"Technical Expertise: Fundamentals of Duodenal Bypass"

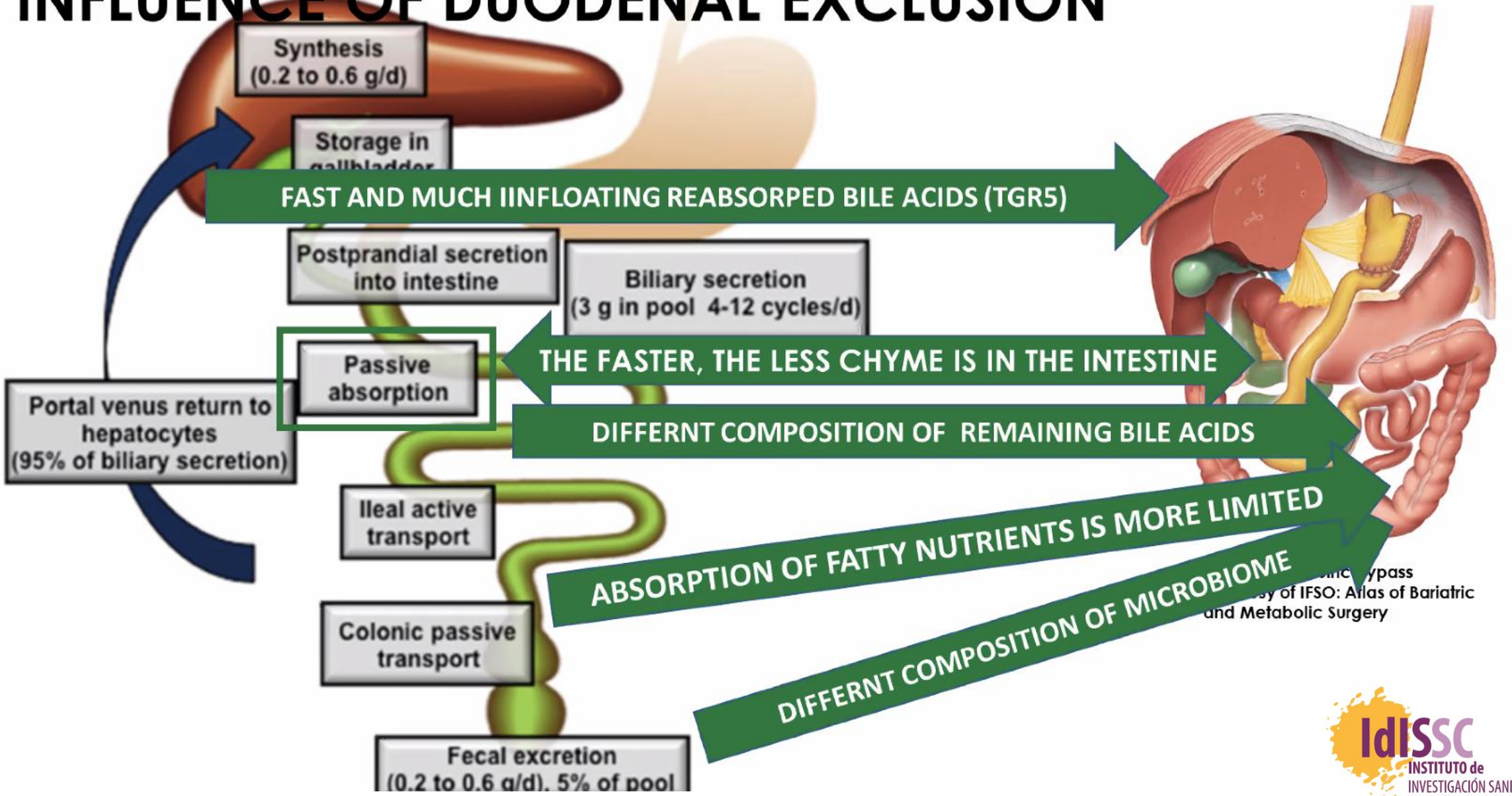
- Antonio J. Torres MD, PhD, FACS, FASMBS
- Professor of Surgery
- Hospital Clínico San Carlos. Universidad Complutense de Madrid
- **President IFSO 2011-2012**
- **Chairman IFSO´s Board of Trustees 2015-2019**

Disclosures

Lectures & Consultant for

- Johnson & Johnson
- Medtronic
- GT Metabolic
- Meril
- Gore Medical

INFLUENCE OF DUODENAL EXCLUSION

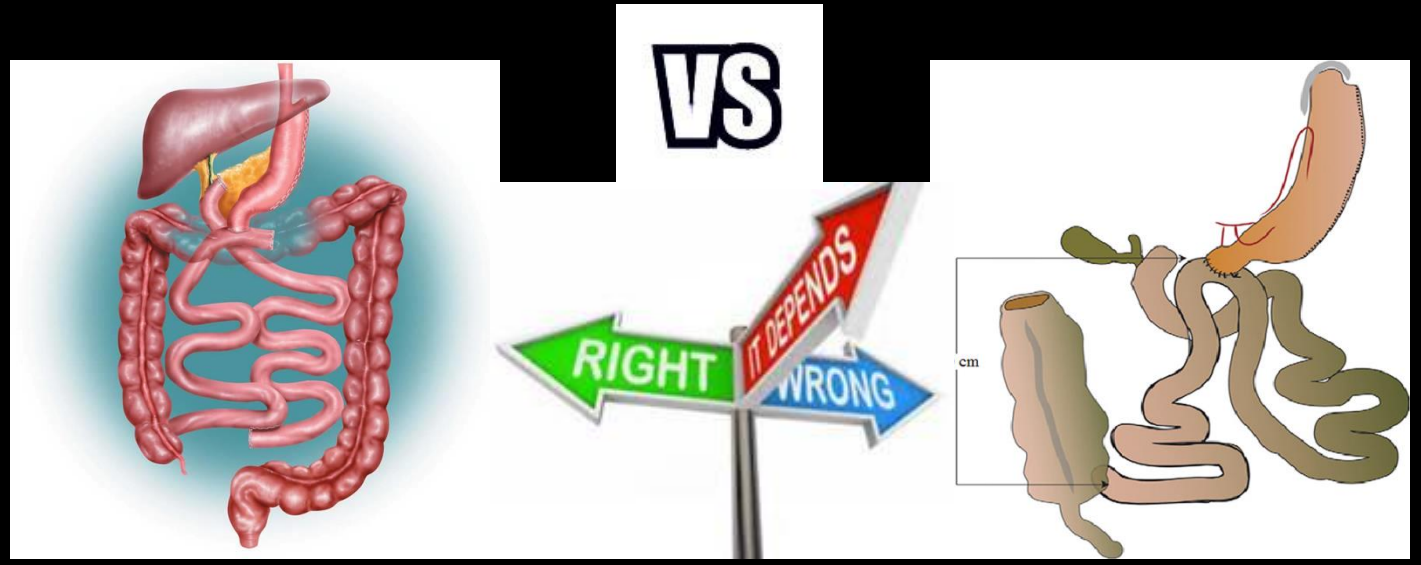


ypass
of IFSO: Atlas of Bariatric
and Metabolic Surgery

IdISSC
INSTITUTO de
INVESTIGACIÓN SANITARIA
Hospital Clínico San Carlos

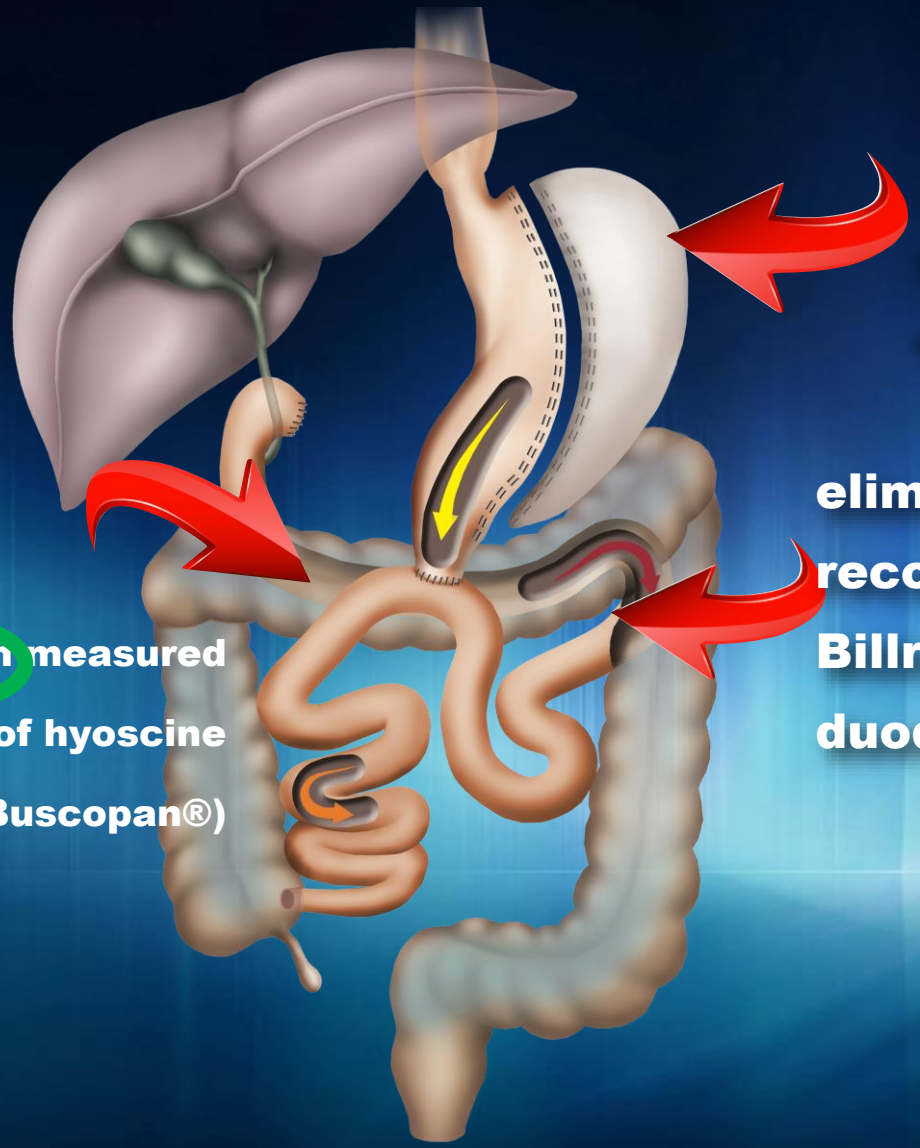
CLASSIC -DS

SADIS-OADS



" Switch to the Switch"

SADI-S



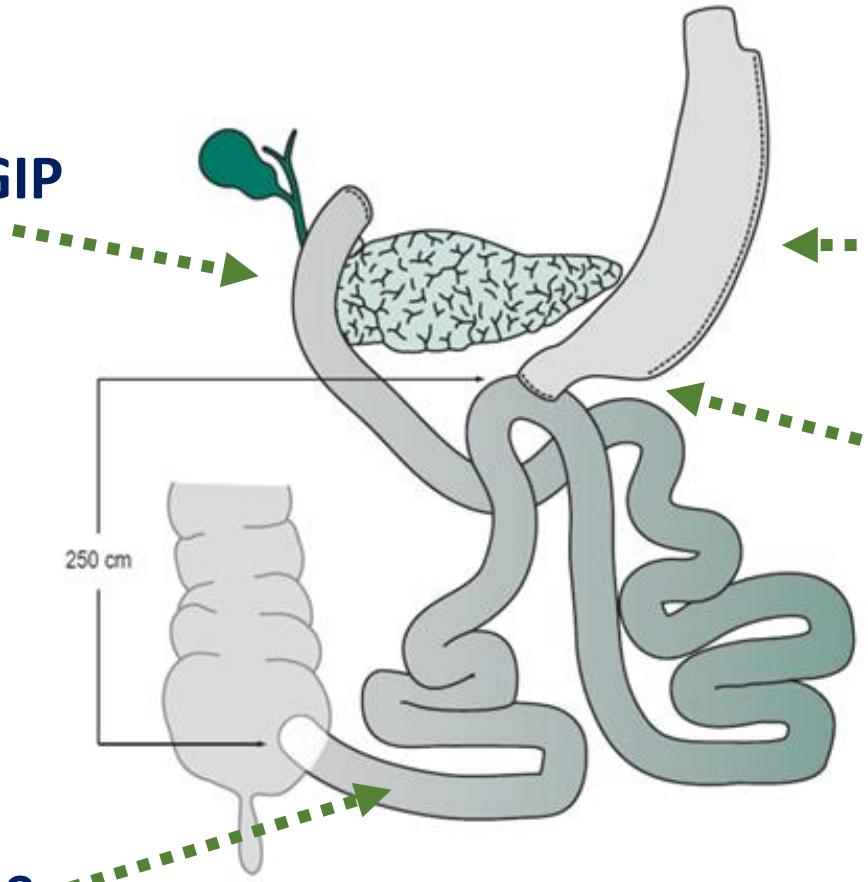
sleeve gastric resectio
over a 54F bougie

eliminates the Roux- en-Y
reconstruction and include
Billroth II-type one-loop
duodenoileostomy instead

the ileocolic junction is identified an 250 cm measured
proximally (formerl 200 cm), fter infusion of hyoscine
butylbromide (Buscopan®)

