

Association of Metabolomic Biomarkers with Sleeve Gastrectomy Weight Loss Outcomes

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Introduction

- Sleeve gastrectomy (SG) results in successful weight loss in the majority of patients [1]. Weight loss outcomes do vary, however, and factors influencing this variability are not well understood.
- Obese individuals have a metabolomic fingerprint that is distinct from normal weight individuals. Alterations in metabolites following bariatric surgery have been identified in previous studies [2]. Thus, changes in metabolites and metabolic pathways following SG may be associated with weight loss outcomes.
- We hypothesized that there would be an association between post-operative metabolomic profiles and weight loss outcomes.

Aims and Objectives

- Evaluate whether an individual's baseline metabolome correlates with weight loss outcomes following sleeve gastrectomy
- Evaluate whether metabolomic biomarkers correlate with weight loss outcomes following sleeve gastrectomy

Methods

- This prospective study evaluated the metabolomic profile of feces and serum prior to SG and three months post-SG, along with weight loss outcomes at three months post-SG in 45 adult patients with obesity.
- Serum and fecal samples were quantitatively profiled using a combination of nuclear magnetic resonance (1H NMR) and targeted mass spectrometry coupled with liquid chromatography (DI-LC-MS/MS) (AbsoluteIDQ P180 kit (Biocrates, Innsbruck)).
- Participants were divided into tertiles based on percent total weight loss (%TWL) at three months post-SG:

$$\frac{(\text{Pre-operative weight} - \text{Post-operative weight at three months post-SG})}{\text{Pre-operative weight}}$$

Results

- Pre-operative BMI was 45.3 ± 7.2 kg/m², age was 48.2 ± 11.5 years, and 89% were female
- %TWL for the highest versus the lowest weight loss tertiles (T3 vs T1) at three months post-SG was $17.0 \pm 1.3\%$ and $11.1 \pm 0.8\%$, $p < 0.001$.
- Baseline fecal and serum metabolomics did not significantly differ between groups.
- Patients with successful weight loss (T3) at three months, when compared to all patients at baseline, were found to have significant alterations in fecal arachidonic acid (AA) metabolism, taurine and hypotaurine metabolism, and bile acid biosynthesis ($p < 0.05$), (Fig 1).
- Compared to all patients at baseline, patients with poor post-operative weight loss (T1) at three months had significant alterations in fecal metabolites related to porphyrin metabolism, ammonia recycling, and bile acid biosynthesis ($p < 0.05$), but *not* AA metabolism.

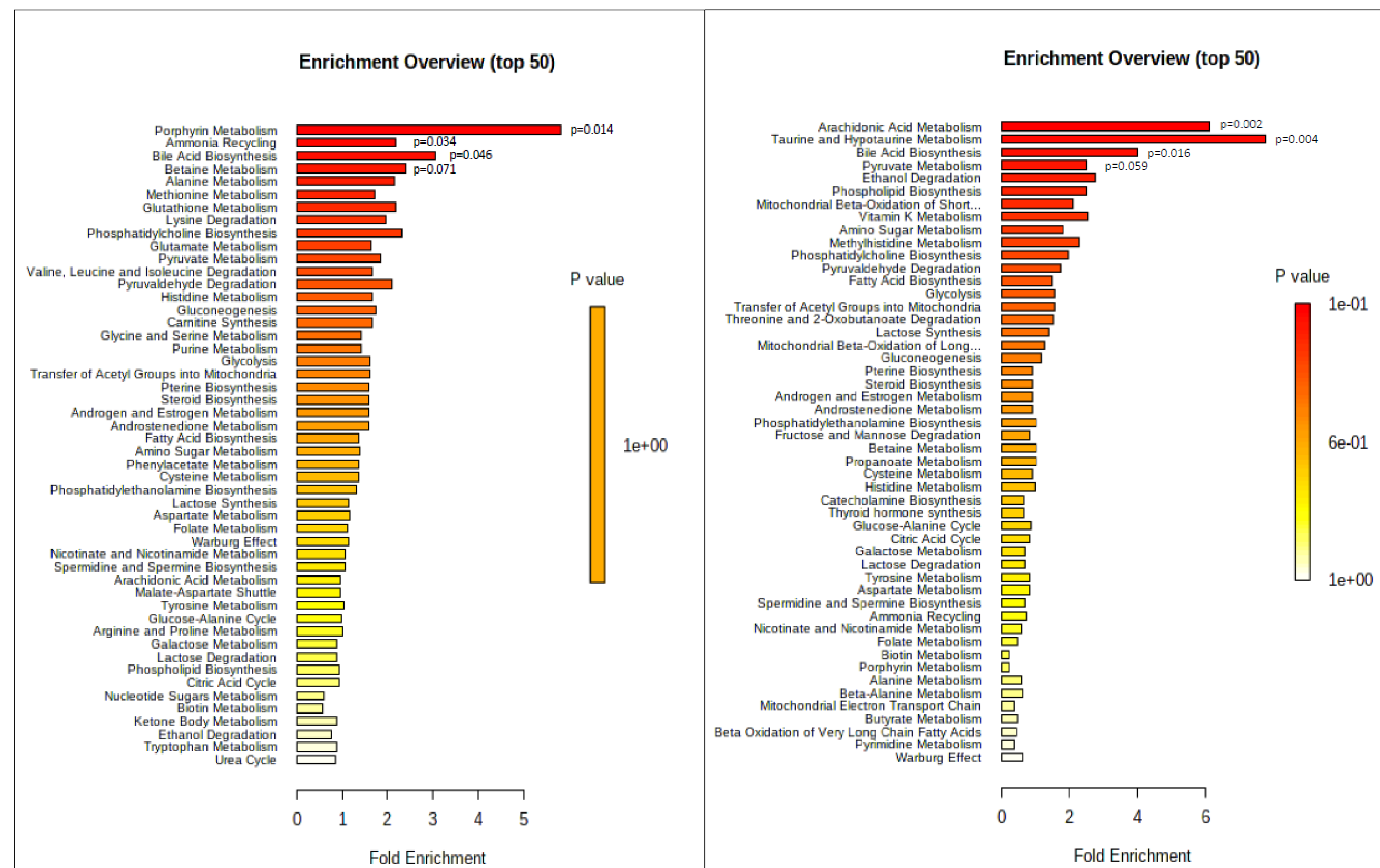


Figure 1. Alterations in fecal metabolites at three-months post-sleeve gastrectomy. Lowest weight loss tertile (T1) and highest weight loss tertile (T3) versus all participants at baseline.

Conclusions

- Studies have examined alterations in post-surgical metabolomics in bariatric patients, but this is the first to evaluate weight-loss outcome-specific differences in fecal metabolites.
- We found that significant alterations in fecal AA metabolism correlates with increased weight loss, while significant alterations in porphyrin metabolism correlates with poor weight loss. AA metabolites have been linked to the pathophysiology of obesity and the initiation and resolution of inflammation. Disorders of porphyrin metabolism have been associated with insulin resistance and metabolic syndrome.
- Further research on pre-operative and post-SG metabolomics could lead to potential targets for peri-operative intervention to enhance weight loss outcomes.

References

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Acknowledgements

- Beaumont Research Institute Metabolomics Department
- Ali Yilmaz, PhD: Metabolomic data analysis
- Matthew Sims, MD, PhD, and Michael Maddens, MD: Assistance with research design
- Nicole Schumacher and Coleen Tessmar, RN: Data collection
- Dr. Michael Maddens Chair of Medicine Research Fund