

## Sleep deprivation affects ability to make sense of what we see

May 20 2008

Neuroscience researchers at the Duke-NUS Graduate Medical School in Singapore have shown for the first time what happens to the visual perceptions of healthy but sleep-deprived volunteers who fight to stay awake, like people who try to drive through the night.

The scientists found that even after sleep deprivation, people had periods of near-normal brain function in which they could finish tasks quickly. However, this normalcy mixed with periods of slow response and severe drops in visual processing and attention, according to their paper, published in the *Journal of Neuroscience* on May 21.

"Interestingly, the team found that a sleep-deprived brain can normally process simple visuals, like flashing checkerboards. But the 'higher visual areas' – those that are responsible for making sense of what we see – didn't function well," said Dr. Michael Chee, lead author and professor at the Neurobehavioral Disorders Program at Duke-NUS. "Herein lies the peril of sleep deprivation."

The research team, including colleagues at the University of Michigan and University of Pennsylvania, used magnetic resonance imaging to measure blood flow in the brain during speedy normal responses and slow "lapse" responses. The study was funded by grants from the DSO National Laboratories in Singapore, the National Institutes of Health, the National Institute on Drug Abuse, the NASA Commercialization Center, and the Air Force Office of Scientific Research.



Study subjects were asked to identify letters flashing briefly in front of them. They saw either a large H or S, and each was made up of smaller Hs or Ss. Sometimes the large letter matched the smaller letters; sometimes they didn't. Scientists asked the volunteers to identify either the smaller or the larger letters by pushing one of two buttons.

During slow responses, sleep-deprived volunteers had dramatic decreases in their higher visual cortex activity. At the same time, as expected, their frontal and parietal 'control regions' were less able to make their usual corrections.

Scientists also could see brief failures in the control regions during the rare lapses that volunteers had after a normal night's sleep. However, the failures in visual processing were specific only to lapses that occurred during sleep deprivation.

The scientists theorize that this sputtering along of cognition during sleep deprivation shows the competing effects of trying to stay awake while the brain is shutting things down for sleep. The brain ordinarily becomes less responsive to sensory stimuli during sleep, Chee said.

This study has implications for a whole range of people who have to struggle through night work, from truckers to on-call doctors. "The periods of apparently normal functioning could give a false sense of competency and security when in fact, the brain's inconsistency could have dire consequences," Chee said.

"The study task appeared simple, but as we showed in previous work, you can't effectively memorize or process what you see if your brain isn't capturing that information," Chee said. "The next step in our work is to see what we might do to improve things, besides just offering coffee, now that we have a better idea where the weak links in the system are."



## Source: Duke University

Citation: Sleep deprivation affects ability to make sense of what we see (2008, May 20) retrieved 6 May 2024 from <u>https://medicalxpress.com/news/2008-05-deprivation-affects-ability.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.