CAETANO
MARCHESINI

Duodenal Exclusion:
Secretion Decrease: CCK, GIP



Potencial Decrease: HCl, pepsin, intrinsic factor intrínseco (B12)

Pylorus Preservation: Less Dumping Syndrome

Hipoabsorption liposoluble vitamins : A,D,E,K

SADI-S

KEYS to SUCCESS

- Mild restriction
- Long Bilio-Pancreatic Limb
- Longer Common Channel
- Pylorus Preservation
- One (Duodenal) Anastomosis

Mild restriction

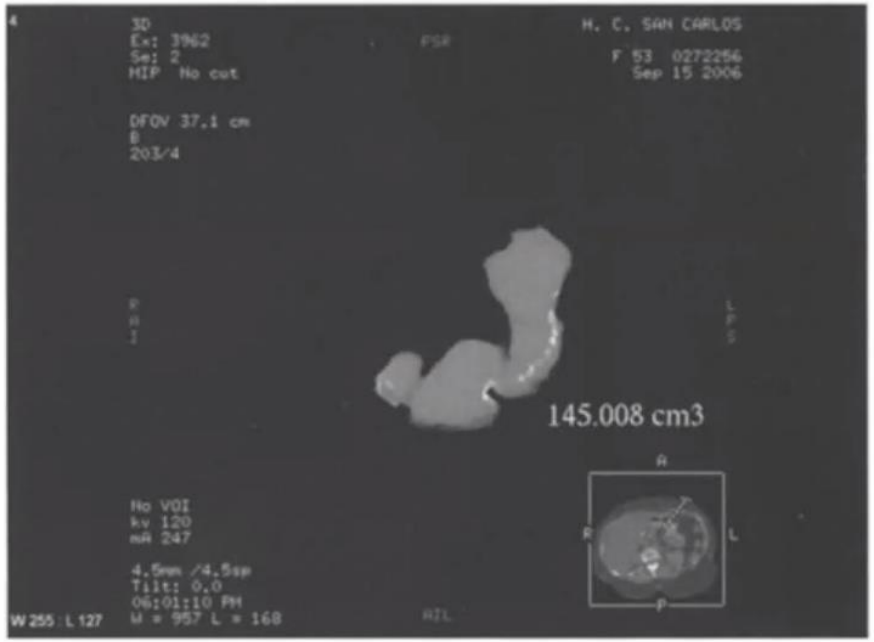
Wide bougie – 54 French:

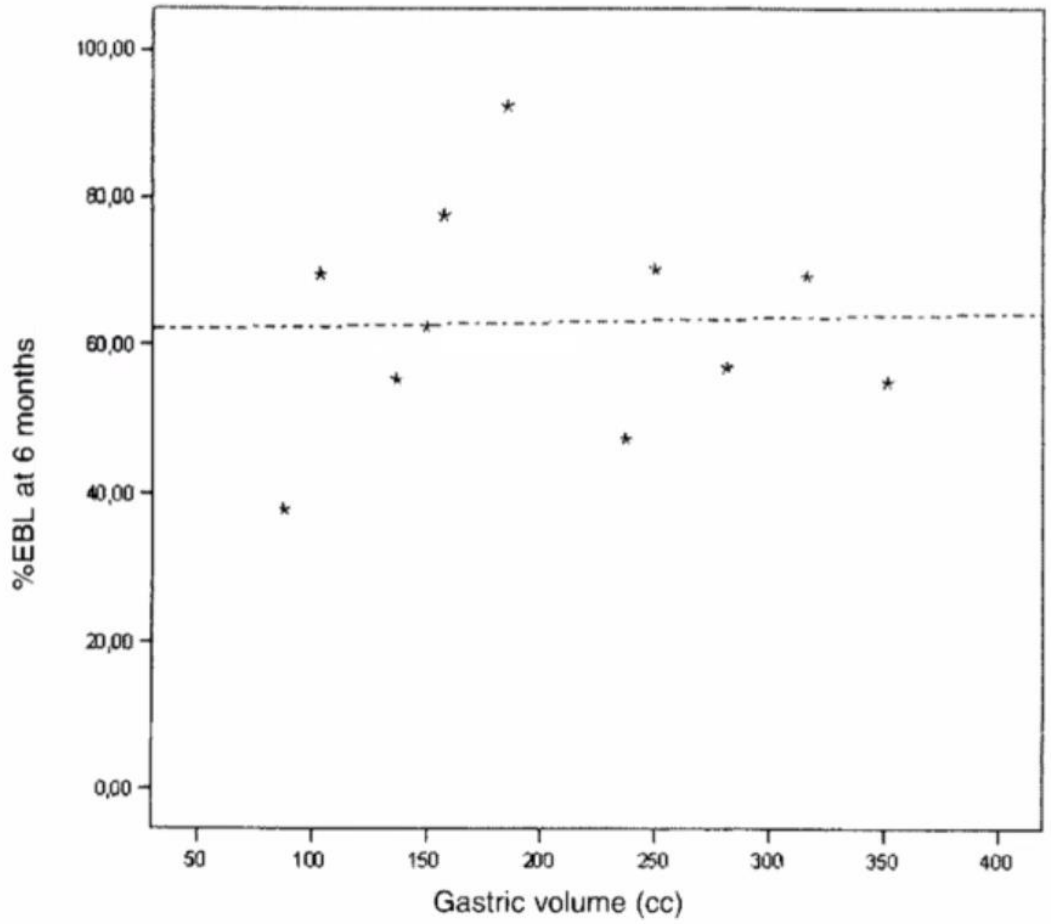
- Easier to perform
- Less complications (stricture-twist)

Mild restriction

Greater gastric volumen:

- Warrants intake
- Lowers intragastric pressure
- Does not affect negatively to weight loss





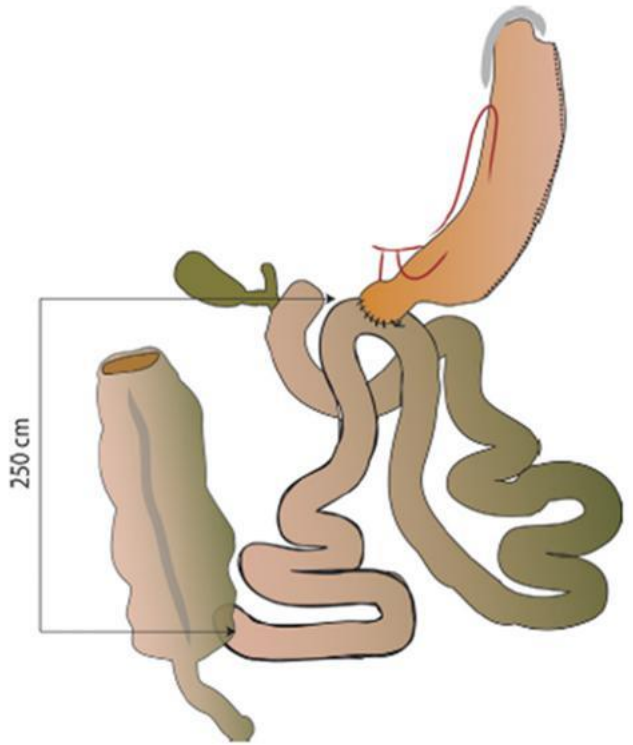
Sánchez-Pernaute A, Torres AJ et al.
Gastric tube volume after duodenal switch and its correlation to short-term weight loss. Obes Surg 2007;17:1178-1182

KEYS to SUCCESS

- Mild restriction
- Long Bilio-Pancreatic Limb
- Longer Common Channel
- Pylorus Preservation
- One (Duodenal) Anastomosis

SADIS: Long BP limb

- ↑ biliary acids absorption
- ↑ stimulation FXR e TGR
- ↑ stimulation L-cells and enterocites
- ↑ incretins (↑ GLP1, ↑ PYY, ↑ OXM, ↑ FGF-19)



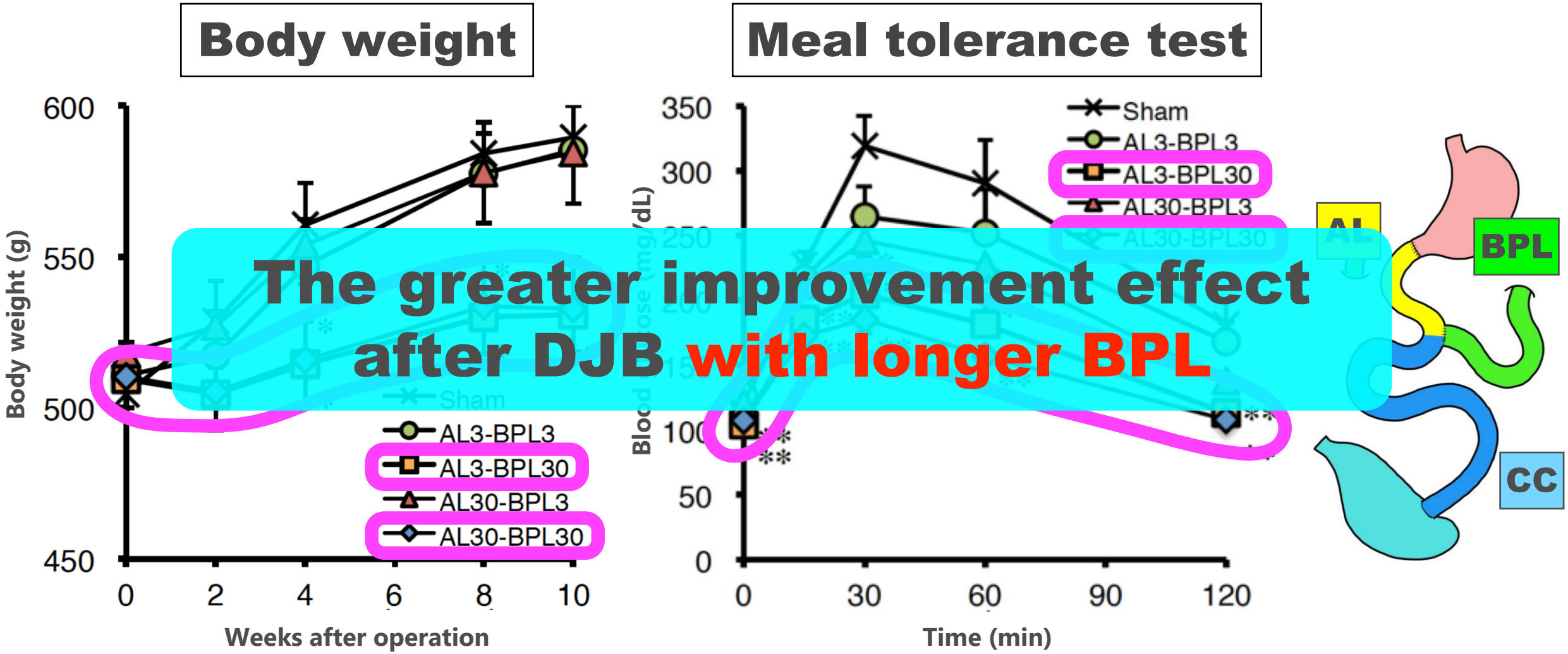
The significance of the Biliopancreatic-limb

Biliopancreatic limb plays an important role in metabolic improvement after duodenal–jejunal bypass in a rat model of diabetes

Tomohiro Miyachi, MD, PhD,[a] Munenori Nagao, MD, PhD,[a] Chikashi Shibata, MD, PhD,[b] Yoshiro Kitahara, PhD,[c] Naoki Tanaka, MD, PhD,[a] Kazuhiro Watanabe, MD, PhD,[a] Takahiro Tsuchiya, MD,[a] Fuyuhiko Motoi, MD, PhD,[a] Takeshi Naitoh, MD, PhD, FACS,[a] *and* Michiaki Unno, MD, PhD,[a] *Sendai and Kanagawa, Japan*

