Bariatrische heelkunde

Vlaamse nefrologiedag 21maart 2017

Matthias Lannoo

Abdominale heelkunde

Outline

- Legitimiteit om obesitas (chirurgisch) te behandelen
- Ingrepen
- Mechanisme
- Outcome
- Outcome in CNI
- Complicaties

Legitimacy: behavioural problem vs disease

- It is a lifestyle choice
- No specific symptoms associated with it
- It is a ***risk factor*** for disease, not a disease itself* ase would define one-third of Americans as being ill and could lead to more reliance on costly drugs and surgery rather than lifestyle changes**
- Characterological flaw (willpower, psychology, morality)

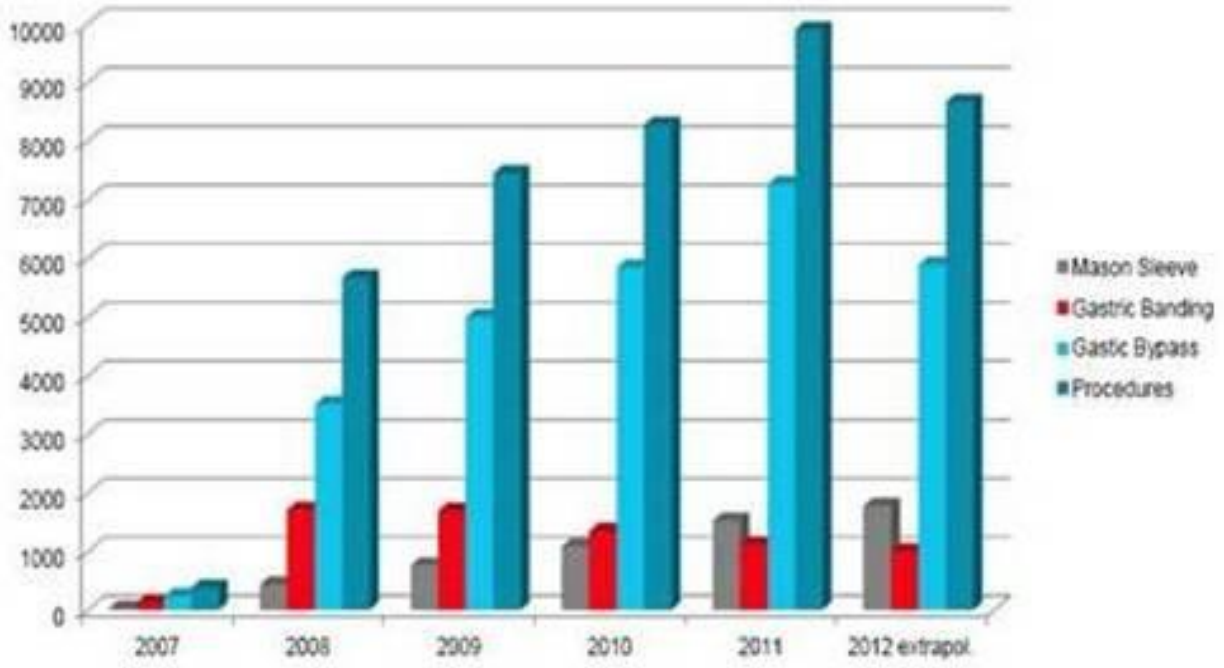
Legitimicy vs stigma

Doctors are the second most common source of weight-related stigma.

- In a sample of 2449 adults with overweight or obesity, 72% reported weight bias from family members, and 69% reported weight bias from physicians.

Puhl & Brownell (2006) *Obesity* 10: 14

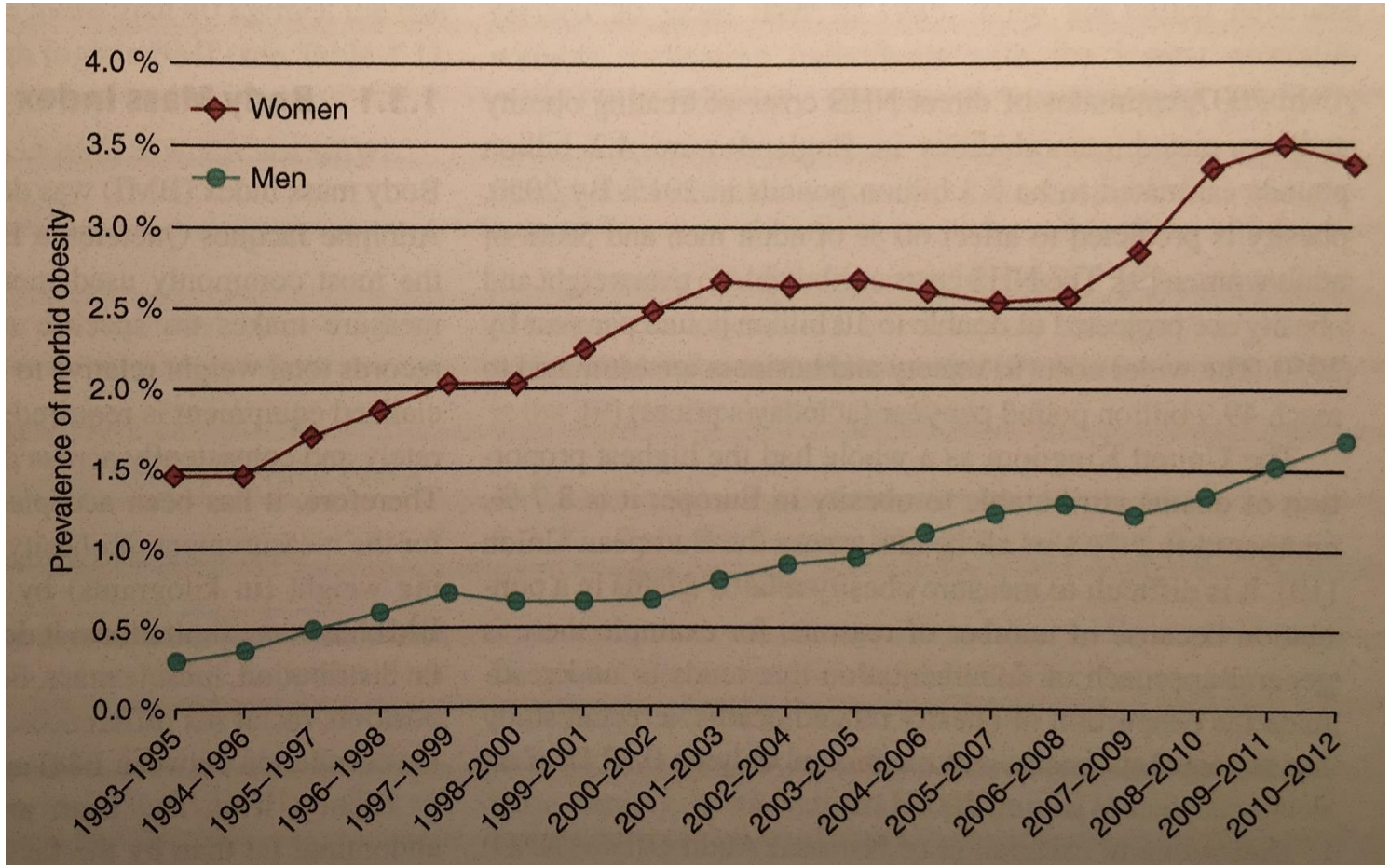
- Curren erestimated
- Curren surgery annual e rates of surgery
- No sig n the U.S. over the pas
- Approx cedures still result f
- België:



	2007	2008	2009	2010	2011	*2012 extra.	Growth 2012
Mason Sleeve	31	440	763	1084	1525	1780	17%
Gastric Banding	122	1714	1692	1345	1113	994	-11%
Gastic Bypass	232	3512	4992	5842	7259	5888	-19%
Procedures	385	5666	7447	8271	9897	8662	-12%

Figures from Dr Gallo's presentation "Regelgeving rond selectcriteria en terugbetaling bariatrie" 12/10/2012
* Extrapolation based on 1st semester 2012 vs 1st semester 2011

Morbid Obesity: even more! (BMI>35)



UZ LEUVEN

Excessive fat accumulation that presents a risk to health

- The presence and severity of obesity can be ***measured*** by body composition analysis
- They can be ***estimated*** by a variety of biomarkers
  - Body mass index (BMI)
  - Body fat distribution
  - Risk scores
  - Comorbidities
- But these markers **should not define** obesity

Normal physiology

Adults **require** approximately 1300 kcal/day
Adults **consume** 2000-2500 kcal/day

Average adults thus consume **1.5-2 times as much food as needed**
Excess intake is available for physiological emergencies

Maintenance of normal fat stores (and body weight) **requires precise disposal** of 40-50% of ingested calories daily

Maintaining weight within 10 kg between ages 21 and 65 requires **matching of intake and expenditure within 0.2%**
Corresponds to accuracy of 4-5 kcal/day

Normal physiology

- The body **needs** to defend a fat mass set point
- •To shed the excess calories consumed daily
- •To recover appropriately from acute illness
- •The body **defends** its fat mass set point
- •Even if it is abnormally high (i.e., obesity)

Purposeful behavior **drives** the physiology of energy balance regulation

VS.

The physiological regulation of energy balance **drives** behavior

Implications

- Increased caloric intake drives weight gain
- All calories have similar effects
- Calories burned during physical activity drive weight loss

Implications

- Changes in the modern diet alter physiology
- The chemical nature of the calories is critical
- Re-regulation of abnormal physiology is essential for success

Obesity is not a disease

Obesity results from a failure of normal weight and energy regulatory mechanisms…

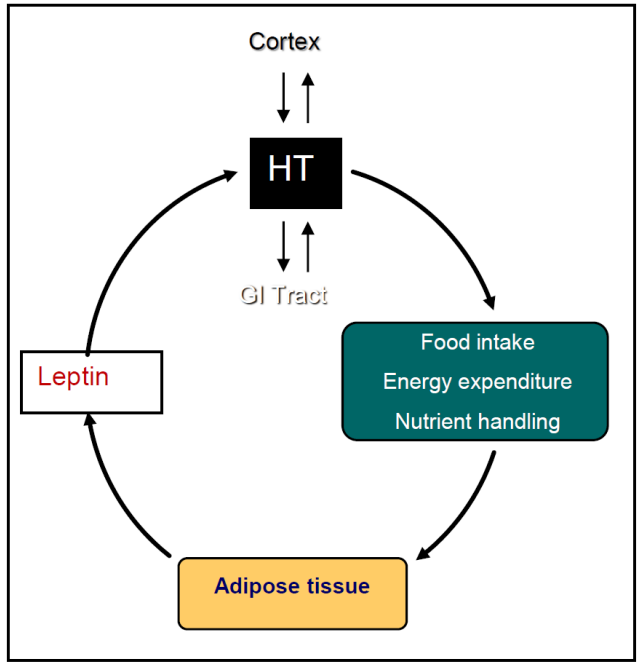
…leading to an elevated body fat set point

Obesity: A Physiological Regulatory Error

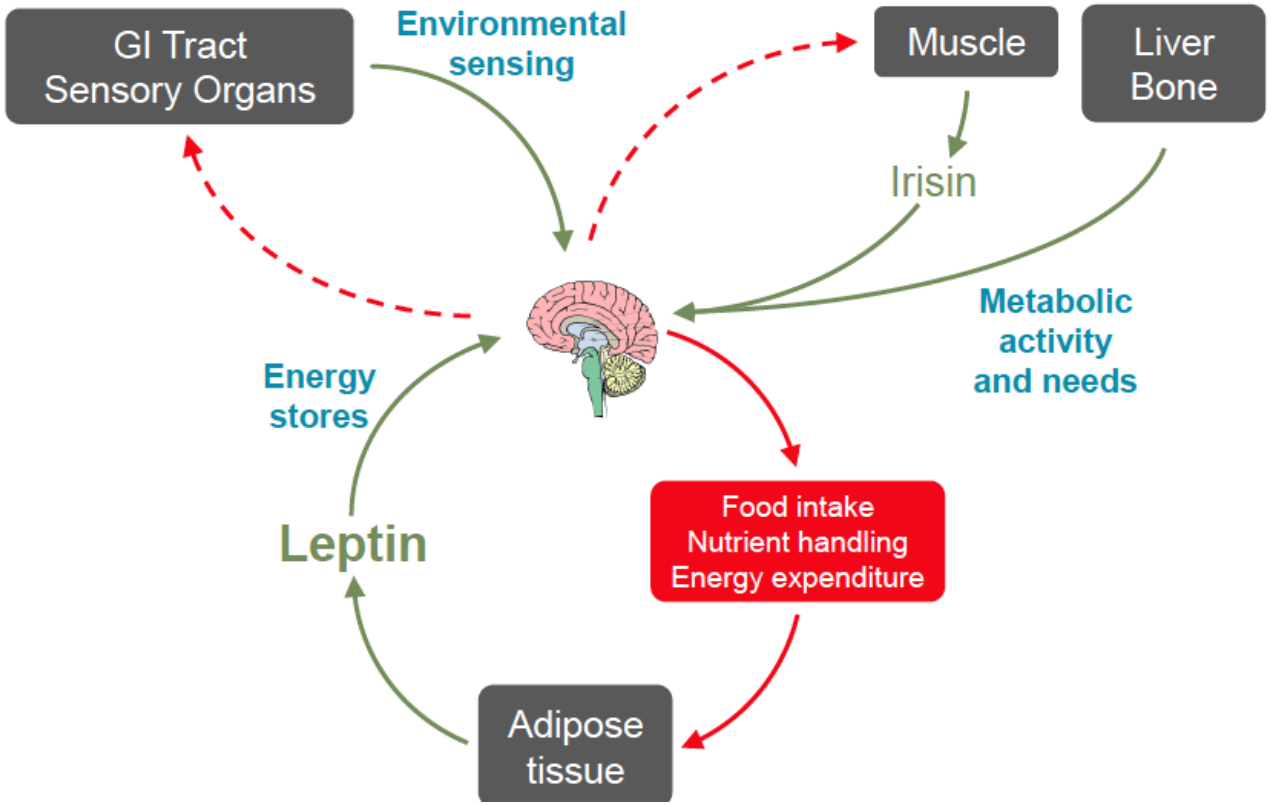
Genetic background

Developmental programming

Environmental Influences



The current obesity epidemic results primarily from changes in the modern environment.


GI Tract
Sensory Organs
Environmental
sensing
Muscle
Liver
Bone
Irisin
Metabolic
activity
and needs
Energy
stores
Leptin
Food intake
Nutrient handling
Energy expenditure
Adipose
tissue

MECHANISMS OF SET POINT DEFENCE

- Energy expenditure
- Food thermogenesis
- Fat hormones: leptin
- Gut hormones: Ghrelin
- Chemosensing:

  protein< carbohydrates<fat

(3) Stress and distress

(direct impact on relevant areas of the brain)

(4) Drugs

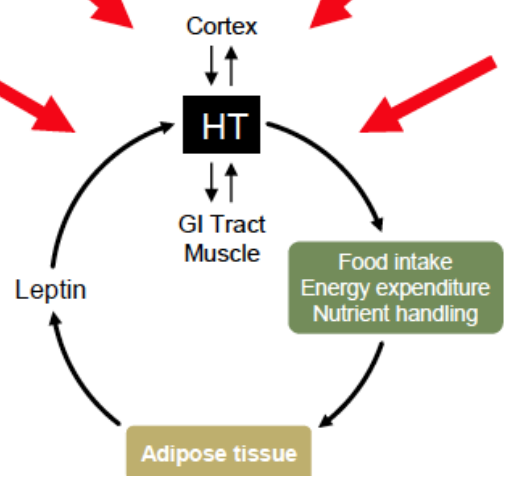
(accounts for up to 10%)

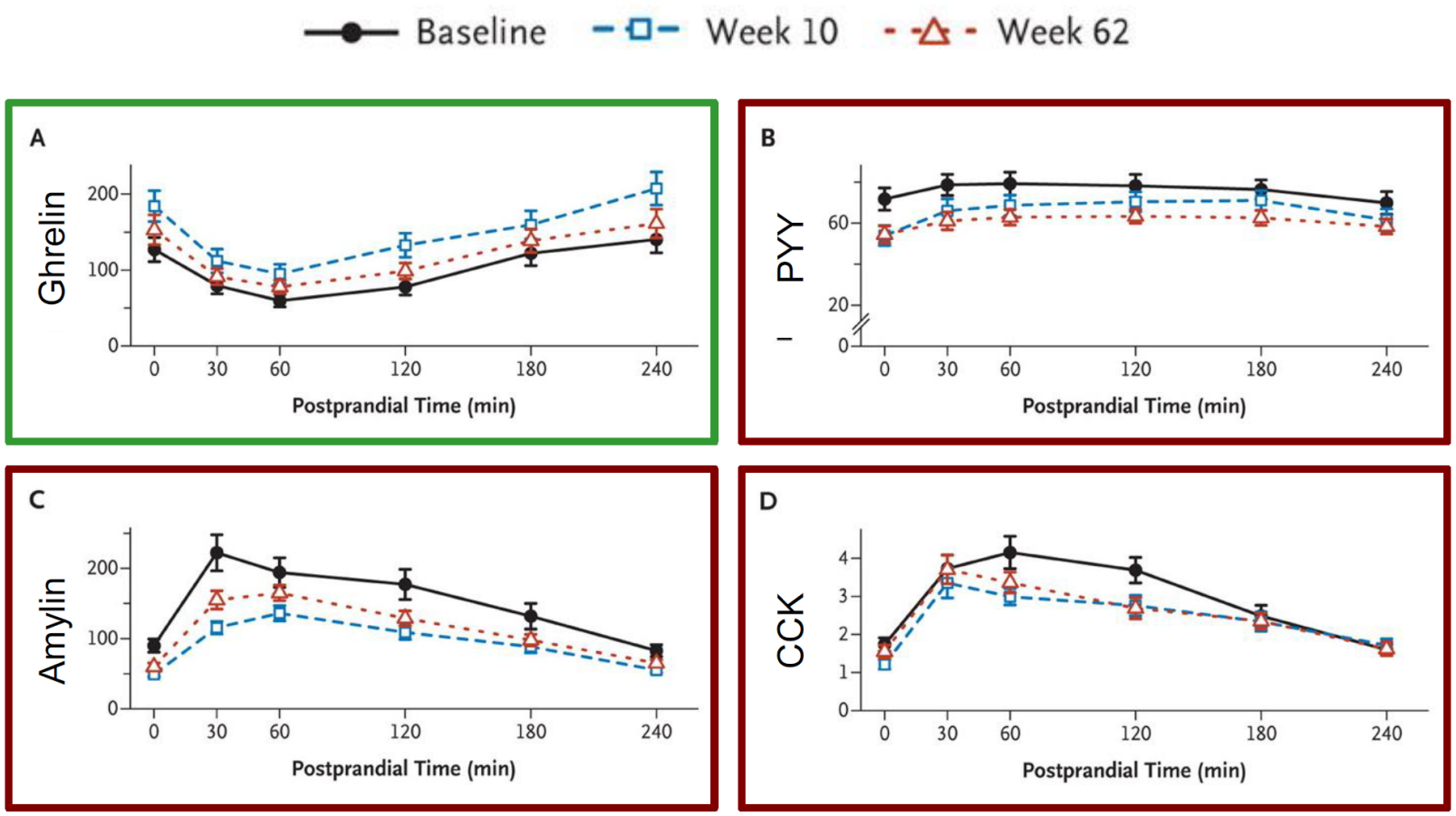
(2) Decreased physical activity

(effects on muscle more than calories)

