

**Appendix 1** to Regen W, Kyle S, Nissen C, et al. Objective sleep disturbances are associated with greater waking resting-state connectivity between the retrosplenial cortex/hippocampus and various nodes of the default mode network. *J Psychiatry Neurosci* 2016.

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### **Description of sleep-related questionnaires**

**Insomnia Severity Index (ISI):** The ISI is a 7-item, 5-point Likert scale that was designed both as a screening and treatment outcome measure of insomnia severity. Total scores range from 0 to 28 points and good validity has been demonstrated (Bastien et al., 2001).

**Pittsburgh Sleep Quality Index (PSQI):** The PSQI is a 19-item questionnaire measuring subjective sleep quality. There are seven component scores (overall sleep quality, sleep onset latency, sleep duration, sleep efficiency, sleep disturbance, sleep medication, daytime dysfunction) ranging from 0 to 3 resulting in a total score ranging from 0 to 21. Good validity has been demonstrated for good and poor sleepers (Buysse et al., 1989).

**Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS-16):** The DBAS-16 is the 16-item short version of the original 30-item DBAS. The scale measures sleep-related cognitions (e.g. unrealistic expectations about sleep, misconceptions about the causes of insomnia, or faulty beliefs about sleep-promoting practices) by requiring ratings of agreement/disagreement on a 100-mm visual analog scale. Good adequate psychometric properties have been shown (Morin et al., 2007).

**Glasgow Sleep Effort Scale (GSES):** The GSES is a 7-item, 3-point Likert scale measuring voluntary attempts to control sleep (termed 'sleep effort'). Good validity has been demonstrated in samples of patients with insomnia and good sleeper controls (Broomfield & Espie, 2005).

**Pre-Sleep Arousal Scale (PSAS):** The PSAS is a 16-item, 5-point Likert scale that assesses somatic (e.g. heart racing) and cognitive arousal (e.g. worries) at bedtime. Good validity has been demonstrated for populations of patients with insomnia and good sleeper controls (Nicassio et al., 1985).

**Epworth Sleepiness Scale (ESS):** The ESS is an 8-item, 4-point Likert scale that measures the habitual likelihood to fall asleep in common situations of daily living. Total scores range from 0 to 24. Good validity has primarily been shown for populations of sleep apnoea patients (e.g. Johns, 1993; Hardinge et al., 1995).

**Morningness-Eveningness Questionnaire (MEQ):** The MEQ is a 19-item mixed-format scale designed to measure the individual preference in the timing of sleep and daytime activities. Good validity has been demonstrated (Horne & Östberg, 1976).

**Stanford Sleepiness Scale (SSS):** The SSS is a single item measure (7-point Likert rating scale) of subjectively perceived sleepiness at a single point in time. Acceptable levels of validity have been shown for this questionnaire using sleep deprivation protocols and correlational analyses with task performance (Hoddes et al., 1973).

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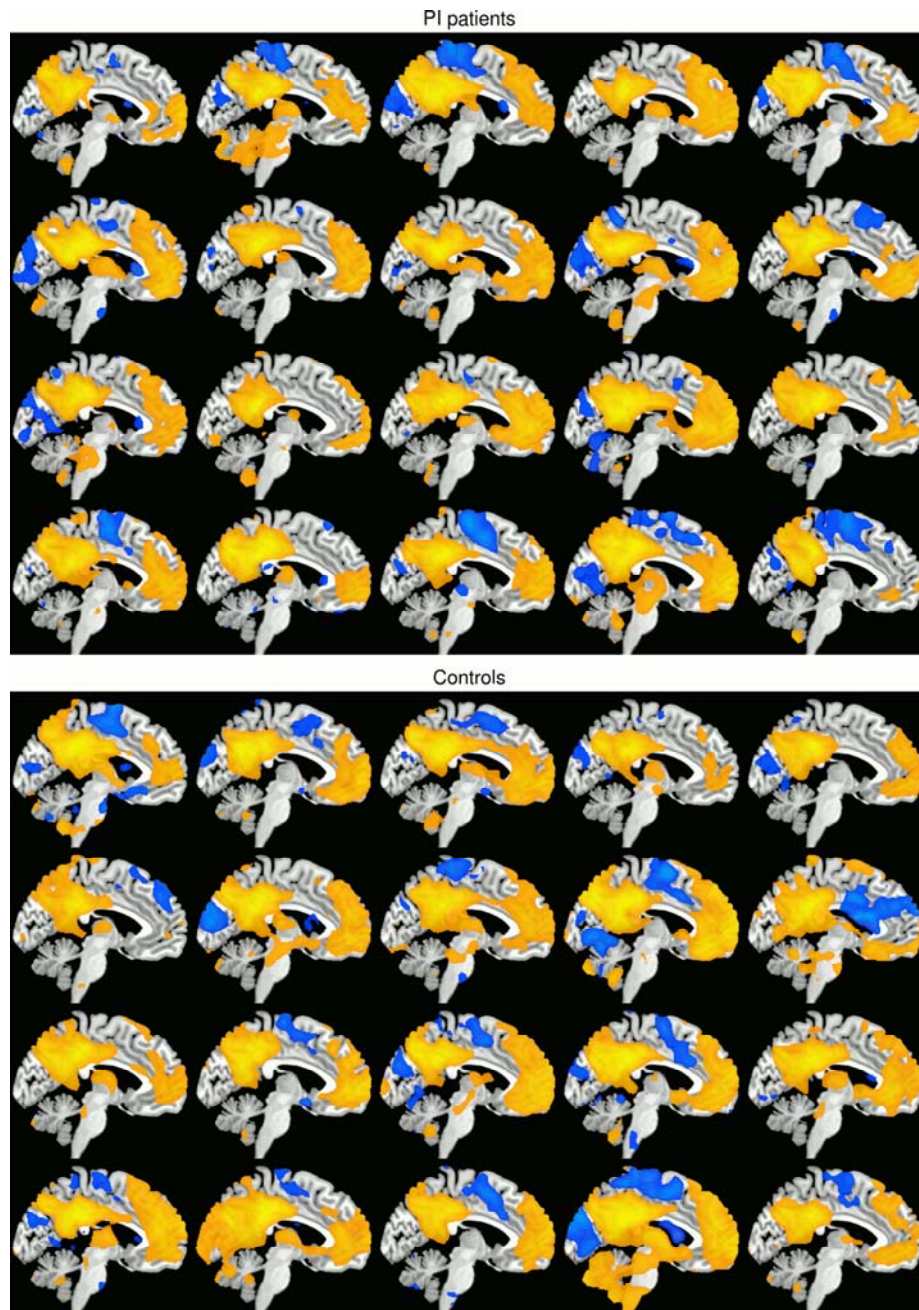
**Table S1:** Polysomnographic data (means  $\pm$  standard deviations) from the adaptation night. PI = Primary insomnia; TST = Total sleep time; PLMS = Periodic leg movements during sleep; SPT = Sleep period time.

