Supplementary Table 1

	All (N=17)	**Sham condition first (N=10)** Mean ±SD	**SWS Disruption first (N=7)** Mean ±SD	**p value**
Age (years)	54.1 ±6.7	52.7 ±6.9	55.9 ±6.4	0.348
Race white n(%)	11 (65%)	7 (70%)	4 (57%)	0.644
Sex female n(%)	11 (65%)	6 (60%)	5 (71%)	1.000
Education (years)	15.8 ±1.6	15.8 ±1.6	15.8 ± 1.7	0.965
MMSE	29.6 ±0.5	29.6 ±0.5	29.5 ±0.5	0.517
***APOE*-ε4 carrier n(%)**	5 (29%)	3 (30%)	2 (29%)	1.000
Delta power change [protocol – sham] $\mu V^2 \times s$	-22.9 ±17.5	-22.6 ±19.6	-23.2 ±15.5	0.944

Comparison of participants who had SWA disruption first, to the participants who had sham condition first, shows no significant differences in demographic characteristics or effectiveness of SWA disruption (delta power change).

Supplementary Table 2

	***APOE*- ε4 Non-carrier (N=12)** **Mean ±SD**	***APOE*- ε4 Carrier (N=5)** **Mean ±SD**	**p value**
Age (years)	53.5 ±6.7	55.4 ±7.3	0.619
Race white n(%)	7 (58%)	4 (80%)	0.600
Sex female n(%)	7 (58%)	4 (80%)	0.600
Sham Delta power ($\mu V^2 \times s$)	131 ±55	89 ±25	0.122
Total sleep time by actigraphy, 6 nights (minutes)	374 ±52 (N=10)	391 ±64	0.574
Sleep efficiency by actigraphy, 6 nights (%)	81.3 ±8.4 (N=10)	86.3 ±2.7	0.218
Sham Aβ42 (pg/mL)	974 ±153	1005 ±164	0.714
Sham Aβ42:Aβ40 ratio (%)	9.6 ±1.3%	9.7 ± 0.4%	0.921
Sham Tau (pg/mL)	198.3	219.8	0.513
Delta power change [protocol – sham] ($\mu V^2 \times s$)	-27 ±19	-13 ±7.6	0.141
Delta power change [protocol – sham] ≥ 20 $\mu V^2 \times s$, n(%)	8 (67%)	1 (20%)	0.131

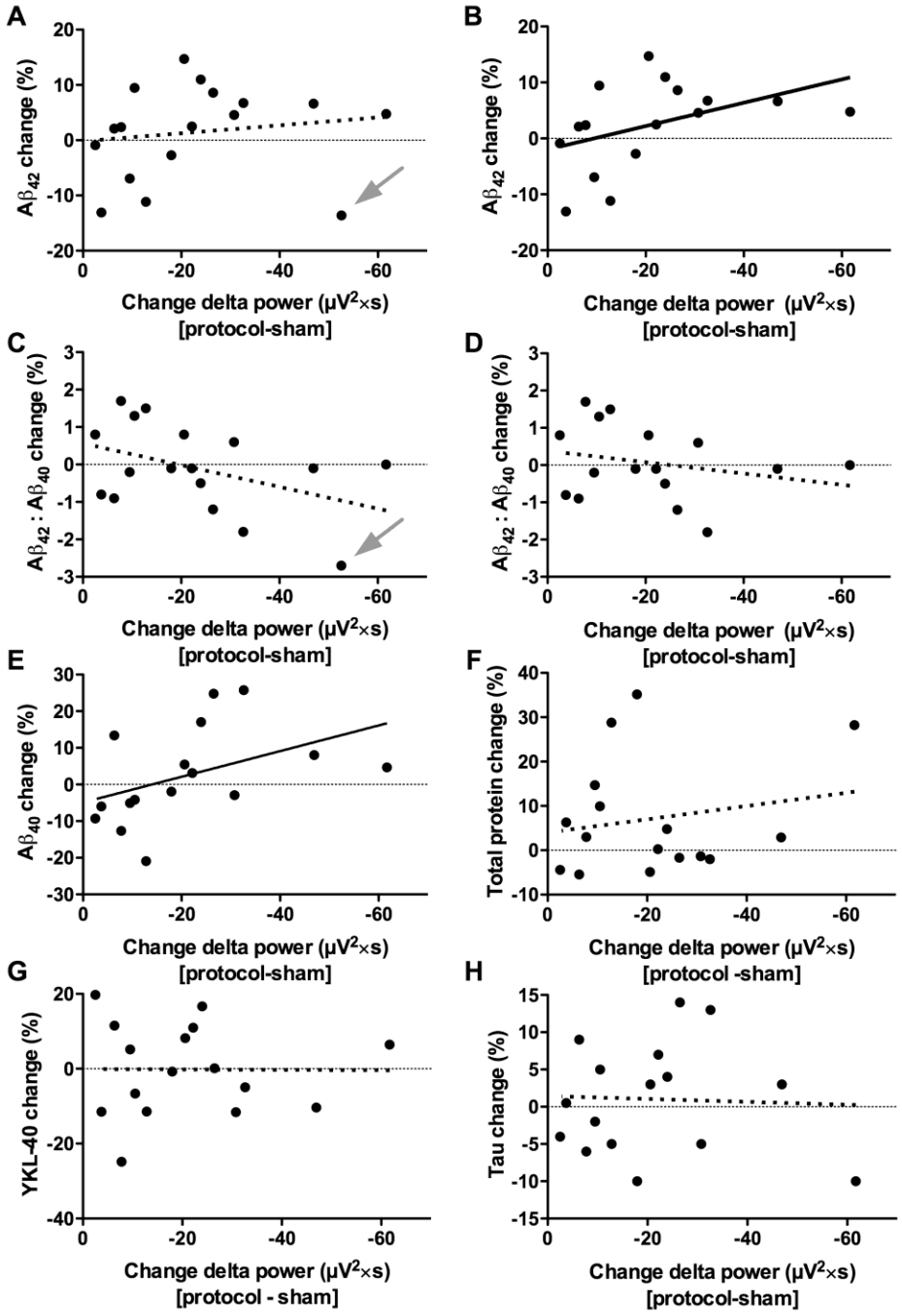
Comparison of participants who are *APOE*-ε4 Non-carriers and carriers show no significant differences in demographic characteristics, sleep, or response to SWA.