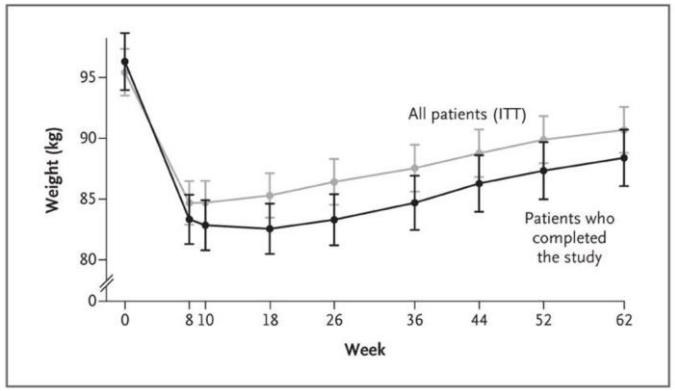
(1) Altered food supply

(signaling more than calories)



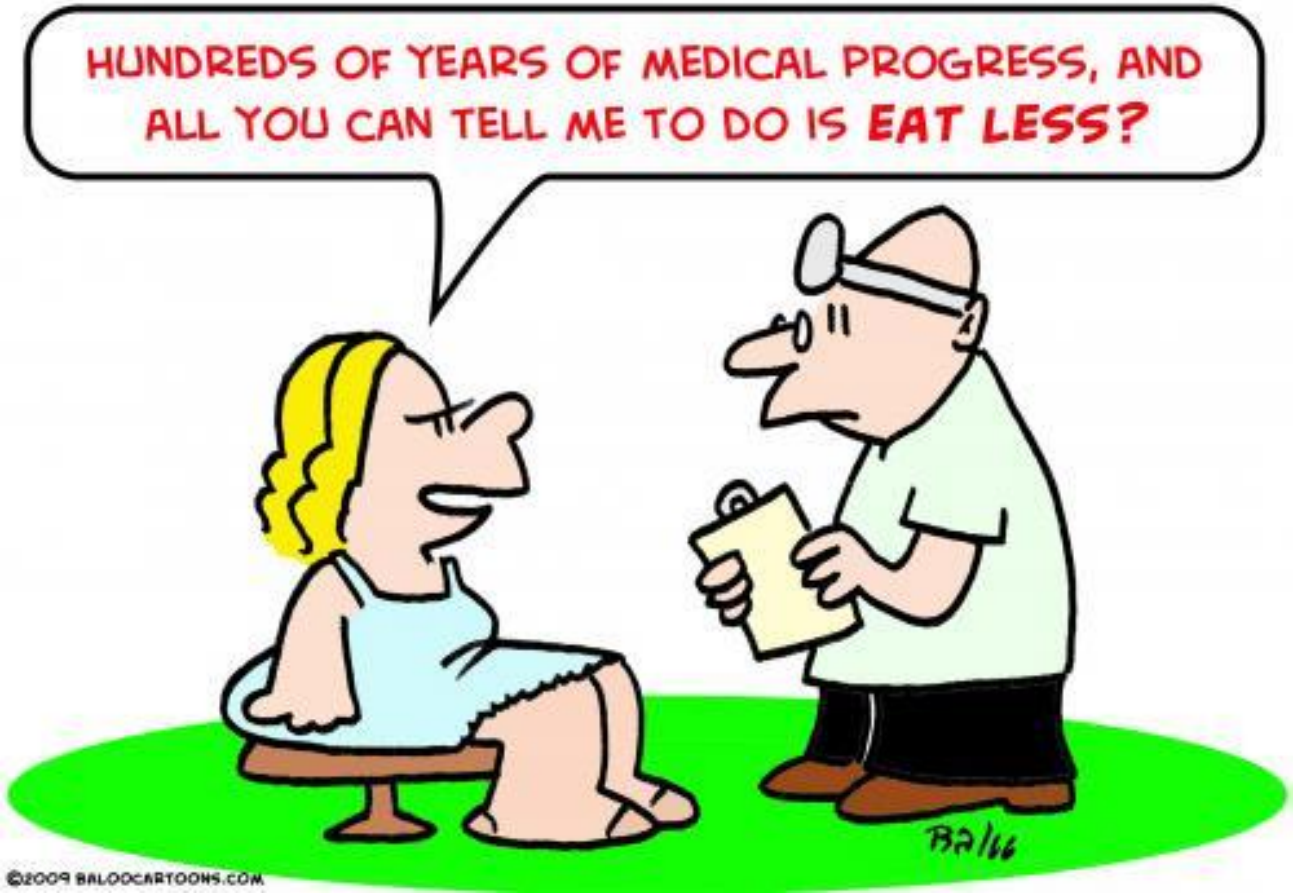


Sumithran et al. NEJM 2011; 365:1597-1604.



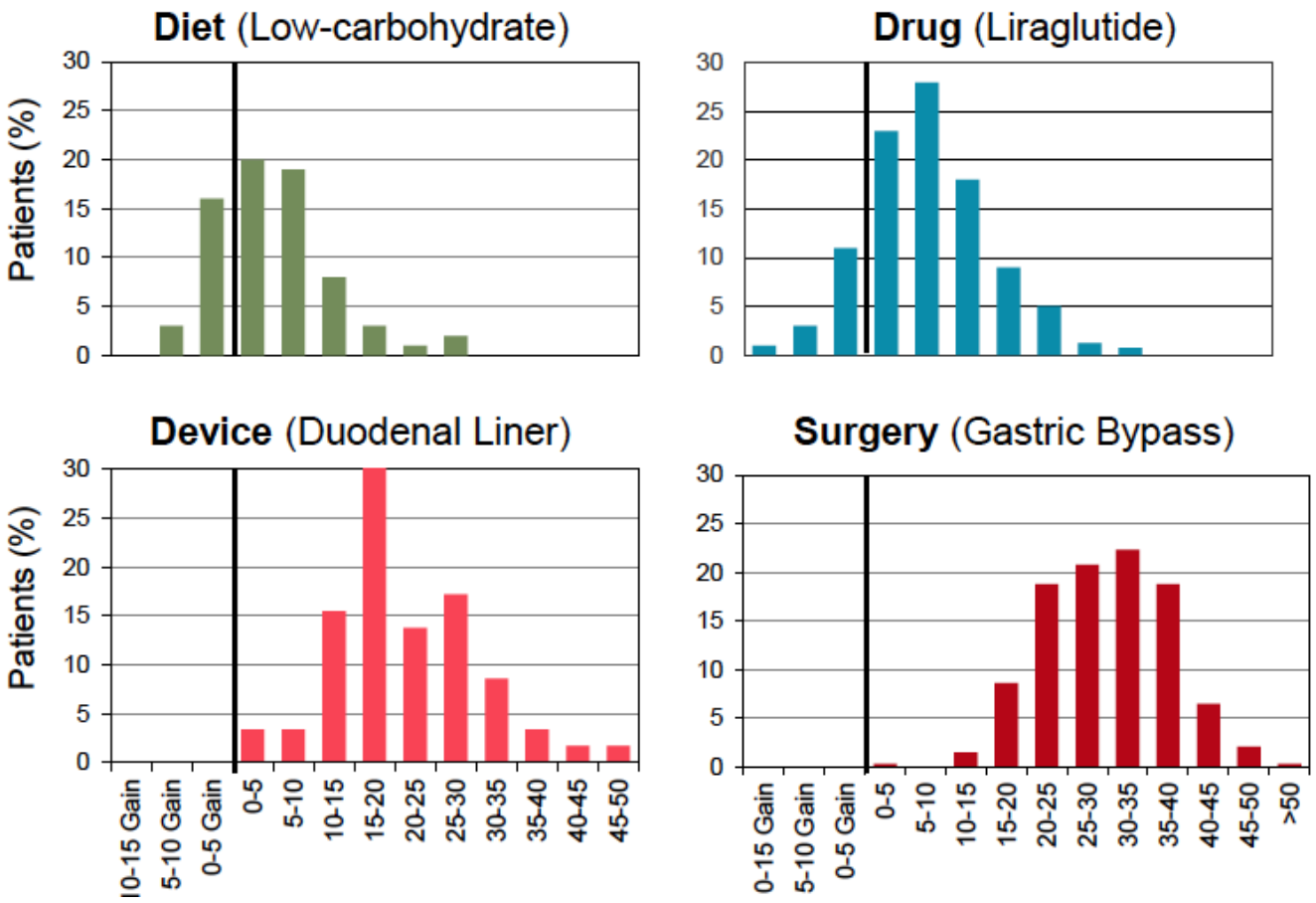
Sumithran et al. NEJM 2011; 365:1597-1604.

The answer to obesity is obvious
Eat Less and Exercise More



Ease of short-term weight loss	Difficulty of long-term weight loss
The rationale for – and data refuting – the calorie-based model of weight regulation	Need for *physiologic* regulation of fat mass to achieve required accuracy and precision
Inability of exercise to cause weight loss	Ability of exercise to prevent weight regain

Variabilty in disease = variability in therapy



Post-surgical Combinations

Weight Loss Surgery

Add Medications

Professionally-directed Lifestyle Change

Self-directed Lifestyle Change

Bariatric procedures

Current Indications for Surgery

- BMI > 40 kg/m^2
- BMI 35-40 kg/m^2 with a major comorbidity
  - Recent AACE/TOS/ASMBS guidelines have broadened these indications to BMI 30-40 kg/m^2 with a major comorbidity
- Adults and adolescents
- No upper limit on age

Conceptueel

Behavioral problem

OBESITY

DISEASE

- Genetically determined
- Metabolic alteration
- Chain reaction
- Exces lipid =catalysator

Mechanical Rationale

BARIATRIC SURGERY

NEUROHORMONAL
by modification of the gastrointestinal tractus

Ileocolic bypass

jejunoilieal bypass

Scopinaro- BPD

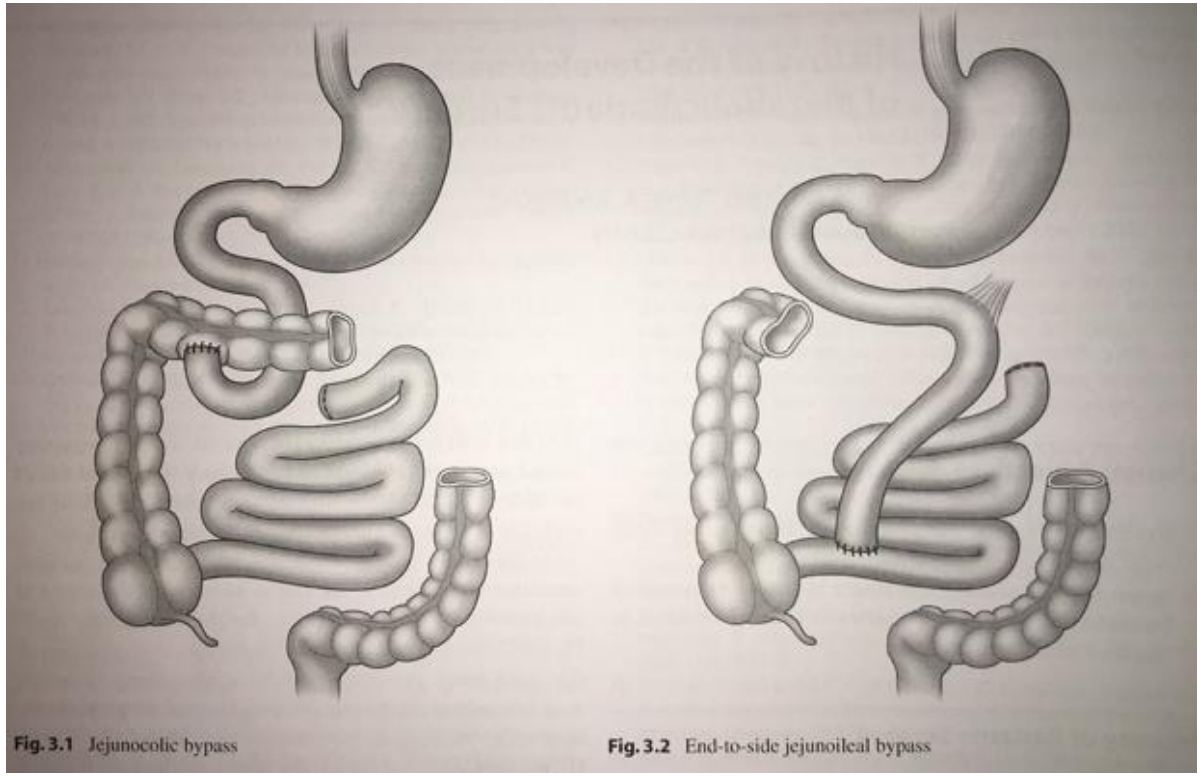
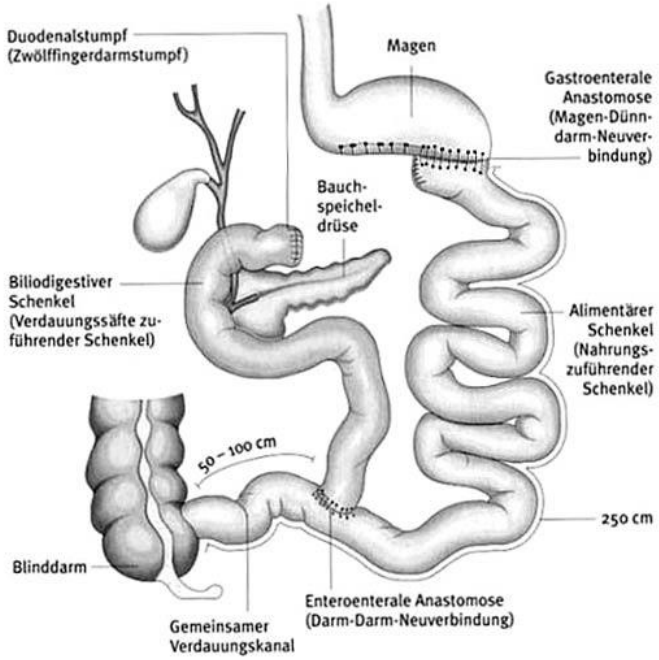
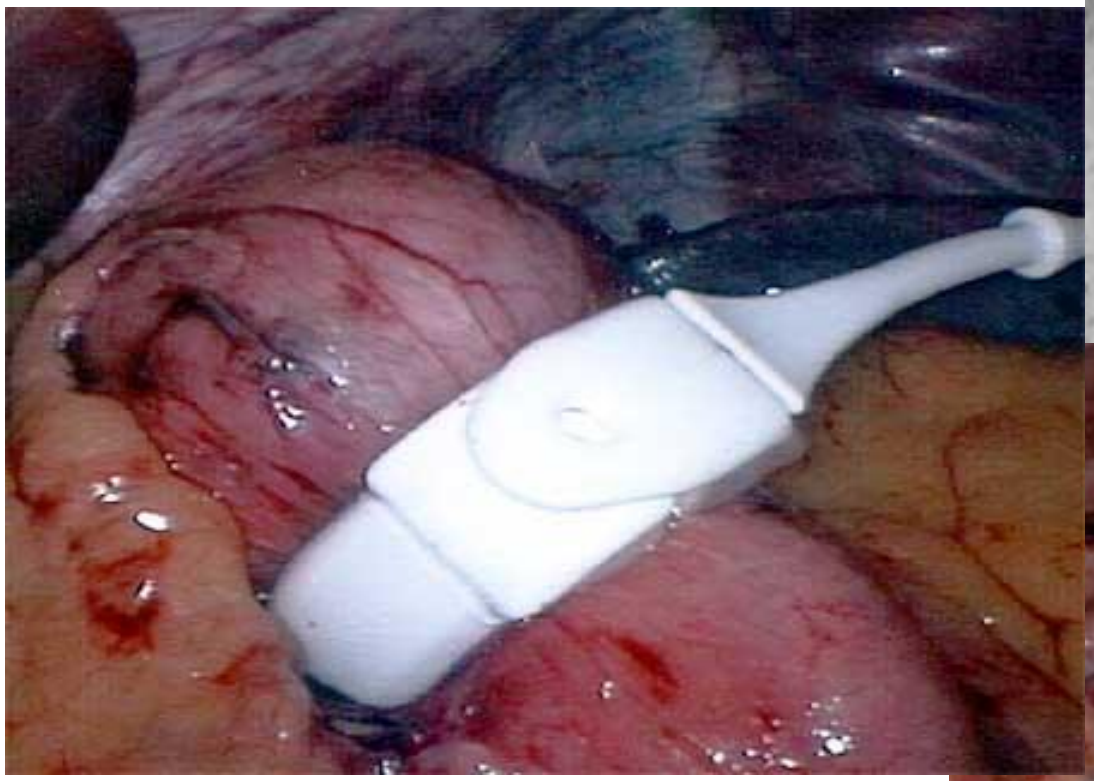


