Brain patterns observed during sleep among participants of the Transcendental Meditation and TM-Sidhi program indicate a more mature style of cerebral functioning that has been associated with clarity of thinking and an enhanced order-creating capacity of the brain.—EDITORS

Previous research into the sleep patterns of human newborns of different gestational age has revealed that in the course of ontogenesis the randomly occurring, isolated, low frequency REMs (rapid eye movements) of the undifferentiated sleep of the premature are gradually ordered in groups of REMs or high frequency REMs, characteristic of mature REM sleep (Petre-Quadens, 1967, 1969, 1978, 1980; Petre-Quadens & De Lee, 1974; Petre-Quadens, De Lee, & Remy, 1971). This observation has led to the hypothesis that there exist two functionally different types of REMs in REM sleep: the high frequency (HF) REMs with an interval of less than one second, reflecting the 'maturity' or 'order' of brain functioning; and the low frequency (LF) REMs with an interval of more than one second, reflecting 'random noise' in the brain.

Subsequent research has supported this hypothesis. Two types of REMs, with an interval \(I < 1\) sec and \(I \geq 2\) sec, were found to be statistically independent of each other (De Lee & Goffe, 1973). Moreover, these HF-REMs (\(I < 1\) sec) were associated with cerebral maturation (age, intelligence, learning ability), while the LF-REMs (\(I \geq 2\) sec) were not (Petre-Quadens, 1969, 1978).

Because the amount of HF-REMs during REM sleep was also related to the amount of information given to the subject, Petre-Quadens (1980) proposed to consider these HF-REMs in relation to the LF-REMs in a HF/LF ratio, in order to obtain a measure for the cerebral capacity to structure 'order' from the 'noisy stream' of information. The information could be primarily internal (e.g., hormonal and metabolic substances) as well as external (e.g., a new computer language) (Chevalier, 1982).

The research findings of Petre-Quadens and co-workers are in accordance with this suggestion (Hoffmann, Vanderbeke, De Cock, & Petre-Quadens, 1976; Petre-Quadens, 1980; Quadens & Green, 1984). In order to test this REM ratio further, and to clarify the mechanisms of this order-creating function during REM sleep, we examined the REM sleep of experienced practitioners of the Transcendental Meditation (TM) and TM-Sidhi techniques. Previous research on the TM and TM-Sidhi programme has given indications that the regular practice of the TM and TM-Sidhi techniques increases the order in brain functioning, as expressed by increased EEG synchrony (Hebert & Lehmann, 1977) and EEG coherence (Dillbeck & Bronson, 1981) and by improved central processing of auditory information (McEvoy, Frumkin, & Harkins, 1980). Psychological research has found that the TM and TM-Sidhi programme improved the cognitive and affective functioning in children and adults as well (Aron, Orme-Johnson, & Brubaker, 1981; Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Gelderloos, 1987; Warner, 1986). TM practitioners also needed less compensatory REM sleep time after 40 hours of sleep deprivation than controls (Miskiman, 1977).

Six subjects practising the TM programme for a mean of 139 months and the TM-Sidhi programme for a mean of 87 months were compared to six control subjects. Each subject was measured at home for two consecutive nights,
using an ambulant 4-channel recorder, the Medilog 4-24 of the Oxford Medical Systems. Electrode placement was as follows: EEG electrodes approximately on C4-P4 and C3-P3, EOG electrodes above the left and below the right lateral corner of the eye, two EMG electrodes below the chin, and two reference electrodes on the forehead.

Advanced TM-Sidhi practitioners and controls were examined on the different REM sleep parameters. The ratio of the HF-REMs (1 < 1 sec) to the LF-REMs (1 ≥ 2 sec), used as a measure for the order-creating capacity of the brain, was significantly higher in the group of TM-Sidhi practitioners (p < .002). This higher ratio was effected by a much higher density of the HF-REMs, used as a measure for the intensity of the information-ordering process (p < .001). The density of all the REMs, regardless of their frequency, used as a measure for the intensity of the stimulation of the brain, was also significantly higher in the TM-Sidhi group (p < .001). The REM sleep time and the total sleep time, used as a measure for the efficiency of the REM sleep and the total sleep, were both significantly shorter in the TM-Sidhi group (p < .002 and p < .004, respectively).

A qualitative observation revealed a larger amplitude and a greater differentiation of the individual REMs in the experimental group. Generally, a larger ratio of HF-REMs to LF-REMs accompanied a larger amount, a larger amplitude, and a lower frequency of alpha activity and sleep spindles (12–14 Hz). Especially during prolonged transition stages between normal waking and sleeping in two experimental subjects, the almost continuous, high amplitude alpha activity and rhythmical eye movements were very similar to Transcendental Meditation in these same subjects. They reported that the degree to which the meditative state of restful alertness was experienced at the beginning of sleep determined how ‘pleasing’ and ‘refreshing’ the sleep continued to be.

To conclude, all the results of the present study (in agreement with previous sleep research) show greater neurophysiological order in the TM-Sidhi group, adding further support to the main hypothesis that the HF-REMs/LF-REMs ratio is a measure of the cerebral capacity to structure ‘order’ out of ‘noise’. The fact that the experimental values on this REM ratio were far higher than the values reported in the literature could be interpreted as indicating the onset of a new dimension of consciousness: a continuum of restful alertness, serving as a background of order, extending to the night’s sleep.

REFERENCES


