movements were predominant in the lower limbs at this CA [Dreyfus-Brisac, 1970].

We could not detect a direct association between SPR and some vegetative phenomena such as variations of cardiac rate and apnea, nor with feeding. The apneas during periodic respiration are a physiological phenomenon of this age; they do not seem to generate sensory afferents able to evoke SPR, neither when breathing stops, nor when it restarts. Nor does feeding produce such significant afferents.

References


Author’s address: Dr. L. Curzi-Dascalova, Centre de Recherches Biologiques Neonatales, 123, Boulevard Port-Royal, F-75 014 Paris (France)


First Cycle of Sleep in Normal Children

F. Leygonie and L. Garma1

Laboratoire de Physiologie, CHU, Pitié-Salpêtrière, Paris

Ten normal children aged 5-11 years have been recorded throughout two successive nights. They were already familiar with the laboratory

1 With technical collaboration of Mrs. Bouard.
environment since nearly all of them were children of researchers. We recorded simultaneously EEG, EMG, EOG, EKG and respiratory rhythm. The data so obtained were compared with those of young adults recorded under the same conditions. In addition, psychological tests were given to the children.

The difficulties met in classifying certain stages in the child have lead us to retain very strict criteria to score the rapid eye movement (REM) period: sequences involving the association of stage 1 on the EEG (that which excludes all spindles), suppression of muscular tone and presence of REM. We did not include three recordings in which the EMG was not sufficiently good.

Results

As for percent time of each sleep stage our data agree with the results of Roffwarg et al. [1964] and of Feinberg [1968]. We found, in the second night of recording, the percentage of deep sleep (stages 3 and 4) to be higher in our children (30%) than in the young adults (21.8 %). Paradoxical sleep covers 21.6% in the children, a value which is identical to that found in the young adult (it is slightly higher in the youngest, reaching 26%). Finally, the latency for the appearance of stage 4, from the start of the first stage 2 is very short in children (13 ± 5 min).

In the present investigations we focused our interest more specifically on the features of the first cycle of the night.

Latencies of the First REM Period

Three categories of latencies can be distinguished: short ones (4983 min, mean 65 min) recorded in 8 nights; long ones (115-145 min, mean 126 min) recorded in 7 nights; very long (183 and 245 min). These categories do not depend on either age or first-night effect.

True REM Period and Partial REM Period

In all cases where the latency of the first (true) REM period is long or very long (9 nights) 42-80 min (mean 61 min) after the start of stage 2, i.e. at the moment where one normally could anticipate the appearance
of a true REM period, a partial REM period appears, i.e. a REM period which lacks one of the third major criteria of paradoxical sleep. Three types of partial REM periods can be distinguished.

First type. Absence of cortical desynchronization. The sleep becomes lighter but does not pass over stage 3 or 2 into stage 1. However, suppression of muscular tone, cardio-respiratory irregularities and some isolated REM are present. This type is most frequent (8 of 13 partial REM periods).

Second type. Absence of muscular atonia although there were twitches, a stage 1 with saw-tooth waves and some REM. This form was observed only in the youngest child.

Third type. Absence of REM, but the EEG exhibits stage 1, there is suppressed muscle tone with twitching and there are cardio-respiratory irregularities (3 times).

The partial REM period is noticed in the first cycle and sometimes twice in the first cycle, i.e. when the REM period latency is very long. It was observed twice in the second cycle in children aged 5-8 years who have a short first REM period latency. It has never been observed beyond the second cycle.

Pattern of Entry into REM Period

The criterion which is lacking in the partial REM periods is also that which occurs last at the time of the following true REM period. In fact, it is a general feature in the child that the criteria of REM sleep do not appear within a few seconds as they do in the adult but rather over a period of a few minutes. The element to appear last is always the same for a given child.

Atypical Stages

In 4 of the 8 first sleep cycles with short first REM period latency we observed an atypical stage, i.e. EEG slow-wave sleep attended by very weak or completely suppressed muscular tone, presence of isolated REM, cardio-respiratory irregularities and muscular twitches. Such atypical stages occur in the first cycle on the average 39 min after the start of stage 2. They are not, however, characteristic of this cycle as they are also found throughout the night, especially in the periods immediately preceding or following the REM periods.
Discussion

In the children, about 1 h after the start of stage 2 there appeared either a complete or a partial REM period. The existence of the partial REM period explains the apparently contradictory results concerning the first REM period latencies for children of this age: 1 h according to Ross et al. [1968], 3 to 4 h according to Roffwarg et al. [1964]. However, Roffwarg mentioned a 'missed' first REM period with an EEG stage 2 in children aged 4-5 years. Evidently this is the type of partial REM period that we have met with most often in our children.

The criterion absent in the partial REM period is the last to appear in the genuine REM period. The development of the paradoxical sleep signs extends over a long period in the child; the REM period builds up slowly and is not terminated abruptly, as in the adult. There is an asynchronism between the different factors coming into play in paradoxical sleep. This asynchronism gradually attenuates with maturation.

The presence of atypical stages has already been mentioned by Jacobson et al. [1964] and Petre-Quadens [1969] in the normal child and, especially, the oligophrenic child, by Lairy et al. [1968] in mental patients, and by Schwartz [1968] in certain cases of diurnal hypersomnolence.

The atypical stage 4 that we have noted during the first cycle in half the children with a short first REM period latency cannot be considered as a substitute for REM period because the latter occurs with a normal latency, as the interval between the end of the atypical stage and the REM period is sufficiently short (5-30 min). It could be interpreted rather as a more or less long preparatory state for paradoxical sleep.

In short, the first cycle of sleep of the children aged 5-11 years is characterized by (1) a rapid passing from the classic stage 2 to the classic stage 4, and (2) by the occurrence of either a genuine REM period (mean latency 65 min) or a partial REM period (mean latency 61 min). This latter pattern is rarely observed in the second cycle and not later in the night.

References


Free Communications: E. Phenomenology of Sleep in Man 376
Analysis of the Ocular Movements during the Onset of Sleep

V. Gabersek and H. Ghiloni

Research Laboratory of Neurophysiology, INSERM, Paris

There have been many investigations of ocular movements (OM) during the REM phase of sleep, whereas ocular motor activity during the onset of sleep has rarely been studied. Aserinski and Kleitman [1] noted the lack of vertical movements during the onset of sleep phase in contrast to the REM phase, during which the movements are vertical and horizontal. Kuhlo and Lehmann [4] described combined, slow horizontal OM. These movements appeared with a modification of the EEG (decrease of frequency and amplitude) and disappeared with a return of a-rhythm or with deepening of sleep (appearance of spindles). We report here the results of our recent re-investigation of this problem.