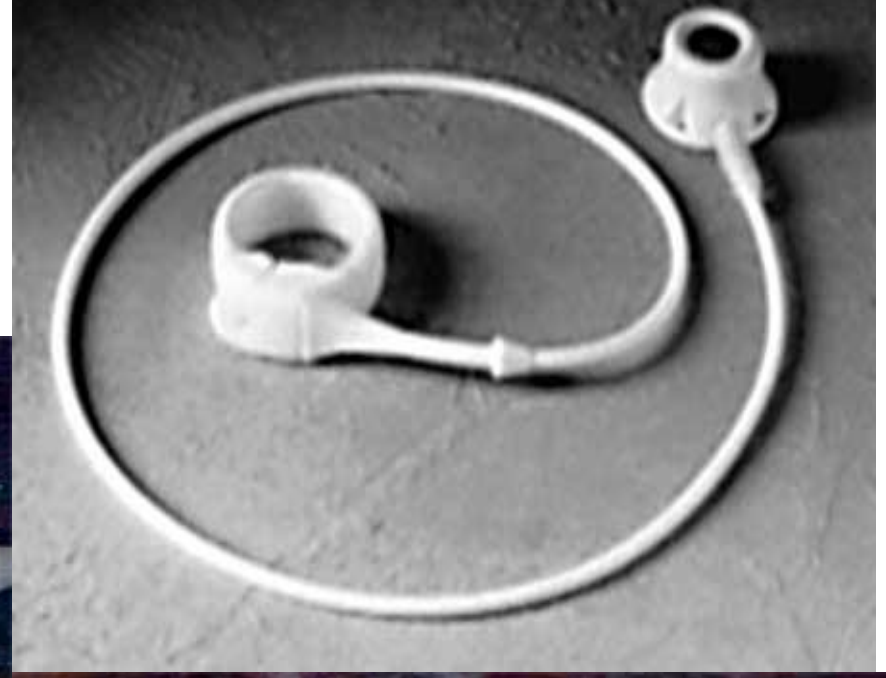
Fig. 3.1 Jejunocolic bypass

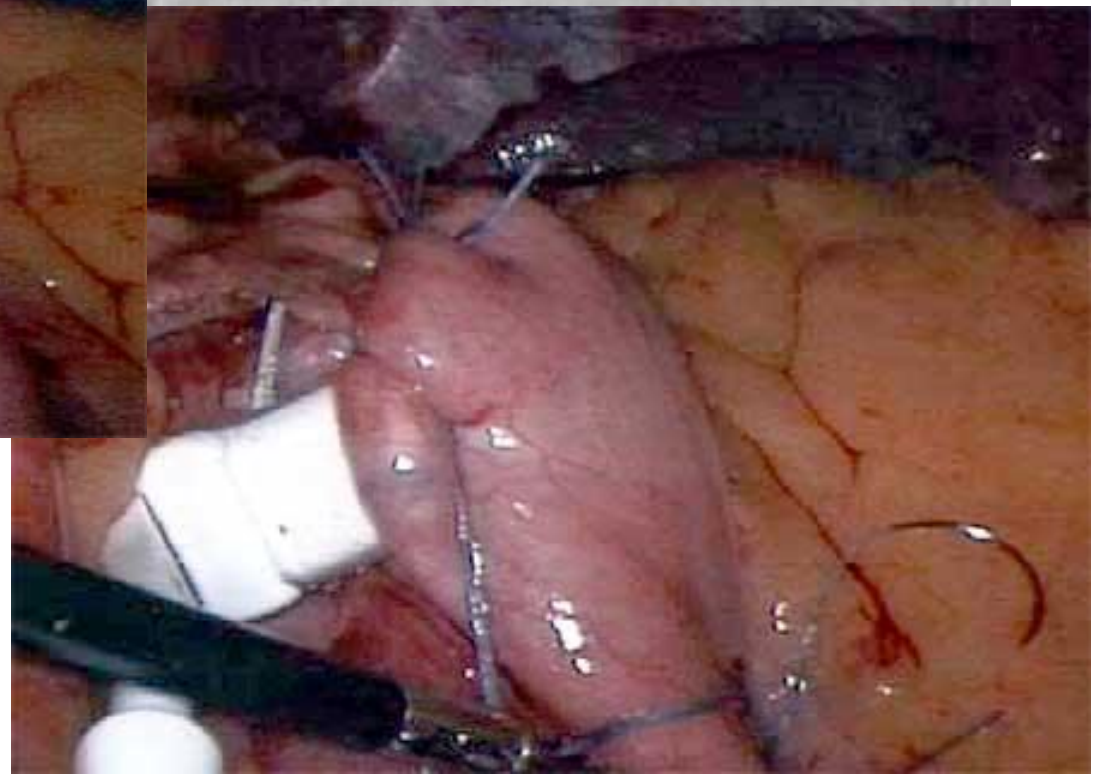
Fig. 3.2 End-to-side jejunoileal bypass



LAP GASTRIC BANDING







Conceptueel

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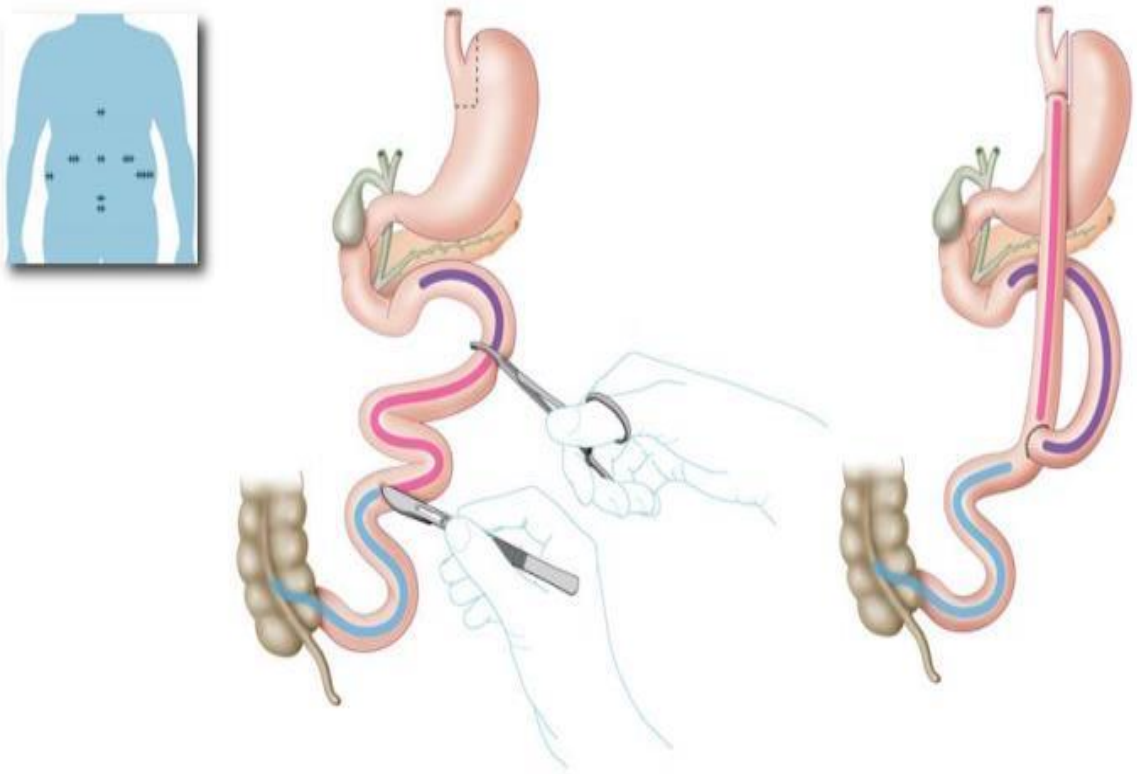
- Exces lipid =catalysator

Mechanical Rationale

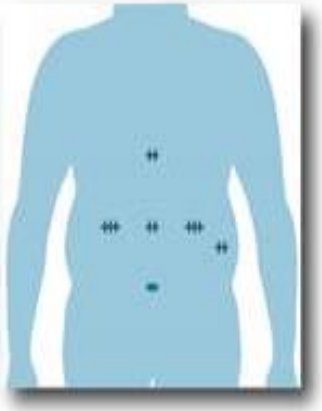
BARIATRIC SURGERY

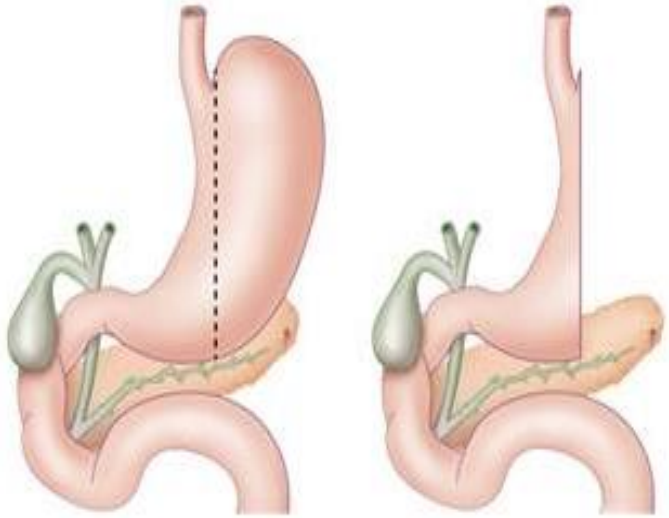
NEUROHORMONAL
by modification of the gastrointestinal tractus

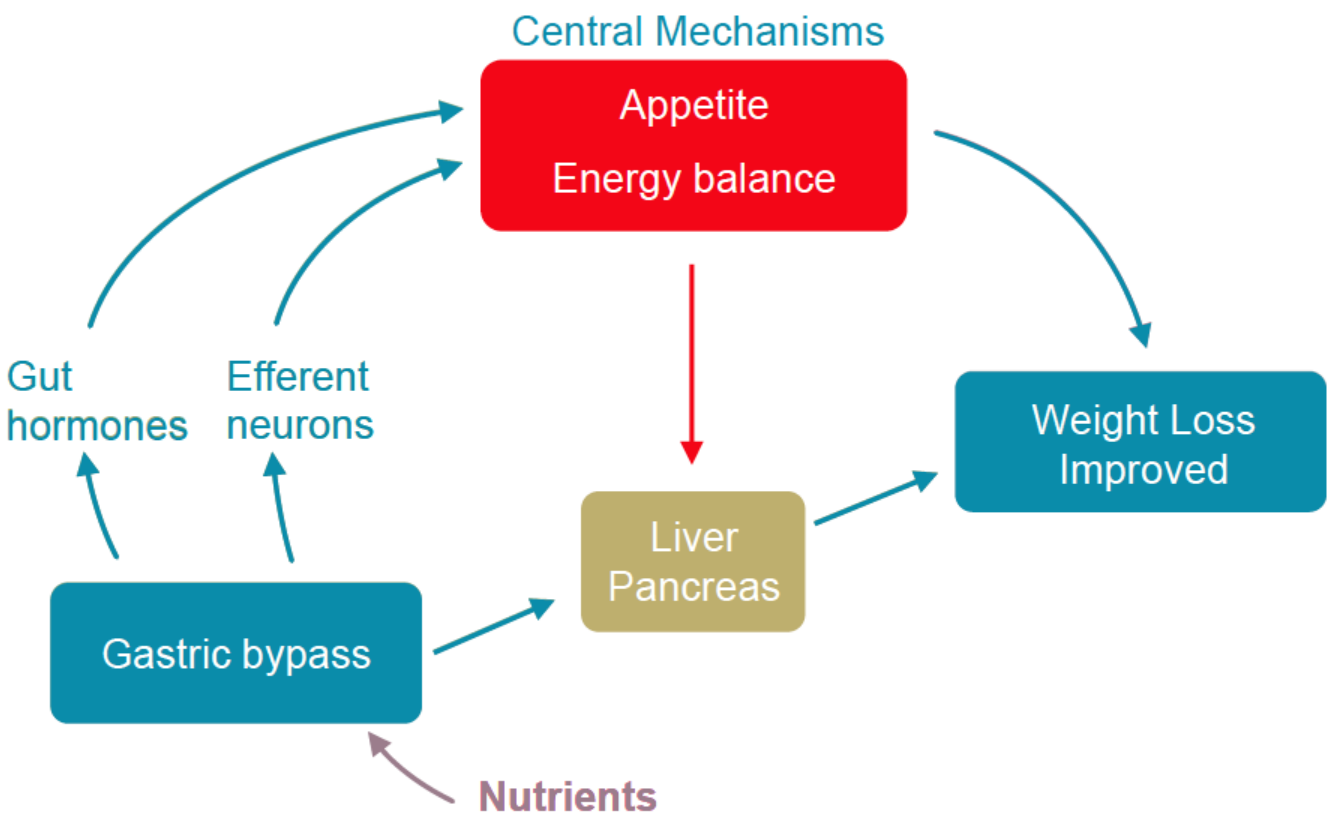
GASTRIC BYPASS



SLEEVE GASTRECTOMIE






Central Mechanisms
Appetite
Energy balance
Gut hormones
Efferent neurons
Weight Loss Improved
Liver Pancreas
Gastric bypass
Nutrients

	Diet	RYGB
Energy expenditure	↓	↑
Appetite	↑	↓
Hunger	↑	↓
Satiety	↓	↑
Reward-based eating	↑	↓
Stress response	↑	↓
Gut peptides		
Ghrelin	↑	↓
GLP-1, PYY, CCK, amylin	↓	↑

Mechanisms of RYGB and SG are neurohormonal

- GLP-1 postprandial 4-5x increase
- Energy expenditure stays high
- Food thermogenesis goes up
- Ghrelin is lowered

Food preference

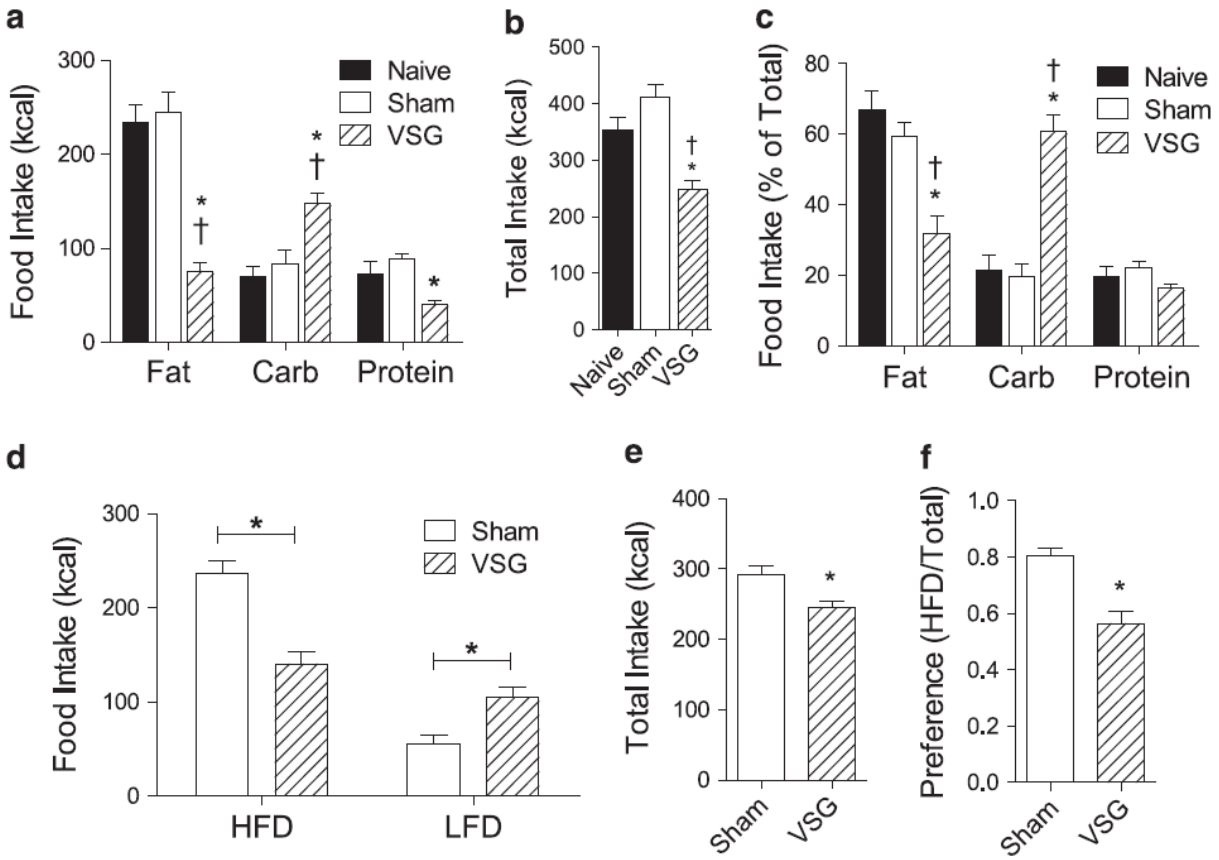


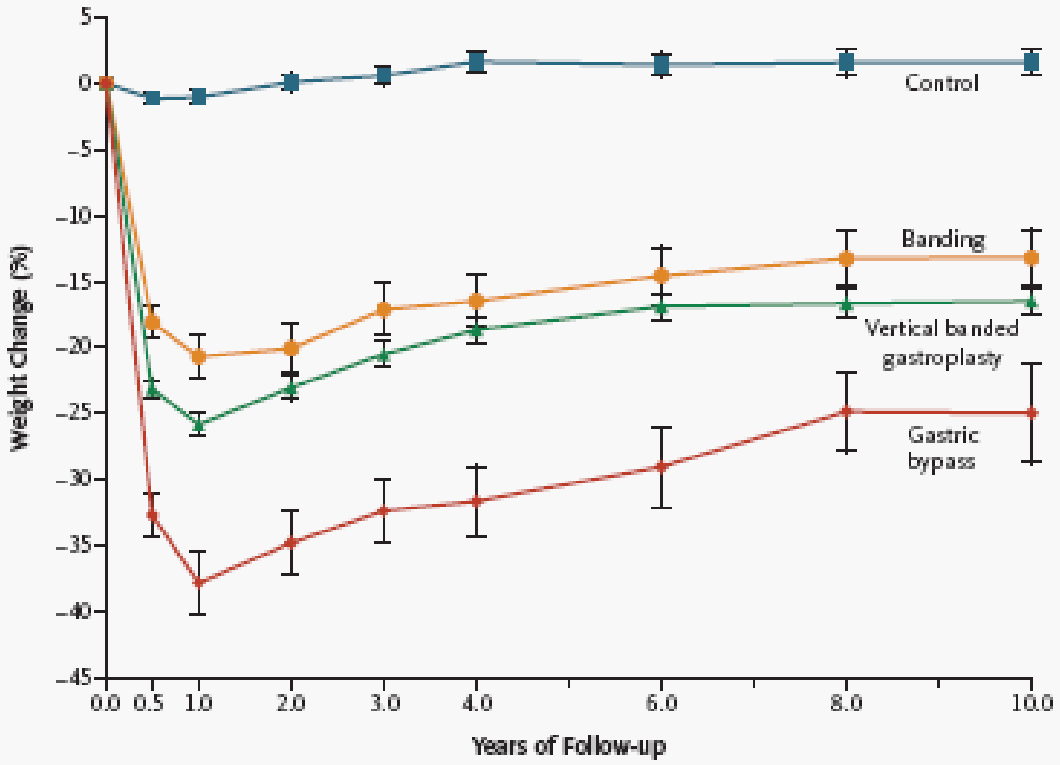
Figure 2. Rats, which received Sham or VSG surgery, or remained surgically naïve (Cohort A), were tested for food choice using a macronutrient-selection paradigm (**a**–**c**). Intake of each macronutrient (**a**), total combined food intake (**b**) and food intake of each macronutrient normalized to total food intake (**c**) are presented. Rats, which received Sham or VSG surgery (Cohort B), were tested for food choice using a HFD vs low-fat diet (LFD) paradigm (**d**–**f**). Intake of each diet (**d**), total combined food intake (**e**) and HFD preference normalized to total food intake (**f**) are presented. $^{*}P<0.05$ for Sham vs VSG and $^{\dagger}P<0.05$ for Naïve vs VSG.

