

Publication

Age-related attenuation of the evening circadian arousal signal in humans.

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The human circadian pacemaker maintains timing and consolidation of sleep-wake behavior by opposing the build-up of homeostatic sleep pressure during the wake episode, particularly in the evening during the 'wake maintenance zone'. We tested whether age-related changes in sleep are a consequence of a weaker circadian arousal signal in the evening. Circadian rhythms and spectral components of the sleep EEG were investigated in 17 young (20-31 year) and 15 older (57-74 year) volunteers under constant posture conditions during a 40-h nap protocol (75/150 min sleep/wake schedule). Quantitative evidence for a weaker circadian arousal signal in aging arose from significantly more sleep occurring during the wake maintenance zone and higher subjective sleepiness ratings in the late afternoon and evening in the older group. In addition, we found a diminished melatonin secretion and a reduced circadian modulation of REM sleep together with less pronounced day-night differences in the lower alpha and spindle range of sleep EEG activity in the older group. Thus, our data indicate that age-related changes in sleep propensity are clearly related to a reduced circadian signal opposing the homeostatic drive for sleep.

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