

***Gastric Bypass vs Sleeve Gastrectomy for Type 2 Diabetes-
Where Do We Stand in 2023?***

Patient Choice, Surgeon Choice, or Evidence-Based Choice

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Yale School of Medicine

Past-President, American Society of Metabolic and
Bariatric Surgery

Inaugural Chair, Committee on Metabolic and
Bariatric Surgery, American College of Surgeons

DISCLOSURES

- **Consultant- Allurion, Ethicon, Novo Nordisk, Olympus, Teleflex**

The People (and Surgeons) Have Voted With Their Feet (And Hands)

Sleeves Grow 5X
Revisions Grow 4X
Bypass, DS flat
Band Declines 96%

Estimate of Bariatric Surgery Numbers, 2011-2021 | American Society for Metabolic and Bariatric Surgery

	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Sleeve	162,888	122,068	162,413	164,978	136,401	126,318	106,448	99,781	76,369	67,090	28,124
RYGB	68,627	41,280	46,744	42,946	40,674	40,318	46,278	61,724	61,218	64,876	67,988
Band	1,121	2,383	2,376	2,860	6,318	7,310	11,172	18,336	26,080	34,948	66,932
BPD-DS	6,626	3,666	2,272	2,123	1,688	1,238	1,178	772	1,790	1,730	1,422
Revision	31,021	22,022	42,881	38,971	32,238	30,077	26,868	22,196	10,740	10,380	9,480
SADI	1,026	488	-	-	-	-	-	-	-	-	-
OAGB	1,149	1,338	-	-	-	-	-	-	-	-	-
Other	7,339	1,221	6,080	6,847	6,606	6,866	6,272	193	4,833	3,979	6,066
ESG	2,220	1,600	-	-	-	-	-	-	-	-	-
Balloons	4,100	2,800	4,656	6,042	6,280	6,744	700	-	-	-	-

New Indications

ELSEVIER

Surgery for Obesity and Related Diseases 18 (2022) 1345–1356

Original article

2022 American Society for Metabolic and Bariatric Surgery (ASMBS) and International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO): Indications for Metabolic and Bariatric Surgery

Major updates to 1991 National Institutes of Health guidelines for bariatric surgery

- Metabolic and bariatric surgery (MBS) is recommended for individuals with a body mass index (BMI) $\geq 35 \text{ kg/m}^2$, regardless of presence, absence, or severity of co-morbidities.
- MBS should be considered for individuals with metabolic disease and BMI of 30-34.9 kg/m^2 .
- BMI thresholds should be adjusted in the Asian population such that a BMI $\geq 25 \text{ kg/m}^2$ suggests clinical obesity, and individuals with BMI $\geq 27.5 \text{ kg/m}^2$ should be offered MBS.
- Long-term results of MBS consistently demonstrate safety and efficacy.
- Appropriately selected children and adolescents should be considered for MBS.

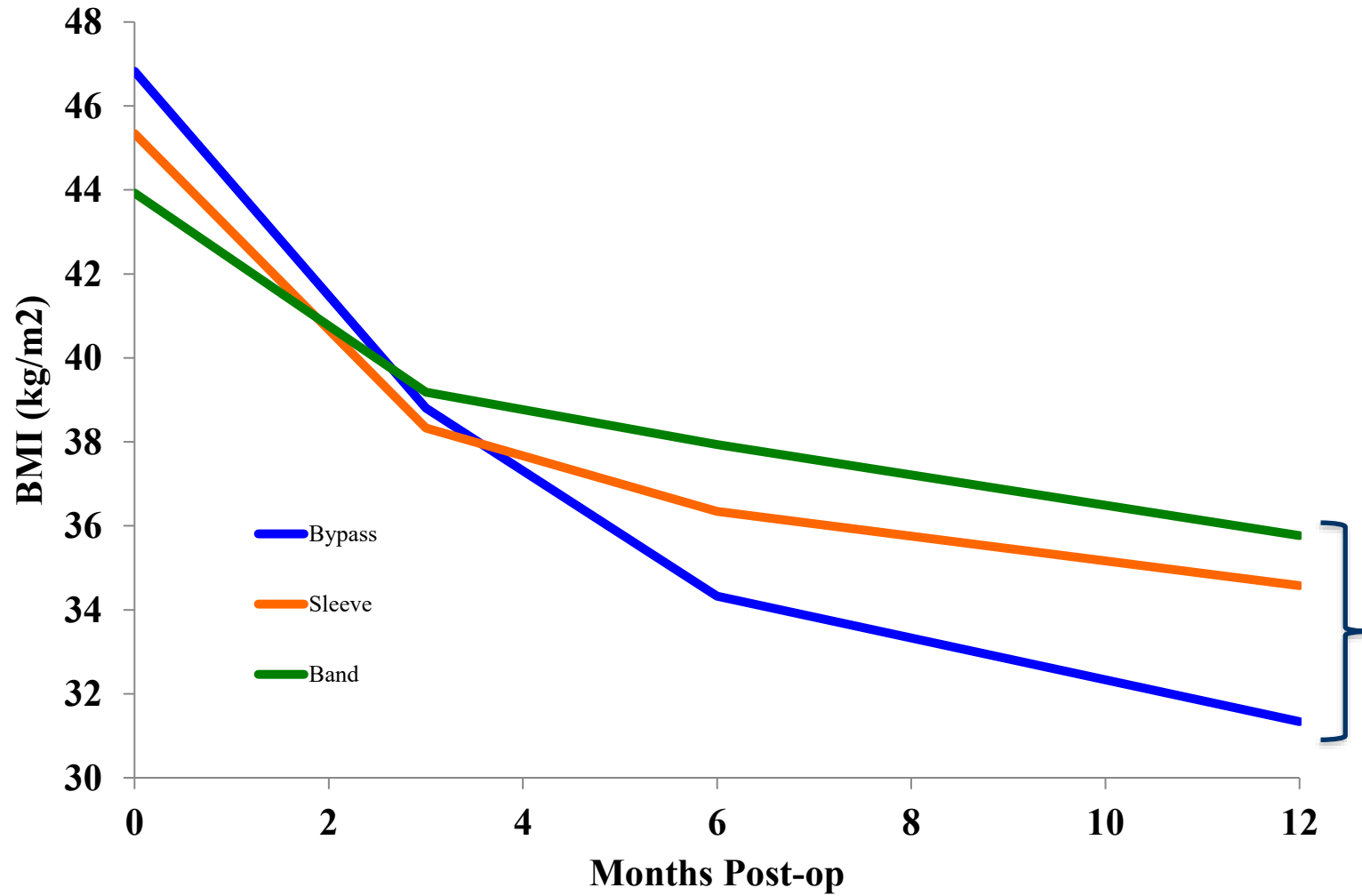
New Indications

- MBS is recommended for individuals with BMI ≥ 35 kg/m², regardless of presence, absence, or severity of co-morbidities.
- MBS is recommended in patients with T2D and BMI ≥ 30 kg/m².
- MBS should be considered in individuals with BMI of 30–34.9 kg/m² who do not achieve substantial or durable weight loss or co-morbidity improvement using nonsurgical methods.
- Obesity definitions using BMI thresholds do not apply similarly to all populations. Clinical obesity in the Asian population is recognized in individuals with BMI >25 kg/m². Access to MBS should not be denied solely based on traditional BMI risk zones.
- There is no upper patient-age limit to MBS. Older individuals who could benefit from MBS should be considered for surgery after careful assessment of co-morbidities and frailty.

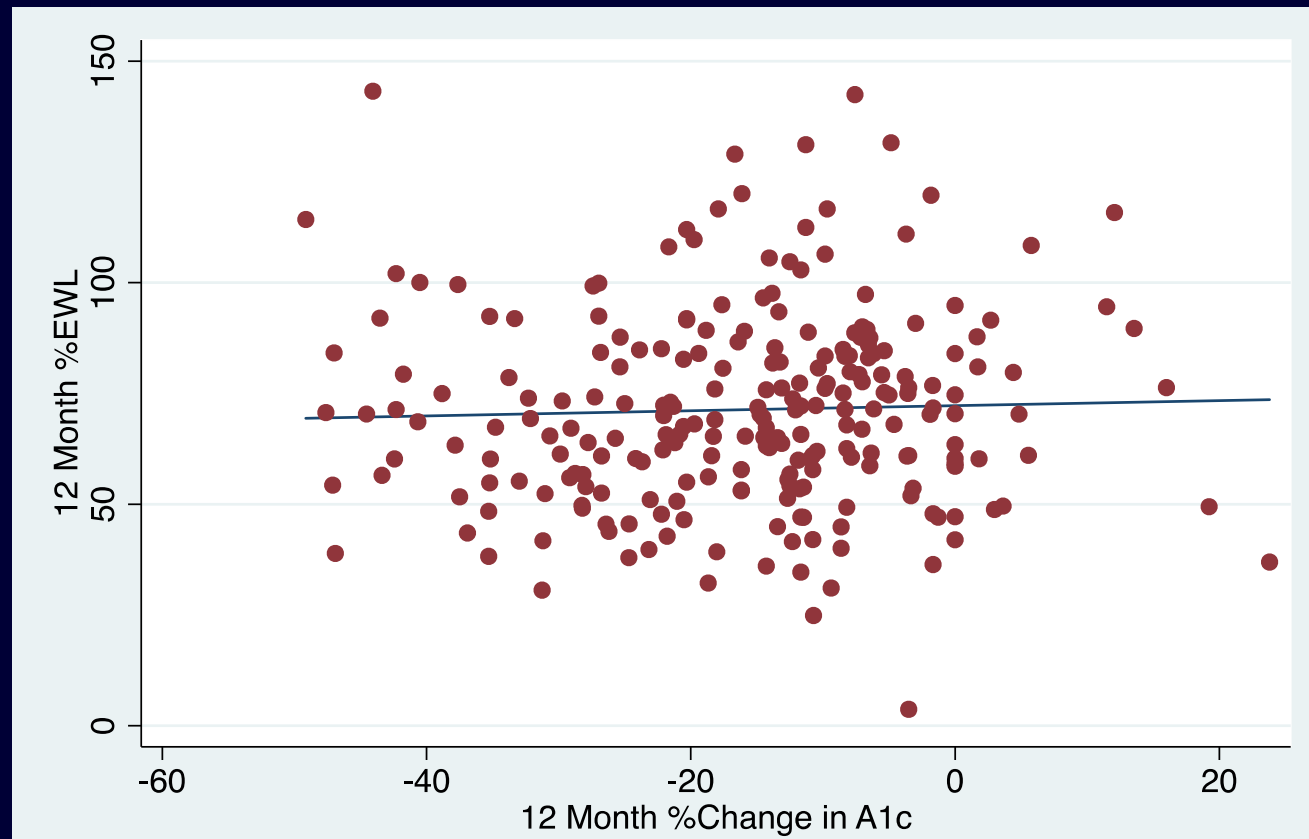
**Comparative Effectiveness of
Bariatric Surgery: Diabetes
Remission after Weight
Loss Surgery**