Food preference

- Patients after gastric bypass prefer healthy food because and aversion for fat and sugar because

- Gut hormone effect
- Increased acuity for sweet
- Brain reward centre reduction (MRI)
- Pavlov

Outcome: weight loss



No. of Subjects									
Control	627	585	594	587	577	563	542	535	627
Banding	156	150	154	153	149	150	147	144	156
Vertical banded gastroplasty	451	438	438	438	429	417	412	401	451
Gastric bypass	34	34	34	34	33	32	32	29	34

SOS study, N Engl J Med 2004

Outcome: weight loss

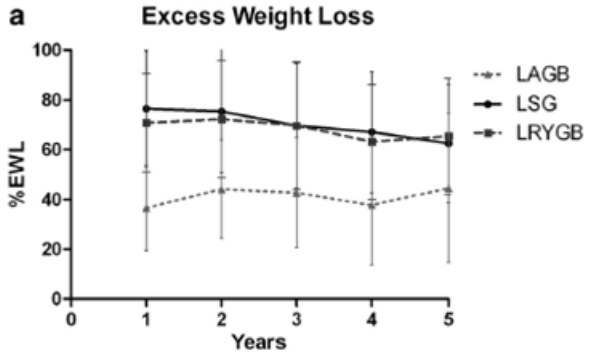
- Meta-analysis of studies reporting long term weight loss.
- statistics: inverse variance weighted random effects meta analytic model effect meta regression to check for durability

- N=4206

EWL: 67%

Attiah M. et al. Ann of surg 2012;00:1-4

Outcome: weight loss



Dogan et Al. Obes Surg 2014 nov

Obesity is many diseases

- Hypertension
- Hyperlipidemia
- GERD
- Orthopedic
- Psychological
- Diabetes
- CVD
- Tumor cerebri
- Cancer
- Infertility
- OSAS

AND YET THE QUESTION REMAINED: "WHO CAME FIRST?"

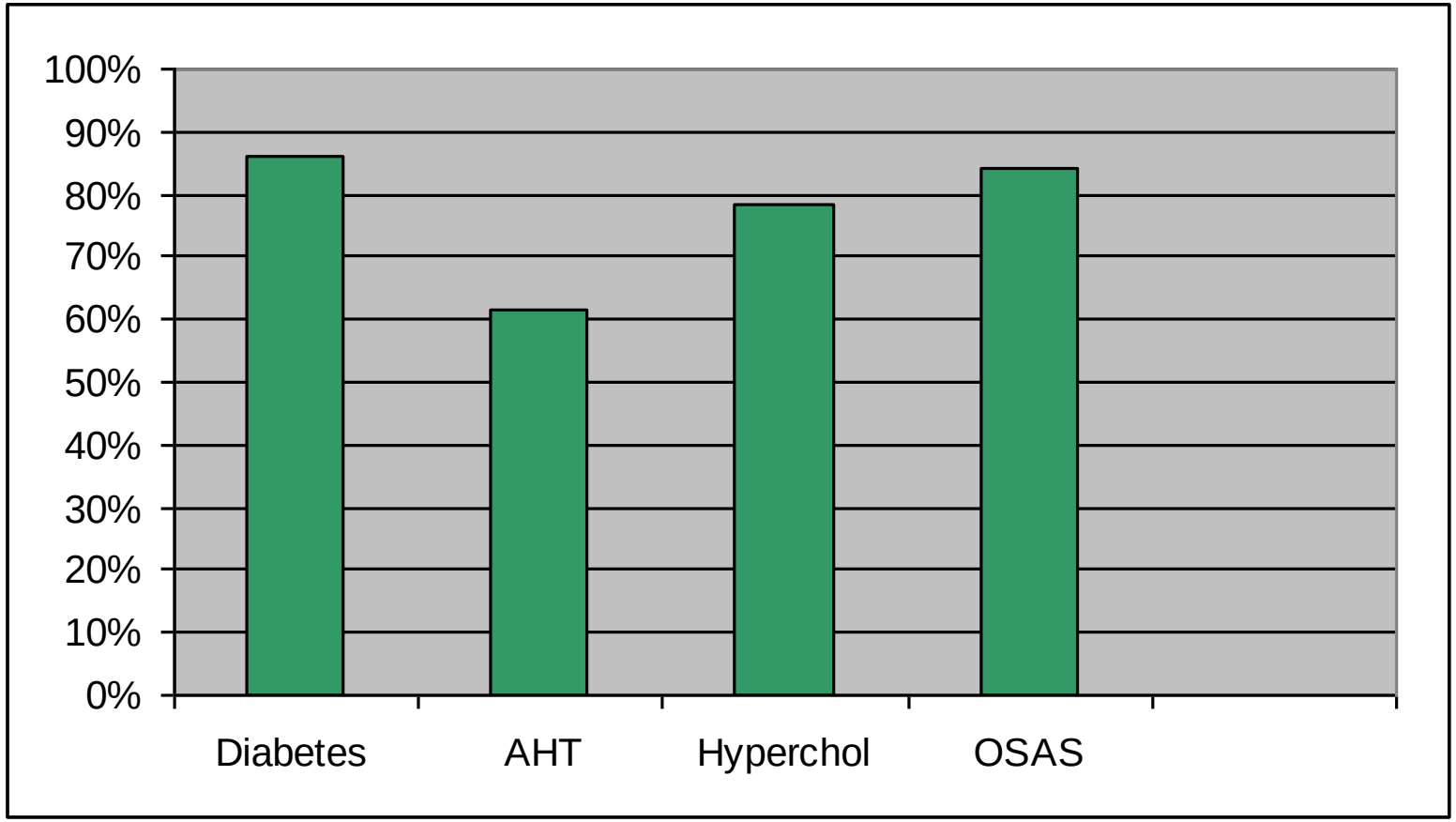
Outcome: co-morbidities

LARGE META-ANALYSIS

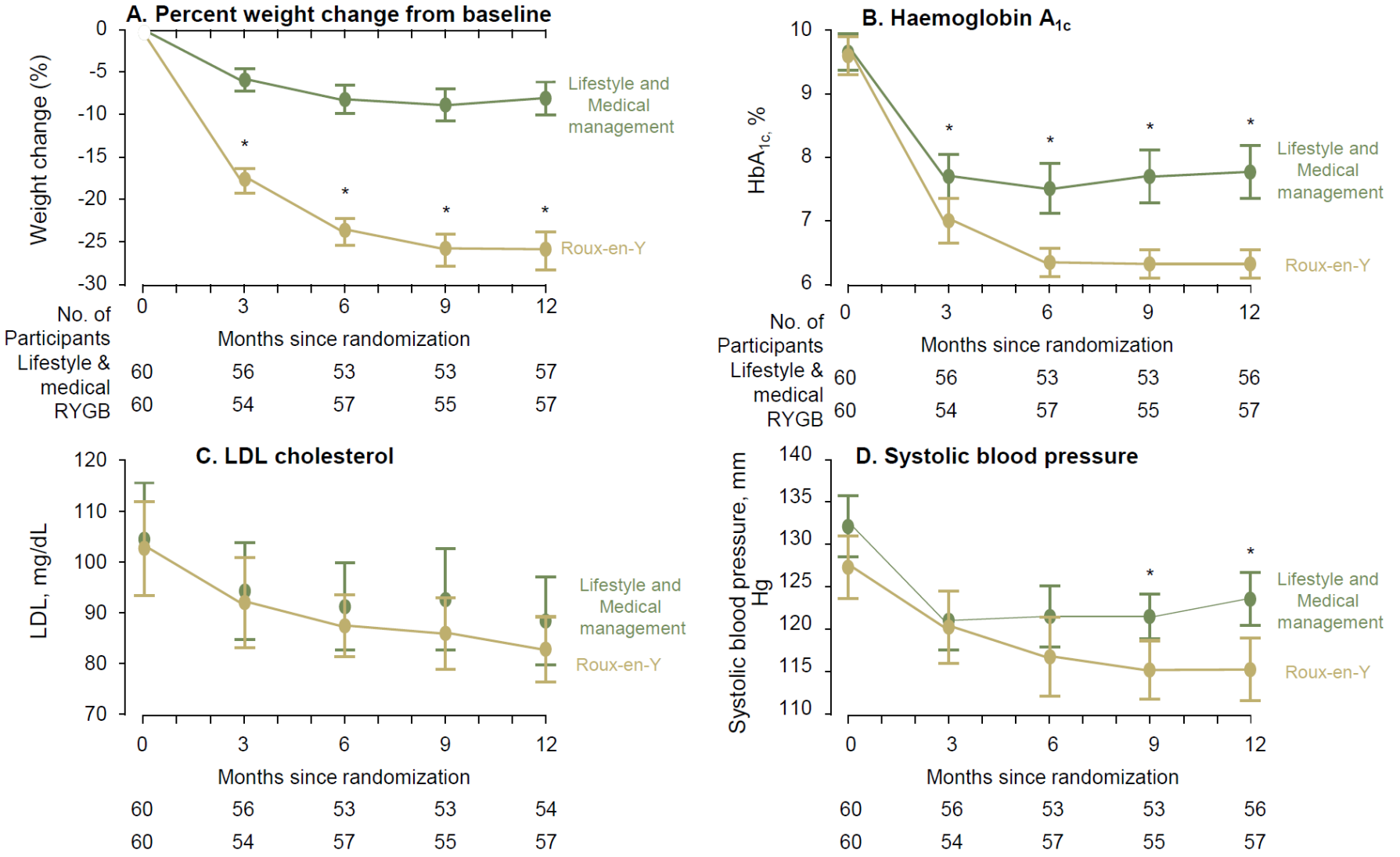
- 163 studies
- 22,094 patients
- Surgical procedures
  - Gastric Banding
  - Gastric Bypass (Roux en Y)
  - Gastroplasty
  - Bilio-pancreatic Diversion
- Assesment of comorbities
  - Diabetes
  - Hypertension
  - Hypercholesterolemia
  - Obstructive Sleep Apnea

N Engl J Med. 2007 Aug 23;357(8):741-52.)

Resolution or improvement (% of patients)



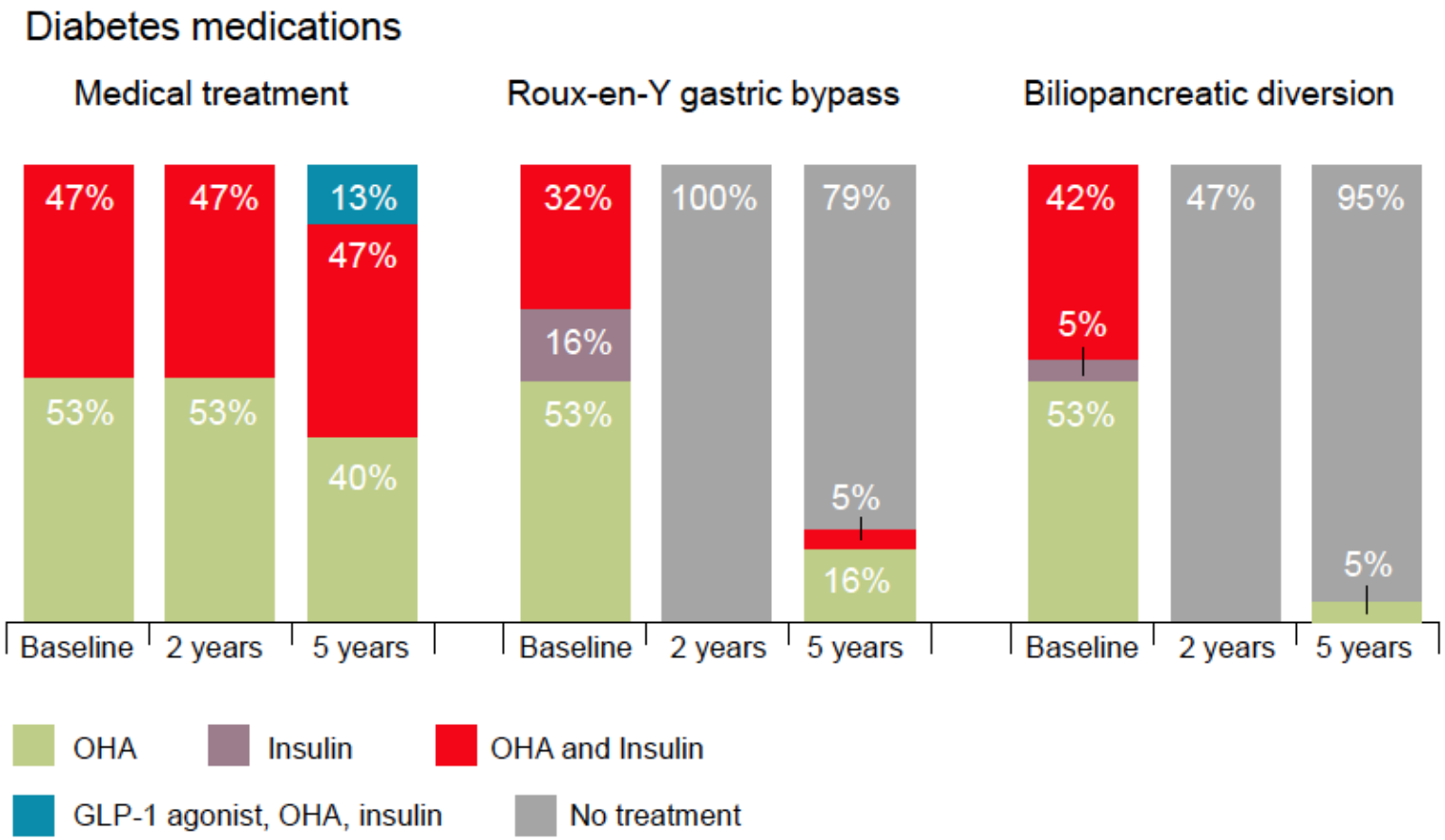
Outcome: comorbidities



Ikramuddin S, *et al.* JAMA 2013; 309:2240–9.

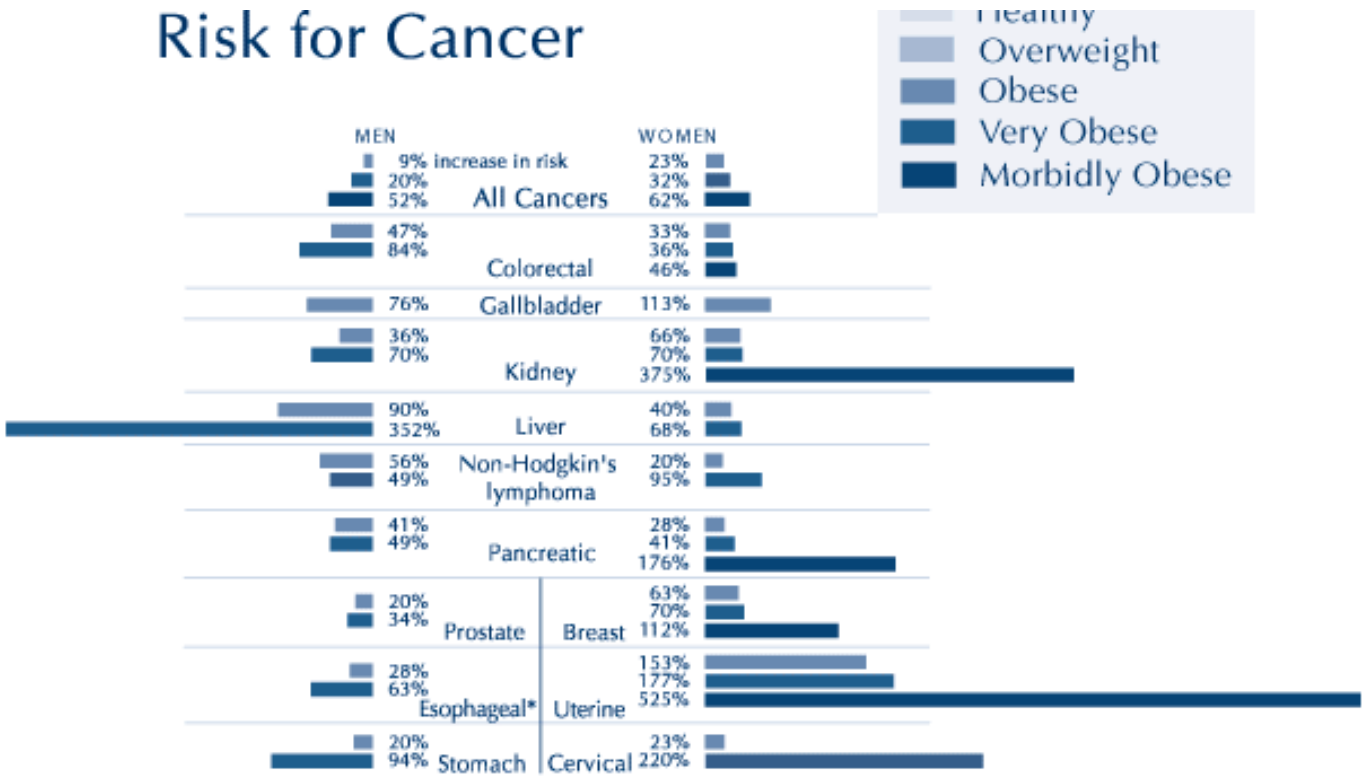
*P-value for difference is <0.01

Obesity and DM=chronic disease!



