Roles of the reward system in sleep, dreaming and the consolidation of emotional memories

ABSTRACT:

Objectives
We previously suggested that abnormal sleep behaviors, as found in parasomnias, may relate to an increased activity of the dopaminergic-reward system during sleep. Because nightmares and sleepwalking predominate during REM and NREM sleep respectively, here we tested whether exploratory excitability, a waking personality trait reflecting high activity within the mesolimbic dopaminergic system, is associated with changes in REM and NREM sleep in these two sleep disorders.

Methods
24 unmedicated patients with parasomnia (12 with idiopathic nightmares, 12 sleepwalkers) were studied. Each patient spent one night of sleep monitored by polysomnography. The Temperament and Character Inventory (TCI) was administered to all patients and healthy controls from the Geneva population (n = 293).

Results
Sleepwalkers were more anxious than patients with idiopathic nightmares (Spielberger Trait anxiety/STAI-T), but the patient groups did not differ on any personality dimension as estimated by the TCI. Compared to controls, all parasomnia patients scored higher on the Novelty Seeking (NS) TCI scale and in particular on the exploratory excitability/curiosity (NS1) subscale, and lower on the Self-directedness (SD) TCI scale, suggesting a general increase in reward sensitivity and impulsivity. Moreover, exploratory excitability (NS1) correlated with the severity of parasomnia, and time spent in REM sleep in patients with nightmares.

Conclusions
These results support the hypothesis that reward networks are activated during human sleep. By showing that patients with parasomnia share common waking personality traits associated to reward-related brain functions, these findings may inspire targeted therapeutic strategies.

Keywords
Sleep, Dreaming, Reward, Dopamine, Parasomnia

Published Work:

Perogamvros, L., Aberg, K., Gex-Fabry, M., Perrig, S., Cloninger, C. R., & Schwartz, S. (2015). Increased reward-related behaviors during sleep and wakefulness in sleepwalking and idiopathic nightmares. *PLoS ONE 10*(8): e0134504. doi: 10.1371/journal.pone.0134504

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