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Epidemiological and longitudinal studies show that short sleep duration (<7h/night) is associated with obesity and weight gain. Clinical studies have provided some clues into the role of sleep in the promotion of obesity. These studies have shown that short sleep leads to increased appetite and food intake, especially for high fat, high carbohydrate snacks, during periods of short (4 h/night) relative to habitual sleep (>7.5 h/night). In our previous R01, we have shown that individuals eat more after a period of short sleep relative to habitual sleep and that neuronal signals in brain reward centers were activated to a greater extent by foods after short compared to habitual sleep. However, there has been no study to date to assess the effects of sleep restriction on energy balance and body composition when sleep restriction is less severe and maintained for a prolonged period of time, as is the case in a natural setting. We therefore propose to test the effects of milder, prolonged sleep restriction (SR) on obesity risk. We expect that SR will lead to a positive energy balance and increased adiposity relative to HS. Energy balance will be thoroughly assessed using a multicomponent approach: structural MRI to assess changes in adiposity, doubly-labeled water to assess 24-h energy expenditure, actigraphy to assess physical activity level; 3-d food records to assess food intake, functional magnetic resonance imaging (fMRI) to assess neuronal responses to food stimuli. Our working hypothesis is that SR will stimulate the orexin system, which will stimulate appetite and increase food intake. Physical activity level will be reduced, leading to an overall positive energy balance and weight gain (increased adiposity). This study will improve our knowledge of the role of sleep, within the context of an ecologically valid model, on the control of energy balance and will provide additional evidence for a causal role of short sleep duration in the etiology of obesity.