IFSO International Federation for the Surgery of Obesity

ΕΛΛΗΝΙΚΗ ΧΕΙΡΟΥΡΓΙΚΗ ΕΤΑΙΡΕΙΑ ΠΑΧΥΣΑΡΚΙΑΣ

Πρόγραμμα Μεταπτυχιακών Σπουδών
ΕΚΠΑ
Καρδιομεταβολική Ιατρική

ΙΑΤΡΙΚΗ ΣΧΟΛΗ ΑΘΗΝΩΝ · ATHENS MEDICAL SCHOOL · 1837 ·

Υποστροφή Διαβήτη Μεταβολική Χειρουργική

Χ.Κ. Παππής, MD, PhD, FACS, FEBS(Hon)

Δ/ντής Κλινικής Λαπαροενδοσκοπικής Χειρουργικής Ογκολογίας & Παχυσαρκίας

Αντιπρόεδρος Ελληνικής Χειρουργικής Εταιρείας Παχυσαρκίας

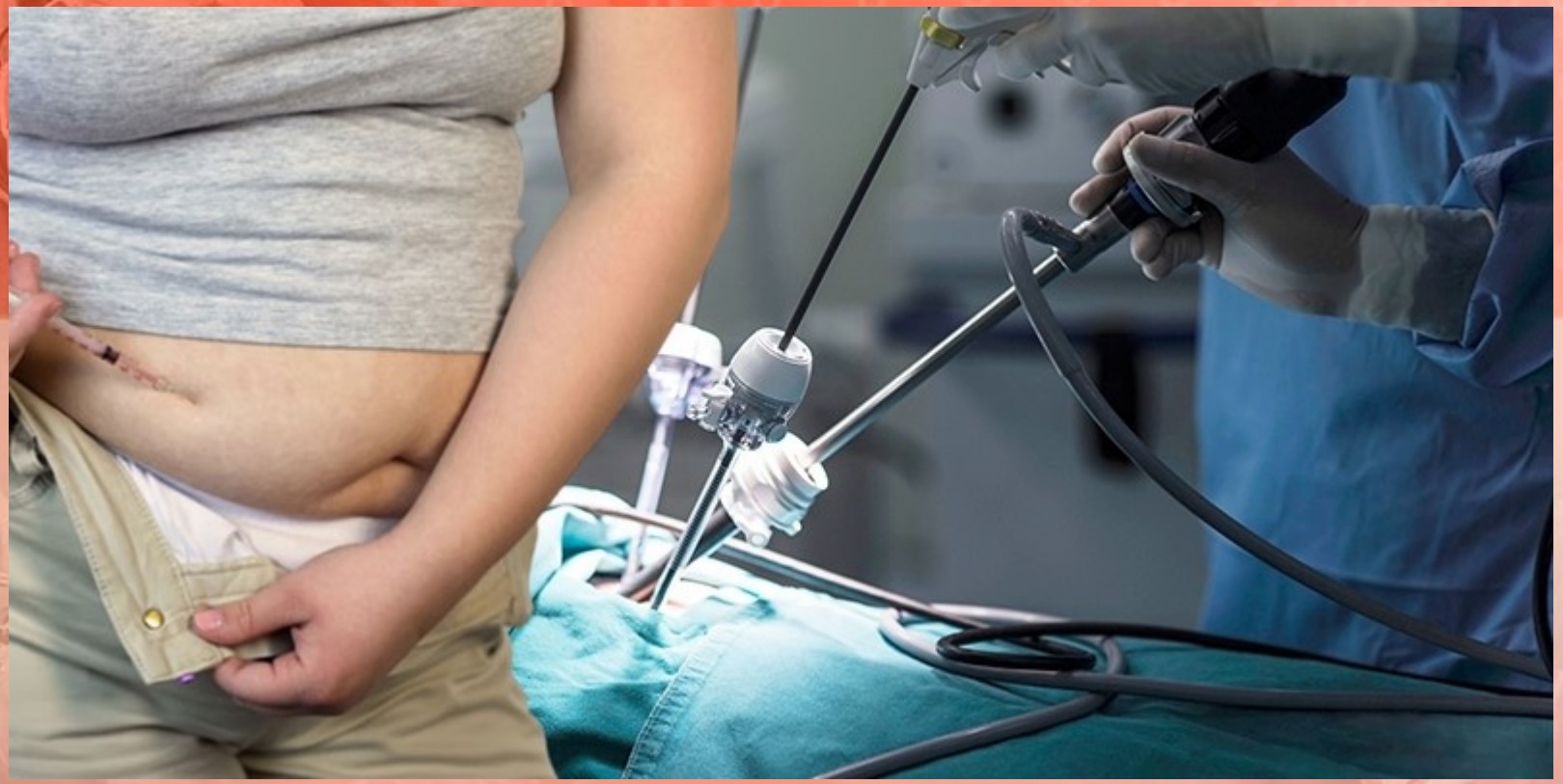
τ.Πρόεδρος Ελληνικής Εταιρείας Λαπαροσκοπικής Χειρουργικής

ΟΜΙΛΟΣ ΙΑΤΡΙΚΟΥ ΑΘΗΝΩΝ

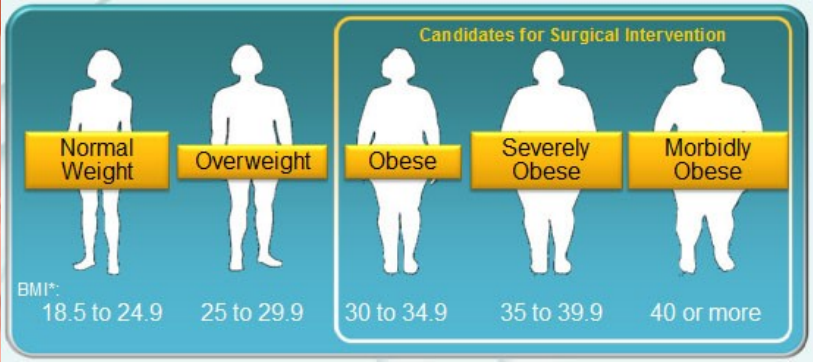
Πάντα ένα βήμα μπροστά!

Λαπαροσκοπική
Χειρουργική Στομάχου

Σακχαρώδης Διαβήτης τύπου ΙΙ → **Ύφεση του Διαβήτη**



BARIATRIC SURGERY	METABOLIC SURGERY
Objective	
Weight loss and mitigation of comorbidities	Metabolic and cardiovascular risk control
Indication	
Body Mass Index (BMI) ≥ 40 kg/m^2 or BMI ≥ 35 kg/m^2 with associated medical conditions	Uncontrolled type 2 diabetes, other metabolic or cardiovascular conditions, BMI ≥ 30 kg/m^2
Mechanisms of action	
Restrict stomach size and intestinal absorption	Complex neuroendocrine mechanisms



Sharma AM, Kushner RF. A proposed clinical staging system for obesity. Int J Obes. 2009; 33(3): 289-95

Table 4 Proposed clinical and functional staging of obesity

Stage	*Description*	*Management*
0	No apparent obesity-related risk factors (e.g., blood pressure, serum lipids, fasting glucose, etc. within normal range), no physical symptoms, no psychopathology, no functional limitations and/or impairment of well being	Identification of factors contributing to increased body weight. Counseling to prevent further weight gain through lifestyle measures including healthy eating and increased physical activity.
1	Presence of obesity-related subclinical risk factors (e.g., borderline hypertension, impaired fasting glucose, elevated liver enzymes, etc.), mild physical symptoms (e.g., dyspnea on moderate exertion, occasional aches and pains, fatigue, etc.), mild psychopathology, mild functional limitations and/or mild impairment of well being	Investigation for other (non-weight related) contributors to risk factors. More intense lifestyle interventions, including diet and exercise to prevent further weight gain. Monitoring of risk factors and health status.
2	Presence of established obesity-related chronic disease (e.g., hypertension, type 2 diabetes, sleep apnea, osteoarthritis, reflux disease, polycystic ovary syndrome, anxiety disorder, etc.), moderate limitations in activities of daily living and/or well being	Initiation of obesity treatments including considerations of all behavioral, pharmacological and surgical treatment options. Close monitoring and management of comorbidities as indicated.
3	Established end-organ damage such as myocardial infarction, heart failure, diabetic complications, incapacitating osteoarthritis, significant psychopathology, significant functional limitations and/or impairment of well being	More intensive obesity treatment including consideration of all behavioral, pharmacological and surgical treatment options. Aggressive management of comorbidities as indicated.
4	Severe (potentially end-stage) disabilities from obesity-related chronic diseases, severe disabling psychopathology, severe functional limitations and/or severe impairment of well being	Aggressive obesity management as deemed feasible. Palliative measures including pain management, occupational therapy and psychosocial support.

Γιατί Χειρουργικές Λύσεις;

- **Η δίαιτα και η άσκηση στο νοσογόνα παχύσαρκο δεν είναι αποτελεσματικά μακροπρόθεσμα**

Philip Schauer et al: Bariatric Surgery versus Intensive Medical Therapy for Diabetes - 5-Year Outcomes (STAMPEDE trial), N Engl J Med 376;7, 2017

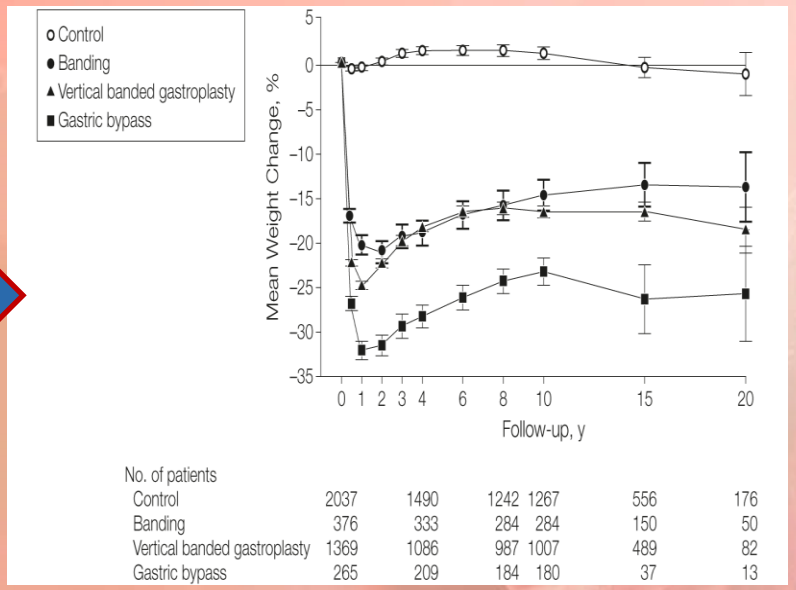
Γιατί Χειρουργικές Λύσεις;

- **Η χειρουργική είναι η μόνη μακροπρόθεσμα αποτελεσματική μέθοδος**

"Only surgery has proven effective over the long term for most patients with clinically severe obesity."

NIH Consensus Conference Statement, 1991

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



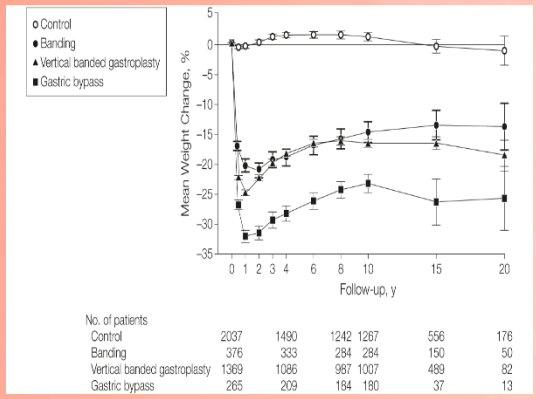
L Carlsson et al: Life Expectancy after Bariatric Surgery in the Swedish Obese Subjects Study N Engl J Med 383;16, 2020

Life Expectancy after Bariatric Surgery in the Swedish Obese Subjects Study

Table 1. Baseline Characteristics of the Study Participants and Reference Cohort.*

Characteristic	Surgery Group (N = 2007)	Control Group (N = 2040)	Reference Cohort (N = 1135)
Age — yr	47.2±5.9	48.7±6.3	49.5±7.0
Male sex — no. (%)	587 (29.2)	593 (29.1)	524 (46.2)
Body-mass index†	42.4±4.5	40.1±4.7	25.2±3.8
Waist:hip ratio	0.992±0.078	0.978±0.074	0.881±0.082
Cardiovascular disease before baseline — no. (%)	46 (2.3)	49 (2.4)	22 (1.9)
Cancer before baseline — no. (%)	25 (1.2)	22 (1.1)	24 (2.1)
Hypertension — no./total no. (%)	1571/2004 (78.4)	1301/2038 (63.8)	312/1129 (27.6)
Glucose tolerance — no./total no. (%)‡			
Normal	1355/2000 (67.8)	1483/2036 (72.8)	999/1132 (88.3)
Impaired	301/2000 (15.0)	290/2036 (14.2)	95/1132 (8.4)
Type 2 diabetes	344/2000 (17.2)	263/2036 (12.9)	38/1132 (3.4)
Insulin level — mU/liter	21.5±13.7	18.0±11.4	8.6±5.1
Total cholesterol level — mmol/liter	5.9±1.1	5.6±1.1	5.5±1.0
Daily smoking — no./total no. (%)	518/2005 (25.8)	422/2030 (20.8)	235/1134 (20.7)
University education — no./total no. (%)	257/2007 (12.8)	431/2040 (21.1)	375/1134 (33.1)
Married or living with a partner — no./total no. (%)	1460/2002 (72.9)	1527/2029 (75.3)	911/1133 (80.4)
History of substance abuse — no. (%)	58 (2.9)	50 (2.5)	10 (0.9)
Psychiatric care or medication before baseline — no. (%)	355 (17.7)	324 (15.9)	83 (7.3)

* Plus–minus values are means ±SD. There were imbalances ($P<0.05$) between the surgery and control groups with respect to age, body-mass index, waist:hip ratio, hypertension, glucose tolerance, insulin level, total cholesterol level, smoking status, and university education, and between the reference cohort and the control group with respect to all variables except cardiovascular disease and smoking.
† The body-mass index is the weight in kilograms divided by the square of the height in meters.
‡ Glucose tolerance was classified as normal (fasting blood glucose level, <90 mg per deciliter [<5.0 mmol per liter]), impaired (≥90 to <110 mg per deciliter [≥5.0 to <6.0 mmol per liter]), or type 2 diabetes (≥110 mg per deciliter [≥6.1 mmol per liter]).



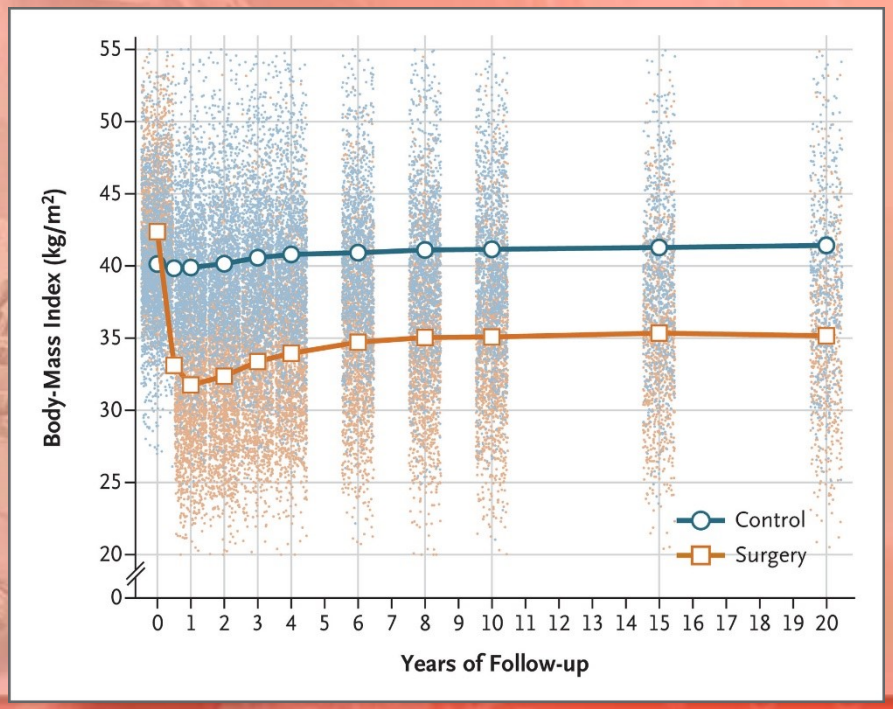


Table 3. Deaths and Complications during the First 90 Days after Bariatric Surgery in the SOS Study.

