ESR1, FTO and UCP2 Genes Interact with Bariatric Surgery Affecting Weight Loss and Glycemic Control in Severely Obese Patients

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Abstract
**Background:**

Significant variability in weight loss and glycemic control has been observed in obese patients receiving bariatric surgery. Genetic factors may play a role in the different outcomes.

**Method:**

Five hundred and twenty severely obese patients with body mass index (BMI) ≥35 were recruited. Among them, 149 and 371 subjects received laparoscopic adjustable-gastric banding (LAGB) and laparoscopic mini-gastric bypass (LMGB), respectively. All individuals were genotyped for five obesity-related single nucleotide polymorphisms (SNPs) on ESR1, FTO, PPARγ and UCP2 genes to explore how these genes effect on weight loss and glycemic control after bariatric surgery at the 6th month.

**Results:**

Obese patients with risk genotypes on rs660339-UCP2 had greater decrease in BMI after LAGB compared to patients with non-risk genotypes (-7.5 vs. -6 units, p = 0.02). In contrast, after LMGB, obese patients with risk genotypes on either rs712221-ESR1 or rs9939609-FTO had significant decreases in BMI (risk vs. non-risk genotype: -12.5 vs. -10.0 units on rs712221, p = 0.02 and -12.1 vs. -10.6 units on rs9939609, p = 0.04) and a significant amelioration in HbA1c levels (p = 0.038 for rs712221 and p <0.0001
for rs9939609). The synergic effect of ESR1 and FTO genes on HbA1c amelioration was greater (-1.54%, p for trend < 0.001) than any of these genes alone in obese patients receiving LMGB.

**Conclusion:**

The genetic variants in the ESR, FTO and UCP2 genes may be considered as a screening tool prior to bariatric surgery to help clinicians predict weight loss or glycemic control outcomes for severely obese patients.

**Key Words:**
ESR1, FTO, UCP2, bariatric surgery, HbA1c