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SURGERY

Gut metabolism differentially altered by bariatric surgeries

Two popular bariatric surgical procedures, Roux-en-Y gastric bypass (RYGB) and vertical sleeve gastrectomy (VSG), improve glucose tolerance by different mechanisms, according to new research.

Bariatric surgery has emerged as a successful treatment for type II diabetes mellitus (T2DM). "Although several hypotheses [for how bariatric surgery resolves T2DM] have been proposed, the underlying mechanisms remain elusive or controversial," says corresponding author Maude Le Gall. "Since the gastrointestinal tract is the direct target of bariatric surgeries, we thought that early intestinal remodelling and adaptation triggered by such interventions could be the starting point for metabolic improvement."

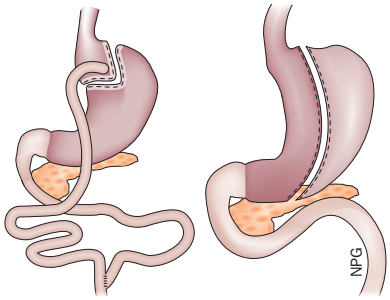
The researchers performed RYGB, VSG or sham surgery (control) on obese rats, and investigated the effects of the different surgical techniques on intestinal morphology. Compared with sham surgery, the jejunal Roux limb in rats was hypertrophic after RYGB. By contrast, VSG surgery in rats did not result in jejunal hyperplasia. Interestingly, RYGB induced jejunal hyperplasia in samples taken from patients who underwent bariatric surgery for obesity.

Previous research indicated increased blood glucose consumption associated with jejunal hyperplasia after RYGB, contributing to the beneficial effect of the surgery on glucose tolerance. Both RYGB and VSG improved glucose tolerance in the obese rats in this study, compared with controls. As only the improvements in the RYGB group might be explained by jejunal hyperplasia, the researchers investigated how different procedures affect intestinal glucose handling. They found increased ectopic mRNA expression of the glucose transporter *Glut1* in the Roux limb in RYGB-treated rats, but not in the jejunum of VSG-treated rats, compared with the sham-operated rats. Expression of *Hif1a* (a factor known to promote *Glut1* expression) was also increased in rats treated with RYGB.

By administering radiolabelled ^{14}C glucose *ex vivo* to rat jejunum segments, the researchers showed that RYGB resulted in markedly increased net uptake of glucose by the Roux limb, from both mucosal and serosal sides, compared with sham surgery. PET–CT scans in patients who underwent RYGB revealed abnormally high glucose uptake by the Roux limb. Glucose transport from the mucosal side was decreased in jejunum from VSG-treated rats, suggesting that the decreased absorption of dietary glucose might contribute to improved glycaemic control in patients after VSG.

The study authors now hope to explore the underlying mechanisms of intestinal adaptation after RYGB and VSG. "We believe that components of these pathways may be putative therapeutic targets for treatment of diabetes, bypassing the need for surgery," concludes Le Gall.

Hugh Thomas



Original article Cavin, J.-B. *et al*. Differences in alimentary glucose absorption and intestinal disposal of blood glucose following Roux-en-Y gastric bypass vs sleeve gastrectomy. *Gastroenterology* doi:10.1053/j.gastro.2015.10.009