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Effects of sleep restriction on physiological functions: A respiratory chamber study

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The purpose of this study is to examine how sleep restriction affect energy expenditure, body temperature and endocrine system. Subjects were 9 healthy young males. Experiment was performed in two conditions (normal sleep condition: NSC, shortened sleep condition: SSC). In the NSC, 7h sleep was taken for 4 nights. In the SSC, subjects took 3.5h sleep for 3 nights following one recovery night sleep. Energy expenditure was measured by a respiratory chamber. In both conditions, energy expenditure and core body temperature continually measured for 48h (3rd, 4th, 5th experimental day). Blood was sampled twice on 4th, 5th day in the morning. Overnight polysomnography was examined 3rd, 4th nights' sleep quality. Time of sleep onset latency was shortened on 3rd experimental night. Slow wave sleep was increase on 3rd night. There was no significant difference in total energy expenditure. While energy expenditure during shortened sleep decreased. Body temperature reduced after continuous sleep restriction. Endocrine systems also changed. TSH and 3-Hydroxybutyric acid tended to increase after shortened sleep. And GLP-1 and PYY were decreased. Increased slow wave sleep compensate impaired brain function. However 3.5h sleep may not be enough to recovery. Decreased body temperature may related to impaired brain functions. These results indicate that continuous sleep restriction affect physiological functions.