Mingrone *et al.* Lancet 2015

Obesity and cancer



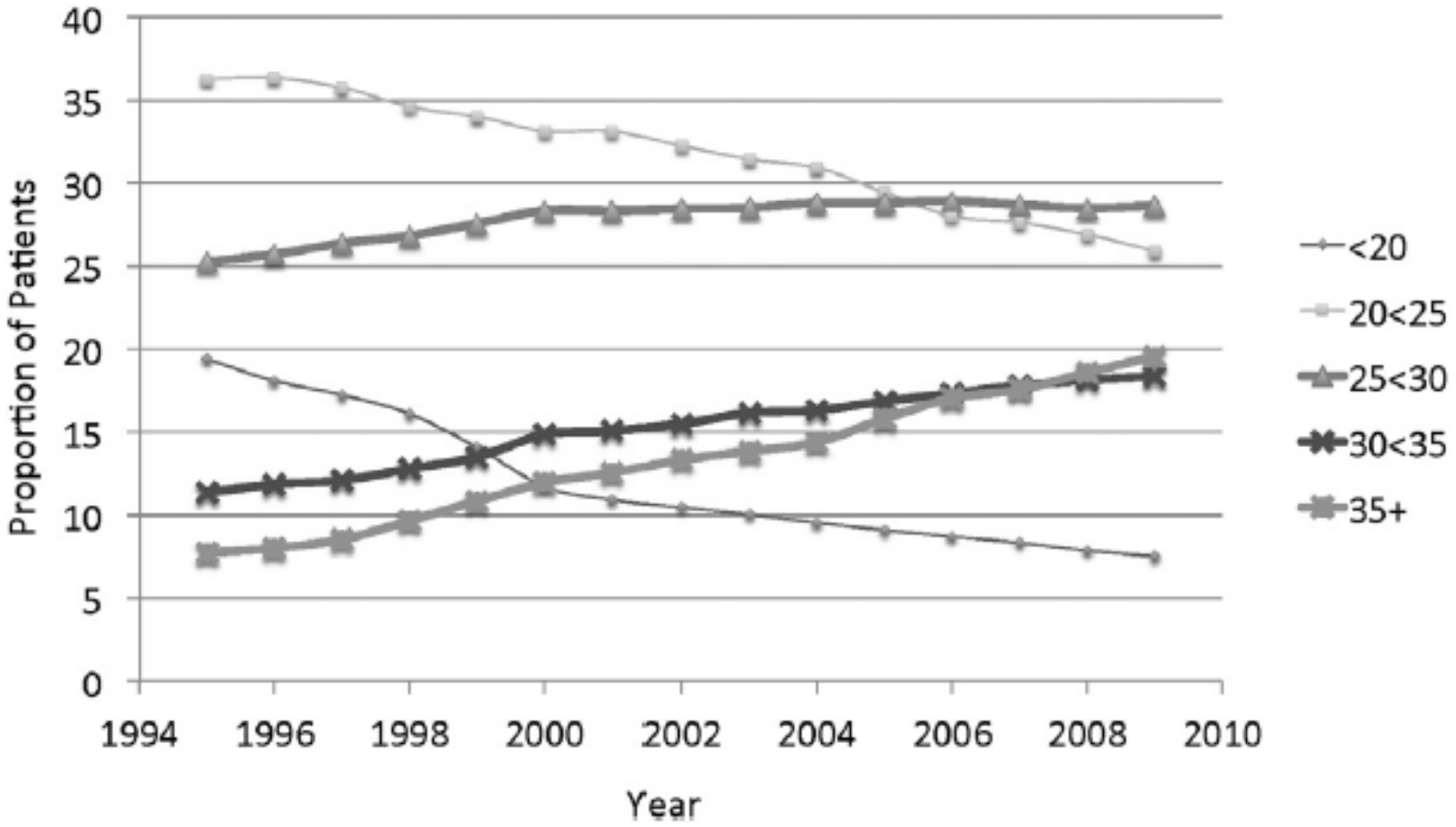
Bariatric surgery and cancer deaths

Table 5 Hazard ratios for mortality according to cancer groups

	Deaths		Hazard ratios for cancer deaths[a]	
	Surgery group *N* = 6,596	Control group *N* = 9,442	Surgery vs. control groups	
Cancer site	*N* (rates/1,000 person years)	*N* (rates/1,000 person years)	Hazard ratio (95% CI)	*P* value*
All cancers: males and females combined	41 (0.50)	107 (0.94)	0.54 (0.37–0.78)	0.001
All cancers: males only	10 (0.12)	24 (0.21)	0.70 (0.34–1.48)	0.35
All cancers: females only	31 (0.38)	83 (0.73)	0.38 (0.23–0.64)	0.0003
Obesity-related cancers[b]	20 (0.24)	55 (0.48)	0.54 (0.32–0.90)	0.02
Nonobesity-related cancers[c]	21 (0.25)	52 (0.46)	0.53 (0.31–0.91)	0.02

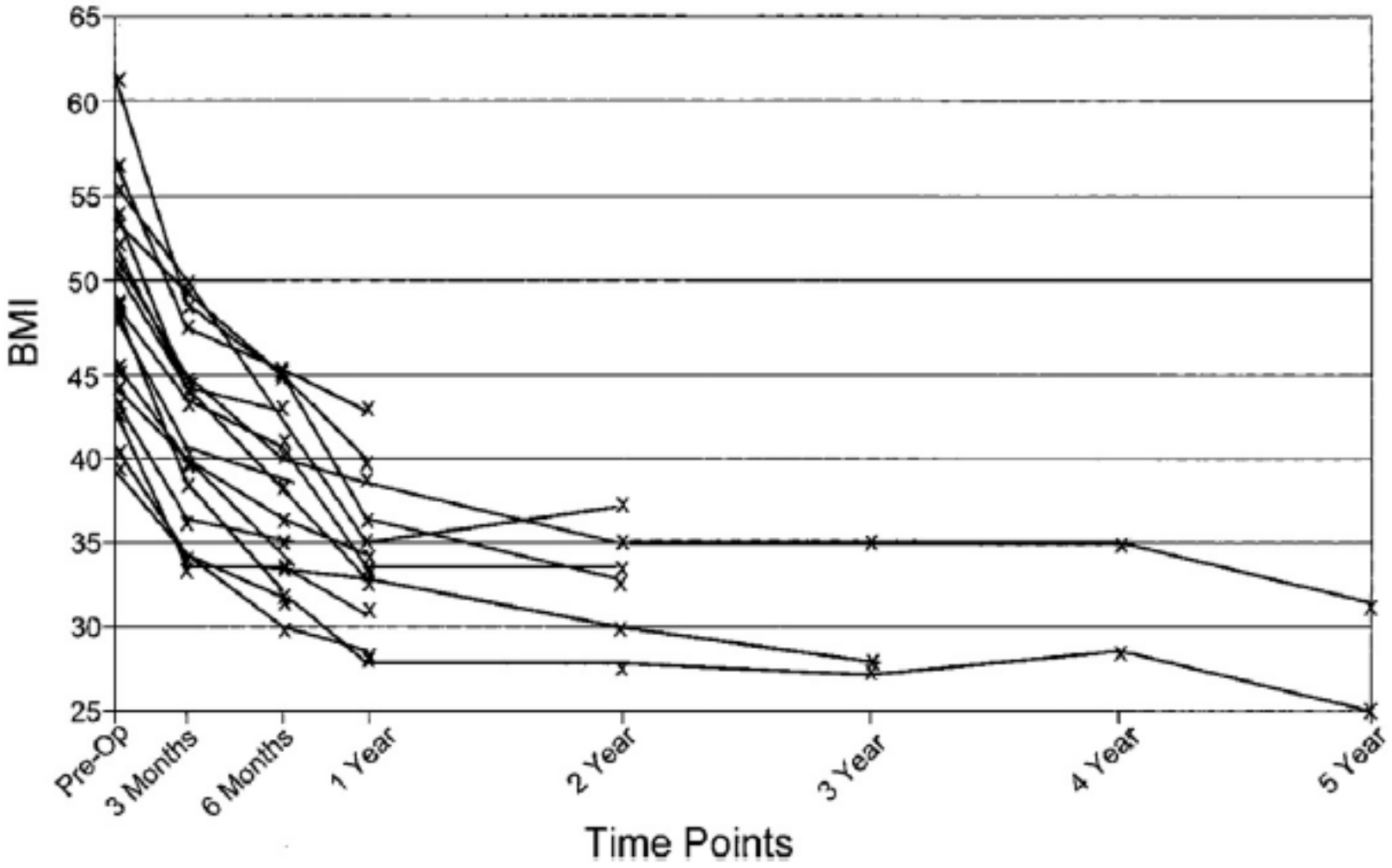
Obesity and CKD

- Obesity = independent risk factor for CKD
  - Compounded by aHT and T2D
  - 3-4 fold increase when BMI > 30
- Paradoxical relation obesity and dialysis mortality



Increasing proportion of incident ESRD patients with obesity, 1995 to 2009.

GBP in Renal Failure Patients



Bariatric surgery in CKD

- Systematic review:
  - WL conservative treatment: GFR= , proteinuria ↘
  - BS WL: GFR ↗ proteinuria ↘
- 3-10% mortality (was before era of before laparoscopy)
- Recent study:
  - small sample 21 dialysis patients (19 RYGB, 2SG and 1 LAGB)
  - Leak 14% one death (unrelated to surgery)
  - 2 of 11 T2D remission
  - 18 on Tx list

Food Preference diminishes FFA and glucose excess

- Preliminary studies suggest that RYGB alters food
- preferences in humans and rodents, but more evidence
- is required to ascertain whether the observations are
- related to conditioned or unconditioned factors leading
- to calorie-dense food avoidance.
-

Bueter, M. Exp Physiol 99.9 (2014) pp 11

Liver-Kidney connection

- *"Effect of bariatric surgery on nonalcoholic fatty liver disease: systematic review and meta-analysis" Clinical Gastroenterology. Mummadi R.R.*

- → 92% improvement / resolution of steatosis
  → 82% improvement / resolution of histologic NASH
  → 66% improvement in hepatic fibrosis

Liver-Kidney connection

- *"Bariatric Surgery Reduces Features of Nonalcoholic Steatohepatitis in Morbidly Obese Patients."*
  G Lassailly et al. Gastroenterology 2015

- Prospective study to determine the biological and clinical effects of bariatric surgery in patients with NASH.
- Lille Bariatric Cohort:
  109 morbidly obese pats with biopsy proven NASH
- Clinical, biological, and histologic data before and 1Y after bariatric surgery.

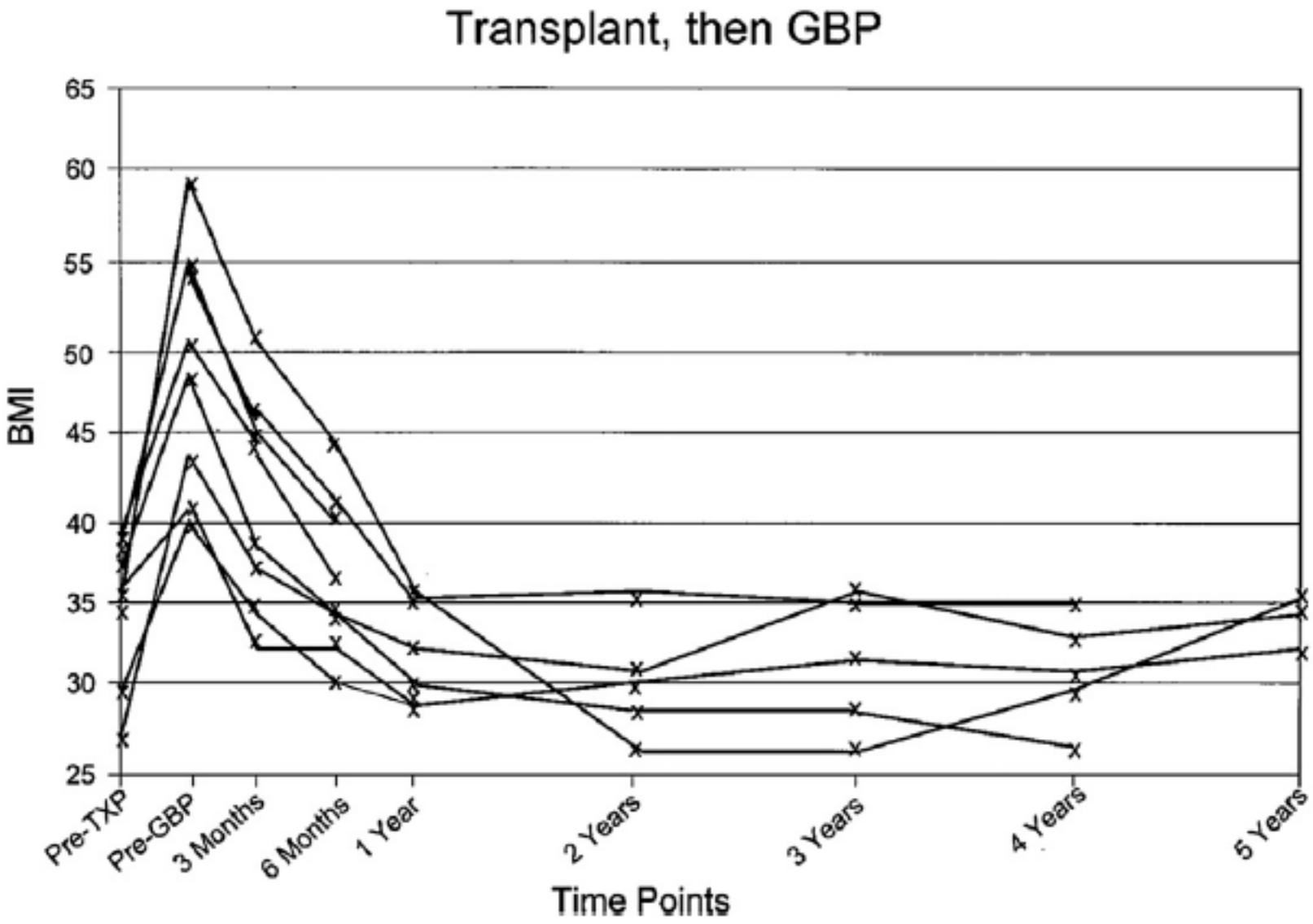
Liver-Kidney connection

- *"Bariatric Surgery Reduces Features of Nonalcoholic Steatohepatitis in Morbidly Obese Patients."*
  G Lassailly et al. Gastroenterology 2015

- Results 1Y: 85% disappearance of NASH and reduced fibrosis.
- Conclusion: Bariatric surgery is a therapeutic option for those who do not respond to lifestyle modifications. More studies are needed to determine long-term effects.

Bariatric surgery after KTX

- 3 prospective case series and 1 multicentre retrospective
- 112 patients (25 lap) (11 SG and 25 RYGB)
- One graft rejection (<30days)
- Individual dose adjustments immunosuppression.


Transplant, then GBP
65
60
55
50
45
40
35
30
25
BMI
Pre-TXP
Pre-GBP
3 Months
6 Months
1 Year
2 Years
3 Years
4 Years
5 Years
Time Points

Timing is everything!

Control of obesity related diseases

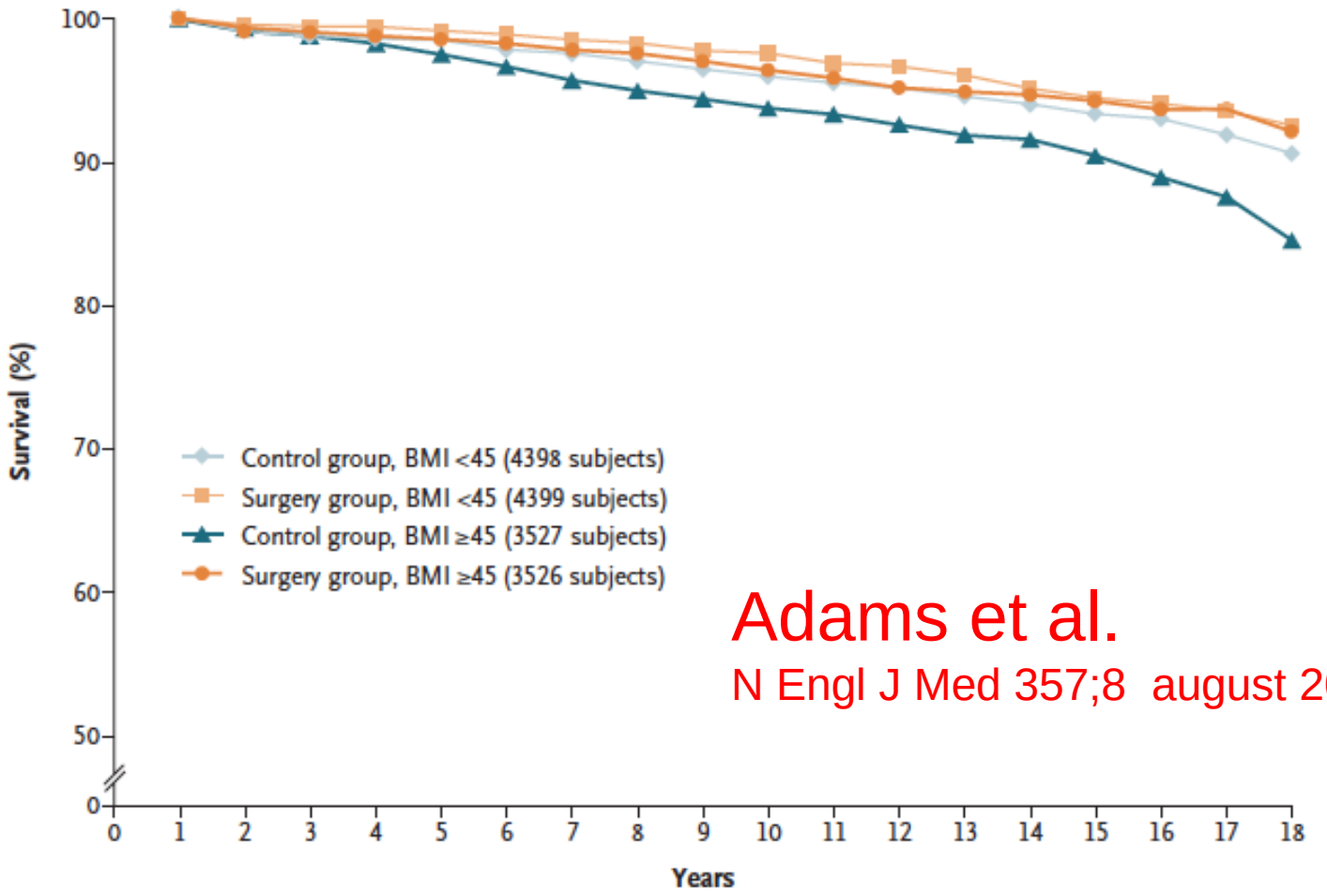
Obesity causes CKD

Surgery can cause kidney failure

Tx only feasible with BMI<35kg/m2

IS medication obesogenic

Outcome: Mortality

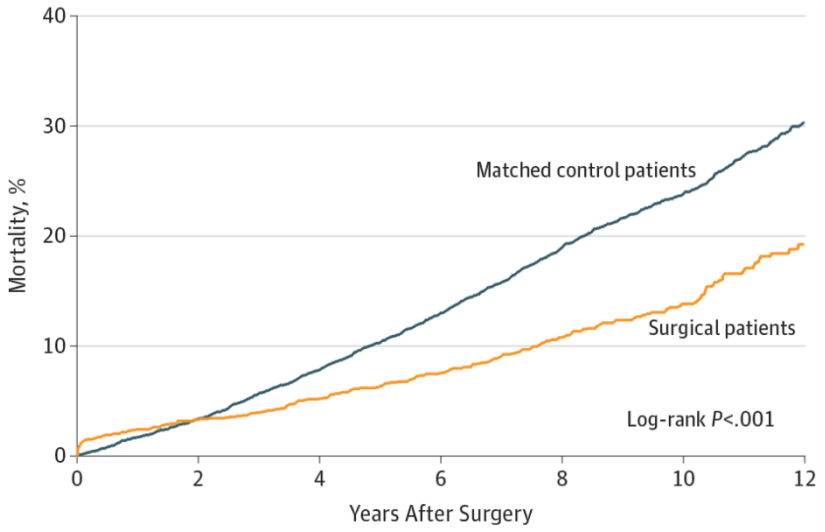


Adams et al.

