Effects of an Artificial Smoke on Arousals During Human Sleep

Abstract:
The central processing of olfactory stimuli is different compared to other sensory systems, as they are not followed by arousals at least with regard to pure olfactory substances such as hydrogen sulfite. It is still unclear, however, whether a stimulus with a higher significance to the sleeper increases arousal frequency. Fifteen healthy volunteers participated in this controlled trial. Intranasal chemosensory stimulation was performed during sleep with an olfactometer. Artificial smoke was selected as an olfactory stimulus with high significance for different stimulus durations (1, 5, and 20 s), and carbon dioxide (CO2) was used in a concentration of 40 % v/v for isolated trigeminal stimulation as an internal control. Arousal reactions in relation to chemosensory stimulation during sleep were assessed with the help of overnight sleep recordings during 30 nights of testing. Stimulation with an artificial smoke did not increase arousal frequency. In contrast, stimulation with CO2 leads to an increase in arousal frequency. Even for the longest stimulus duration of artificial smoke, a statistically significant increase in arousal frequency could not be detected. Even a strong and significant olfactory stimulus such as artificial smoke does not elicit arousals during human sleep. Overall, the results confirm the unique role of the olfactory system in sensory physiology.