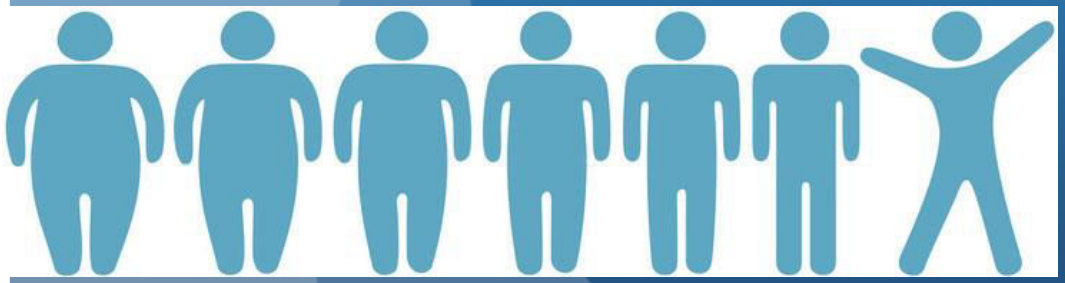
ISDS – Brac – 16.6.2016

Intestinale und endokrine Veränderungen nach Adipositaschirurgie



OA Dr. Strutzmann Johannes

LKH Wolfsberg

Fig. 7.1 Age-standardized prevalence of obesity in men aged 18 years and over (BMI ≥30 kg/m²), 2014

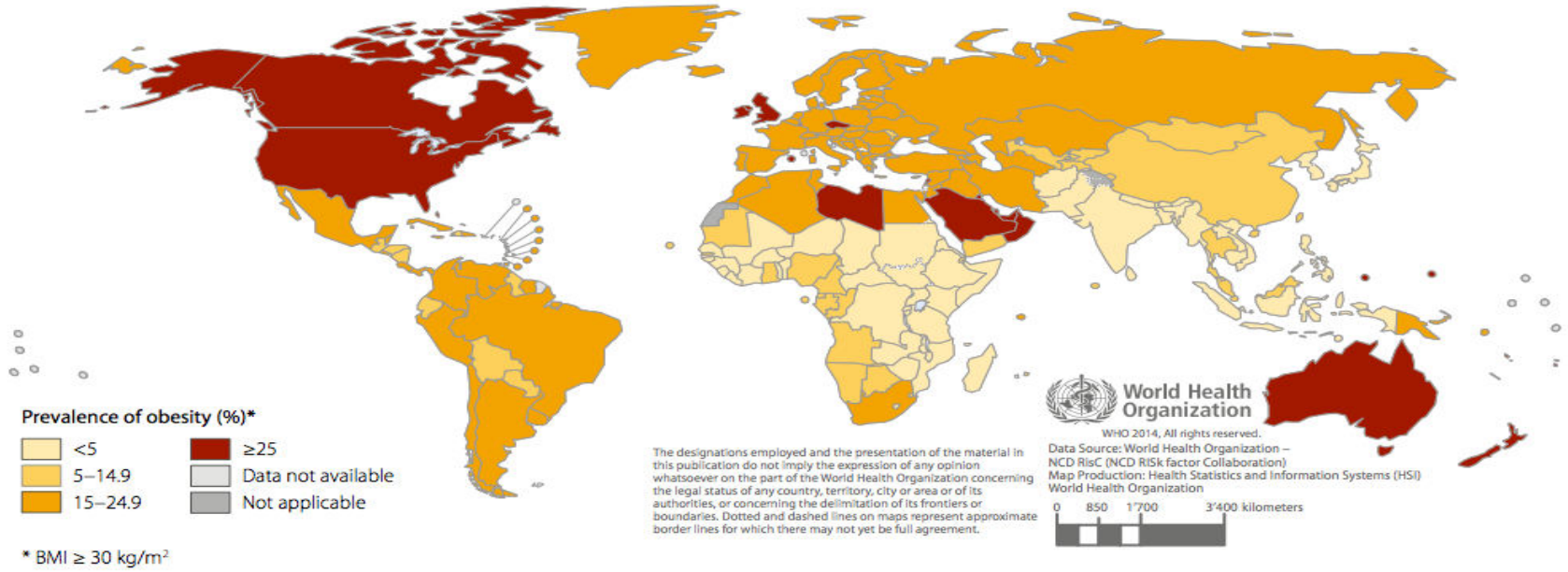
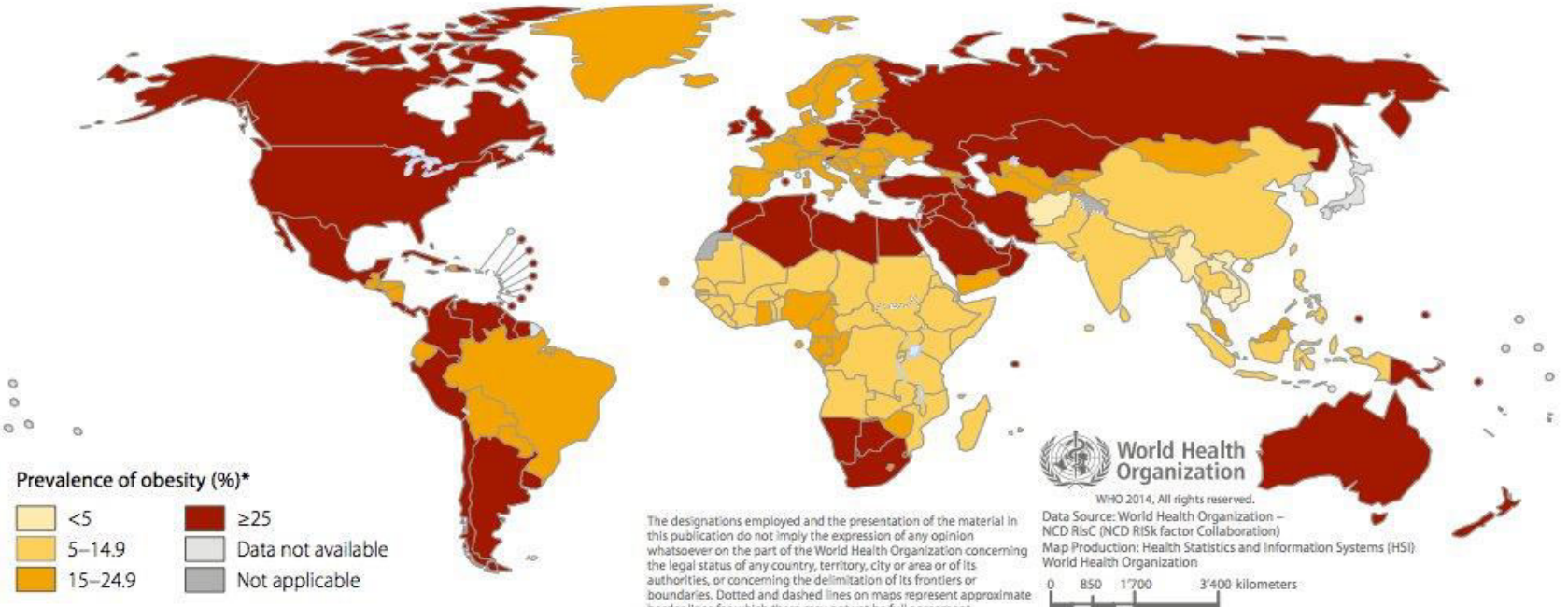
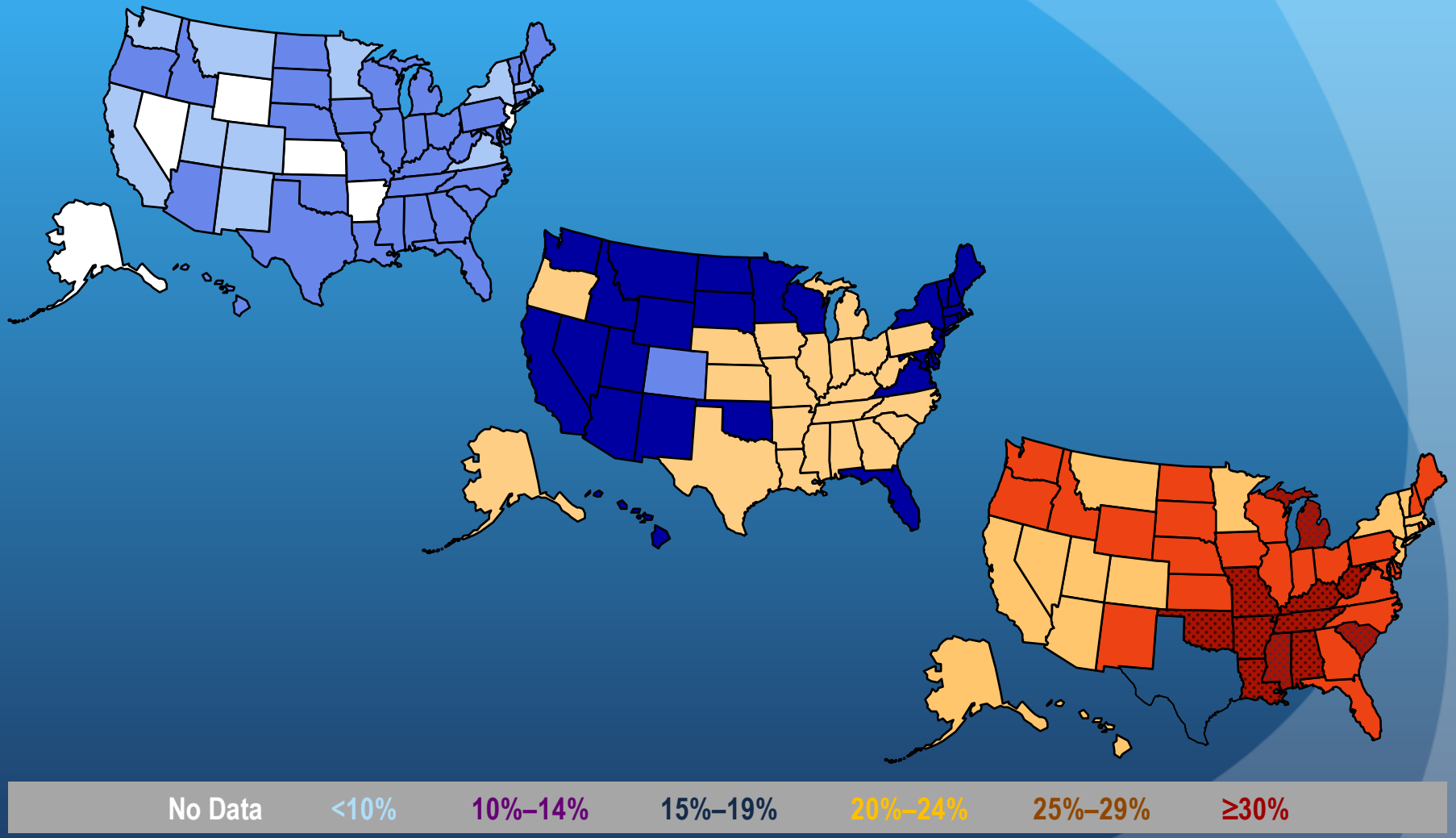


Fig. 7.2 Age-standardized prevalence of obesity in women aged 18 years and over (BMI ≥30 kg/m²), 2014

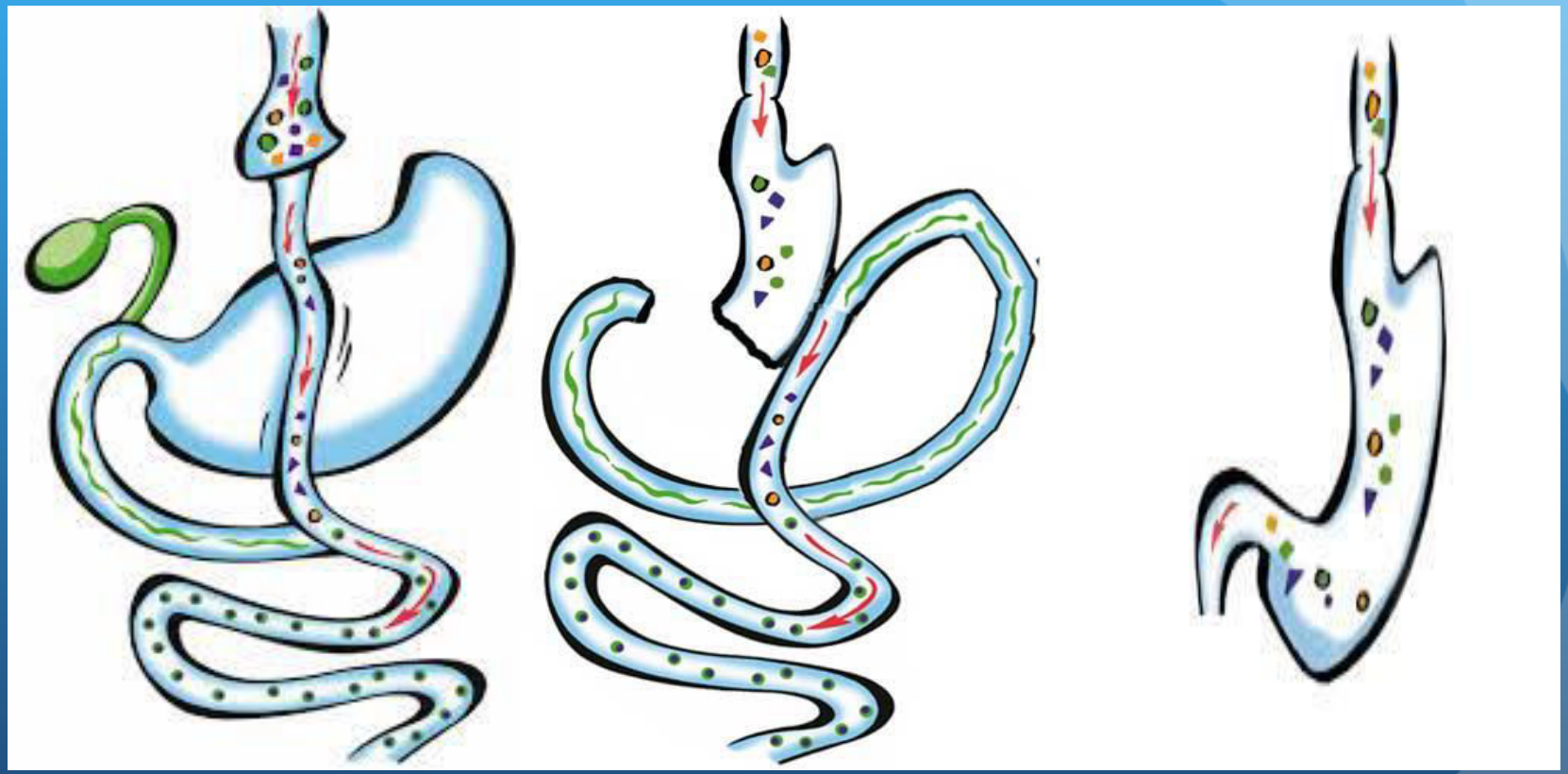


Obesity Trends* Among U.S. Adults
BRFSS, 1990, 2000, 2010

(*BMI ≥30, or about 30 lbs. overweight for 5'4" person)



Von welchen Eingriffen sprechen wir...



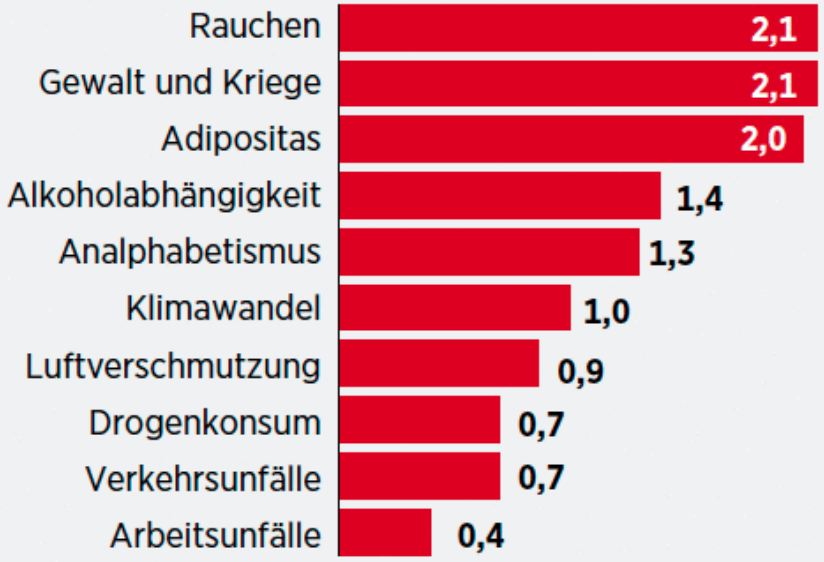
Y-Roux Bypass

Omega Loop Bypass

Sleeve Gastrektomie

Übergewicht

Geschätzte jährliche wirtschaftliche Folgekosten weltweit in Bill. US-$



Quelle: McKinsey, Julius Bär

Die Folgen von krankhaftem Übergewicht wie zum Beispiel Diabetes, Herz- oder Gelenkprobleme richten großen **wirtschaftlichen Schaden** an – unter anderem in Form von geringerer Produktivität oder Invalidität.

Übergewicht

59%
aller Deutschen
sind übergewichtig

Die Zahl
der Fettleibingen
hat in Deutschland
seit 1985 um

44%
bei den Männern
zugenommen

Die Zahl
der Fettleibingen
hat in Deutschland
seit 1985 um

39%
bei den Frauen
zugenommen

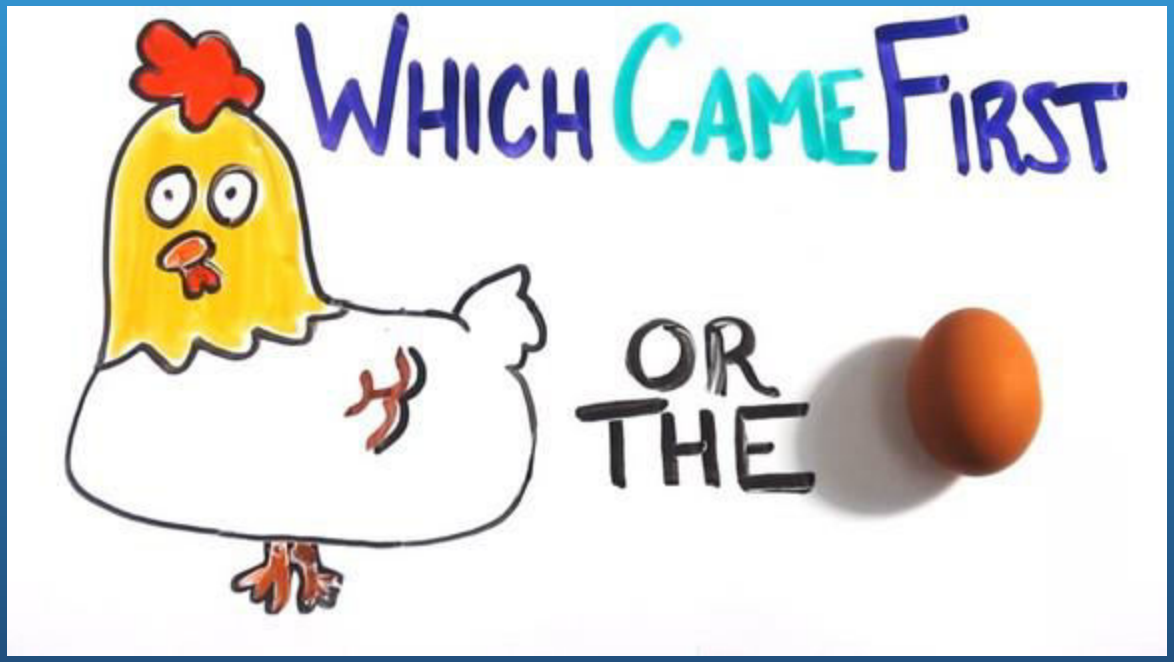
7%
aller verloren
gegangenen gesunden
Lebensjahre sind Folge
von Fettleibigkeit

Adipositas – Eine chronische Erkrankung

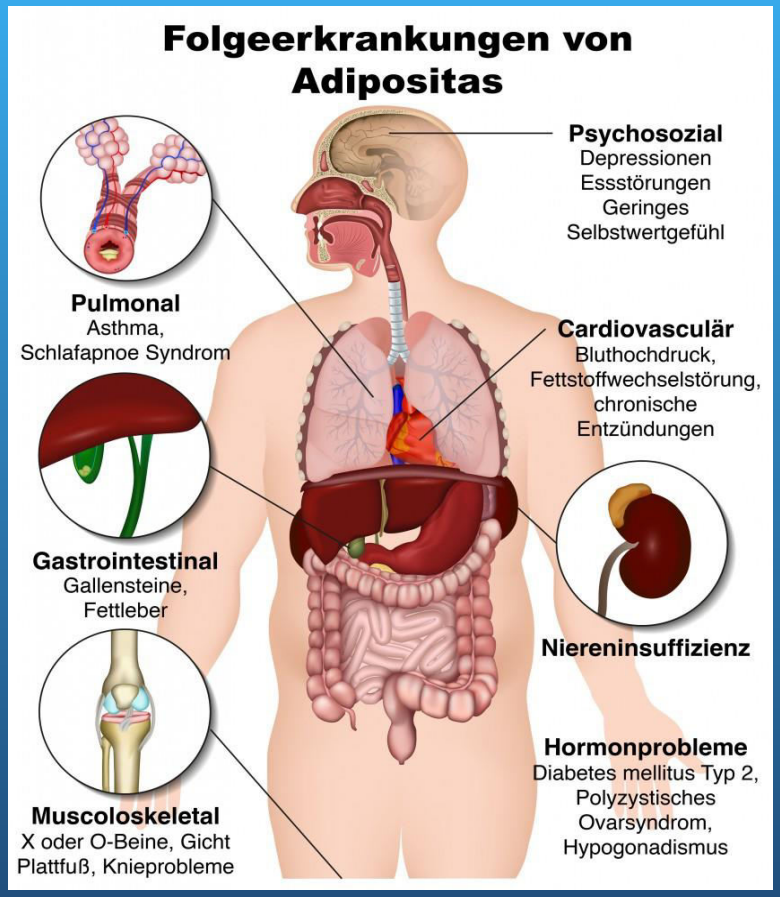
Schlaganfall
Tumorerkrankungen
Lungenfunktionsstörungen
Typ 2 Diabetes Mellitus
Psychosoziale Störungen
Hormonelle Störungen
Koronare Pathologien
Hypertonie
Fettstoffwechselstörungen
Gastrointestinale Erkrankungen
Orthopädische Erkrankungen
Venenerkrankungen
u.v.m.

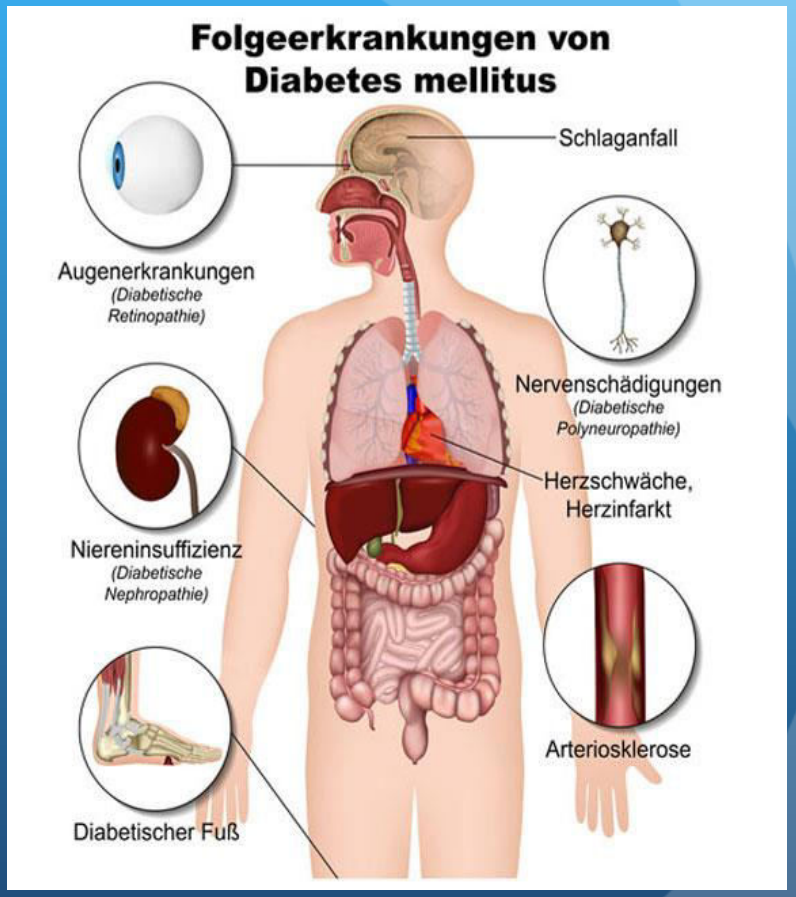
Thema

„Intestinale und endokrine Veränderungen nach Adipositaschirurgie“



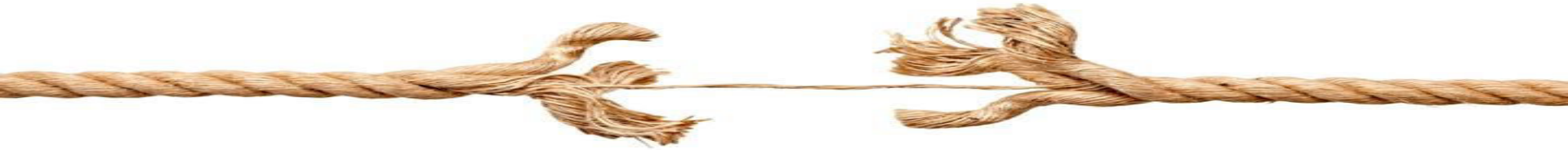
Folgeerkrankungen Adipositas





Diseases Associated with Obesity

- Diabetes: 80% related to obesity
- Hypertension: prevalence is >40% in obesity
- Heart disease: 70% related to obesity
- Cancer: Obesity accounts for 15-20% of cancer-related deaths
- **Death: Obese individuals have a 50-100% increased risk of death from all causes compared to lean individuals** (most of this risk is due to cardiovascular disease)



Benefits of 10% Weight Loss

Mortality	>20% fall in total mortality >30% fall in diabetes related deaths >40% fall in obesity related deaths
Blood pressure	fall of 10mmHg systolic and diastolic pressure
Diabetes	50% fall in fasting glucose
Lipids	10% dec. total cholesterol 15% dec. in LDL 30% dec. in triglycerides 8% inc. in HDL

Jung 1997

PHYSIOLOGY OF OBESITY

Hormones, Adipokines, enzymes, molecules and other factors reportedly associated with Adipose Tissue

- 3α-hydroxysteroid dehydrogenase (3αHSD)
- α-1 acid glycoprotein (AGP)
- 3β-HSD
- 5α reductase
- 7α hydroxylase
- 11βHSD
- 17βHSD
- Acylation-stimu
- Adenosine
- Adipocyte diffe
- Adipogenin
- Adiponectin
- Adiponutrin
- Adipohilin (adip [ADRP])
- Adipose protein acid-binding pro
- Adipose triglyce
- Adipsin (ADN; c activator and pr
- Agouti protein
- Androgens
- Angiotensin I an
- Angiotensin-cor
- Angiotensinoge
- Annexin (lipocor
- Apelin
- Aoplipoproteins
- Aquaporin 7 (AQ
- Autotaxin (lyosp
- Bone morphoge
- C-reactive prot
- Calumenin
- Calvasculin
- Cathepsin D and
- Ceramide
- Cholesteryleste
- Chymase
- Collagen Type V
- Complement fac

- Cytochrome p450-dependent aromatase (P450arom)
- E2F proteins
- Ecto-nucleotide pyrophosphatase/phosphodiesterase 1
- Eicosanoids

- Lysophospholipid
- Macrophage migration inhibitory factor
- Metalloproteases
- Metallothionein
- Monobutyrin
- Monocyte chemoattractant protein-1
- Necdin
- Nerve growth factor

- Nitric oxide synthase
- Nuclear factors
- Omentin
- Osteonectin (secreted protein, acidic and rich in cystein/SPARC)

nase

kinase

actor

or

atin C and Colligin-1)

stacyclins

nal T-cell expressed

ein-rich adipocyte-F])

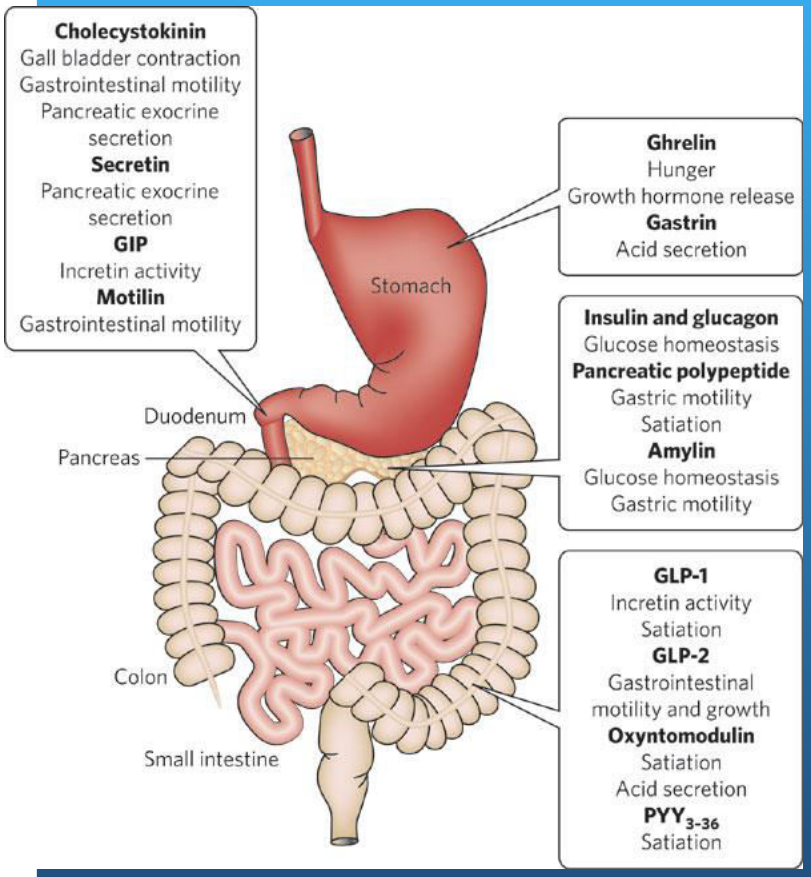
e.g., stromal cell-pre-B growth

- Transforming growth factor-β
- Tumor necrosis factor-α
- UDP-glucuronosyltransferase A242B15
- Uncoupling proteins
- Vascular endothelial growth
- Visceral adipose tissue-derived serpin
- Visfatin (pre-β cell colony-enhancing factor [PBEF])

Hormone or peptide	Major tissue locations in the gut	Principal known actions
Bombesin	Throughout the gut and pancreas	Stimulates release of cholecystokinin (CCK) and gastrin
Calcitonin gene-related peptide	Enteric nerves	Unclear
Chromogranin A	Neuroendocrine cells	Secretory protein
Enkephalins	Stomach, duodenum	Opiate-like actions
Enteroglucagon	Small intestine, pancreas	Inhibits insulin secretion
Galanin	Enteric nerves	
Ghrelin	Stomach	Stimulates appetite, increases gastric emptying
Glucagon-like peptide 1	Pancreas, ileum	Increases insulin secretion
Glucagon-like peptide 2	Ileum, colon	Enterocyte-specific growth hormone
Growth factors	Throughout the gut	Cell proliferation and differentiation
Growth hormone-releasing factor	Small intestine	Unclear
Leptin	Stomach	Appetite control
Motilin	Throughout the gut	Increases gastric emptying and small bowel motility
Neuropeptide Y	Enteric nerves	Regulation of intestinal blood flow
Neurotensin	Ileum	Affects gut motility; increases jejunal and ileal fluid secretion
Pancreatic polypeptide	Pancreas	Inhibits pancreatic and bilary secretion
Peptide YY	Colon	Inhibits food intake
Somatostatin	Stomach, pancreas	Inhibits secretion and action of many hormones
Substance P	Enteric nerves	Unclear
Trefoil peptides	Stomach, intestine	Mucosal protection and repair

Gastrointestinale Hormone

Gut Hormone



- Ghrelin
- Peptide YY (PYY)
- Cholecystokinin (CCK)
- Pancreatic polypeptide (PP)
- Amylin
- Glucose-dependent insulinotropic polypeptide
- Glucagon-like peptide-1, 2 (GLP-1, 2)
- Oxyntomodulin
- …

Table 1

Selected GI and pancreatic peptides that regulate food intake

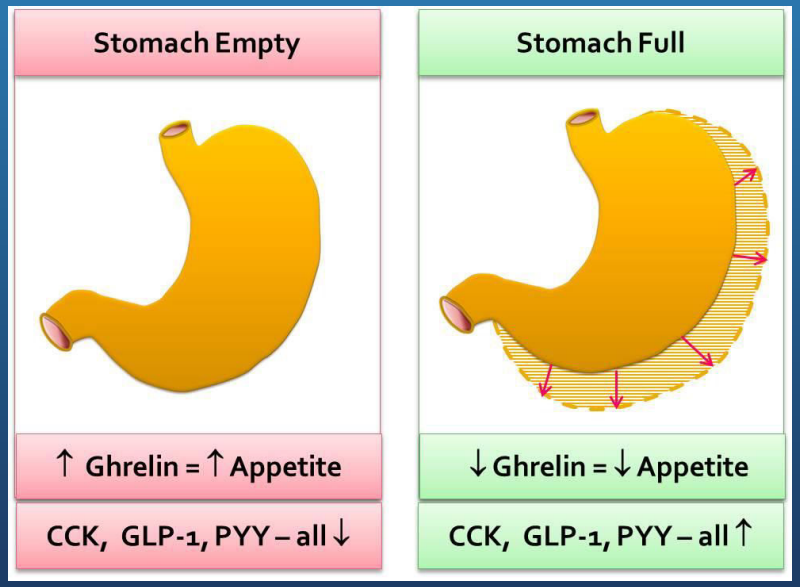
Peptide	Main site of synthesis	Receptors mediating feeding effects	Sites of action of peripheral peptides germane to feeding			Effect on food intake[A]
			Hypothalamus	Hindbrain	Vagus nerve	
CCK	Proximal intestinal I cells	CCK1R	X	X	X	↓
GLP1	Distal-intestinal L cells	GLP1R	X?	X?	X	↓
Oxyntomodulin	Distal-intestinal L cells	GLP1R and other	X			↓
PYY_{3-36}	Distal-intestinal L cells	Y2R	X		X	↓
Enterostatin	Exocrine pancreas	F1-ATPase β subunit			X	↓
APO AIV	Intestinal epithelial cells	Unknown	X		X	↓
PP	Pancreatic F cells	Y4R, Y5R		X	X	↓
Amylin	Pancreatic β cells	CTRs, RAMPs	X	X		↓
GRP and NMB	Gastric myenteric neurons	GRPR		X	X	↓
Gastric leptin	Gastric chief and P cells	Leptin receptor	?	?	X	↓
Ghrelin	Gastric X/A–like cells	Ghrelin receptor	X	X	X	↑

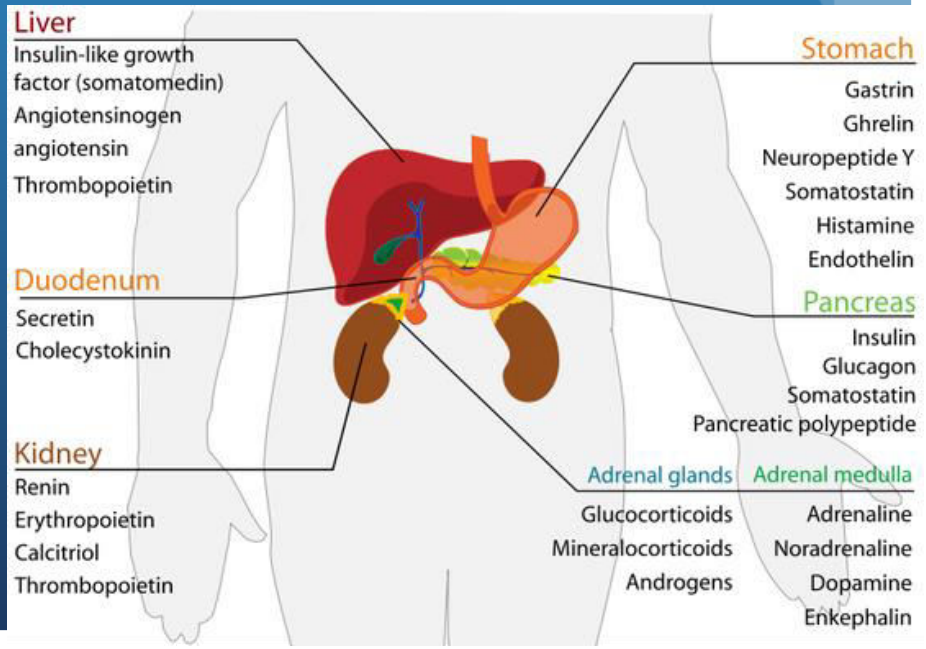
(Cummings and Overduin., 2004)

The role of gut hormones in energy homeostasis

Gut hormones have a number of functions, including the regulation of blood glucose levels, gastrointestinal motility and growth, exocrine secretion and adipocyte function.