N Engl J Med 357;8 august 2007

No. of Deaths																		
Control group	41	66	85	117	153	176	199	219	234	244	259	271	281	294	302	310	318	327
Surgery group	42	54	62	74	86	102	113	132	141	159	169	182	192	202	206	210	213	213

Outcome: Mortality



No. at risk							
Matched control patients	7462	7114	5306	3878	2641	1407	472
Surgical patients	2500	2416	1868	1412	1004	552	185

30% MORTALITY reduction

JAMA. 2015;313(1):62-70. doi:10.1001/jama.2014.16968

Surgical Mortality

- Mortality ↘↘↘ last decade
  - 2002: 4%
  - 2009: 0,6%
  - 2014: 0,17%
- Majeure complicaties: 4%

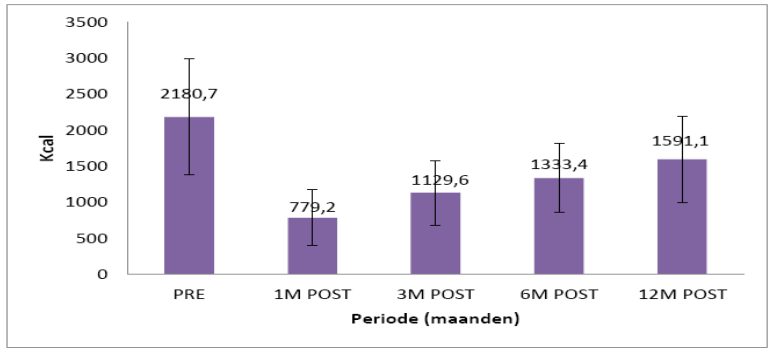
NUYGEN et al.

Ways to get there

- Standardization+++
- Anaesthesia specific for obese
- Equipment has to be specific, OR table, BP measurement,….

Care for the bariatric patient!!!!!!!!!!

	Inname pre-RYGB (n=54)		Inname 1M post-RYGB (n=45)		Inname 3M post-RYGB (n=43)		Inname 6M post-RYGB (n=35)		Intake 12M post-RYGB (n=26)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Energie (kcal)[2-4,8-10]	2180,7	808,5	779,2	386,8	1129,6	447,3	1333,4	482,9	1591,1	596,3
Proteïnen (g)[1,2,7-9]	89,1	27,9	47,3	27,9	54,7	23	68,2	34,3	71,3	26
Vet (g)[1-9]	91	41,4	25,9	16,8	41,7	24	52,1	27,9	63,2	27,8
Koolhydraten (g)[1-4,6-10]	243,2	105,6	88,8	44,8	129,7	61,7	114,3	50,1	180,8	81,8



Diet Counseling

- Vloeibare fase (modifast, fortimel soup) Doorbreken van gewoonten

- Zachte voeding
  - Licht verteerbare voeding
  - Principes gezonde voeding
  - Eiwitten

- Gezonde voeding adhv voedingsdriehoek
  - Vetarm
  - suikerarm

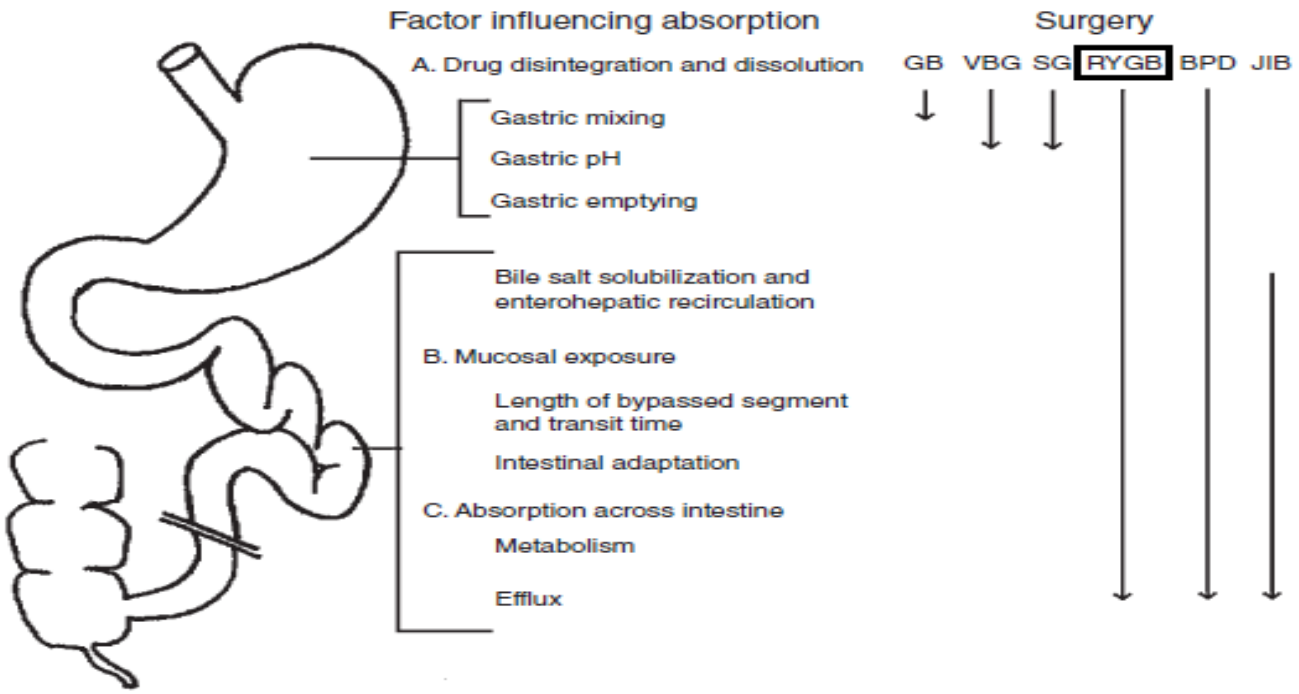
Voedingsadvies: algemeen

- Kleine frequente maaltijden
- Traag eten / Goed kauwen
- Niet drinken bij de maaltijd
  20-30 minuten voor of na elke maaltij

Eiwitten

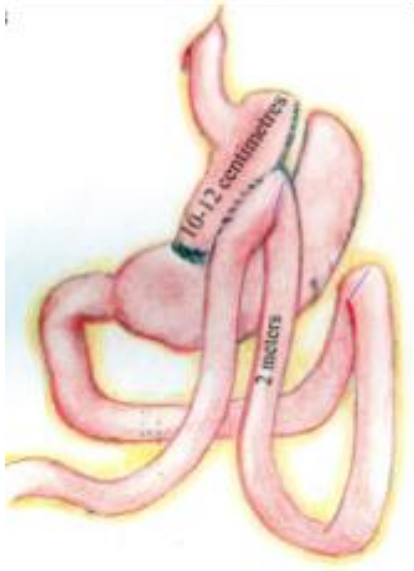
- Essentieel binnen elke fase
- Bouwstoffen in het lichaam
- Streven naar minimale behoefte:
  - Vrouw: 60gram eiwitten per dag
  - Man: 70gram eiwitten per dag

Protein malabsorption after RYGB? Always compliance problem?

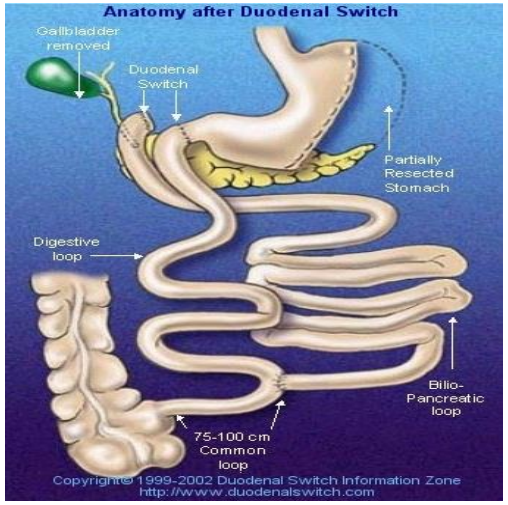


Padwal R, Brocks D, Sharma AM. A systematic review of drug absorption following bariatric surgery and its theoretical implications. Obes Rev 2010 Jan;11(1):41-50.

“MINI” gastric bypass



BPD – DS



BPD-DS

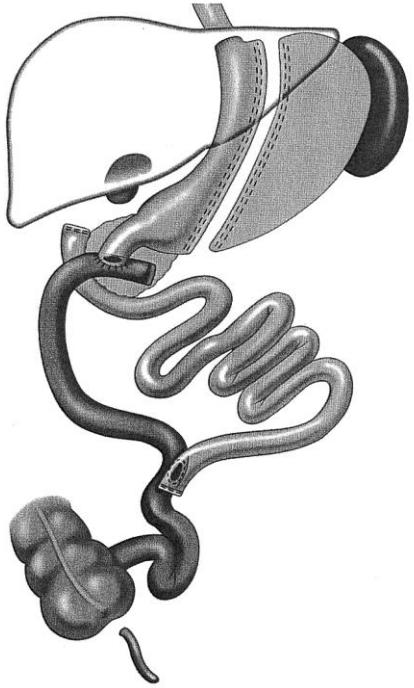
Table 4
Incidence of vitamin/micronutrient deficiencies 2 years after BPD/DS

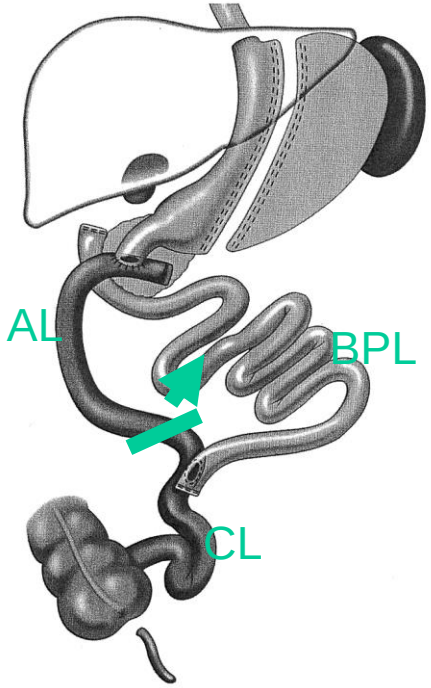
	Deficiency		Severe deficiency
	Preop	Postop	
Vitamin A	9 [13%]	23 [22.5%]	15 (<300 mg/l)
Vitamin D	66 [94%]	75 [70%]	19 (<25 nmol/l)
Vitamin B9	22 [31%]	16 [16%]	N/A
Vitamin B12	2 [3%]	9 [8.7%]	N/A
Albumin	4 [6%]	13 [12.6%]	0 (<20 g/l)
Pre-albumin	N/A	21 [21.4%]	1 (<0.10 g/l)
Iron	8 [16.6%]	19 [18.6%]	N/A
Ferritin	1 [2.4%]	7 [6.6%]	N/A
Hemoglobin	4 [5.8%]	10 [10%]	0 (<10 g/dL)
Zinc	N/A	31 [34%]	N/A

P. Topart et al. / SOARD, 10 (2014) 936–943

Correction of malabsorption

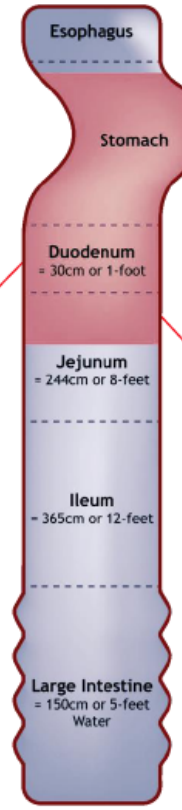
- elongation common limb (150 – 180 cm)
- conversion to gastric bypass





Malabsorption: vitamins and micronutrients

Prevalence ranges from 10% (Fe) to 34% (Vit D)



Copper
Intrinsic factor

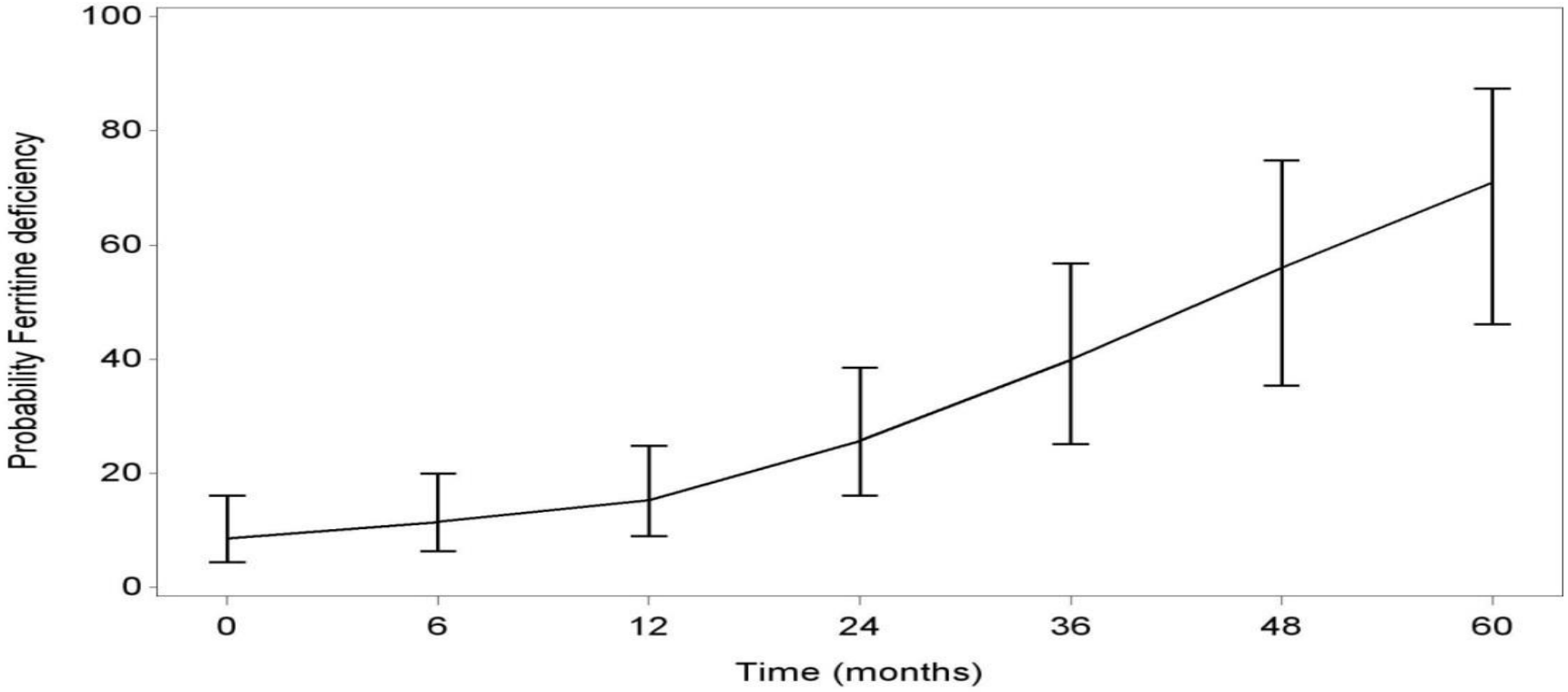
Calcium
Iron
Copper
Selenium
Thiamine
Folate
A, **D**, E, K