Adverse Event	Surgery Group (N = 2007)
	no. of patients (%)
Death	5 (0.2)
Pulmonary event	89 (4.4)
Thromboembolism	16 (0.8)
Vomiting	61 (3.0)
Wound infection	43 (2.1)
Other infection	28 (1.4)
Hemorrhage	26 (1.3)
Anastomotic leak, peritonitis, or abscess	30 (1.5)
Ileus	10 (0.5)
Wound dehiscence	14 (0.7)
Other complication	21 (1.0)
At least one complication	292 (14.5)
Repeat surgery during the first 90 days	59 (2.9)

Γιατί Χειρουργικές Λύσεις;

- **Βελτίωση ή ίαση συνοδών παθήσεων**

Outcomes of different bariatric procedures

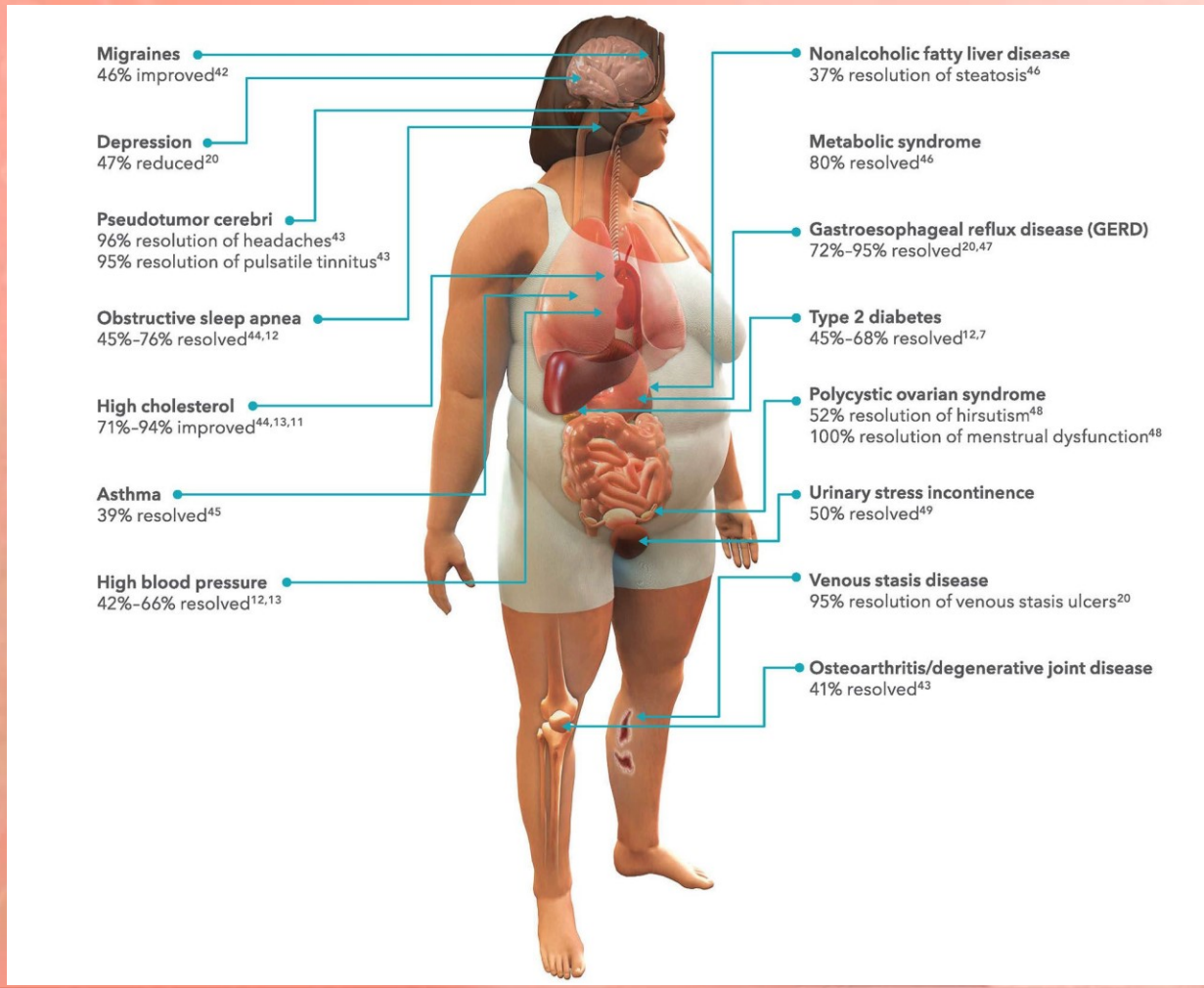
	LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING	ROUX-EN-Y GASTRIC BYPASS	BILIO-PANCREATIC DIVERSION
Excess weight loss	46.2%	59.5%	63.3%
Operative mortality	0.1%	0.5%	1.1%
Remission of type 2 diabetes mellitus	56.7%	80.3%	95.1%
Remission of hyperlipidemia	59%	97%	99%
Remission of hypertension	43%	68%	83%

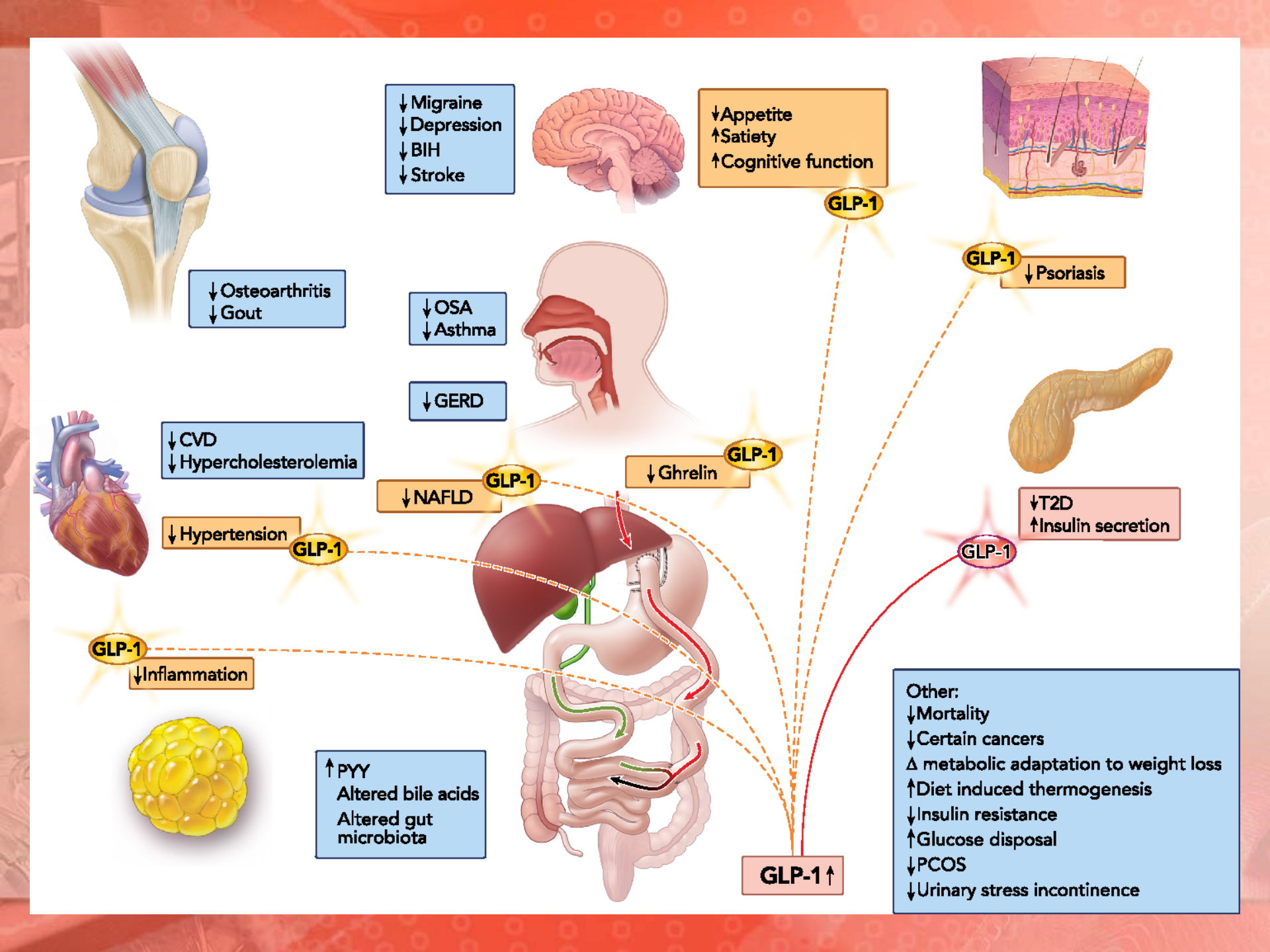
JAMA®
Online article and related content current as of September 14, 2008.

Bariatric Surgery: A Systematic Review and Meta-analysis

Henry Buchwald; Yoav Avidor; Eugene Braunwald; et al.

JAMA. 2004;292(14):1724-1737 (doi:10.1001/jama.292.14.1724)




↓Migraine
↓Depression
↓BIH
↓Stroke
↓Appetite
↑Satiety
↑Cognitive function
GLP-1
GLP-1
↓Psoriasis
↓Osteoarthritis
↓Gout
↓OSA
↓Asthma
↓GERD
↓CVD
↓Hypercholesterolemia
↓NAFLD
GLP-1
↓Ghrelin
GLP-1
↓Hypertension
GLP-1
↓T2D
↑Insulin secretion
GLP-1
GLP-1
↓Inflammation
↑PYY
Altered bile acids
Altered gut microbiota
GLP-1↑
Other:
↓Mortality
↓Certain cancers
Δ metabolic adaptation to weight loss
↑Diet induced thermogenesis
↓Insulin resistance
↑Glucose disposal
↓PCOS
↓Urinary stress incontinence

Γιατί Χειρουργικές Λύσεις;

- **Μικρός χειρουργικός κίνδυνος V μακροχρόνιος κίνδυνος παχυσαρκίας**

Trends in mortality in bariatric surgery: A systematic review and meta-analysis

Henry Buchwald, MD, PhD,[a] Rhonda Estok, RN, BSN,[b] Kyle Fahrbach, PhD,[b] Deirdre Banel, BS,[b] and Isabella Sledge, MD, MPH,[b] *Minneapolis, Minn, and Medford, Mass*

Conclusion. *The early and late mortality rates after bariatric surgery are low and [illegible] be subjected to risk stratification for comparative analyses and prospective risk assessments.*
(Surgery 2007;142:621-35.)

Total Mortality
0,28%

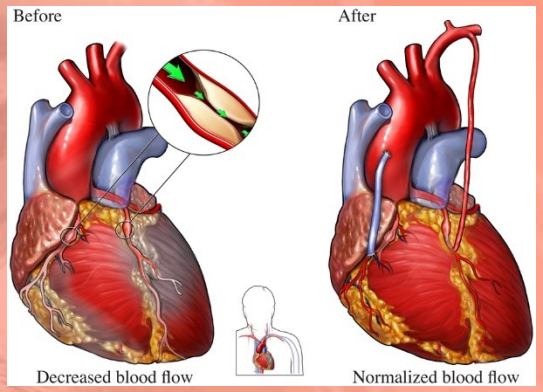
Meta-Analysis > Br J Surg. 2021 Aug 19;108(8):892-897. doi: 10.1093/bjs/znab245.

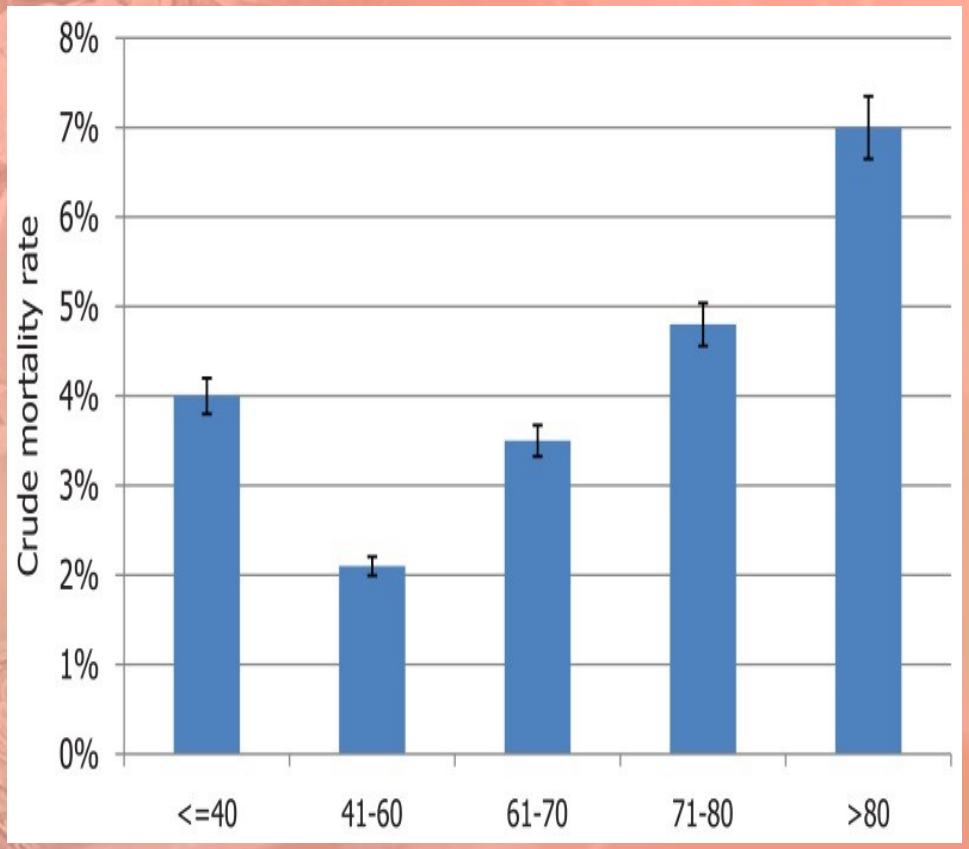
Perioperative mortality in bariatric surgery: meta-analysis

A G N Robertson [1], T Wiggins [2], F P Robertson [3], L M Hollyman [4], R Welbourn [4]

Results: Some 4[illegible]6 articles were identified and 58 met the inclusion criteria. Data were available on over 3.6 m[illegible]on patients. There were 4707 deaths. Pooled analysis showed an overall mortality rate of 0.08 (95 per cent c.i. 0.06 to 0.10; 95 per cent prediction interval 0 to 0.21) per cent. In subgroup analysis, there was no statistically significant difference between overall, 30-day, 90-day or in-hospital mortality (P = 0.29). There was no significant difference in reported mortality for RCTs, large studies, national databases or registries (P = 0.60). The pooled mortality rates by procedure type in ascending order were: 0.03 per cent for gastric band, 0.05 per cent for sleeve gastrectomy, 0.09 per cent for one-anastomosis gastric bypass, 0.09 per cent for Roux-en-Y gastric bypass, and 0.41 per cent for duodenal switch (P < 0.001 between operations).

Conclusion: Bariatric surgery is safe, with low reported perioperative mortality rates.


