THE SLEEP/WAKE AND CIRCADIAN ASPECTS OF MOOD IN HEALTHY SUBJECTS

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INTRODUCTION

In psychiatry speculations are made on the relation between circadian rhythms and mood. Depressive patients show symptoms like diurnal variation of mood and disorders of sleep, while manipulations of the sleep/wake cycle (like total sleep deprivation) can have anti-depressive effects. These observations suggest that both sleep need related and circadian factors may be involved in the dysregulation of mood in depression. Recently, the technique of forced desynchronization has been demonstrated to represent a powerful means to disentangle both aspects. (Dijk et al, 1992; Johnson et al, 1992).

The purpose of the present study is to obtain more information on the sleep/wake and circadian aspects of mood. In three groups of healthy subjects the level of activity was manipulated in a forced desynchrony protocol.

METHODS

In this study thirty-four healthy male subjects (age 22.8 ± 1.3 years, range 20-25) spent almost six days and nights in an isolation unit. Each of them was scheduled to an artificial light-dark cycle of a period of 20 hours, 13.5 hours of dim light (<10 lux) and 6.5 hours of darkness, in which the subjects had to be in bed. All daily activities were scheduled in such a way that all subjective days had exactly the same temporal structure. The imposed period of 20 hours is so much shorter than the intrinsic period of the circadian pacemaker that the pacemaker will free-run with a period close to 24 hours. (Klerman et al, 1996) During five 24-h days the subjects experienced six 20-h days. Thus waking and sleeping hours successively shifted through the various phases of the biological clock. (fig 1)

Changes in mood were measured using a Visual Analogue Scale and Von Zerssen’s Adjective Mood Scale (AMS). Subjects had to fill out these rating scales every two hours during the waking period. Mood data were obtained from all thirty-four subjects. Data are analysed according to clock time and to elapsed time from lights-on on the 20-h day. Data are z-transformed for each subject.
The subjects were divided into three different groups:
1. 12 subjects; no physical activity apart from the normal daily routine.
2. 11 subjects; high physical activity including six half hour episodes per subjective day in which the subjects cycle on a cycle-trainer at 70% VO₂max.
3. 11 subjects; low physical activity including six half hour episodes per subjective day in which the subjects cycle on a cycle-trainer with minimal effort.
RESULTS

Fig 2A shows the sleep/wake related variation of the z-transformed AMS data of the three groups. The lines connect the mean values of the groups. The absolute mean values of the three groups are not significantly different. After waking up mood improves and then mood deteriorates during wakefulness.

Fig 2B demonstrates the clock related variation of the three groups. The three groups have the worst mood at the minimum of the body temperature cycle (phase 0) and the best mood at the maximum. The clock related variation of mood for the three groups is very similar despite the different levels of activity. The same holds for the sleep/wake related variation.

Fig 3A shows the sleep/wake related variation of the z-transformed VAS data (elation) of the three groups. The lines connect the mean values of the three groups. The absolute mean values of the three groups are not significantly different.

Fig 3B demonstrates the clock related variation. The clock related variation of elation is nearly the same for the three groups. The same holds for the sleep/wake related variation.

The variation in VAS data is comparable to the variation in the AMS data.
CONCLUSION

We found considerable mood variation in all thirty-four subjects. The AMS and VAS data show a significant clock related variation (P<0.05) with the worst mood at the minimum of the body temperature cycle and the best mood at the maximum. The data also varied significantly with elapsed time since lights-on (P<0.05). First mood improves probably due to the waking up process and than gradually deteriorates during the waking day.

Both the sleep/wake cycle and the circadian pacemaker contribute to the variation of mood in healthy subjects. The manipulation of the level of activity has no major influence on the variation in mood.

REFERENCES