JACS 2017

Results: Change in BMI

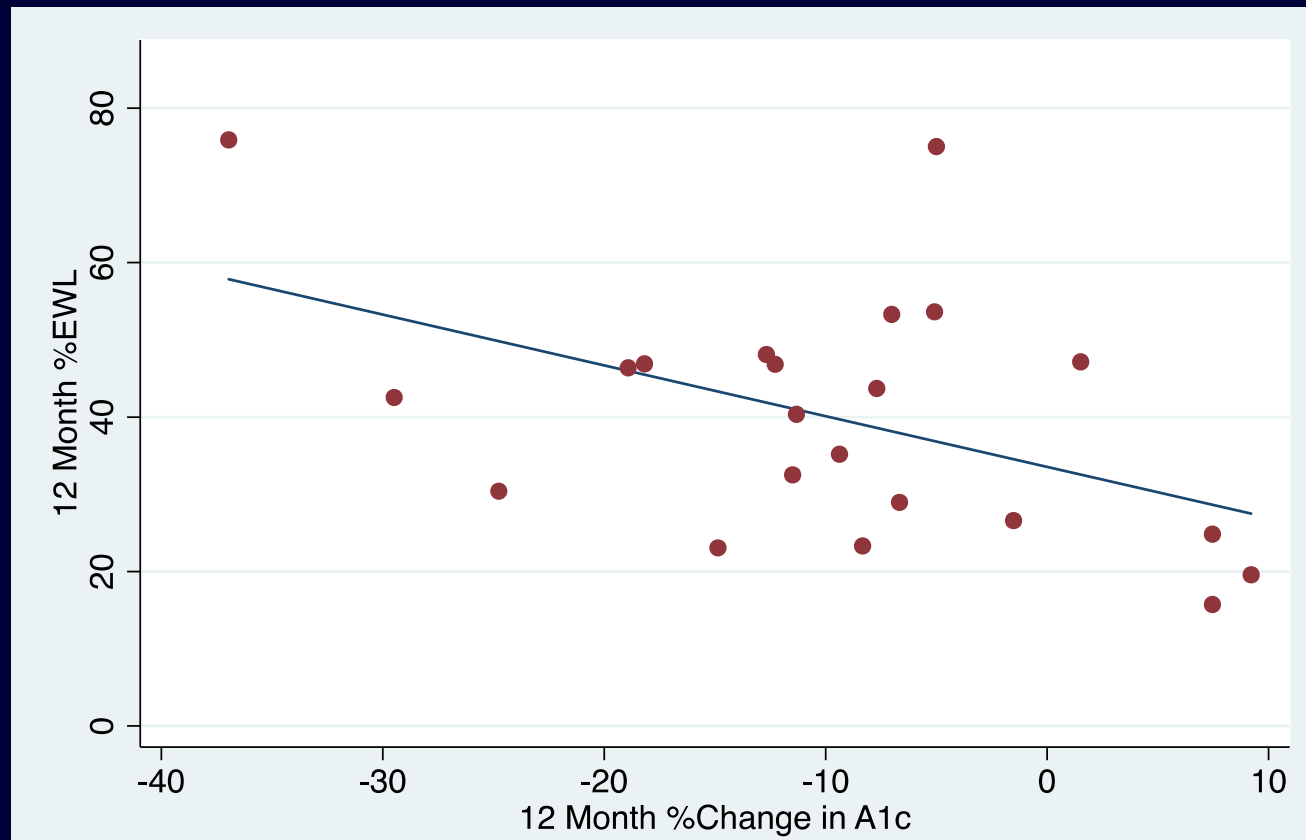


Results: Correlation between 12 month change in HbA1C and excess weight loss for Diabetic Bypass patients



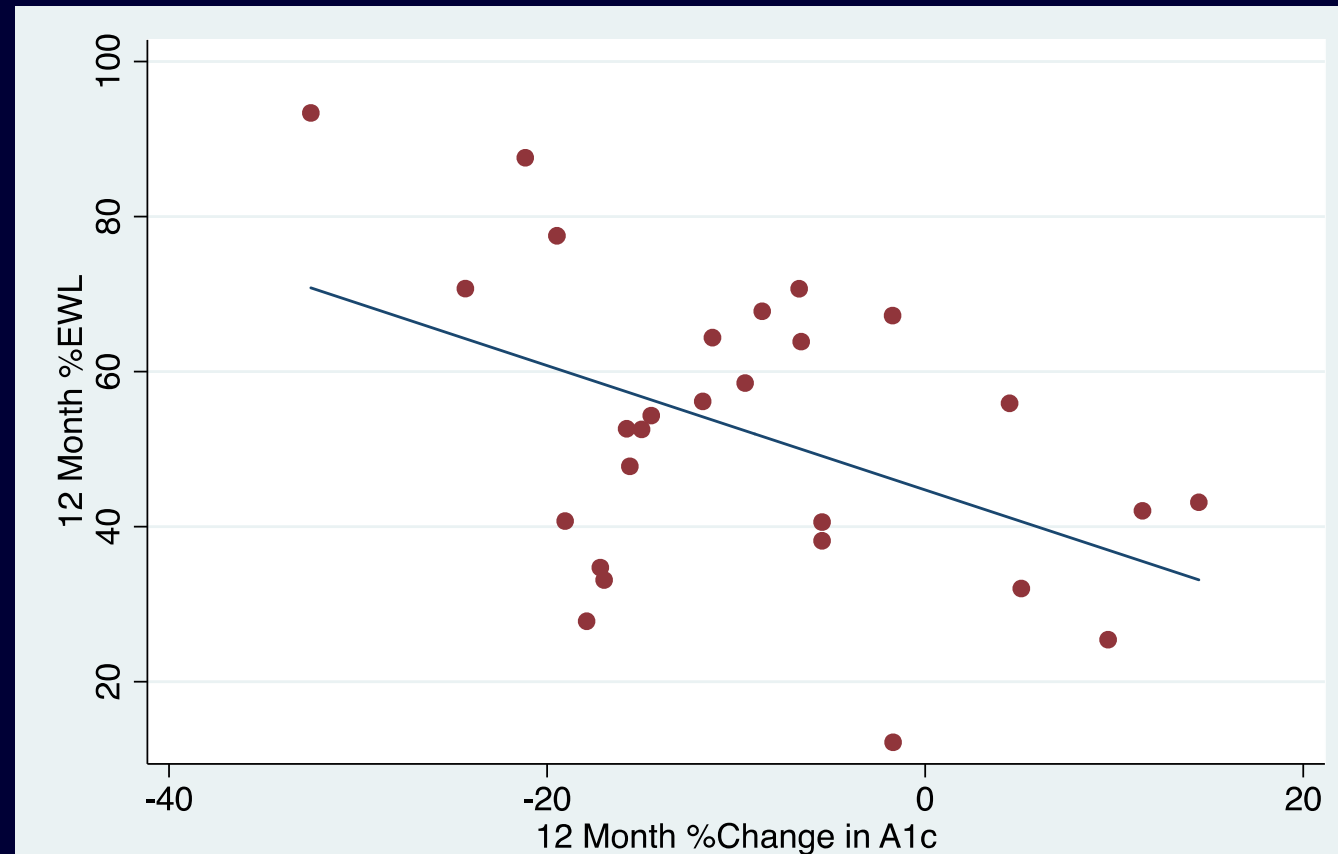
$R = 0.035$; $p = 0.591$

Results: Correlation between 12 month change in HbA1C and excess weight loss for Diabetic Band patients



$R = -0.47; p = 0.027$

Results: Correlation between 12 month change in HbA1C and excess weight loss for Diabetic Sleeve patients



$R = -0.47; p = 0.013$

Conclusion

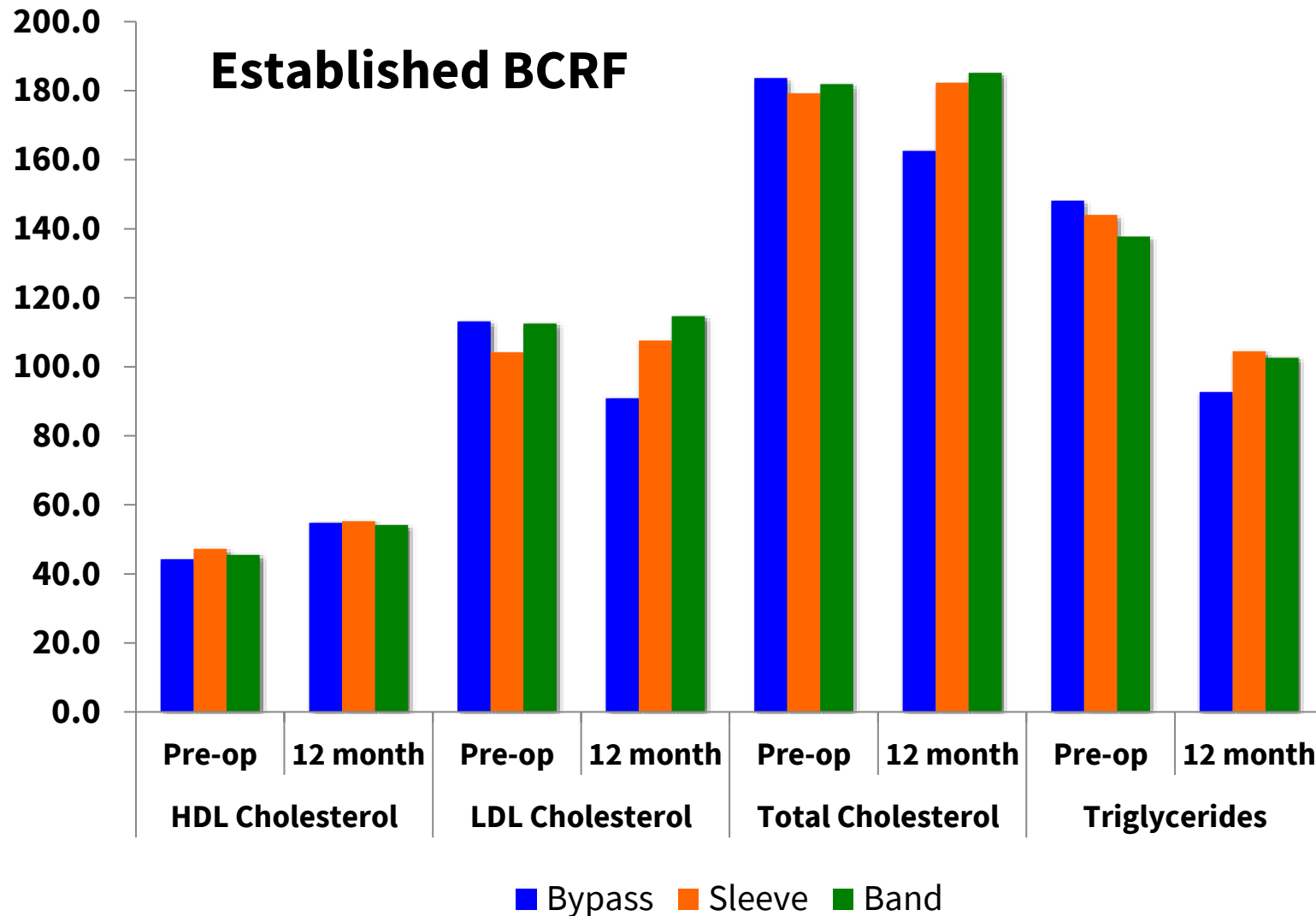
While weight loss contributes to diabetes remission in restrictive procedures, the anatomical alterations in RYGB lead to weight-independent resolution of diabetes.