Before
After
Decreased blood flow
Normalized blood flow


Crude mortality rate
8%
7%
6%
5%
4%
3%
2%
1%
0%
<=40
41-60
61-70
71-80
>80

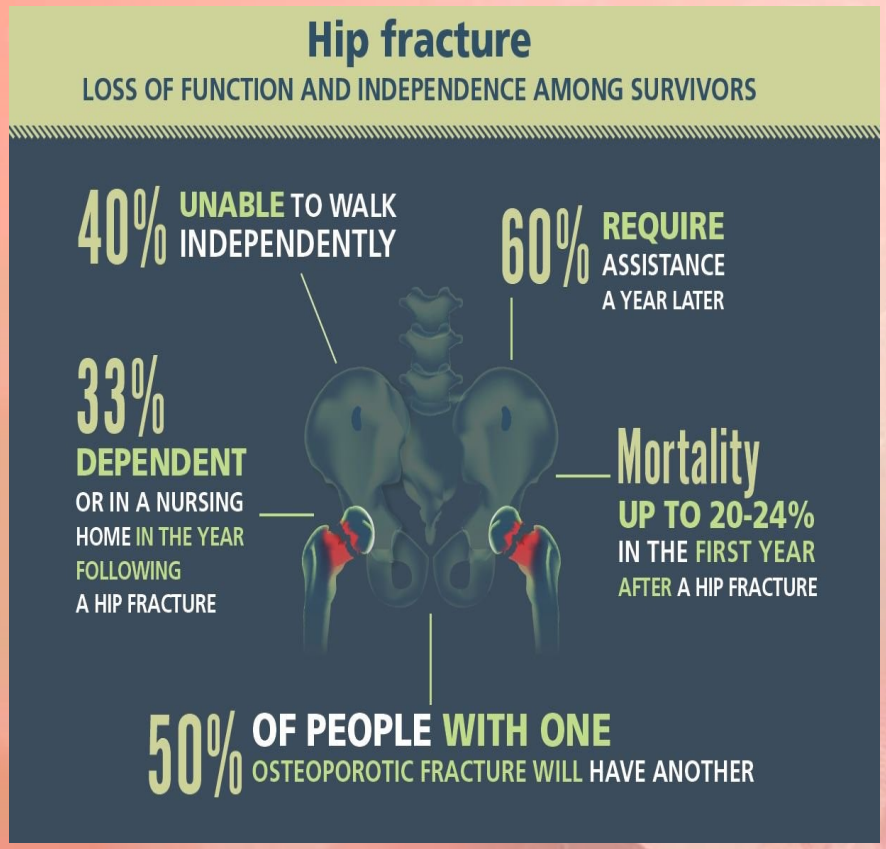

Hip fracture
LOSS OF FUNCTION AND INDEPENDENCE AMONG SURVIVORS
40% UNABLE TO WALK INDEPENDENTLY
60% REQUIRE ASSISTANCE A YEAR LATER
33% DEPENDENT OR IN A NURSING HOME IN THE YEAR FOLLOWING A HIP FRACTURE
Mortality UP TO 20-24% IN THE FIRST YEAR AFTER A HIP FRACTURE
50% OF PEOPLE WITH ONE OSTEOPOROTIC FRACTURE WILL HAVE ANOTHER

TABLE 1. STUDIES OF LONG-TERM MORTALITY ASSOCIATED WITH BARIATRIC SURGERY

Source	Mean Years of Follow-Up	Description of Cases Including N, Gender, Age at Entry, and BMI	Description of Controls Including N, Gender, Age at Entry, and BMI	Deaths for Cases and Controls (%)	HR or RR Compared to Control and % Reduction in Death for Cases
MacDonald et al[12] (1997)	9 years for cases; 6.2 years for controls	154 GBP (all diabetic); 77% female; 41.9 years; 50.6 kg/m^2	78 seeking bypass but denied (all diabetic); 73% female; 43.5 years; 48.8 kg/m^2	Cases, 9%; controls, 28%	No HR given
Flum and Dellinger[13] (2004)	4.4 years	3,328 GBP; 47 years; 81% females; BMI unknown	62,781 non-GBP treated in hospital with ICD-9 code for morbid obesity; 64% female; BMI unknown	Cases, 11.8%; controls, 16.3%	HR, 0.67 (95% CI, 0.54–0.85); 33% reduction in death
Christou et al[14] (2004)	2.5 years for cases; 2.6 years for controls	1,035 (81% GBP, 19% VBG); 45 years; 66% female; 45 years; 50 kg/m^2	5,746 non-GBP treated in hospital with ICD-9 code for morbid obesity; 64% female; 47 years; BMI unknown	Cases, 0.68%; controls, 6.2%	RR, 0.11 (95% CI, 0.04–0.27); 89% reduction in death
Zhang et al[15] (2005)	8.3 years	18,972 (54% GBP; 19% VBG; 27% other); 87% female; 39 years; 47 kg/m^2	No control group	Cases, 3.5%; no control group	HR not applicable, no control group
Sowemino et al[18] (2007)	4.4 years for cases; 3.7 years for controls	908 (99% GBP; 1% banding); 73.5% female; 43.2 years; 54 kg/m^2	112 70.5% female; 47.9 years; 51 kg/m^2	Cases, 2.9%; controls, 14.3%	Adjusted HR, 0.18 (95% CI, 0.09–0.35 *P*<.0001); 82% reduction in death
Sjostrom et al[16,24-26] (2007)	16 years total for cases and controls; 10.9 years average—SOS Study started in 1992 prospective, controlled intervention study	2,010 (13% GBP; 68% VBG; 19 GB); 67% females; 47 years; 42 kg/m^2	2,037 no bariatric surgery; 67% females; 47 years; 41 kg/m^2	Cases, 5%; controls, 6%	Unadjusted HR, 0.76 (95% CI, 0.59–0.99 *P*=.04); 24% reduction in death; adjusted HR, 0.73 (95% CI, 0.56–0.95); 27% reduction in death
Adams, et al[17] (2007)	18 years total for cases and controls; 7.1 years average—Utah study retrospective cohort study	9,949 GBP (7,925 used for matching); for matched group—84% female; 39.5 years; 45.3 kg/m^2	9,628 (7,925 used for matching); for matched group—84% female; 39.3 years; 46.7 kg/m^2	For matched groups—cases, 2.7%; controls, 4.1	For matched groups— adjusted HR, 0.60 (95% CI, 0.45–0.67 *P*<.001); 40% reduction in death
Omalu, et al[19] (2007)	Mean follow-up years not given; total follow-up of 10 years	16,683 bariatric surgery patients; 82.3% female; 48 years; no BMI reported	Directly matched by age and gender (not BMI) to Pennsylvania Division of Vital Records	Cases, 2.6%; controls, overall % not given	3 to 11 times greater death rate among postbariatric surgery patients compared to population controls

HR = hazard ratio, RR = relative risk, GBP = gastric bypass surgery, VBG = vertical banded gastroplasty, GB = gastric banding.

***Adams* TD** et al. *Long-Term Mortality Following Bariatric Surgery: A Brief Review*. *Review of Endocrinology, March 2008*

A LONG ROAD

Observations that diabetes can be improved or even resolved by surgical operations have been reported for almost a century.

1955
Weight-loss (bariatric) sugery introduced.

Jejuno-ileal bypass

1978 Ahmad et al; Diabetes Care

1981 Ackerman NB. Surg Gynecol Obstet.

2004
Experimental evidence in rats links gastroin-testinal surgery and glucose metabolism[6].

2007
First Diabetes Surgery Summit.

2015
Second Diabetes Surgery Summit.

1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020

2016
Guidelines for the surgical treatment of diabetes published in Diabetes Care[1].

1925-50
Several reports document diabetes resolution after stomach surgery.

1970-95
Several reports consistently document remission of diabetes after bariatric surgery

2006-07
Studies in humans start to explore the use of surgery as an intentional treatment of diabetes[10].

2008-15
Publication of several randomized clinical trials demonstrates effects of surgical treatment of diabetes.

Gastric Bypass

1979 Printen et al; Ann Surg

1987 Pories et al; Ann Surg.

1999
RCT comparing surgery vs medical therapy not acceptable by IRBs.

F. Rubino Nature 533, 459–461 (2016).

1899-1920s

Aspirin is used to treat pain or fever.

Original Use/Indication

1948

Clinical Observations of less heart attacks.

Clinical Observations of Unexpected Benefits

Early 1970s

Scientists discover Aspirin inhibits Prostaglandins

Understanding Mechanisms of Action

1988

FDA expands the use of aspirin to CV Disease.

Treatment Approved for Other Indications

Παλιές παρατηρήσεις....

THE AMELIORATION OF DIABETES MELLITUS FOLLOWING SUBTOTAL GASTRECTOMY

MURRY N. FRIEDMAN, M.D., F.A.C.S., ANTONIO J. SANCETTA, M.D., and GEORGE J. MAGOVERN, M.D., Brooklyn, New York

In 1923, Murlin noted the presence of a substance in extracts of the pancreas which could raise the blood sugar. Subsequently, this hyperglycemic factor was demonstrated

and duodenum. Therefore, when subtotal gastrectomy for duodenal ulcer resulted in marked [illegible] of the diabetic state in 3 patients at the Brooklyn Veterans Hospi-

Surgery, Gynecology & Obstetrics, February 1955

Acta Medica Scandinavica. Vol. 169, fasc. 6, 1961

Department of Pathology II (Stig Ranström, M. D.), Medicine I (Lars Werkö, M. D.) and Surgery I (Einar Ljunggren, M. D.), Sahlgrenska Sjukhuset, University of Göteborg, Göteborg, Sweden

Amelioration of Diabetes Mellitus Following Gastric Resection

By

L. Angervall, G. Dotevall and H. Tillander

Is Type II Diabetes Mellitus (NIDDM) a Surgical Disease?

WALTER J. PORIES, M.D.,* KENNETH G. MACDONALD, JR., M.D.,* EDWARD G. FLICKINGER, M.D.,† G. LYNIS DOHM, PH.D.,‡ MADHUR K. SINHA, PH.D.,§ HISHAM A. BARAKAT, PH.D.,‡ HAROLD J. MAY, PH.D.,‖ PRABHAKER KHAZANIE, PH.D.,¶ MELVIN S. SWANSON, PH.D.,* ELIZABETH MORGAN, B.S.N.,* NANCY LEGGETT-FRAZIER, B.S.N.,§ STUART D. LONG, B.S.,* BRENDA M. BROWN, M.R.A.,* KEVIN O'BRIEN, PH.D.,§ and JOSE F. CARO, M.D.§

Since February 1, 1980, 515 morbidly obese patients have undergone the Greenville gastric bypass (GGB) operation. Of these, 212 (41.2%) were euglycemic, 288 (55.9%) were either diabetic or had glucose intolerance, and 15 (2.9%) were unable to complete the evaluation. After the operation, only 30 (5.8%) patients remained diabetic (and 20 of these improved), 457 (88.7%) became and have remained euglycemic, and inadequate data prevented

From the Departments of Biochemistry,‡ Family Medicine,‖ Pathology,¶ Medicine,§ and Surgery of the East Carolina University School of Medicine, Greenville, North Carolina; and the Department of Surgery,† The University of Rochester, Rochester, New York*

Accepted for publication January 30, 1992.

ANNALS OF SURGERY
Vol. 222, No. 3, 339–352

Who Would Have Thought It?

An Operation Proves to Be the Most Effective Therapy for Adult-Onset Diabetes Mellitus

Walter J. Pories, M.D., Melvin S. Swanson, Ph.D., Kenneth G. MacDonald, M.D., Stuart B. Long, B.S., Patricia G. Morris, B.S.N., Brenda M. Brown, M.R.A., Hisham A. Barakat, Ph.D., Richard A. deRamon, M.D., Gay Israel, Ed.D., Jeanette M. Dolezal, Ph.D., and Lynis Dohm, Ph.D.

From the Departments of Surgery and Biochemistry of the School of Medicine and the Human Performance Laboratory of East Carolina University, Greenville, North Carolina

ORIGINAL ARTICLE

The Early Effect of the Roux-en-Y Gastric Bypass on Hormones Involved in Body Weight Regulation and Glucose Metabolism

Francesco Rubino, MD, Michel Gagner, MD, FACS,‡ Paolo Gentileschi, MD,§ Subhash Kini, MD,§ Shoji Fukuyama, MD,§ John Feng, MD,§ and Ed Diamond, MD†*

Surgery as an Effective Early Intervention for Diabesity

Why the reluctance?

JOHN B. DIXON, MBBS, PHD[1]
WALTER J. PORIES, MD[2]
PAUL E. O'BRIEN, MD[1]
PHILLIP R. SCHAUER, MD[3]
PAUL ZIMMET, MD, PHD[4]

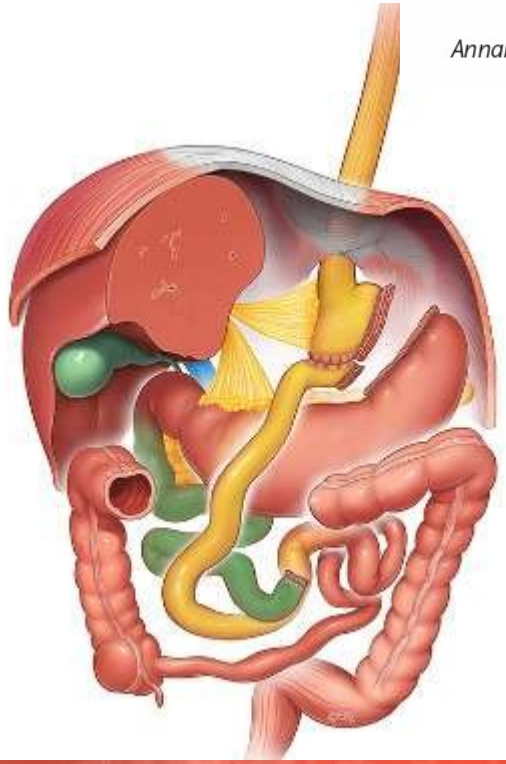
significant weight loss. Recent publications have confirmed earlier research that substantial and durable weight loss is achieved by current bariatric surgical pro-

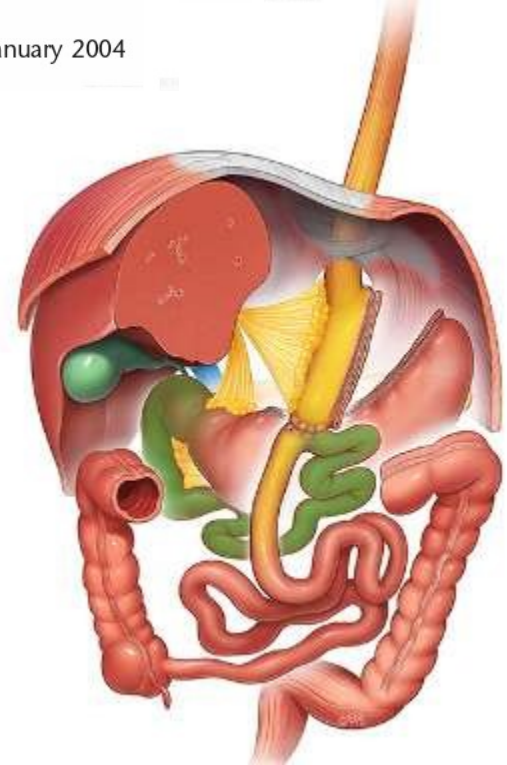
Effect of Duodenal–Jejunal Exclusion in a Non-obese Animal Model of Type 2 Diabetes

A New Perspective for an Old Disease

Francesco Rubino, MD, and Jacques Marescaux, MD, FRCS

Annals of Surgery • Volume 239, Number 1, January 2004





2nd Diabetes Surgery Summit (DSS-II)
International Guidelines

Metabolic Surgery in the Treatment Algorithm for Type 2 Diabetes: A Joint Statement by International Diabetes Organizations

Diabetes Care 2016;39(6):861–877

56 ENDORSING SOCIETIES

Table 1—International societies that have ratified and/or endorsed the DSS-II consensus statements and guidelines