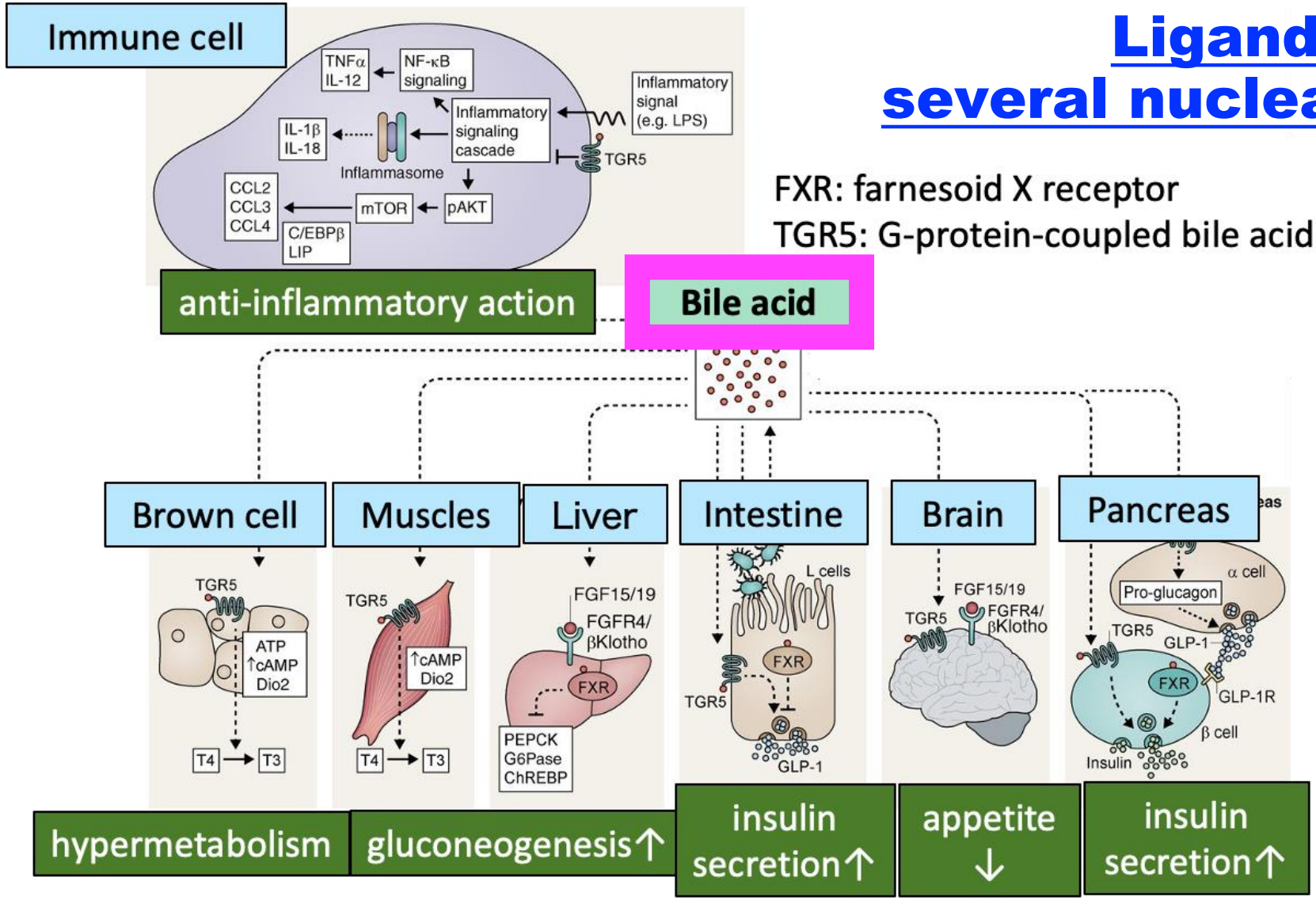
Miyachi T, Naitoh T, et al. Surgery 2016; 159(5): 1360-1371.

Comparison of DJB with various limb lengths



Miyachi T, Naitoh T, et al. Surgery 2016; 159(5): 1360-1371

Bile acids and metabolic improvement effects



Ligands of several nuclear receptors

FXR: farnesoid X receptor

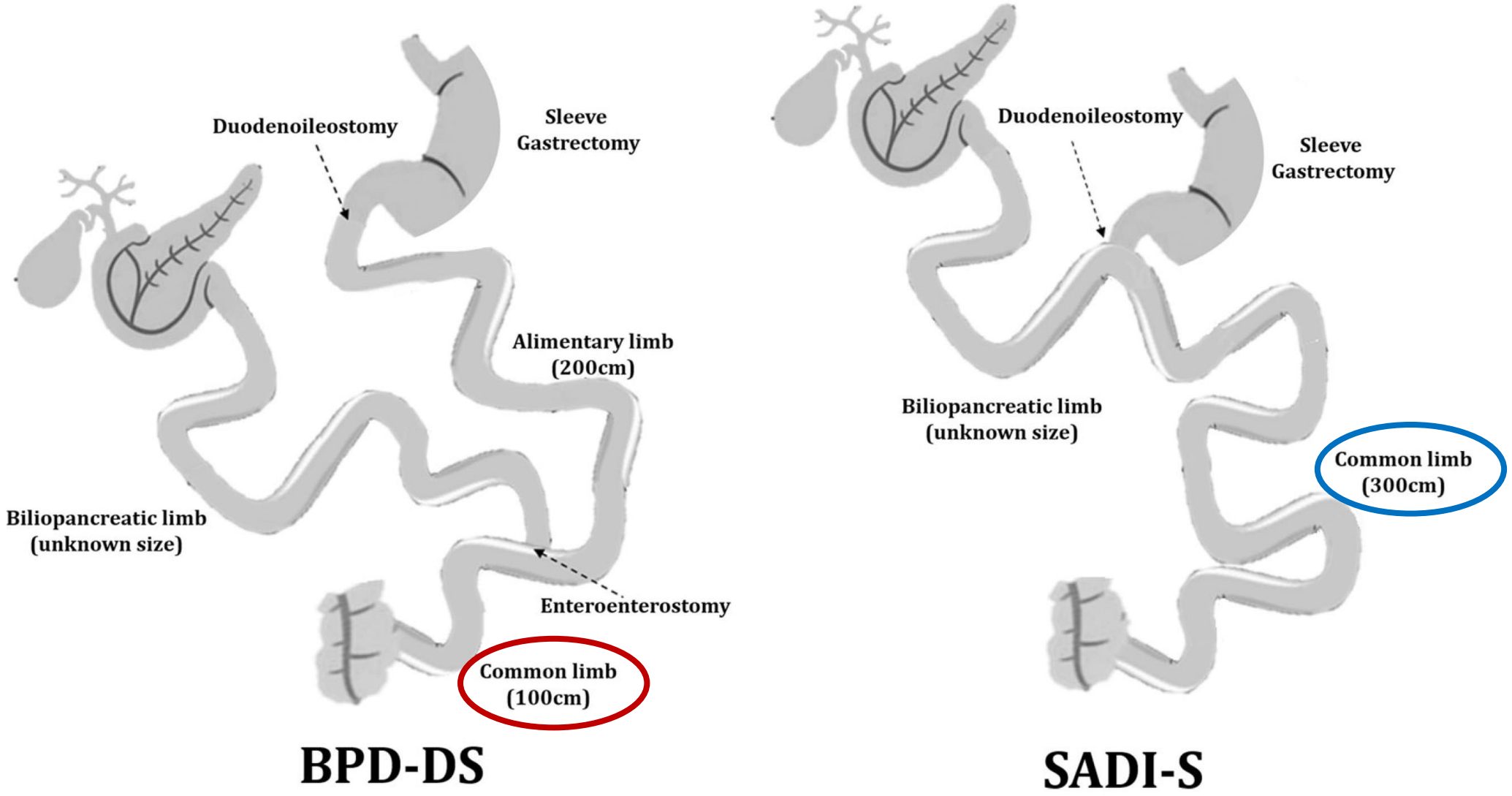
TGR5: G-protein-coupled bile acid receptor

Hagit Shapiro et al. J Exp Med doi:10.1084/jem.20171965

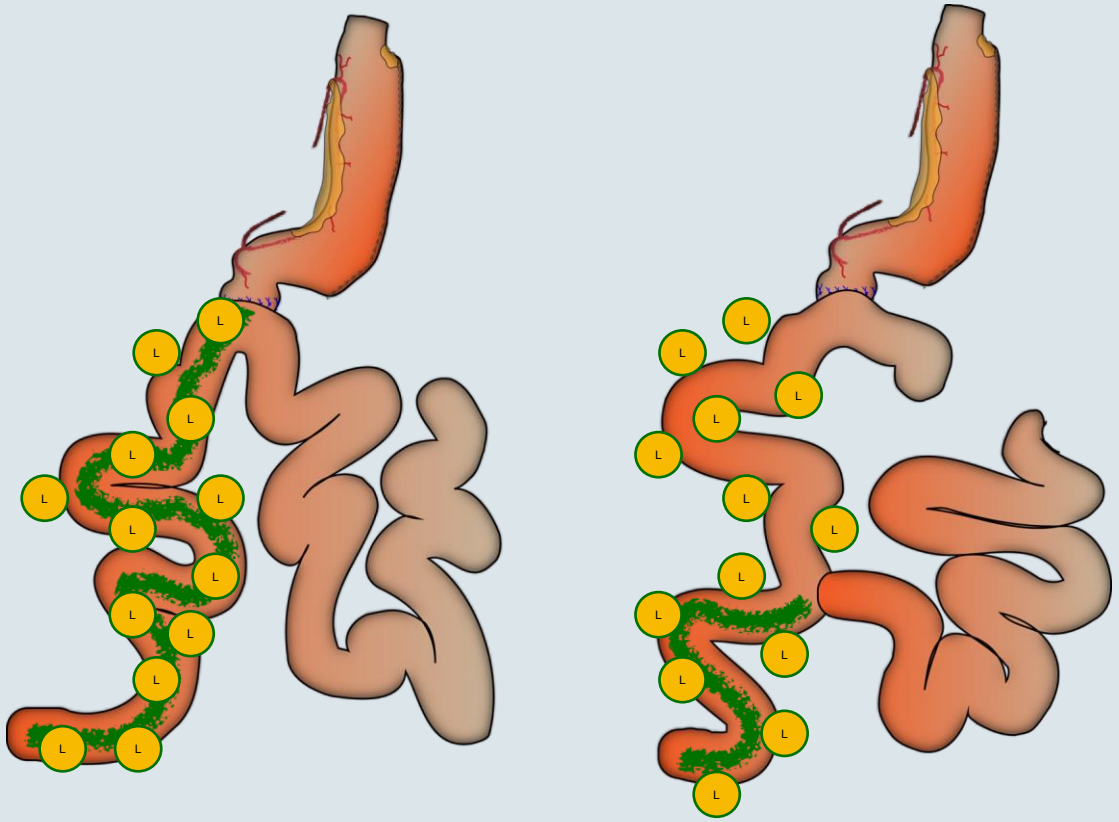
KEYS to SUCCESS

- Mild restriction
- Long Bilio-Pancreatic Limb
- Longer Common Channel
- Pylorus Preservation
- One (Duodenal) Anastomosis

SADIS has a LONGER COMMON CHANNEL than BPD-DS



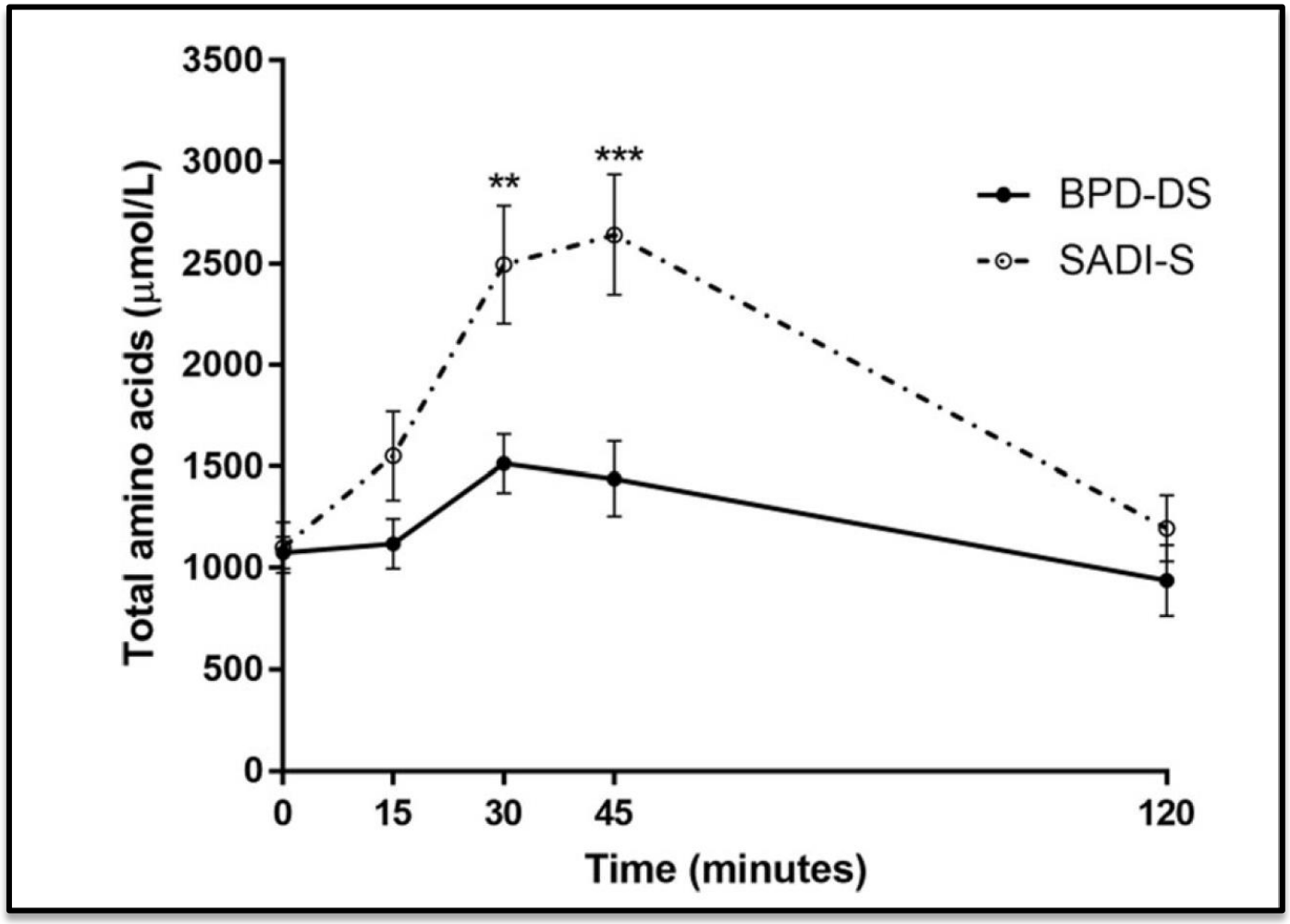
One-anastomosis techniques permit a longer common channel than Roux-en-Y