Comparative Effectiveness of Bariatric Surgery

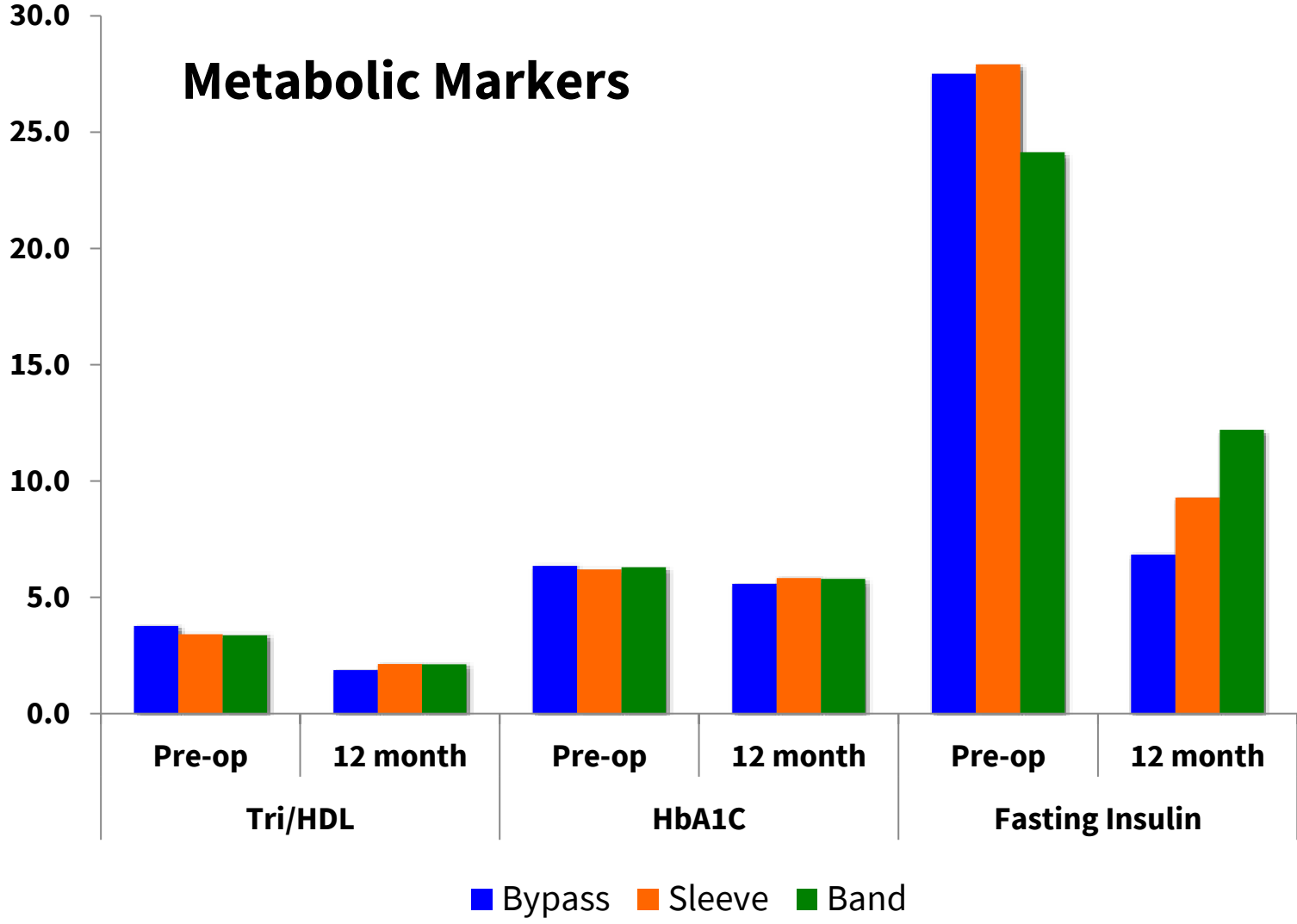
CARDIAC RISK FACTOR IMPROVEMENT

JACS 2017

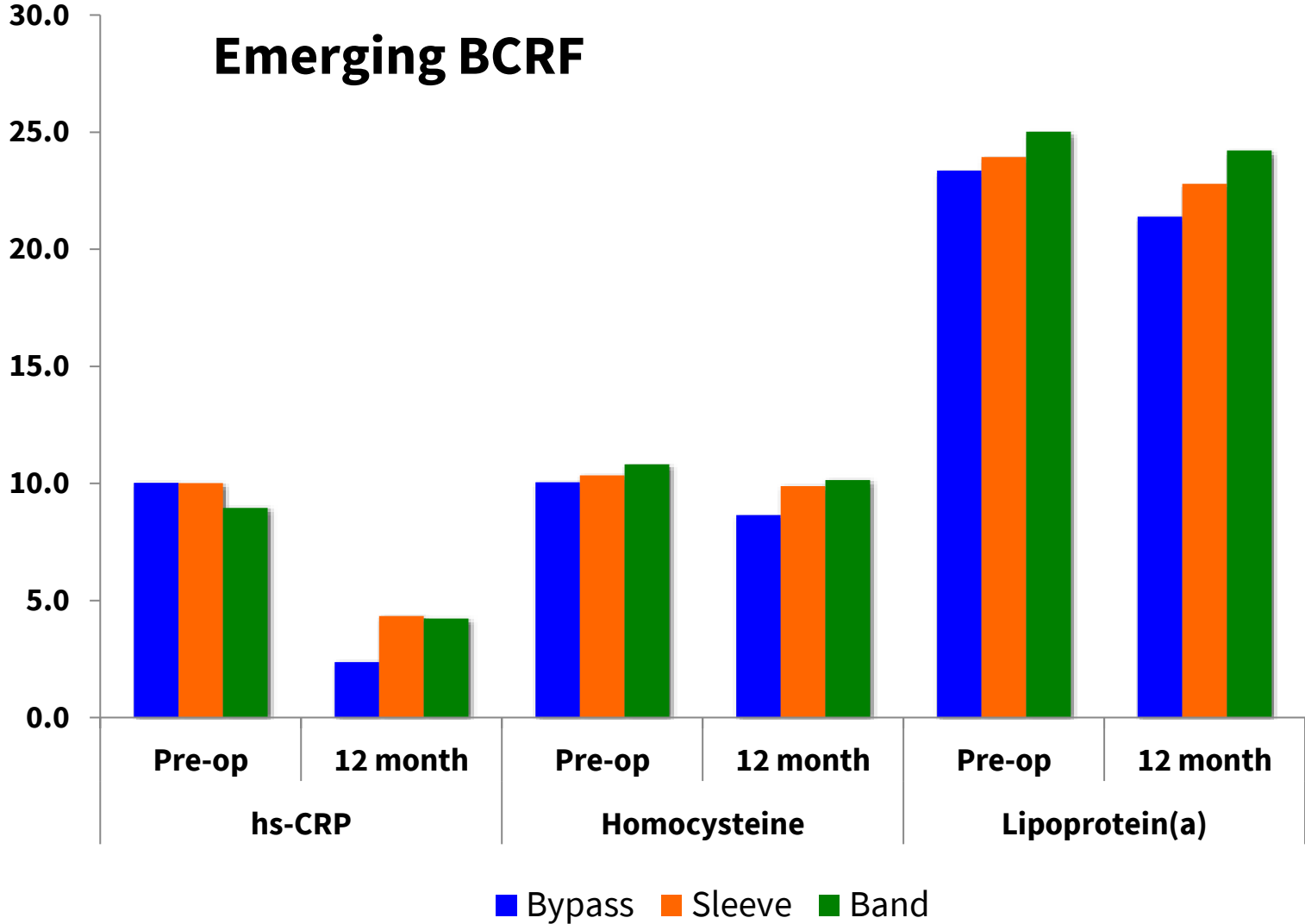
Results: Pre-op and 12-month BCRFs



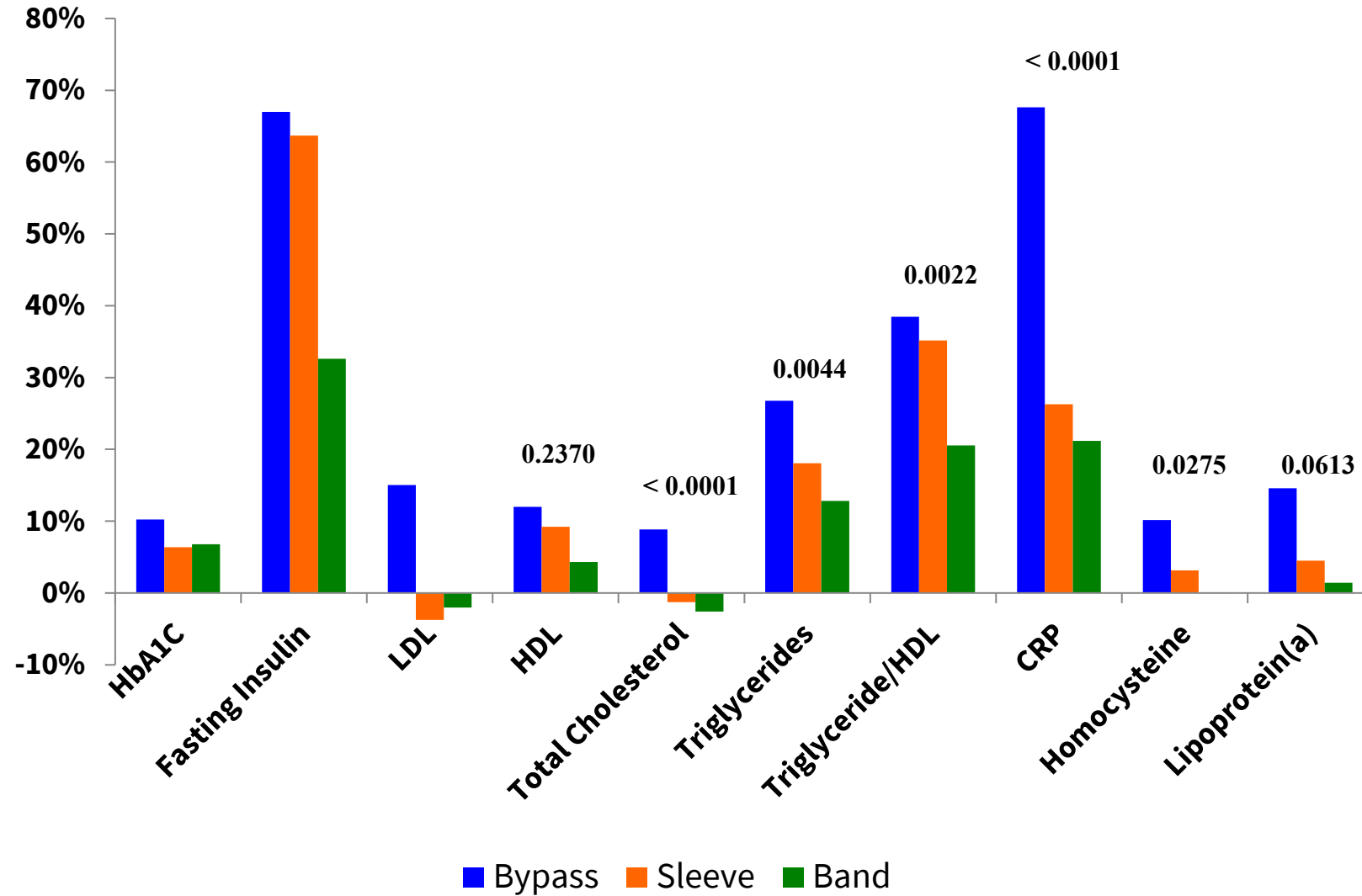
Results: Pre-op and 12-month BCRFs



Results: Pre-op and 12-month BCRFs



Results: BCRF Improvement



Results: Predicting CRP Improvement

	OR (95% CI)	<i>p</i> value
BMI >50	0.79 (0.45-1.38)	0.41
Male	0.63 (0.36-1.08)	0.095
White	0.69 (0.40-1.19)	0.18
Age >50	0.62 (0.37-1.03)	0.63
Private Insurance	1.24 (0.66-2.33)	0.50
Band	1.00	-
Bypass	3.77 (1.88-7.59)	<0.001