Partner diabetes organizations that helped develop and have ratified the DSS-II consensus statements and guidelines:	Country
American Diabetes Association (ADA)	USA
International Diabetes Federation (IDF)	International
Diabetes UK (DUK)	UK
Chinese Diabetes Society (CDS)	China
Diabetes India (DI)	India
Other organizations that formally endorse the DSS-II consensus statements and guidelines (to date):	
American Association of Clinical Endocrinologists (AACE)	USA
American College of Surgeons (ACS)	USA
American Gastroenterological Association (AGA)	USA
American Society for Metabolic and Bariatric Surgery (ASMBS)	USA
Argentinian Society of Diabetes (SAD)	Argentina
Argentinian Society for Bariatric and Metabolic Surgery (SACO)	Argentina
Asia-Pacific Bariatric and Metabolic Surgery Society (APBMSS)	International
Association of British Clinical Diabetologists (ABCD)	UK
Australian Diabetes Society (ADS)	Australia
Belgian Diabetes Association (ABD)	Belgium
Brazilian Society of Diabetes (SBD)	Brazil
Brazilian Society of Bariatric and Metabolic Surgery (SBCBM)	Brazil
British Obesity and Metabolic Surgery Society (BOMSS)	UK
Czech Society for the Study of Obesity (CSSO)	Czech Republic
Chilean Society of Endocrinology and Diabetes (SCED)	Chile
Chilean Society for Bariatric and Metabolic Surgery (SCCBM)	Chile
Endocrine Society	USA
European Association for the Study of Obesity (EASO)	International
French Society of Diabetes (SFD)	France
French Society of Bariatric and Metabolic Surgery (SOFFCO)	France
German Diabetes Society (DDG)	Germany
German Society for Obesity Surgery (CA-ADIP)	Germany
Hellenic Diabetes Association (HDA)	Greece
International Federation for the Surgery of Obesity & Metabolic Disorders (IFSO)	International
Israel Diabetes Association (IDA)	Israel
Italian Society of Bariatric & Metabolic Surgery (SICOB)	Italy
Italian Society of Diabetology (SID)	Italy
Japan Diabetes Society (JDS)	Japan
Latin American Association of Diabetes (ALAD)	International
Mexican College of Bariatric and Metabolic Surgery (CMCOEM)	Mexico
Mexican Society of Nutrition and Endocrinology (SMNE)	Mexico
Qatar Diabetes Association (QDA)	Qatar
Saudi Diabetes and Endocrine Association (SDEA)	Saudi Arabia
Society of American Gastrointestinal and Endoscopic Surgeons (SAGES)	USA
Society for Endocrinology (SfE)	UK
Society for Surgery of the Alimentary Tract (SSAT)	USA
South African Society for Surgery Obesity and Metabolism (SASSO)	South Africa
Spanish Society for Bariatric and Metabolic Surgery (SECO)	Spain
Spanish Society of Diabetes (SED)	Spain
The Obesity Society (TOS)	USA

This table indicates the societies that, at the time this article went to press, had officially ratified and/or endorsed the DSS-II consensus statements and guidelines. Additional international medical and scientific societies are currently considering endorsing these results as well.

and administered questionnaires for the Delphi process and chaired the face-to-face meeting of voting delegates (vide infra).

Methods for Collection and Evaluation of Evidence

Criteria used for evidence search were based on methods used in p consensus development confer systematic reviews of evide adapted to serve the DSS We used a highly sele focused approach (onl from RCTs) to assess tiveness of surgery therapies for T2D glycemic effects A broader eviden plus high-quali for matters suc control, surgic lar disease (CV implications gery were as ies of cost-ef reviews with with T2D.

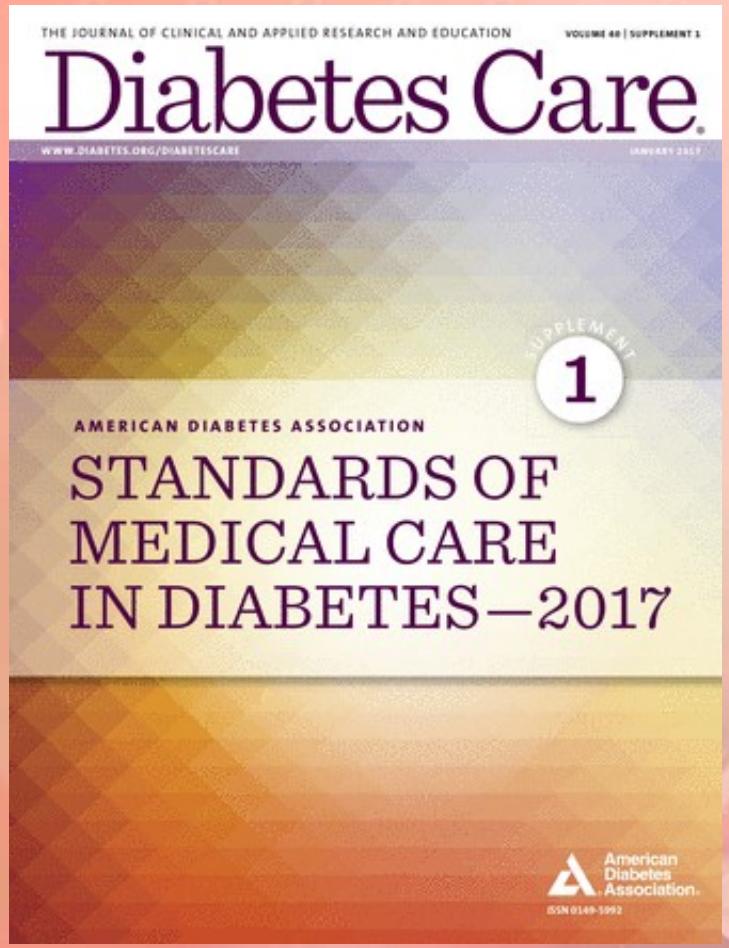
Questions cluded the fo of surgery on with T2D; *2*) e pared with me on glycemic effectiveness o T2D; *4*) effects cular complicatio CVD events, and long-term surgical s tive safety profile of

MEDLINE from 1 Jan 15 June 2015 was searc the first draft of the conse New evidence published by 2015 was available for discuss to-face DSS-II meetings and is rated into this document, using the inclusion/exclusion criteria for eviden evaluation as in the initial draft.

Studies considered to appraise the evidence included RCTs and observational studies (case-control and case-series), as appropriate for specific questions (vide infra). For both RCTs and observational studies, only reports documenting at least 1-year follow-up and with 80% retention at 2 years and 70% beyond 2 years were included. These criteria are adapted from the methods of recent systematic reviews of bariatric surgery (46).

January 2017:
The American Diabetes Association (ADA) introduces surgery in the ***Standards of Medical Care*** for Diabetes

American Diabetes Association®



SPECIAL REPORT **HOW CITIES CAN SAVE US ALL** A vision for a zero-waste, driver-free, energy-positive urban future PAGE 44

SCIENTIFIC AMERICAN

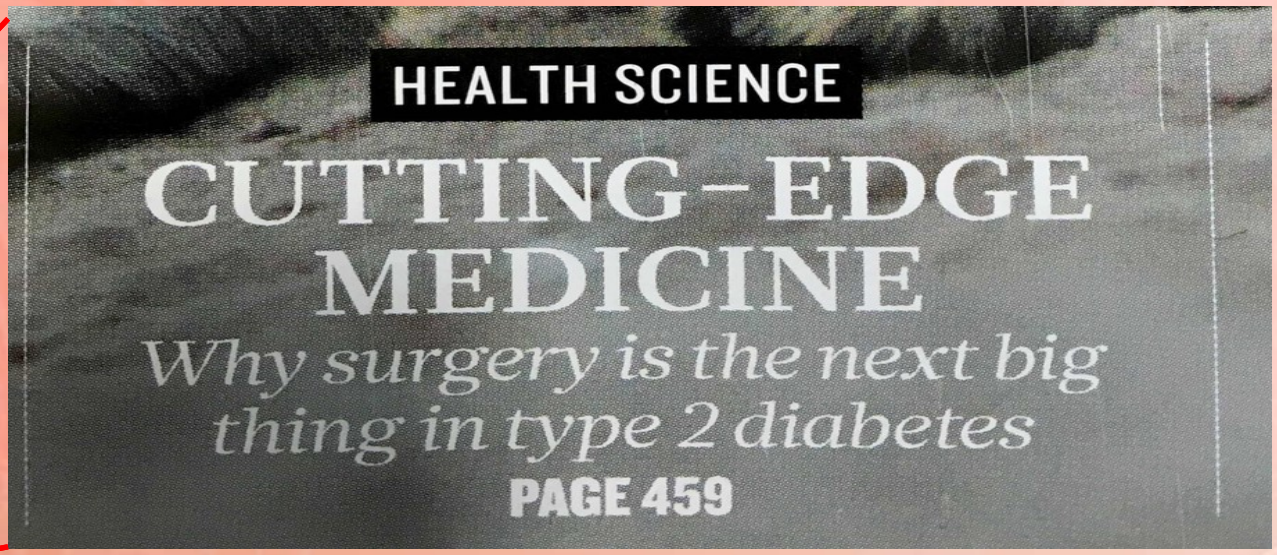
PLUS

IS DARK MATTER MADE OF BLACK HOLES?

A cosmic mystery PAGE 38

SURGERY STOPS DIABETES ...

... and leads to a new theory of the disease PAGE 60



NewScientist

"One of the most significant changes in treating diabetes since the discovery of insulin in 1921"

Scalpel, Please

Gastric surgery can achieve extraordinary results for diabetes sufferers

ealth secretary would lightly spend £600 mil-
on 100,000 operations if he did not think
were essential. That is why the diabetes
rch community has assembled every possible
nent in favour of gastric surgery as a
nent for the condition. The arguments are
elling and Jeremy Hunt and NHS regulators
d pay attention to them.

tric surgery is traditionally seen as a last
for the morbidly obese. The latest science
tes that it may in fact be the closest thing
ave to a cure for diabetes, which afflicts
illion people in Britain and consumes 12 per
f global healthcare spending.

betes is the pandemic of the modern age.
is a direct correlation between rising GDP
ne incidence of obesity-linked type 2 diabe-
here are also serious barriers to the adoption
asive surgery as a way of containing it,
ling the high cost per patient and the widely
iew that the first line of defence should be a
to healthier lifestyles by people seen to have
ht the illness on themselves. Economics as
s science suggest otherwise. Gastric bands and bypasses on a mass scale may be the best investment on offer to a cash-strapped NHS.

Research released yesterday based on 11 clinical trials finds that surgery can attack the causes of diabetes, not just its symptoms — and can do so more effectively than drugs, diet or exercise. In one study by Newcastle University the blood-sugar levels of 18 patients returned to normal after gastric bypass surgery. In another published last year half the subjects were, effectively, free of diabetes five years after a similar procedure. Meanwhile, fewer than half of sufferers who rely on conventional treatments significantly lower their risk of complications, which include stroke, kidney failure, blindness and heart disease.

How surgery can achieve such dramatic results is not yet clear. Some experiments suggest that it boosts natural insulin production by altering the secretion of hormones in the gut. Others point to fat loss in the pancreas itself, allowing formerly obese patients to resume virtually normal blood-sugar management. However, the potential for surgery to reverse the effects of diabetes rather than merely treat them is clear. The conclusion that surgery should be considered a mainstream response is unavoidable.

In Britain the first step towards this would be for the National Institute for Health and Care Excellence (Nice) to approve surgery not just for extreme obesity but specifically for advanced type 2 diabetes. About a million patients would be eligible. Of these 100,000 would be highly likely to benefit. At present, their treatment costs the NHS about £3,000 per patient a year. At an average cost per operation of £6,000 the health service could expect to earn that back in subsequent savings within two years.

Some worry that the easy availability of surgery would signal to diabetes sufferers that better diets and less sedentary lifestyles were no longer paramount. This advice has not stopped the global incidence of diabetes quadrupling since 1980. Moreover, surveys show that the rapid results achieved through surgery often encourage patients where willpower alone has let them down. In straitened times, with an ageing population and spiralling diabetes-related costs, Nice and the NHS need to think outside the box and embrace the band.

“The conclusion that Surgery should be considered a mainstream response is unavoidable”

nature

UIG/GETTY

Surgery can be an effective treatment for type 2 diabetes.

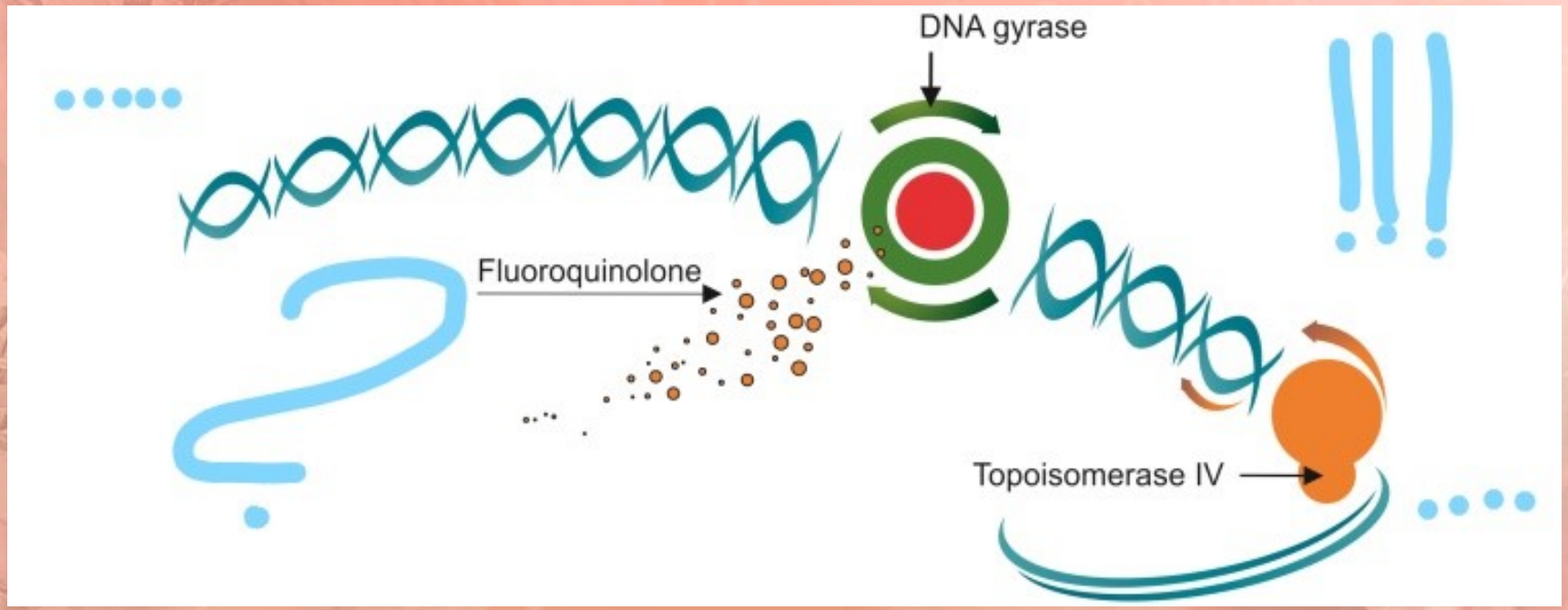
Time to think differently about diabetes

New guidelines for the surgical treatment of type 2 diabetes bolster hopes of finding a cure, writes **Francesco Rubino**, but long-standing preconceptions must be put aside.

For a surgical procedure for any type of disease, the indication for surgical treatment is usually determined by the assessment of the balance between the risks from the disease and the risk from surgery itself.

