

Editorial

## Chronic insufficient sleep and its recovery

The Janjua et al. paper in this issue presents a clinical case of chronic insufficient sleep associated with an irregular sleep schedule that was erroneously diagnosed by standard NPSG and MSLT testing as narcolepsy [1]. The case is highly informative and its presentation well documented, with the evidence showing a previous irregular and insufficient sleep schedule by sleep diary. Then a 4-day period of ad libitum nocturnal sleep in the laboratory initially showed a recovery sleep of 14 h that subsequently dropped to 10 h sleep on nights 3 and 4. Initially, the MSLT showed excessive sleepiness (mean sleep latency of 3.4 min) and two SOREMPs that then normalized with the increased nocturnal sleep time.

The paper highlights a number of important points, the first being that chronic insufficient sleep must be considered in the differential diagnosis of any case presenting with excessive daytime sleepiness. The original 1983 case series description of chronic insufficient sleep noted that approximately 50% of the patients had been previously prescribed stimulants and in some cases received a formal diagnosis of narcolepsy [2]. Unlike the comparison group of narcoleptics in the 1983 study, the chronic insufficient sleepers reported 2 h or more sleep time on weekends vs. weekdays, had a laboratory sleep efficiency of 93% vs. the narcoleptics' 83% efficiency, and slept 2 h more in the laboratory than they reported sleeping on weekdays at home. Unlike the current case, the chronic insufficient sleepers of the 1983 study did not show multiple SOREMPs, a difference that may be attributed to any number of factors including the irregular sleep schedule in the Janjua et al. case. In the 1983 case series, an irregular sleep schedule had been ruled out by sleep diary.

Multiple SOREMPs in this patient is an interesting finding that raises some important questions about the specificity of this sign for narcolepsy. We do not have adequate data regarding the false positive rate of multiple SOREMPs in non-narcoleptic populations. Very specifically, what is the false positive rate in healthy normal sleepers, people with an irregular sleep-wake schedule, people with chronic insufficient sleep, people with sleep disorders that disrupt and fragment sleep? This case reminds us that we do not know the answers to these questions.

Another critical point made in this case is that recovery from chronic insufficient sleep may require multiple nights

of recovery sleep before a normalization of the MSLT can be observed. Several studies of sleepy healthy normals have shown that 1–2 weeks of a 10-h enforced bedtime is necessary to normalize the MSLT. In one study an average daily sleep latency of about 5 min increased to about 10 min after 6 nights of 10 h bedtime [3]. In a second study an average daily 6-min sleep latency increased to 12 min over a 14-night sleep extension (10 h nightly) [4]. In both studies on the first extended night sleep efficiency was 93% which then declined to 87% over the 6–14 nights of sleep extension. In another study healthy normal young adults were placed on 14-h enforced bedtime for 30 days [5]. Initially, these subjects slept 10 h, but their nightly sleep time declined reaching 8.2 h by week 4. The increased sleep time was associated with improved self-rated daytime alertness.

All of the above studies of sleep recovery used a fixed time-in-bed rather than an ad libitum time-in-bed. Many individuals spontaneously awaken in the morning due to circadian alerting signals, even though they have not completely reversed their sleep debt. If forced to remain in bed, they return to sleep and recover additional sleep. Those factors motivating individuals to get out of bed in response to the circadian signal, before their biological sleep need is met, will also motivate that individual to get up before a complete sleep recovery has occurred.

Of note in this case is the patient's sleep time on the fourth night of the ad libitum schedule (i.e. 10 h) associated with the increased MSLT. The apparently stable sleep time and the increased MSLT score may erroneously suggest that 10 h is this patient's biological sleep requirement. However, we cannot know what this patient's biological sleep need truly is. Clearly, it is less than 10 h as the patient is showing sleep recovery as seen by the increasing MSLT. It is important to note that in the Wehr et al. study cited above, sleep time did not reach a final stable level of 8.2 h until the second week of the enforced 14 h time-in-bed [5]. At 10 h this patient may still be recovering lost sleep.

Finally, the paper discusses the optimal approach to assuring that an irregular and insufficient sleep schedule is not the cause of excessive sleepiness and multiple SOREMPs on a MSLT. A sleep diary is advocated to indicate the patient's habitual sleep time and the likelihood of sleep insufficiency prior to testing. It should be noted addi-

tionally that the diary provides information regarding the regularity of the sleep schedule and guidance in setting the laboratory NPSG and MSLT testing schedule. Ad libitum sleep on the initial laboratory testing night is then advocated. However, a spontaneous awakening after one night, as this case clearly indicates, is not indicative of the complete discharge of a prior sleep debt. When chronic insufficient sleep is suspected, rather than ad libitum sleep on the first laboratory test night, an enforced and extended bedtime (i.e. 9 or 10 h), that shows a high sleep efficiency (i.e. > 90%), no primary sleep disorders, and excessive sleepiness on the MSLT the following day, is strongly suggestive of a prior sleep debt and chronic insufficient sleep. Additional laboratory time and expense is not necessary to confirm this presumptive diagnosis. Documented adherence to an enforced and extended bedtime at home with alleviation of the patient complaint confirms the diagnosis. Only without alleviation of the complaint is further diagnostic and laboratory testing then required.

## References

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