Adaptation night	PI patients	Healthy controls	$t_{38}$	$p$ value
Total sleep time [min]	348.2 $\pm$ 78.7	397.9 $\pm$ 47.0	-2.38	0.023
Sleep efficiency [%]	72.7 $\pm$ 16.6	82.8 $\pm$ 9.7	-2.30	0.027
Sleep onset latency [min]	30.1 $\pm$ 23.9	16.2 $\pm$ 13.8	2.23	0.032
Wake after sleep onset [min]	97.0 $\pm$ 60.6	61.1 $\pm$ 39.0	2.19	0.035
Arousal index / TST [ $h^{-1}$ ]	18.4 $\pm$ 7.4	18.0 $\pm$ 7.5	0.20	0.846
Apnea-hypopnea index / TST [ $h^{-1}$ ]	0.3 $\pm$ 0.6	0.5 $\pm$ 0.7	-0.89	0.379
PLMS arousal index / TST [ $h^{-1}$ ]	0.6 $\pm$ 0.9	0.4 $\pm$ 0.8	0.60	0.553
Stage N1 [% SPT]	9.2 $\pm$ 3.3	10.7 $\pm$ 4.9	-1.19	0.242
Stage N1 [min]	40.7 $\pm$ 14.6	49.2 $\pm$ 22.6	-1.39	0.172
Stage N2 [% SPT]	49.8 $\pm$ 9.7	51.4 $\pm$ 9.6	-0.53	0.602
Stage N2 [min]	223.1 $\pm$ 50.0	236.8 $\pm$ 47.4	-0.88	0.387
Stage N3 [% SPT]	5.1 $\pm$ 5.8	7.4 $\pm$ 6.1	-1.21	0.233
Stage N3 [min]	22.8 $\pm$ 26.4	33.8 $\pm$ 28.0	-1.27	0.214
Stage R [% SPT]	13.6 $\pm$ 6.2	17.0 $\pm$ 4.0	-2.01	0.052
Stage R [min]	61.6 $\pm$ 29.4	78.2 $\pm$ 19.0	-2.08	0.045