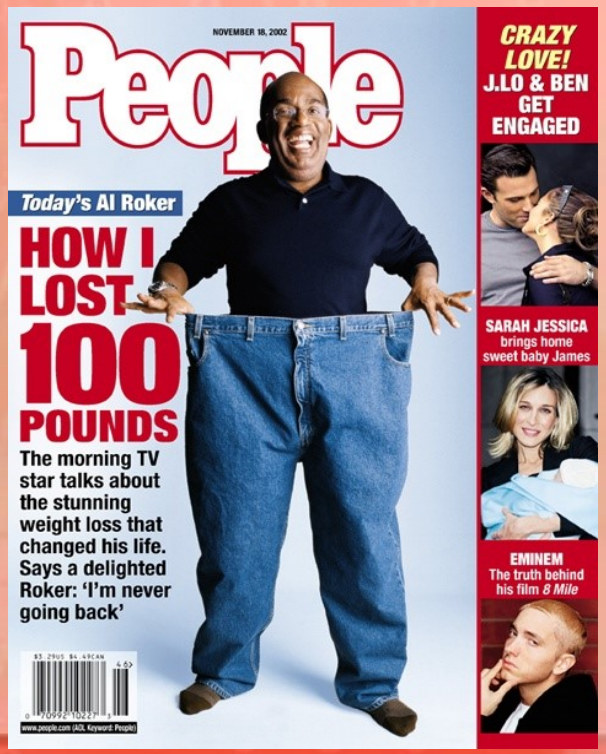
Diabetes should be no exception.

MECHANISMS



Πώς δρούν οι επεμβάσεις;

- *Τελευταία ευκαιρία!!!*
- *Φόβος-Υποχρεωτική πειθαρχία*
- *Ψυχολογική 'αναδιοργάνωση'*



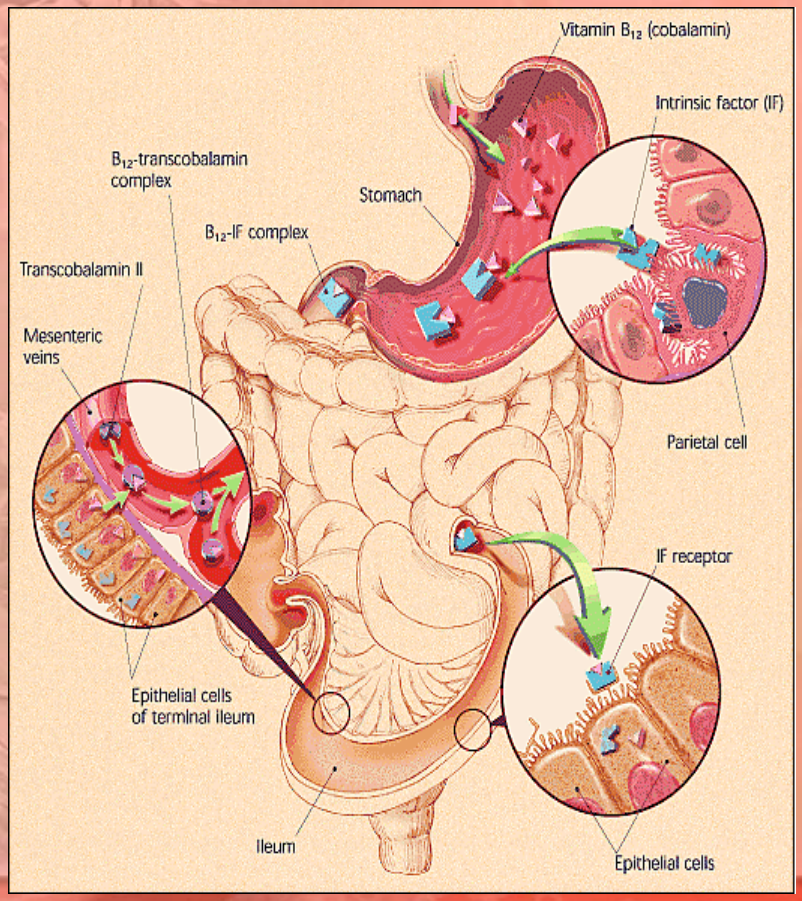
- ***Περιορισμός***
- ***Υπο-απορρόφηση***
- ***Ορμονικοί μηχανισμοί***

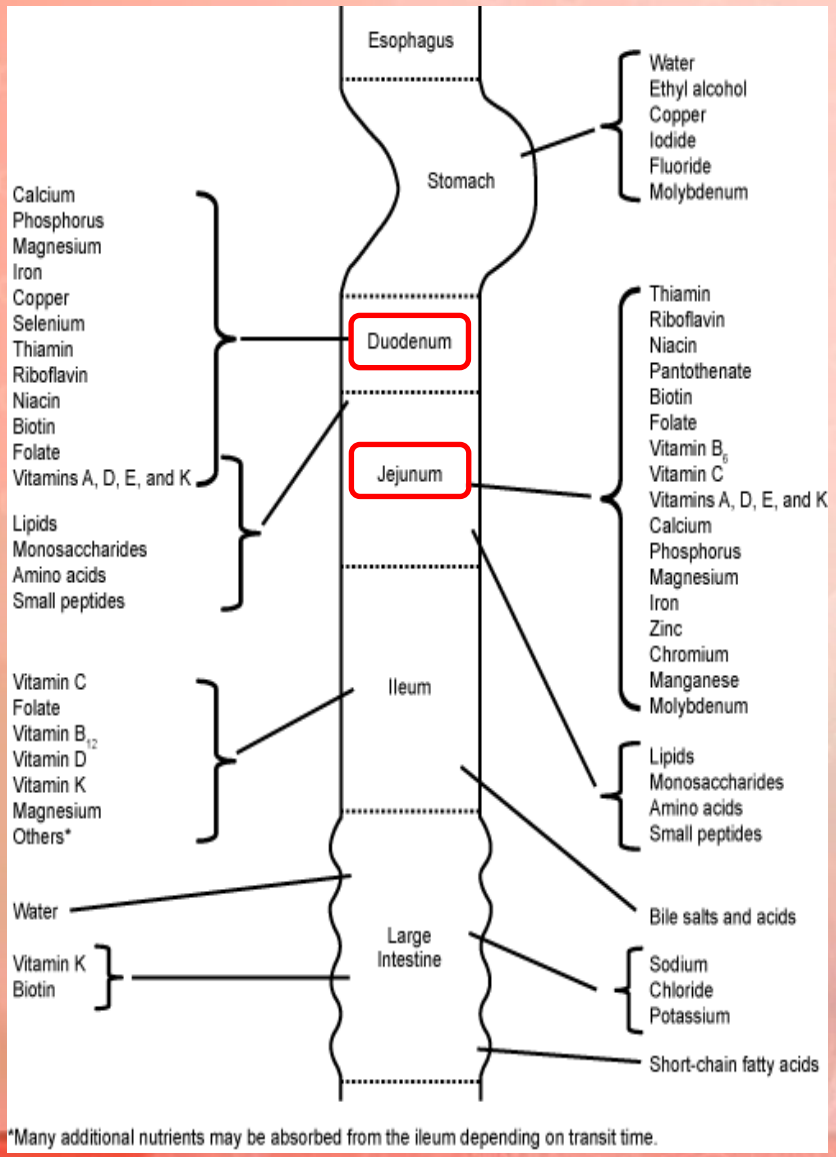
Περιορισμός !!!

Περιορισμός ποσότητας προσλαμβανόμενων θερμίδων

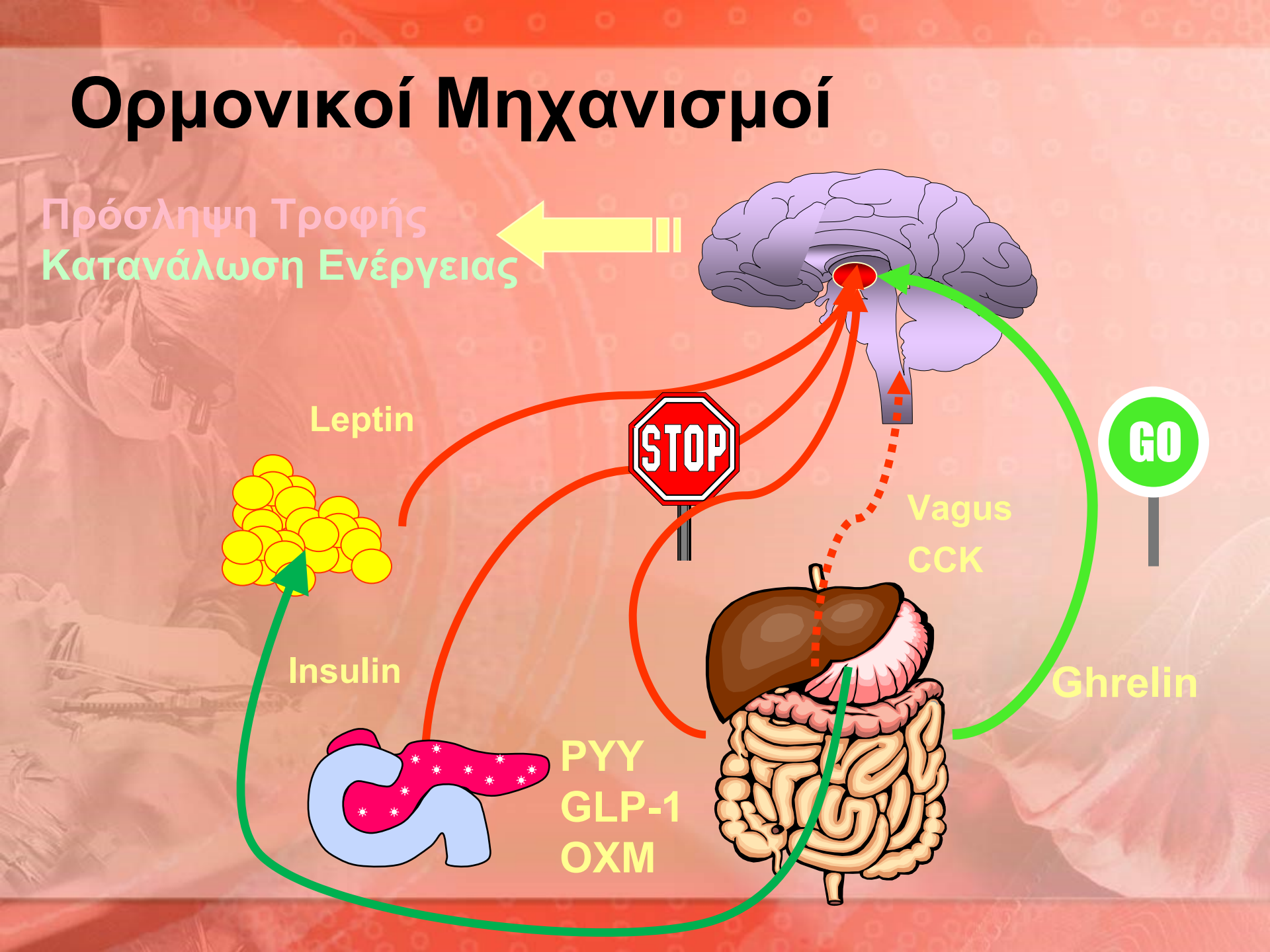
Ο κυριότερος μηχανισμός δράσης της βαριατρικής χειρουργικής !!!

Υπο-απορρόφηση



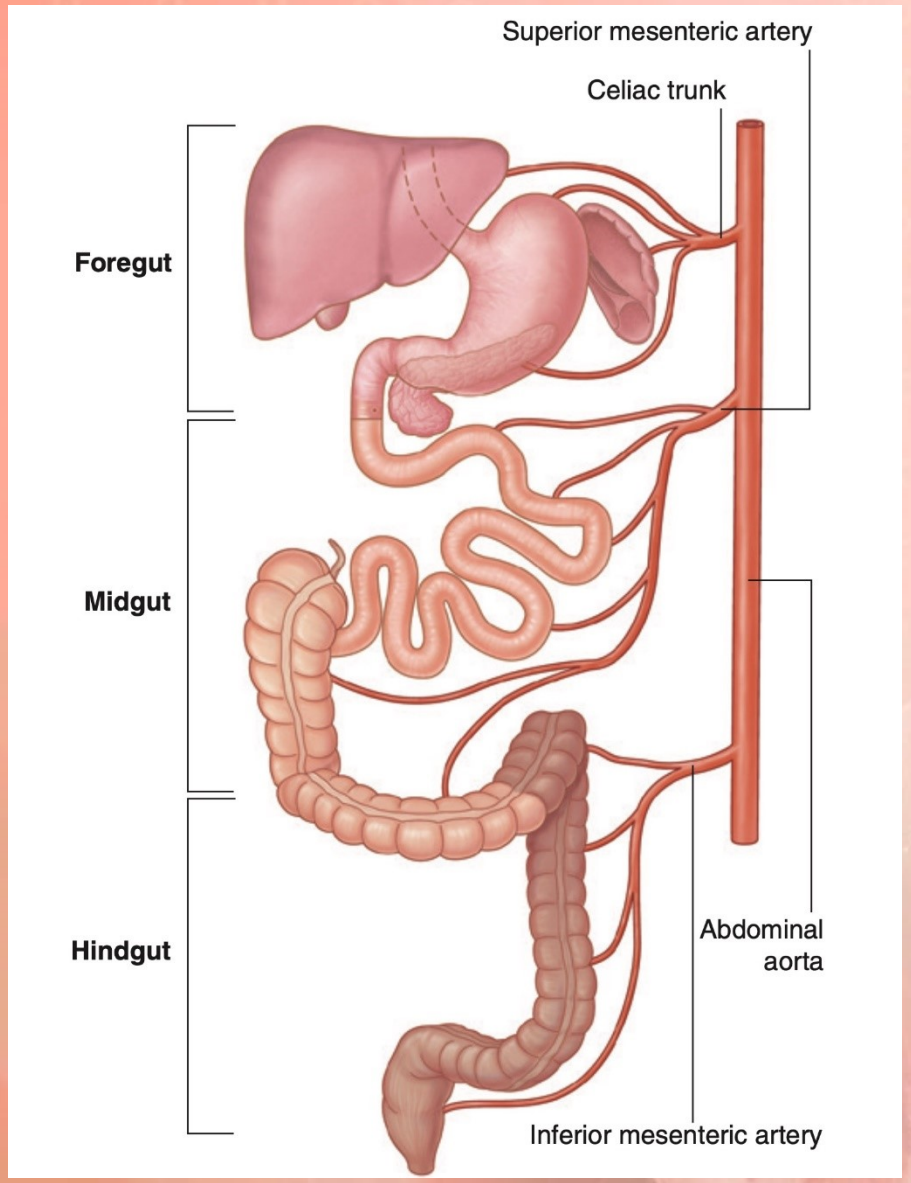


Ορμονικοί Μηχανισμοί



Foregut Theory
Η παράκαμψη του στομάχου και του δωδεκαδακτύλου οδηγεί σε αυξημένη παραγωγή ορμονών

Hindgut Theory
Η ταχεία είσοδος των τροφών στον ειλεό, προκαλεί αυξημένη παραγωγή ορμονών



