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# Brain activity differentiates subjects with high and low dream recall frequencies during both sleep and wakefulness : ERPs and PET studies

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## Abstract

Dreaming is still a mystery of human cognition. In the fifties, dreaming was associated with rapid eye movement (REM) sleep (Dement & Kleitman 1957; Sastre & Jouvet 1979) but this hypothesis which cannot explain all the characteristics of dream reports has been challenged (Solms 1997; Nir & Tononi 2010). We used event-related potentials (ERPs) and positron emission tomography (PET) during wakefulness and sleep, to measure brain activity in subjects who report dreams frequently (Dreamers, D) versus rarely (Non-Dreamers, ND). During ERPs data acquisition, participants (18 D and 18 ND) passively listened to sounds while they were either watching a silent movie or sleeping at night. PET data were acquired in the afternoon while participants (21 D and 20 ND) were resting (wakefulness) or sleeping (N2, N3 and REM sleep). ERPs results revealed that the primary steps of auditory processing (N1 and MMN) match in Dreamers and Non-Dreamers. However, latter responses, reflecting higher cognitive processing, dramatically differ in the two groups during pre-sleep wakefulness and during sleep. In the PET study, D vs ND contrast showed rCBF increases in TPJ during REM sleep, N3, and wakefulness, and in MPFC during REM sleep and wakefulness. This study reveals for the first time functional neuroanatomical correlates of the ability to recall dreams in healthy subjects and argue in favor of the forebrain "dream-on" hypothesis (Solms 2000). Results of the two studies support the hypothesis that high/low dream recall frequency is associated with particular cerebral functional organisation independent of the state of vigilance

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