REM sleep very important to people's learning process

By LEAH WINTER

Going to sleep later than usual is just as bad as not going to sleep at all, if you're trying to learn and apply complex new information, say Trent University researchers.

Psychologist Carlyle Smith and his colleagues have found that people who lose 'rapid eye movement' (REM) sleep cannot apply complex new information as well as those who get all their REM sleep. They also found that learning is impaired if REM sleep is lost at certain critical times for up to a week afterwards.

The REM phase, the period of sleep during which most dreaming occurs, is characterized by quickened eye movements and changes in the sleeper's blood pressure, respiration and pulse rate. REM periods alternate with non-REM periods in approximately 90-minute cycles that recur about five times during a regular night's sleep.

Smith says the first non-REM phase is very deep and long; it's probably the time during which the body recovers from its fatigue and the brain recharges. This is followed by a short REM period of 5 to 10 minutes. As sleep continues the REM periods get longer. During the final cycle, the REM period lasts about 50 minutes. In a normal night's sleep, the total REM time is 90 to 120 minutes.

Smith's studies initially looked at the influence of REM sleep on the learning of two different tasks. The first was a simple word-memorization task. The second, more complex, task was to learn and apply rules to complete and solve a problem.

Smith taught the two tasks to 20 college students and then divided the students into four groups. That night, one group slept all night undisturbed, one stayed awake all night, one was awakened each time a REM period started, and one was awakened just after a REM period finished and the non-REM period began.

A week later, Smith tested the groups on the tasks they had learned. On the word memorization task there was little difference in performance. On the application task, however, the non sleepers and the REM-deprived groups scored approximately 30 per cent lower than the others.

Smith's next study was to determine "how much REM sleep needs to be lost" to affect learning. Theorizing that loss of sleep in the longest - the last two - REM periods would affect learning more, he interrupted the first two REM periods of one group and the last two REM periods of a second group.

However, he found that both of the REM-deprived groups scored 30 per cent lower on the application task compared with a group that was not REM-deprived and a control group that had slept all night.

As a result, Smith wondered whether staying up late was as bad for learning as missing a night's sleep altogether.

To test this he had a group stay up four hours past their normal bedtime and allowed them to 'sleep in' the next day, so they got a normal amount of sleep, but delayed by four hours. Again, the application task scores were 30 per cent lower than those of the control group of sleepers who went to bed at the usual time.

Delaying sleep suppresses the first two REM periods and alters the sleep cycle, which in turn affects the learning process, Smith explains. Furthermore, he found that the learning process extends over a period of time and that there are a number of 'weak spots' or 'windows' for up to a week afterwards during which learning is vulnerable to sleep loss.

It's not just the sleep delay on the night of learning that affects the ability to retain and apply the information. Smith delayed sleep by four hours in one group on the night of learning and in other groups on the following nights (i.e. if the tasks were learned on Tuesday, one group delayed sleep that night, one on Wednesday night, and one on Thursday). Test results showed that scores dropped for those who had delayed sleep the night of learning (Tuesday) and those delayed two nights later (Thursday). The group that delayed sleep on the night between scored as well as a control group who had not delayed their sleep.

The vulnerable spots in the learning process recur, and delaying sleep during one of them "is just as awful" as not sleeping at all, Smith says.

Smith concludes that when people are learning complex information, tney should get their REM sleep when their bodies need and expect it. "It looks as if in order to learn something new, involving heavy duty thinking and application...for the best results you should get to bed early." Funding for Smith's studies has been provided by the Natural Sciences and Engineering Research Council.

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