Effects of Bariatric Surgery on Appetite Control Mechanisms

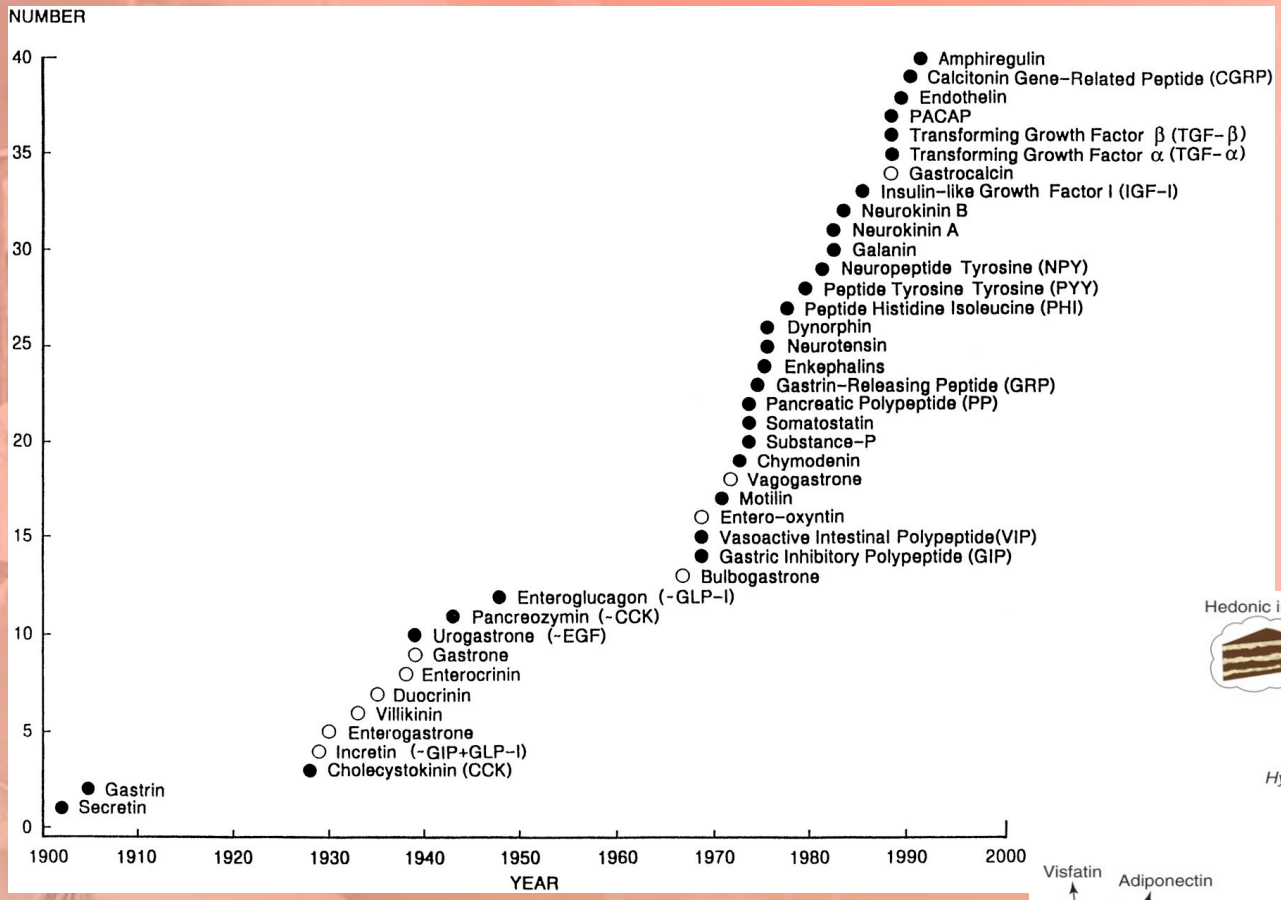
Hormone	Potential post-surgical effect
↑ GLP-1	▪ Increased satiety and decreased food intake
↑ Peptide YY	▪ Increased satiety and decreased food intake ▪ Possible alterations to energy expenditure
↑ Oxyntomodulin	▪ Increased satiety and decreased food intake
↑ GLP-2	▪ Increased mucosal cell mass in response to injury, leading to ▪ Long-term increases in GLP-1 and PYY ▪ Gut proliferation, reducing malabsorption
↓ GIP	▪ Reduced fat accumulation and long-term weight loss/maintenance
↓ Ghrelin(?)	▪ Reduced appetite, possibly mediated by vagal denervation
Vagus denervation	▪ Reduced hunger signals? ▪ Alterations in GI hormone release?
Altered gut flora	▪ Shift in Bacteroidetes and Firmicutes bacterial populations to proportions more like those found in lean individuals

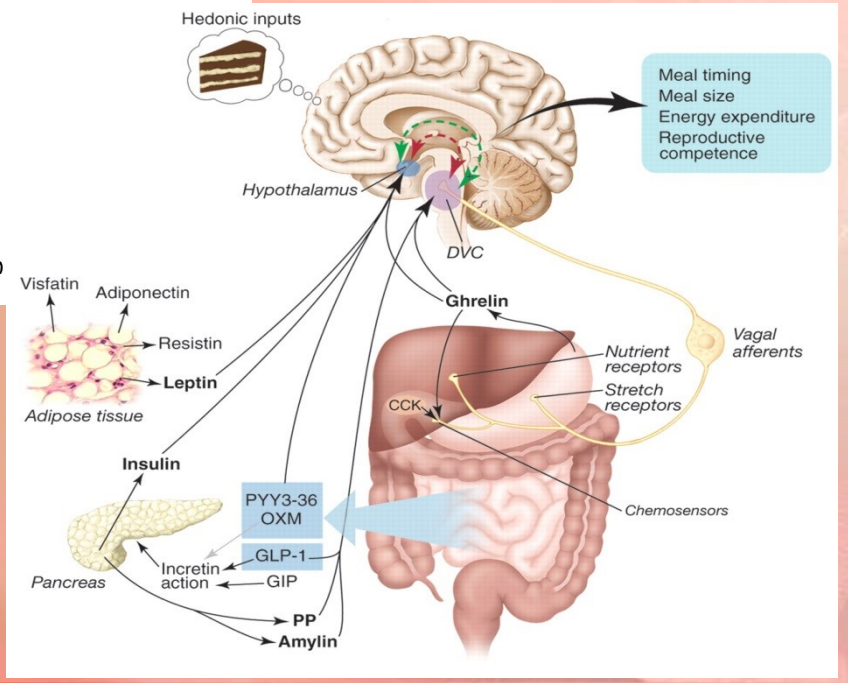
GIP = glucose-dependent insulinotropic polypeptide; GLP = glucagon-like peptide; PYY = protein YY.

Ionut V, Bergman RN. *J Diabetes Sci Technol*. 2011;5:1263-1282.

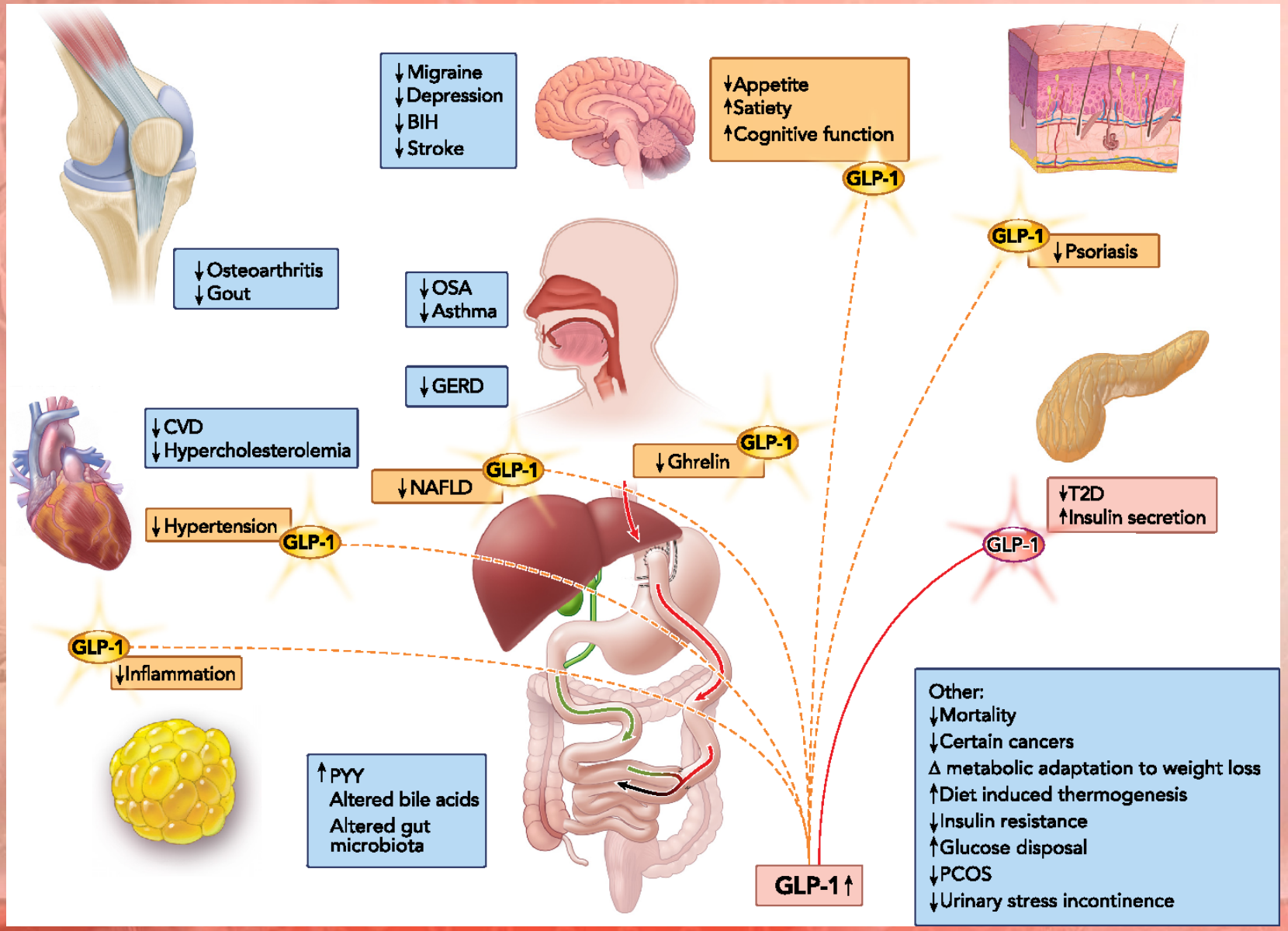
Ορμόνες πεπτικού….

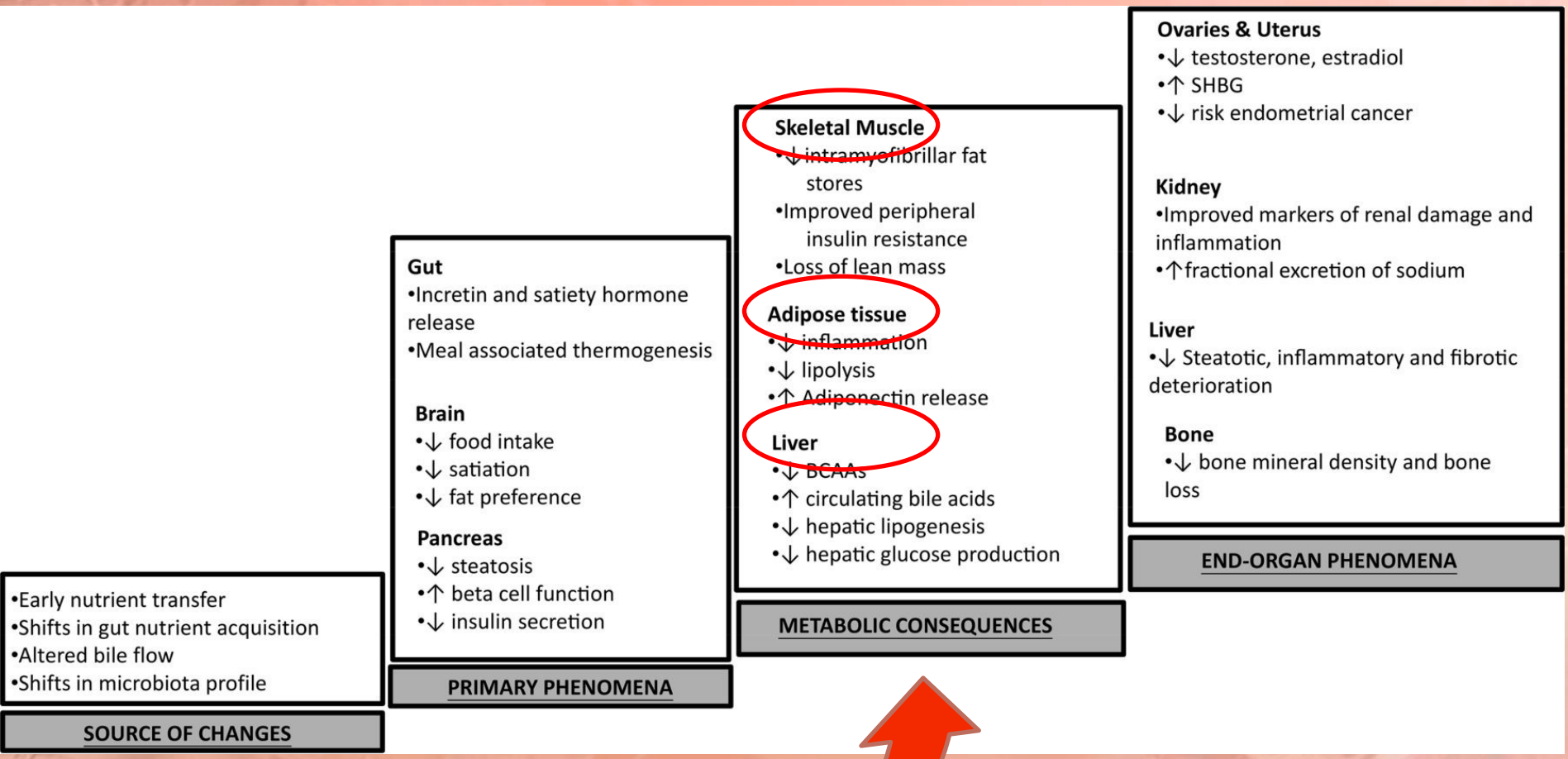
- Το γαστρεντερικό σύστημα είναι το μεγαλύτερο και πολυπλοκότερο ενδοκρινικό όργανο του σώματος
- Εκκρίνει περισσότερες από 40 ορμόνες, με πολλές από αυτές να έχουν επίδραση στο μεταβολισμό της γλυκόζης και τη ρύθμιση της όρεξης
- Σκοπός αυτών είναι
  - Να αντιλαμβάνονται την ποσότητα και το είδος των τροφών στον εντερικό αυλό και
  - να ειδοποιούν τους ιστούς και τα όργανα που εμπλέκονται στο μεταβολισμό και αποθήκευση των θρεπτικών ουσιών


NUMBER
40
35
30
25
20
15
10
5
0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
YEAR
Amphiregulin
Calcitonin Gene-Related Peptide (CGRP)
Endothelin
PACAP
Transforming Growth Factor β (TGF-β)
Transforming Growth Factor α (TGF-α)
Gastrocalcin
Insulin-like Growth Factor I (IGF-I)
Neurokinin B
Neurokinin A
Galanin
Neuropeptide Tyrosine (NPY)
Peptide Tyrosine Tyrosine (PYY)
Peptide Histidine Isoleucine (PHI)
Dynorphin
Neurotensin
Enkephalins
Gastrin-Releasing Peptide (GRP)
Pancreatic Polypeptide (PP)
Somatostatin
Substance-P
Chymodenin
Vagogastrone
Motilin
Entero-oxyntin
Vasoactive Intestinal Polypeptide(VIP)
Gastric Inhibitory Polypeptide (GIP)
Bulbogastrone
Enteroglucagon (-GLP-I)
Pancreozymin (-CCK)
Urogastrone (-EGF)
Gastrone
Enterocrinin
Duocrinin
Villikinin
Enterogastrone
Incretin (-GIP+GLP-I)
Cholecystokinin (CCK)
Gastrin
Secretin


Hedonic inputs
Meal timing
Meal size
Energy expenditure
Reproductive competence
Hypothalamus
DVC
Visfatin
Adiponectin
Ghrelin
Resistin
Leptin
Adipose tissue
Vagal afferents
Nutrient receptors
Stretch receptors
CCK
Insulin
PYY3-36
OXM
GLP-1
Incretin action
GIP
Pancreas
Chemosensors
PP
Amylin

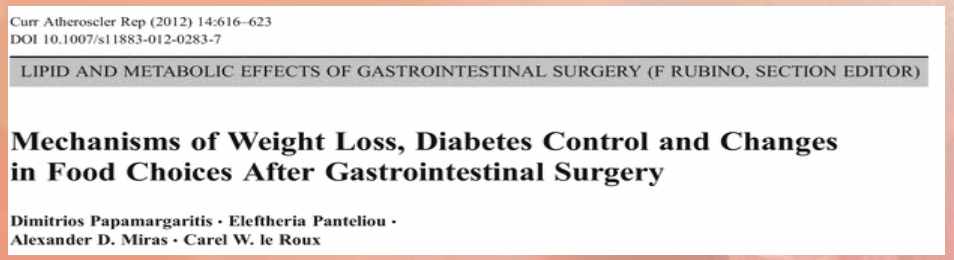
Επίδραση του χειρουργείου...