These functions are often integrated with their actions in the central regulation of appetite circuits, and the gut hormones themselves interact to stimulate or suppress the release of other hormones.





The future of gut hormones in appetite control

- Current drugs are insufficiently efficacious to cope with the obesity epidemic sweeping the developed world.
- At present, the most effective treatment for obesity is bariatric surgery.
- Gut hormones are molecules designed by evolution to be 'administered' peripherally to specifically target appetite circuits in the central nervous system.
- However, as the obesity epidemic rumbles on, so do the efforts to sate hunger. Gut hormones may yet prove that the way to a man's brain is through his stomach.

Ghrelin

Ghrelin (Akronym, engl. *Growth Hormone Release Inducing* „Wachstumshormonfreisetzung einleitend“) ist ein appetitanregendes Hormon, welches in der Magenschleimhaut und der Bauchspeicheldrüse produziert wird. Neben der Appetitanregung hat das Hormon eine Reihe anderer Wirkungen.

Bildung

Es wird vor allem in den Belegzellen im Epithel des Magenfundus, aber auch von den ε-Zellen der Bauchspeicheldrüse produziert sowie in einer Vorstufe im Hypothalamus und der Hypophyse und durch Abspaltung einiger Aminosäuren in die aktive Form übergeführt.

Struktur

Ghrelin ist ein Peptidhormon, bestehend aus 28 Aminosäuren, welches durch posttranslationale Modifikation aus dem Präkursor-Protein Preproghrelin (117 Aminosäuren) gebildet wird. Gleichzeitig entsteht ein Molekül Obestatin.Die dritte Aminosäure Serin des Ghrelins ist mit Octansäure verestert. Diese Modifikation ist essentiell für die Wirkung des Hormons. Die Molekülmasse des Präkursor beträgt 12,91 kDa, die des Ghrelin 3,24 kDa.

Physiologie

Ghrelin ist ein Hormon, das die Nahrungsaufnahme und die Sekretion von Wachstumshormon reguliert. Möglicherweise spielt es eine Rolle bei der Entstehung von Adipositas. In Hungerphasen steigt der Ghrelinspiegel im Blut an, nach dem Essen sinkt er ab. Schlafmangel induziert erhöhte Ghrelin-Ausschüttung und trägt auf diese Weise vermutlich zur Entwicklung der Adipositas bei.

Wirkungen

Hunger

Im Experiment erhöhen Ghrelin-Infusionen die Nahrungsaufnahme. Im Fastenzustand ist die Ghrelinausschüttung erhöht, nach dem Essen sinkt der Ghrelinspiegel ab.

Es stimuliert im Hypothalamus die Sekretion von Neuropeptid Y, von dem bekannt ist, dass es die Nahrungsaufnahme steigert.

Peptid YY

Peptid YY (PYY) ist ein Peptidhormon, welches aus 36 Aminosäuren besteht. Es hat die Summenformel $C_{194}H_{295}N_{55}O_{57}$. Es wird beim Menschen in den endokrinen Zellen des distalen Dünndarms gefunden (vorwiegend im Ileum) und dort freigesetzt. Die Freisetzung von PYY erfolgt hauptsächlich induziert durch Fette. Erstmals gefunden wurde es 1980 in der Mukosa eines Schweinedünndarms.

Physiologie

Die Synthese des Peptids YY erfolgt in spezifischen polarisierten, endokrinen Zellen der Schleimhaut. Diese Zellen weisen meist eine trianguläre Struktur auf. Sie tragen Mikrovilli an der schmalen, zum Darmlumen orientierten Zellseite und besitzen basal (zur Blutseite orientiert) Speichervesikel mit den präformierten Hormonen. Darüber hinaus wird PYY je nach Spezies in den α- und/oder PP-Zellen der Langerhans-Inseln der Bauchspeicheldrüse gebildet.

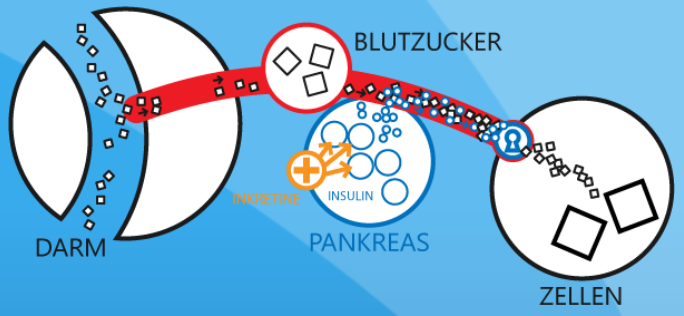
Zusammen mit Glucagon-artigen Peptiden und Oxyntomodulin wird Peptid YY postprandial (nach dem Essen) von neuroendokrinen L-Zellen der Darmschleimhaut ins Blut abgegeben. Die biologische Wirkung von PYY umfasst die Hemmung der Magenentleerung, der exokrinen Pankreassekretion und der Magensekretion. Damit soll erreicht werden, dass eine Entleerung von fetthaltiger Nahrung in den Dünndarm verzögert und so eine bessere Verdauung ermöglicht wird. Die Wirkung wird durch Aktivieren des Neuropeptid Y-Y_2-Rezeptors vermittelt.

Peptid YY hat ebenfalls starken Einfluss auf das Appetit- und Sättigungsgefühl und ist hierbei das stärkste aller gastrointestinalen Hormone. Es führt somit zu einer reduzierten Nahrungsaufnahme. Es hat ebenfalls Einfluss auf die Motilität des Darmes und bewirkt eine Verengung der Blutgefäße. Hohe PYY-Spiegel führen zu einer erhöhten Synthese von FSH und LH in der Hypophyse. Es kann angenommen werden, dass PYY das Zyklusgeschehen positiv beeinflusst.

Medizinische Bedeutung

Bei adipösen Patienten ist die PYY-Konzentration stark erniedrigt, während sie stark erhöht ist bei Krankheiten, die mit starkem Gewichtsverlust einhergehen. Die Gabe von Peptid YY3-36 führt zu einer Abnahme von Hungergefühl und Nahrungsaufnahme, hierbei tritt allerdings Brechreiz als Nebenwirkung auf.

Inkretin



Definition

Inkretine (intestinal secretion of insulin) sind Peptidhormone, welche im Dünndarm (Ileum) gebildet werden und neben Insulin, Glucagon und Amylin einen wichtigen Einfluss auf die Glucosehomöostase ausüben.

Wirkungen

Inkretine sind antidiabetisch und antihyperglykämisch:

1. fördern die Insulinsynthese und die Insulinfreisetzung aus den Betazellen des Pankreas
2. verbessern die Empfindlichkeit der Betazellen auf Glucose und erhöhen die Glucoseaufnahme der Gewebe
3. erniedrigen die Glucagonsekretion aus den Alphazellen im Pankreas und führen dadurch zu einer verminderten Glucoseproduktion in der Leber
4. verlangsamen die Magenentleerung und reduzieren die Geschwindigkeit, mit der Glucose in den Blutkreislauf gelangt
5. vermindern den Appetit und das Körpergewicht
6. wirken nur, wenn der Blutzucker normal oder erhöht ist
7. üben möglicherweise protektive Wirkungen auf die Betazellen aus und fördern ihre Proliferation

Glucagon-like Peptide 1

Das Peptidhormon **Glucagon-like Peptide 1** (**GLP-1**) ist neben GIP das bedeutsamste Hormon für den *Inkretin-Effekt* (die erhöhte Insulinausschüttung bei enteraler verglichen mit parenteraler Glucosezufuhr). Beim Menschen besteht das wirksame Hormon aus den Aminosäuren 7-36 des Präglucagon-Proteins.

Bildung

GLP-1 wird als Darmhormon von den neuroendokrinen L-Zellen in Ileum und Colon als Reaktion auf Glucose im Chymus produziert und in den Blutkreis freigesetzt.

Wirkungen

Es verstärkt die Glucose-abhängige Freisetzung von Insulin aus den β-Zellen der Bauchspeicheldrüse durch Bindung an G_s-gekoppelte Rezeptoren. Über den Proteinkinase-A-Signalweg werden Kaliumkanäle geschlossen, die resultierende Depolarisation der Zellmembran führt zur Öffnung spannungsabhängiger Calciumkanäle. Calcium triggert die Fusion Insulin-speichernder Vesikeln mit der Zellmembran. Ferner stimuliert GLP-1 die Transkription des Insulin-Gens und die Proliferation der Langerhans-Inseln.

Es senkt die Produktion von Glucagon in den α-Zellen der Bauchspeicheldrüse. (Glucagon setzt Glucose aus der Leber frei.) Es fördert die Sättigung durch Bindung an Rezeptoren in der Area postrema.

Durch die ersten beiden Wirkungen werden zu hohe Glucosewerte im Blut verhindert, durch die beiden anderen Wirkungen die Nahrungsaufnahme gedrosselt.

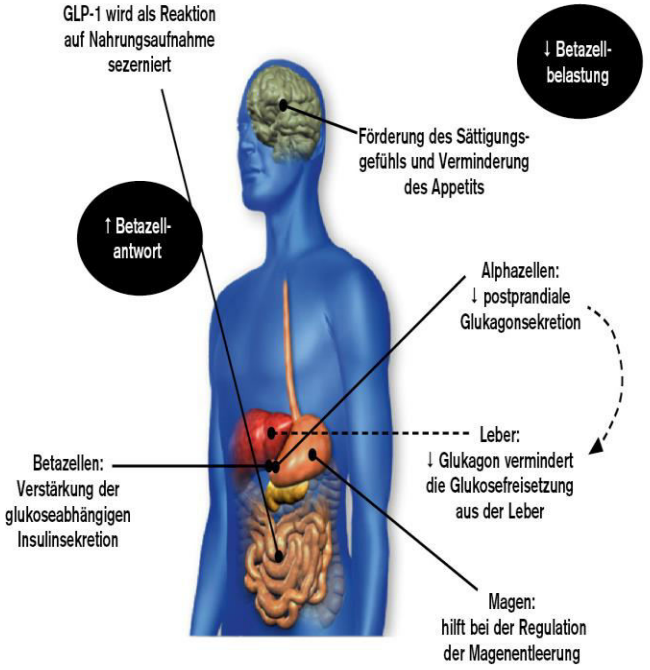
Diabetestherapie mit GLP-1

Bei der Analyse von Stoffen aus dem Speichel der Gila-Krustenechse wurde das Hormon Exendin-4 isoliert, das GLP-1 ähnelt und wie dieses an die Rezeptoren der Bauchspeicheldrüse bindet, aber von der Dipeptidylpeptidase 4 nicht abgebaut wird. Das US-amerikanische pharmazeutische Unternehmen *Amylin* entwickelte gentechnisch Exendin-4 und brachte es unter dem Namen Exenatid 2005 als Arzneistoff zur subkutanen Injektion für Typ-II-Diabetiker in den Handel. In der Folge wurden weitere Inkretinmimetika entwickelt und als Arzneimittel zugelassen.

Der Inkretin-Effekt

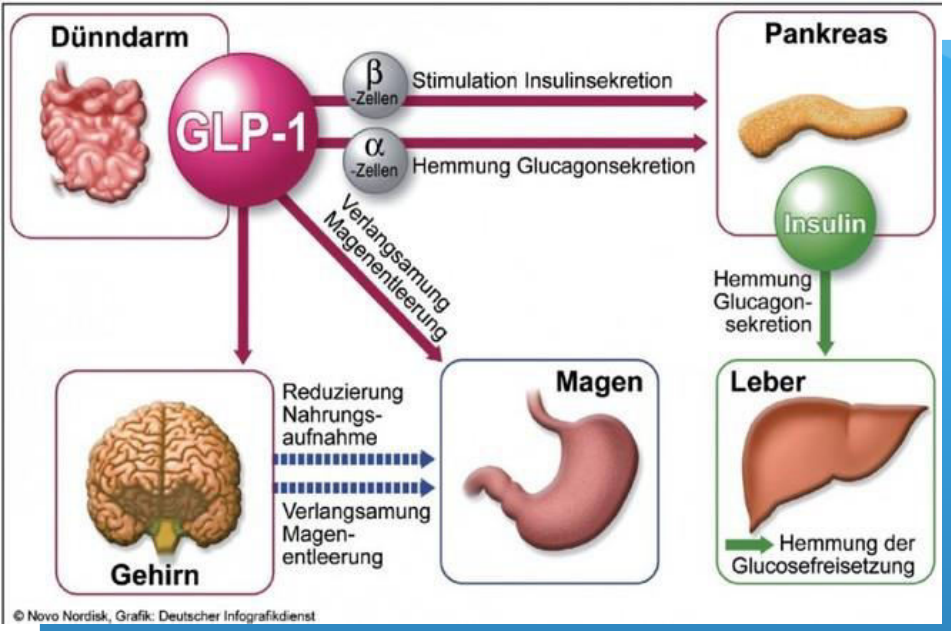
Als Inkretin-Effekt wird in der Medizin die Mitte der 1960er Jahre beschriebene Beobachtung bezeichnet, dass bei gleichen Blutzuckerspiegeln die intravenöse Injektion von Glukose zu einer deutlich geringeren Ausschüttung des blutzuckersenkenden Hormons Insulin führt als eine orale Glukosezuführung. Die Konzentration von Glukose im Blut erklärt daher nicht allein die Menge der Insulinausschüttung der Bauchspeicheldrüse. Mitte der 1980er Jahre wurde auf der Basis experimenteller Daten das Ausmaß des Inkretin-Effekts in Abhängigkeit von der Glukosemenge auf etwa 25 bis 60 Prozent der Insulinantwort geschätzt.

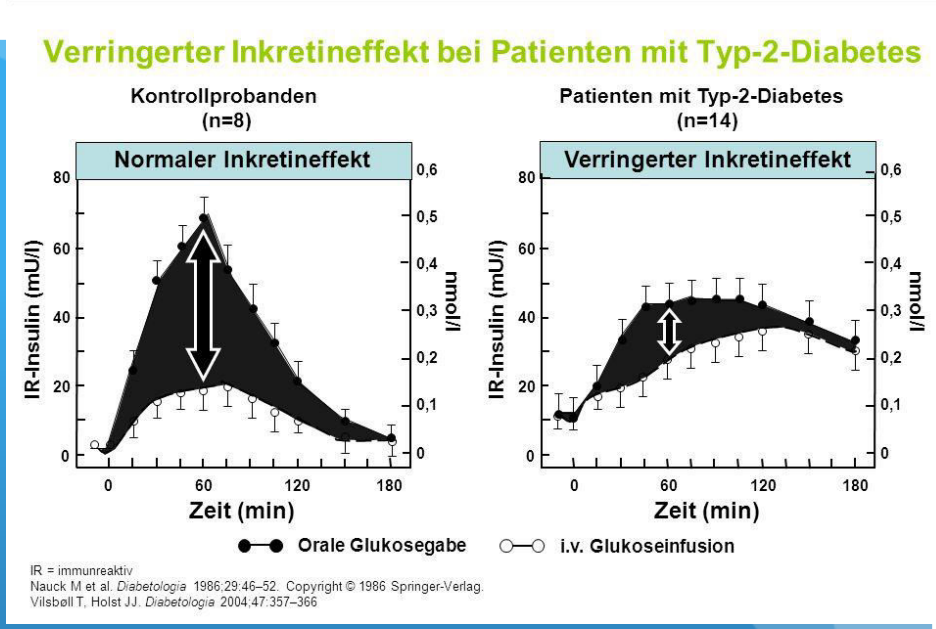
Als Ursache für den Inkretin-Effekt wurde die Existenz von Hormonen postuliert, die von der Darmschleimhaut gebildet werden. Auf der Suche nach diesen als Inkretine bezeichneten Hormonen wurde zunächst das von den K-Zellen der Zwölffingerdarmschleimhaut gebildete Glukoseabhängige insulinotrope Peptid (GIP) gefunden, dessen insulinfreisetzende Wirkung um 1970 nachgewiesen wurde. Da eine Neutralisation des GIP den Inkretin-Effekt jedoch nur um 20 bis 50 Prozent reduziert, wurde nach weiteren Inkretinen gesucht. Mitte der 1980er Jahre wurde dann das Glucagon-like Peptid 1 (GLP-1) beschrieben, das von den L-Zellen der Darmschleimhaut produziert wird. Die höchste Dichte dieser Zellen findet man am Ende des Dünndarms, dem sogenannten Ileum, sowie dem Anfang des Dickdarms. Es konnte gezeigt werden, dass GLP-1 einen wesentlichen Anteil am Inkretin-Effekt hat und dass seine Wirkung additiv zur Wirkung des GIP ist. Gegenwärtig wird davon ausgegangen, dass diese beiden Hormone für den gesamten Inkretin-Effekt verantwortlich sind.



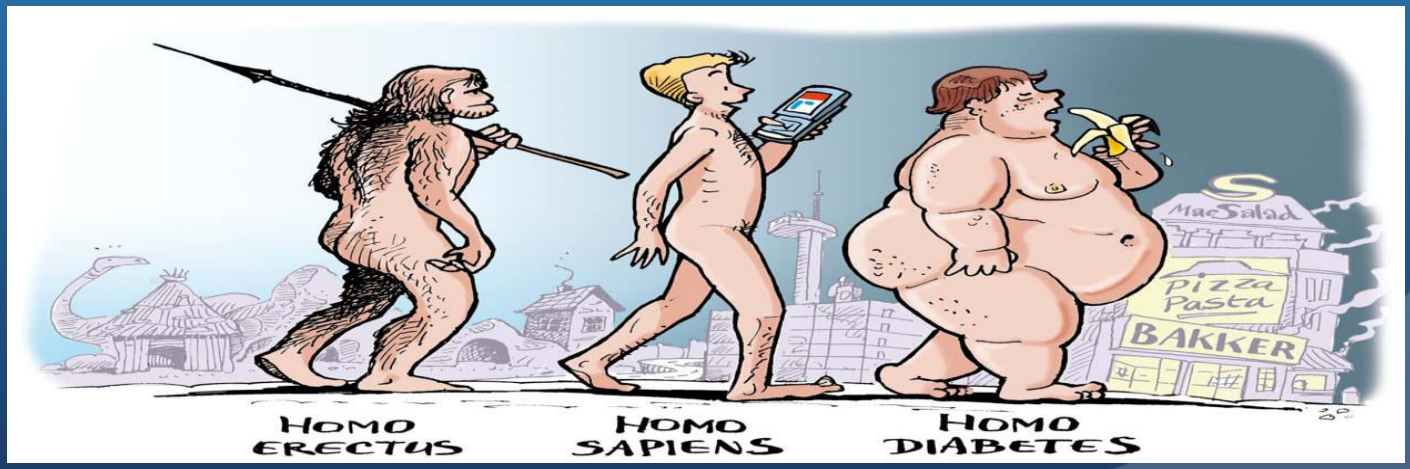
Modifiziert nach: Flint A. et al., J Clin Invest 1998; 101:515-520; Larsson H. et al., Acta Physiol Scand 1997; 160:413-422; Nauck M.A. et al., Diabetologia 1996; 39:1546-1553; Drucker D.J., Diabetes 1998; 47:159-169

Abb.: Bedeutung der Inkretine für die Blutglukoseregulation

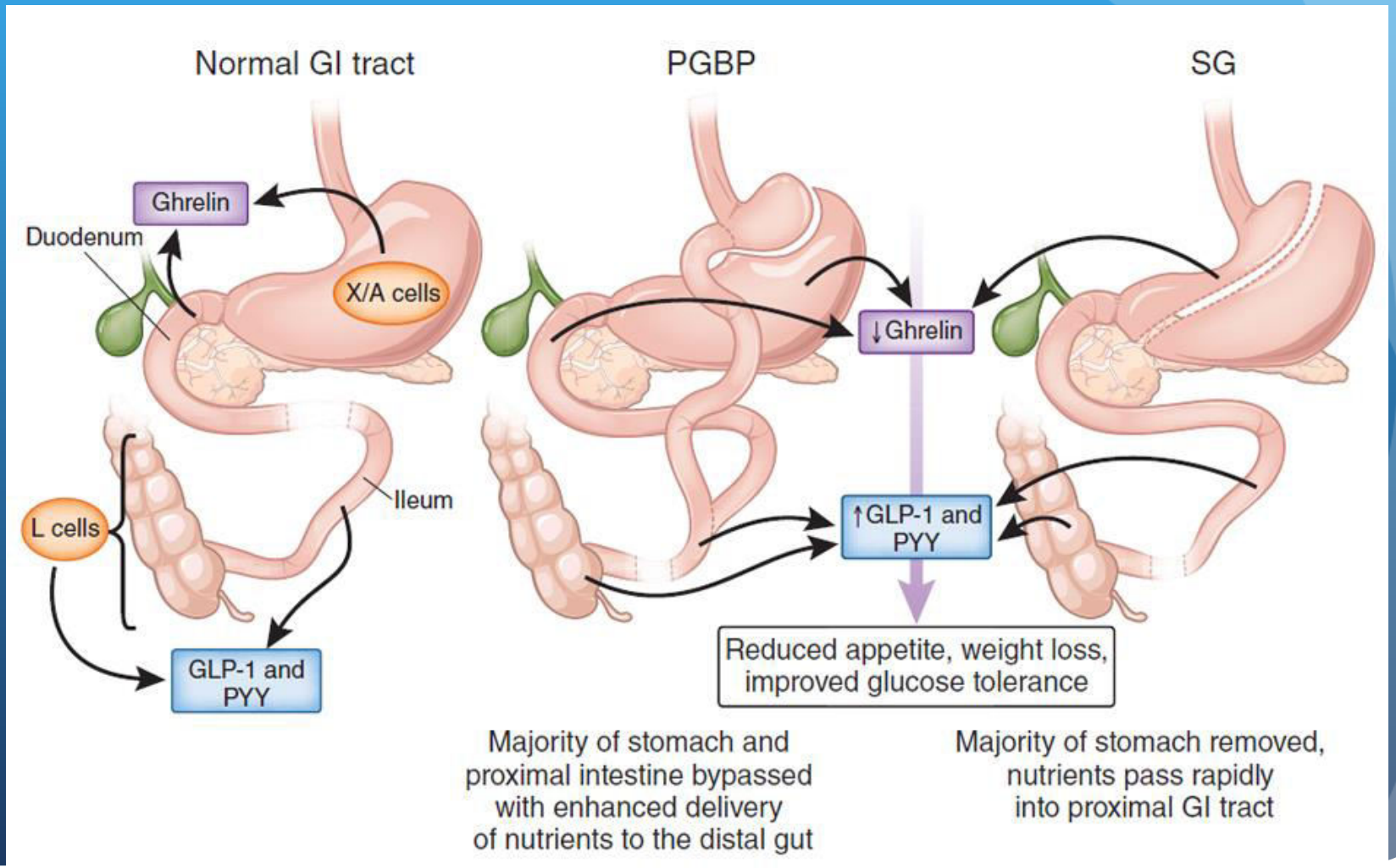




"Erst kommt das Fressen, dann die Moral." (Bertold Brecht)

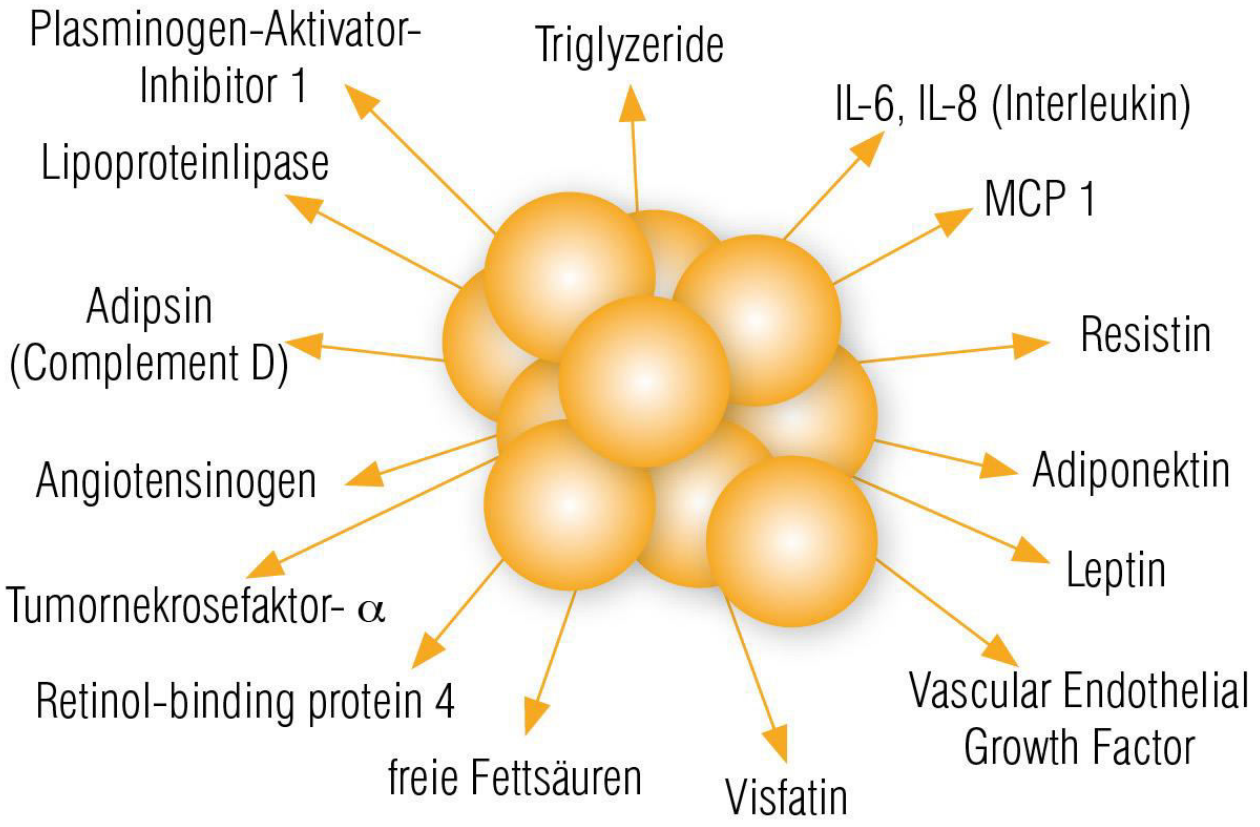


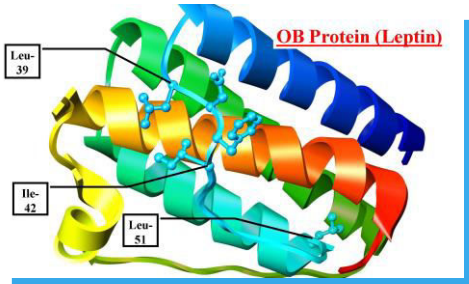
Ghrelin, GLP-1, PYY…



Fettgewebe - ein unterschätztes Organ

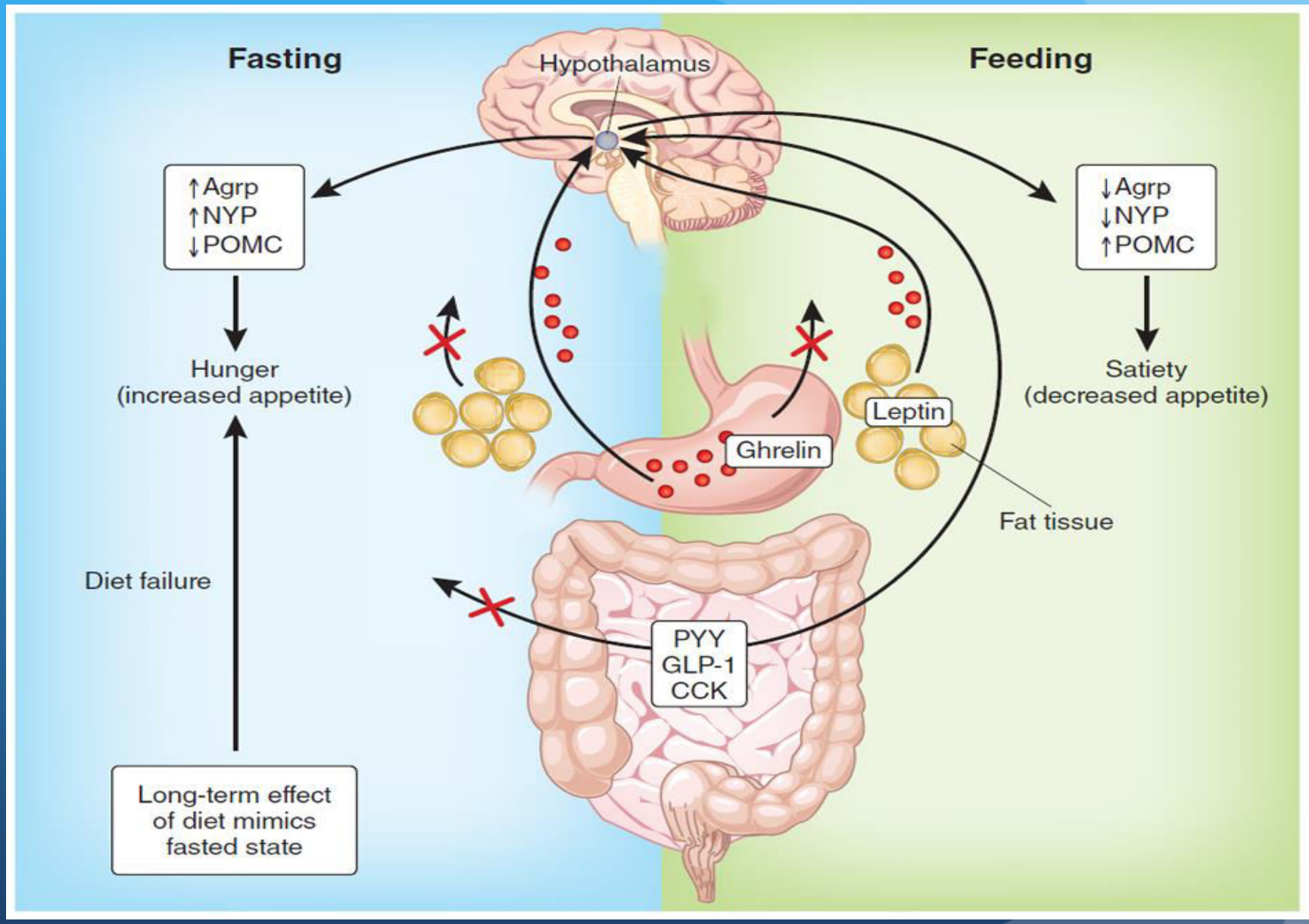
Abb. 1: Viszerales Fettgewebe als endokrines Organ