- Milder malabsorption
- Less number of bowel movements
- Better QoL

- Longer time of contact bile acids and mucosa
- Greater stimulation TGR5 receptors
- Greater GLP-1 secretion
- Better metabolic effect

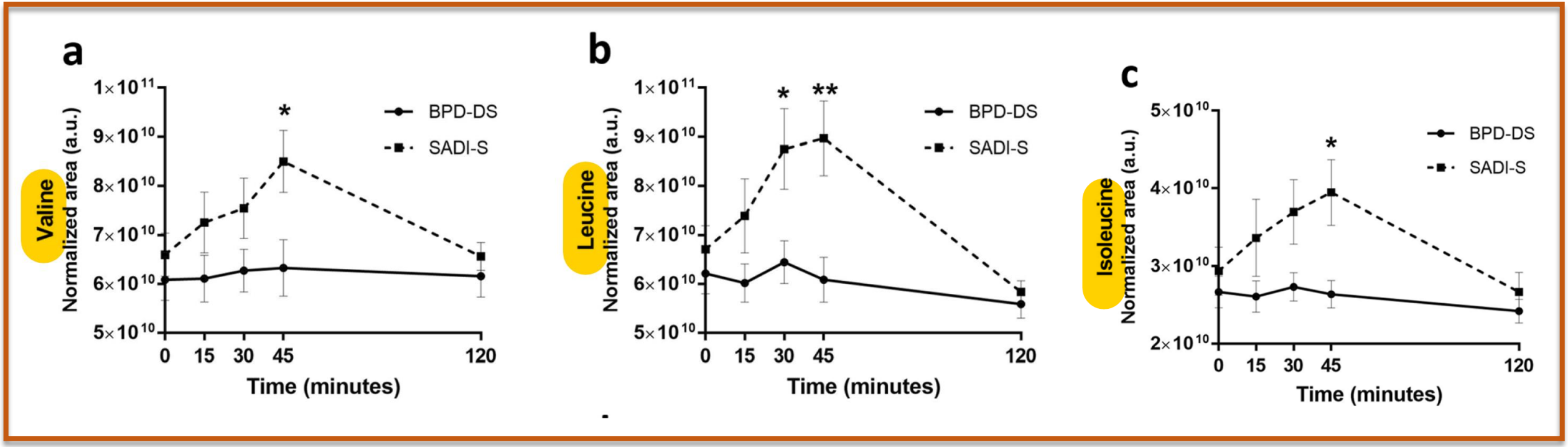
Brain Chain AminoAcids (BCAA) absorption is Superior in SADIS vs BPD-DS patients after Mixed Meal Test



Aminogram by Nuclear Magnetic Resonance (NMR) Spectrometry

Pereira SS, et al. Obes Surg. 2020 Oct;30(10):4019-4028.

Brain Chain AminoAcids (BCAA) absorption is Superior in SADIS vs BPD-DS patients after Mixed Meal Test



Aminograma realizado mediante espectroscopia NMR

Pereira SS, et al. Obes Surg. 2020 Oct;30(10):4019-4028.

KEYS to SUCCESS

- Mild restriction
- Long Bilio-Pancreatic Limb
- Longer Common Channel
- Pylorus Preservation
- One (Duodenal) Anastomosis

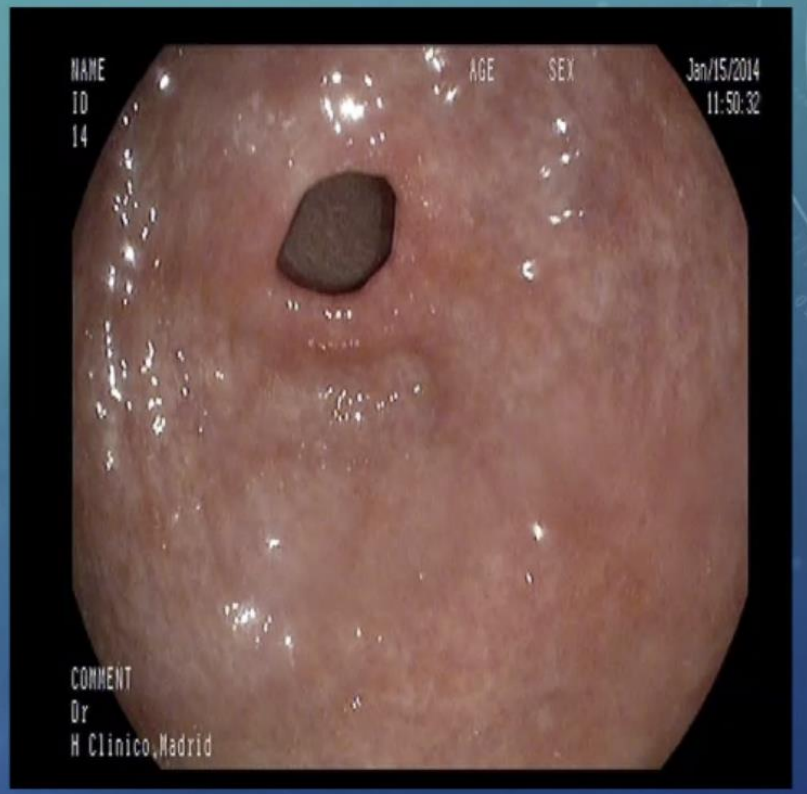
Pylorus

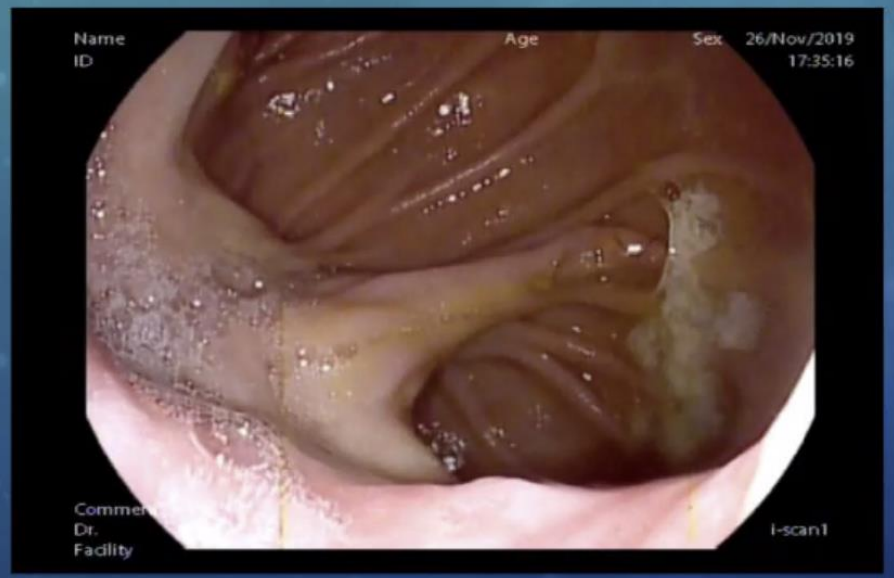
- Avoids biliary reflux into the stomach

