Reduced neural satiety responses in women affected by obesity

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INTRODUCTION

Overweight and obesity are major risk factors for a number of chronic diseases. Obesity rates are on the rise worldwide with women more often affected than men. Hedonic responses to food seem to play a key role in obesity, but the exact mechanisms and relationships are still poorly understood. In this study, we investigate in women the perceived pleasantness of food rewards in relation to satiety states as well as BMI status and calories consumed during an ad libitum meal.

METHODS

Participants
Healthy weight: n=32; BMI: 19.25; mean: 21.9
Overweight: n=10; BMI: 26.29; mean: 28.2
Obese: n=24; BMI: 30.37; mean: 33
Age: 18-40; mean: 25.7

EXPERIENCED FOOD VALUE

Milkshake ratings (3T scanner)

Participants received artificial saliva as a neutral liquid and four different milkshakes. The milkshakes were chocolate or strawberry flavored, mixed with water or white cream, resulting in different fat concentrations (2,4). The task was performed four times, during two menstrual cycle phases (preovulatory and postovulatory), and different levels of satiety (fasted and fed).

MODEL

Generalized Linear Mixed Model: beta regression (all covariates and predictors were z-scored)

Pleasances Ratings = \( (\beta_0 + \beta_1 x_1) + (\beta_2 + \beta_3 x_2) + (\beta_4 + \beta_5 x_3) + (\beta_6 + \beta_7 x_4) + (\beta_8 + \beta_9 x_5) + \ldots \)

RESULTS

“The effect of BMI status on pleasantness ratings depends on the amount of food needed to reach satiety”

CONCLUSIONS

- Hedonic responses are more strongly associated with food consumption during the ad libitum meal in women with obesity. Moreover, neural responses to food reward are less sensitive to satiety in women with obesity than with healthy weight.
- The hypothalamus shows lower neural responses in women with obesity, independently of satiety status.
- In women with overweight and obesity, we found possible dysfunctions in the hedonic and homeostatic systems that regulate normal eating. These could potentially promote food overconsumption that leads to or perpetuates obesity.