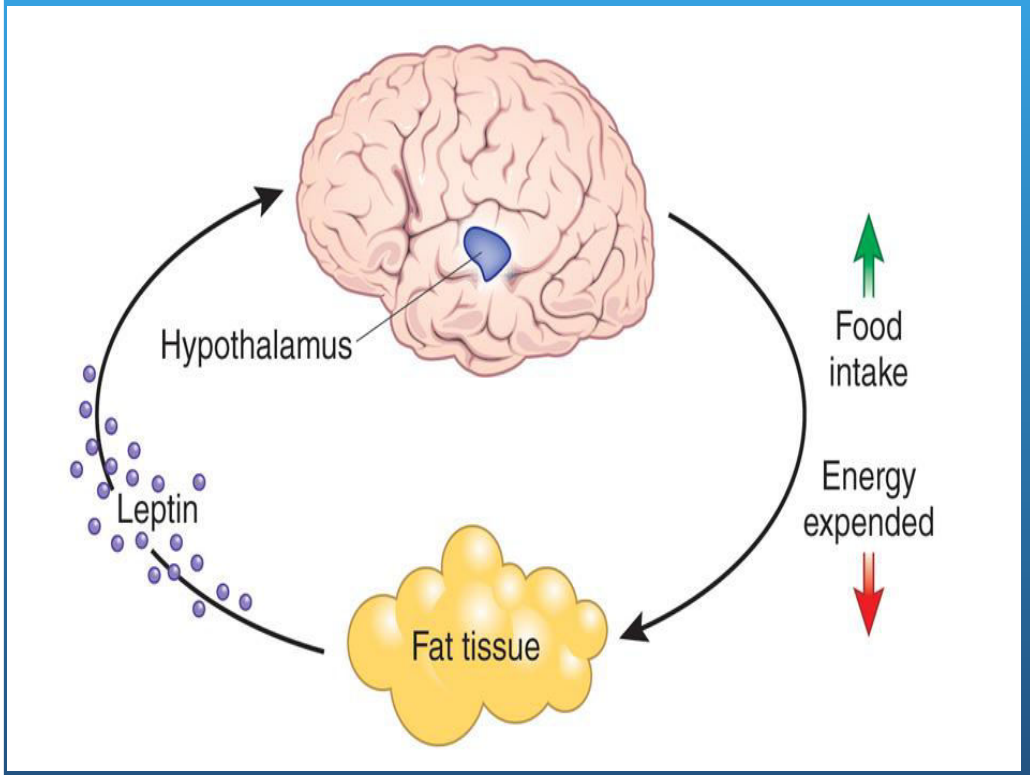


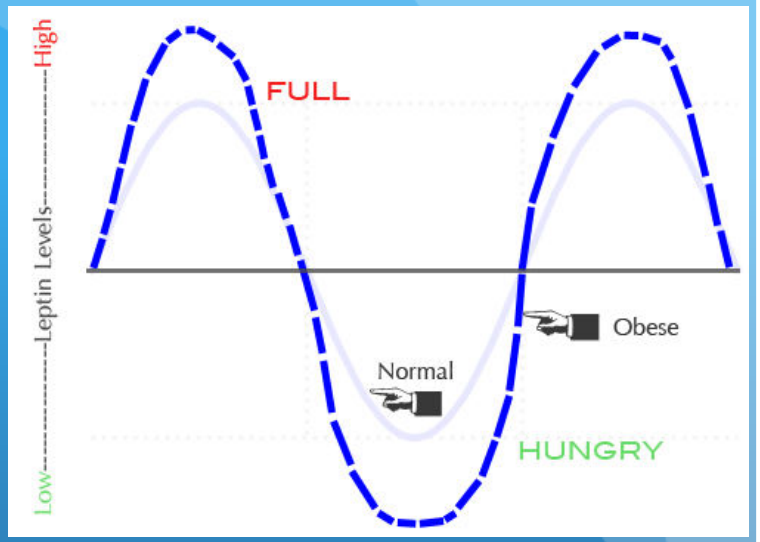
Leptin

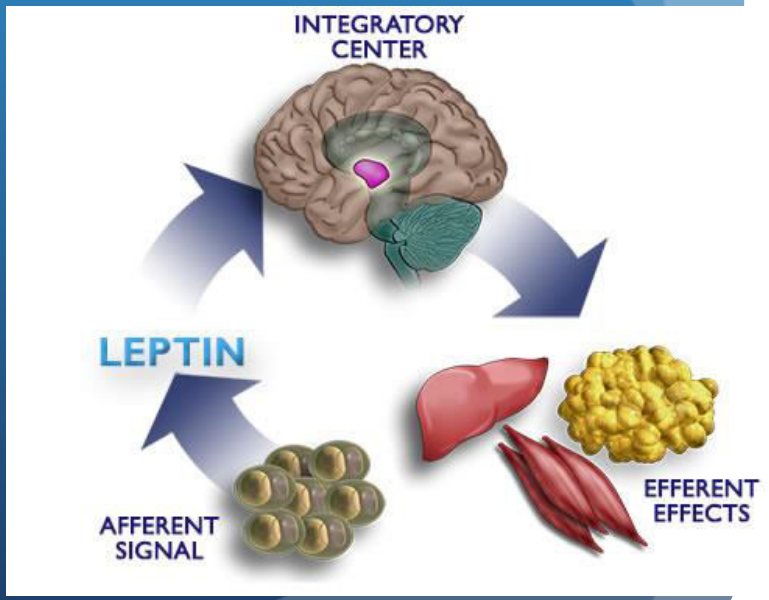
Leptin wird durch das *„obese“*-Gen kodiert und hauptsächlich von Adipozyten („Fettzellen“) exprimiert, in geringen Mengen aber auch in der Plazenta, der Magenschleimhaut, dem Knochenmark, dem Brustepithel, der Skelettmuskulatur, der Hypophyse und dem Hypothalamus. Leptin hemmt das Auftreten von Hungergefühlen und spielt eine wichtige Rolle bei der Regulierung des Fettstoffwechsels von Menschen und anderen Säugern.
Rezeptoren für Leptin (Ob-Rs) konnten in zwei unterschiedlichen Populationen von Neuronen in Kerngebieten des *Nucleus arcuatus* und *Nucleus paraventricularis* des Hypothalamus identifiziert werden. Die erste Gruppe dieser Neuronen produziert die appetitstimulierenden Neuropeptide AgRP (agouti-related protein) und NPY (Neuropeptid Y), welche durch das Leptin unterdrückt werden. Die zweite Population produziert POMC (Proopiomelanocortin) und Kokain- und Amphetamin-reguliertes Transkript (CART), beides Transmitterstoffe, die appetitzügelnd wirken. Diese werden durch Leptin aktiviert. In dem Maße, wie die Fettdepots des Körpers reduziert werden, nimmt auch die Konzentration des Leptins im Blutkreislauf ab, was wiederum eine Zunahme des Appetits bewirkt.
Durch Stimulation des sympathischen Nervensystems bewirkt Leptin auch eine Erhöhung des Blutdrucks, der Herzfrequenz sowie der Thermogenese durch Entkopplung der Zellatmung von der ATP-Synthese.
Hoffnungen, dass Leptin sich als wirkungsvolles appetitzügelndes Medikament erweisen könnte, haben sich zunächst zerschlagen, als man feststellte, dass die meisten fettleibigen Menschen hohe Spiegel dieses Hormons aufweisen. Diese häufig hungrigen Patienten weisen keinen Mangel an Leptin (Leptin-Defizienz) auf, sondern leiden vielmehr an einer sogenannten Leptin-Resistenz. In diesem Zustand unterbleibt die physiologische Wirkung des Leptins auf die Zielneuronen. Der zugrunde liegende Mechanismus ist noch nicht aufgeklärt. Neuere Forschungen zeigen eine modulierende Wirkung, bzw. eine Interaktion von Distickstoffmonoxid und Leptin auf. Früheren Studien zufolge weist allerdings Distickstoffmonoxid alleine schon eine appetitzügelnde Wirkung auf. Darüber hinaus geht von Distickstoffmonoxid eine durstvermindernde Wirkung aus.
Wie eine neue Studie an Mäusen zeigt, könnte sich Leptin auch bei Menschen mit Typ-1-Diabetes als Alternative zu Insulin erweisen. Vorteil gegenüber Insulin ist: Leptin ist offenbar ein besserer Gegenspieler von Glukagon, senkt daher Blutzuckerspiegel präziser. Andere Nachteile der Insulintherapie entfallen möglicherweise. Klinische Studien sollen diese Hypothesen verifizieren.

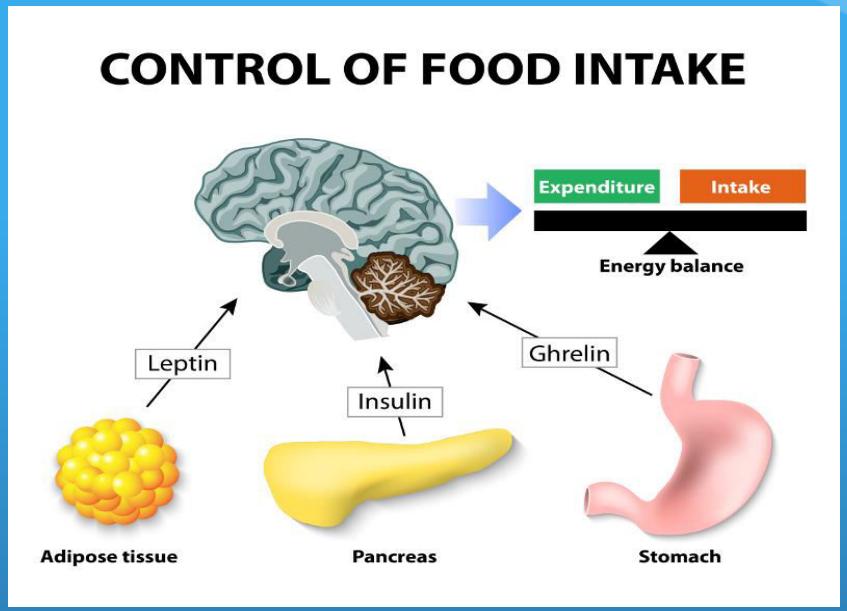

Fasting
Feeding
Hypothalamus
↑Agrp
↑NYP
↓POMC
↓Agrp
↓NYP
↑POMC
Hunger
(increased appetite)
Satiety
(decreased appetite)
Leptin
Ghrelin
Fat tissue
Diet failure
PYY
GLP-1
CCK
Long-term effect
of diet mimics
fasted state

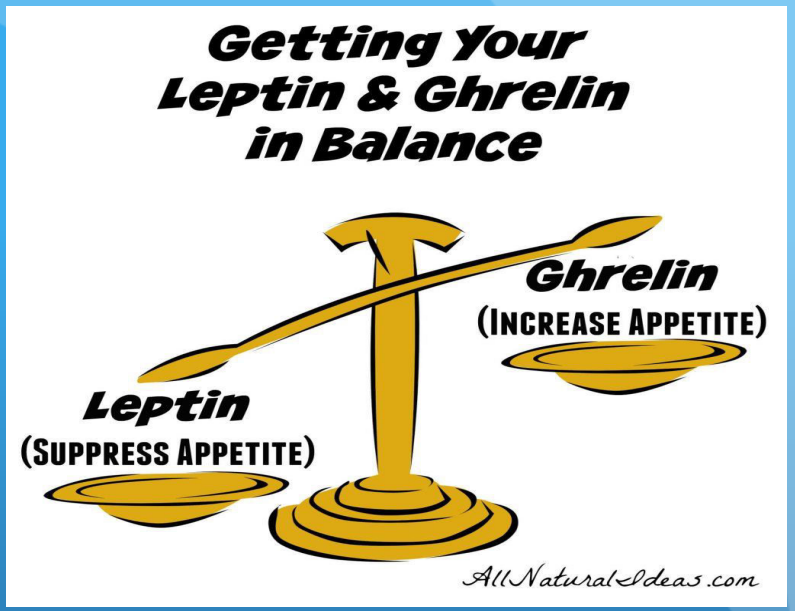
Physiologie: Leptin

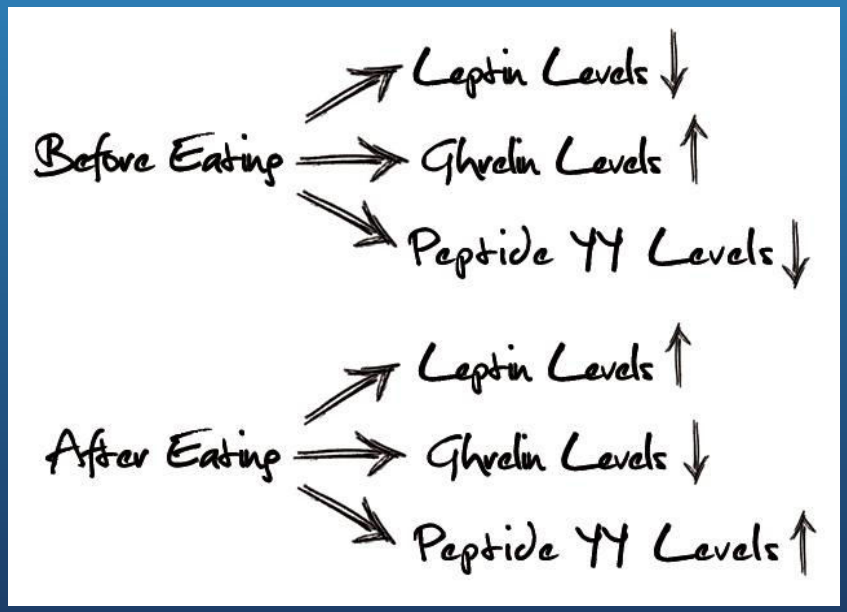


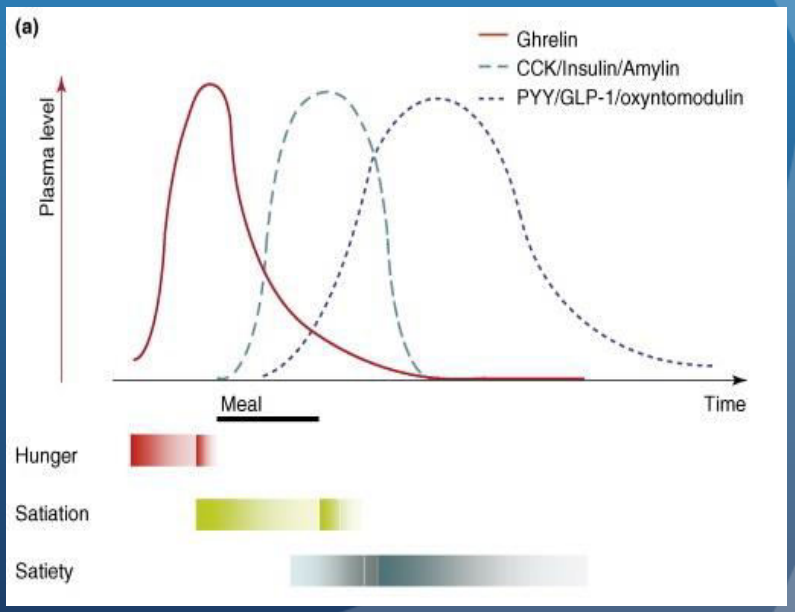




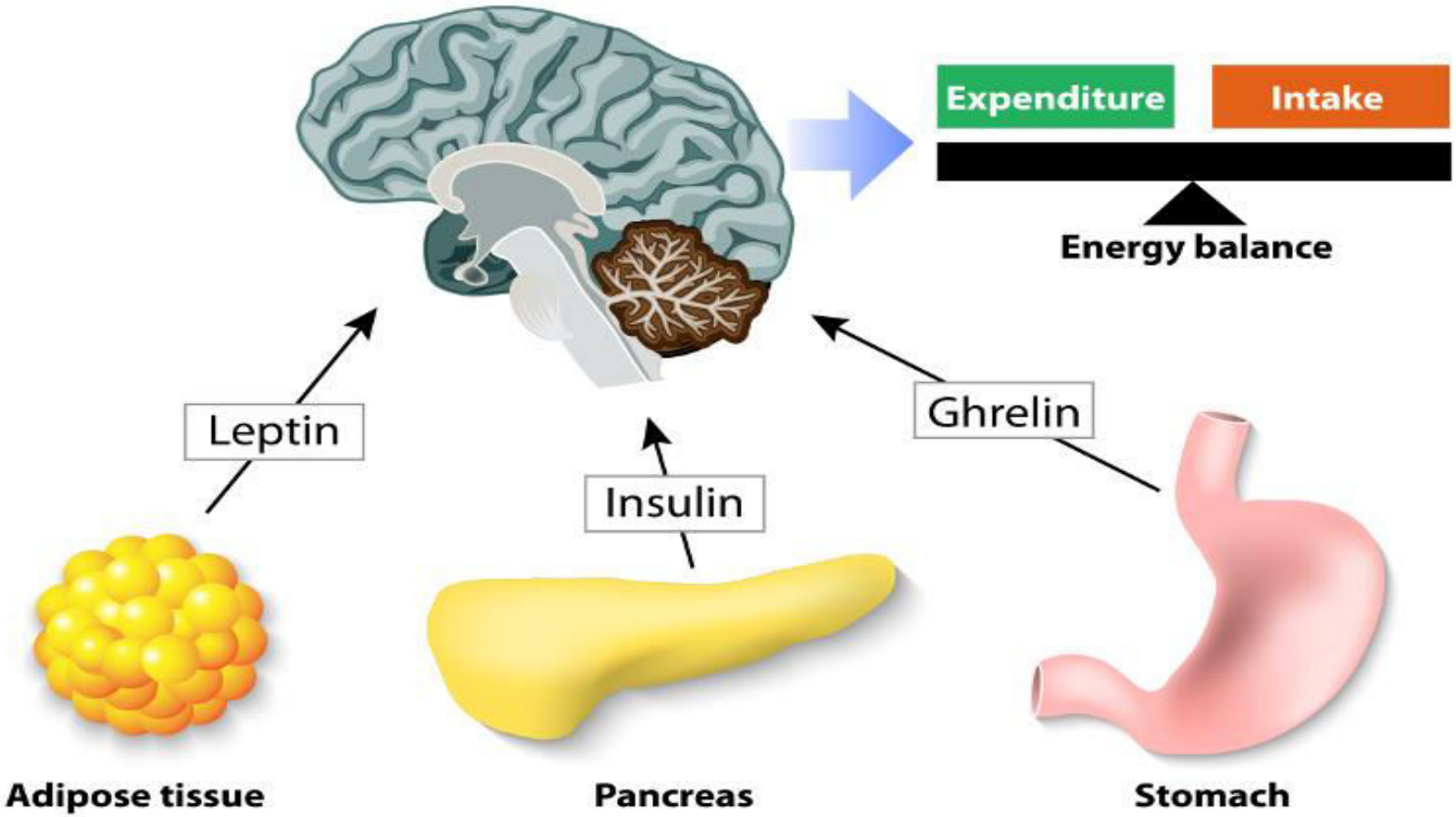

CONTROL OF FOOD INTAKE
Expenditure
Intake
Energy balance
Leptin
Insulin
Ghrelin
Adipose tissue
Pancreas
Stomach

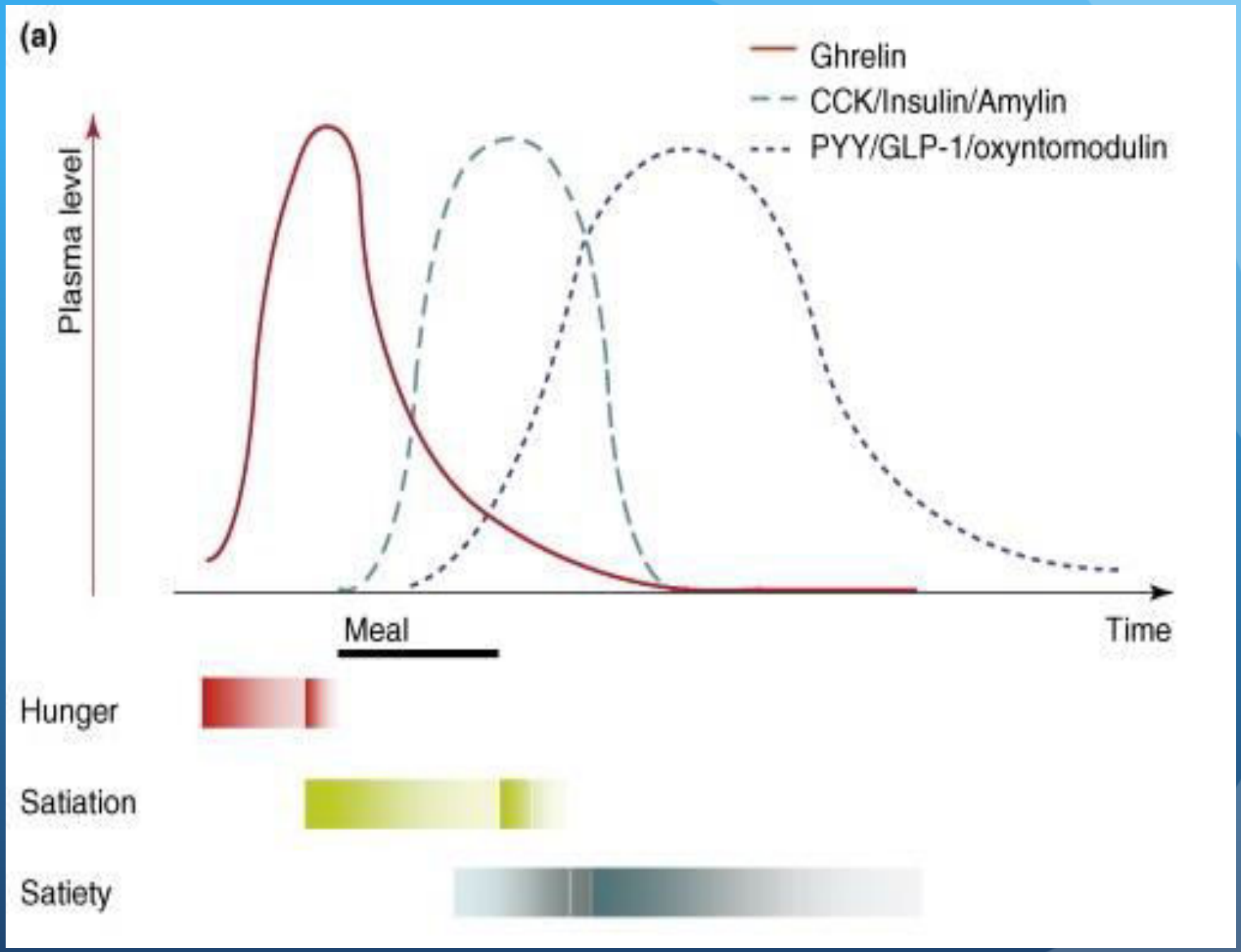

Getting Your Leptin & Ghrelin in Balance
Ghrelin
(INCREASE APPETITE)
Leptin
(SUPPRESS APPETITE)
AllNaturalIdeas.com


Before Eating
Leptin Levels ↓
Ghrelin Levels ↑
Peptide YY Levels ↓
After Eating
Leptin Levels ↑
Ghrelin Levels ↓
Peptide YY Levels ↑


(a)
Ghrelin
CCK/Insulin/Amylin
PYY/GLP-1/oxyntomodulin
Plasma level
Meal
Time
Hunger
Satiation
Satiety

CONTROL OF FOOD INTAKE




(a)
Ghrelin
CCK/Insulin/Amylin
PYY/GLP-1/oxyntomodulin
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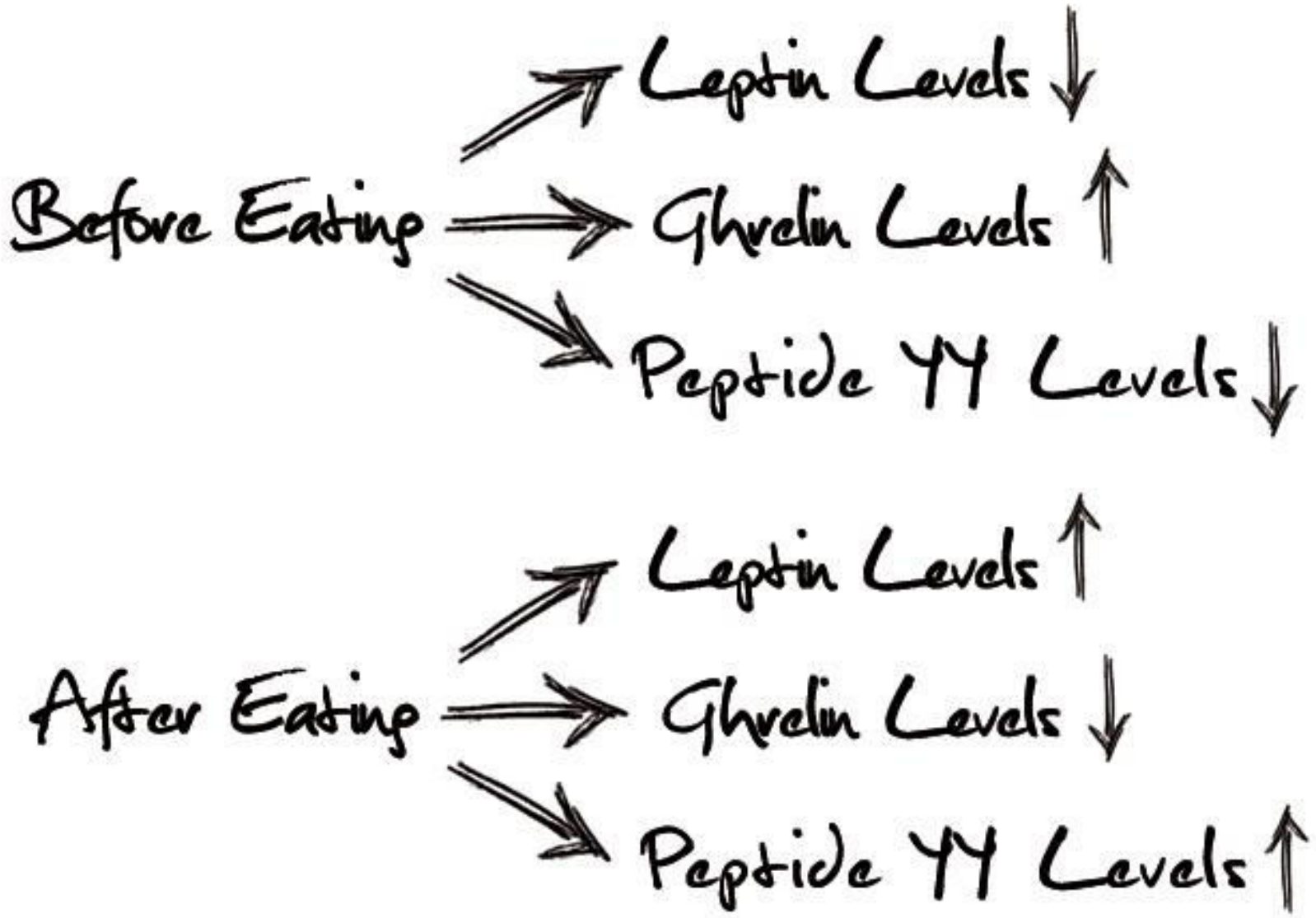
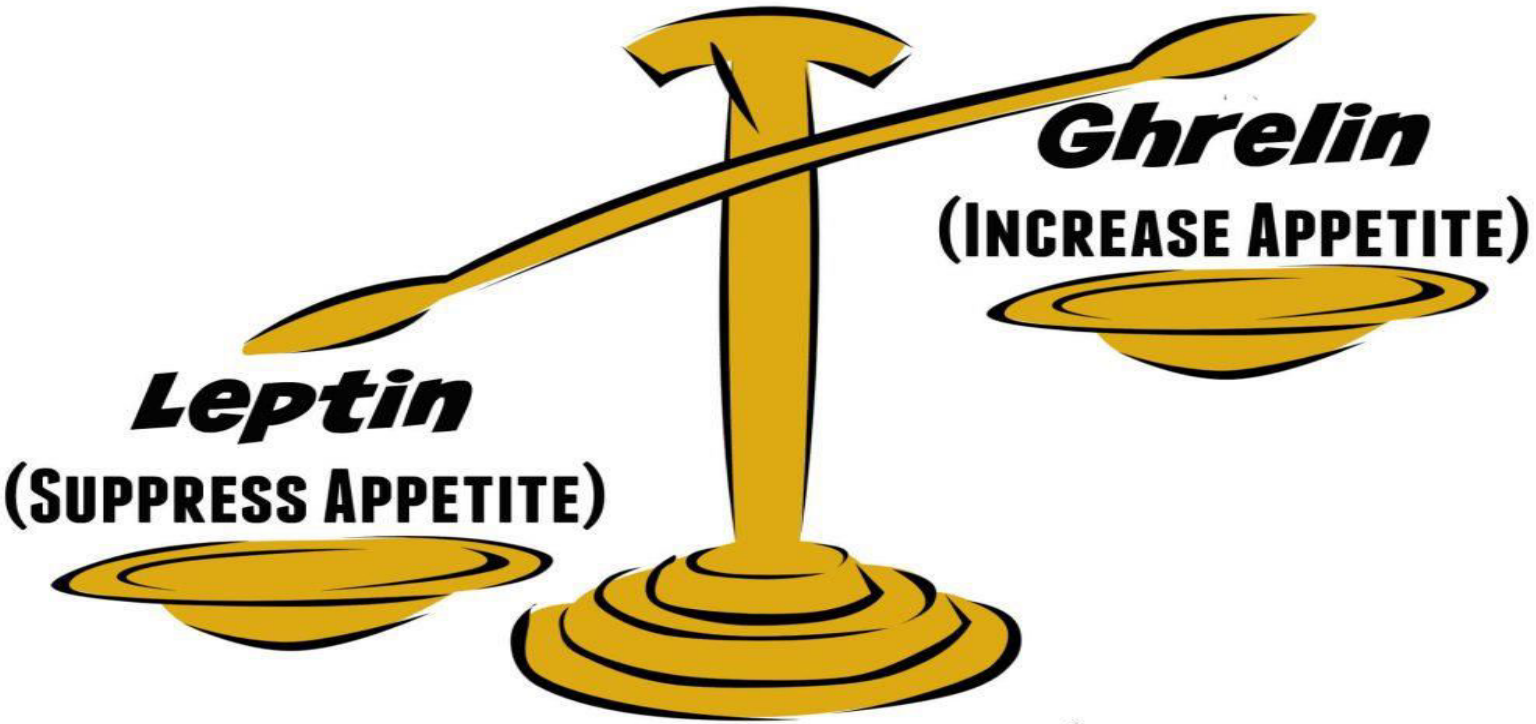

Leptin Levels ↓
Before Eating
Ghrelin Levels ↑
Peptide YY Levels ↓
Leptin Levels ↑
After Eating
Ghrelin Levels ↓
Peptide YY Levels ↑

Getting Your Leptin & Ghrelin in Balance



In Vivo. 2016 05-06;30(3):321-330.

Gastrointestinal Hormones, Intestinal Microbiota and Metabolic Homeostasis in Obese Patients: Effect of Bariatric Surgery.

Federico A[1], Dallio M[2], Tolone S[3], Gravina AG[2], Patrone V[4], Romano M[2], Tuccillo C[2], Mozzillo AL[3], Amoroso V[3], Misso G[5], Morelli L[4], Docimo L[3], Loguercio C[2].

BACKGROUND/AIM:
Bariatric surgery has proven efficacy in the modulation of a number of gut peptides that can contribute to improvement of diabetes and its associated metabolic changes. In order to evaluate dietary intake, nutritional assessment and plasma levels of gastrointestinal peptides, we enrolled severely obese patients before and after bariatric surgery.
PATIENTS AND METHODS:
We evaluated food intake, plasma levels of peptide YY (PYY), glucagon-like peptide-1/2 (GLP-1/2), ghrelin (GHR), orexin (ORE) and cholecystokinin (CCK), body composition and fecal microbiota in 28 severely obese patients and 28 healthy normal-weight controls. All parameters were evaluated at 0 time and 6 months after bariatric surgery.
RESULTS:
In obese patients we found a higher intake of nutrients, a decrease of free fat mass and an increase of BMI (body mass index), a significant decrease of GLP-1 and an increase of GLP-2, GHR and PYY with respect to controls, further increase in GLP-2, GHR and PYY, as well as increase over control values of GLP-1 after bariatric surgery. Obese individuals were found to harbor a community dominated by members of the Clostridial clusters XIVa and IV, whereas prominent bands after surgery were identified as Lactobacillus crispatus and Megasphaera elsdenii-related phylotype.
CONCLUSION:
The beneficial effects of bariatric surgery may at least in part be accounted for changes in circulating gastrointestinal (GI) peptides and fecal microbiota.

Ann Surg. 2006 Jan;243(1):108-14.

Gut hormone profiles following bariatric surgery favor an anorectic state, facilitate weight loss, and improve metabolic parameters.

le Roux CW[1], Aylwin SJ, Batterham RL, Borg CM, Coyle F, Prasad V, Shurey S, Ghatei MA, Patel AG, Bloom SR.

OBJECTIVE:
To study the effect of bariatric surgery on the entero-hypothalamic endocrine axis of humans and rodents.
BACKGROUND:
Bariatric surgery is the most effective obesity treatment as it achieves substantial and sustained weight loss. Glycemic control and enhanced satiation improve before substantial weight loss occurs. Gut peptides, acting both peripherally and centrally, contribute to glycemic control and regulate food intake.
METHODS:
We examined meal-stimulated responses of insulin, ghrelin, peptide YY (PYY), glucagon-like-peptide-1 (GLP-1), and pancreatic polypeptide (PP) in humans and rodents following different bariatric surgical techniques.
RESULTS:
Compared with lean and obese controls, patients following Roux-en-Y gastric bypass (RYGB) had increased postprandial plasma PYY and GLP-1 favoring enhanced satiety. Furthermore, RYGB patients had early and exaggerated insulin responses, potentially mediating improved glycemic control. None of these effects were observed in patients losing equivalent weight through gastric banding. Leptin, ghrelin, and PP were similar in both the surgical groups. Using a rodent model of jejuno-intestinal bypass (JIB), we showed elevated PYY and GLP-1 in JIB rats compared with sham-operated rats. Moreover, exogenous PYY reduced food intake and blockade of endogenous PYY increased food intake. Thus, higher plasma PYY following JIB may contribute to reduced food intake and contribute to weight loss.
CONCLUSIONS:
Following RYGB and JIB, a pleiotropic endocrine response may contribute to the improved glycemic control, appetite reduction, and long-term changes in body weight.

Surg Obes Relat Dis. 2015 Nov 27.

Incretin effects, gastric emptying and insulin responses to low oral glucose loads in patients after gastric bypass and lean and obese controls.

Wölnerhanssen BK[1], Meyer-Gerspach AC[2], Peters T[3], Beglinger C[4], Peterli R[5].

BACKGROUND:
After laparoscopic Roux-en-Y gastric bypass (LRYGB), many patients suffer from dumping syndrome. Oral glucose tolerance tests are usually carried out with 50-75 g of glucose. The aim of this study was to examine whether minimal glucose loads of 10 g and 25 g induce a reliable secretion of satiation peptides without dumping symptoms after LRYGB. In addition, lean and obese controls were examined.

OBJECTIVE:
The objective of this study was to determine the effects of low oral glucose loads on incretin release and gastric emptying.

SETTING:
All surgical procedures were performed by the same surgeon (RP) at the St. Claraspital Basel in Switzerland. Oral glucose challenges were carried out at the University Hospital of Basel (Phase 1 Research Unit).

METHODS:
Eight patients 10±.4 weeks after LRYGB (PostOP; body mass index [BMI]: 38.6 kg/m^2±1.7) as well as 12 lean controls (LC; BMI: 21.8 kg/m^2±.6) and 12 obese controls (OC; BMI 38.7 kg/m^2±1.3) received 10 g and 25 g of oral glucose. We examined clinical signs of dumping syndrome; plasma glucose, insulin, glucagon-like peptide 1, glucose-dependent insulinotropic peptide, and peptide tyrosine tyrosine concentrations; and gastric emptying with a ^{13}C-sodium acetate breath test.

RESULTS:
No signs of dumping were seen in PostOP. Compared with OC, LC showed lower fasting glucose, insulin, and C-peptide, and lower homeostasis model assessment (HOMA) and AUC-180 for insulin and C-peptide. In PostOP, fasting insulin, HOMA and AUC-180 for insulin was lower and no difference was found in fasting C-peptide or AUC-180 for C-peptide compared to OC. There was no significant difference in fasting glucose, insulin, C-peptide, HOMA and AUC-180 for insulin in PostOP compared to LC, but AUC-180 for C-peptide was higher in PostOP. AUC-60 for gut hormones was similar in OC and LC and higher in PostOP compared to OC or LC. gastric emptying was slower in LC and OC compared with PostOP.

CONCLUSION:
After LRYGB, 25 g oral glucose is well tolerated and leads to reliable secretion of gut hormones. Fasting glucose, insulin and C-peptide are normalized, while glucagon-like peptide 1, glucose-dependent insulinotropic peptide and peptide tyrosine tyrosine are overcorrected. Pouch emptying is accelerated after LRYGB.

J Clin Endocrinol Metab. 2015 Dec;100(12):4677-84.

Gastrointestinal Hormones and Weight Loss Maintenance Following Roux-en-Y Gastric Bypass.

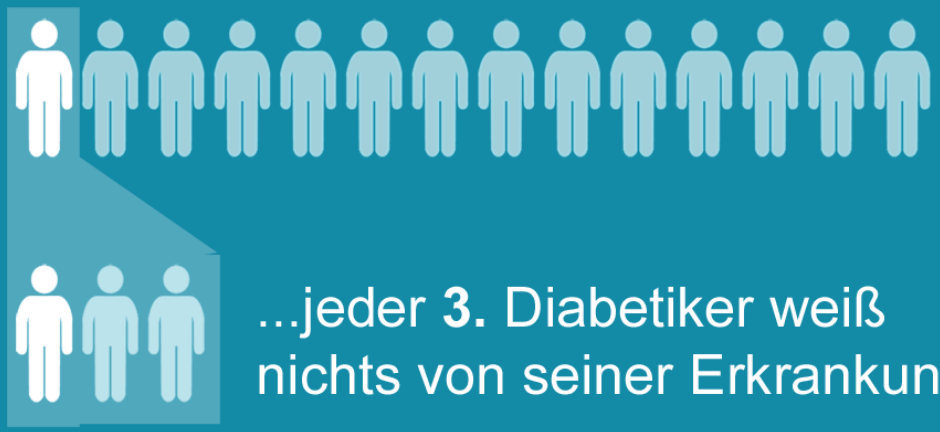
de Hollanda A[1], Casals G[1], Delgado S[1], Jiménez A[1], Viaplana J[1], Lacy AM[1], Vidal J[1].