- The anastomosis is safer – mucous tamponade

- Coordinates gastric emptying – glycemic control

PYLORIC PRESERVATION





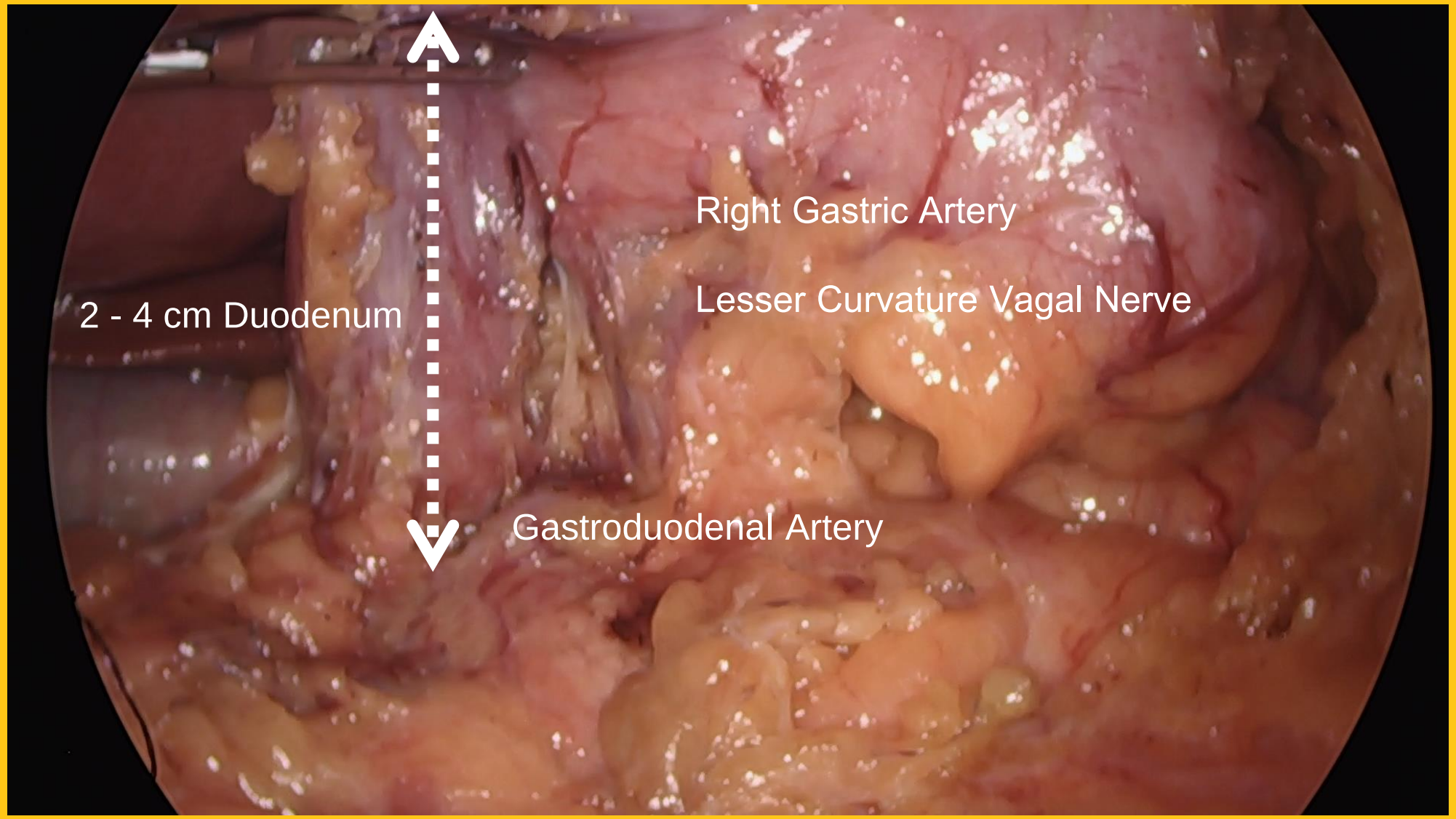
Antral preservation

GERD

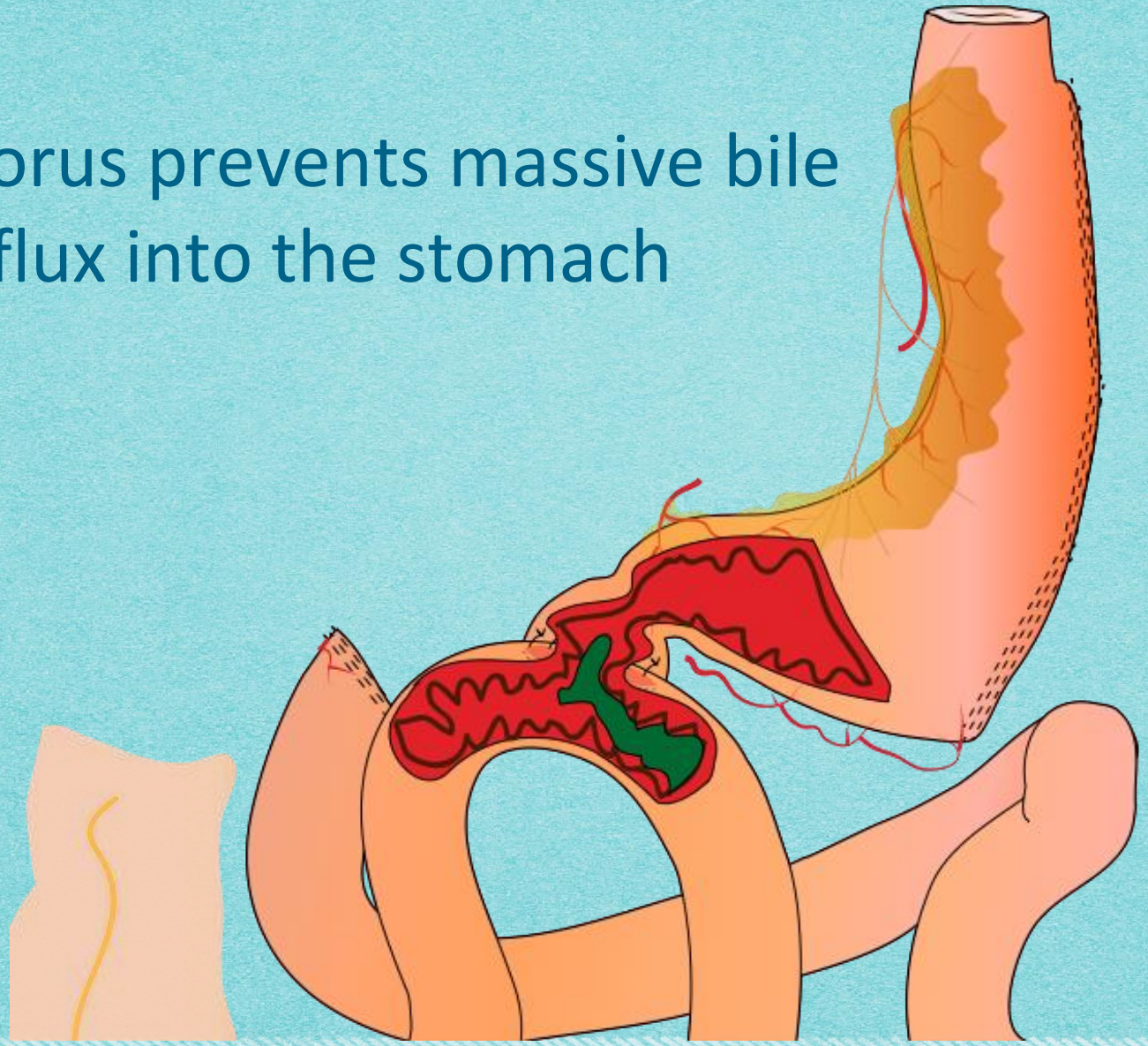
Gastric emptying

Motility

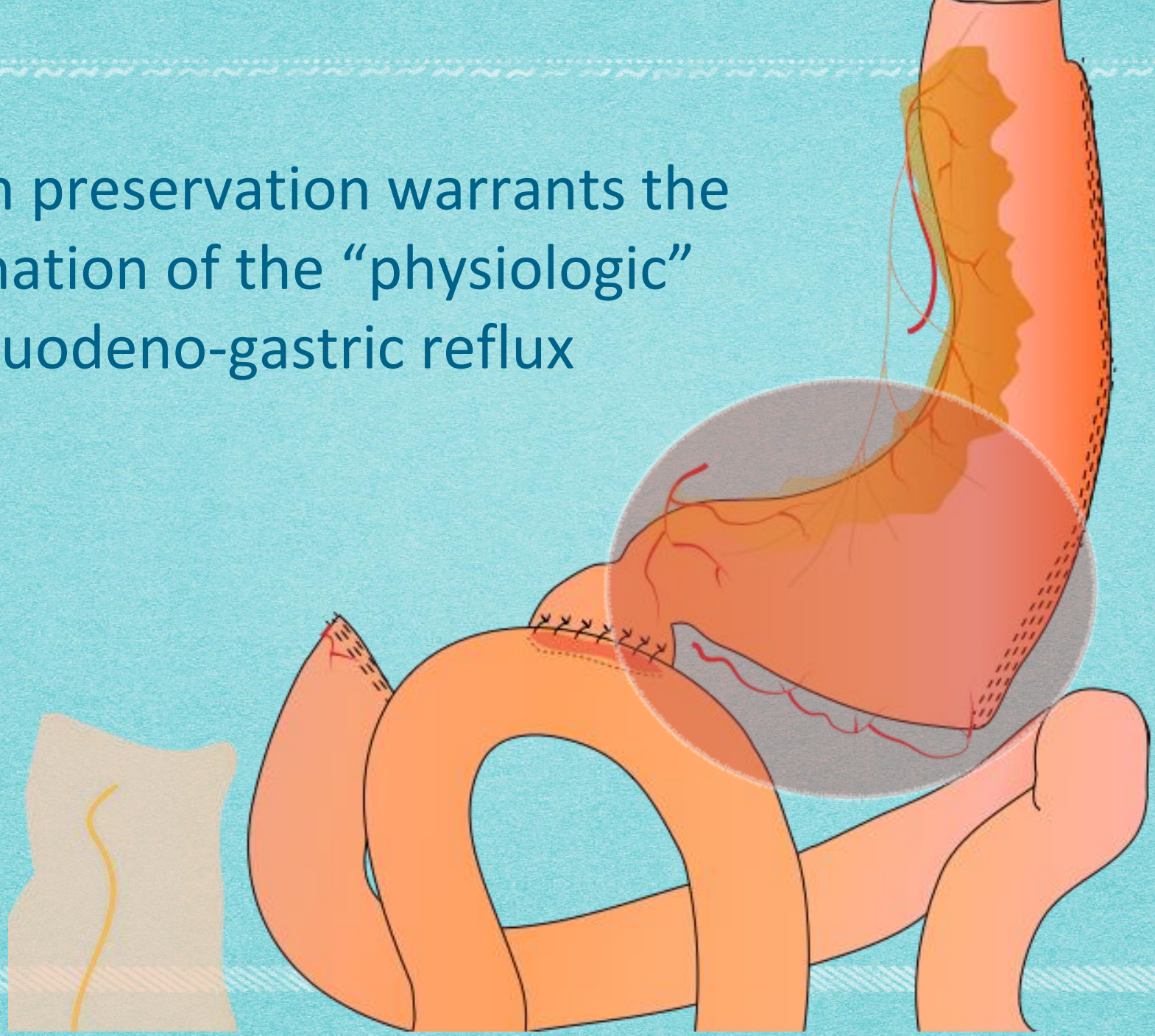
Blood Supply and Vagus Nerve Preservation



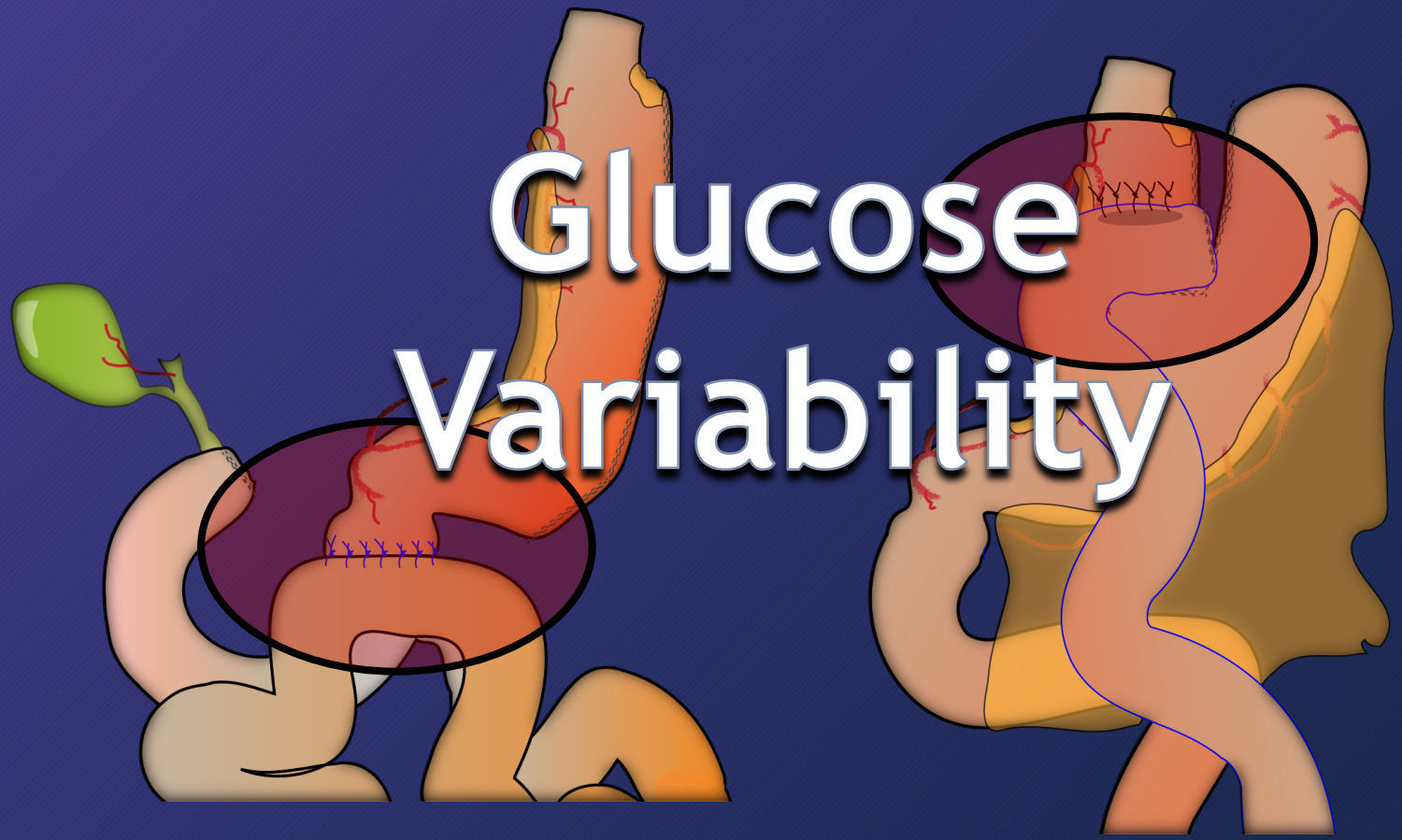
The pylorus prevents massive bile reflux into the stomach