Sleeve	1.67 (0.68-4.08)	0.26

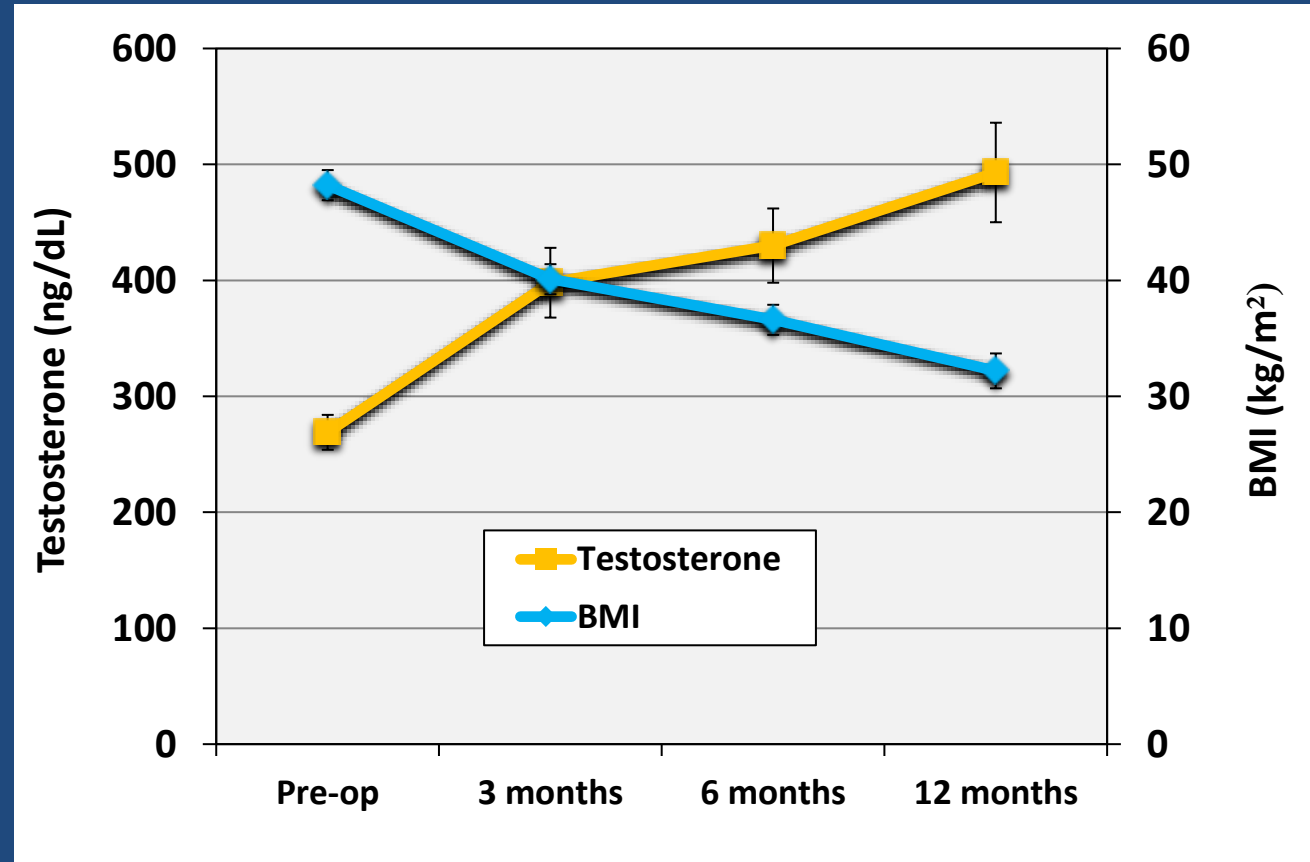
Results: Predicting Triglyceride:HDL Improvement

	OR (95% CI)	<i>p</i> value
BMI >50	0.64 (0.41-0.99)	0.049
Male	1.25 (0.74-2.09)	0.41
White	0.78 (0.51-1.19)	0.25
Age >50	0.50 (0.33-0.75)	0.001
Private Insurance	0.58 (0.32-1.07)	0.081
Band	1.00	-
Bypass	2.50 (1.33-4.72)	0.005
Sleeve	2.19 (0.91-5.27)	0.08

Conclusion

Bariatric procedures, namely gastric bypass, result in considerable weight loss and improvement in biochemical cardiac risk factors at 12 months. Specifically for bypass, improvement for CRP was independent of weight loss.

