD - External ventricular drain