CONTEXT:
Factors underlying variable weight loss (WL) after Roux-en-Y gastric bypass (RYGB) are poorly understood.
OBJECTIVE:
Our objective was to gain insight on the role of gastrointestinal hormones on poor WL maintenance (P-WLM) following RYGB.
DESIGN AND PATIENTS:
First, glucagon-like peptide-1 (GLP-1), peptide YY (PYY), and ghrelin responses to a standardized mixed liquid meal (SMLM) were compared between subjects with good WL (G-WL, n = 32) or P-WLM (n = 22). Second, we evaluated food intake (FI) following blockade of gut hormonal secretion in G-WL (n = 23) or P-WLM (n = 19) subjects. Finally, the impact of dietary-induced WL on the hormonal response in subjects with P-WLM (n = 14) was assessed.
SETTING:
This study was undertaken in a tertiary hospital.
MAIN OUTCOME MEASURES:
In studies 1 and 3, the outcomes measures were the areas under the curve of gut hormones following a SMLM; in study 2, FI following subcutaneous injection of saline or octreotide were evaluated.
RESULTS:
P-WLM associated a blunted GLP-1 (P = .044) and PYY (P = .001) responses and lesser suppression of ghrelin (P = .032) following the SMLM challenge. On saline day, FI in the G-WL (393 ± 143 kcal) group was less than in the P-WLM (519 ± 143 Kcal; P = .014) group. Octreotide injection resulted in enlarged FI in both groups (G-WL: 579 ± 248 kcal, P = .014; P-WLM: 798 ± 284 Kcal, P = .036), but the difference in FI between groups remained (P < .001). In subjects with P-WLM, dietary-induced WL resulted in larger ghrelin suppression (P = .046), but no change in the GLP-1 or PYY responses.
CONCLUSION:
Our data show gastrointestinal hormones play a role in the control of FI following RYGB, but do not support that changes in GLP-1, PYY, or ghrelin play a major role as determinants of P-WLM after this type of surgery.

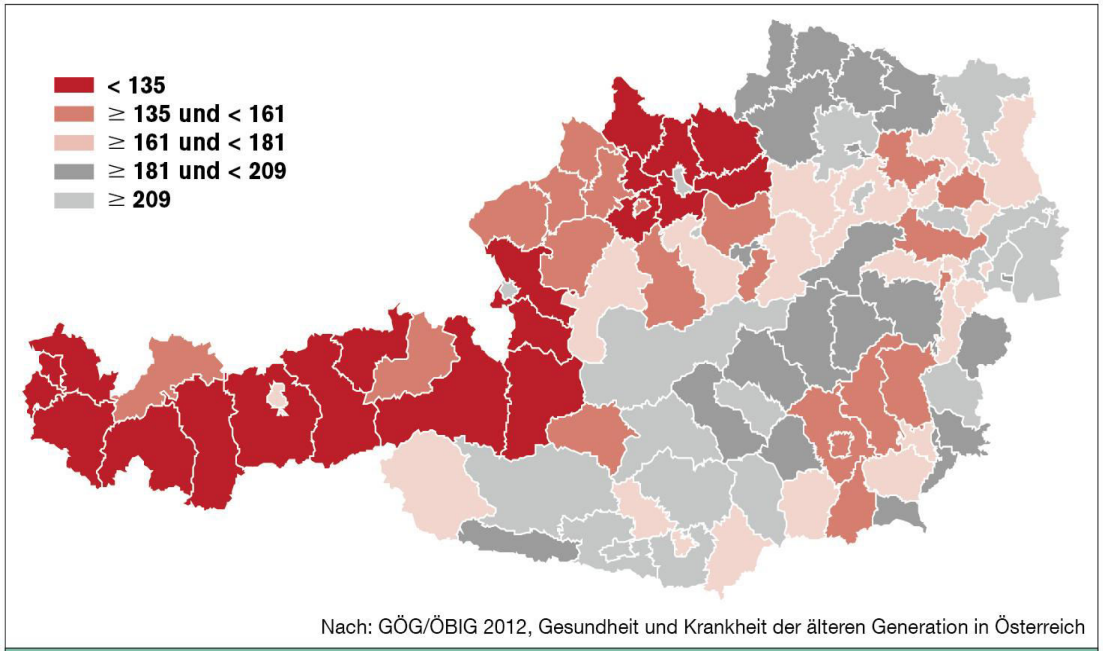
Adipositas – Eine chronische Erkrankung

Schlaganfall
Tumoreerkrankungen
Lungenfunktionsstörungen
Typ 2 Diabetes Mellitus
Psychosoziale Störungen
Hormonelle Störungen
Koronare Pathologien
Hypertonie
Fettstoffwechselstörungen
Gastrointestinale Erkrankungen
Orthopädische Erkrankungen
Venenerkrankkungen
u.v.m.

Jeder **14.** Österreicher hat Diabetes...



...jeder **3.** Diabetiker weiß nichts von seiner Erkrankung



Nach: GÖG/ÖBIG 2012, Gesundheit und Krankheit der älteren Generation in Österreich

Abb. 1: Mortalitätsrate aufgrund von Diabetes mellitus bei der über 64-jährigen Bevölkerung nach österreichischen Bezirken 2001–2010

Bundesministerium für Gesundheit

österr. Diabetesbericht 2013

Häufigkeit

Weltweit sind rund 366 Millionen Menschen an Diabetes mellitus erkrankt (rund 8 %; mehrheitlich an Typ-2-Diabetes); 53 Millionen davon in Europa (rund 8 %).

In Österreich wird die Gruppe der Diabetiker/innen derzeit auf rund 573.000 bis 645.000 Menschen geschätzt (rund 8 bis 9 %). Die Summe inkludiert dabei rund 430.000 ärztlich diagnostizierte Diabetes-Fälle (rund 6 %) sowie geschätzte 143.000 bis 215.000 undiagnostizierte Diabetiker/innen (rund 2 bis 3 %).

In der Gruppe der 0- bis 14-Jährigen kann für Österreich ein Diabetiker-Anteil von rund 0,1 Prozent angenommen werden (ca. 1.300 bis 1.500 Kinder).

Risikofaktoren

- Alter > 45 Jahre
- Erhöhter Bauchumfang (Frauen > 88 cm, Männer >102 cm)
- Übergewicht (BMI > 25 kg/m2) oder Adipositas (BMI > 30 kg/m2)
- Verwandte ersten Grades mit Diabetes
- Hypertonie
- Niedriges HDL und/oder erhöhte Triglyzeride
- Prä-Diabetes: IFG, IGT oder HbA1c 5,7-6,4 %
- Metabolisches Syndrom
- Kardio- oder cerebrovaskuläre Erkrankung
- Ethnie mit hohem Risiko (asiatisch, afrikanisch, lateinamerikanisch)
- Insulinresistenzassoziierte Veränderungen: Acanthosis nigricans
- Status nach Gestationsdiabetes
- Herzinsuffizienz
- Fettlebererkrankungen (NAFDL und NASH)
- Pankreastumoren
- Rauchen
- Diabetes der Mutter in der Schwangerschaft

Bundesminiterium für Gesundheit
österr. Diabetesbericht 2013

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Bundesminiterium für Gesundheit
österr. Diabetesbericht 2013

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Bundesminiterium für Gesundheit
österr. Diabetesbericht 2013

In the WHO European Region

1 in 3 11-year-olds is **overweight** or **obese**

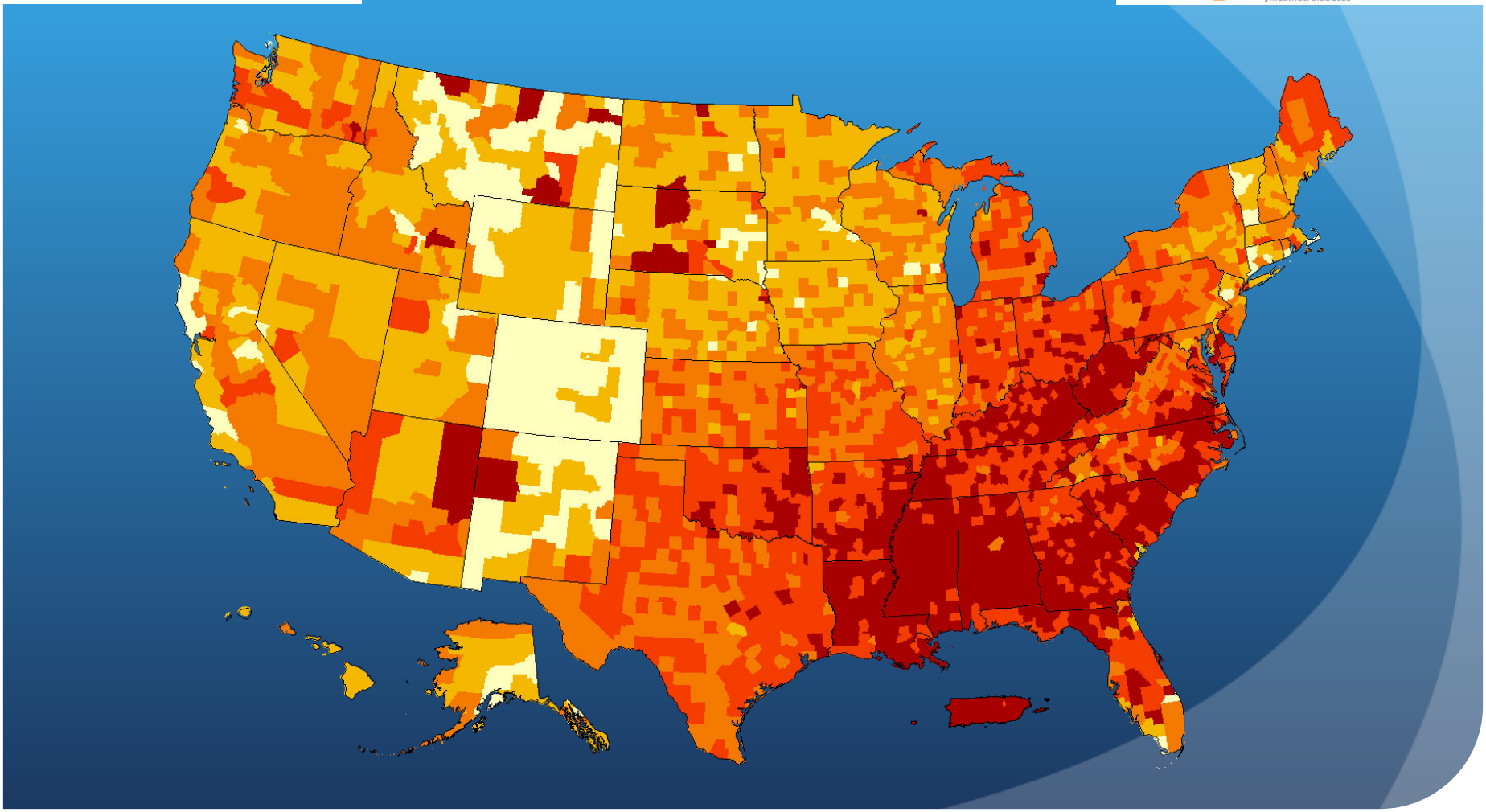
Volkskrankheit Nr. 1

1 OUT OF 3 U.S. ADULTS HAS PREDIABETES, ONLY 10% KNOW THEY HAVE IT.

Source: Centers for Disease Control and Prevention (2014)

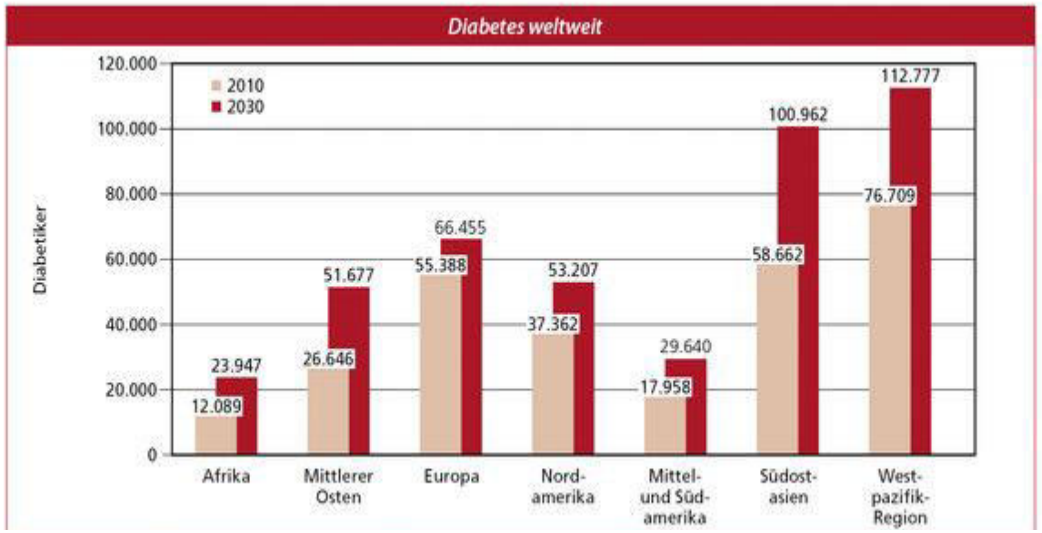
the Y

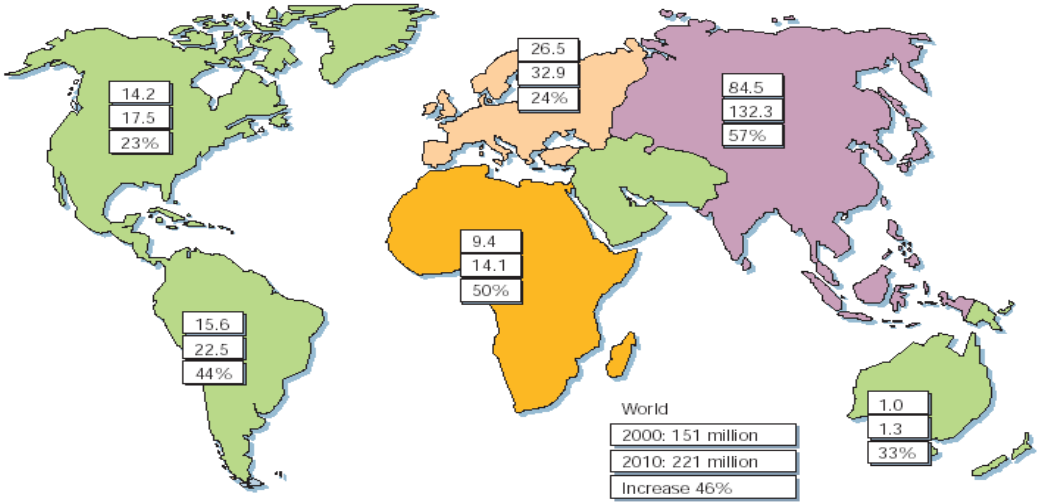
ymca.net/diabetes



theuglytruth

Diabetes & Adipositas – metabolische Chirurgie





theuglytruth

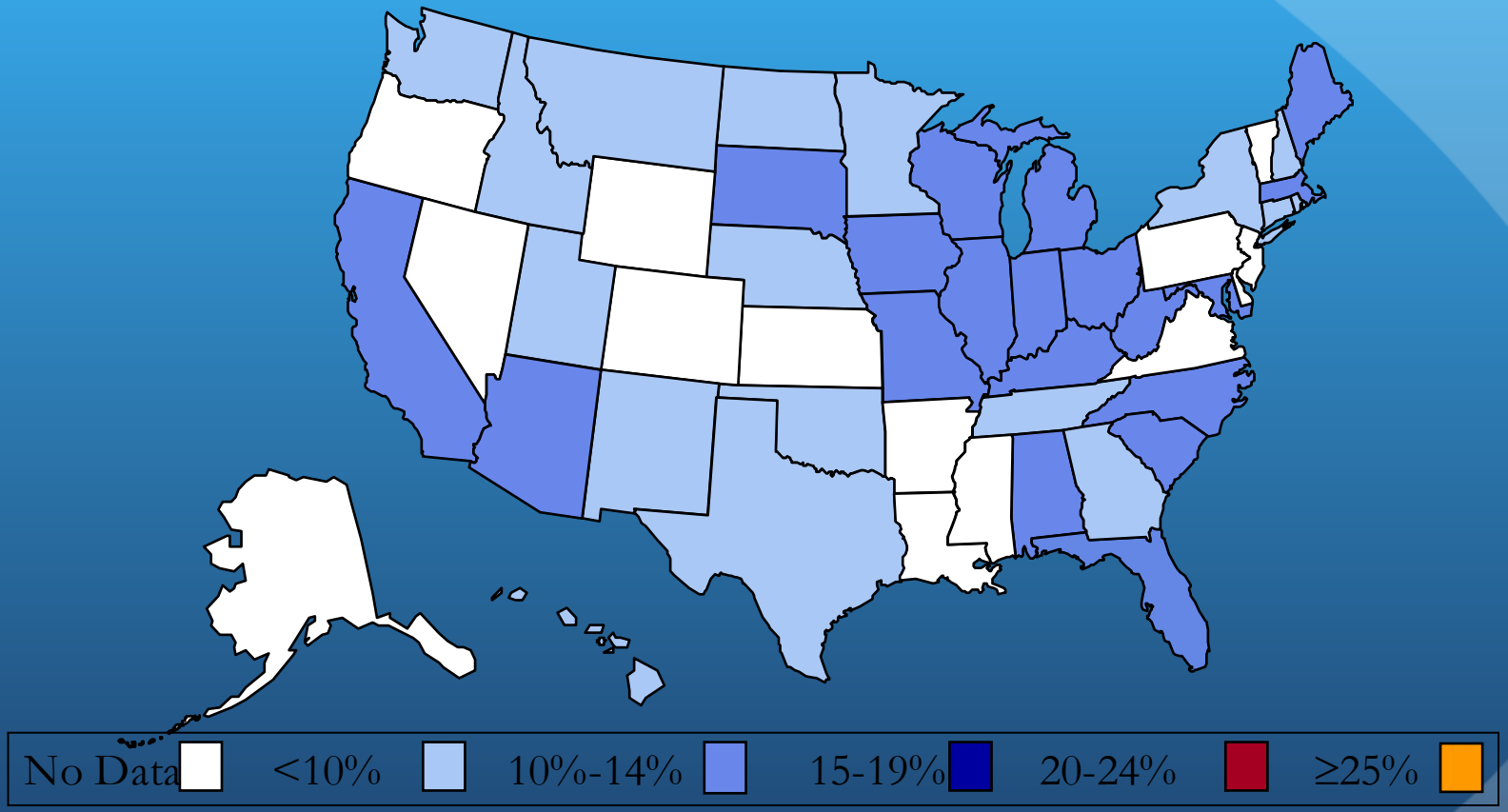
Diabetes & Adipositas - metabolische Chirurgie

Rasanter Kostenanstieg bei Typ 2 Diabetes durch Folgeschäden und Begleiterkrankungen

Obesity* Trends Among U.S. Adults

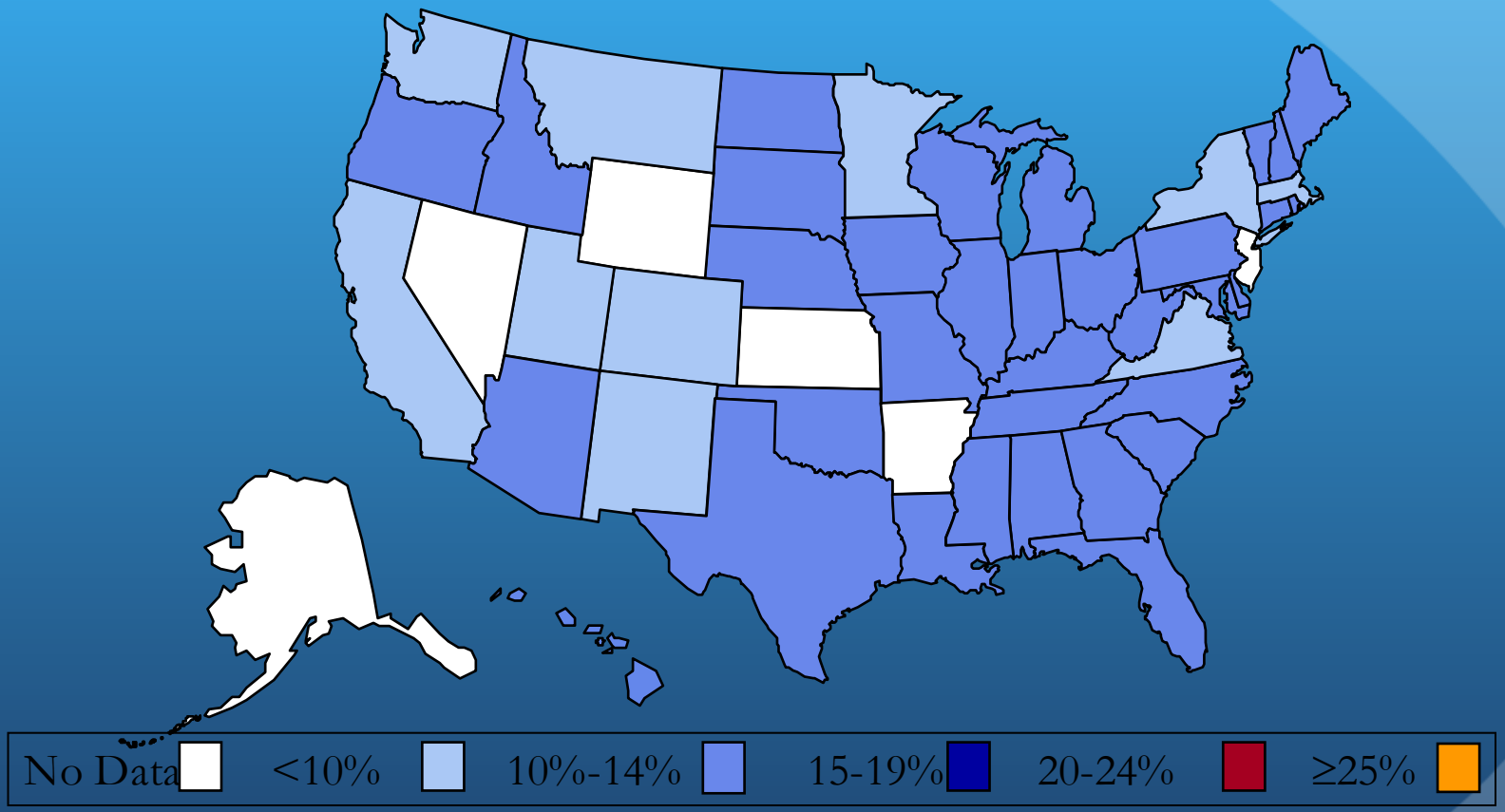
BRFSS, 1988

(*BMI ≥ 30, or ~ 30 lbs overweight for 5'4" person)



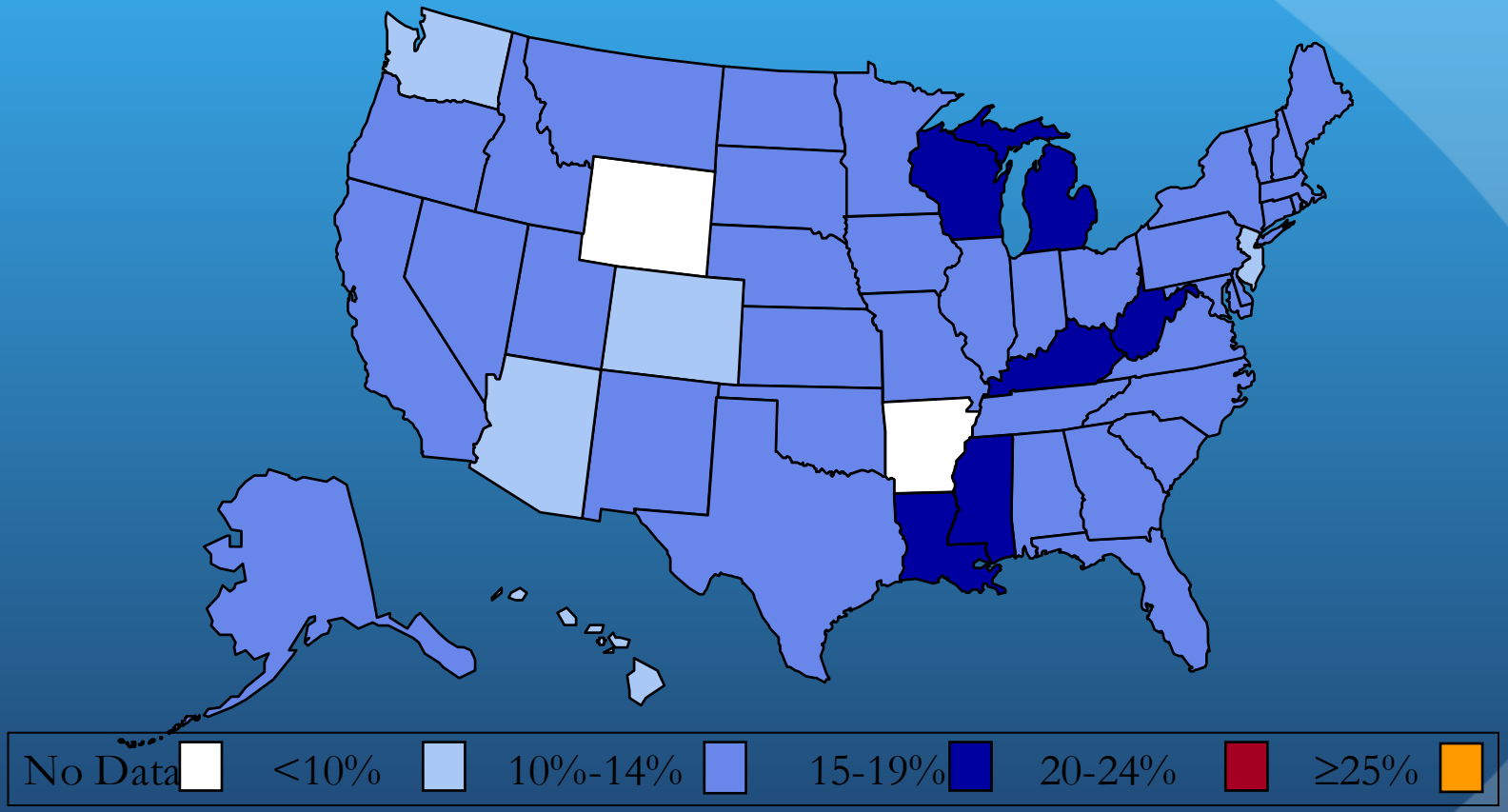
Obesity Trends Among U.S. Adults

BRFSS, 1990



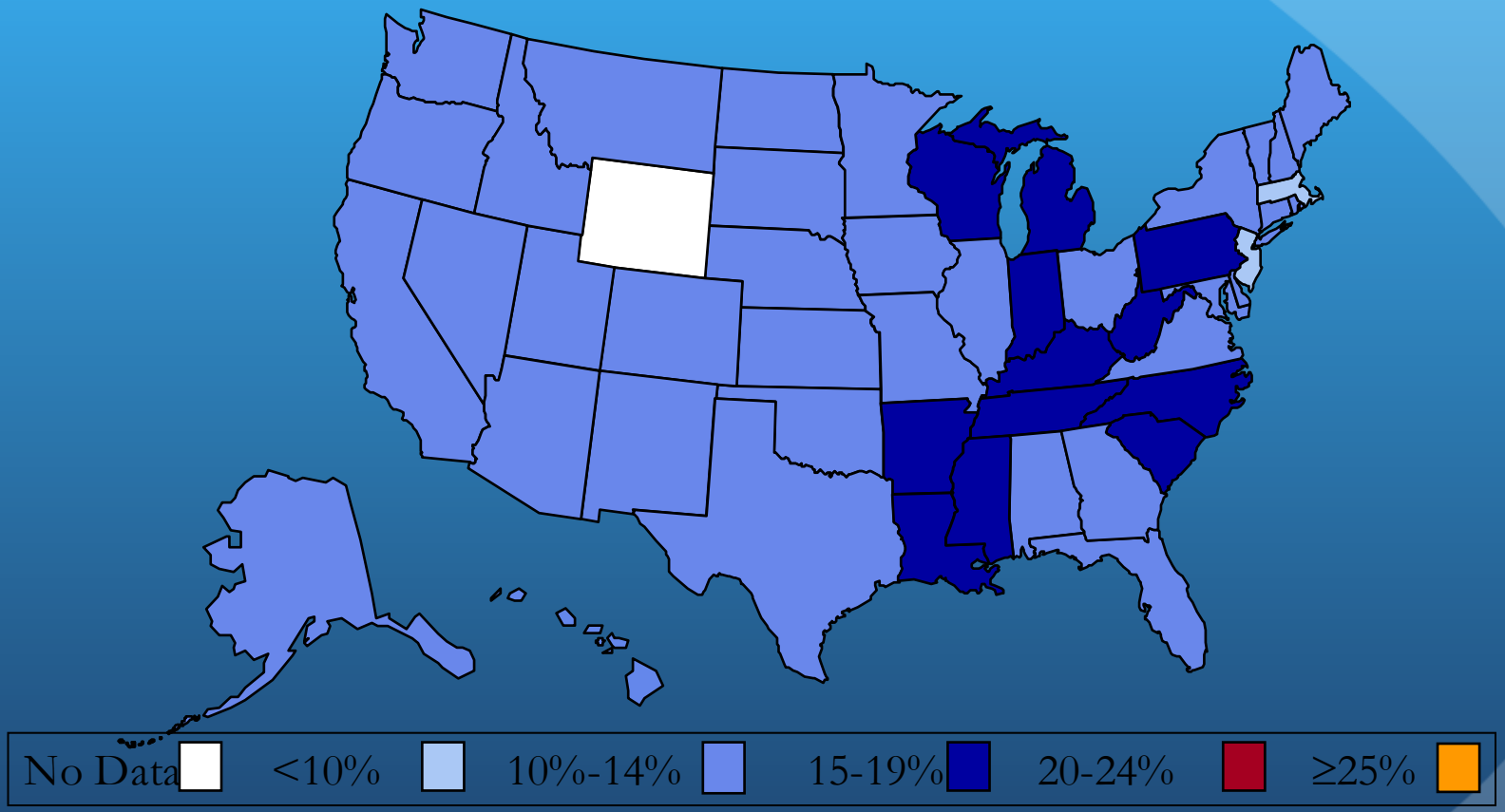
Obesity Trends Among U.S. Adults

BRFSS, 1992



Obesity Trends Among U.S. Adults

BRFSS, 1993



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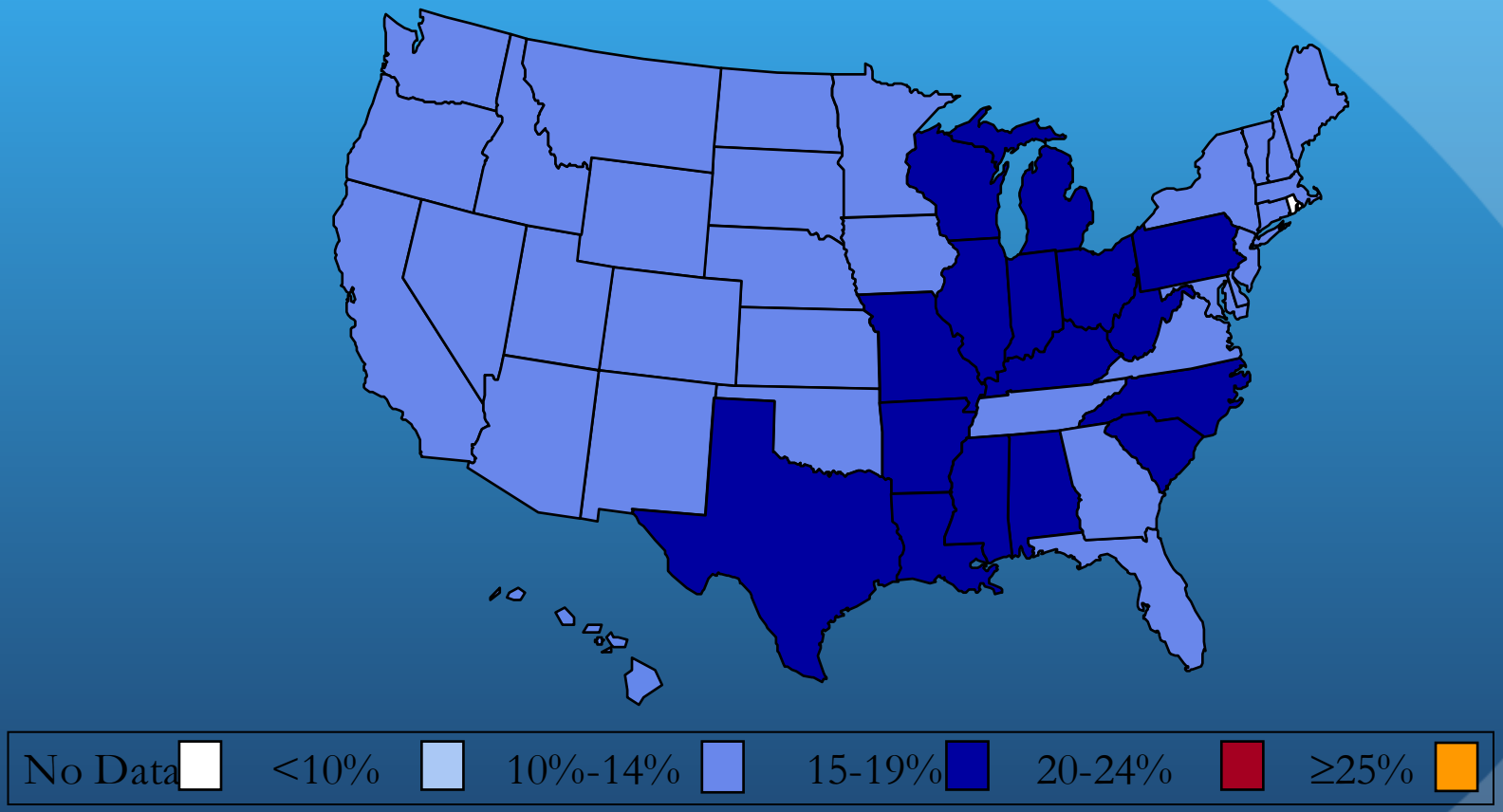