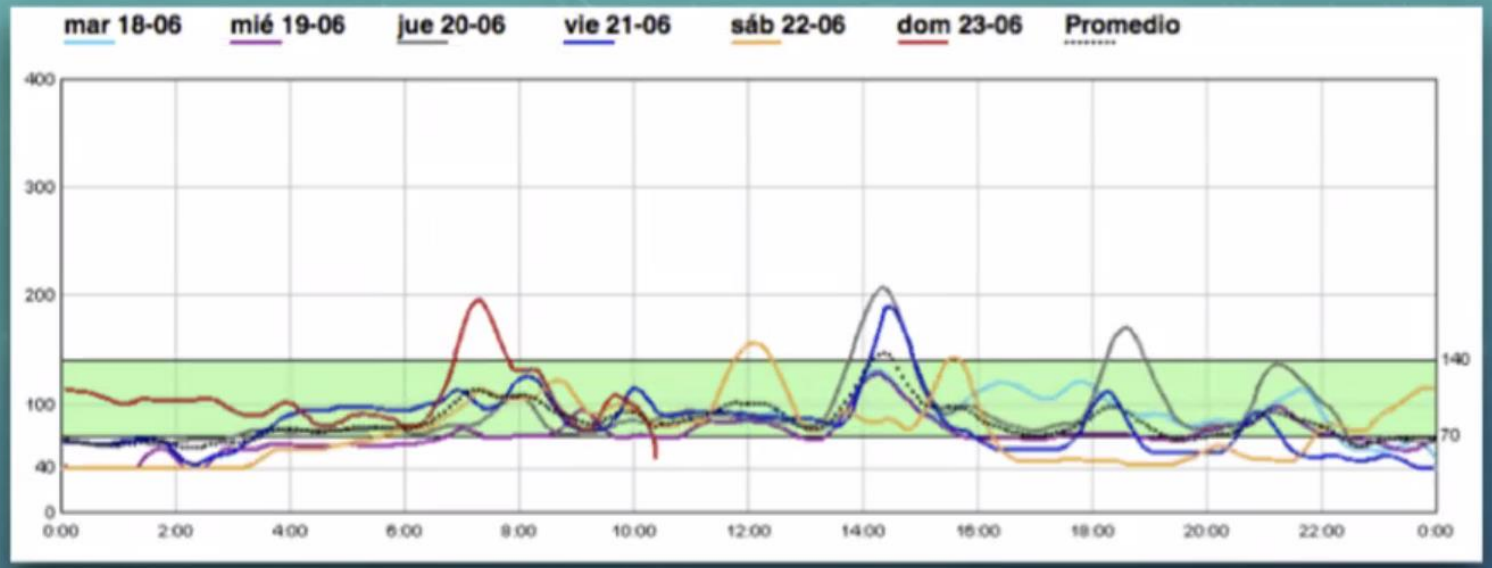


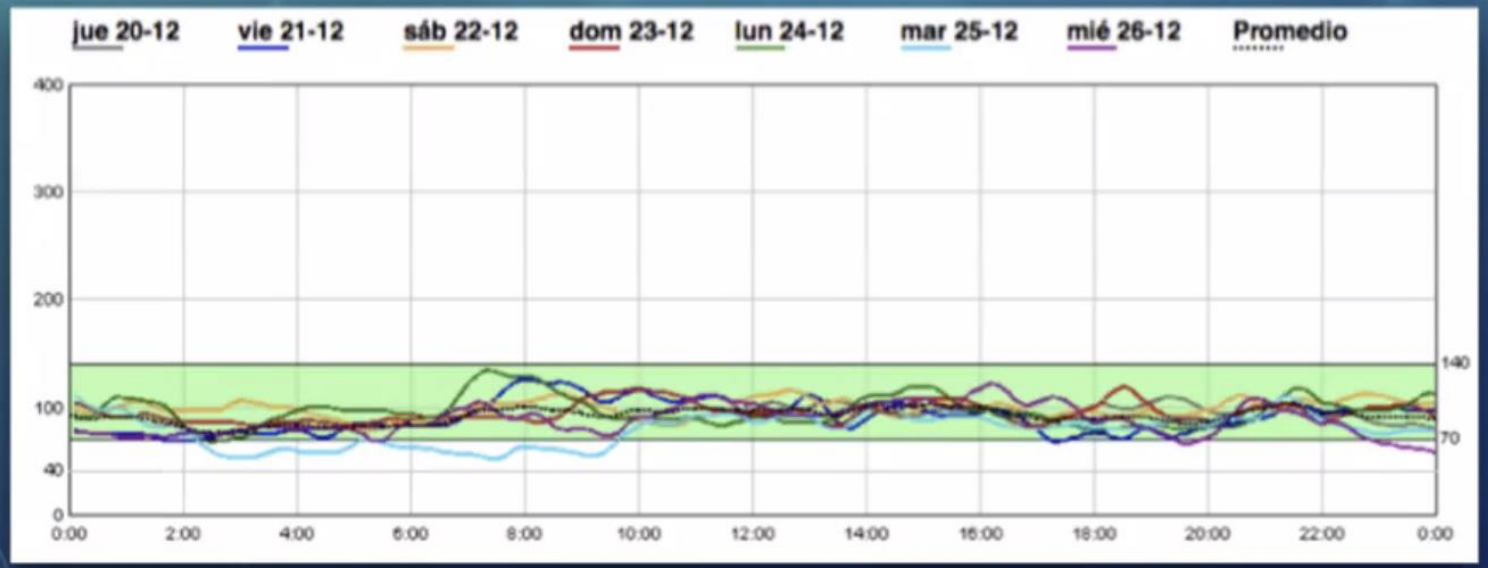
Antrum preservation warrants the elimination of the “physiologic” duodeno-gastric reflux



Glucose Control – RYGB vs SADI-S




mar 18-06
mié 19-06
jue 20-06
vie 21-06
sáb 22-06
dom 23-06
Promedio
400
300
200
100
40
0
140
70
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00


jue 20-12
vie 21-12
sáb 22-12
dom 23-12
lun 24-12
mar 25-12
mié 26-12
Promedio
400
300
200
100
40
0
140
70
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00

OBES SURG
https://doi.org/10.1007/s11695-017-2960-7

BRIEF COMMUNICATION

Glucose Variability After Bariatric Surgery: Is Prediction of Diabetes Remission Possible?

Ana M. Ramos-Leví[1] · Andrés Sánchez-Pernaute[2] · Clara Marcuello[3] · Mercedes Galindo[3] · Alfonso L. Calle-Pascual[3,4] · Antonio J. Torres[2] · Miguel A. Rubio[3]

	RYGB	SADI-S	*p*
Age (years)	54.9 ± 8.1	54.8 ± 9.2	0.981
Diabetes duration (years)	6.7 ± 5.5	6.9 ± 4.7	0.906
Preop BMI (kg/m^2)	41.2 ± 7.0	44.0 ± 3.8	0.240
Preop HbA1c (%)	6.8 ± 0.8	7.2 ± 1.1	0.287
Insulin use, *N* (%)	3 (25%)	6 (50%)	0.206
Mean BG (mg/dl)	87	93	0.163
SD (mg/dl)	23	15	0.002
CV (mg/dl)	0.26	0.16	0.000
Max BG (mg/dl)	193	149	0.004
Min BG (mg/dl)	49	53	0.283
% time in BG < 70 mg/dl	21	7	0.010
% time in BG 70–140 mg/dl	74	90	0.002
% time in BG > 140 mg/dl	5	2	0.004

“Adipostat” Model of Body-Weight Regulation

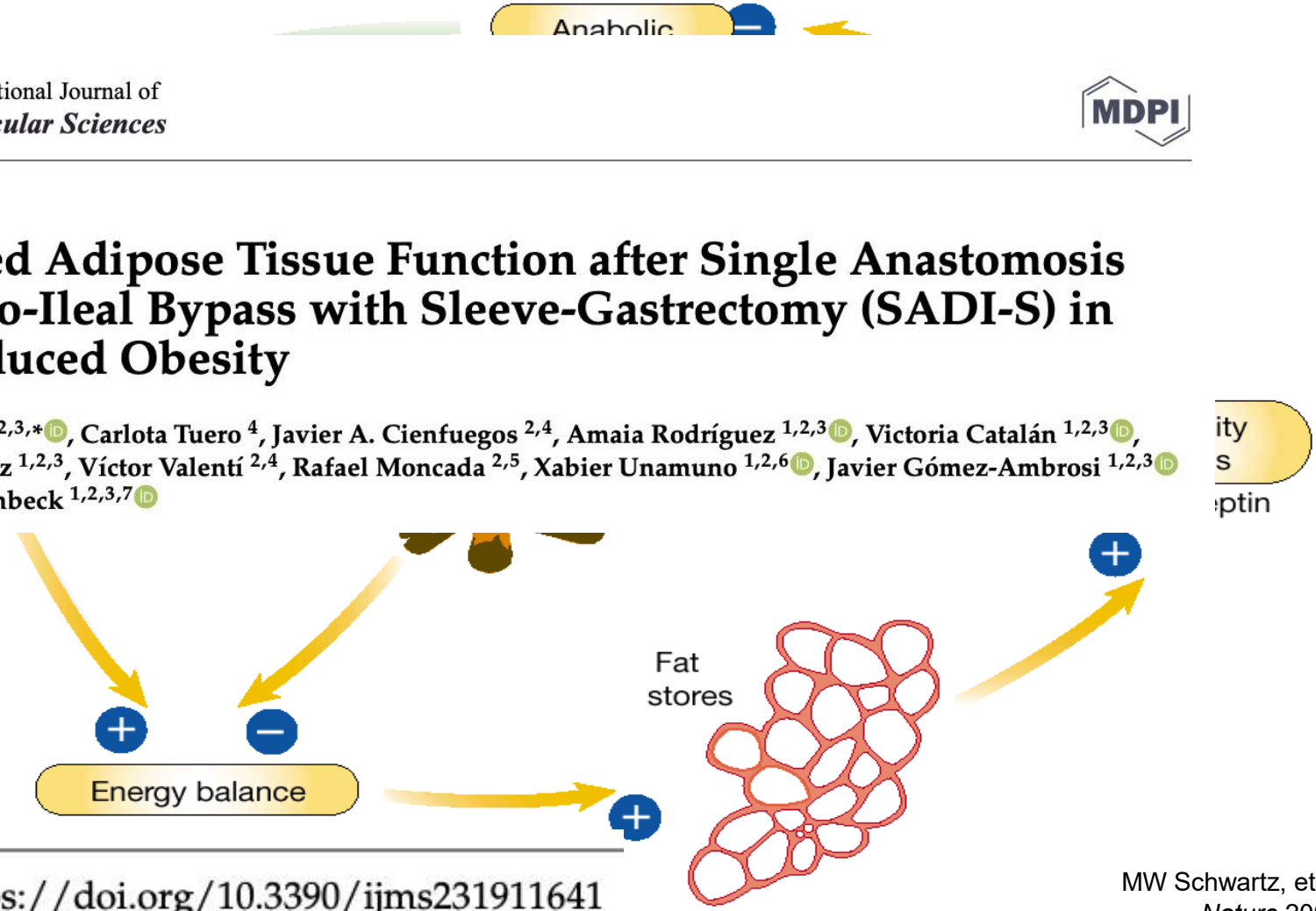
International Journal of *Molecular Sciences*

MDPI

Article

Improved Adipose Tissue Function after Single Anastomosis Duodeno-Ileal Bypass with Sleeve-Gastrectomy (SADI-S) in Diet-Induced Obesity

Sara Becerril [1,2,3,*], Carlota Tuero [4], Javier A. Cienfuegos [2,4], Amaia Rodríguez [1,2,3], Victoria Catalán [1,2,3], Beatriz Ramírez [1,2,3], Víctor Valentí [2,4], Rafael Moncada [2,5], Xabier Unamuno [1,2,6], Javier Gómez-Ambrosi [1,2,3] and Gema Frühbeck [1,2,3,7]

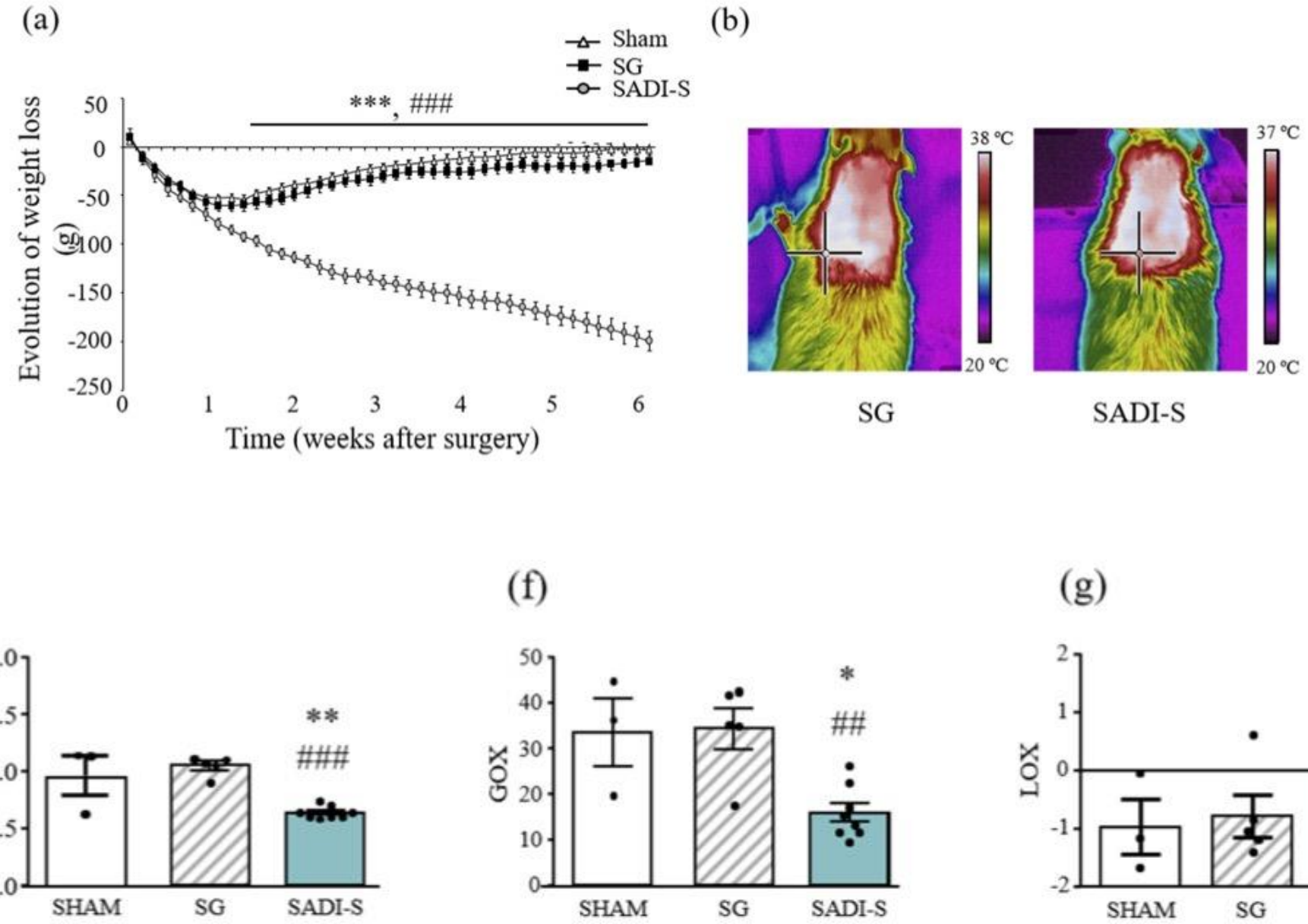


Int. J. Mol. Sci. **2022**, *23*, 11641. https://doi.org/10.3390/ijms231911641

MW Schwartz, et al
Nature 2000

Weight loss and glycemic effects derived from bariatric surgery were traditionally thought to be the result of caloric restriction (reduced gastric volume) and/or malabsorption of ingested nutrients, but these modifications do not fully account for the magnitude of weight loss observed after surgery. Recent studies have demonstrated that changes in energy balance physiology and adipose tissue (AT) mass are the primary mechanisms [6,7], suggesting that molecular mechanisms affecting metabolism underlie the effect of bariatric surgery. AT can be classified into white, brown or beige fat. While white adipose tissue (WAT) is a heterogeneous tissue mainly comprised of lipid-filled adipocytes that store energy reserves as fat, brown (BAT) and beige ATs (BeAT) are highly active metabolic organs specialized in non-shivering thermogenesis [8].

