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Spontaneous brain rhythms predict sleep stability in the face of noise

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Abstract

Quality sleep is an essential part of health and well-being. Yet fractured sleep is disturbingly prevalent in our society, partly due to insults from a variety of noises [1]. Common experience suggests that this fragility of sleep is highly variable between people, but it is unclear what mechanisms drive these differences. Here we show that it is possible to predict an individual's ability to maintain sleep in the face of sound using spontaneous brain rhythms from electroencephalography (EEG). The sleep spindle is a thalamocortical rhythm manifested on the EEG as a brief 11-15 Hz oscillation and is thought to be capable of modulating the influence of external stimuli [2]. Its rate of occurrence, while variable across people, is stable across nights [3]. We found that individuals who generated more sleep spindles during a quiet night of sleep went on to exhibit higher tolerance for noise during a subsequent, noisy night of sleep. This result shows that the sleeping brain's spontaneous activity heralds individual resilience to disruptive stimuli. Our finding sets the stage for future studies that attempt to augment spindle production to enhance sleep continuity when confronted with noise.

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