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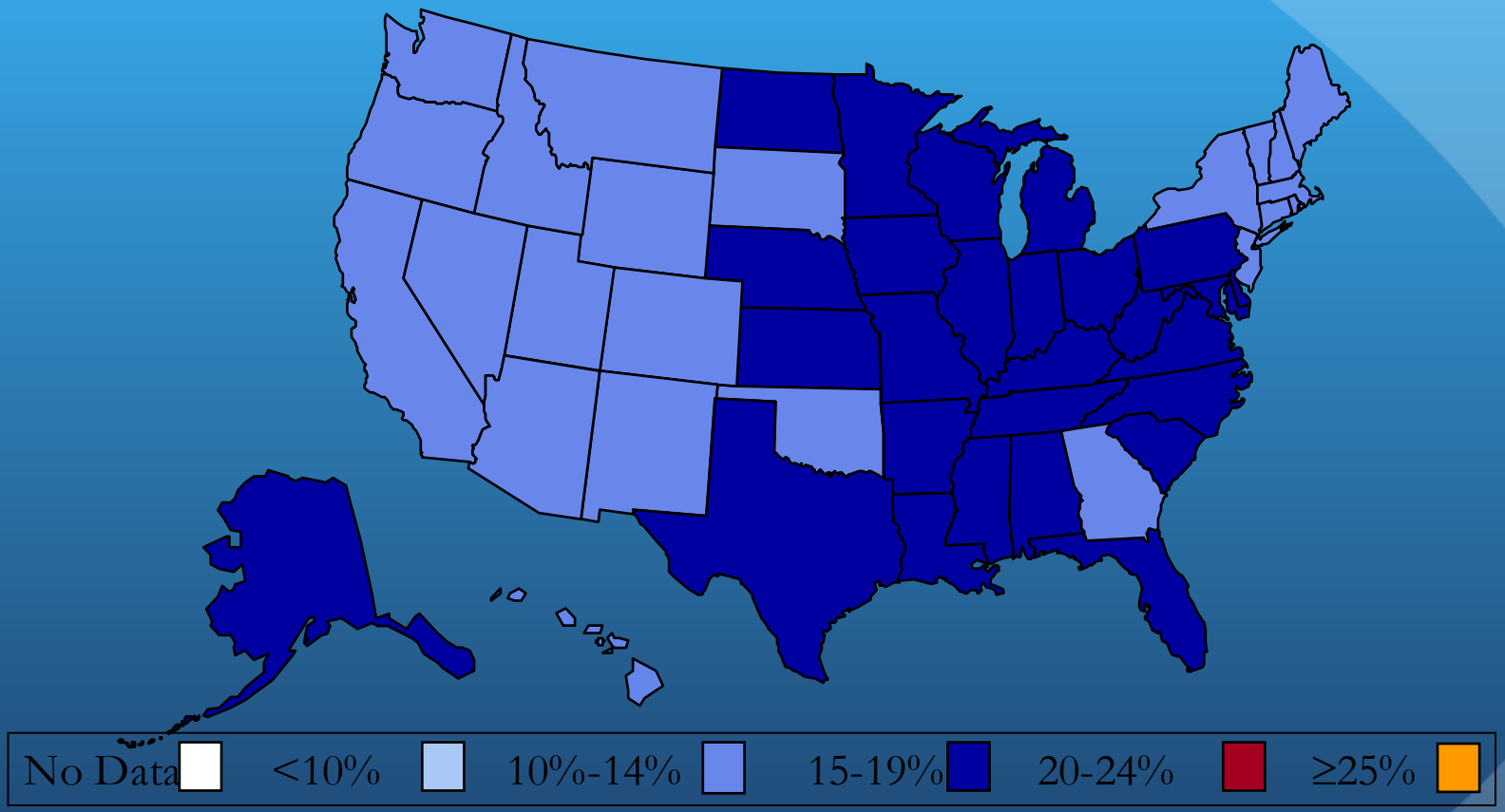

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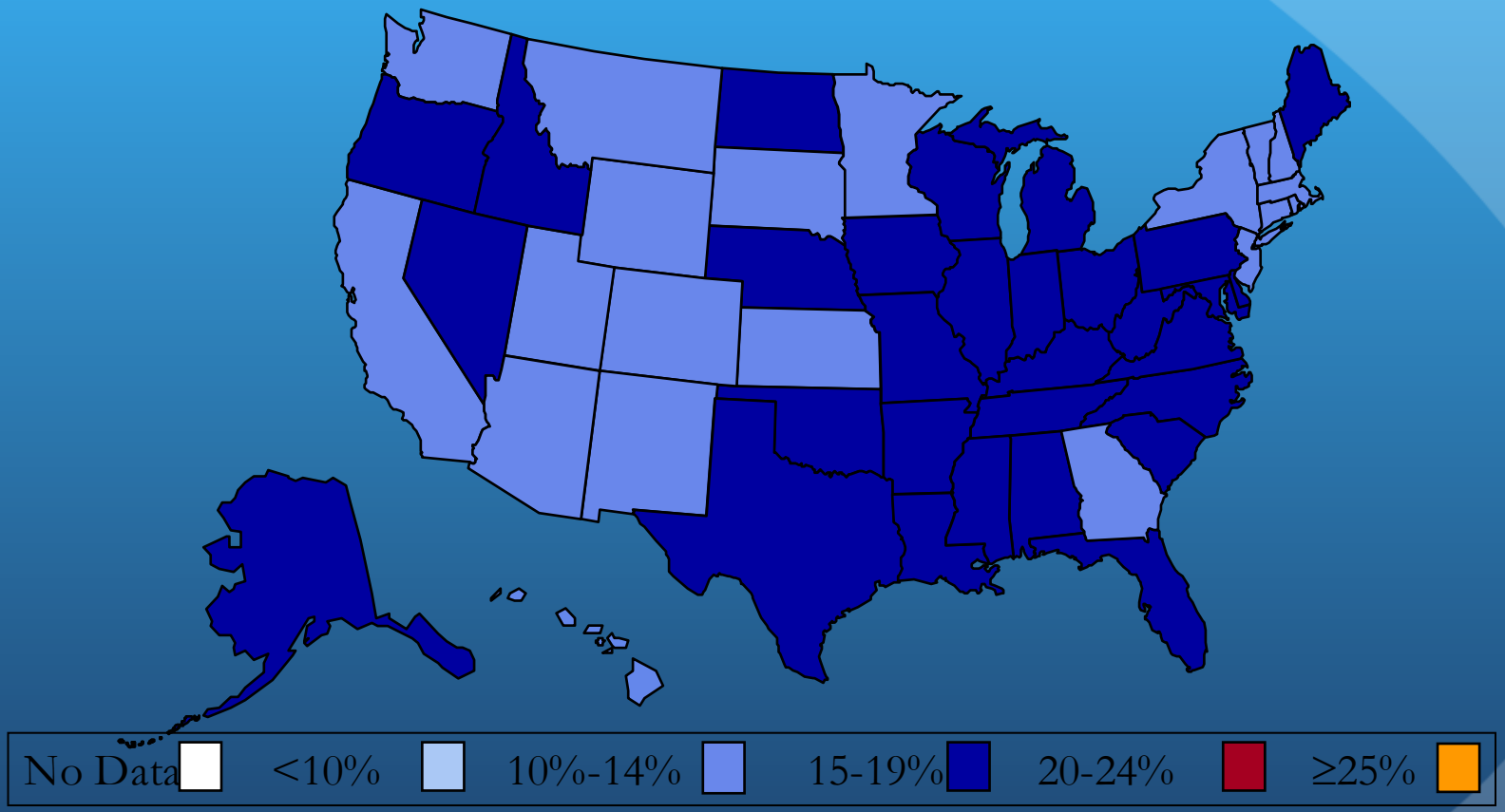

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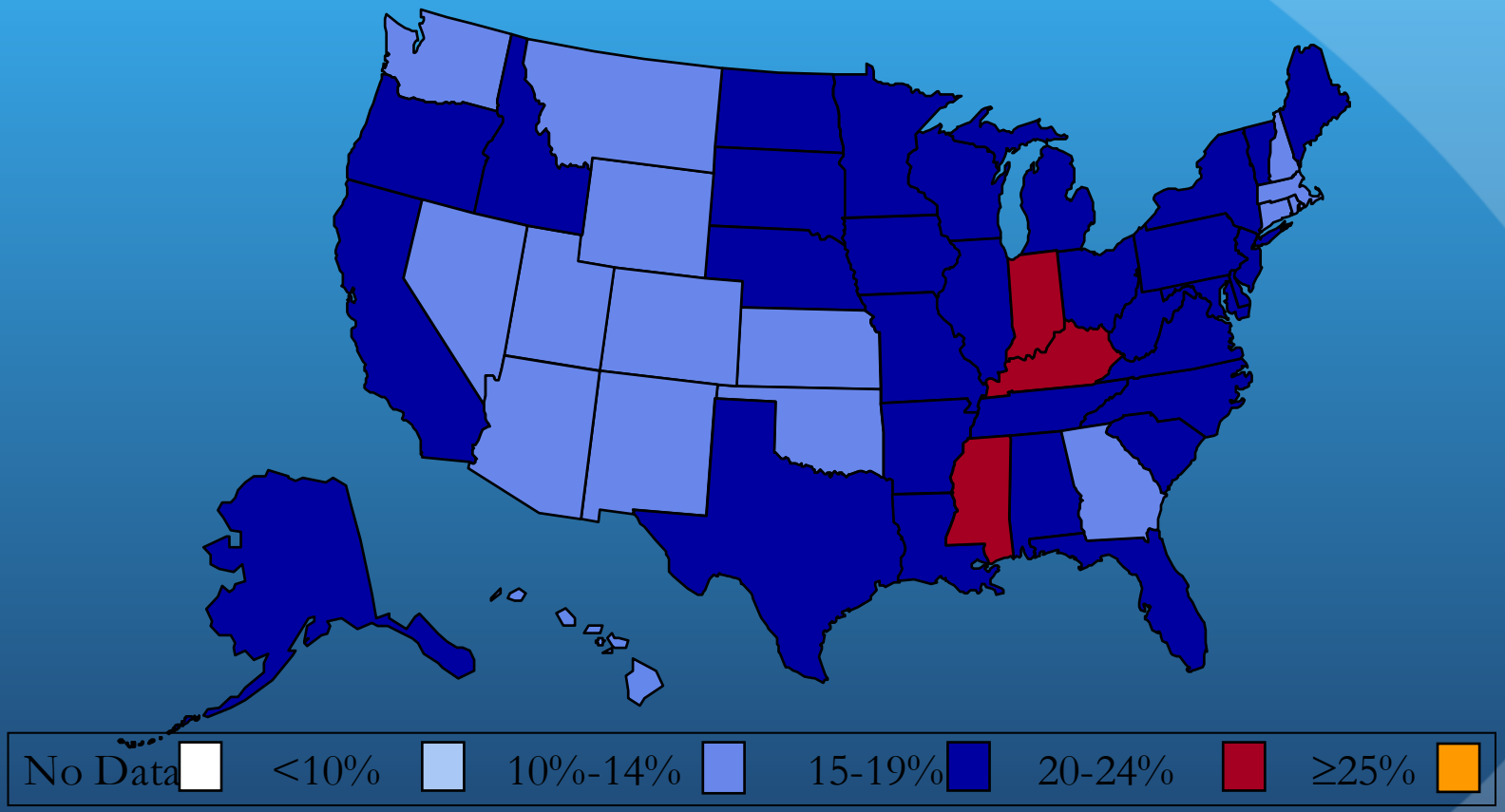

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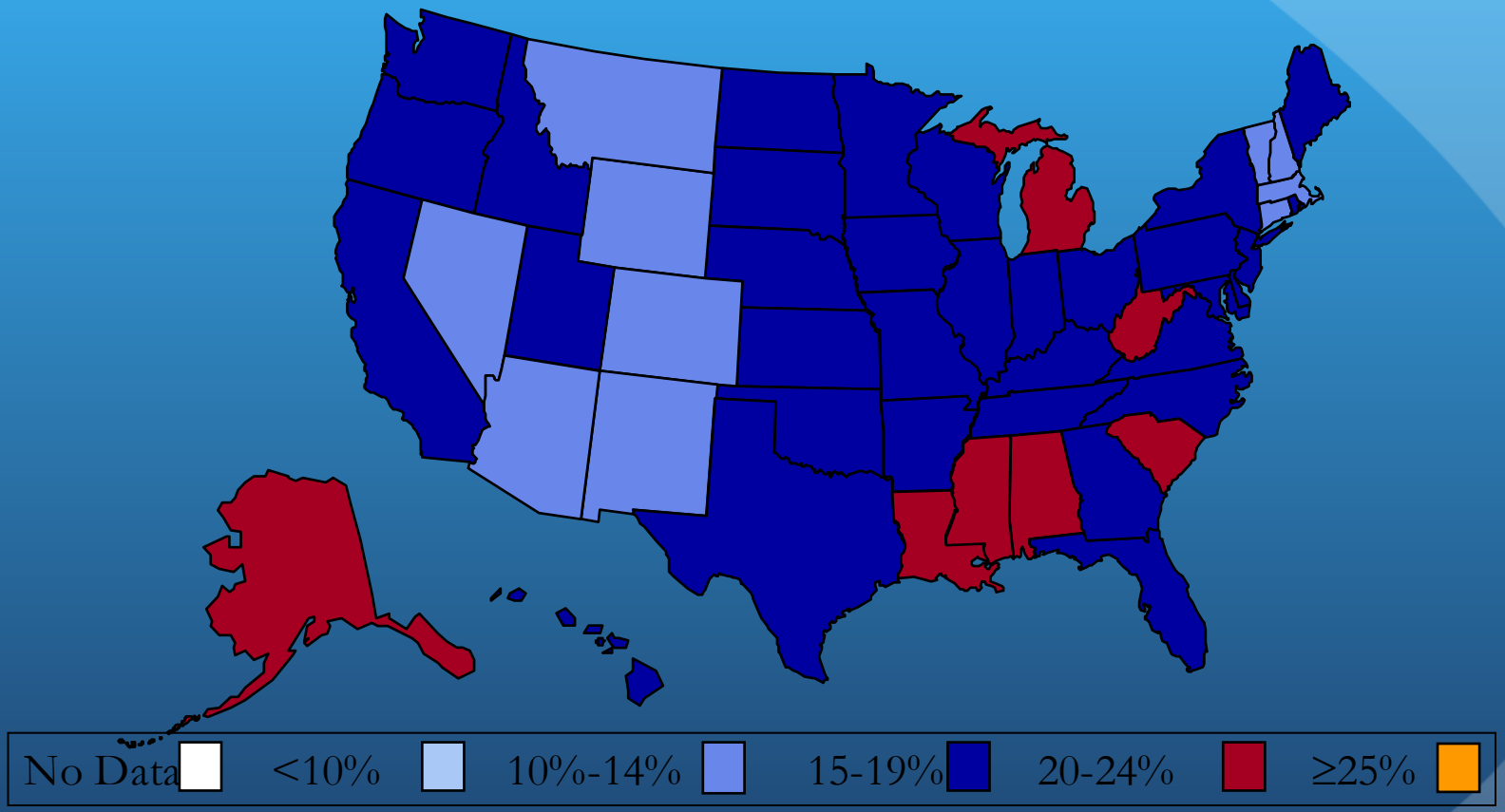

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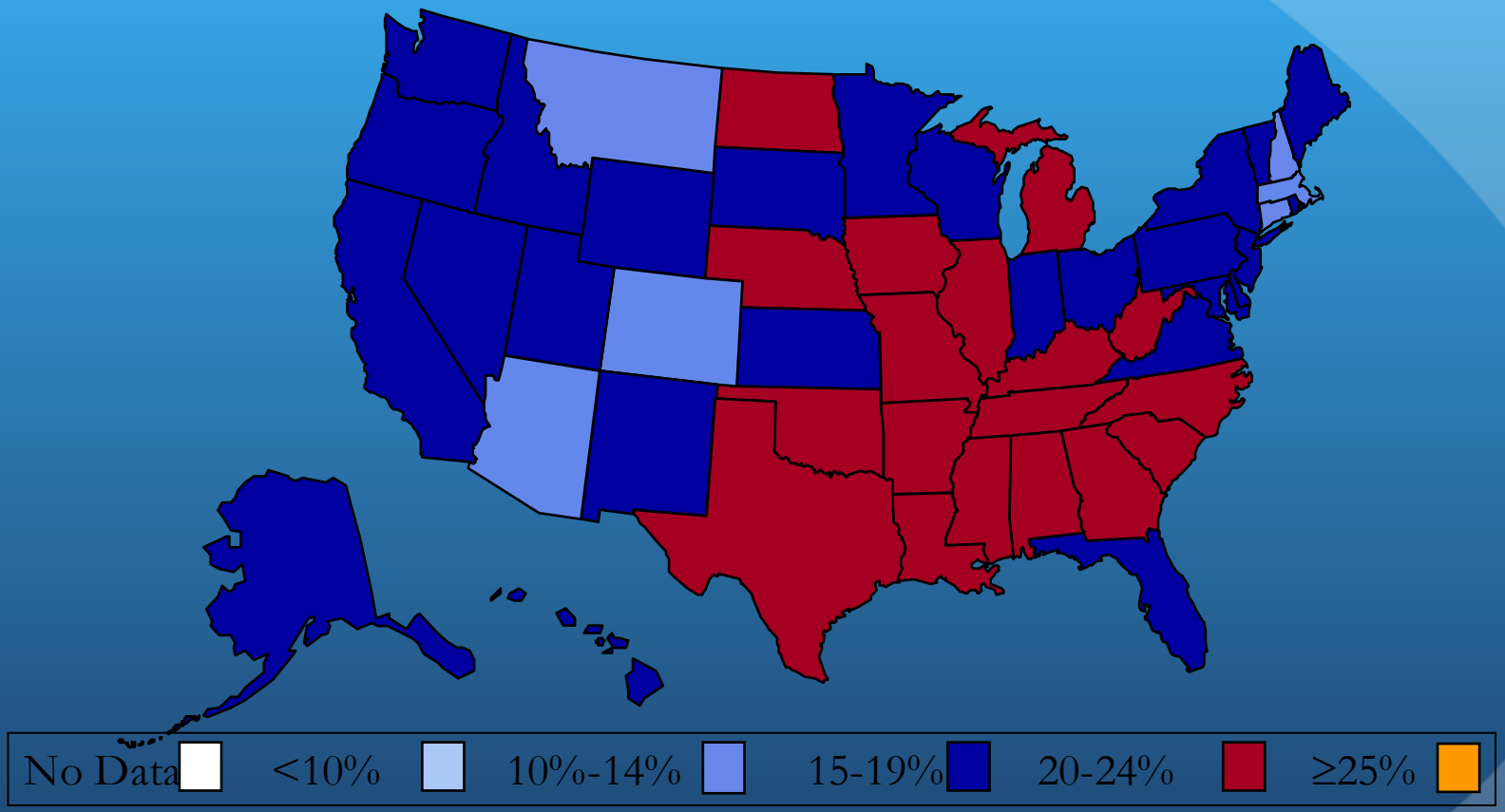

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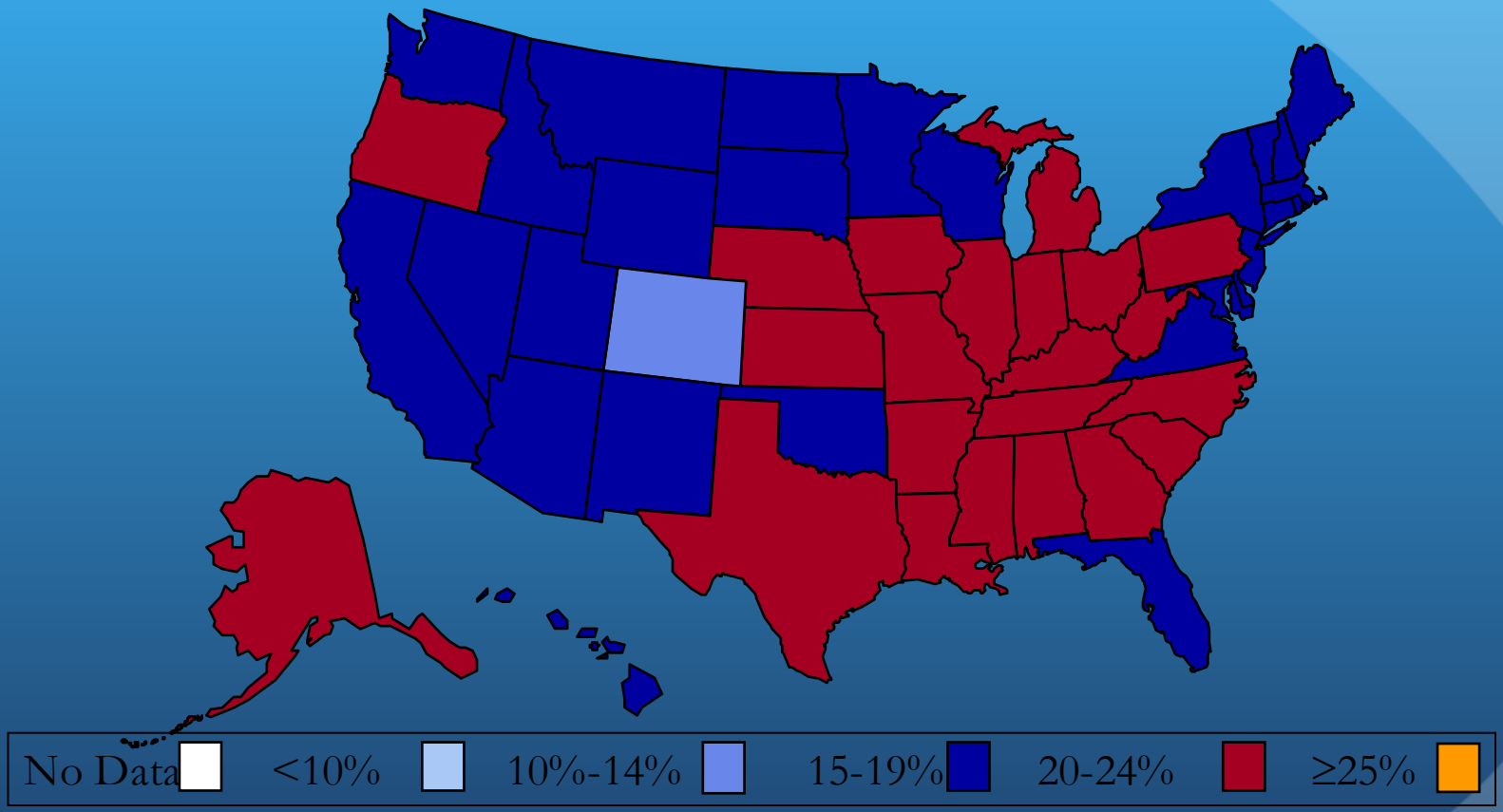

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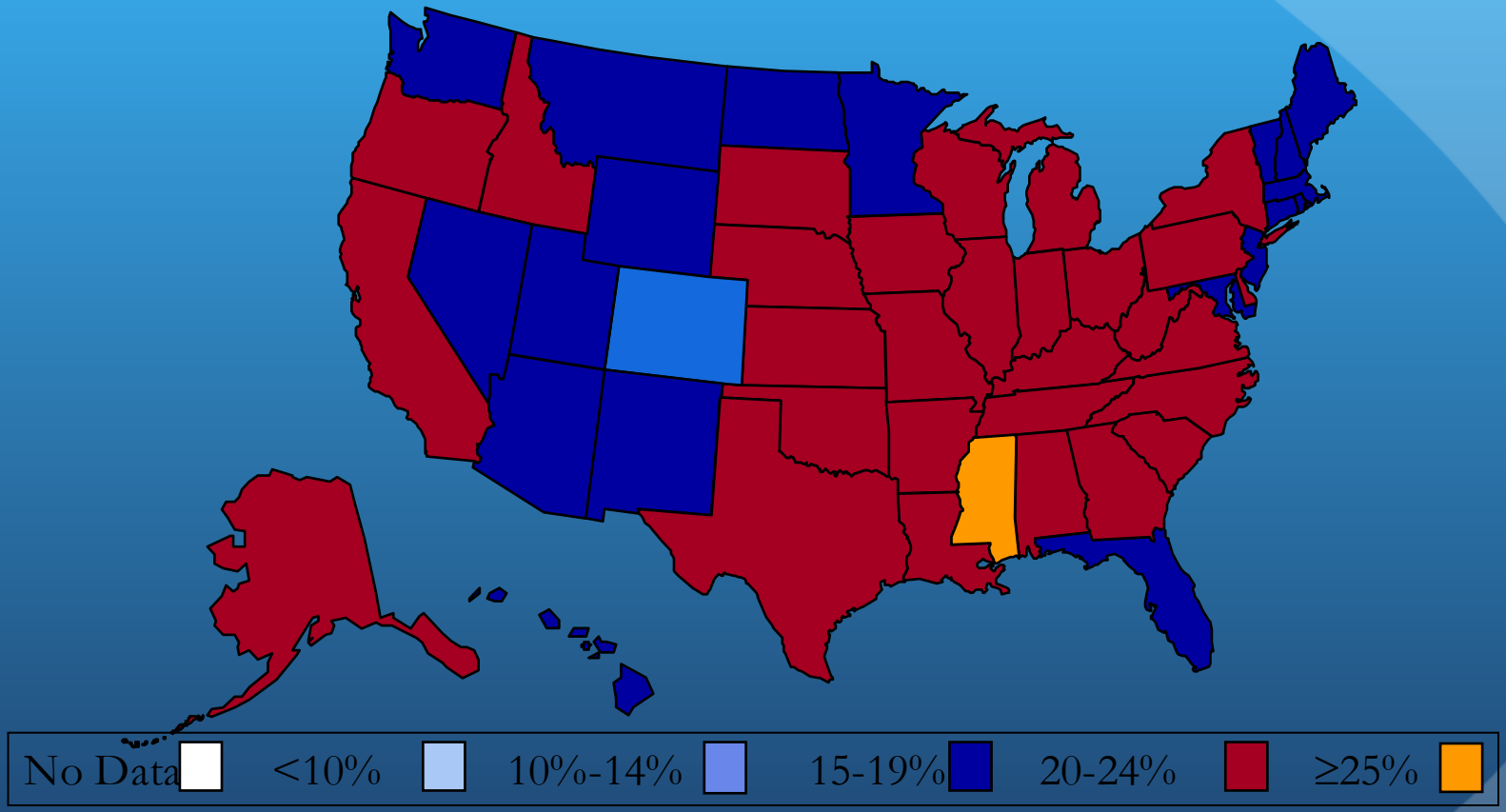
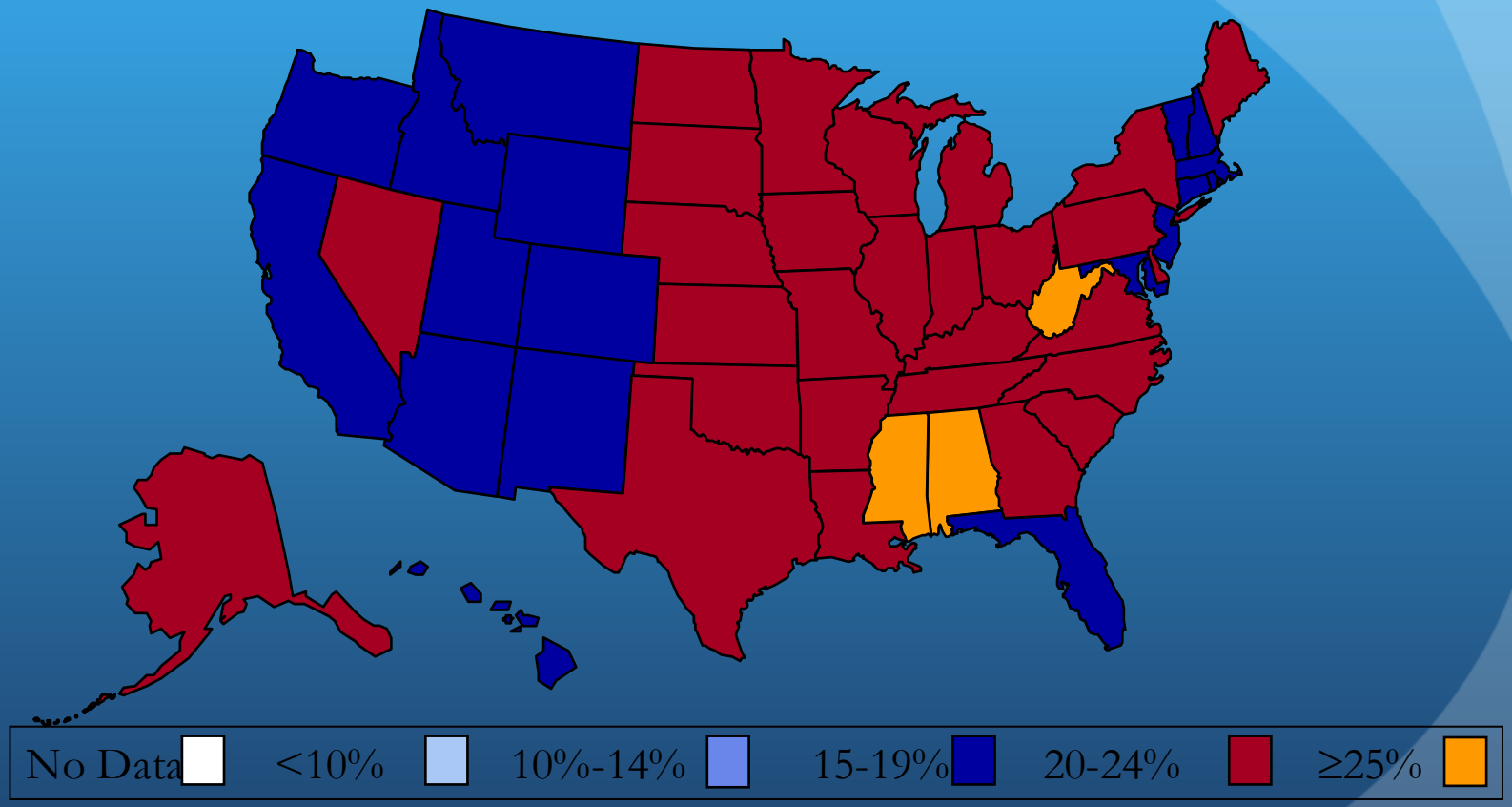
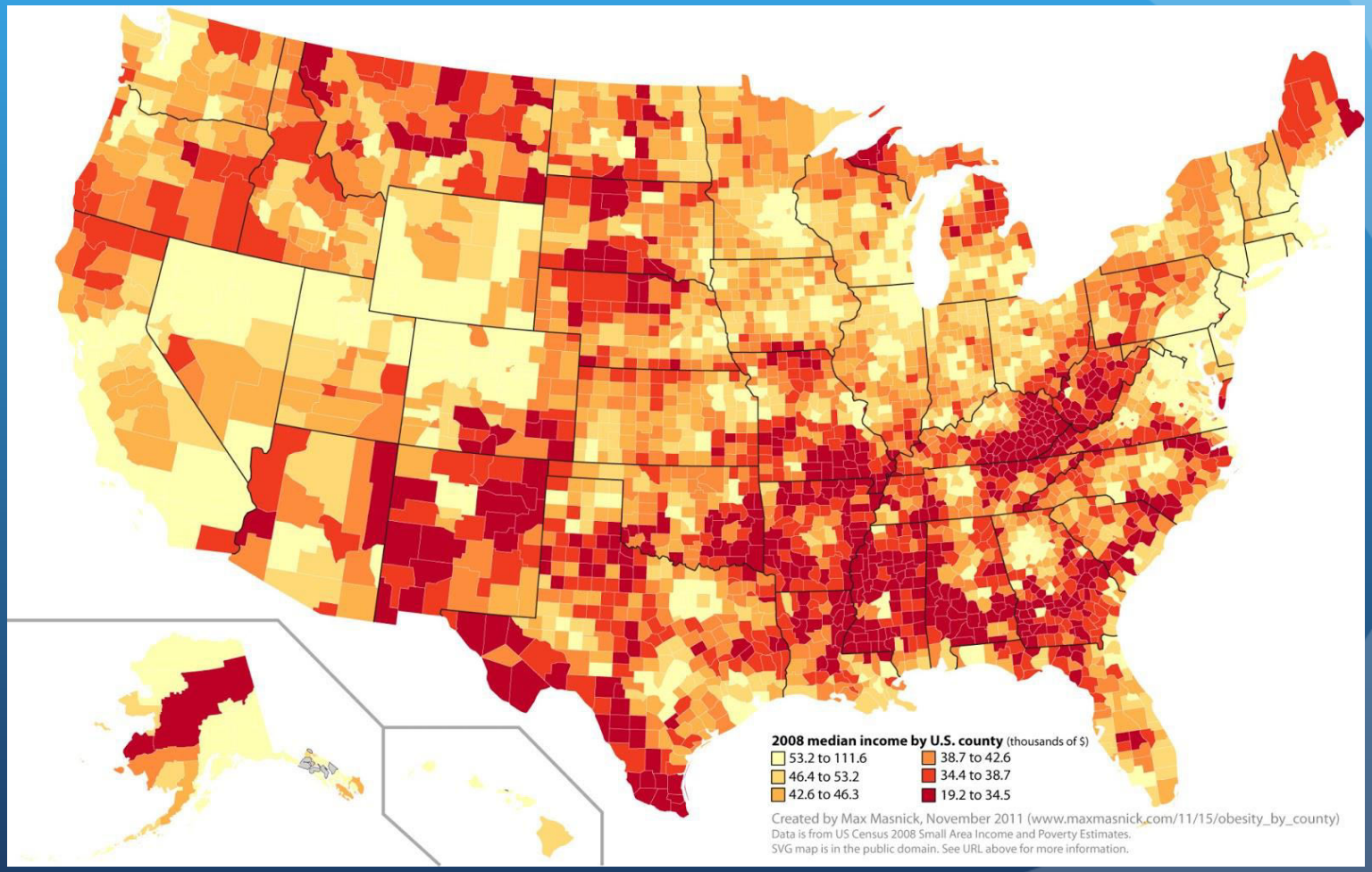


Obesity Trends Among U.S. Adults

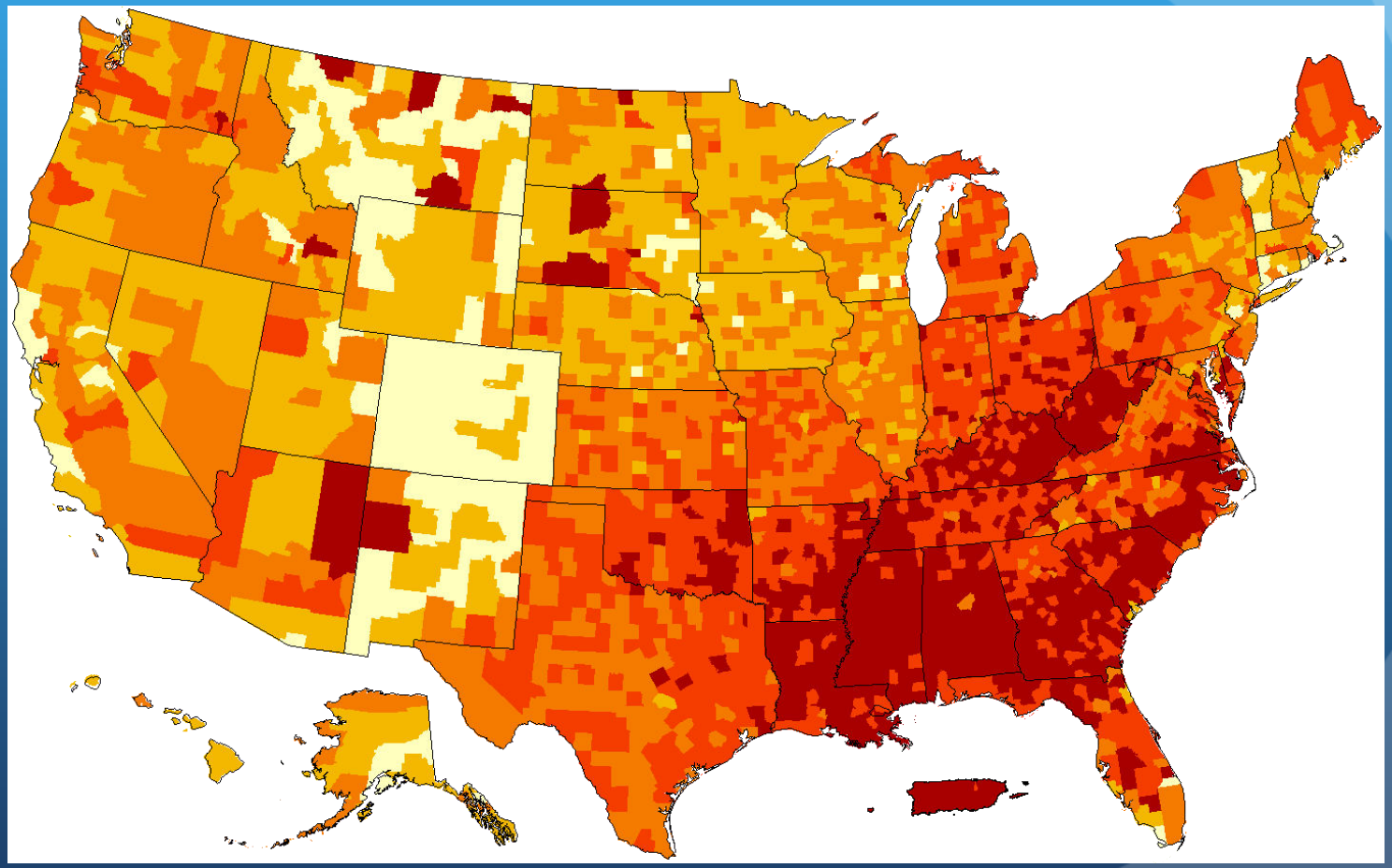
BRFSS, 2002



Obesity USA 2014

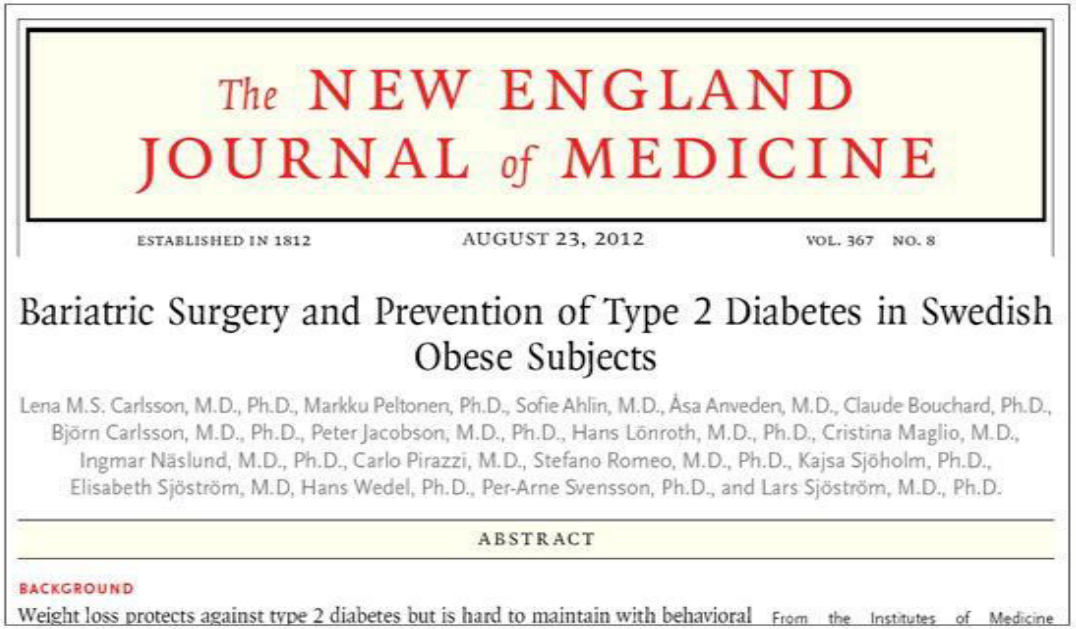


Diabetes USA 2014



Swedish Obese Subjects (SOS)

Bariatric surgery appears to be markedly more efficient than usual care in the prevention of Type 2 diabetes in obese persons.