•Early nutrient transfer
•Shifts in gut nutrient acquisition
•Altered bile flow
•Shifts in microbiota profile
SOURCE OF CHANGES
Gut
•Incretin and satiety hormone release
•Meal associated thermogenesis
Brain
•↓ food intake
•↓ satiation
•↓ fat preference
Pancreas
•↓ steatosis
•↑ beta cell function
•↓ insulin secretion
PRIMARY PHENOMENA
Skeletal Muscle
•↓intramyofibrillar fat stores
•Improved peripheral insulin resistance
•Loss of lean mass
Adipose tissue
•↓ inflammation
•↓ lipolysis
•↑ Adiponectin release
Liver
•↓ BCAAs
•↑ circulating bile acids
•↓ hepatic lipogenesis
•↓ hepatic glucose production
METABOLIC CONSEQUENCES
Ovaries & Uterus
•↓ testosterone, estradiol
•↑ SHBG
•↓ risk endometrial cancer
Kidney
•Improved markers of renal damage and inflammation
•↑fractional excretion of sodium
Liver
•↓ Steatotic, inflammatory and fibrotic deterioration
Bone
•↓ bone mineral density and bone loss
END-ORGAN PHENOMENA

Οι βαριατρικές επεμβάσεις έχουν μια σημαντική επίδραση στην ανθρώπινη φυσιολογία:

- **Μειώνουν το αίσθημα της πείνας**
- **Αυξάνουν το αίσθημα του κορεσμού**
- **Αυξάνουν την κατανάλωση ενέργειας (βελτιώνουν το μεταβολισμό)**
- **Αλλάζουν τις διατροφικές συνήθειες προς πιο υγιεινές επιλογές**


Curr Atheroscler Rep (2012) 14:616–623
DOI 10.1007/s11883-012-0283-7

LIPID AND METABOLIC EFFECTS OF GASTROINTESTINAL SURGERY (F RUBINO, SECTION EDITOR)

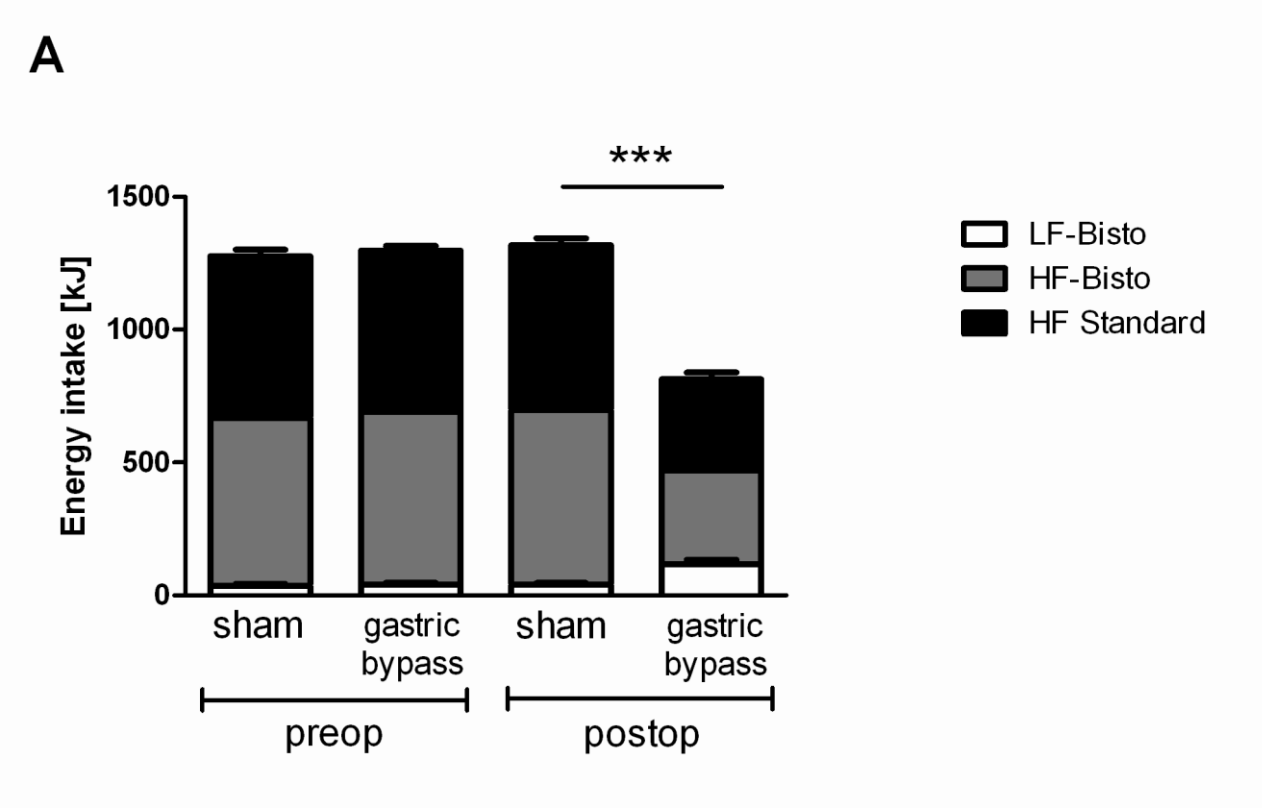
Mechanisms of Weight Loss, Diabetes Control and Changes in Food Choices After Gastrointestinal Surgery

Dimitrios Papamargaritis · Eleftheria Panteliou · Alexander D. Miras · Carel W. le Roux

Προεγχειρητικά

Μετεγχειρητικά

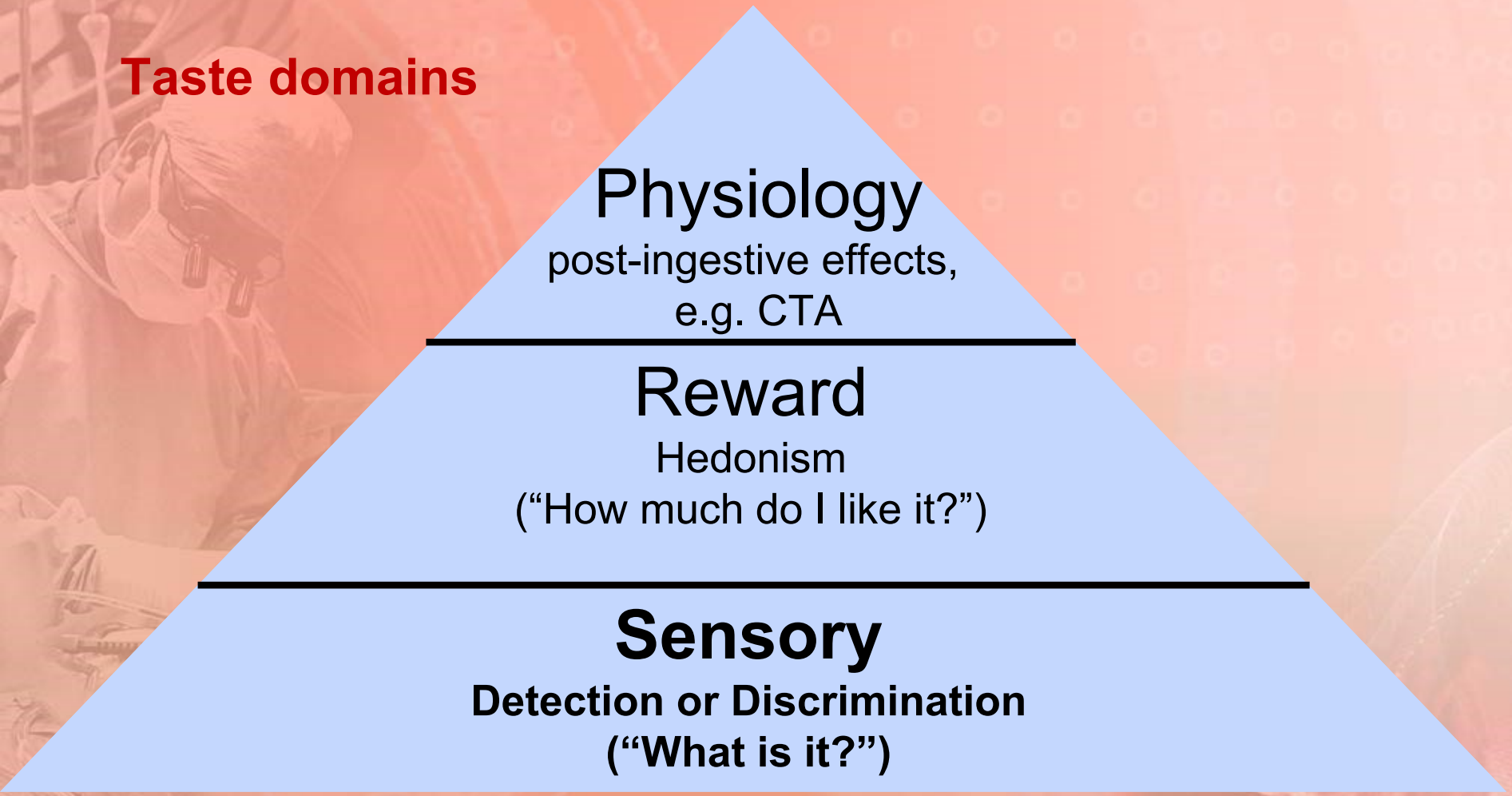
Επιθυμία για πρόσληψη λίπους



Gastric bypass reduces fat intake and preference
Carel W. le Roux, Marco Bueter, Nadine Theis, Malin Werling, Hutan Ashrafian, Christian Löwenstein, Thanos Athanasiou, Stephen R. Bloom, Alan C. Spector, Torsten Olbers and Thomas A. Lutz
Am J Physiol Regul Integr Comp Physiol 301:R1057-R1066, 2011. First published 6 July 2011; doi:10.1152/ajpregu.00139.2011

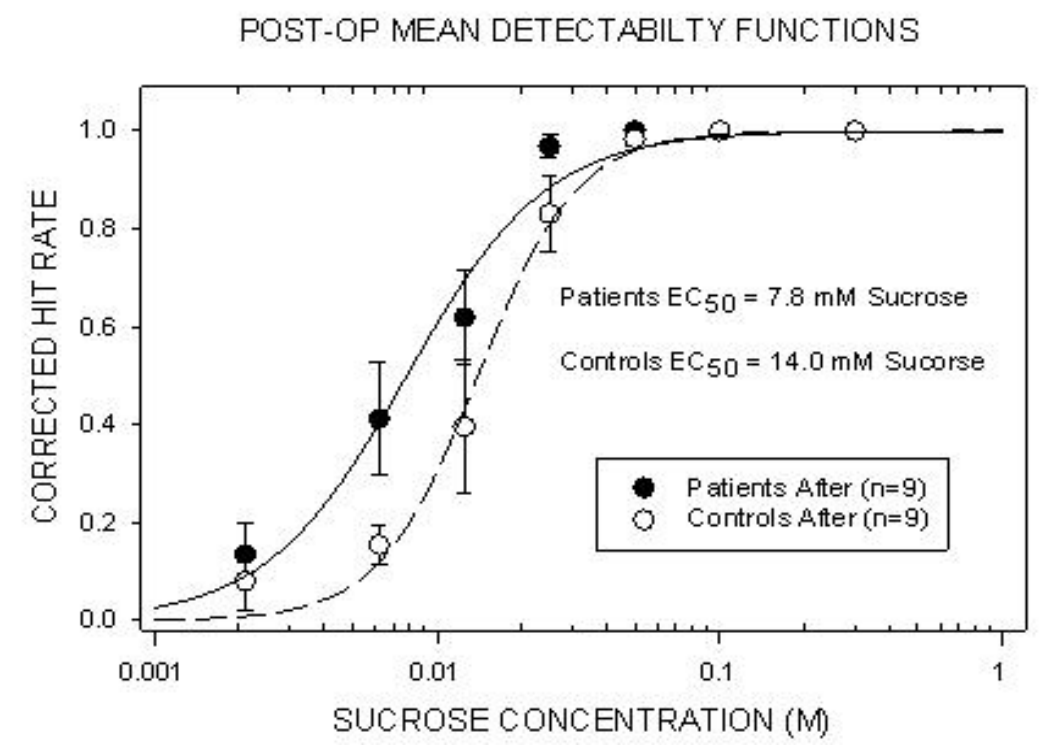
ΤΡΟΠΟΠΟΙΗΣΗ ΤΗΣ ΑΝΤΙΛΗΨΗΣ ΤΗΣ ΓΕΥΣΗΣ

Taste domains



Spector A, Neuroscience and Biobehavioral Reviews 24 (2000) 391–416

Αντίληψη της «γλυκύτητας» μετά από RYGB

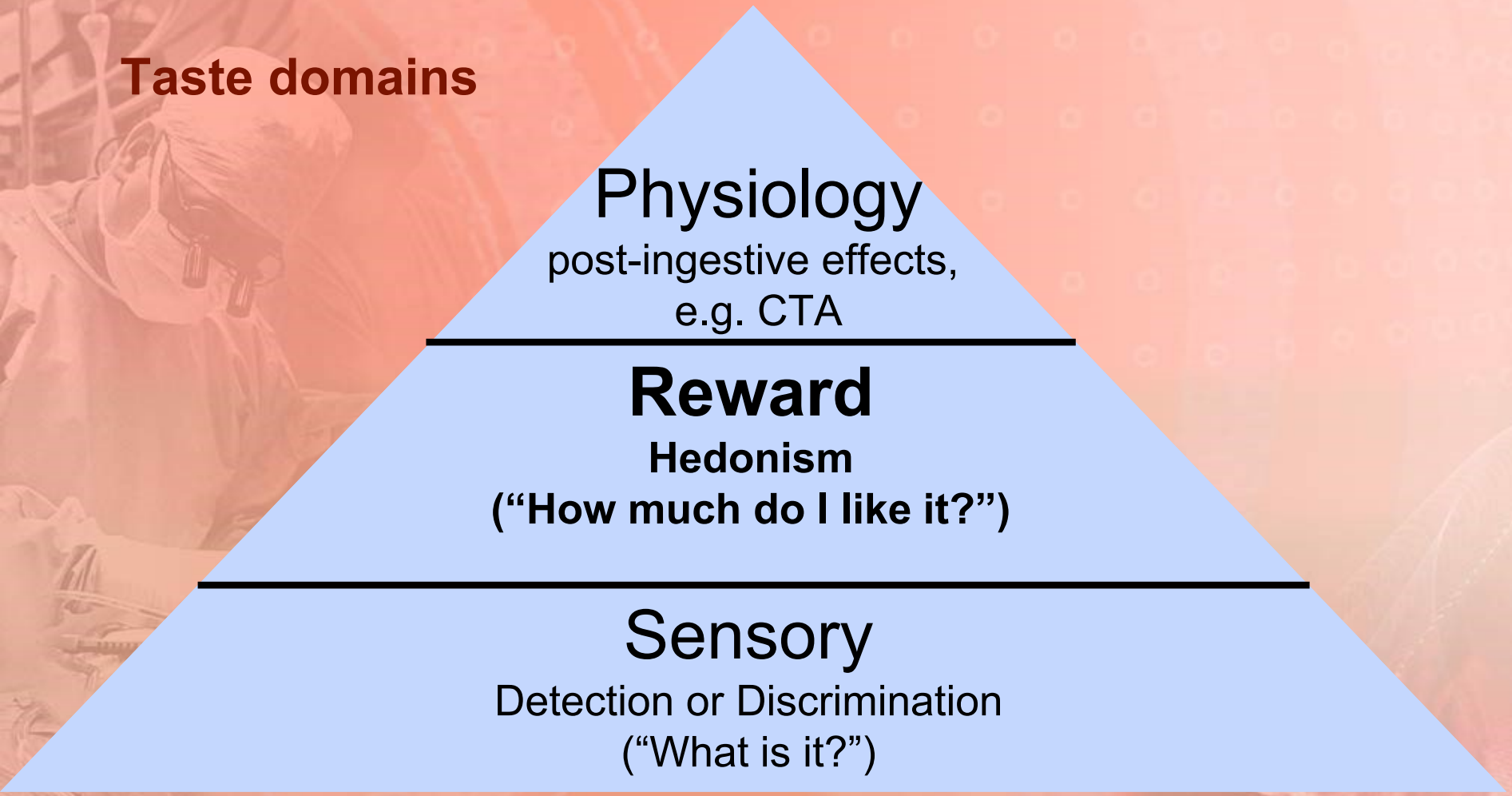


Alterations of sucrose preference after Roux-en-Y gastric bypass

Bueter, M; Miras, A D; Chichger, H; Fenske, W; Ghatei, M A; Bloom, S R; Unwin, R J; Lutz, T A; Spector, A C; le Roux, C W