Calcium
Iron
Zinc
Thiamine
Folate
A, **D**, E, K

Typical bypass

https://www.nationalbariatriclink.org
Xanthakos. *Pediatr Clin N Amer*. 2009

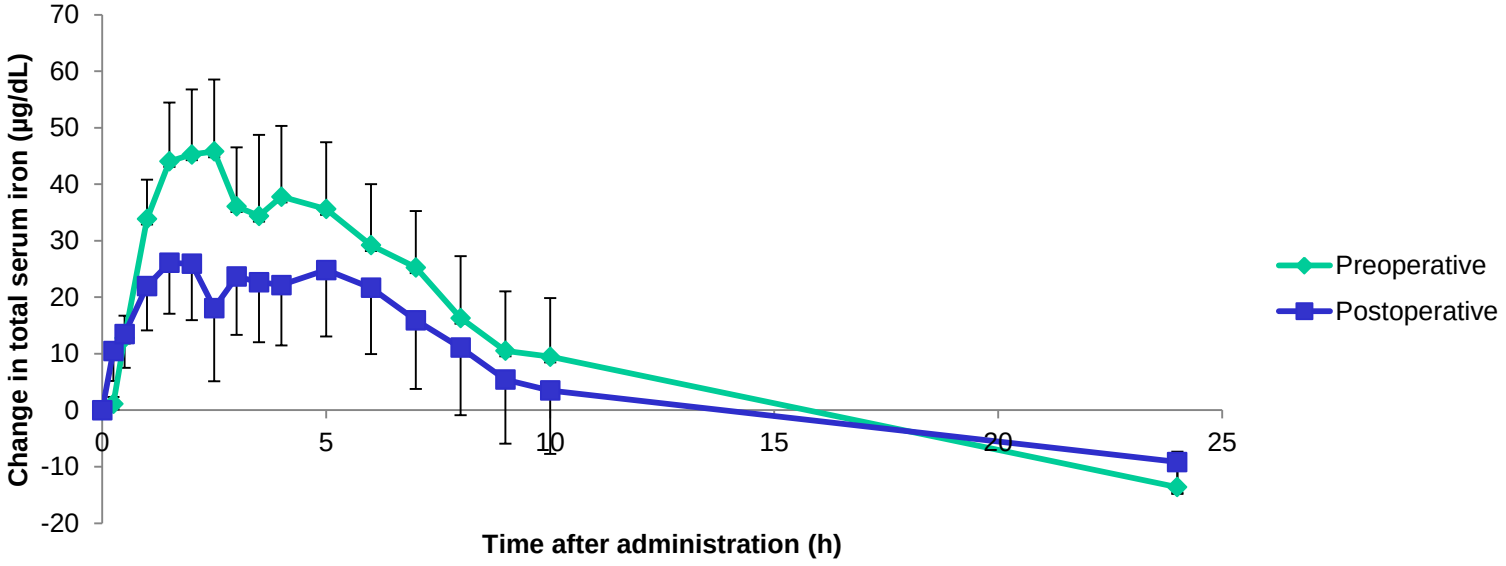
Iron deficiency



Gesquiere I et al. Obes Surg 2014

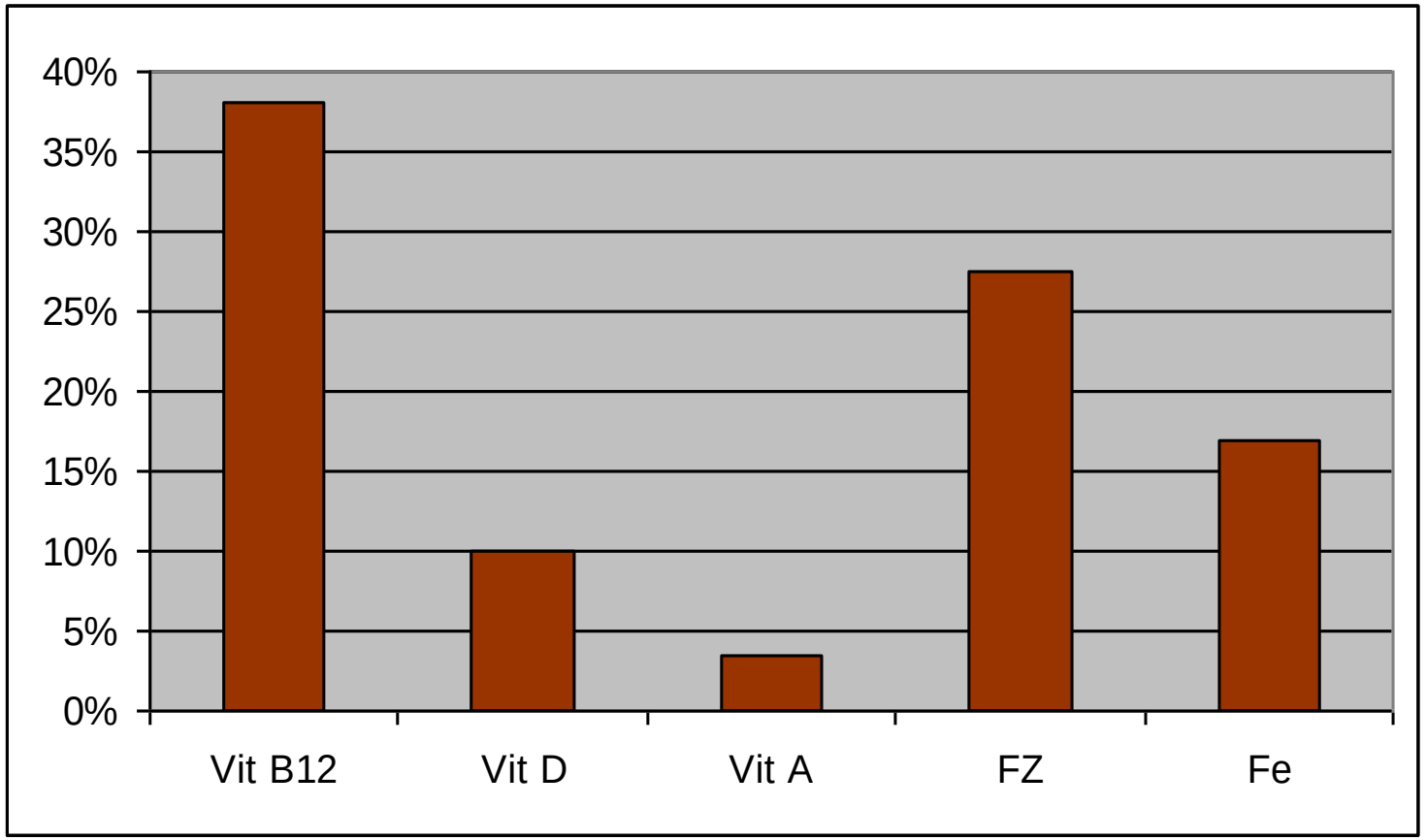
Iron absorption

Losferron®



	Before RYGB	After RYGB
Hemoglobin (g/dL)	13.5	12.5
Transferrin (g/L)	2.7	2.5
Transferrin saturation (%)	17.5	20.4
Ferritin (µg/L)	88.2	144.2

Vitamin deficiency 6m postop



Recommandation for supplemention

	RDA	RDA na RYGB	Additioneel percentage
Ca (mg)	1000	1200	20
Fe (mg)	13	19.5	50
Cu (mg)	0.9	1.35	50
Zn (mg)	9.5	12.64	33
Vit. A (µg)	800	1600	100
Vit. B1 (mg)	1.15	2.88	150
Vit. B12 (µg)	2.4	9.6	300
Vit. C (mg)	82.5	247.5	200
Vit. D (µg)	15	30	100

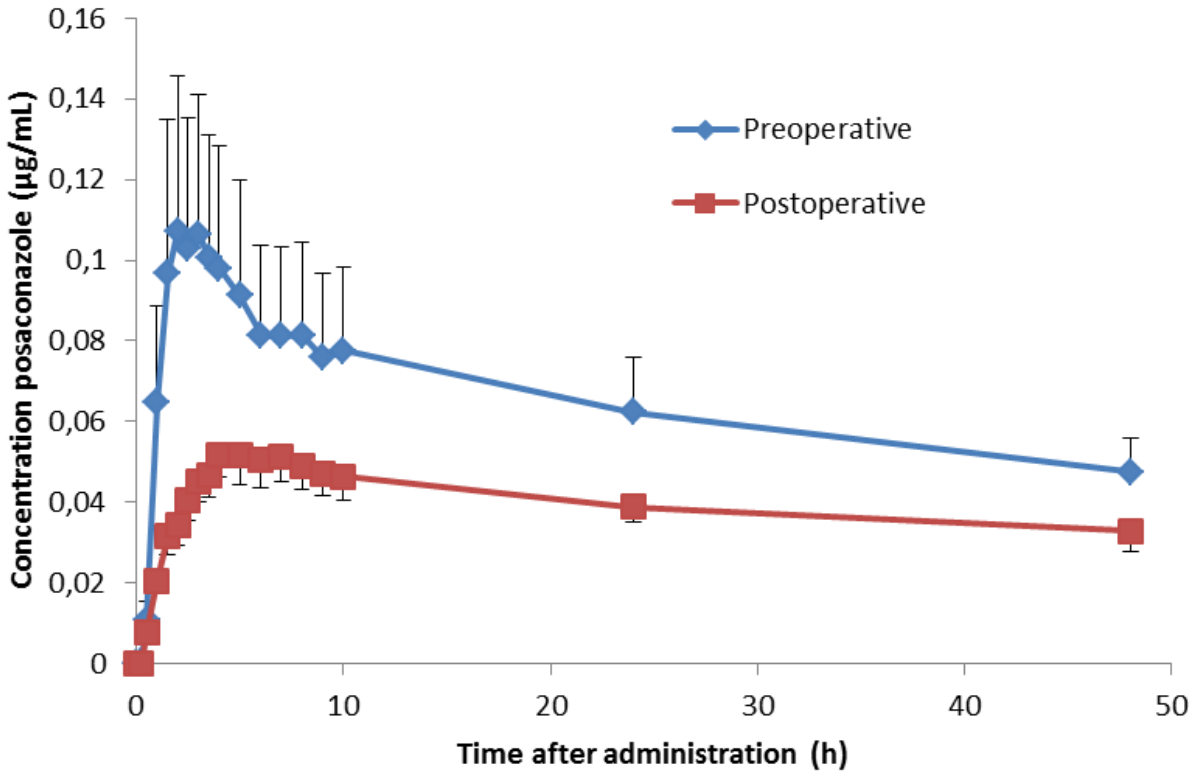
Valentino D et al. Curr Opin Clin Nutr and Metab Care 2011

Lab tests: yearly

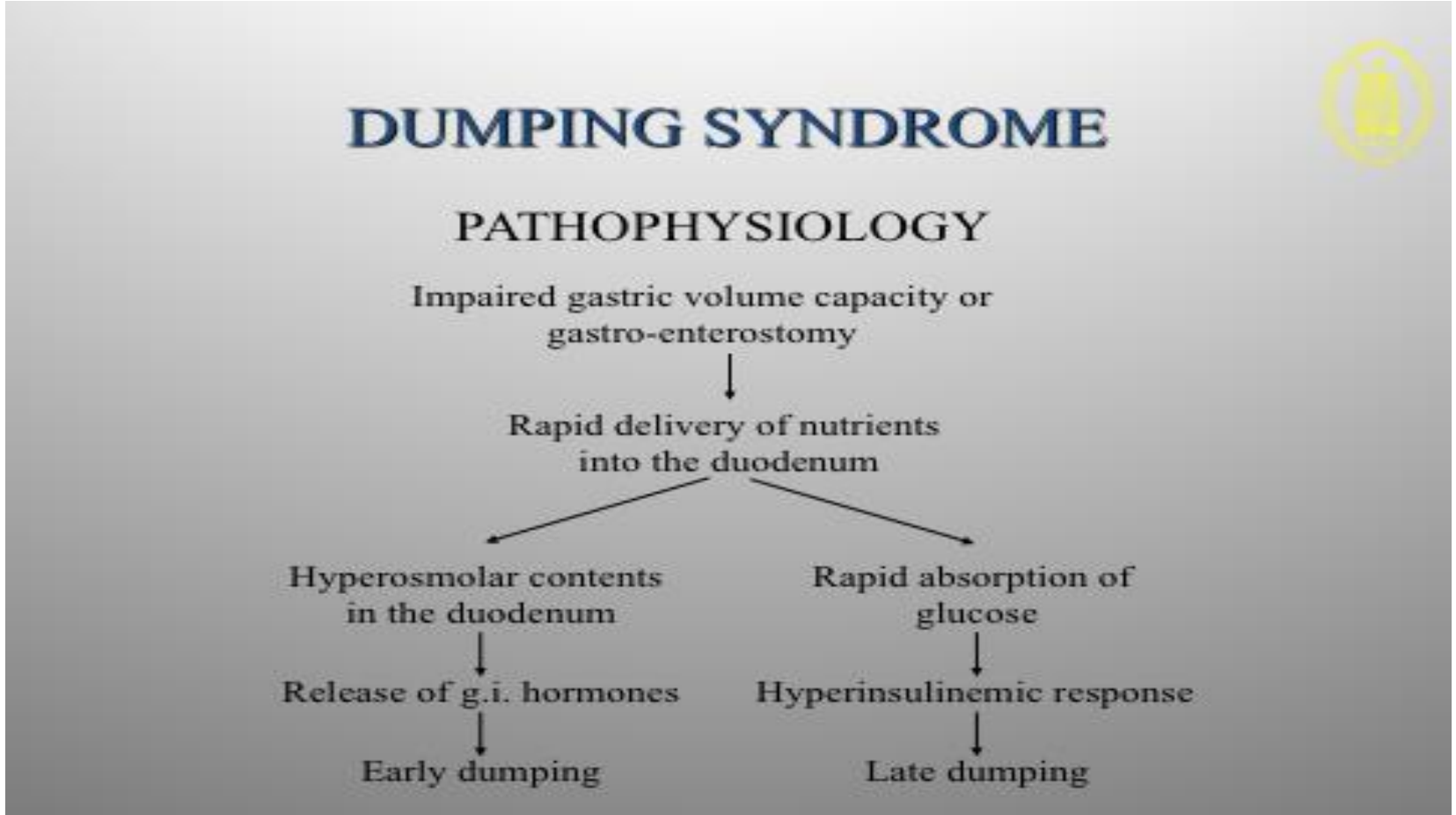
- Complet, liver function,
- ionogram en renal functio
- iron, ferritin, transferrin
- Folic acid, vit B12
- calcium, fosfor, magnesium
- copper, zinc
- cholesterol tot, LDL en HDL
- tot. protei,n, albumin amylase en lipase
- Vit A, vit D en vit B1
- glucose en HbA1c

Absorption of pharmacological agents

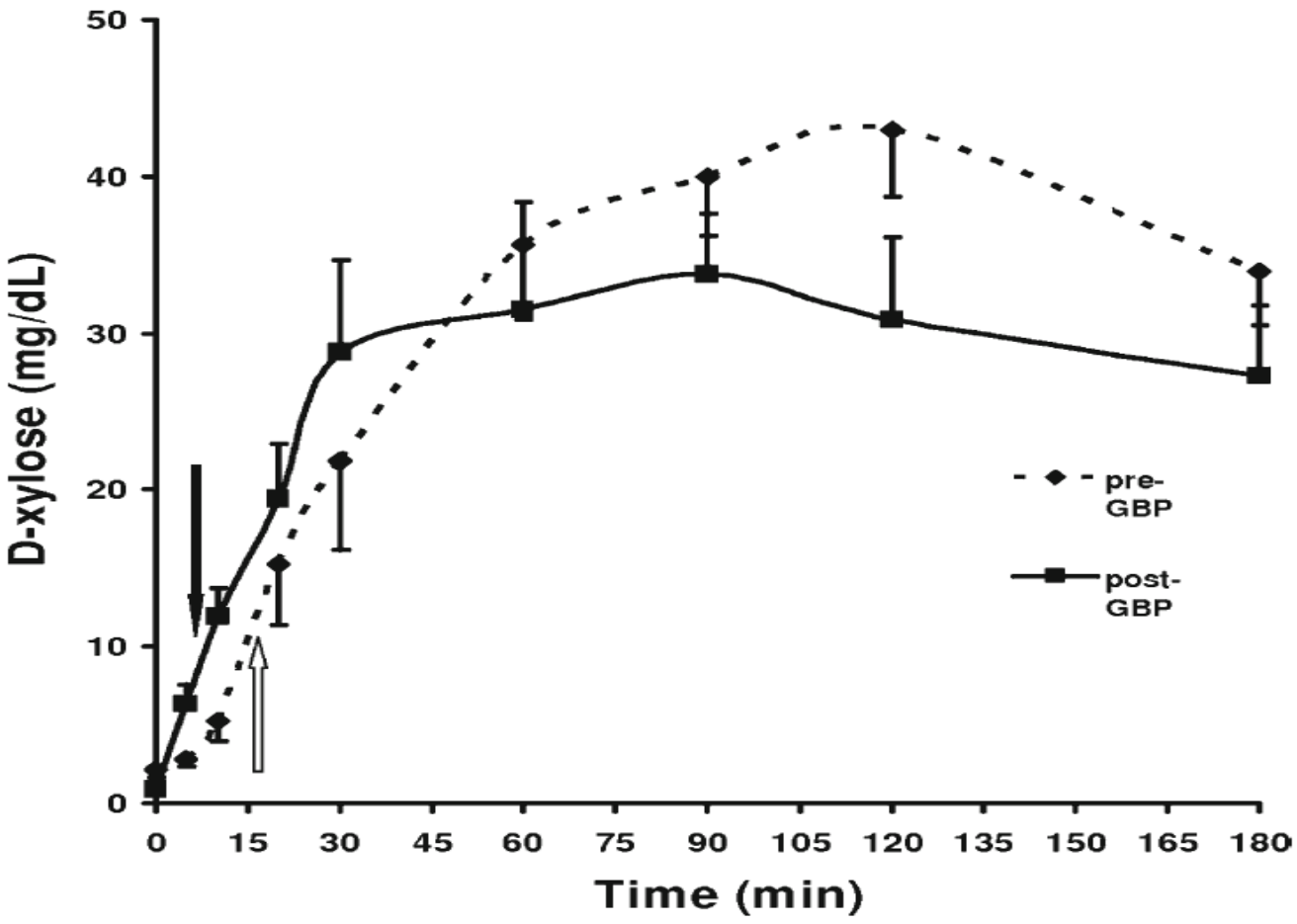
posaconazole



Dumping gewenst of complicatie?



- Glucose absorption



Wang et al. OBES SURG 2012

DUMPING

≤ 4 : no dumping

5 or 6 : uncertain

≥ 7 : present

www.medial.org

- Clinical index of Sigstad for diagnosis of Dumping
  - Preshock or shock 5
  - Syncope, faintness, loss of consciousness 4
  - Desire to lie down 4
  - Breathlessness, dyspnoe 3
  - Weakness, feeling exhausted 3
  - Drowsiness, sleepiness, yawning, falling asleep, apathy 3
  - Palpitation 3
  - Restlessness 2
  - Dizziness 2
  - Headaches 1
  - Sweating, feeling warm, clammy skin and/or pallor 1
  - Nausea 1
  - Fullness, bloating 1
  - Borborygmia 1
  - Eracutatio 1
  - Vomiting -4