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 AUGUST 23, 2012 VOL. 367 NO. 8

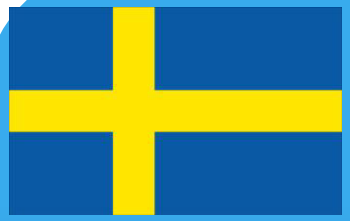
Bariatric Surgery and Prevention of Type 2 Diabetes in Swedish Obese Subjects

Lena M.S. Carlsson, M.D., Ph.D., Markku Peltonen, Ph.D., Sofie Ahlin, M.D., Åsa Anveden, M.D., Claude Bouchard, Ph.D., Björn Carlsson, M.D., Ph.D., Peter Jacobson, M.D., Ph.D., Hans Lönroth, M.D., Ph.D., Cristina Maglio, M.D., Ingmar Näslund, M.D., Ph.D., Carlo Pirazzi, M.D., Stefano Romeo, M.D., Ph.D., Kajsa Sjöholm, Ph.D., Elisabeth Sjöström, M.D, Hans Wedel, Ph.D., Per-Arne Svensson, Ph.D., and Lars Sjöström, M.D., Ph.D.

ABSTRACT

BACKGROUND

Weight loss protects against type 2 diabetes but is hard to maintain with behavioral From the Institutes of Medicine



Swedish Obesity Study

So zeigt die SOS-Studie, dass sich bei 72 % der Patienten zwei Jahre nach Operation ihr Diabetes mellitus Typ 2 in Remission befand (95% CI 5.68 – 12.5; P value: < 0.001). Nach zehn Jahren hat sich die Zahl der in Diabetes-Remission befindlichen Patienten zwar wieder halbiert (36 %, 95 % CI 1.64 – 7.28; P value: <0.001), liegt aber immer noch weit höher als in der konservativen Therapiegruppe. In vielen Fällen kam es bereits in den ersten Tagen nach der Operation zur Diabetes-Remission. Die SOS-Studie konnte nicht nur einen therapeutischen Effekt auf den Diabetes mellitus Typ 2, sondern auch einen präventiven Effekt nachweisen. Die Inzidenz der Diabetes-Neuerkrankungen lag zwei Jahre nach Operation bei den operierten Patienten 86 % niedriger als bei den nicht-operierten Studienteilnehmern (95 % CI: 0.08 – 0.24; P value: < 0.001). Nach zehn Jahren lag das Risiko, an Diabetes mellitus Typ 2 zu erkranken, immer noch um 75 % niedriger (95 % CI: 0.17 – 0.38; P value: < 0.001).

Sjöström L, et al.: Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 Years after Bariatric Surgery. N Engl J Med 2004; 351: 2683-2693. Sjöström L, et al.: Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects. N Engl J Med 2007 357:741-52.

JAMA. 2014 Jun 11;311(22):2297-304.

Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications.

Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].

IMPORTANCE:
Short-term studies show that bariatric surgery causes remission of diabetes. The long-term outcomes for remission and diabetes-related complications are not known.

OBJECTIVES:
To determine the long-term diabetes remission rates and the cumulative incidence of microvascular and macrovascular diabetes complications after bariatric surgery.

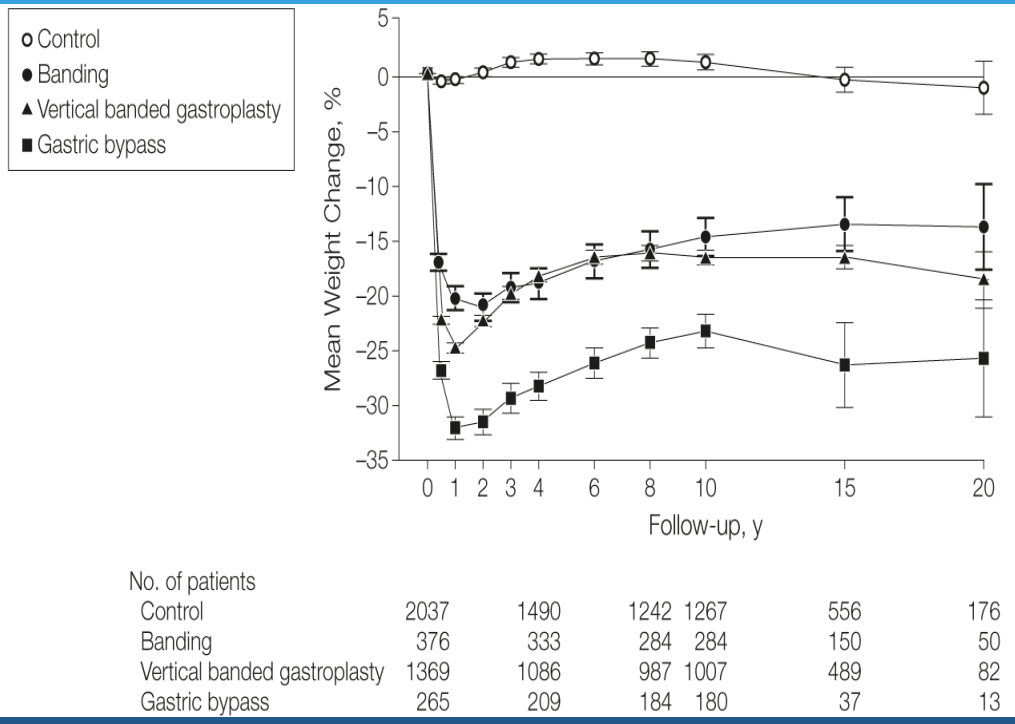
DESIGN, SETTING, AND PARTICIPANTS:
The Swedish Obese Subjects (SOS) is a prospective matched cohort study conducted at 25 surgical departments and 480 primary health care centers in Sweden. Of patients recruited between September 1, 1987, and January 31, 2001, 260 of 2037 control patients and 343 of 2010 surgery patients had type 2 diabetes at baseline. For the current analysis, diabetes status was determined at SOS health examinations until May 22, 2013. Information on diabetes complications was obtained from national health registers until December 31, 2012. Participation rates at the 2-, 10-, and 15-year examinations were 81%, 58%, and 41% in the control group and 90%, 76%, and 47% in the surgery group. For diabetes assessment, the median follow-up time was 10 years (interquartile range [IQR], 2-15) and 10 years (IQR, 10-15) in the control and surgery groups, respectively. For diabetes complications, the median follow-up time was 17.6 years (IQR, 14.2-19.8) and 18.1 years (IQR, 15.2-21.1) in the control and surgery groups, respectively.

INTERVENTIONS:
Adjustable or nonadjustable banding (n = 61), vertical banded gastroplasty (n = 227), or gastric bypass (n = 55) procedures were performed in the surgery group, and usual obesity and diabetes care was provided to the control group.

MAIN OUTCOMES AND MEASURES:
Diabetes remission, relapse, and diabetes complications. Remission was defined as blood glucose <110 mg/dL and no diabetes medication.

RESULTS:
The diabetes remission rate 2 years after surgery was 16.4% (95% CI, 11.7%-22.2%; 34/207) for control patients and 72.3% (95% CI, 66.9%-77.2%; 219/303) for bariatric surgery patients (odds ratio [OR], 13.3; 95% CI, 8.5-20.7; P < .001). At 15 years, the diabetes remission rates decreased to 6.5% (4/62) for control patients and to 30.4% (35/115) for bariatric surgery patients (OR, 6.3; 95% CI, 2.1-18.9; P < .001). With long-term follow-up, the cumulative incidence of microvascular complications was 41.8 per 1000 person-years (95% CI, 35.3-49.5) for control patients and 20.6 per 1000 person-years (95% CI, 17.0-24.9) in the surgery group (hazard ratio [HR], 0.44; 95% CI, 0.34-0.56; P < .001). Macrovascular complications were observed in 44.2 per 1000 person-years (95% CI, 37.5-52.1) in control patients and 31.7 per 1000 person-years (95% CI, 27.0-37.2) for the surgical group (HR, 0.68; 95% CI, 0.54-0.85; P = .001).

Swedish Obesity Study



	Study type	Bariatric metabolic surgery	Conventional medical treatment	*P*-value
Sjöström et al[43]	Large PCC	72%	21%	<0.001
O'Brien et al[40]	RCT	93%	46.7%	<0.01
Dixon et al[41]	RCT	73%	13%	<0.001
Mingrone et al[37]	RCT	85%	0%	<0.001
Schauer et al[51]	RCT	39.4%	12%	<0.01
Ikramuddin et al[39]	RCT	49%	19%	<0.001
Courcoulas et al[42]	RCT	39.1%	0%	<0.001

Sjöström L, et al.: Lifestyle, Diabetes, and Cardiovascular Risk Factors 10 Years after Bariatric Surgery. N Engl J Med 2004; 351: 2683-2693. Sjöström L, et al.: Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects. N Engl J Med 2007 357:741-52.

Swedish Obesity Study

Table 2. Cause of Death.*

Variable	Surgery Group (N=2010)	Control Group (N=2037)
	no. of subjects	
Cardiovascular condition		
Any event	43	53
Cardiac	35	44
Myocardial infarction	13	25
Heart failure	2	5
Sudden death	20	14
Stroke	6	6
Intracerebral hemorrhage	2	4
Infarction	1	2
Subarachnoid bleeding	3	0
Other	2	3
Aortic aneurysm	1	2
Aortic thrombosis	0	1
Diabetic gangrene	1	0
Noncardiovascular condition		
Any event	58	76
Tumor	29	48
Cancer	29	47
Meningioma	0	1
Infection	12	3
Thromboembolic disease	5	7
Pulmonary embolism	4	7
Vena caval thrombosis	1	0
Other	12	18
Total no. of deaths	101	129

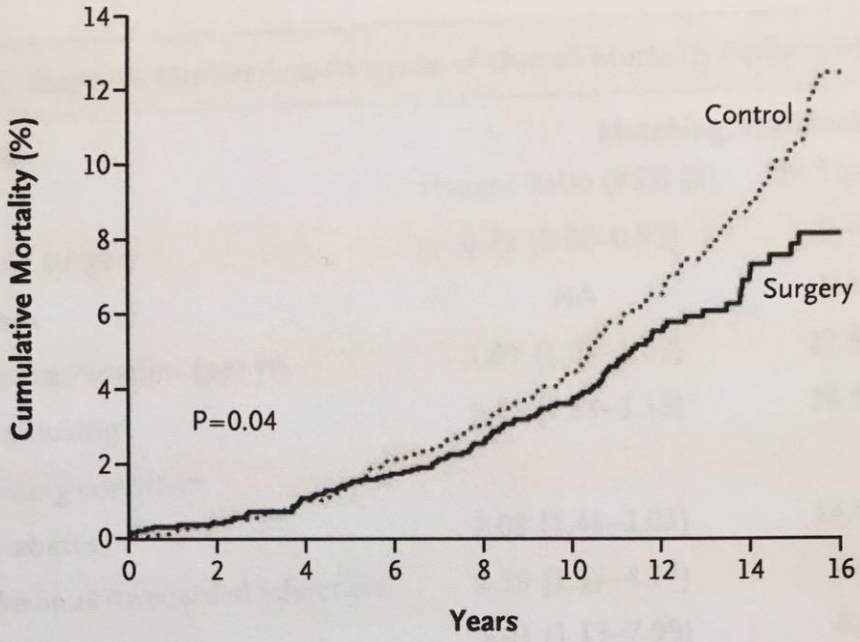


Figure 2. Unadjusted Cumulative Mortality.

The hazard ratio for subjects who underwent bariatric surgery, as compared with control subjects, was 0.76 (95% confidence interval, 0.59 to 0.99; P=0.04), with 129 deaths in the control group and 101 in the surgery group.

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Any event	43	53
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Heart failure	2	5
Sudden death	20	14
Stroke	6	6
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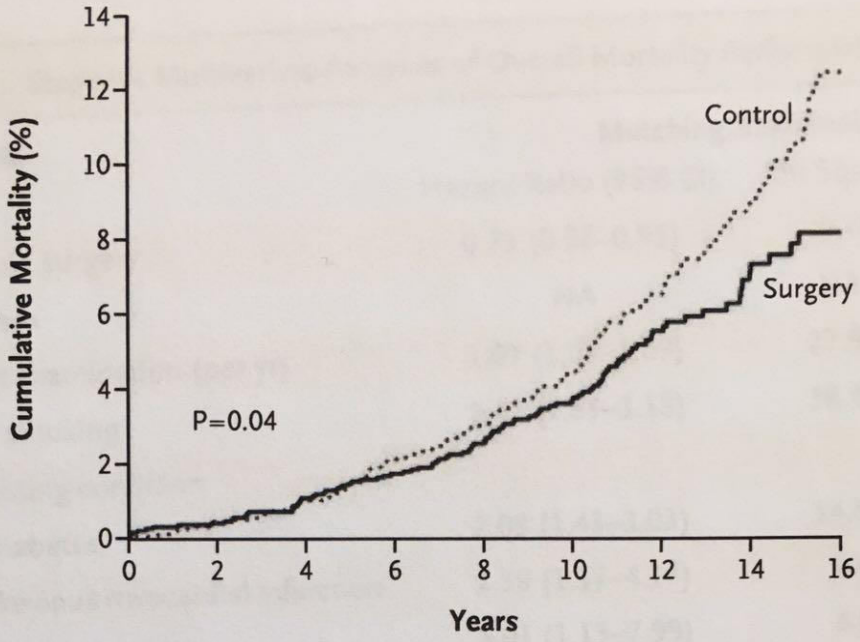

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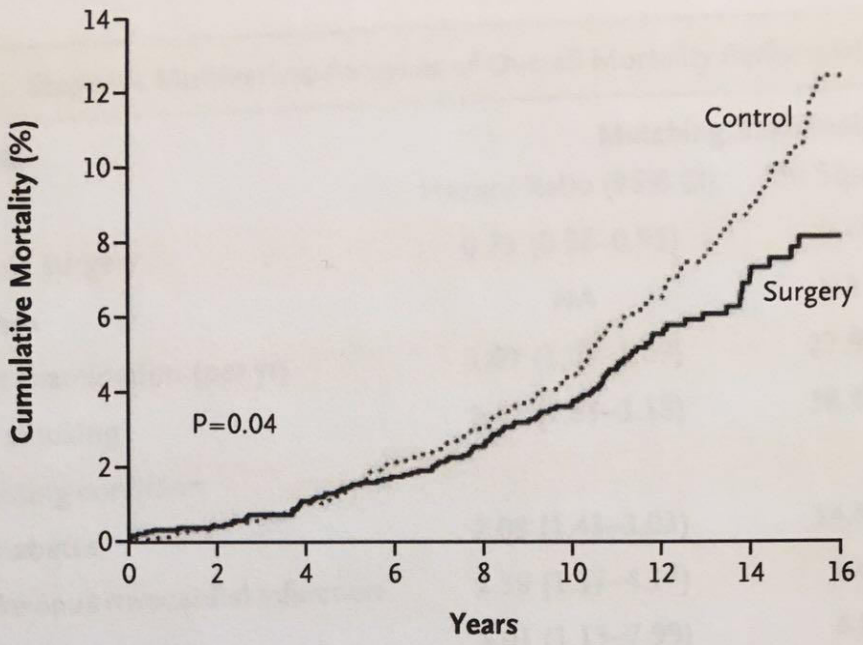

No. at Risk

Surgery	2010	2001	1987	1821	1590	1260	760	422	169
Control	2037	2027	2016	1842	1455	1174	749	422	156

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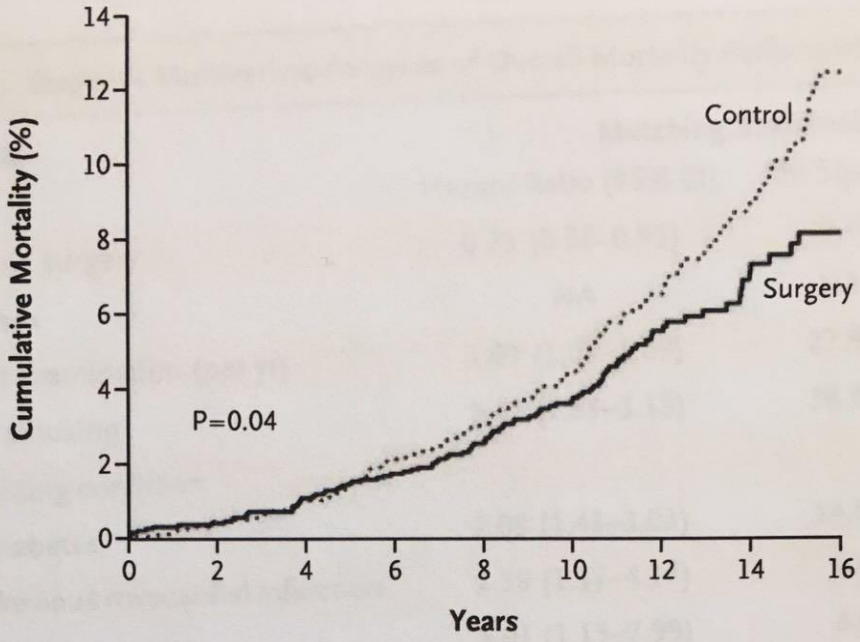

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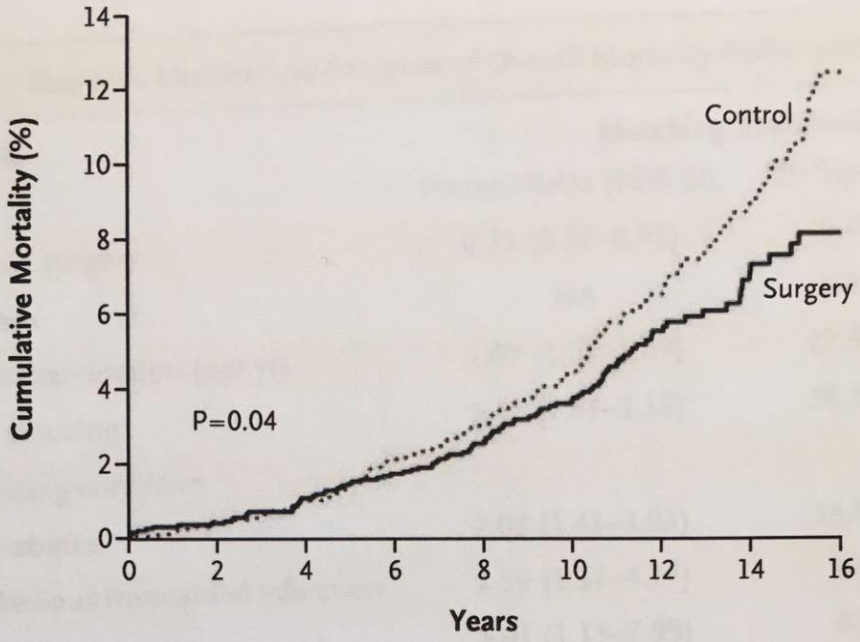

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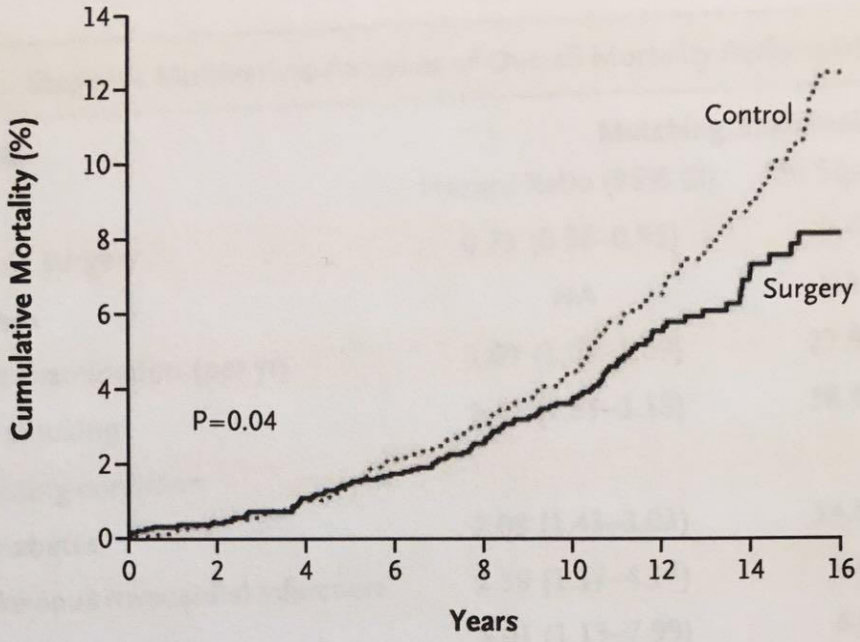

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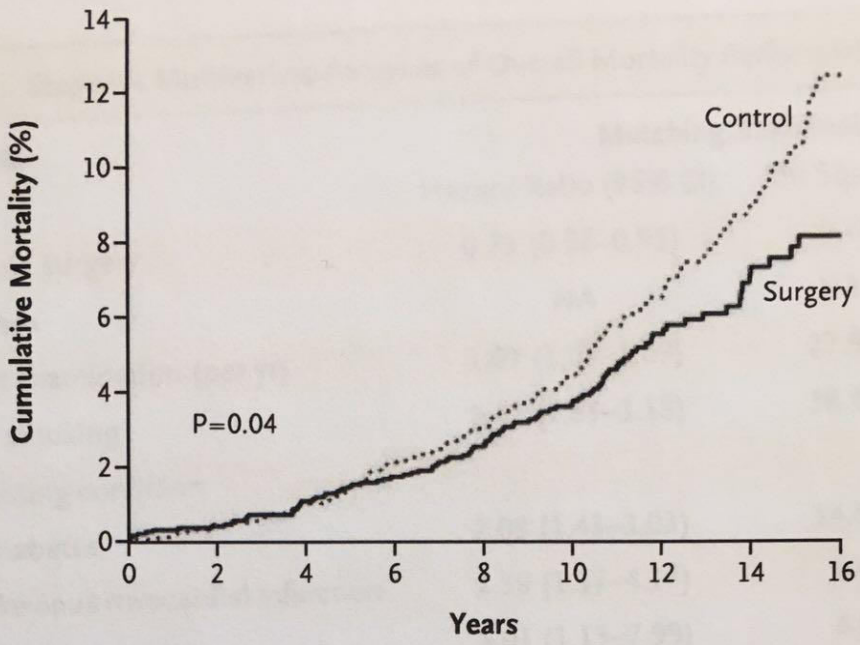

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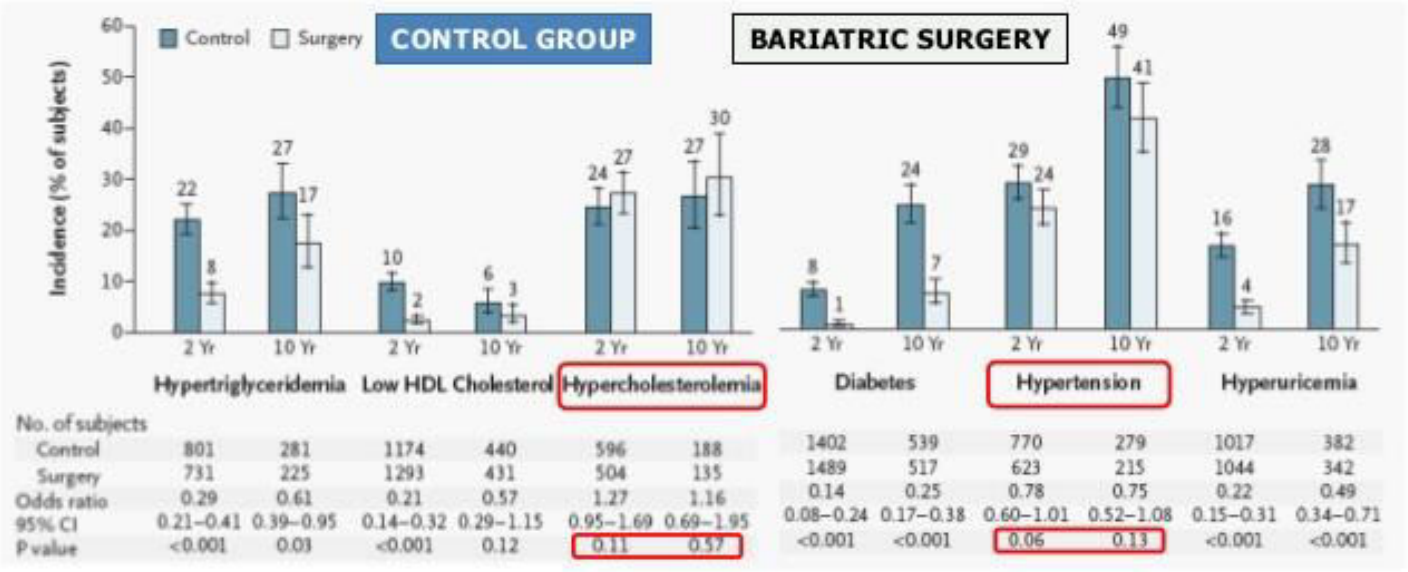
Follow-up of comorbidity changes in the SOS



	Hypertriglyceridemia		Low HDL Cholesterol		Hypercholesterolemia		Diabetes		Hypertension		Hyperuricemia	
No. of subjects												
Control	801	281	1174	440	596	188	1402	539	770	279	1017	382
Surgery	731	225	1293	431	504	135	1489	517	623	215	1044	342
Odds ratio	0.29	0.61	0.21	0.57	1.27	1.16	0.14	0.25	0.78	0.75	0.22	0.49
95% CI	0.21–0.41	0.39–0.95	0.14–0.32	0.29–1.15	0.95–1.69	0.69–1.95	0.08–0.24	0.17–0.38	0.60–1.01	0.52–1.08	0.15–0.31	0.34–0.71
P value	<0.001	0.03	<0.001	0.12	0.11	0.57	<0.001	<0.001	0.06	0.13	<0.001	<0.001

Lack of significant differences in incidence at 2 and 10 years between control and bariatric surgery groups

JAMA. 2014 Jun 11;311(22):2297-304.

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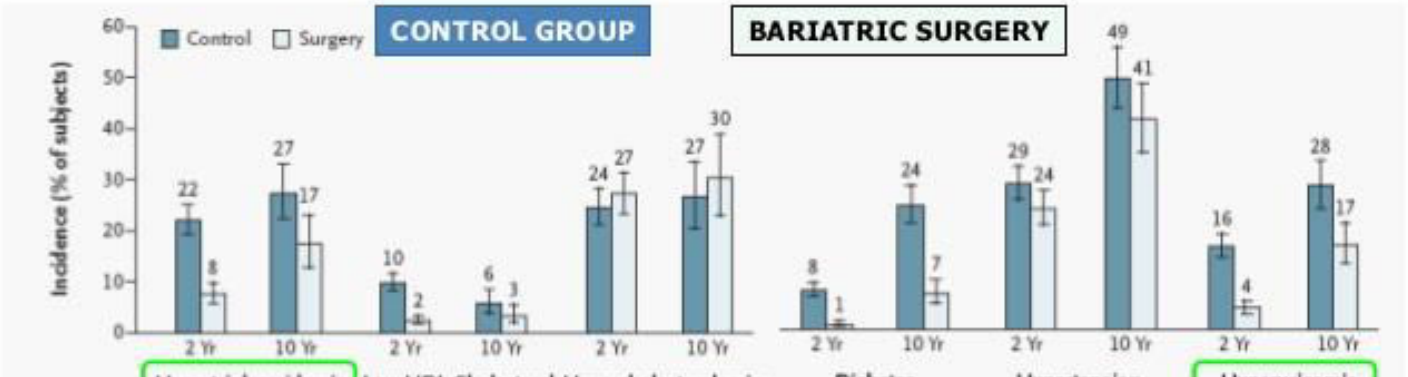
Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].

Follow-up of comorbidity changes in the SOS



No. of subjects	Hypertriglyceridemia		Low HDL Cholesterol		Hypercholesterolemia		Diabetes		Hypertension		Hyperuricemia	
	2 Yr	10 Yr	2 Yr	10 Yr	2 Yr	10 Yr	2 Yr	10 Yr	2 Yr	10 Yr	2 Yr	10 Yr
Control	801	281	1174	440	596	188	1402	539	770	279	1017	382
Surgery	731	225	1293	431	504	135	1489	517	623	215	1044	342
Odds ratio	0.29	0.61	0.21	0.57	1.27	1.16	0.14	0.25	0.78	0.75	0.22	0.49
95% CI	0.21–0.41	0.39–0.95	0.14–0.32	0.29–1.15	0.95–1.69	0.69–1.95	0.08–0.24	0.17–0.38	0.60–1.01	0.52–1.08	0.15–0.31	0.34–0.71
P value	<0.001	0.03	<0.001	0.12	0.11	0.57	<0.001	<0.001	0.06	0.13	<0.001	<0.001

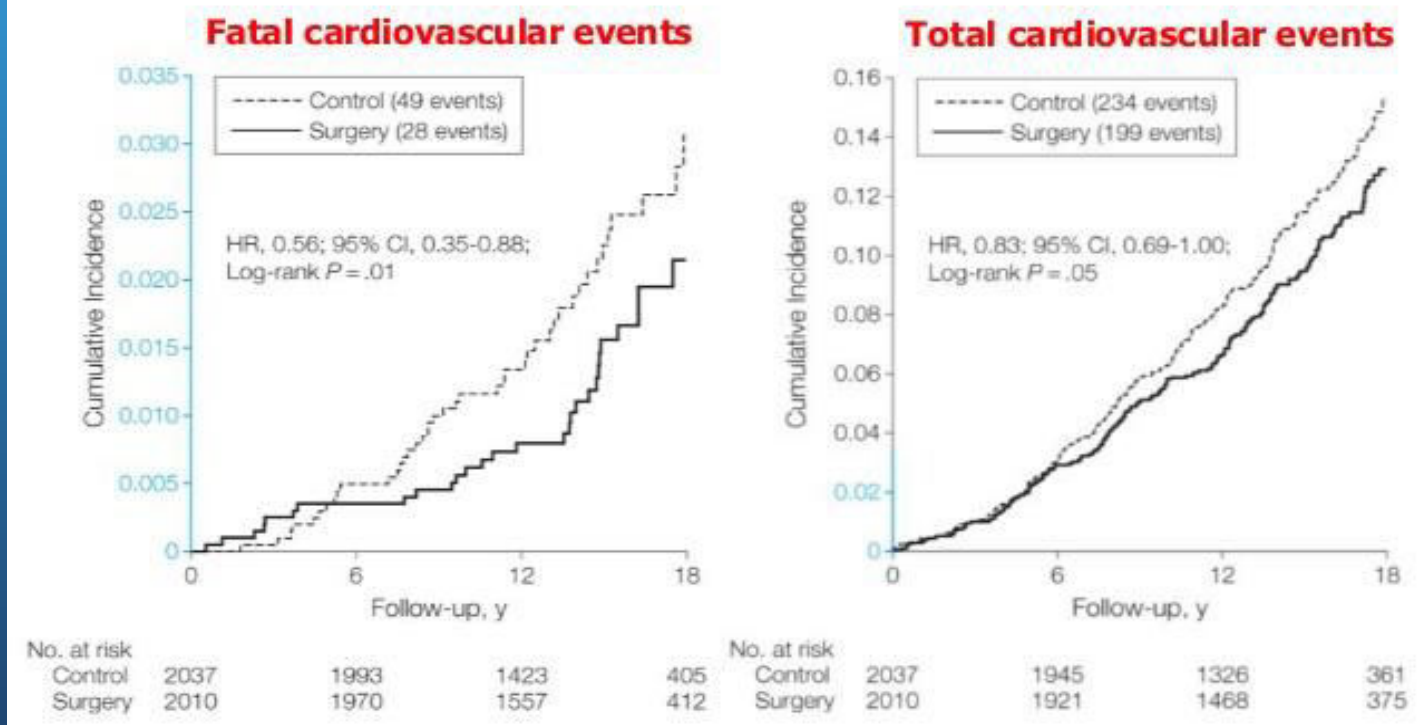
Increased incidence in comparison to the one observed after 2 years
Maintenance of significant differences after 10 years vs control group

JAMA. 2014 Jun 11;311(22):2297-304.

Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications.

Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].

Cumulative mortality in SOS trial



Sjöström, JAMA 2012

CVD first cause of mortality in both groups
Decreased after bariatric surgery

JAMA. 2012 Jan 4;307(1):56-65.

Bariatric surgery and long-term cardiovascular events.

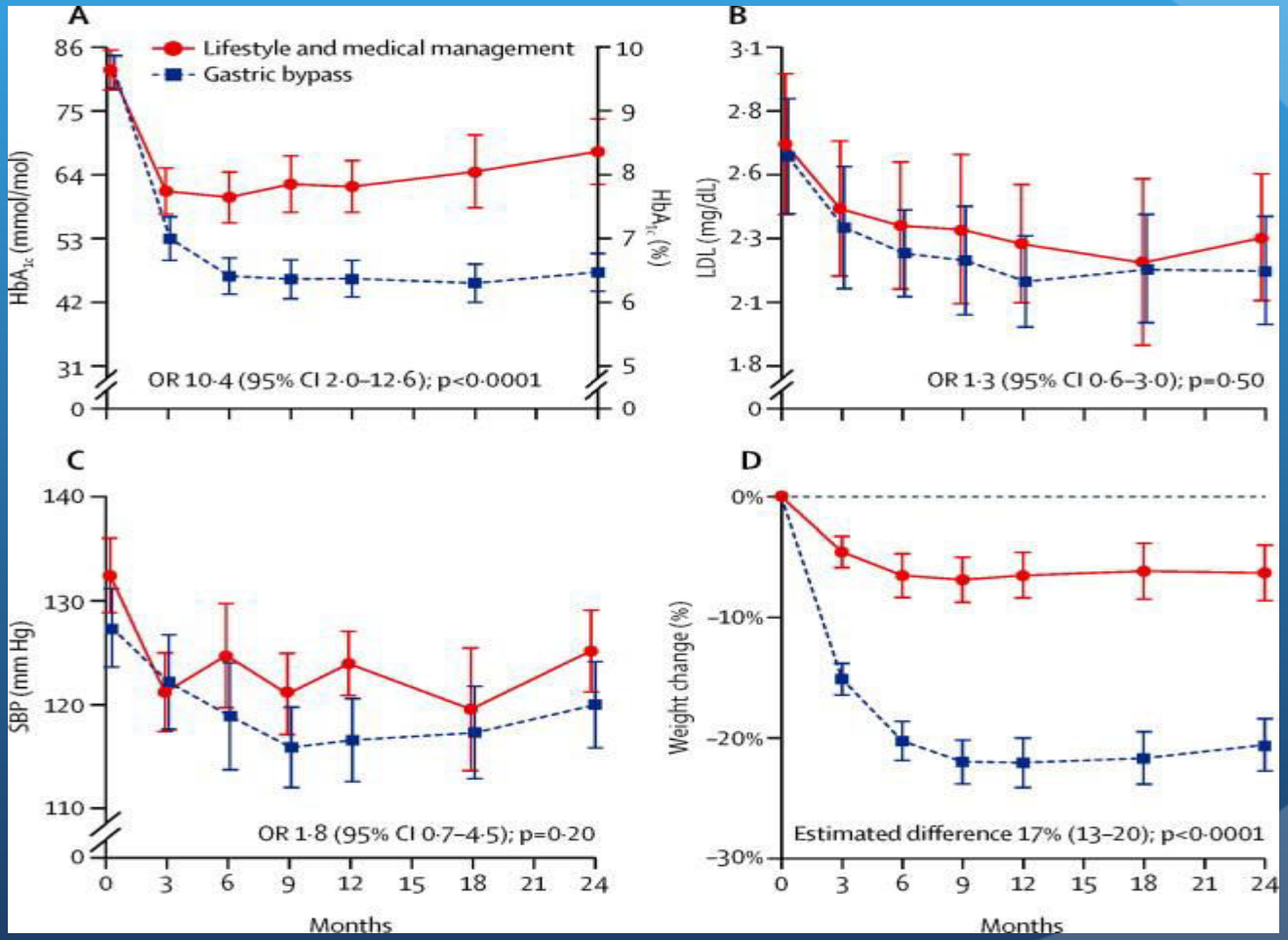
Sjöström L[1], Peltonen M, Jacobson P, Sjöström CD, Karason K, Wedel H, Ahlin S, Anveden Å, Bengtsson C, Bergmark G, Bouchard C, Carlsson B, Dahlgren S, Karlsson J, Lindroos AK, Lönroth H, Narbro K, Näslund I, Olbers T, Svensson PA, Carlsson LM.

OBJECTIVE:
To study the association between bariatric surgery, weight loss, and cardiovascular events.
DESIGN, SETTING, AND PARTICIPANTS:
The Swedish Obese Subjects (SOS) study is an ongoing, nonrandomized, prospective, controlled study conducted at 25 public surgical departments and 480 primary health care centers in Sweden of 2010 obese participants who underwent bariatric surgery and 2037 contemporaneously matched obese controls who received usual care. Patients were recruited between September 1, 1987, and January 31, 2001. Date of analysis was December 31, 2009, with median follow-up of 14.7 years (range, 0-20 years). Inclusion criteria were age 37 to 60 years and a body mass index of at least 34 in men and at least 38 in women. Exclusion criteria were identical in surgery and control patients. Surgery patients underwent gastric bypass (13.2%), banding (18.7%), or vertical banded gastroplasty (68.1%), and controls received usual care in the Swedish primary health care system. Physical and biochemical examinations and database cross-checks were undertaken at preplanned intervals.
MAIN OUTCOME MEASURES:
The primary end point of the SOS study (total mortality) was published in 2007. Myocardial infarction and stroke were predefined secondary end points, considered separately and combined.
RESULTS:
Bariatric surgery was associated with a reduced number of cardiovascular deaths (28 events among 2010 patients in the surgery group vs 49 events among 2037 patients in the control group; adjusted hazard ratio [HR], 0.47; 95% CI, 0.29-0.76; P = .002). The number of total first time (fatal or nonfatal) cardiovascular events (myocardial infarction or stroke, whichever came first) was lower in the surgery group (199 events among 2010 patients) than in the control group (234 events among 2037 patients; adjusted HR, 0.67; 95% CI, 0.54-0.83; P < .001).
CONCLUSION:
Compared with usual care, bariatric surgery was associated with reduced number of cardiovascular deaths and lower incidence of cardiovascular events in obese adults.

JAMA. 2014 Jun 11;311(22):2297-304.

Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications.

Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].



Diabetes Care. 2015 Dec 17. pii: dc151407.

Weight Change-Adjusted Effects of Gastric Bypass Surgery on Glucose Metabolism: Two- and 10-Year Results From the Swedish Obese Subjects (SOS) Study.

Sjöholm K[1], Sjöström E[2], Carlsson LM[2], Peltonen M[3].

OBJECTIVE:
It has been suggested that weight change-independent effects on fasting insulin and glucose levels are present after gastric bypass (GBP) but not after banding and vertical banded gastroplasty (VBG). We therefore evaluated weight change-adjusted effects of GBP, compared with restrictive surgical procedures, on long-term changes in fasting levels of glucose, insulin, and homeostatic model assessment of insulin resistance (HOMA-IR) in the Swedish Obese Subjects (SOS) study.
RESEARCH DESIGN AND METHODS:
Participants who completed the 2-year (n = 1,762) and/or the 10-year (n = 1,216) follow-up were divided into three weight change classes (weight loss >30%, 20-30%, or ≤20%), and by surgical method (banding, VBG, or GBP). Glucose, insulin, and HOMA-IR changes were analyzed in relation to weight change over 2 and 10 years. Analyses were performed in the full cohort and also in subgroups based on baseline glucose status.
RESULTS:
Within weight change classes, reductions in glucose, insulin, and HOMA-IR were similar in the three surgery groups both at 2 and at 10 years. Reductions in glucose, insulin, and HOMA-IR increased with increasing weight loss, and changes were typically related to weight change within each surgery group. Moreover, the association between weight change and change in glucose, insulin, or HOMA-IR did not differ between the surgery groups at 2 and 10 years. When patients were subdivided also by baseline glucose status, similar relationships between weight changes and changes in glucose, insulin, and HOMA-IR were observed.

Diabetologia. 2015 Jul;58(7):1448-53.

Incidence and remission of type 2 diabetes in relation to degree of obesity at baseline and 2 year weight change: the Swedish Obese Subjects (SOS) study.

Sjöholm K[1], Pajunen P, Jacobson P, Karason K, Sjöström CD, Torgerson J, Carlsson LM, Sjöström L, Peltonen M.

AIMS/HYPOTHESIS:
The aim of this work was to analyse the rates of incidence and remission of type 2 diabetes in relation to baseline BMI and weight change in the prospective, controlled Swedish Obese Subjects (SOS) study.
METHODS:
Three-thousand four-hundred and eighty-five obese individuals receiving bariatric surgery or conventional treatment were grouped into four baseline BMI categories (<35, 35-40, 40-45 or ≥ 45 kg/m(2)) and five weight-change categories according to their BMI at 2 years (increase [≥ 1 BMI unit increase], no change [less than 1 BMI unit change], minor reduction [-1 to -9 BMI units], medium reduction [-10 to -14 BMI units] and major reduction [< -15 BMI units]). The incidence and remission of diabetes at 2 years was assessed.
RESULTS:
Among individuals with no weight change, diabetes incidence rates were 5.5%, 7.4%, 8.3% and 5.2%, in the four baseline BMI categories, respectively. In those with an initial BMI of 35-40, 40-45 and ≥ 45 kg/m(2) who attained a minor reduction in weight, the corresponding rates were 1.3%, 1.2% and 3.4%, respectively. In both the medium- and major-weight-reduction groups, diabetes incidence was ≤ 0.5%. Among individuals with diabetes at baseline, the remission rates were 15.3-26.9% in the no-weight-change groups, and 48.1-70% for individuals who attained a minor weight reduction. In the medium- and major-weight-reduction groups, the remission rate was 77-97%. There were no differences in 2 year incidence and remission rates between different baseline BMI groups that achieved the same degree of weight reduction.
CONCLUSIONS/INTERPRETATION:
In obese individuals, the favourable effect of weight reduction on type 2 diabetes incidence and remission is independent of initial BMI.

JAMA. 2014 Jun 11;311(22):2297-304.

Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications.

Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].

IMPORTANCE:
Short-term studies show that bariatric surgery causes remission of diabetes. The long-term outcomes for remission and diabetes-related complications are not known.

OBJECTIVES:
To determine the long-term diabetes remission rates and the cumulative incidence of microvascular and macrovascular diabetes complications after bariatric surgery.

DESIGN, SETTING, AND PARTICIPANTS:
The Swedish Obese Subjects (SOS) is a prospective matched cohort study conducted at 25 surgical departments and 480 primary health care centers in Sweden. Of patients recruited between September 1, 1987, and January 31, 2001, 260 of 2037 control patients and 343 of 2010 surgery patients had type 2 diabetes at baseline. For the current analysis, diabetes status was determined at SOS health examinations until May 22, 2013. Information on diabetes complications was obtained from national health registers until December 31, 2012. Participation rates at the 2-, 10-, and 15-year examinations were 81%, 58%, and 41% in the control group and 90%, 76%, and 47% in the surgery group. For diabetes assessment, the median follow-up time was 10 years (interquartile range [IQR], 2-15) and 10 years (IQR, 10-15) in the control and surgery groups, respectively. For diabetes complications, the median follow-up time was 17.6 years (IQR, 14.2-19.8) and 18.1 years (IQR, 15.2-21.1) in the control and surgery groups, respectively.

INTERVENTIONS:
Adjustable or nonadjustable banding (n = 61), vertical banded gastroplasty (n = 227), or gastric bypass (n = 55) procedures were performed in the surgery group, and usual obesity and diabetes care was provided to the control group.

MAIN OUTCOMES AND MEASURES:
Diabetes remission, relapse, and diabetes complications. Remission was defined as blood glucose <110 mg/dL and no diabetes medication.

RESULTS:
The diabetes remission rate 2 years after surgery was 16.4% (95% CI, 11.7%-22.2%; 34/207) for control patients and 72.3% (95% CI, 66.9%-77.2%; 219/303) for bariatric surgery patients (odds ratio [OR], 13.3; 95% CI, 8.5-20.7; P < .001). At 15 years, the diabetes remission rates decreased to 6.5% (4/62) for control patients and to 30.4% (35/115) for bariatric surgery patients (OR, 6.3; 95% CI, 2.1-18.9; P < .001). With long-term follow-up, the cumulative incidence of microvascular complications was 41.8 per 1000 person-years (95% CI, 35.3-49.5) for control patients and 20.6 per 1000 person-years (95% CI, 17.0-24.9) in the surgery group (hazard ratio [HR], 0.44; 95% CI, 0.34-0.56; P < .001). Macrovascular complications were observed in 44.2 per 1000 person-years (95% CI, 37.5-52.1) in control patients and 31.7 per 1000 person-years (95% CI, 27.0-37.2) for the surgical group (HR, 0.68; 95% CI, 0.54-0.85; P = .001).

Nutr Hosp. 2012 Mar-Apr;27(2):623-31.

Resolution of diabetes mellitus and metabolic syndrome in normal weight 24-29 BMI patients with One Anastomosis Gastric Bypass.

García-Caballero M[1], Valle M, Martínez-Moreno JM, Miralles F, Toval JA, Mata JM, Osorio D, Mínguez A.

INTRODUCTION:
Diabetes mellitus type 2 (DMT2) is a major cause of death in the world. The medical therapy for this disease has had enormous progress, but it still leaves many patients exposed to the complications developed from the disease. It is well known the beneficial effects of bariatric surgery in obese diabetic patients, however it is important to investigate if the same principles of bariatric surgery that improve diabetes in obese patients, could be applied to non obese normal weight diabetics.

MATERIAL AND METHODS:
Thirteen diabetic patients operated by One Anastomosis Gastric Bypass (BAGUA), were evaluated in the preoperative period and 1,3 and 6 months after surgery. Body weight and composition, Fasting Plasma Glucose, HbA1c levels, blood pressure and serum lipids levels were analyzed, as well as the monitoring of the immediate postoperative treatment necessities for Diabetes and other metabolic syndrome comorbidities.

RESULTS:
After the surgery the 77% of the patients resolves its T2DM, 46% from surgery, and rest noted an significant improvement of the disease in spite of having a C peptide level near to zero some of the patients. The comorbidities, mainly hypertension and lipid abnormalities experience improvement early. All patients reduce their weight and the amount of fat mass until values consistent with their age and height.

CONCLUSIONS:
The One Anastomosis Gastric Bypass leads to resolution or improvement of T2DM in non obese normal weight patients. The best results are obtained in patients with few years of diabetes, without or short term use of insulin treatment and high C-peptide levels.

Obes Res Clin Pract. 2013 Dec;7(6):e494-500.

Predictors of remission of type 2 diabetes mellitus in obese patients after gastrointestinal surgery.

Lee YC[1], Lee WJ, Liew PL.

BACKGROUND:
Gastroenterology is a beneficial treatment of morbidly obese type 2 diabetes mellitus (T2DM). We aimed to identify the predictors for the treatment of T2DM obese patients.
METHODS:
A retrospective study consisting of 531 patients undergoing laparoscopic gastric banding (LGB), laparoscopic mini-gastric bypass (LMGB) and laparoscopic sleeve gastrectomy (LSG) from January 2004 to May 2007 was performed. Patients with preoperative fasting serum glucose concentration of more than 126 mg/dl were diagnosed as T2DM. A postoperatively fasting serum glucose level of less than 110 mg/dl was considered to be remission of T2DM.
RESULTS:
Of the 531 patients, 62 (11.6%) were diagnosed as T2DM, including 23 men and 39 women, with a mean age of 31.8 ± 9.2 years, and a mean body mass index (BMI) of 40.0 kg/m(2). The mean glucose at 3, 6, and 12 months after surgery were 100.1 mg/dl, 95.1 mg/dl and 91.8 mg/dl, respectively. The mean body weight loss one year after surgery was 9.4% for LGB, 31.4% for LSG and 37.1% for LMGB, respectively. Among these operation methods (LGB, LMGB and LSG), the BMI, body weight, waist circumference, serum lipid profile and serum factors associated with glucose metabolism were significantly different during the one-year postoperative follow-up. Remission rate of T2DM was achieved in 84.8%, 58.8% and 58.3% of patients for LMGB, LGB and LSG, respectively. The best operative method for the remission of T2DM was LMGB. Using an artificial neural network (ANN) data mining technique, waist circumference, operative methods and C-peptide were significantly predictors for the remission of T2 DM.
CONCLUSION:
One year after gastrointestinal surgery, improvement of serum lipid profiles and serum data related to glucose metabolism in the different operative methods were noticed. LMGB seems to be the most effective procedure for the reduction of serum glucose levels compared with LAGB and LSG.

Obes Surg. 2015 Oct 16.

Seven Years of Mini-Gastric Bypass in Type II Diabetes Patients with a Body Mass Index <35 kg/m2.

Kular KS[1], Manchanda N[2], Cheema GK[3].

BACKGROUND:
Mini-gastric bypass (MGB) is a safe, effective, and reversible procedure for patients with type II diabetes mellitus (T2DM) and morbid obesity. Less is known, however, about its long-term effects in patients with a body mass index (BMI) <35 kg/m^2.
METHODS:
From February 2007 to February 2014, 1468 patients underwent MGB at our institution, including 983 with T2DM. Of these, 128 (82 women), of mean age 41.6 ± 10.2 years, had a BMI of 30-35 kg/m^2. Prospectively collected data were analyzed retrospectively. Factors assessed included disease duration, family history, medication use, remission, and biochemical indicators, including fasting plasma glucose, glycosylated hemoglobin (HbA1c), serum insulin, and C-peptide concentrations. Remission of T2DM was defined as HbA1c <6.0 % without medication.
RESULTS:
Prior to surgery, patients had a mean BMI of 33.4 ± 3.3 kg/m^2, mean waist circumference of 104.5 ± 8.2 cm, mean C-peptide concentration of 3.4 ± 1.2 ng/ml, and mean T2DM duration of 6.5 ± 3.1 years. Within 6 months of MGB, 95 % of these patients had attained HbA1c <7 %. Complete remission rates at 1, 2, and 7 years were 64, 66, and 53 %, respectively. Mean HbA1c decreased from 10.7 ± 1.5 % at baseline to 6.2 ± 0.5% at 1 year, 5.4 ± 1.2 % at 3 years, and 5.7 ± 1.8 % at 7 years. No deaths occurred, but two (1.6 %) patients experienced major complications.
CONCLUSIONS:
MGB provides good, long-term control of T2DM in patients with class I obesity. Early intervention results in higher remission rates.

Obes Surg. 2014 Jul;24(7):1044-51.

Short-term outcomes of laparoscopic single anastomosis gastric bypass (LSAGB) for the treatment of type 2 diabetes in lower BMI (<30 kg/m(2)) patients.

Kim MJ[1], Hur KY.

BACKGROUND:
Bariatric surgery is an efficient procedure for remission of type 2 diabetes (T2DM) in morbid obesity. However, in Asian countries, mean body mass index (BMI) of T2DM patients is about 25 kg/m(2). Various data on patients undergoing gastric bypass surgery showed that control of T2DM after surgery occurs rapidly and somewhat independent to weight loss. We hypothesized that in non-obese patients with T2DM, the glycemic control would be achieved as a consequence of gastric bypass surgery.
METHODS:
From September 2009, the 172 patients have had laparoscopic single anastomosis gastric bypass (LSAGB) surgery. Among them, 107 patients have been followed up more than 1 year. We analyzed the dataset of these patients. Values related to diabetes were measured before and 1, 2, and 3 years after the surgery.
RESULTS:
The mean BMI decreased during the first year after the surgery but plateaued after that. The mean glycosylated hemoglobin level decreased continuously. The mean fasting and postglucose loading plasma glucose level also decreased.
CONCLUSION:
After LSAGB surgery in non-obese T2DM patients, the control of T2DM was possible safely and effectively. However, longer follow-up with matched control group is essential.

Obes Surg. 2014 Sep;24(9):1552-62.

Laparoscopic sleeve gastrectomy versus single anastomosis (mini-) gastric bypass for the treatment of type 2 diabetes mellitus: 5-year results of a randomized trial and study of incretin effect.

Lee WJ[1], Chong K, Lin YH, Wei JH, Chen SC.

BACKGROUND:
Bariatric surgery may be beneficial in mildly obese patients with poorly controlled diabetes. The optimal procedure to achieve diabetes remission is unknown. In 2011, we published the short-term results of a pilot study designed to evaluate the efficacy of diabetic control and the role of duodenal exclusion in mildly obese diabetic patients undergoing laparoscopic sleeve gastrectomy (SG) vs. a laparoscopic single anastomosis (mini-) gastric bypass (SAGB). This study analyzes the 5-year results and evaluates the incretin effect.

METHODS:
A double-blind randomized trial included 60 participants with a hemoglobin A1c (HbA1c) level higher than 7.5%, a body mass index (BMI) between 25 and 35 Kg/m(2), a C-peptide level ≥1.0 ng/mL, and a diagnosis of type 2 diabetes mellitus (T2DM) for at least 6 months. A SAGB with duodenal exclusion or a SG without duodenal exclusion was performed.

RESULTS:
The 5-year results of the primary outcome were as an intention-to-treat analysis for HbA1c ≤6.5% without glycemic therapy. Assessments of the incretin effect and β cell function were performed at baseline and between 36 and 60 months. The patients were randomly assigned to SAGB (n = 30) and SG (n = 30). At 60 months, 18 participants (60%; 95% confidence interval (CI), 42 to 78%) in the SAGB group and nine participants (30%; 95% CI, 13 to 47%) in the SG group achieved the primary end points (odds ratio (OR), 0.3; 95% CI, 0.1 to 0.8%). The participants assigned to the SAGB procedure had a similar percentage of weight loss as the SG patients (22.8 ± 5.9 vs. 20.1 ± 5.3%; $p > 0.05$) but achieved a lower level of HbA1c (6.1 ± 0.7 vs. 7.1 ± 1.2 %; $p < 0.05$) than the SG patients. There was a significant increase in the incretin effect before and after surgery in both groups, but the SAGB group had a higher incretin effect than the SG group at 5 years.

CONCLUSIONS:
In mildly obese patients with T2DM, SG is effective at improving glycemic control at 5 years, but SAGB was more likely to achieve better glycemic control than SG and had a higher incretin effect compared to SG.

Obes Surg. 2014 Dec;24(12):2040-7.

Changes of body composition in patients with BMI 23-50 after tailored one anastomosis gastric bypass (BAGUA): influence of diabetes and metabolic syndrome.

Garciacaballero M[1], Reyes-Ortiz A, García M, Martínez-Moreno JM, Toval JA, García A, Mínguez A, Mata JM, Miralles F.

BACKGROUND:
The use of bariatric surgery to treat diabetes mellitus (DM) requires procedures developed for morbid obese in patients with normal and over-weight. Therefore, we started tailoring one anastomosis gastric bypass (BAGUA) adapted to each patient. This study analyzes changes in body composition (BC) of patients with BMI 23-50 after BAGUA as well as influence of DM and MS.

METHODS:
We studied 79 (37 diabetic and 42 non-diabetic) patients (BMI 23-50) who completed all evaluation appointment (preoperative, 10 days, 1, 3, 6, and 12 months) after tailored BAGUA for obesity, diabetes, or diabesity. Patients were classified according to BMI (23-29, 30-34, 35-50) and bearing or not diabetes. Variables are components of BC as well as DM and MS.

RESULTS:
Preoperatively, mean values of weight varied 37 kg (78-115 kg), muscle mass (MM) 8 kg (54-62 kg), while fat mass (FM) 30 kg (22-53 kg). Basal metabolism (BM) was higher in diabetic. After surgery, percentage (%) of excess weight loss (%EWL) ranged from 76 % (BMI 35-50) to 128 % (BMI 23-29), FM 56 % (BMI 23-29) to 65 % (BMI 35-50), without differences bearing DM. MM 12 % (non-diabetics BMI 30-34) to 17 % (diabetics BMI 35-50) and visceral fat (VF) 50 % (diabetics BMI 30-34) to 56 % (non-diabetics BMI 35-50).

CONCLUSIONS:
After tailored BAGUA, MM maintains steady while FM is highly reduced and variable. BM is reduced in all groups. Diabetics lose less weight and VF but more MM than non-diabetic patients. Preoperative presence of MS influences the changes in BC.

Ann Surg. 2005 Jul;242(1):20-8.

Laparoscopic Roux-en-Y versus mini-gastric bypass for the treatment of morbid obesity: a prospective randomized controlled clinical trial.

Lee WJ[1], Yu PJ, Wang W, Chen TC, Wei PL, Huang MT.

OBJECTIVES:
This prospective, randomized trial compared the safety and effectiveness of laparoscopic Roux-en-Y gastric bypass (LRYGBP) and laparoscopic mini-gastric bypass (LMGBP) in the treatment of morbid obesity.
SUMMARY BACKGROUND DATA:
LRYGBP has been the gold standard for the treatment of morbid obesity. While LMGBP has been reported to be a simple and effective treatment, data from a randomized trial are lacking.
METHODS:
Eighty patients who met the NIH criteria were recruited and randomized to receive either LRYGBP (n = 40) or LMGBP (n = 40). The minimum postoperative follow-up was 2 years (mean, 31.3 months). Perioperative data were assessed. Late complication, excess weight loss, BMI, quality of life, and comorbidities were determined. Changes in quality of life were assessed using the Gastro-Intestinal Quality of Life Index (GIQLI).
RESULTS:
There was one conversion (2.5%) in the LRYGBP group. Operation time was shorter in LMGBP group (205 versus 148, $P < 0.05$). There was no mortality in each group. The operative morbidity rate was higher in the LRYGBP group (20% versus 7.5%, $P < 0.05$). The late complications rate was the same in the 2 groups (7.5%) with no reoperation. The percentage of excess weight loss was 58.7% and 60.0% at 1 and 2 years, respectively, in the LPYGBP group, and 64.9% and 64.4% in the LMGBP group. The residual excess weight <50% at 2 years postoperatively was achieved in 75% of patients in the LRYGBP group and 95% in the LMGBP group ($P < 0.05$). A significant improvement of obesity-related clinical parameters and complete resolution of metabolic syndrome in both groups were noted. Both gastrointestinal quality of life increased significantly without any significant difference between the groups.

Obes Surg. 2005 Oct;15(9):1304-8.

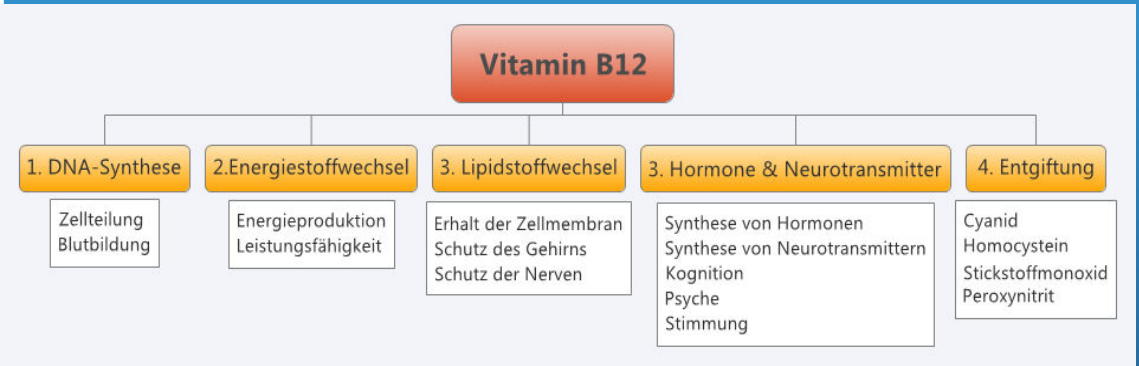
Continued excellent results with the mini-gastric bypass: six-year study in 2,410 patients.

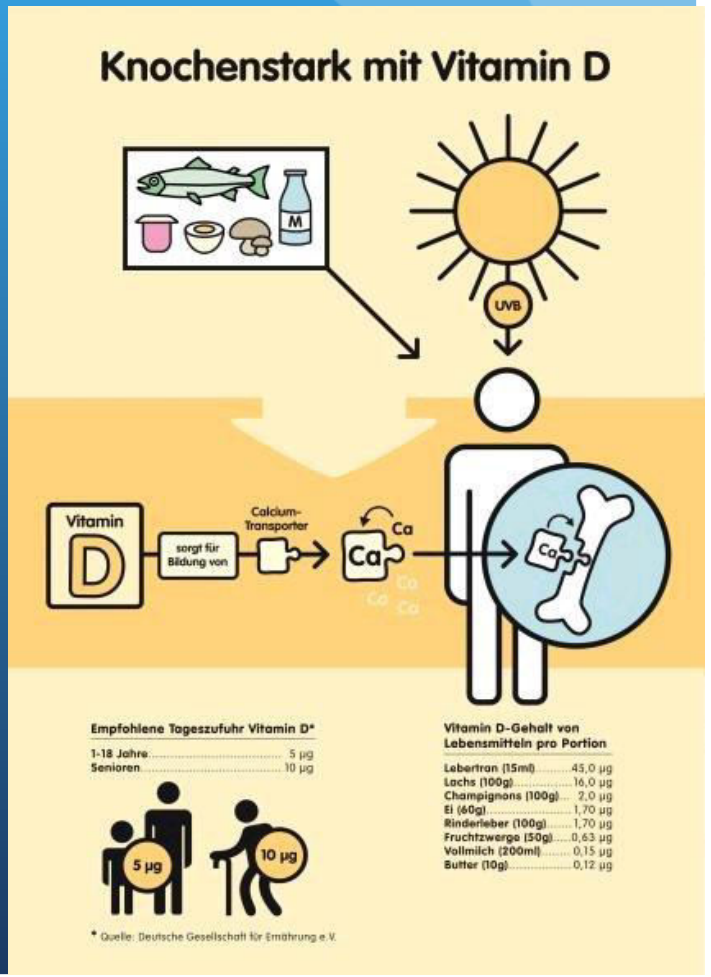
Rutledge R[1], Walsh TR.

BACKGROUND:
There is a growing body of evidence showing that the Mini-Gastric Bypass (MGB) is a safe and effective alternative to other bariatric surgical operations. This study reports on the results of a consecutive cohort of patients undergoing the MGB.
METHODS:
A prospective database was used to continuously assess the results in 2,410 MGB patients treated from September 1997 to February 2004.
RESULTS:
The average operative time was 37.5 minutes, and the median length of stay was 1 day. The 30-day mortality and complication rates were 0.08% and 5.9% respectively. The leak rate was 1.08%. Average weight loss at 1 year was 59 kg (80% of excess body weight). The most frequent long-term complications were dyspepsia and ulcers (5.6%) and iron deficiency anemia (4.9%.) Excessive weight loss with malnutrition occurred in 1.1%. Weight loss was well maintained over 5 years, with <5% patients regaining more than 10 kg.

Vitamine – Vit. D, Vit B12, Vit. K, Vit. C, ..

Unterernährung
Fehlernährung
Resorptionsstörungen





Hyperparathyreoidismus

Hyperparathyreoidismus (**HPT**) ist eine Regulationsstörung der Epithelkörperchen (Nebenschilddrüsen). Der Hyperparathyreoidismus ist gekennzeichnet durch eine vermehrte Bildung von Nebenschilddrüsenhormon (Parathormon), welches den Calcium-Spiegel im Blut reguliert.

Liegt der vermehrten Bildung von Parathormon eine gutartige Geschwulst (Adenom) der Nebenschilddrüse zugrunde, spricht man von einer primären Überfunktion der Nebenschilddrüsen (**Primärer Hyperparathyreoidismus**). Kennzeichen des primären Hyperparathyreoidismus sind ein erhöhter Parathormon-Spiegel und ein erhöhtes Serum-Calcium.

Ist die vermehrte Bildung von Parathormon die adäquate Reaktion der Nebenschilddrüsen auf ein vermindertes Serum-Calcium (z. B. bei Vitamin-D-Mangel), spricht man von **sekundärem Hyperparathyreoidismus**. Charakteristisch für den sekundären Hyperparathyreoidismus ist ein erhöhter Parathormon-Spiegel bei niedrigem Serum-Calcium. Eine wichtige Ursache des sekundären Hyperparathyreoidismus ist die verminderte Aktivierung von Vitamin D aufgrund einer chronischen Nierenerkrankung.

Ein über lange Zeit bestehender sekundärer Hyperparathyreoidismus kann aufgrund einer chronischen Überstimulierung der Nebenschilddrüsen zu einem inadäquaten Anstieg des Parathormons führen. Parathormon-Spiegel und Serum-Calcium sind erhöht, man spricht von **tertiärem Hyperparathyreoidismus**.

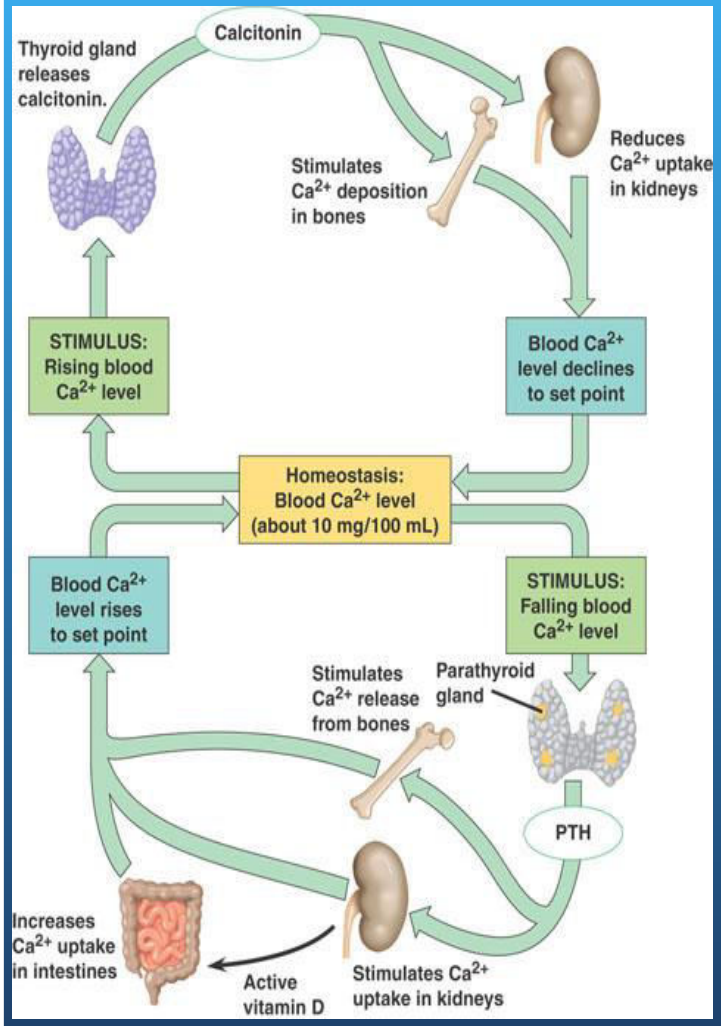
Folgen des Hyperparathyreoidismus sind Abbau von Knochensubstanz aufgrund einer vermehrten Calcium-Freisetzung aus dem Knochen, Nierensteine aufgrund einer vermehrten Calcium-Ausscheidung in den Urin, Verkalkungen der Blutgefäße durch Ablagerung von Calcium und Phosphat sowie eine Vielzahl weiterer, zum Teil unspezifischer Symptome.