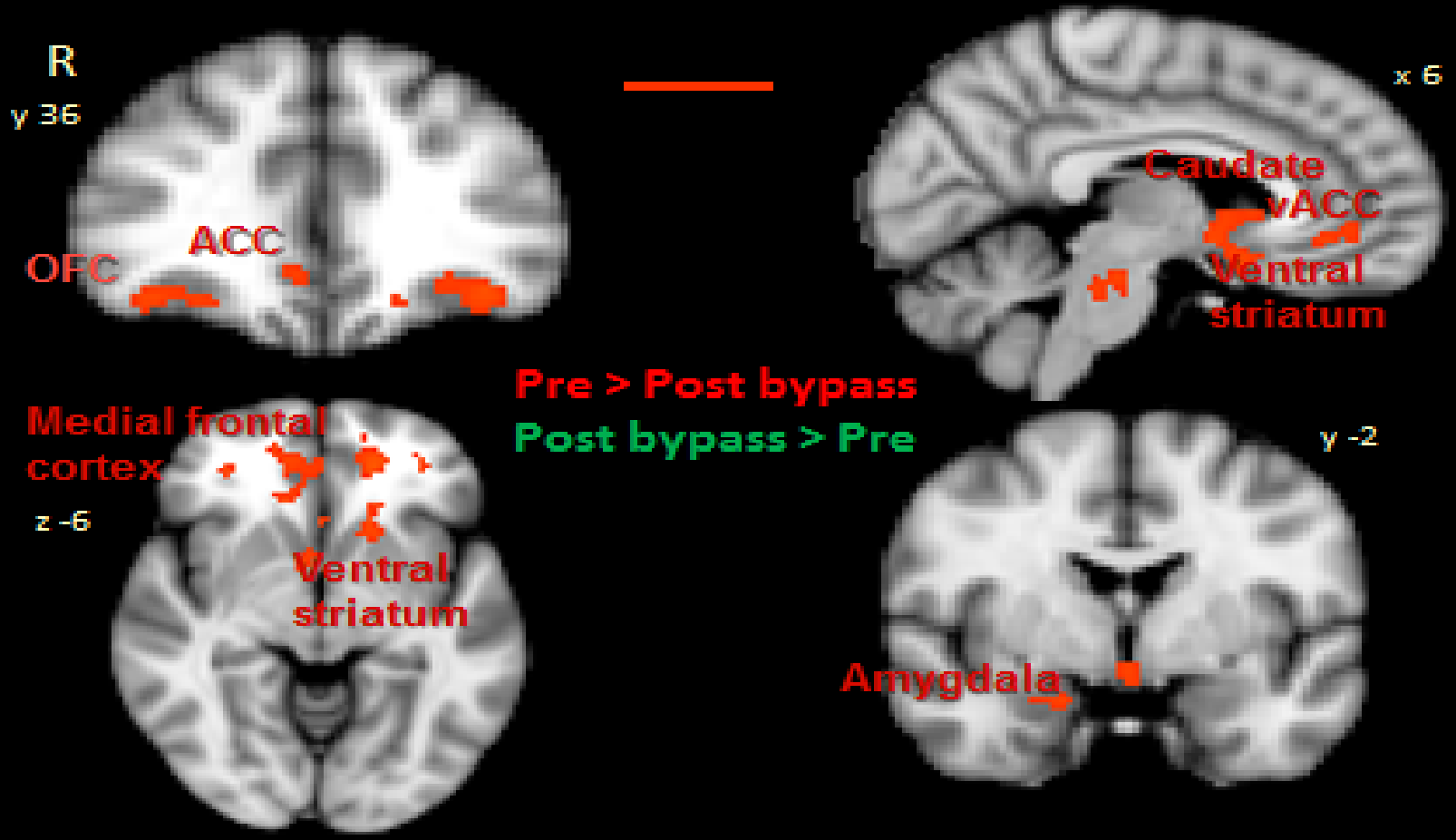
ΤΡΟΠΟΠΟΙΗΣΗ ΤΗΣ ΑΠΟΛΑΥΣΗΣ ΤΗΣ ΓΕΥΣΗΣ

Taste domains



Spector A, Neuroscience and Biobehavioral Reviews 24 (2000) 391–416

Activation to *High-Calorie Foods after* Gastric Bypass



High-calorie food > Objects, n=19, cluster threshold Z>2.1 , P<0.05

Scholtz, Miras, le Roux, Goldstone et al unpublished

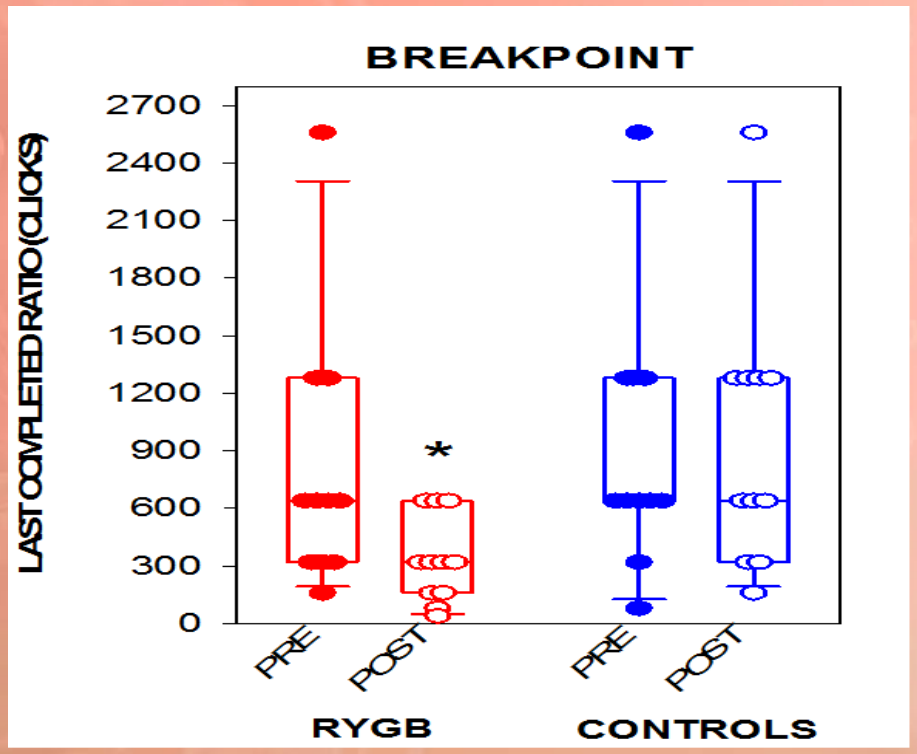
GUT

Obese patients after gastric bypass surgery have lower brain-hedonic responses to food than after gastric banding

Samantha Scholtz, Alexander D Miras, Navpreet Chhina, et al.

Gut published online August 20, 2013

Μετά από RYGB μείωση κατά 50% της προσπάθειας ανταμοιβής για γλυκό



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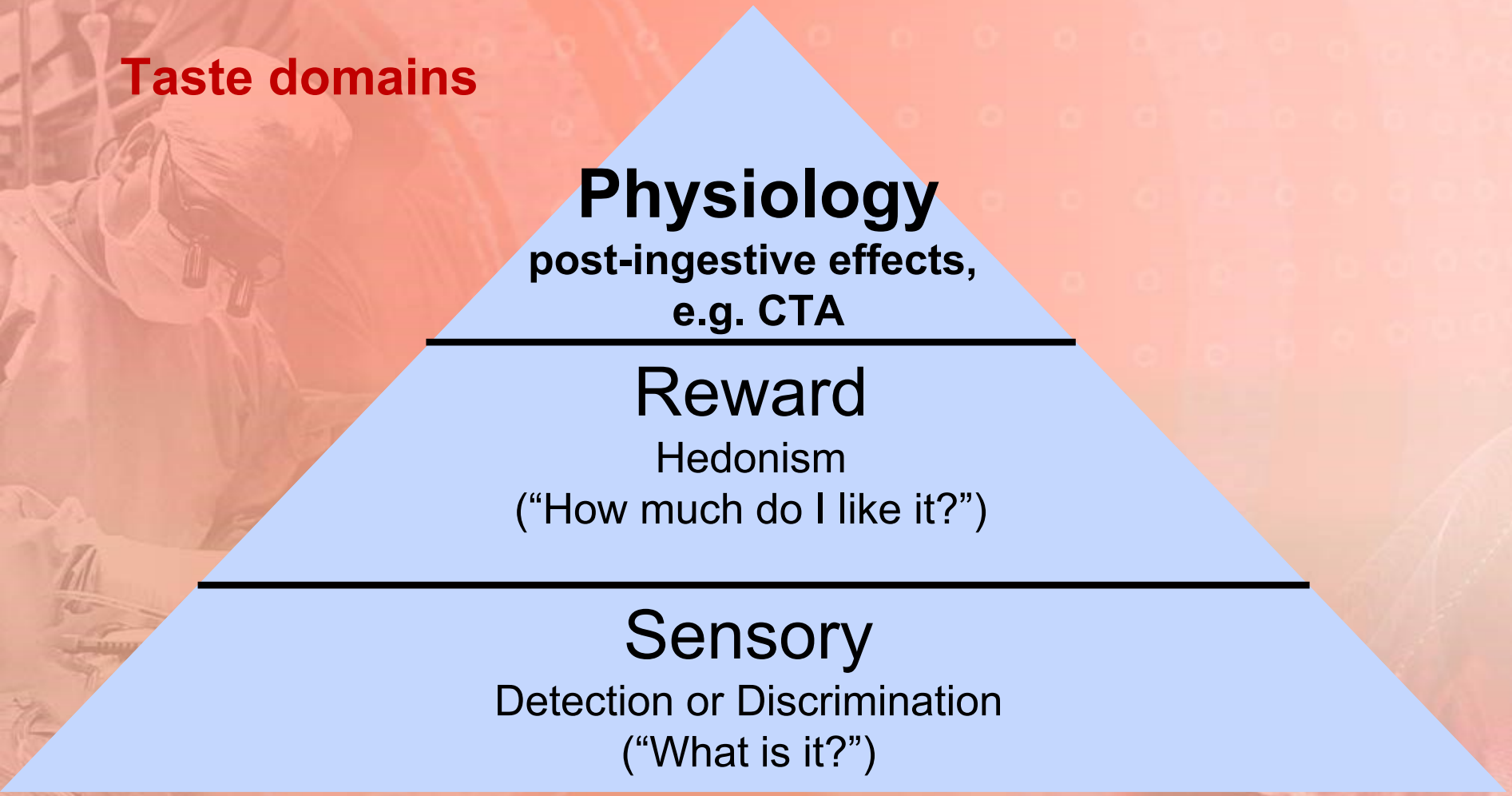
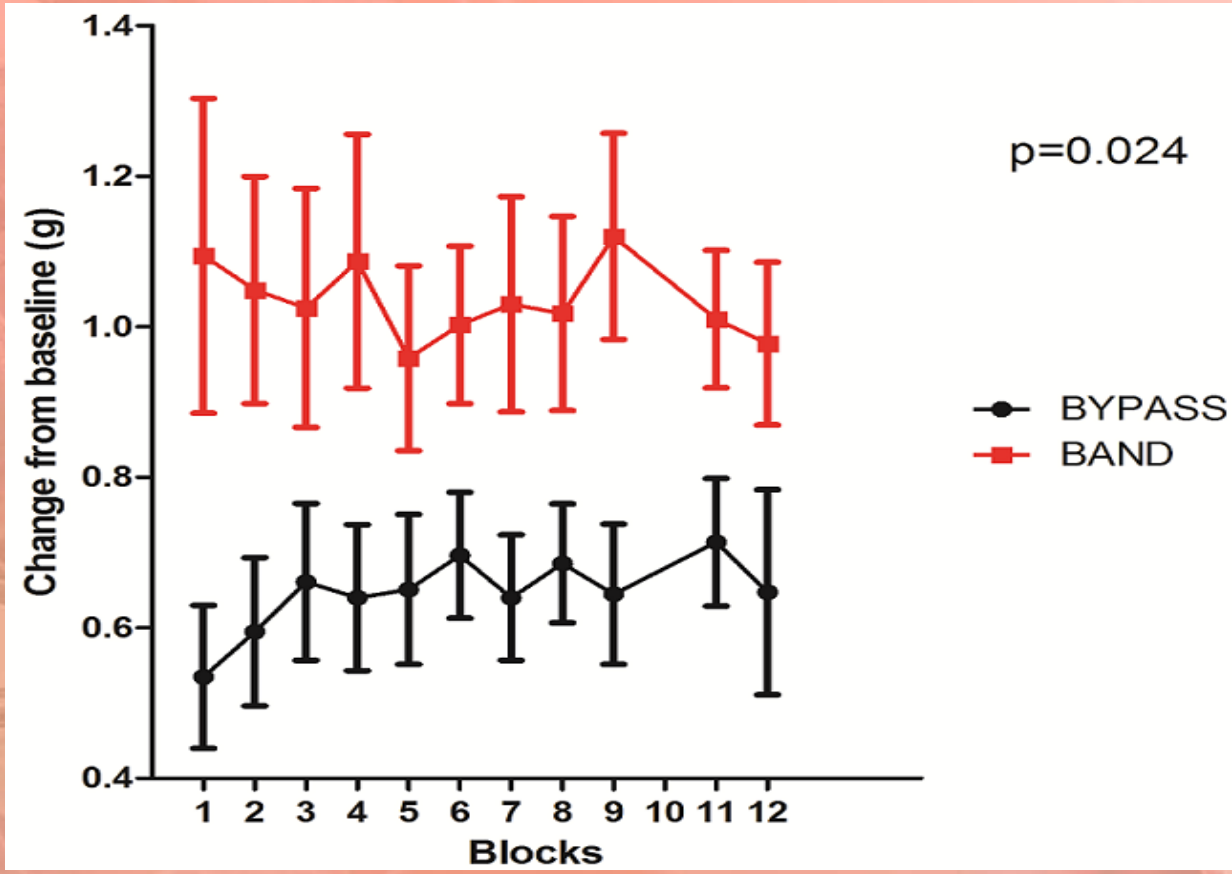
ΤΡΟΠΟΠΟΙΗΣΗ ΤΟΥ ΦΥΣΙΟΛΟΓΙΚΟΥ ΑΠΟΤΕΛΕΣΜΑΤΟΣ ΤΗΣ ΓΕΥΣΗΣ

Taste domains



Spector A, Neuroscience and Biobehavioral Reviews 24 (2000) 391–416

Παραγωγή σιέλου σε γλυκαντικό ερέθισμα μετά από RYGB V Γαστρικό Δακτύλιο



Carel W. le Roux προσωπική επικοινωνία

Η ΒΑΡΙΑΤΡΙΚΗ/ΜΕΤΑΒΟΛΙΚΗ ΧΕΙΡΟΥΡΓΙΚΗ επιτυγχάνει εξαιρετικά αποτελέσματα στην απώλεια βάρους, αλλά και στη ρύθμιση μεταβολικών προβλημάτων, **με σειρά περίπλοκων μηχανισμών, και όχι μόνο με όπλο τον περιορισμό και τη δυσαπορρόφηση!!!**

THE END