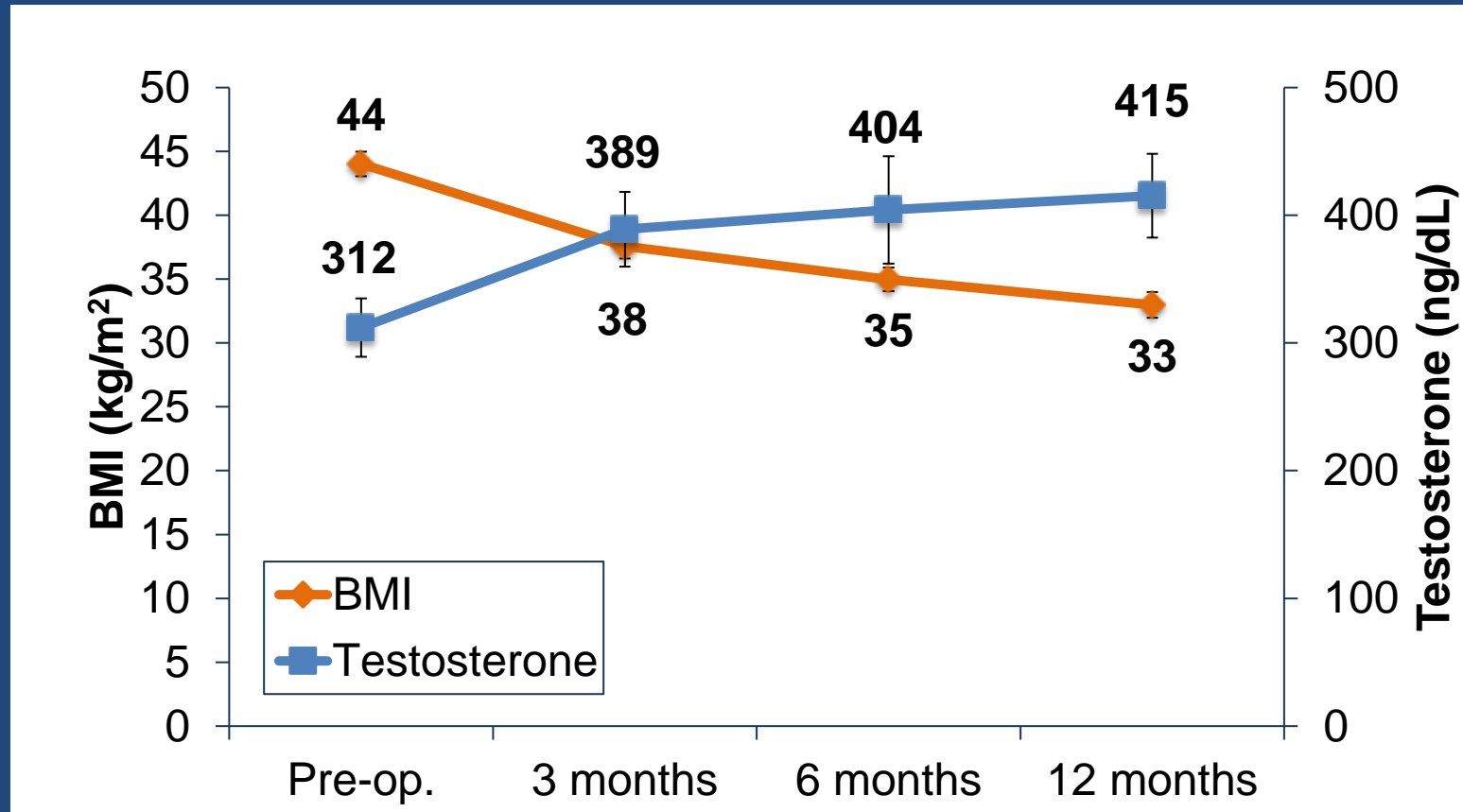
Testosterone levels following RNYGB



**Continuous significant rise in testosterone levels
($p < .0001$) at all time points**

BJS 2010

Testosterone following sleeve gastrectomy



Continuous significant rise in testosterone levels
($p < 0.001$) at all time points

Survival Benefit Overall Survival Benefit Diabetes Which Procedure Best?

SLEEVE?!

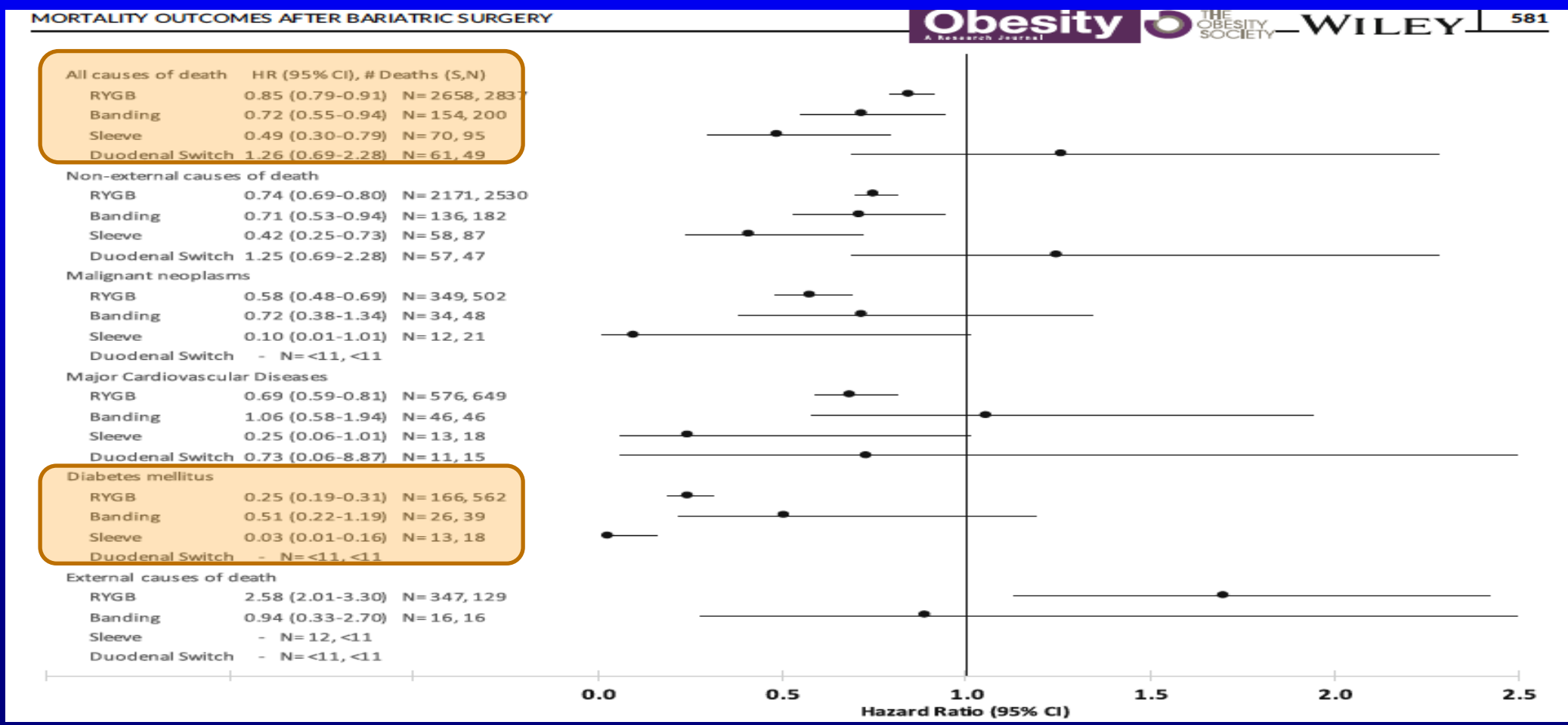
ORIGINAL ARTICLE
Epidemiology/Genetics

Obesity | THE OBESITY SOCIETY | WILEY

Long-term all-cause and cause-specific mortality for four bariatric surgery procedures

Ted D. Adams^{1,2,3} | Huong Meeks⁴ | Allison Fraser⁴ | Lance E. Davidson^{2,5} | John Holmen⁶ | Michael Newman⁷ | Anna R. Ibele⁸ | Nathan Richards¹ | Steven C. Hunt^{2,9} | Jaewhan Kim¹⁰

Obesity (Silver Spring). 2023;31:574-585.



Association Between Bariatric Surgery and Alcohol Use-Related Hospitalization and All-Cause Mortality in a Veterans Affairs Cohort

Nadim Mahmud, MD, MS, MPH, MSCE; Sarjukumar Penchal, MD, PharmD; Samir Abu-Gazala, MD; Marina Sorpet, MD, MS; James D. Lewis, MD, MSCE; David E. Kaplan, MD, MSc

JAMA Surg. 2023;168(2):162-171. doi:10.1001/jamasurg.2022.6410
Published online December 14, 2022.

Impaired Alcohol Metabolism after Gastric Bypass Surgery: A Case-Crossover Trial

Gavitt A Woodard, BS, John Downey, MD, Tina Hernandez-Boussard, PhD, MPH, John M Morton, MD, MPH, FACS

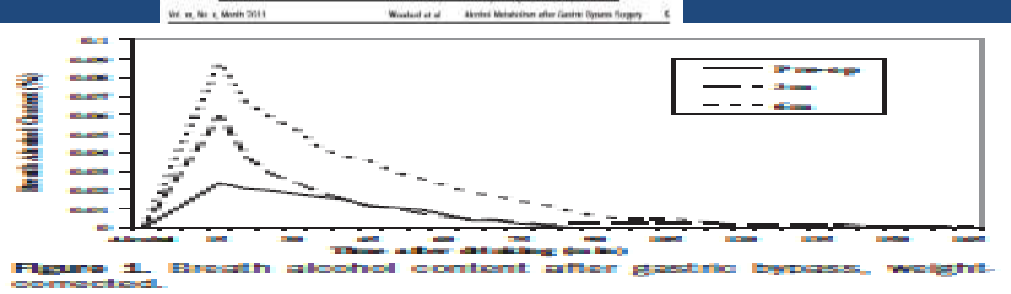
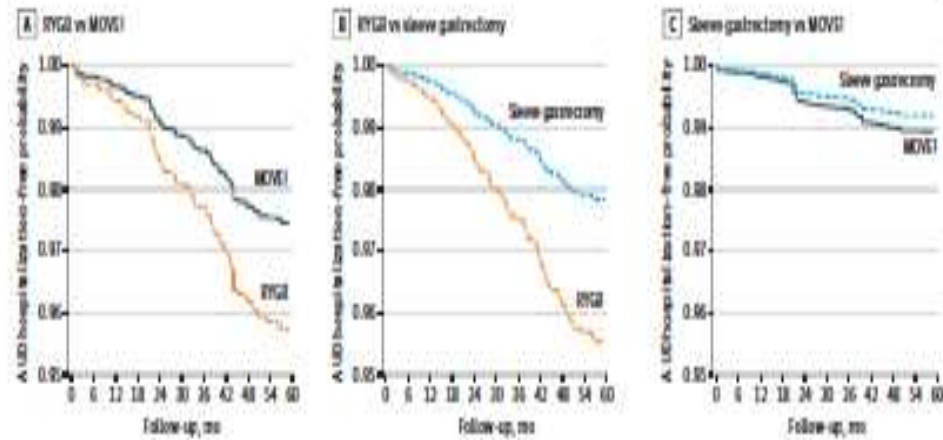


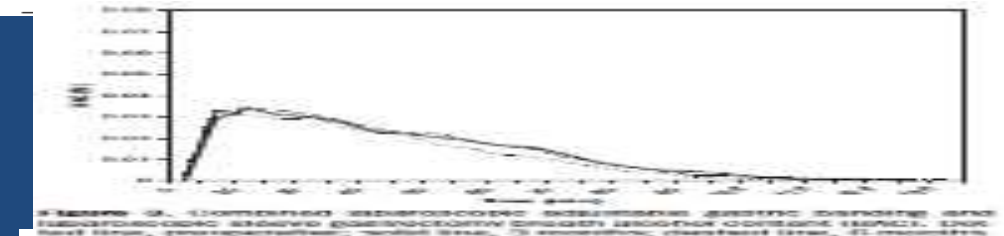
Figure 1. Association Between Weight Management Approach and Alcohol Use Disorder (AUD)-Related Hospitalization



CONCLUSIONS AND RELEVANCE This cohort study found that RYGB was associated with an increased risk of AUD-related hospitalizations vs both sleeve gastrectomy and the MOVE1 program. The mortality benefit associated with RYGB was diminished by increased alcohol use, highlighting the importance of careful patient selection and alcohol-related counseling for patients undergoing this procedure.