of ingested nutrients, but these modifications do not fully account for the magnitude of weight loss observed after surgery. Recent studies have demonstrated that changes in energy balance physiology and adipose tissue (AT) mass are the primary mechanisms [6,7], suggesting that molecular mechanisms affecting metabolism underlie the effect of bariatric surgery. AT can be classified into white, brown or beige fat. While white adipose tissue (WAT) is a heterogeneous tissue mainly comprised of lipid-filled adipocytes that store energy reserves as fat, brown (BAT) and beige ATs (BeAT) are highly active metabolic organs specialized in non-shivering thermogenesis [8].


(a)
Sham
SG
SADI-S
***, ###
Evolution of weight loss (g)
50
0
-50
-100
-150
-200
-250
0
1
2
3
4
5
6
Time (weeks after surgery)
(b)
38 °C
20 °C
37 °C
20 °C
SG
SADI-S
(e)
RQ (Arbitrary Units)
2.0
1.5
1.0
0.5
0.0
**
###
SHAM
SG
SADI-S
(f)
GOX
50
40
30
20
10
0
*
##
SHAM
SG
SADI-S
(g)
LOX
2
1
0
-1
-2
##
***
SHAM
SG
SADI-S

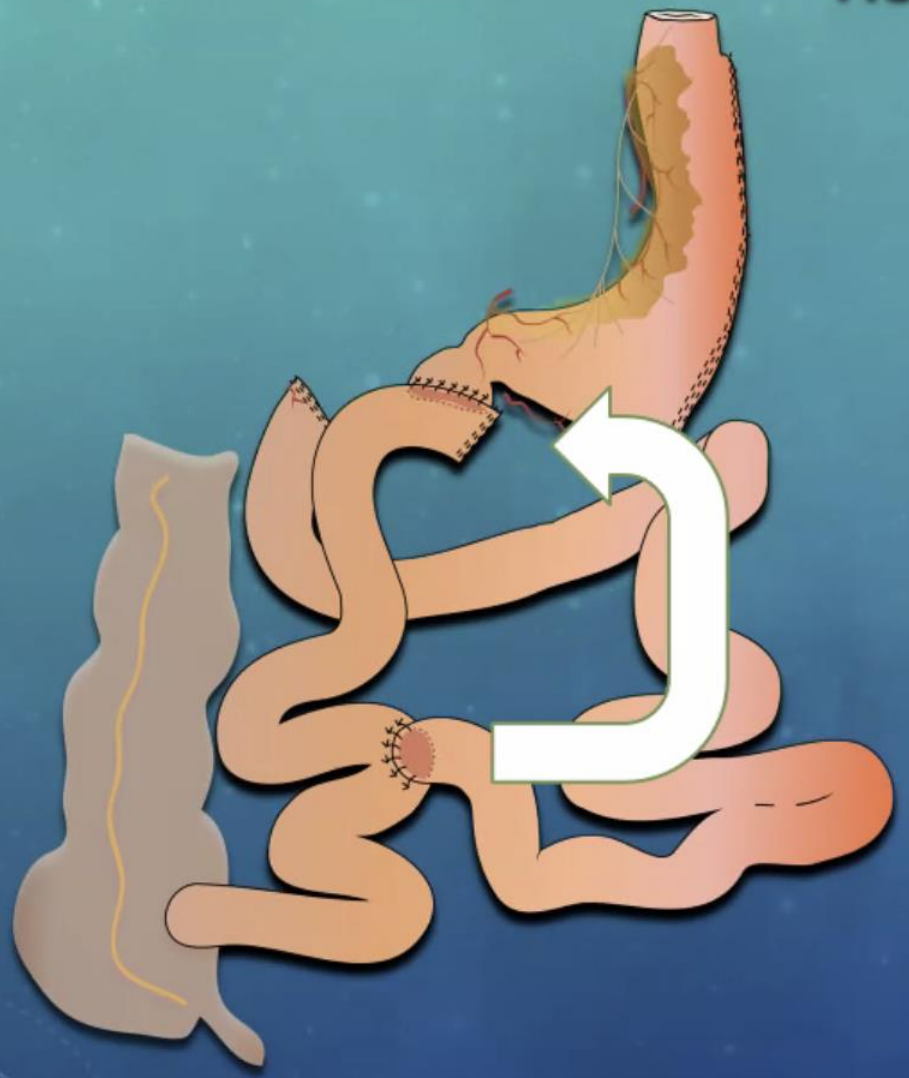
4. Conclusions

The present study indicates a fundamental difference in the amelioration of metabolic parameters between SADI-S and SG, suggesting that the manipulation of different parts of the gastrointestinal tract may lead to different physiologic effects. Our data provide new insights into the improvement of AT function after SADI-S, reinforcing the notion of the plausible beneficial effect of the SADI-S against obesity due to increased WAT browning, constituting an important mechanism that might explain the metabolic differences between surgical techniques

Additional studies assessing the impact of SADI-S on adipose tissue function in humans will be helpful to better understand the molecular mechanisms underlying the beneficial metabolic effects of this bariatric surgical procedure.

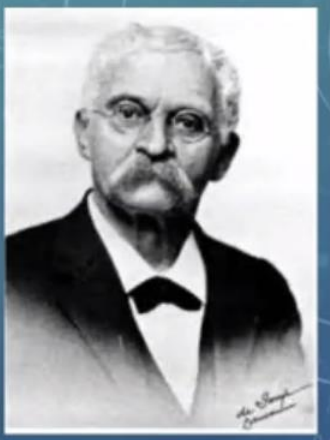
KEYS to SUCCESS

- Mild restriction
- Long Bilio-Pancreatic Limb
- Longer Common Channel
- Pylorus Preservation
- One (Duodenal) Anastomosis



Roux en Y anastomosis intention:

- Avoid tensión
- Avoid biliary reflux



Pyloric preservation permits elimination of the Roux limb

Longer common limb
Less malabsorption
Better QoL

SADI-S:

SINGLE ANASTOMOSIS DUODENO–ILEAL BYPASS WITH SLEEVE GASTR

2007 - 2009: 50 patients submitted to SADI-S **200 CM**

September 2009: SADI-S 250 cm

2009: First patient submitted to SADI-S as a second step

2007 - 2022: 809 patients submitted to SADI-S 200-250-300 cm

Long-Term Results of Single-Anastomosis Duodeno-ileal Bypass with Sleeve Gastrectomy (SADI-S)

Andrés Sánchez-Pernaute[1] · Miguel Ángel Rubio Herrera[2] · Natalia Pérez Ferré[2] · Carlos Sáez Rodríguez[1] · Clara Marcuello[2] · Clara Pañella[1] · Leyre Lopez Antoñanzas[1] · Antonio Torres[1] · Elia Pérez-Aguirre[1]

Obes Surg 2022

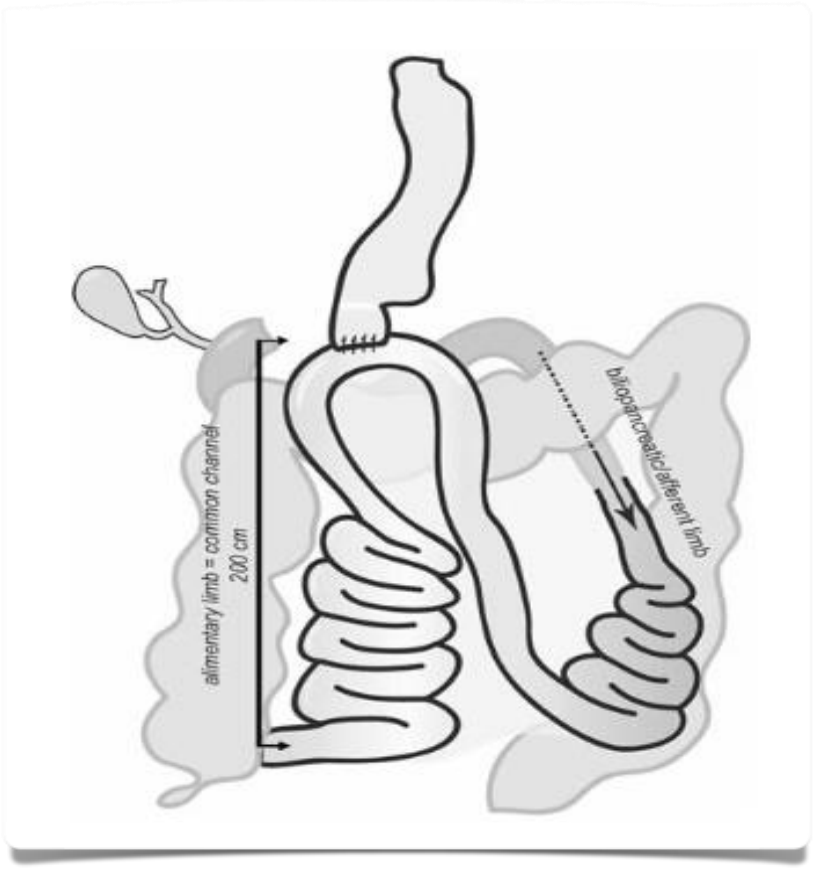
-164 patients (75% fu 10 y)
-47 y (22-71)
-BMI 45.8 Kg/m² (34-67)
-women 99, men 65
-200 cm (50), 250 cm (99), 300 cm 15
-12 surgery hypoproteinemia (7 (200 cm), 5 (250 cm))
-Def ferritin 66,7%, Vit D 57,9%, Vit A 26,7%
-Stool frec 2,4 (0-8)/2,1 (0-6)
-36 gastroscopy , 1 IQ hiatal hernia

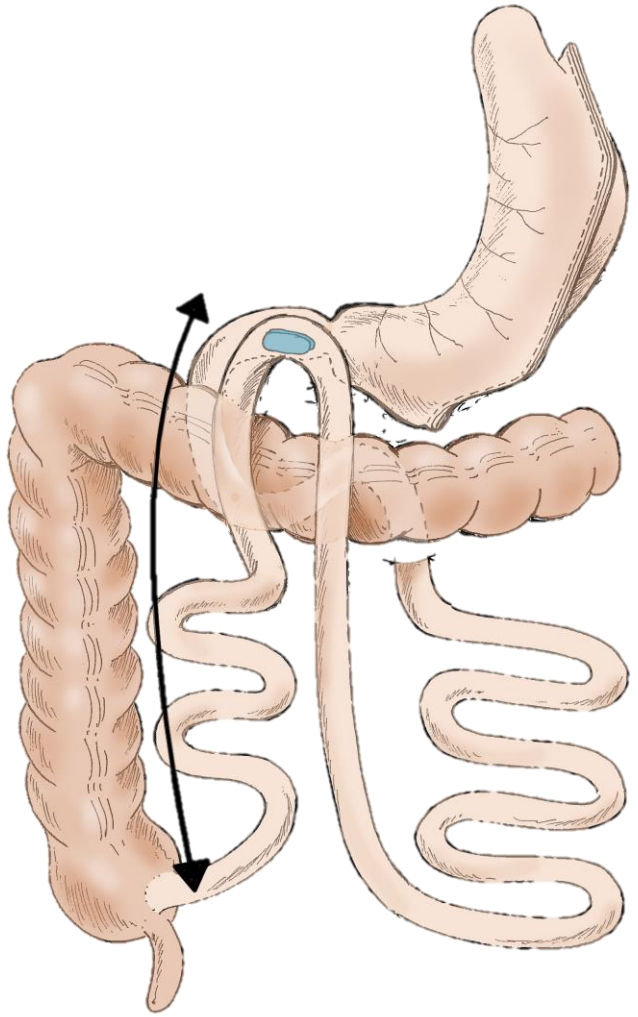
Time	BMI	EWL (%)	TWL (%)	% failures
Basal	45.8	0	0	0
1 year	26.5	95.5	42	1/153–0.6
2 years	26,2	96.6	42.5	2/146–1.3
3 years	26.9	92.7	41	4/144–2.7
4 years	27.5	89.9	39.7	5/143–3.4
5 years	28	87.8	38.8	8/139–5.7
6 years	27.8	88.7	38.9	5/114–4.4
7 years	28.2	86.8	38	5/104–4.8
8 years	28.3	85.7	37.2	7/95–7.3
9 years	28.4	83.2	36.1	8/82–9.7
10 years	28.9	80.4	34.4	7/60–11.6

