Project title

Sleep education in high school students: effect on sleep-wake patterns, inhibitory control and risk for obesity

Project summary:

Epidemiological and experimental evidence indicate that insufficient and irregular sleep are risk factors for obesity, mainly through modifications of eating behavior, with a shift towards increased intake of highly palatable food (1-2). Insufficient sleep has also been found to be associated with cognitive difficulties in implementing complex and controlled behavior which are related to a functional alteration of the prefrontal cortex, in particular inhibitory control and impulsivity. It remains to be determined whether 1. improving sleep-wake patterns has beneficial effects on eating behavior and body composition, and 2. whether the changes in eating behavior following sleep improvement are mediated by improvements in inhibitory control and impulsivity.

Previous work has showed the capacity of a sleep education program at school to induce sustained increase in sleep duration (3). Because insufficient and irregular sleep affect almost half of all teenagers, the present study aims to delineate the impact of a sleep education program in high school on sleep-wake patterns, cognitive functioning (inhibitory control and impulsivity) and obesity risk (food intake and body composition).

Two groups of high schoolers ages 13-14 will be studied; 1 group that will benefit from a 3-weeks sleep education program coupled to a web-based application and 1 control group. In both groups, the following measurements will be obtained before and after the sleep education program, as well as 4 to 7 and 9 to 12 months later: 7-days actigraphic recordings of sleep, two behavioral cognitive tests measuring impulsivity and inhibitory control, 3 week-days and 1 week-end day of eating behavior (pictures taken prior and after completion of each meal/snack/drink), and body composition by Bioelectrical Impedance Analysis (BIA).

If our hypotheses are correct, in comparison with the control group, high schoolers in the sleep education group will show increases in sleep duration and regularity, and these sleep changes will be associated with improved inhibitory control, reduced caloric intake for highly palatable foods and better body composition. In addition, the changes in inhibitory control will mediate the association between improved sleep and reduced caloric intake of highly palatable food.

3-5 publications:

1. Spiegel K, Tasali E, Penev P, Van Cauter E. Brief communication: Sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite. *Annals of Internal* Medicine, 141 (2004), 846-50. Citation index : 1500.

2. Spiegel K, G. Copinschi. Fonction endocrino-métabolique et sommeil. Chapitre 22. In: Dauvilliers Y (ed): Les troubles du sommeil. 3ème édition. Elsevier Masson. 2019.

3. Rey AE, Guignard-Perret A, Imler-Weber F, Garcia-Larrea L, Mazza S. Improving sleep, cognitive functioning and academic performance with sleep education at school in children. Learning and Instruction. 2020;65.