Normal Alcohol Metabolism after Gastric Banding and Sleeve Gastrectomy: A Case-Cross-Over Trial

Eric M Changchien, MD, Gavitt A Woodard, MD, Tina Hernandez-Boussard, PhD, MPH, John M Morton, MD, MPH, FACS



ORIGINAL ARTICLE

Trends in Gastrectomy and ADH1B and ALDH2 Genotypes in Japanese Alcoholic Men and Their Gene-gastrectomy, Gene-gene and Gene-age Interactions for Risk of Alcoholism

COMMENTARY

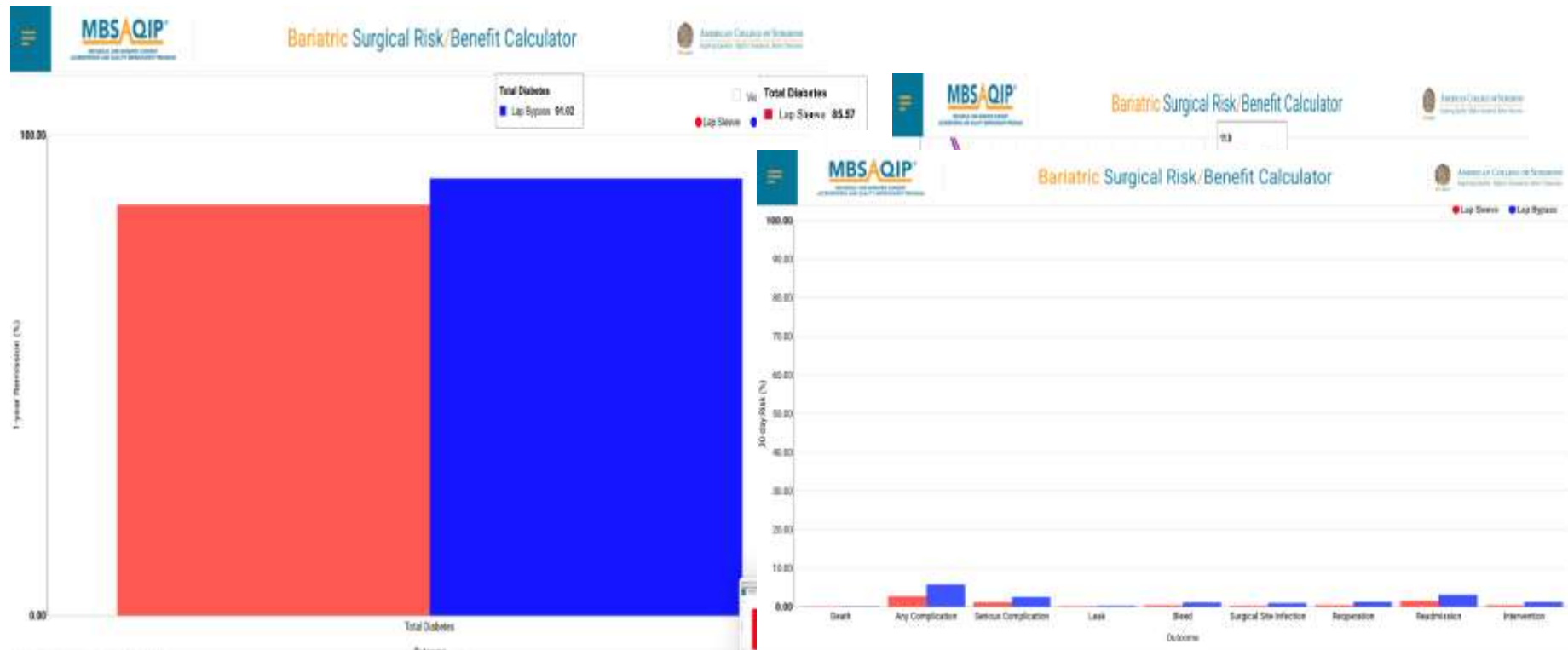
Commentary on: Fat-free mass accounts for most of the variance in alcohol elimination rate in women

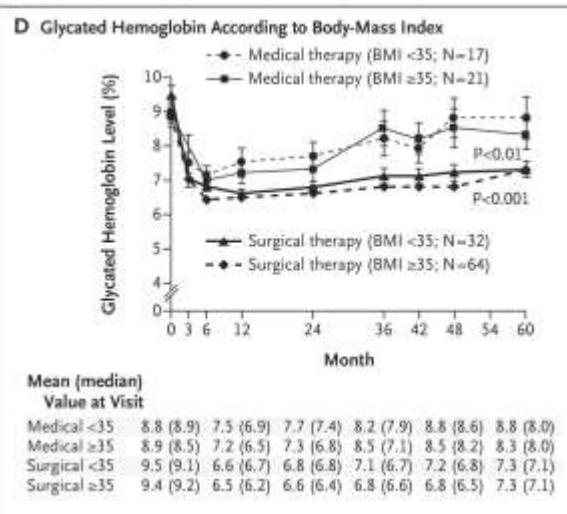
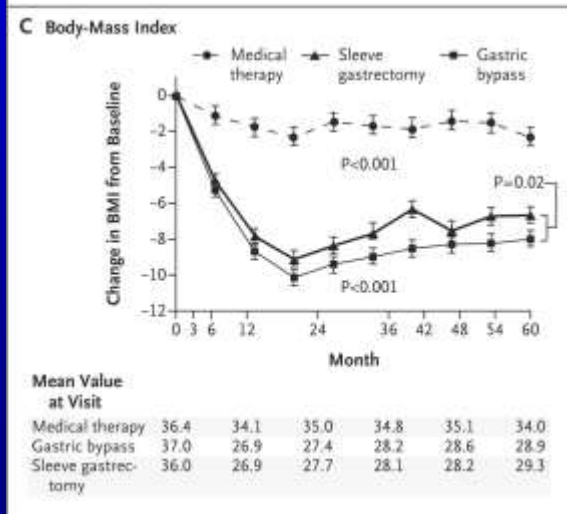
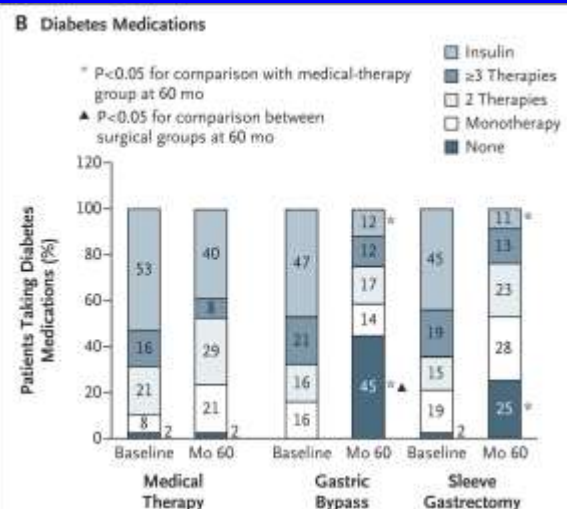
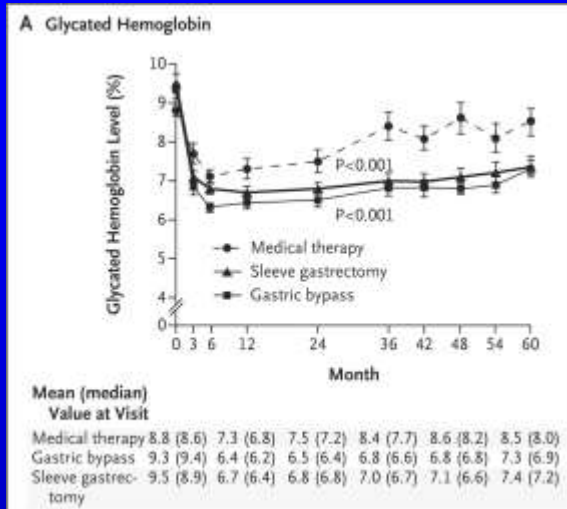
John M. Morton

Physiology not Psychology

Shared Decision Making: Bariatric Risk-Benefit Calculator

<https://riskcalculator.facs.org/bariatric/patientoutcomes.jsp>





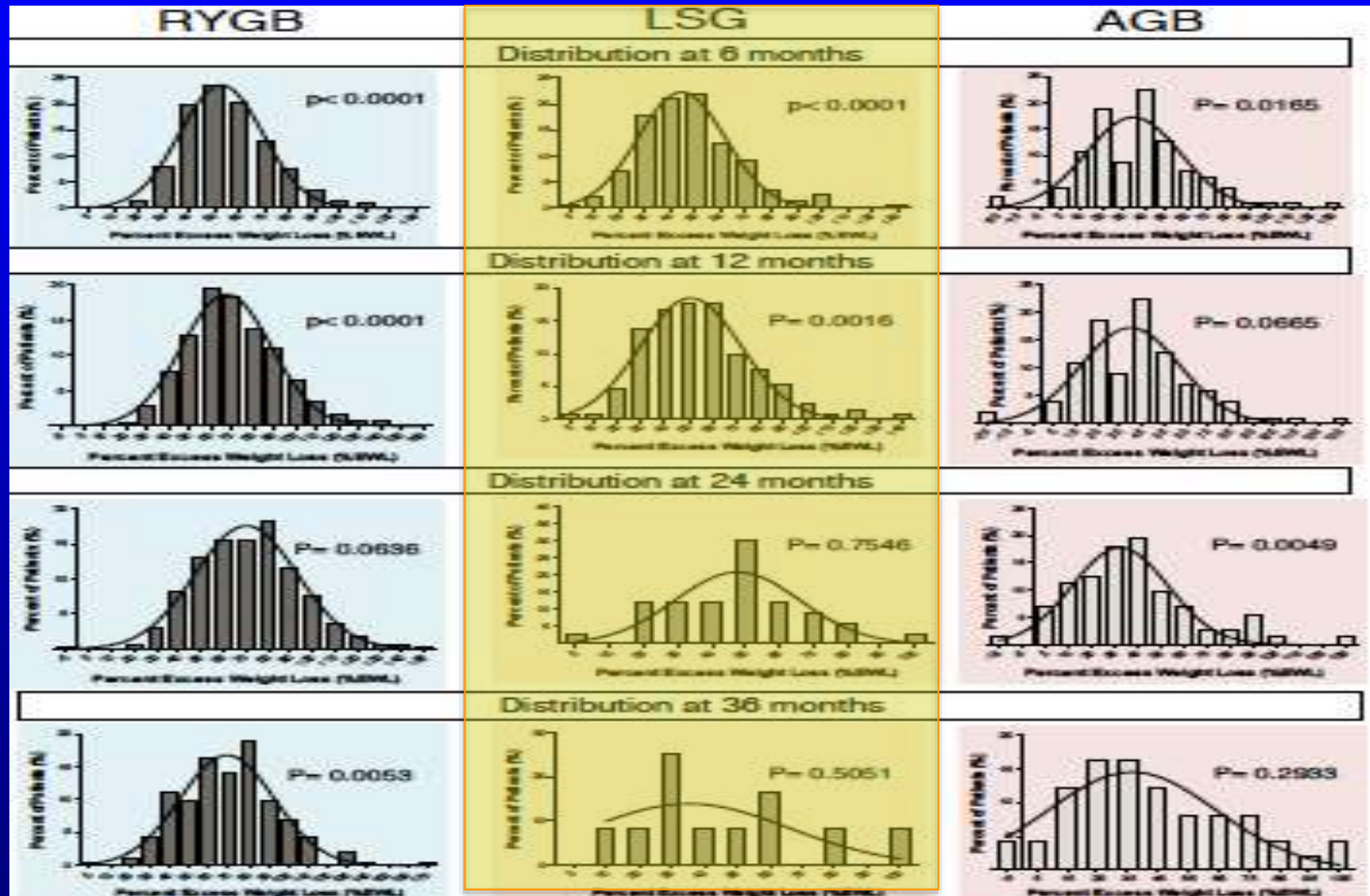
- Surgery is superior to medical therapy
- Sleeve Gastrectomy and Gastric Bypass Equivalent in Weight Loss and Diabetes for lower BMIs

