

Appendix 1 to Kang J-M, Joo SW, Son Y-D. Low white matter integrity between the left thalamus and inferior frontal gyrus in patients with insomnia disorder *J Psychiatry Neurosci* 2018.

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Supplementary methods

Participant exclusion criteria

The exclusion criteria for both groups included the following: (i) suspected to have a present or previous major sleep disorder other than insomnia disorder, as determined by medical history or score on the screening scale; (ii) shift work or travel accompanied by frequent jet lag; (iii) classification as “high risk of sleep apnea” according to the Korean Berlin Sleep Questionnaire or moderate to severe diurnal sleepiness according to the Korean version of the Epworth Sleepiness Scale (ESS) based on a score ≥ 13 ; (iv) a body mass index (BMI) ≥ 30 ; (v) evidence of any sleep disorder except insomnia according to polysomnography (PSG) findings (e.g., Apnea–Hypopnea Index [AHI] ≥ 5 , Periodic Limb Movements in Sleep [PLMS] ≥ 15 , or rapid eye movement [REM] sleep without atonia); (vi) current or past diagnosis of other comorbid psychiatric disorders (except insomnia disorder) based on a clinical interview; (vii) evidence of either depression (Beck Depression Index [BDI] ≥ 16) or anxiety (Beck Anxiety Index [BAI] ≥ 19) at a moderate or high level based on the screening scale; (viii) history or presence of significant neurological or medical illnesses, such as cerebrovascular disease, Parkinson’s disease, or epilepsy; (ix) contraindications for 3T MRI, such as claustrophobia, metal implants, or pacemakers; (x) pregnancy, lactation, or plans to become pregnant during the study period; and (xi) structural brain abnormalities based on MRI.

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MRI acquisition

High-resolution transaxial T1-weighted structural images were acquired using 3D magnetization-prepared rapid gradient-echo (3D-MPRAGE) with the following parameters: repetition time = 1900 ms; echo time = 3.3 ms; inversion time (TI) = 900 ms; flip angle = 9°; matrix size = 208 × 256; number of slices = 160; pixel size = 0.5 × 0.5 mm²; thickness = 1

mm. dMRI images were acquired via an echo-planar imaging (EPI) dMRI sequence. Two sets of baseline (b=0) images and 30 diffusion gradient directions with a b-value of 900 s/mm² (a total of 62 images) were also acquired. The scan parameters for dMRI were as follows: matrix size = 128 × 128; pixel size = 1.8 × 1.8 mm²; thickness = 1.8 mm, TE = 78 ms, flip angle = 90°, and repetition time = 13100 ms.

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Table S1. Group differences in the diffusion measures of the tracts connecting the left thalamus and the left pars triangularis with controlling for age, sex, and BDI non-sleep score

Variables	Normal control (n=27)	Insomnia disorder (n=22)	Statistical tests†		
	Mean (SD)	Mean (SD)	F	df	p‡
FA	520.32 (29.00)	485.95 (43.76)	6.129	1,42	0.035
TR (10 ⁻³ mm ² /s)	2.09 (0.67)	2.10 (0.86)	0.001	1,38	0.972
AD (10 ⁻³ mm ² /s)	1174.59 (42.90)	1140.90 (47.29)	8.72	1,43	0.02
RD (10 ⁻³ mm ² /s)	458.58 (26.33)	481.20 (39.63)	1.157	1,41	0.384

SD = standard deviation; FA = fractional anisotropy; TR = trace; RD = radial diffusivity; AD = axial diffusivity

†Adjusted for age, sex, and BDI (non-sleep score); ANCOVA (analysis of covariance) was performed to reveal group differences in each diffusion measure.

‡False discovery rate (FDR)-adjusted p-value.

Diffusion measures 1.5*IQR (interquartile range) below Q1 (lower quartile) or above Q3 (upper quartile) were removed in all analyses.