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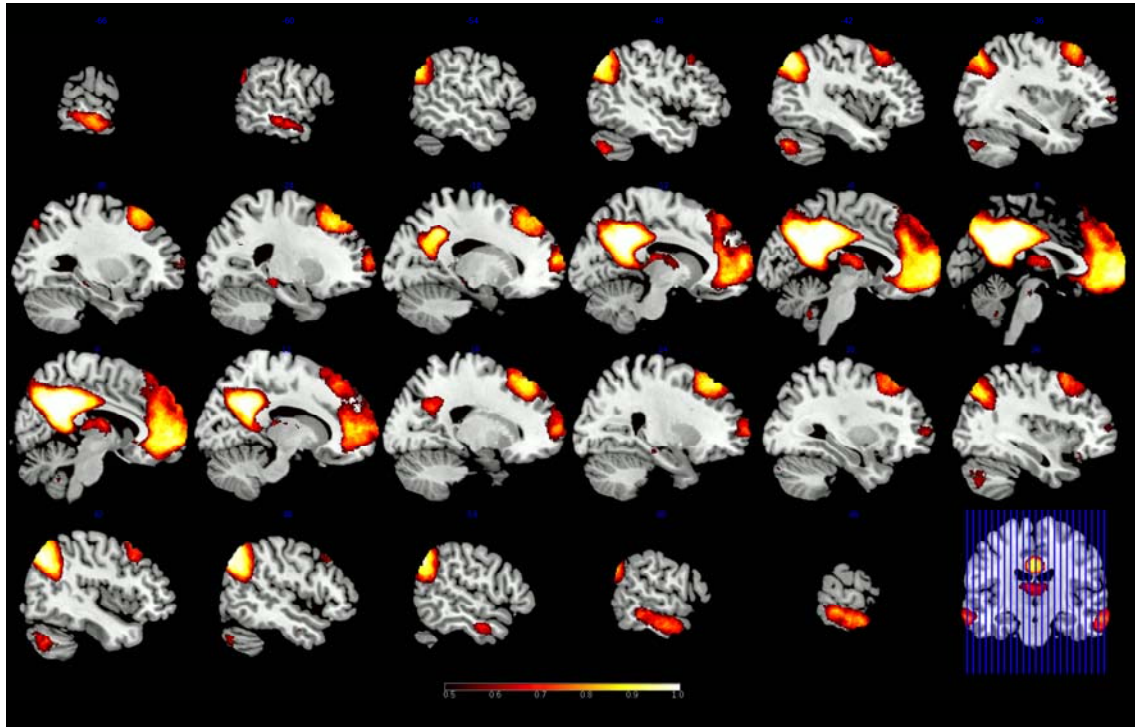


**Figure S1:** Sagittal view ( $x = -5$ ) of brain areas in each participant that were functionally connected with the PCC seed region with a correlation coefficient of  $>0.2$  (yellow colours) or  $<-0.2$  (blue colours). 1827x2602mm (72 x 72 DPI).

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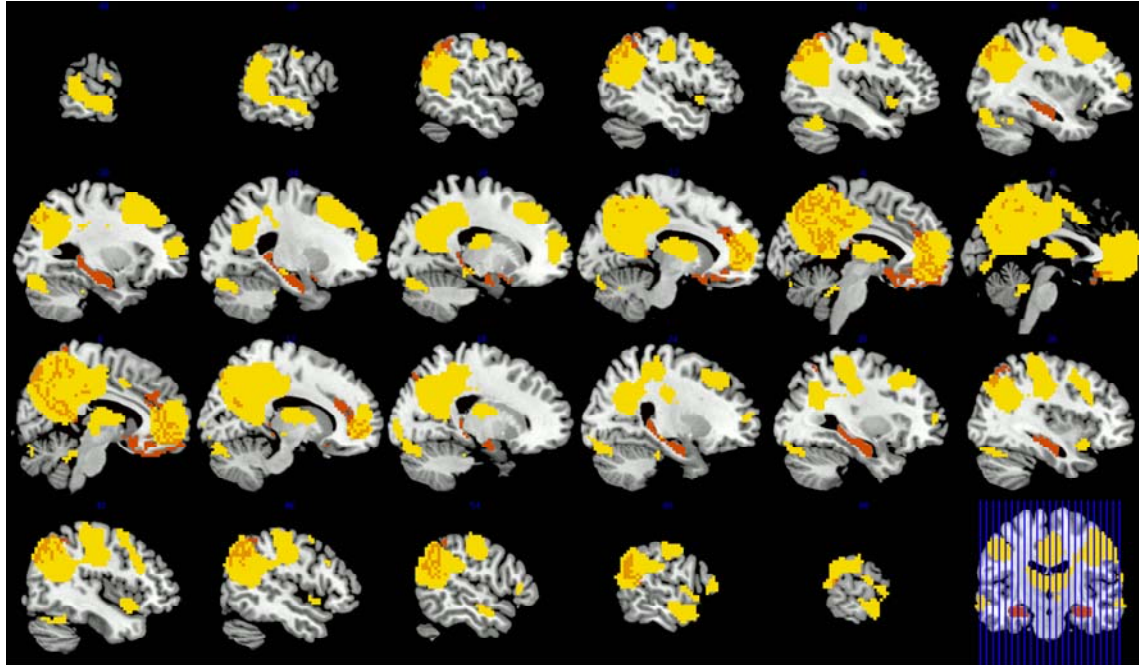


**Figure S2:** Spatial probability map showing for every voxel the proportion of individuals in which the voxel's activity is significantly correlated with the averaged time-series of the PCC (individual voxel threshold of  $p < 0.001$ ; group map thresholded at  $p = 50\%$ ). 2139x1370mm (72 x 72 DPI)

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**Figure S3:** Spatial distribution of the seven predefined ROIs (red), the DMN according to group ICA analysis (yellow; minimum cluster size of 351 mm<sup>3</sup>; voxel threshold of  $p < 0.005$ ), and the overlap between these two (orange). The proportion of voxels of the individual ROIs that were located within the group DMN map were: 100 % for the PCC, 88.8 % for the RSC, 86.3 % for the precuneus, 64.2 % for the ACC, 50.9 % for the IPC, 42.9 % for the vmPFC, and 1.9 % for the hippocampus.