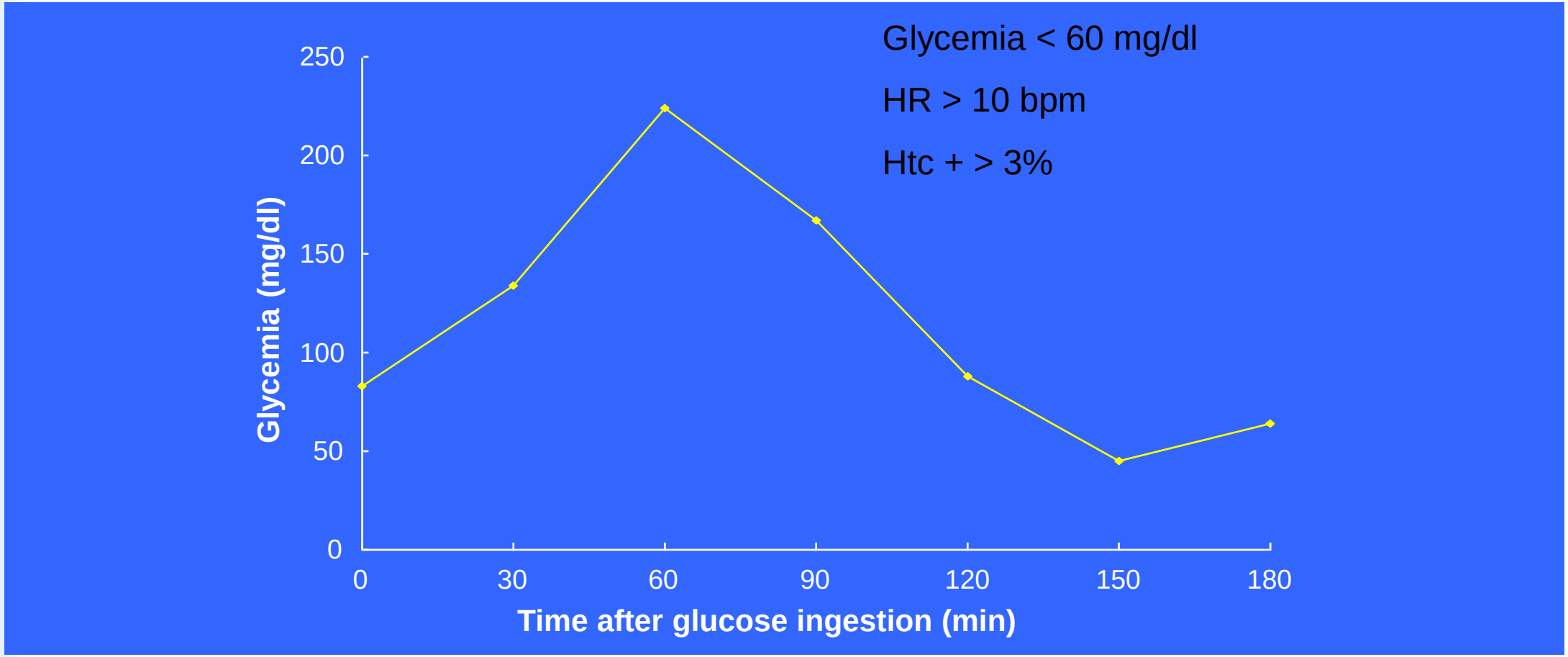
Sigstad H. 1970

Dumping

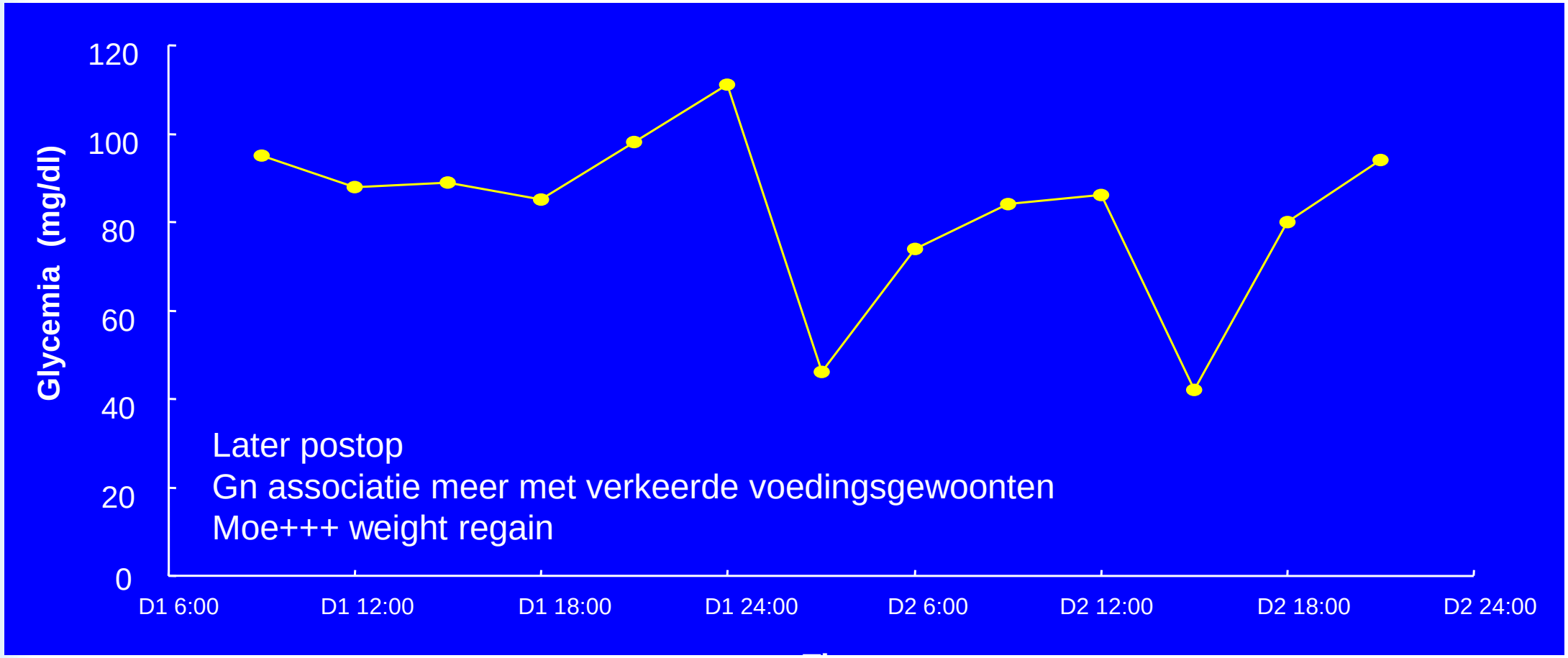
DUMPING	early	late
adequate	high calory ↓ neg feedback + weightloss	feedback is difficult information is important
inadequate	normal food ↓ anorexia	Hypoglycemia Nesidioblastosis

DUMPING

GLUCOSE CHALLENGE TEST



Dumping


Glycemia (mg/dl)
120
100
80
60
40
20
0
D1 6:00
D1 12:00
D1 18:00
D1 24:00
D2 6:00
D2 12:00
D2 18:00
D2 24:00
Later postop
Gn associatie meer met verkeerde voedingsgewoonten
Moe+++ weight regain

DUMPING

is ook versnelde transit!

vetten, drinken+eten, snelle suikers

verlengd negatief effect

Overgroei colonflora

R/ dieet+ soms AB

ALCOHOL!!!!!!!

- Substance Use following Bariatric Weight loss Surgery

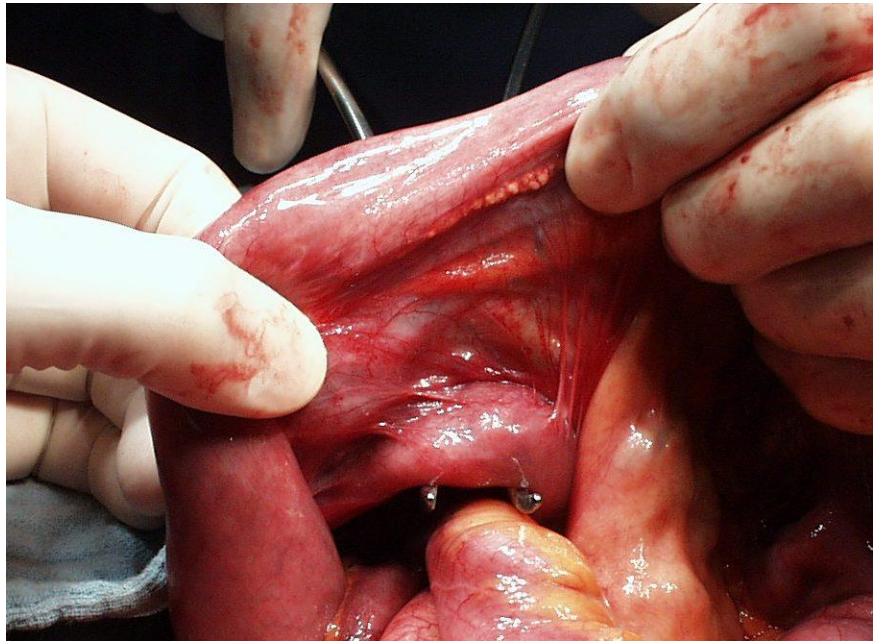
  Significant increase of composite substance use from baseline to 24 months after surgery (P = 0.02)

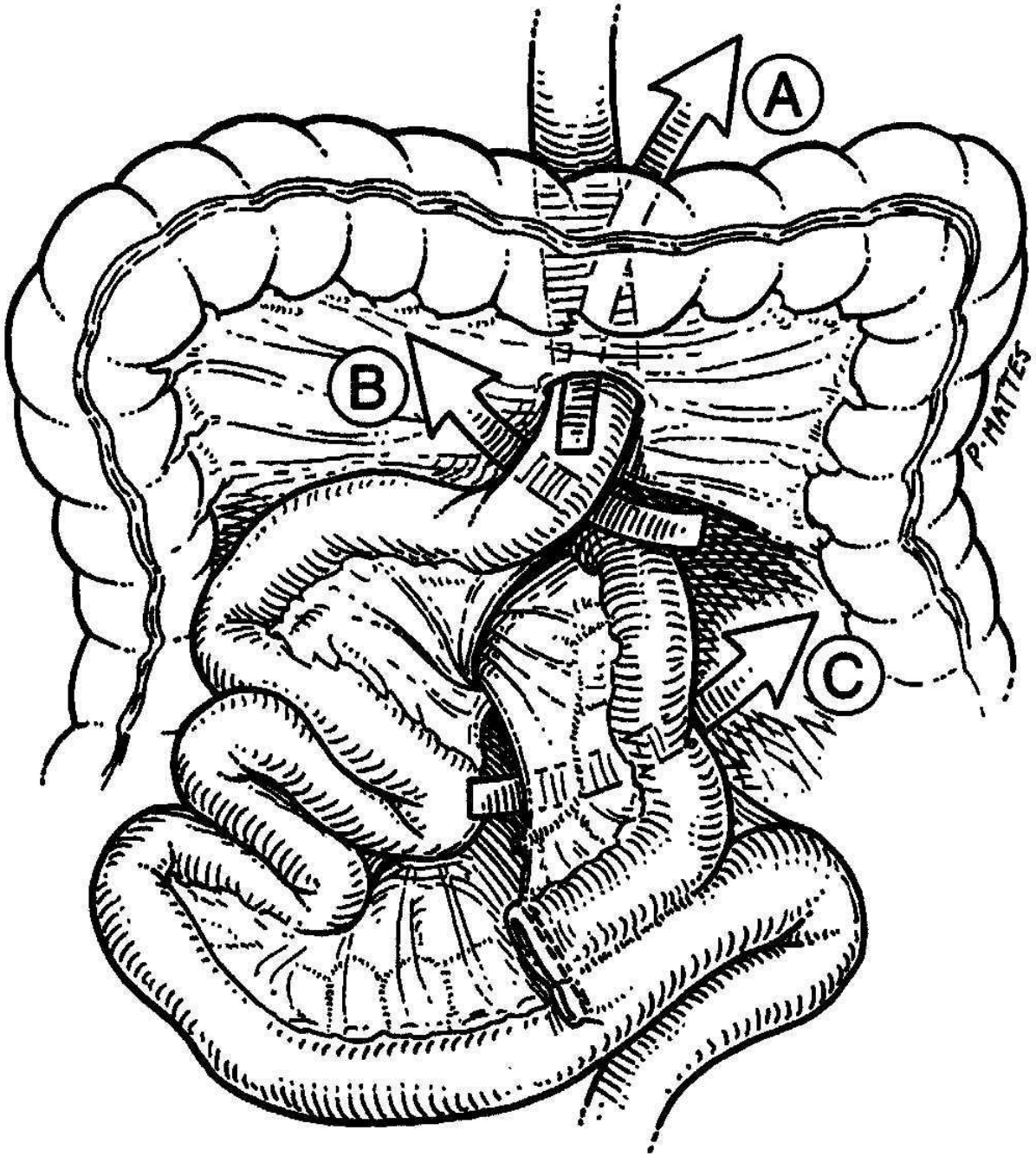
Ref: Conason et al. JAMA SURG FEB 2013

Internal Hernia + SBO

incidence : 0 – 8 % after laparoscopic procedures

diagnosis : CT - scan



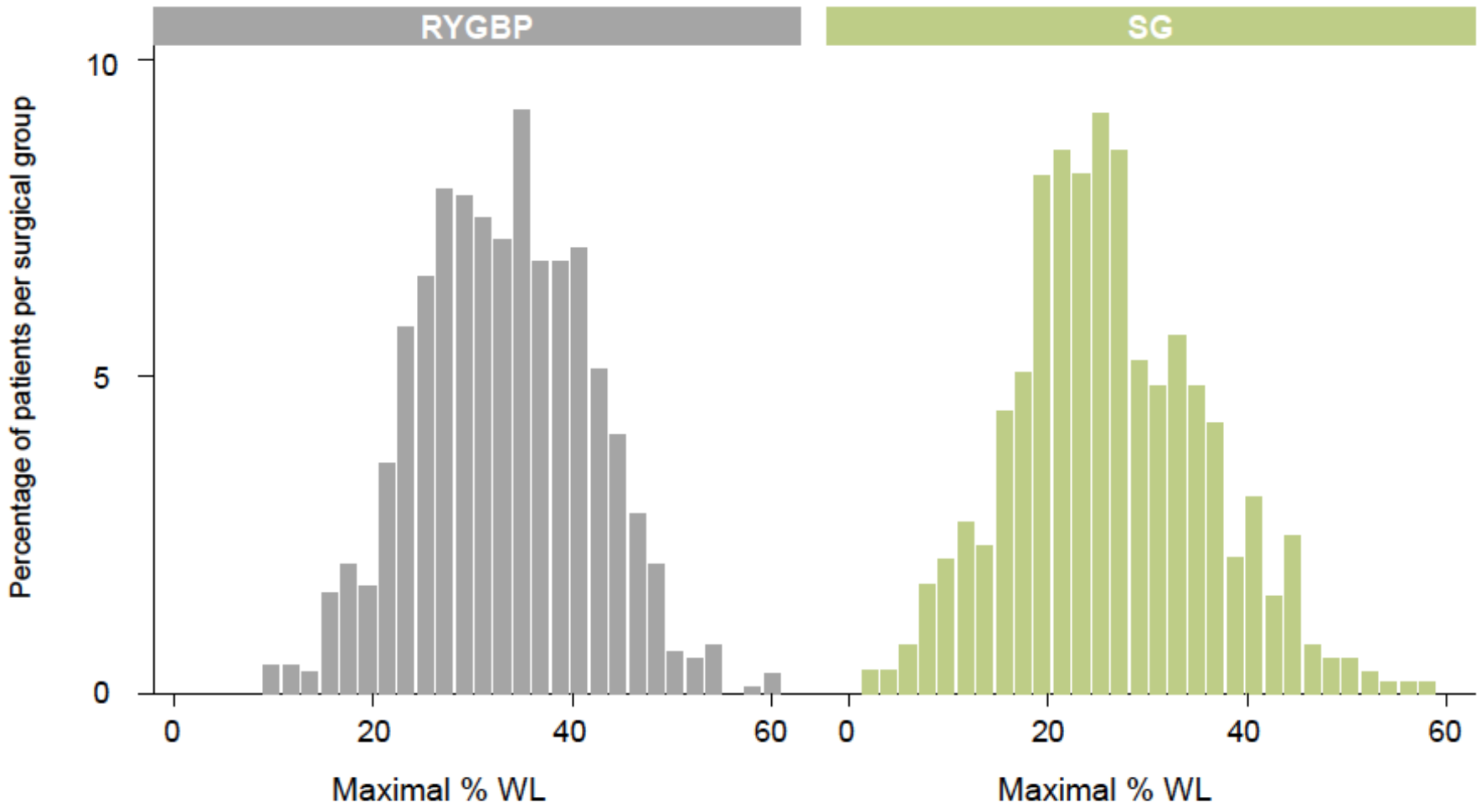

A
B
C
P. MATTES

Interne hernia

- Pijn li hypochonder, dysfagie nausea, zelden braken!
- CT toont slechts indirecte tekens of niets
- Drempel exploratieve laparoscopie is

ZEER LAAG

RYGB vs SG: Weight loss



RYGBP: Roux-en-Y gastric Bypass n=877; SG: Sleeve Gastrectomy n= 513

RYGB unless …

- Crohn, TX, DM type 1, HF, COPD…
- NSAID dependency
- Age
- Young female, pregnancy wish
- History of –OH, PSY, bradyfrenia
- Chaotic lifestyle

- Cave Barrett, GERD gr C&D, no REDO!!!!

Follow up program

- After 2 weeks: dietitian (group)
- After 4 weeks: abdominal surgeon + dietitian (group)
- After 3 months: abdominal surgeon + dietitian
- After 6 months: endocrinologist + dietitian + psychologist

Follow up program

- After 9 months: Dietitian: on indication of the dietitian (if dietary errors/problems on 6 months)
- At 1 year : endocrinologist + dietitian + psychologist (on indication)
- After 1 year: endocrinologist + dietitian
- Then annual follow-up by the endocrinologist en dietitian

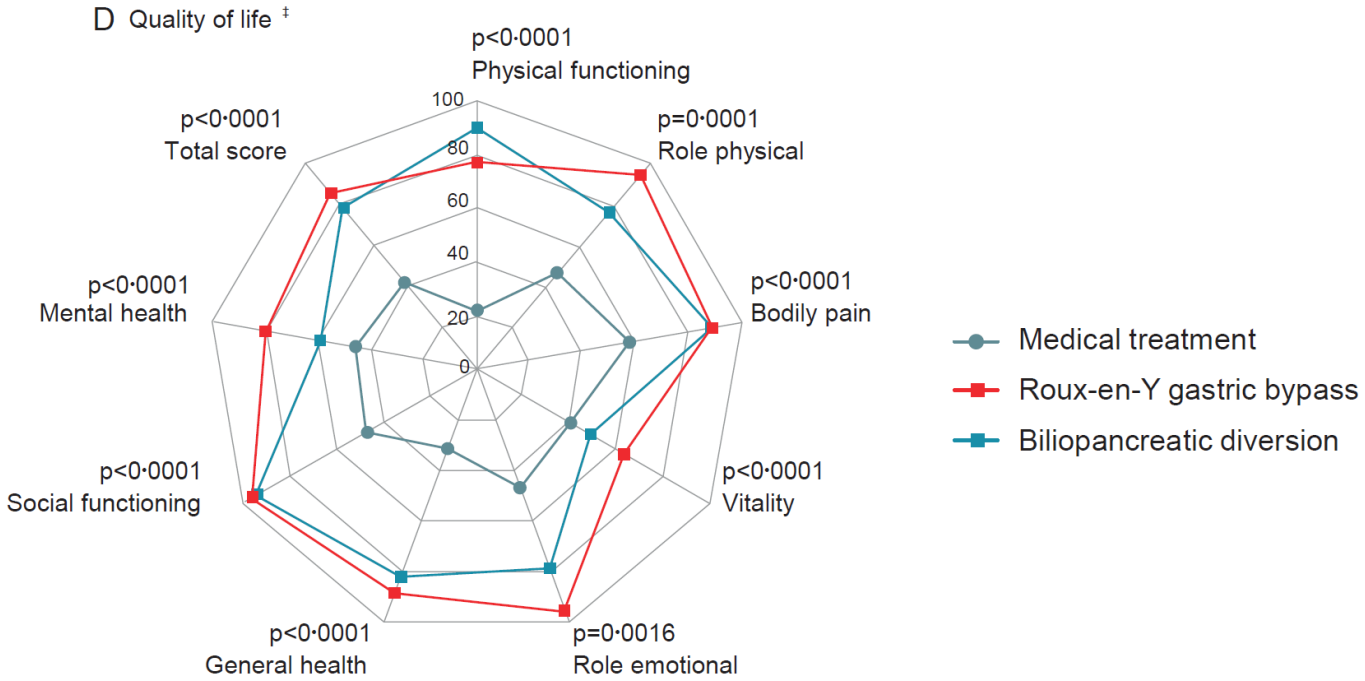
Follow up revalidation program

3 months revalidation , 2x/week with endurance exercise and strength training

Start 6 weeks after Intervention

5-Yr Outcomes of Surgical vs Medical Treatment of T2DM: An Open-label, Randomized Clinical Trial

Surgery associated with Improved QoL



G. Mingrone….F. Rubino. Lancet 2015; 386:964-73

Benefits of bariatric surgery protect Tx organ and patient