? What About Higher BMIs



Heterogeneity of Weight Loss

Morton, Surgery 2018



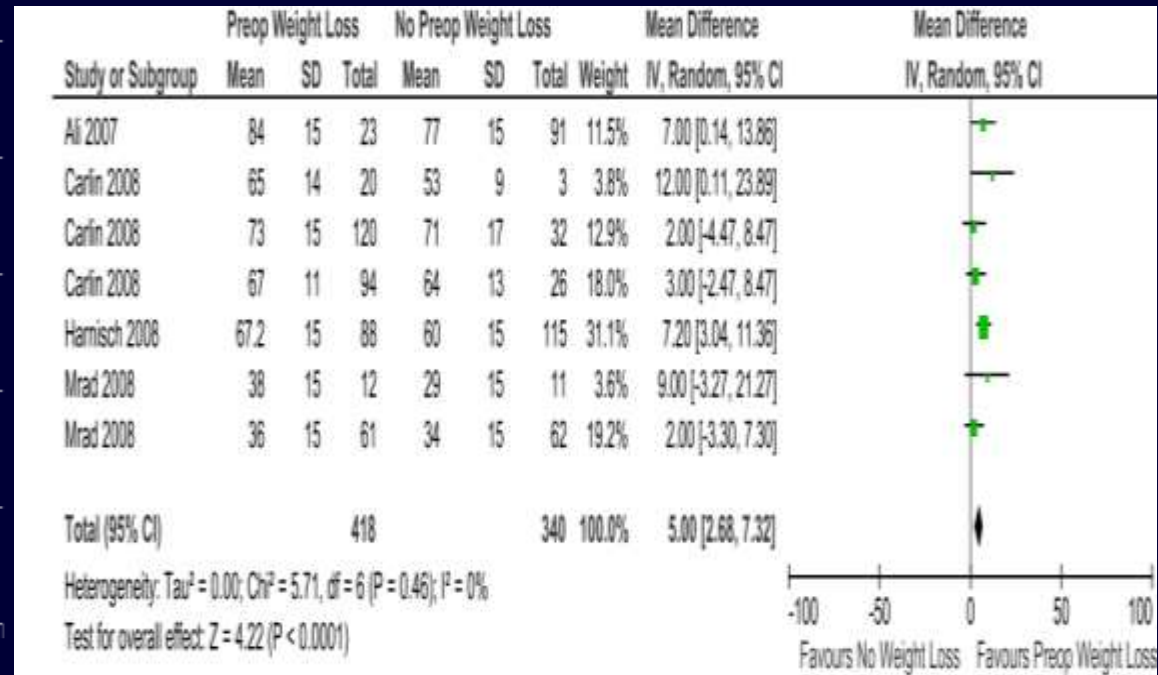
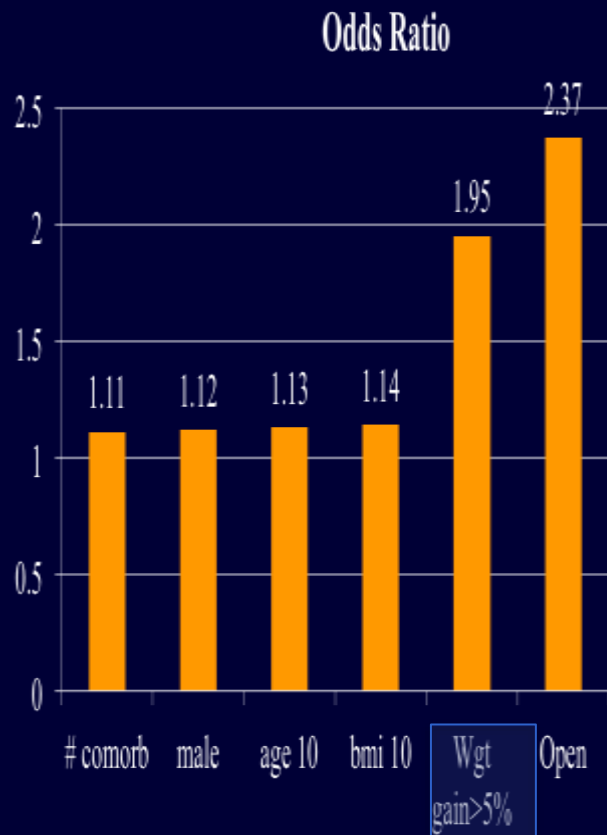
Weight loss distribution: P values calculated using D'Agostino test
 p value > 0.05 implies data not inconsistent with Gaussian distribution.

Factors Associated With Achieving a Body Mass Index of Less Than 30 After Bariatric Surgery

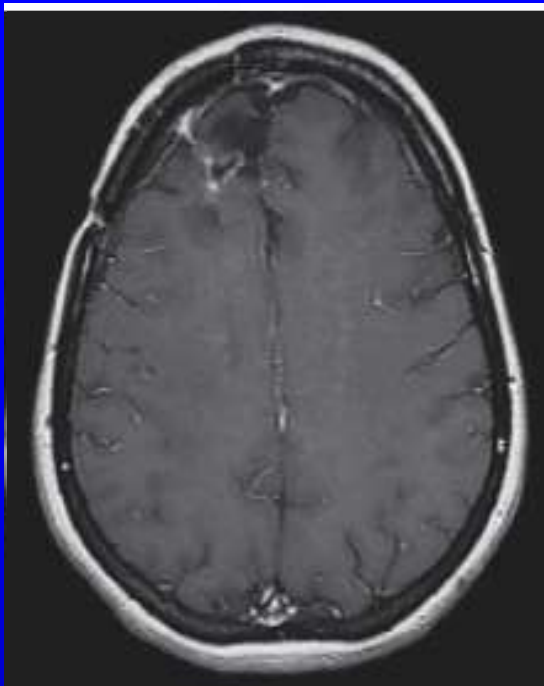
CONCLUSIONS AND RELEVANCE Patients with a preoperative BMI of less than 40 are more likely to achieve a BMI of less than 30 after bariatric surgery and are more likely to experience comorbidity remission. Policies and practice patterns that delay bariatric surgery until the BMI is 50 or greater can result in significantly inferior outcomes.

DOWNSTAGING THE DISEASE

Pre-operative Weight Loss Decreases Complications and Improves Post-Operative Weight Loss



Livhits, M., (2009). Does weight loss immediately before bariatric surgery improve outcomes: a systematic review. SOARD, 5(6), 713-721.



- ADJUVANT CHEMOTHERAPY
- SAFEGUARD RESULTS

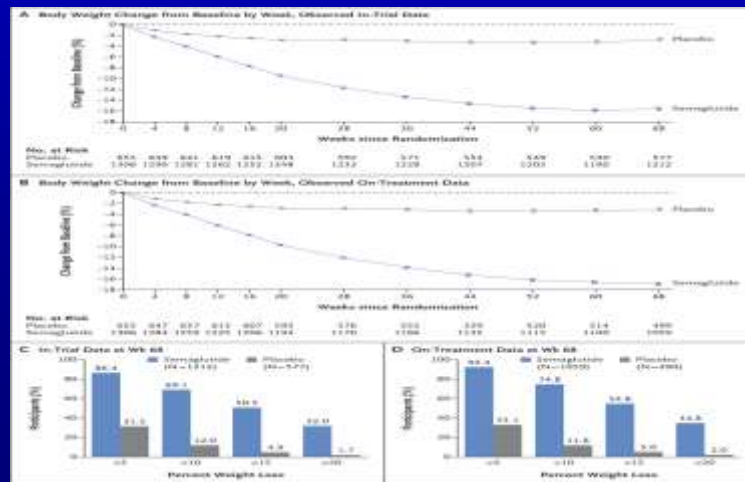


THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Tirzepatide Once Weekly for the Treatment of Obesity

Ania M. Jastreboff, M.D., Ph.D., Louis J. Aronne, M.D.,
 Nadia N. Ahmad, M.D., M.P.H., Sean Wharton, M.D., Pharm.D.,
 Lisa Connery, M.D., Breno Alves, M.D., Arihiro Kiyosue, M.D., Ph.D.,
 Shuyu Zhang, M.S., Bing Liu, Ph.D., Mathijs C. Bunck, M.D., Ph.D.,
 and Adam Stefanski, M.D., Ph.D., for the SURMOUNT-1 Investigators*



Procedural Characteristics Improving Mortality Preoperative Weight Loss

Original article

Preoperative weight loss is linked to improved mortality and leaks following elective bariatric surgery: an analysis of 548,597 patients from 2015–2018

Valentin Mocanu, M.D.*, Gabriel Marcil, M.D., Jerry T. Dang, M.D., Daniel W. Birch, M.D., M.Sc., Noah J. Switzer, M.D., M.P.H., Shahzeer Karmali, M.D., M.P.H.