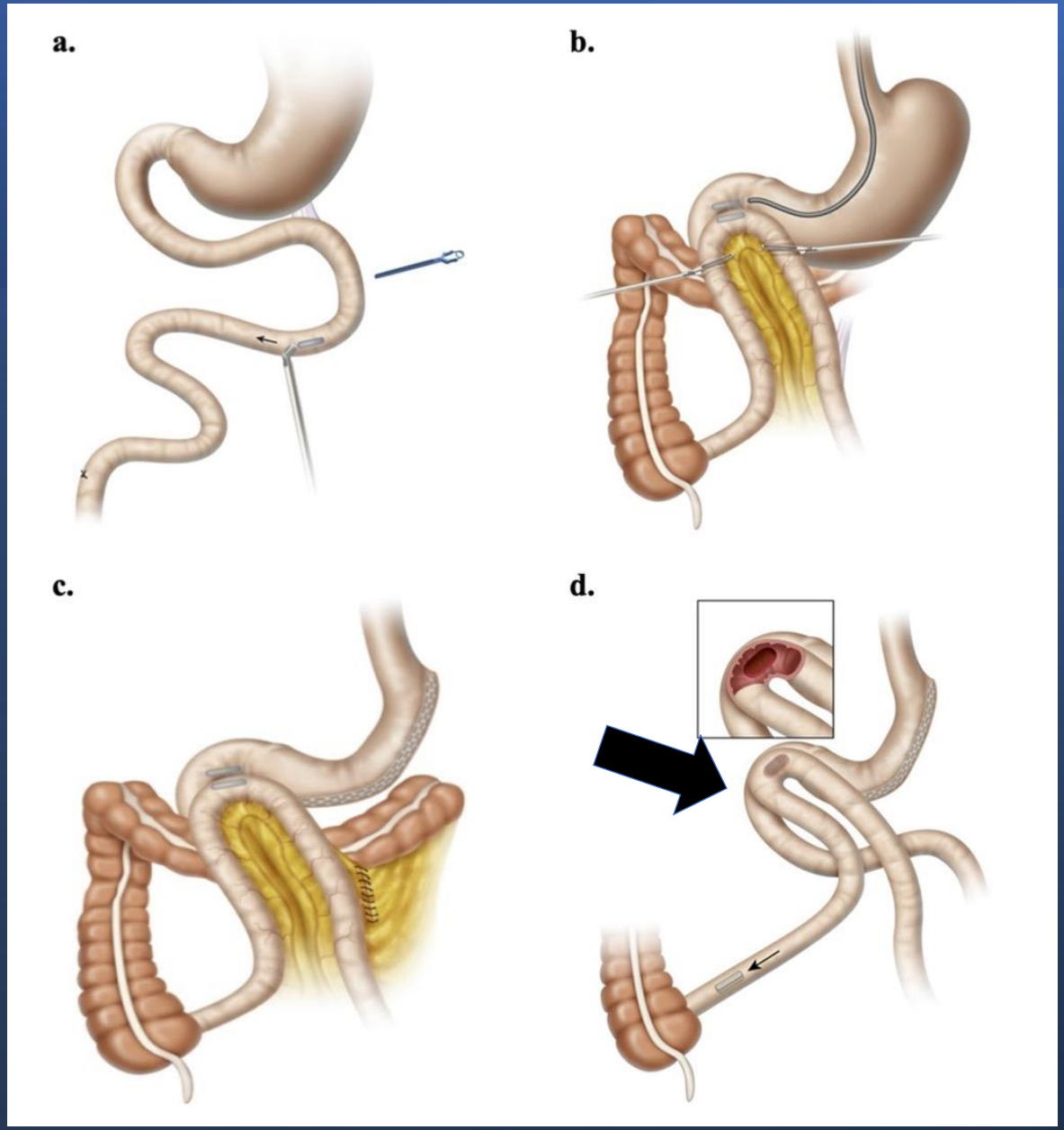
	Preoperative	5 years	10 years
Insulin (*n*)	41	7	12
Oral (*n*)	47	17	27
Diet/no. therapy (*n*)	13	77	62
Glycemia (mg/dL)	169.8 (88–408)	104.16	118.2 (74–207)
HbA1c (%)	7.69 (5.4–14)	5.51	5.86 (4.6–7.9)
Arterial hypertension (%)	56	25.7	14
Obstructive apnea (%)	54	5.8	2.1

	Preoperative			5 years			10 years		
	Mean	Range	% abnormal	Mean	Range	% abnormal	Mean	Range	% abnormal
Triglycerides (mg/dL)	183	50–799	57	90.7	37–232	7	113	49–362	20
HDL (mg/dL)	47.8	23–82	24	53.4	28–85	10.6	54.4	31–92	13
LDL (mg/dL)	105.2	35–197	64	84.4	26–187	23	90.6	21–172	36
Cholesterol (mg/dL)	190	110–313	41	157.2	84–273	8	166.4	100–264	8.5
Dyslipidemia (%)			72			35			53.8

SADIS → Duodenal-Bipartition






a.
b.
c.
d.

Surgical Endoscopy (2023) 37:6452–6463
https://doi.org/10.1007/s00464-023-10134-6

2023 SAGES ORAL

Side-to-side magnet anastomosis system duodeno-ileostomy with sleeve gastrectomy: early multi-center results

Michel Gagner[1,8] · Guy-Bernard Cadiere[2] · Andres Sanchez-Pernaute[3] · David Abuladze[4] · Todd Krinke[5] · J. N. Buchwald[6] · Nathalie Van Sante[7] · Marc Van Gossum[2] · Jana Dziakova[3] · Levan Koiava[4] · Maja Odovic[3] · Mathilde Poras[2] · Lamees Almutlaq[1] · Antonio J. Torres[3]

Table 2 Evolution of weight and clinical parameters after side-to-side magnetic duodeno-ileostomy with sleeve gastrectomy

	Baseline	6-month follow-up (n = 24)			12-month follow-up (n = 5)		
	Mean ± SEM	Mean ± SEM	Mean change ± SEM (95%CI)	P-value	Mean ± SEM	Mean change ± SEM (95%CI)	P-value
Weight							
Absolute wt, kg	121.9 ± 3.3	87.8 ± 2.8	34.2 ± 1.6 (30.9, 37.4)	< 0.001	77.6 ± 4.7	40.0 ± 3.1 (31.4, 48.6)	< 0.001
BMI, kg/m^2	44.4 ± 0.8	32.0 ± 0.8	12.4 ± 0.5 (11.5, 13.3)	< 0.001	29.3 ± 1.5	15.1 ± 1.0 (12.2, 18.0)	< 0.001
TWL, %	–	28.1 ± 1.0	–	–	34.0 ± 1.4	–	–
EWL, %	–	66.2 ± 3.4	–	–	80.2 ± 6.6	–	–
Clinical							
$HbA1_C$, %*	6.2 ± 0.3	5.1 ± 0.2	1.1 ± 0.4 (0.2, 1.9)	< 0.05	4.8 ± 0.2	2.0 ± 1.1 _††	0.173
Glucose, mg/dL†	111.3 ± 6.1	86.5 ± 3.5	24.8 ± 6.6 (11.0, 38.6)	< 0.001	87.3 ± 6.3	53.8 ± 6.3 _††	0.113

BMI: Body mass index; *TWL*: Total weight loss; *EWL*: Excess weight loss; *$HbA1_C$*: Glycosylated hemoglobin

*$HbA1_C$ baseline n = 20; 6-month n = 19; 12-month n = 4

†Glucose baseline n = 21; 6-month n = 21; 12-month n = 4

††Not applicable due to small sample size

Figure 3: Mean changes in body mass index (BMI, kg/m^2); total weight loss (%TWL); and in excess weight loss (%EWL)

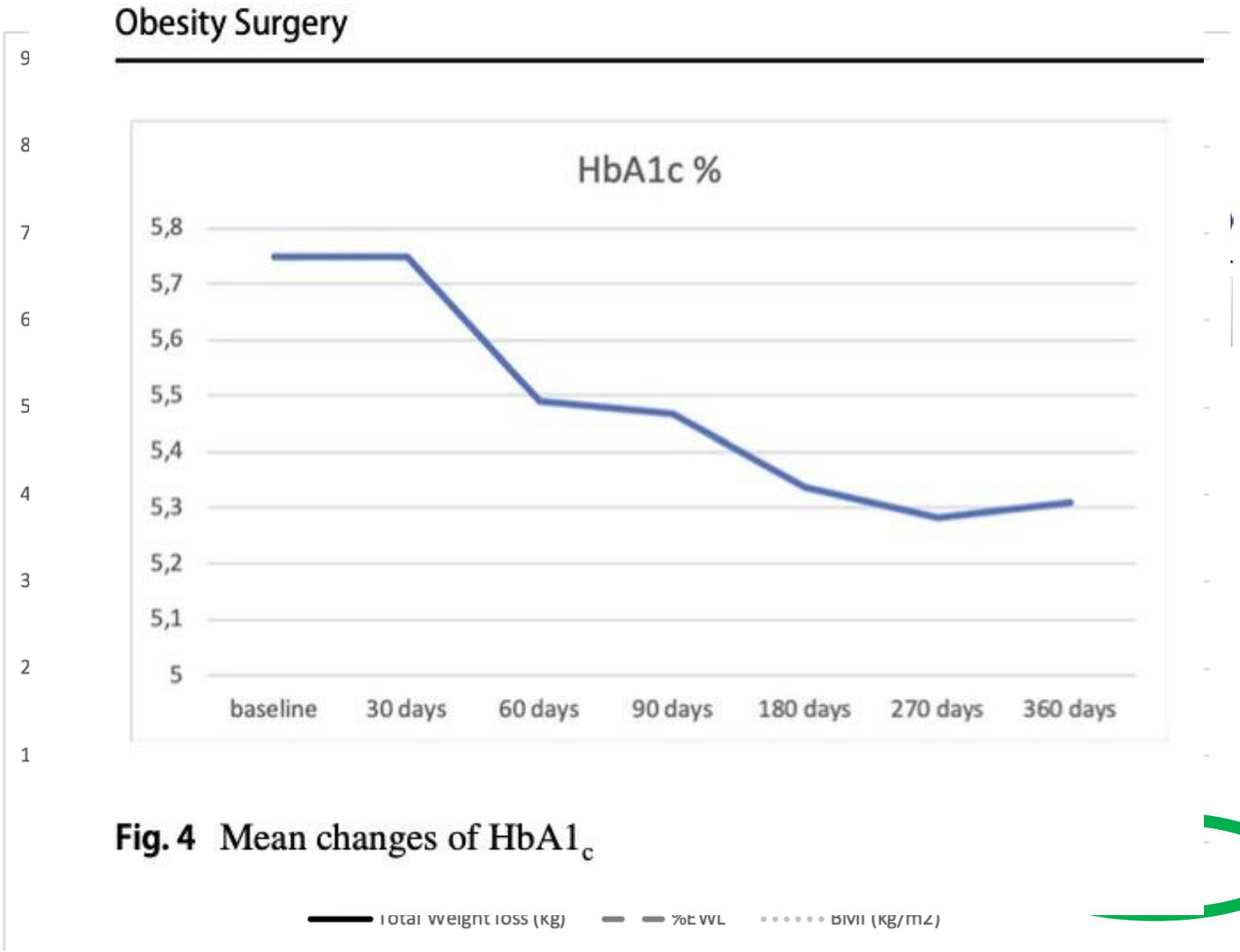


Fig. 4 Mean changes of $HbA1_c$

“DUODENAL BYPASS: RY-DS & SADIS-OADS”


INTEGRATE YOUR...
IFSO
MELBOURNE 2024
XXVII IFSO World Congress
3 - 6 September 2024
Melbourne Convention and Exhibition Centre
www.ifso2024.org
Congress Co-Presidents
Ahmad Aly & Harry Frydenberg
IFSO


CO SAN CARLOS

"T

"


Tak
Obrigado
감사합
Gracias
Merci
Thank you
Danke
Grazie