Sex Differences in Response to Bariatric Surgery

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UC DAVIS HEALTH

Building Interdisciplinary Research Careers in Women's Health

BACKGROUND

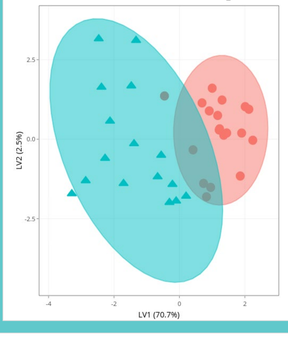
- Obesity is on the rise with >40% of Americans having a body mass index (BMI) over 30 m/kg2
- Obesity is strongly associated with metabolic syndrome (MetS), such as diabetes, hypertension, and hyperlipidemia.
- Obesity has a slight predominance in women while men present with worse MetS at a lower BMI.
- Bariatric surgery (such as gastric bypass, RYGB) is the most effective treatment for obesity and MetS.
- Weight loss, surgical complications, and MetS response to RYGB may differ by sex.
- The gut microbiome and its metabolites such as bile acids are thought to play a role in obesity and RYGB outcomes.
- Variations in gut microbiome and its metabolites vary by sex.

RESULTS

Preop Clinical Data for Women

Characteristics (mean)	Healthy (n=19)	Metabolic Syndrome (n=16)	T test P value
Age (years)	38.7±10.1	45.3±7.3	0.03
BMI (m/kg^2)	47.3±7.6	44.5±7.7	0.28
HbA1c (%)	5.76±0.3	7.74±1.1	<0.01
Fasting plasma glucose (mg/dL)	87.6±12.2	155.4±55.9	<0.01
LDL (mg/dL)	110.3±28.0	78.8±26.6	<0.01

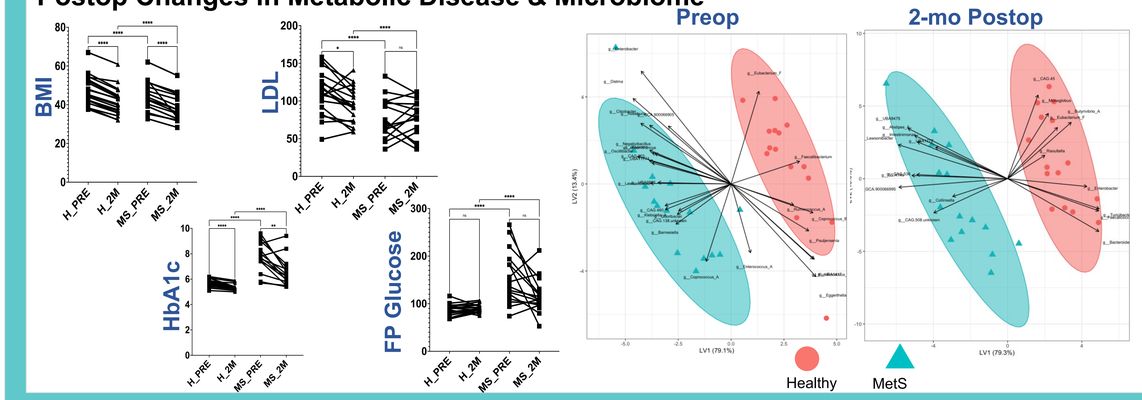
PLSDA of Preop Female Markers



Labs alone able to differentiate patients into two unique cohorts of healthy versus MetS

Fasting glucose	LDL
HbA1c	HDL
Total Insulin	Triglycerides
Free Insulin	AST
Total Cholesterol	ALT
	Alk Phos

Postop Changes in Metabolic Disease & Microbiome



RESULTS

Male Recruitment: 18 total (9/2021-8/29/2024)

- 2 dropouts
- 17 preop samples
- 14 postop 2-month samples
- 3 postop 6-month samples

Characteristics by Sex

Characteristics (mean)	Women (n=35)	Men (n=14)	T test P value
Age (years)	41.7±9.5	48.7±13.3	0.04
BMI (m/kg^2)	45.7±7.7	53.6±10.8	0.01
HbA1c (%)	6.7±1.3	7.7±1.2	0.01
Fasting plasma glucose (mg/dL)	118.6±51.3	103.7±12.5	0.28
LDL (mg/dL)	95.9±31.3	90.1±33.9	0.56

Next Steps:

- Finish female sample microbiome & metabolomics analysis
- Complete male recruitment
- Compare male/female clinical outcomes, microbiome, and metabolomics analysis

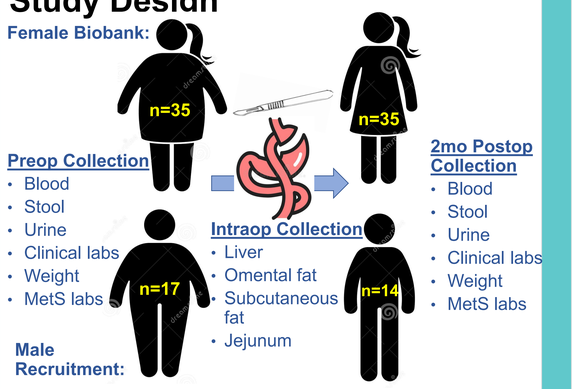
HYPOTHESIS & AIMS

Hypothesis: Sex-specific differences in gut microbiota, bile acids, and sex steroid hormones exist after bariatric surgery, and these differences mediate sex-specific differences in the metabolic and weight loss outcomes after RYGB

1. Determine differing weight loss and MetS response to RYGB by sex
2. Determine unique microbiome and gut modified metabolite patterns are sex-specific and predictive of outcomes.

METHODS

Study Design



Planned Analysis

- Goal recruit 20 male patients
- Analyze clinical outcomes of weight loss & metabolic syndrome improvement
  - Compare Preop vs Postop
  - Compare Female vs Male
- Fecal metagenomic microbiome analysis
- Plasma and Fecal metabolomics for bile acids and untargeted metabolomics
- Plasma sex steroid hormone analysis

CONCLUSIONS

1. Female patient cohorts differ in MetS disease severity
   - Will analyze if differences in their microbiome & metabolomics differ and are associated with differences in MetS severity
2. Preoperative characteristics are similar between men & women
3. Looking forward to future analyses

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