Table 4
Effect of PWL on leaks, bleeds, serious complications, and mortality as evaluated by multivariable logistic regression

	Leak			Bleed			Serious complications			Mortality		
	OR	95% CI	P value	OR	95% CI	P value	OR	95% CI	P value	OR	95% CI	P value
Percent weight loss												
0–5% versus 0%	.87	.77–.98	.02	.94	.87–1.02	.2	.97	.93–1.02	.2	.78	.61–.99	.04
5–10% versus 0%	.72	.63–.83	<.0001	.96	.88–1.05	.4	.95	.91–1.00	.04	.81	.62–1.06	.1
>10% versus 0%	.68	.56–.84	<.0001	1.08	.96–1.22	.2	1	.93–1.06	.9	.6	.39–.92	.02
Absolute weight loss												
0–5 kg versus 0 kg	.87	.77–.99	.03	.95	.88–1.04	.3	.98	.94–1.03	.4	.79	.62–1.02	.08
5–10 kg versus 0 kg	.78	.68–.89	<.0001	.95	.87–1.04	.3	.95	.91–1.00	.053	.8	.61–1.04	.1
>10 kg versus 0 kg	.7	.60–.81	<.0001	1	.91–1.10	1	.96	.91–1.01	.1	.71	.53–.95	.02
Percent weight loss (per 5% loss)	.85	.80–.91	<.0001	1.04	1.00–1.07	.06	.99	.97–1.01	.4	.9	.79–1.02	.09
Weight loss (per 5-kg loss)	.9	.86–.94	<.0001	1.02	.99–1.04	.1	.99	.98–1.00	.1	.94	.87–1.01	.09

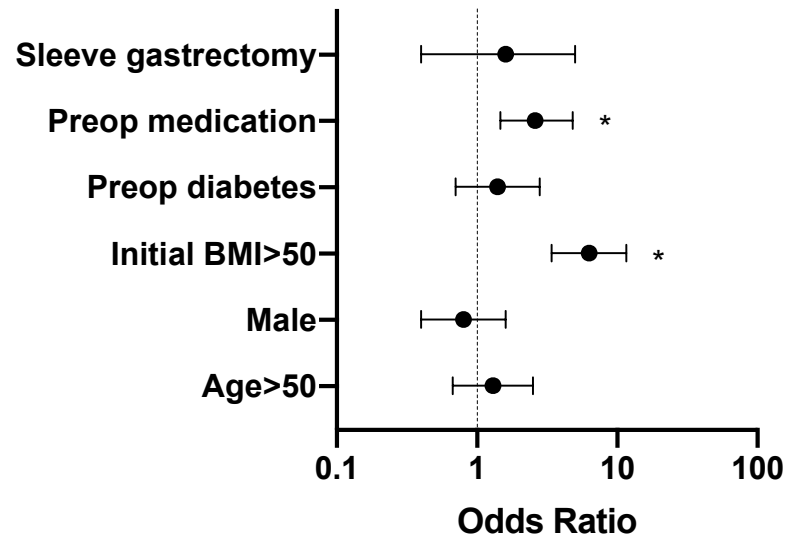
With Preop 10% Total Body Weight Loss...

40% Reduction in Mortality and 32% Reduction in Leaks

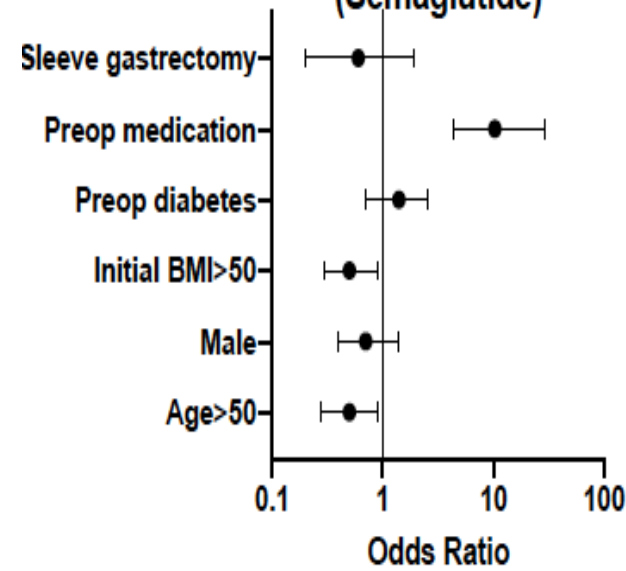
Utilizing Neoadjuvant Anti-Obesity Medications for Patients Undergoing Bariatric Surgery Improves Outcomes- Morton et al

	Preop %TWL>10%	1 month %TWL>15%	6 month %TWL > 30%	12 month %TWL > 30%
<i>Independent variables</i>	<i>Odds ratio [95% Confidence interval]</i>			
Age>50	0.5 [0.3 - 0.9]	0.9 [0.4 - 2.1]	1.2 [0.6 - 2.8]	2.3 [1.0 - 5.5]
Male	1.4 [0.7 - 2.6]	1.6 [0.7 - 3.5]	0.9 [0.4 - 2.2]	0.4 [0.2 - 1.1]
Initial BMI>50	2.1 [1.1 - 4.2]	3.9 [1.9 - 8.4]	2.2 [0.9 - 4.9]	1.4 [0.6 - 3.2]
Preop diabetes	1.4 [0.8 - 2.6]	0.6 [0.2 - 1.3]	1.0 [0.4 - 2.3]	0.9 [0.4 - 2.0]
Preop medication	10.0 [4.2 - 28.0]	3.8 [1.7-8.5]	1.1 [0.4 - 2.7]	1.4 [0.5 - 3.8]
Sleeve gastrectomy	1.6 [0.5 - 5.3]	1.3 [0.2 - 4.8]	2.3 [0.6 - 8.2]	2.8 [0.8 - 11.9]

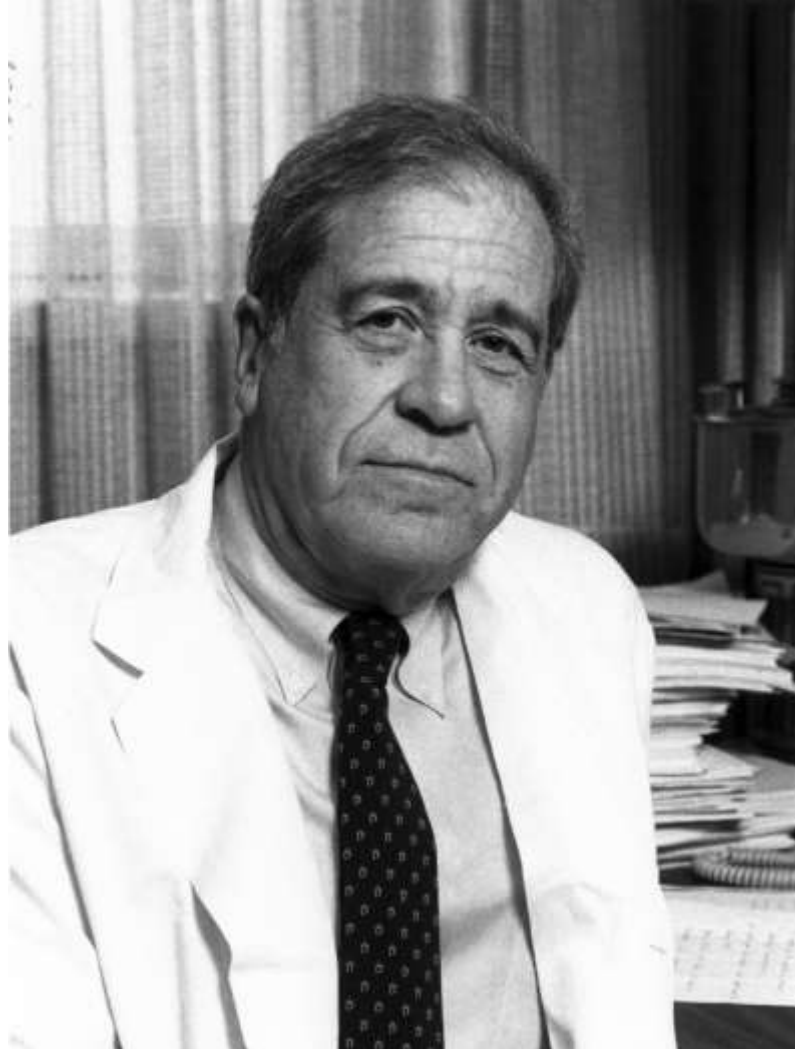
Factors Associated with Preoperative Weight Loss > 10%



Factors associated with preop weight loss > 10% (Semaglutide)



MATTERS TRIAL **METABOLIC ADJUVANT TAILORED THERAPY ENHANCES** **RESPONSE TO SURGERY**



NSABP

Adjuvant chemotherapy made the less invasive segmental resection equivalent in treatment to the more invasive mastectomy and superior for safety
Segmental breast resection combined with adjuvant chemotherapy led to less risk of recurrence.

Principles learned from NSABP

Disease is systemic and that less invasive techniques may be enhanced with multi-modality therapy

MATTERS TRIAL

- 1. PREOPERATIVE WEIGHT LOSS MAY BE ACHIEVED SAFELY, EFFECTIVELY AND IN A TIMELY MANNER BY USING GLP-1 AGONIST.**
- 2. POST-OPERATIVE WEIGHT LOSS WILL BE INCREASED AND LESS VARIABLE WITH PREOPERATIVE WEIGHT LOSS ACHIEVED BY GLP-1 AGONIST.**
- 3. DETERMINE WHICH POSTOPERATIVE PATIENTS WILL NEED ADJUVANT GLP-1 THERAPY**

Choosing the Operation

- Gastric Band
 - ? Patient Preference
- Gastric Sleeve
 - BMI 35-50, Uncomplicated Diabetes, Tx/Hernia/Prior Surgery, Continued Need for Oral Medications
- Roux en-Y Gastric Bypass
 - BMI >50, GERD, Complicated Diabetes
- Duodenal Switch
 - BMI >60, Malignant Diabetes

We are temporarily out of the Wegovy® (semaglutide) injection 2.4 mg Prescribing Information.

For Prescribing Information, including Boxed Warning, please visit WegovyPro.com or visit Booth #1023.

Thank You



John. Morton@ Yale.edu

Twitter X @jmortonmd