

Roux-en-Y Gastric Bypass Alters Brain Activity in Regions that Underlie Reward and Taste Perception.

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Abstract

BACKGROUND: Roux-en-Y gastric bypass (RYGB) surgery is a very effective bariatric procedure to achieve significant and sustained weight loss, yet little is known about the procedure's impact on the brain. This study examined the effects of RYGB on the brain's response to the anticipation of highly palatable versus regular food.

METHODS: High fat diet-induced obese rats underwent RYGB or sham operation and were then tested for conditioned place preference (CPP) for the bacon-paired chamber, relative to the chow-paired chamber. After CPP, animals were placed in either chamber without the food stimulus, and brain-glucose metabolism (BGLuM) was measured using positron emission tomography (μ PET).

RESULTS: Bacon CPP was only observed in RYGB rats that had stable weight loss following surgery. BGLuM assessment revealed that RYGB selectively activated regions of the right and midline cerebellum (Lob 8) involved in subjective processes related to reward or expectation. Also, bacon anticipation led to significant activation in the medial parabrachial nuclei (important in gustatory processing) and dorsomedial tegmental area (key to reward, motivation, cognition and addiction) in RYGB rats; and activation in the retrosplenial cortex (default mode network), and the primary visual cortex in control rats.

CONCLUSIONS: RYGB alters brain activity in areas involved in reward expectation and sensory (taste) processing when anticipating a palatable fatty food. Thus, RYGB may lead to changes in brain activity in regions that process reward and taste-related behaviors. Specific cerebellar regions with altered metabolism following RYGB may help identify novel therapeutic targets for treatment of obesity.

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