Supplementary Table 3

	Responders (N=9) **Mean ±SD**	**Non-responders (N=8)** **Mean ±SD**	**p value**
Age (years)	54.0 ±7.7	54.2 ±5.9	0.946
Race white n(%)	6 (67%)	5 (63%)	1.000
Sex female n(%)	7 (78%)	4 (50%)	0.335
***APOE*-ε4 carrier n(%)**	1 (11%)	4 (50%)	0.131
Sham Delta power ($\mu V^2 \times s$)	147 ±52	86 ±26	**0.009**
Total sleep time by actigraphy, 6 nights (minutes)	388 ±48 (N=7)	317 ±63	0.554
Sleep efficiency by actigraphy, 6 nights (%)	83.1 ±5.3 (N=7)	82.8 ±9.1	0.936
Sham Aβ42 (pg/mL)	973 ±147	995 ±147	0.784
Sham Aβ42:Aβ40 ratio (%)	9.5 ±1.3%	9.9 ± 0.9%	0.537
Sham Tau (pg/mL)	206.1	203.0	0.918

Individuals who had more than 20 $\mu V^2 \times s$ decrease in delta power with the SWA disruption protocol, or "Responders," are compared to individuals who did not.

Supplementary Figure 1: Effect of an outlier on CSF $A\beta_{42}$ and other CSF proteins



(A) When all 17 participants are included, suppression of slow wave activity, as measured by the change in delta power, was not significantly correlated with increased $A\beta_{42}$ (*r*=0.341, p=0.181).

However, there is a notable outlier (arrow), who has the lowest $A\beta_{42}$ (628 pg/mL), just above the cut-off of 608 pg/mL, indicating a high likelihood of having amyloid plaques. **(B)** Exclusion of the outlier with probable amyloid plaques demonstrates a strong significant correlation between SWA disruption and $A\beta_{42}$ (r=0.579, p=0.019). There was no significant correlation between SWA disruption and the change in $A\beta_{42}$:$A\beta_{40}$ ratio (expressed as a percentage) whether the outlier was (**C**) included (r=-0.238, p=0.374) or (**D**) excluded (r=-0.341, p=0.181). Exclusion of the outlier did not change the relationships between SWA disruption and **(E)** $A\beta_{40}$ (r=0.624, p=0.010), (**F**) total protein (r=0.041, p=0.880), (**G**) YKL-40 (r=-0.071, p=0.795), or (**H**) tau (r=0.106, p=0.696) shown in Figure 1.

Supplementary methods

Sleep and EEG spectral analysis

Polysomnograms were performed with standard electrodes and montage for sleep staging, including bilateral frontal, central, and occipital parasagittal electrodes referenced to opposite mastoid electrodes; bilateral electro-oculograms, bilateral chin electromyogram, and 2-lead electrocardiogram. EEG sampling rate was 200 Hz. Polysomnogram data were acquired using a MK3 TrackIt recorder (Lifelines Diagnostics, Troy, IL). All sleep staging was performed by a registered polysomnographic technologist according to standard criteria (Iber, 2007), using Polysmith (Nihon Kohden, Irvine, California). Additionally, the technologist and a sleep physician separately visually (manually) scored each 10-second mini-epoch of sleep for EEG artifact, and any mini-epochs containing artifact were excluded from analysis. Live SWA disruption was performed using custom Matlab (IBM) scripts as previously described (Ooms, 2017).

EEG spectral power was derived from the right and left frontal and central electrodes (F3, F4, C3, C4), referenced to the opposite mastoids. Data for each 10.24 seconds, with 0.24 seconds overlap between each pair of mini-epochs, were analyzed using Welch's method. The 2048 data points were divided into four equal sections with 50% overlap. A Hamming window was applied prior to the discrete Fourier Transform to calculate the spectral power for every 0.5 Hz bin from 0.5 to 32 Hz. Mini-epochs scored as artifact were excluded. Spectral power values were averaged for three mini-epochs for each 30-second epoch, then averaged for all NREM epochs. SWA was quantified as mean power in the delta (0.5-4 Hz) band, or "delta power," averaged over all NREM epochs. Spectral analysis was performed using custom scripts in Matlab (IBM).

Actigraphy

Actigraphy data were collected using Actiwatch2™ (Philips-Respironics, Murrysville, Pennsylvania) in 30-second epochs and manually scored using actigraph time stamps and sleep diaries (Ju *et al.*, 2013). Bedtime and Waketime were set as when the participant pushed a button on the actigraph indicating that they had lain down with the intention of going to sleep, and when they had gotten out of bed in the morning, respectively. If the button was not pushed, the sleep diary, which queried for the same intended bedtime and waketime, was used. A sensitive or "low" cut-off of 20 activity counts was used to detect sleep for each epoch between bedtime and waketime. Immobile time of 10 minutes was used to determine sleep onset and offset.