

The central GLP-1 system and food reward in dietary obese rats after Roux-en-Y gastric bypass

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Roux-en-Y gastric bypass surgery (RYGB) has emerged as one of the most successful treatments for obesity and type-2 diabetes, but the underlying mechanisms remain unclear. One possibility is reduced food reward due to increased release of the anorexigenic incretin hormone glucagon-like peptide-1 (GLP-1) following RYGB that has been observed in both humans and rats. Despite growing evidence supporting this notion, it remains unknown how GLP-1 engages the reward system, and whether the expression of the brain GLP-1 receptors (GLP-1R) change after RYGB. Therefore, we assessed how manipulations of central and peripheral GLP-1Rs influence sucrose reward in high-fat diet-induced obese male rats that received RYGB or sham surgery (SHAM). In addition, we measured GLP-1R mRNA levels in the midbrain. To measure incentive motivation to obtain palatable (0.3M) sucrose solution, a progressive ratio-10 schedule of reinforcement licking task was used in combination with peripheral (IP) or central (ICV) administration of the GLP-1R agonist Exendin-4 or antagonist Exendin-9. Whereas peripheral injections of Exendin-4 had no effect on sucrose licks, central infusions of Exendin-4 reduced operant performance (break-point) to obtain and consume sucrose. Pre-treatment with the GLP-1R antagonist Exendin-9 blocked the effects of Exendin-4 suggesting a direct receptor interaction. RT-PCR analysis revealed lower GLP-1R mRNA expression in the midbrain of the RYGB compared to Sham-operated rats. These findings support the notion that one action of brain GLP-1Rs is to reduce food reward and suggest that such a mechanism may play a role in post-RYGB improvement of eating behaviors. The exact mechanisms and transferability of the findings to humans warrants further studies.

Biography

Ann M. Rogers received her MD from Cornell University Medical College. She completed an internship and residency in General Surgery at St. Luke's-Roosevelt Hospital Center in New York City, a Columbia affiliate. She then completed a fellowship in Minimally Invasive and Bariatric Surgery at the Penn State Milton S. Hershey Medical Center. She is the Director of the Penn State Surgical Weight Loss Program. She has published numerous peer-reviewed articles and abstracts in the fields of Minimally Invasive and Bariatric Surgery, the physiology of obesity, and human and rodent obesity treatments and complications.

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