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Effects of acute sleep loss on diurnal plasma dynamics of CNS health biomarkers in young men

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Study objective and summary result

This study examined whether acute sleep loss alters diurnal profiles of plasma-based Alzheimer disease-associated biomarkers. The result showed that sleep loss results in increased blood levels of total tau.

What is known and what this paper adds

Acute sleep loss is associated with increased levels of amyloid-β (Aβ) and total tau in the CSF. This investigation shows that increased total tau levels are also observable in the blood.

Participants and setting

The investigators recruited 15 healthy young men (mean age, 22.3 ± 0.5 years; mean body mass index value, 22.6 ± 0.5 kg/m^2) in 2012 and 2013. The experiments were conducted at the Uppsala University Biomedical Center (Uppsala, Sweden). The participants reported good sleep qualities, with typical sleep durations of 7–9 hours per night.

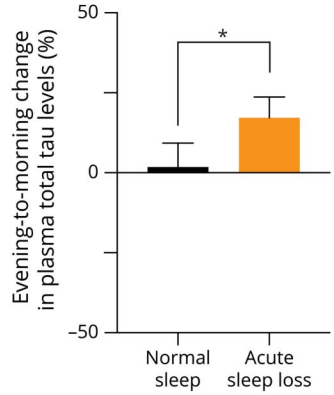
Design, size, and duration

The experiments were conducted according to a within-participant crossover protocol in which those staying overnight in the laboratory experienced a night of normal sleep or a night of continual wakefulness, with the 2 conditions being experienced in a randomized order. For each condition, fasting blood samples were collected the preceding evening and the following morning. Personnel who were blinded to clinical data and condition assignments used single-molecule arrays to quantify plasma levels of total tau, Aβ40, and Aβ42, and evening-to-morning changes in biomarker levels were calculated.

Primary outcome measures

The primary outcomes were comparisons of the normal sleep and sleep loss conditions in terms of evening-to-morning changes in biomarker levels.

Figure Evening-to-morning changes in plasma total tau levels under each condition



*$p < 0.05$.

Main results and the role of chance

Relative to the normal sleep condition, the sleep loss condition was associated with greater evening-to-morning increases in plasma total tau levels ($p = 0.035$).

Bias, confounding, and other reasons for caution

The present study had a small sample size.

Generalizability to other populations

The present study's focus on young men may limit the generalizability of the results to women, children, and older individuals.

Study funding/potential competing interests

This study was funded by the Swedish government, various Swedish foundations and scholarly societies, the European Research Council, and the Dementia Research Institute at University College London. Some authors report receiving consulting fees and committee appointments from various healthcare companies and cofounding Brain Biomarker Solutions. Go to Neurology.org/N for full disclosures.

A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The corresponding author(s) of the full-length article and the journal editors edited and approved the final version.

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