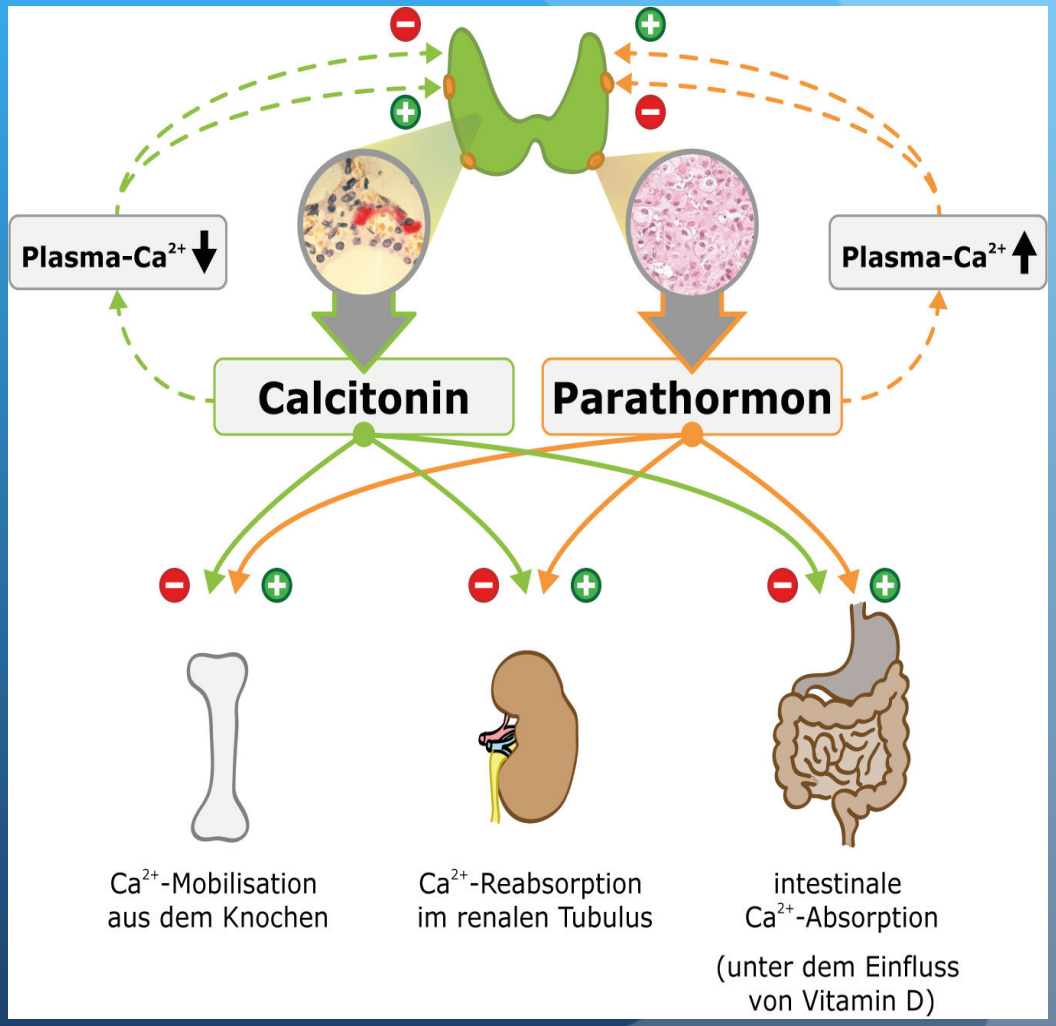
Die Therapie des primären Hyperparathyreoidismus erfolgt durch operative Entfernung des Nebenschilddrüsen-Adenoms. Ist eine Operation nicht möglich oder wird diese nicht gewünscht, kann bei geringgradig erhöhtem Serum-Calcium der Krankheitsverlauf durch regelmäßige Kontrollen von Parathormon und Calcium beobachtet werden. Bei stark erhöhtem Calcium kann die Bildung von Parathormon durch das Medikament Cinacalcet gehemmt werden.

Der sekundäre Hyperparathyreoidismus wird behandelt mit Vitamin D, Cinacalcet und Phosphatbindern, letztere senken bei chronischer Nierenkrankheit erhöhte Phosphatspiegel.

Der tertiäre Hyperparathyreoidismus wird durch operative Entfernung der Nebenschilddrüsen behandelt. Um eine ausreichende Bildung von Parathormon zu gewährleisten, wird entweder ein Teil eines Epithelkörperchens belassen (subtotale Parathyreoidektomie) oder ein Teil eines Epithelkörperchens wird an anderer Stelle in einen Muskel eingepflanzt (autologe Retransplantation).

Parathormon/Calzitonin





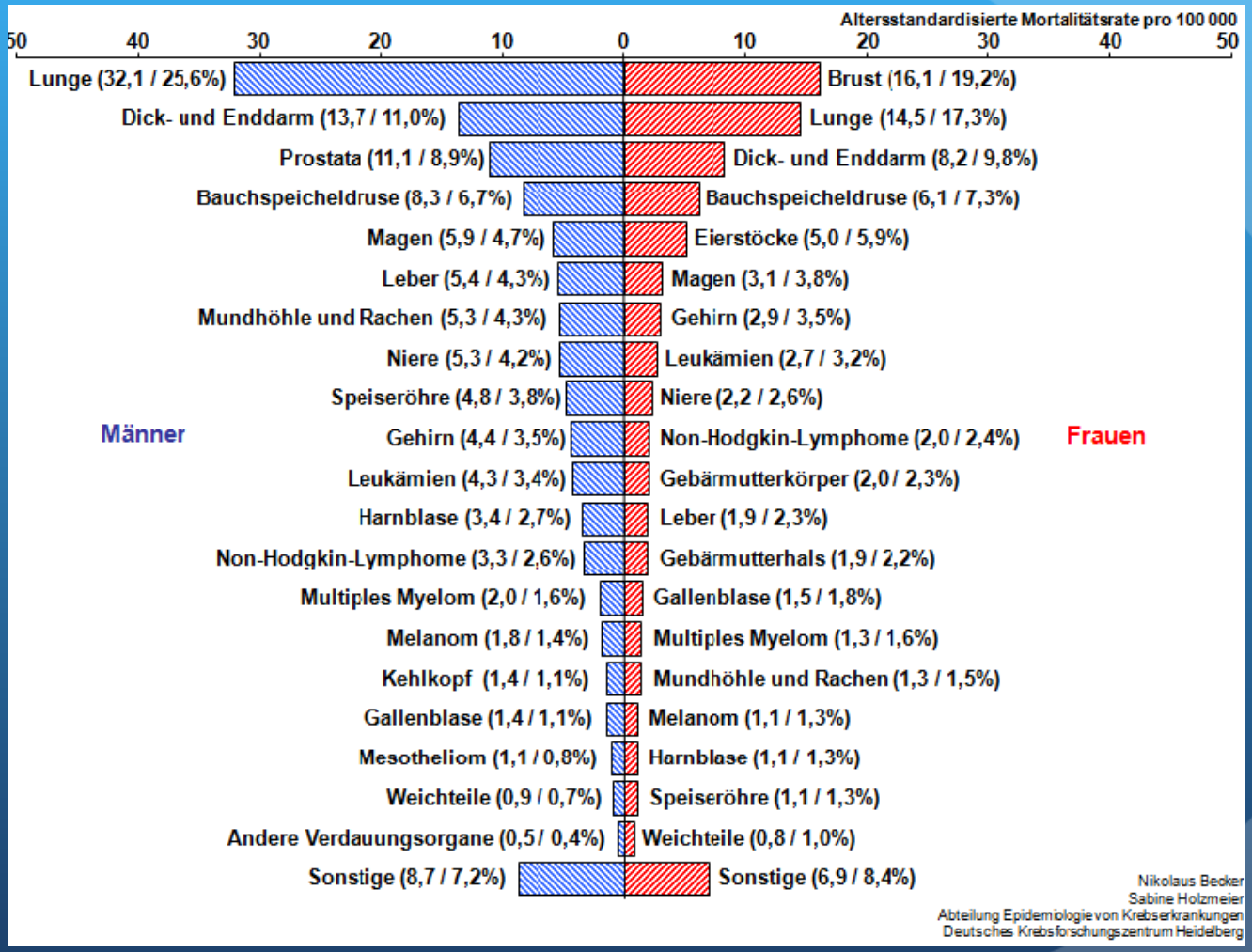
Obes Surg. 2015 Jun;25(6):1056-62.

Effects of omega-loop gastric bypass on vitamin D and bone metabolism in morbidly obese bariatric patients.

Luger M[1], Kruschitz R, Langer F, Prager G, Walker M, Marculescu R, Hoppichler F, Schindler K, Ludvik B.

BACKGROUND:
Bariatric patients often suffer from nutrient deficiencies. Little is known about vitamin D levels and bone metabolism in patients undergoing omega-loop gastric bypass (OLGB). We, therefore, evaluated parameters of vitamin D metabolism preoperatively and during the first postoperative year.
METHODS:
Within our cohort study, we retrospectively evaluated the respective parameters pre-, 3, 6, and 12 months postoperatively in patients with OLGB, between February 2011 and February 2013.
RESULTS:
In patients [n = 50; age 46 (15) years, mean (SD); 12 male, 38 female] BMI was 45.4 (6.6) kg/m(2) preoperatively and decreased to 29.1 (3.8) kg/m(2) after 12 months, corresponding to a total body weight loss of 36 %. Preoperatively, the prevalence of vitamin D deficiency was 96 and 30 % demonstrated elevated parathyroid hormone yielding a prevalence of secondary hyperparathyroidism of 17 %. Postoperatively, subjects received individually adjusted vitamin D3 supplementation (95 % CI 200-3000 IU/day), according to the available guidelines at that time. Nevertheless, every third patient was vitamin D deficient at 12 months (80 %). In patients with preoperative BMI >45 vs. <45 kg/m(2), we observed a 3-fold higher risk for vitamin D deficiency over 12 months [OR = 3.10, 95 % CI (1.01-9.51), p = 0.048].
CONCLUSIONS:
To avoid vitamin D deficiency, morbidly obese patients, particularly those with higher preoperative BMI, should be regularly screened pre- and postoperatively. Standard postsurgical supplementation has not been adequate to restore 25-OHD status and current guidelines are not very specific in terms of timing and dosing of vitamin D3 supplementation. Consequently, further trials to enhance the evidence on vitamin D supplementation are warranted.

Karzinom

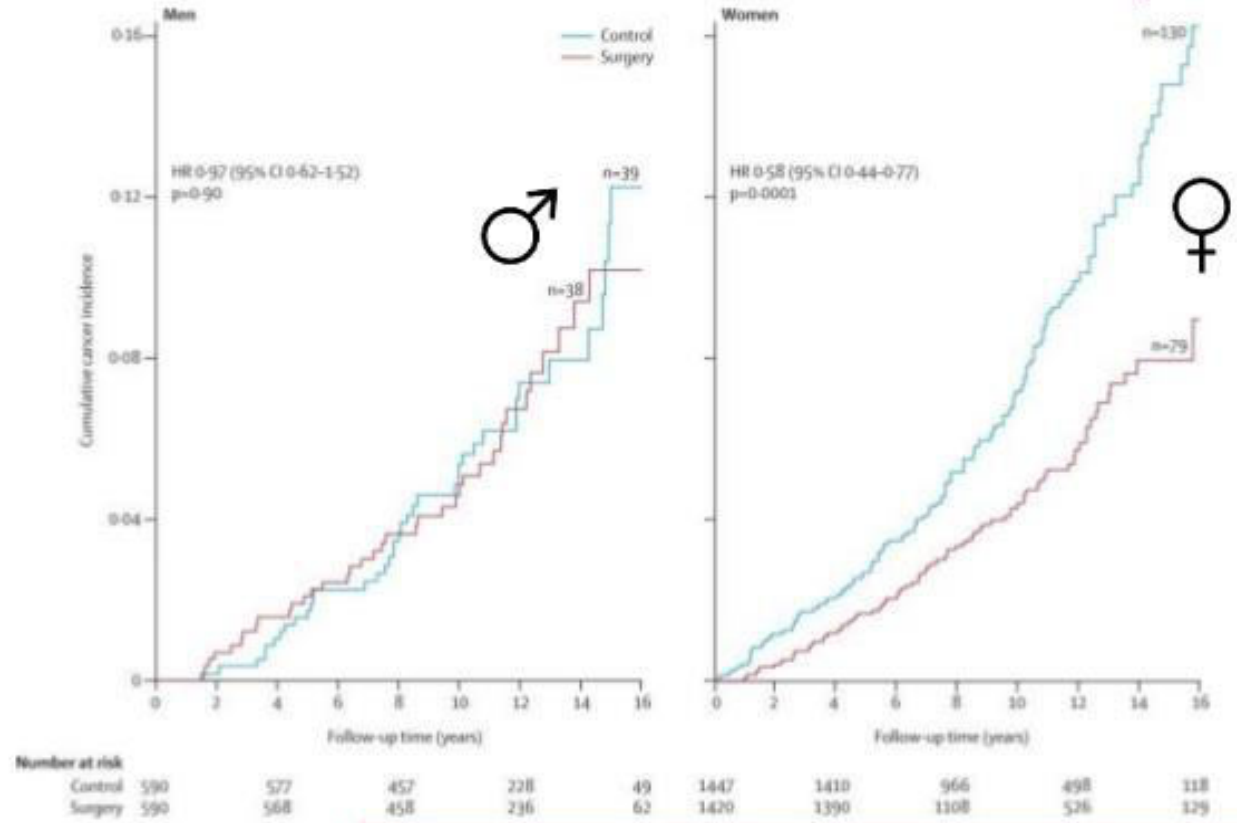

Altersstandardisierte Mortalitätsrate pro 100 000
50 40 30 20 10 0 10 20 30 40 50
Männer
Frauen
Lunge (32,1 / 25,6%)
Brust (16,1 / 19,2%)
Dick- und Enddarm (13,7 / 11,0%)
Lunge (14,5 / 17,3%)
Prostata (11,1 / 8,9%)
Dick- und Enddarm (8,2 / 9,8%)
Bauchspeicheldruse (8,3 / 6,7%)
Bauchspeicheldruse (6,1 / 7,3%)
Magen (5,9 / 4,7%)
Eierstöcke (5,0 / 5,9%)
Leber (5,4 / 4,3%)
Magen (3,1 / 3,8%)
Mundhöhle und Rachen (5,3 / 4,3%)
Gehirn (2,9 / 3,5%)
Niere (5,3 / 4,2%)
Leukämien (2,7 / 3,2%)
Speiseröhre (4,8 / 3,8%)
Niere (2,2 / 2,6%)
Gehirn (4,4 / 3,5%)
Non-Hodgkin-Lymphome (2,0 / 2,4%)
Leukämien (4,3 / 3,4%)
Gebärmutterkörper (2,0 / 2,3%)
Harnblase (3,4 / 2,7%)
Leber (1,9 / 2,3%)
Non-Hodgkin-Lymphome (3,3 / 2,6%)
Gebärmutterhals (1,9 / 2,2%)
Multiples Myelom (2,0 / 1,6%)
Gallenblase (1,5 / 1,8%)
Melanom (1,8 / 1,4%)
Multiples Myelom (1,3 / 1,6%)
Kehlkopf (1,4 / 1,1%)
Mundhöhle und Rachen (1,3 / 1,5%)
Gallenblase (1,4 / 1,1%)
Melanom (1,1 / 1,3%)
Mesotheliom (1,1 / 0,8%)
Harnblase (1,1 / 1,3%)
Weichteile (0,9 / 0,7%)
Speiseröhre (1,1 / 1,3%)
Andere Verdauungsorgane (0,5 / 0,4%)
Weichteile (0,8 / 1,0%)
Sonstige (8,7 / 7,2%)
Sonstige (6,9 / 8,4%)
Nikolaus Becker
Sabine Holzmeier
Abteilung Epidemiologie von Krebserkrankungen
Deutsches Krebsforschungszentrum Heidelberg

JAMA. 2014 Jun 11;311(22):2297-304.

Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications.

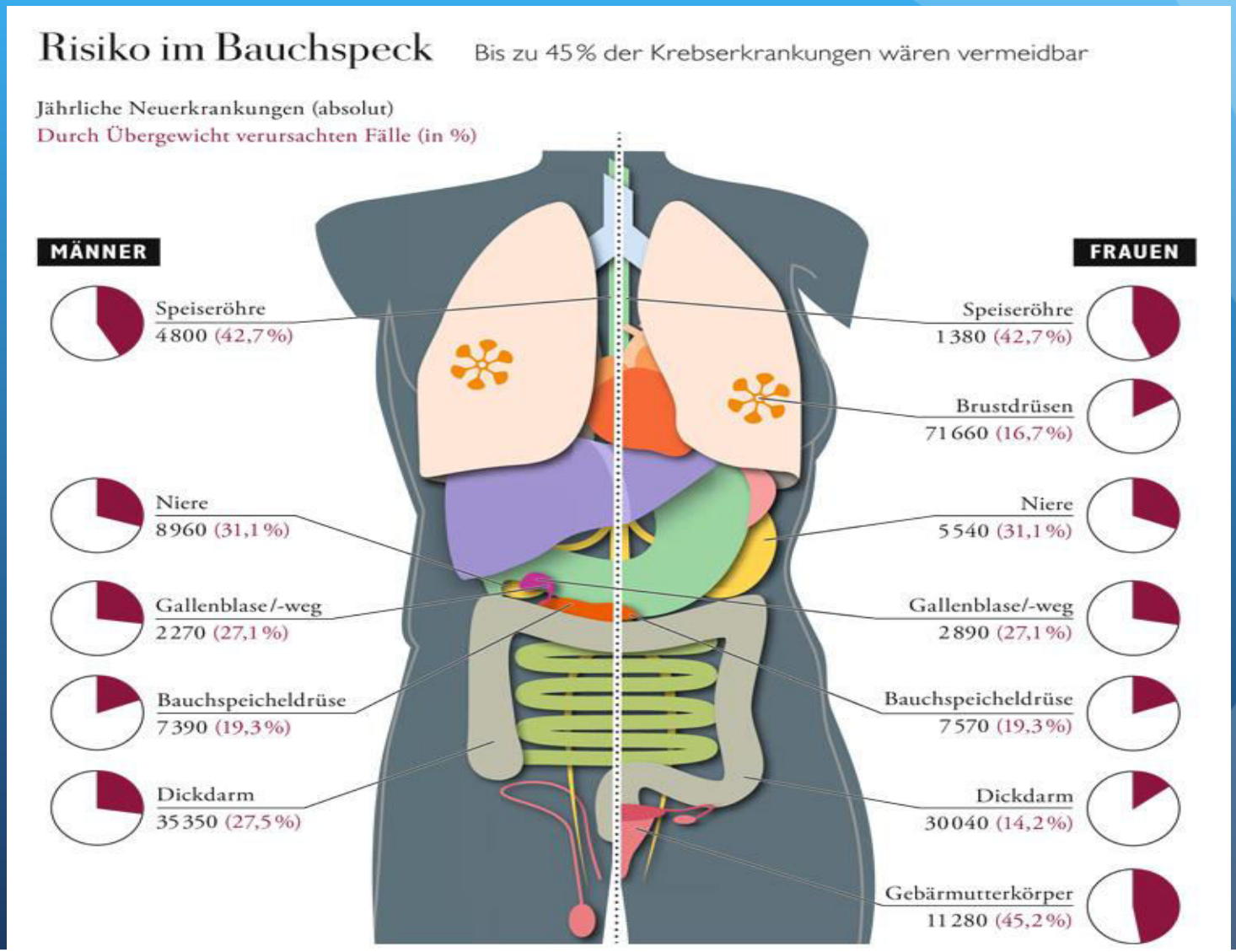
Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].

Effect on cancer incidence in SOS study



Decreased cancer incidence following bariatric surgery, but only significant in women

Karzinom


Risiko im Bauchspeck
Bis zu 45 % der Krebserkrankungen wären vermeidbar
Jährliche Neuerkrankungen (absolut)
Durch Übergewicht verursachten Fälle (in %)
MÄNNER
Speiseröhre
4800 (42,7 %)
Niere
8960 (31,1 %)
Gallenblase/-weg
2270 (27,1 %)
Bauchspeicheldrüse
7390 (19,3 %)
Dickdarm
35350 (27,5 %)
FRAUEN
Speiseröhre
1380 (42,7 %)
Brustdrüsen
71660 (16,7 %)
Niere
5540 (31,1 %)
Gallenblase/-weg
2890 (27,1 %)
Bauchspeicheldrüse
7570 (19,3 %)
Dickdarm
30040 (14,2 %)
Gebärmutterkörper
11280 (45,2 %)
ZEIT-GRAFIK/Quelle: Eugenia E. Calle, Rudolf Kaaks, »Nature Reviews Cancer 4«, 2004, »Krebs in Deutschland« (2012) Robert Koch Institut

Surg Laparosc Endosc Percutan Tech. 2014 Oct;24(5):400-5.

Gastric cancer following bariatric surgery: a review.

Orlando G[1], Pilone V, Vitiello A, Gervasi R, Lerose MA, Silecchia G, Puzziello A.

BACKGROUND:
Bariatric procedures can induce a massive weight loss that lasts for >15 years after surgery; in addition, they achieve important metabolic effects including diabetes resolution in the majority of morbidly obese patients. However, some bariatric interventions may cause gastroesophageal reflux disease and other serious complications. The aim of our study is to evaluate the risk of cancer after bariatric surgery.
METHODS:
We conducted a review of the literature about the cases of gastric cancer arising after any bariatric procedure, including a case of adenocarcinoma incidentally discovered by the authors 6 months after laparoscopic adjustable gastric banding.
RESULTS:
Globally, 17 case reports describing 18 patients were retrieved, including the case study by the authors. The diagnosis of tumor was at a mean of 8.6 years after bariatric surgery, 9.3 years after RYGB, and 8.1 years after restrictive procedures. The adenocarcinoma represented most cases (15 patients, 83%). In the patients with RYGB, the adenocarcinoma was localized in the excluded stomach in 5 patients (83%) and in the pouch in 1 patient (17%). After a restrictive procedure, the cancer was localized in the pouch in 5 patients (62.5%), in the pylorus in 2 patients (25%), and in lesser curvature only in 1 patient (12.5%).
CONCLUSIONS:
There is a lack of evidence about a connection between the late occurrence of gastric adenocarcinoma and the bariatric surgery. For this reason, although the preoperative upper endoscopy is still mandatory, there is no need for a regular endoscopic evaluation of patients after surgery.

Endocrinol Nutr. 2015 Mar;62(3):138-43.

Does bariatric surgery reduce cancer risk? A review of the literature.

Maestro A[1], Rigla M[1], Caixàs A[2].

INTRODUCTION:
Bariatric surgery has been shown to provide sustained weight loss and to decrease obesity-related mortality in most patients with morbid obesity, but its effect on cancer risk is less clear. Our aim was to review the published studies on the association between bariatric surgery and cancer risk.
METHODS:
A literature search for relevant articles published in English, with no limitation on the year of publication, was conducted using PubMed. Studies reporting data on preoperative cancer, case reports, and publications with no abstract available were excluded.
RESULTS:
Overall, the published literature suggests that bariatric surgery may decrease risk of cancer, although this effect appears to be limited to women. However, two recent studies contradict these findings and state that risk of cancer has not been actually shown to decrease after surgery, and an increased risk of colorectal cancer has even been seen. Although most studies report lower cancer risk after bariatric surgery, the main limitations include their designs, which do not achieve the highest levels of evidence. Moreover, several mechanisms have been proposed to explain the protective effect of surgery, but the exact mechanisms have not been elucidated yet, which suggests the need for further research.
CONCLUSIONS:
Bariatric surgery may have a protective effect from overall cancer risk, mainly in women, but additional research is needed. Further research is also required to better examine the relationship between bariatric surgery and risk of colorectal cancer before confirming or dismissing the above reported higher risk, as well as the risk of esophagogastric cancer, which has not been adequately studied to date.

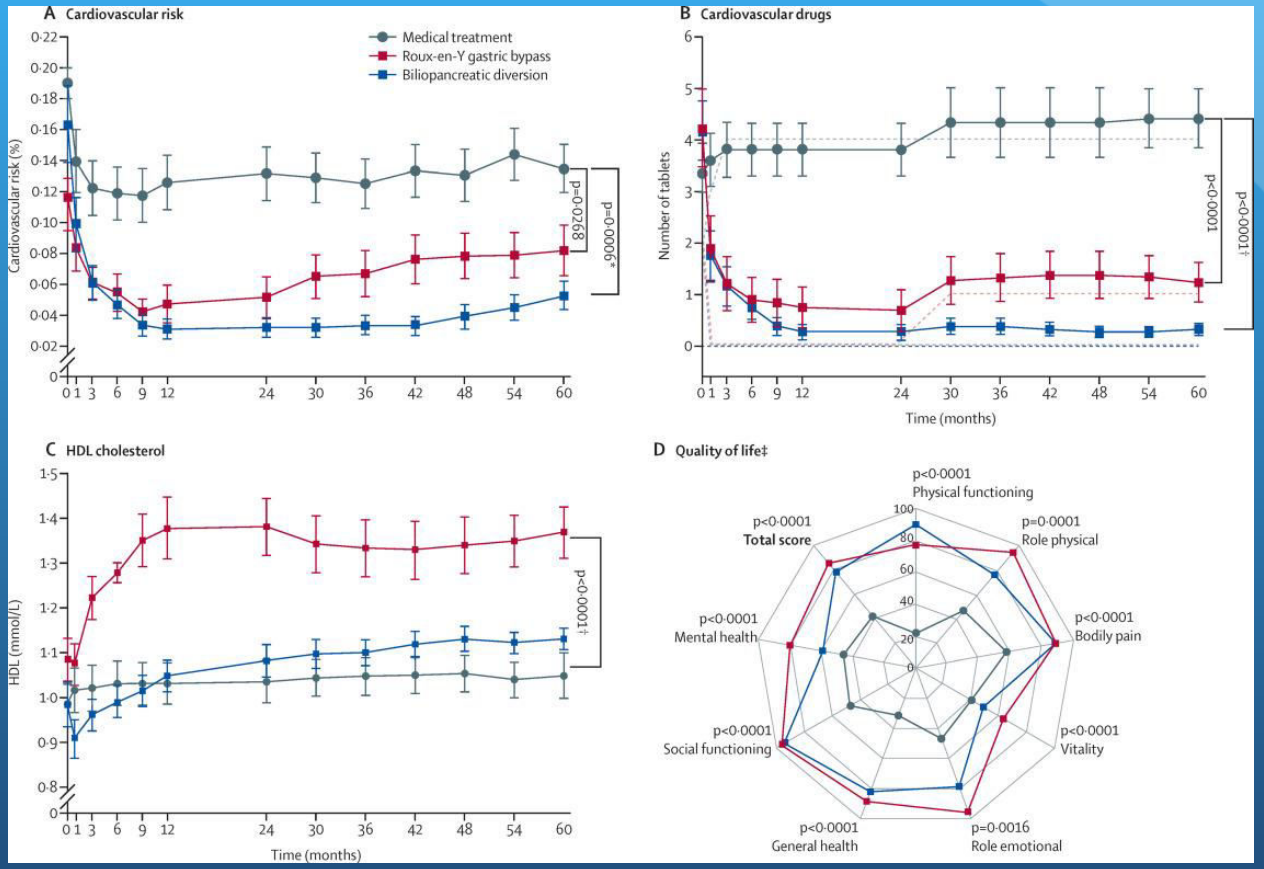
Surg Obes Relat Dis. 2015 Jul-Aug;11(4):949-55.

Bariatric surgery and risk of postoperative endometrial cancer: a systematic review and meta-analysis.

Upala S[1], Anawin Sanguankeo[2].

BACKGROUND:
Bariatric surgery is an essential intervention for severely obese patients who fail medical treatment. It has been linked to improvements in cardiovascular and cerebrovascular disease. However, its effect on endometrial cancer risk is still unknown. This is a systematic review and meta-analysis of available studies on bariatric surgery and risk of postoperative endometrial cancer. The objective of this study was to explore the association between bariatric surgery and endometrial cancer risk.
METHODS:
A comprehensive search of the databases of PubMed/MEDLINE, EMBASE, and CENTRAL was performed from their dates of inception to July 2014. The inclusion criterion was articles on bariatric surgery and incidence of endometrial cancer after the procedure. Two authors independently assessed the quality of the articles and extracted the data.
RESULTS:
From 159 full-text articles, 6 observational studies met the inclusion criterion, and 3 studies involving 890,110 participants were included in the meta-analysis based on the random effects model. There was a reduced risk of endometrial cancer postoperatively in those receiving bariatric surgery compared with controls with pooled relative risk = .40 (95% CI: .20-.79).
CONCLUSIONS:
Bariatric surgery is associated with a reduced risk of endometrial cancer after the procedure. However, more randomized controlled studies are needed to provide better quality of evidence.

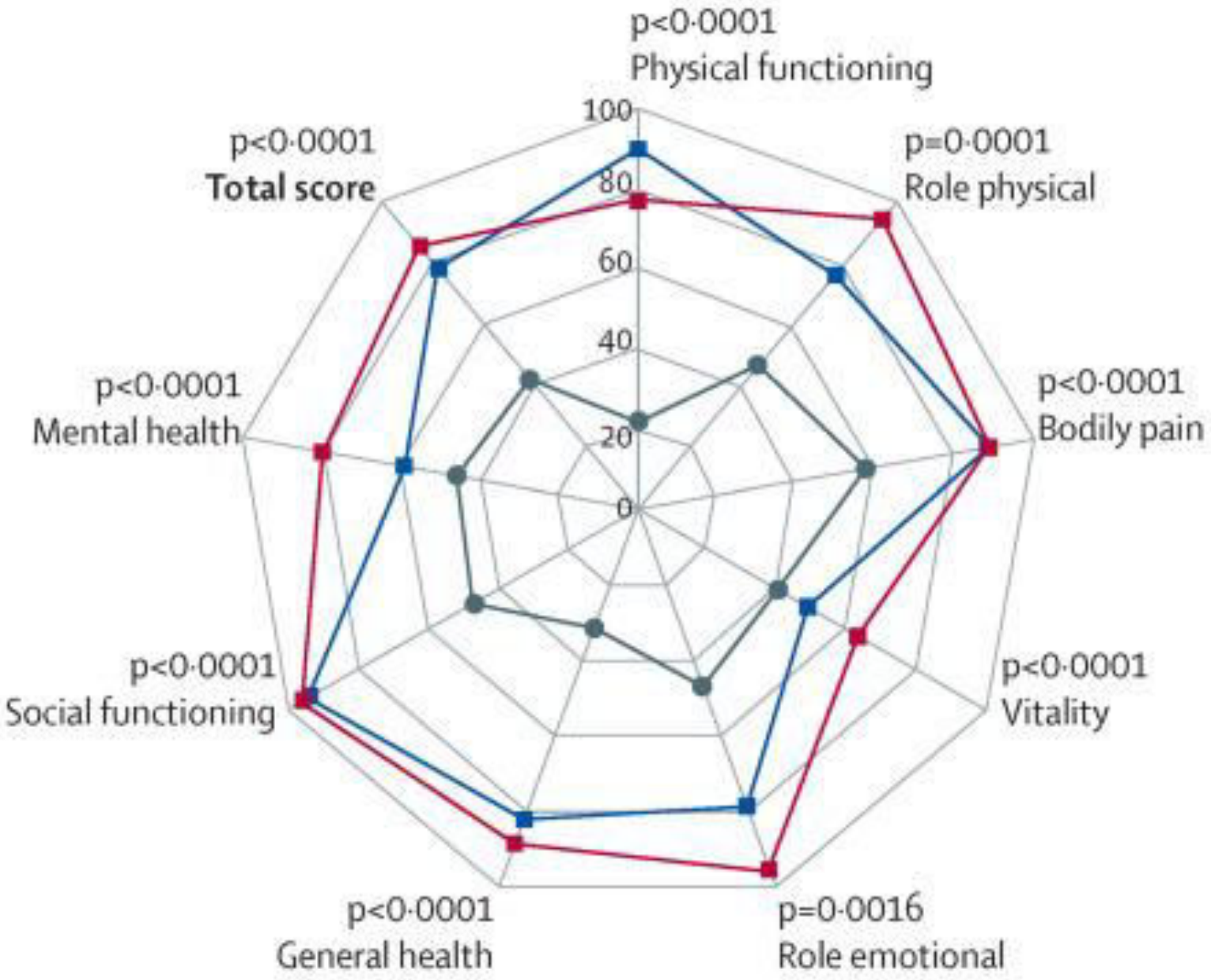
Quality of Life



"THE QUALITY OF LIFE IS MORE IMPORTANT THAN LIFE ITSELF."

Time (months)

D **Quality of life‡**



Acta Clin Belg. 2016 May 3:1-8.

Long-term effects of gastric bypass surgery on psychosocial well-being and eating behavior: not all that glitters is gold.

Vangoitsenhoven R[1,2], Frederiks P[2], Gijbels B[1], Lannoo M[1,3], Van der Borght W[2], Van den Eynde A[2], Mertens A[1,2], Mathieu C[1,2], Van der Schueren B[1,2].

OBJECTIVES:
The aim of this pilot study was to evaluate long-term effects of Roux-en-Y gastric bypass (RYGB) on physical and psychosocial health as well as eating behavior of obese patients.
METHODS:
We compared 23 patients 7 years after RYGB to 23 body mass index (BMI), sex, and age matched obese control patients by means of self-reporting questionnaires: Hospital Anxiety and Depression Scale (HADS), Quality of Life Enjoyment and Satisfaction Questionnaire - Short Form (Q-LES-Q SF), Dutch Eating Behavior Questionnaire (DEBQ), and Alcohol Use Disorders Identification Test (AUDIT). Data are presented as median ± interquartile rage.
RESULTS:
Physical health had improved and body image (80 ± 25% vs. 20 ± 49%, $p < 0.001$) was better in post-RYGB patients when compared to controls. HADS-depression score (4 ± 8 vs. 11 ± 9; $p = 0.005$) was lower post-RYGB. Satisfaction with physical health (2 ± 2 vs. 2 ± 1, $p = 0.037$), daily life functioning (4 ± 2 vs. 2 ± 2, $p = 0.050$), and hobbies (4 ± 1 vs. 2 ± 2, $p = 0.011$) was higher post-RYGB, but social relationships and sexual performance were not perceived as superior. In addition, post-RYGB patients were more prone to eat on external cues (13 ± 7 vs. 19 ± 13; $p = 0.007$).
CONCLUSION:
Seven years post-RYGB, patients reported a significant improvement of physical health and higher satisfaction with daily life, but not with social relationships or sexual performance. Eating behavior post-RYGB was more influenced by external cues.

Engl J Med. 2004 Dec 23;351(26):2683-93.

Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery.

Sjöström L[1], Lindroos AK, Peltonen M, Torgerson J, Bouchard C, Carlsson B, Dahlgren S, Larsson B, Narbro K, Sjöström CD, Sullivan M, Wedel H; Swedish Obese Subjects Study Scientific Group.

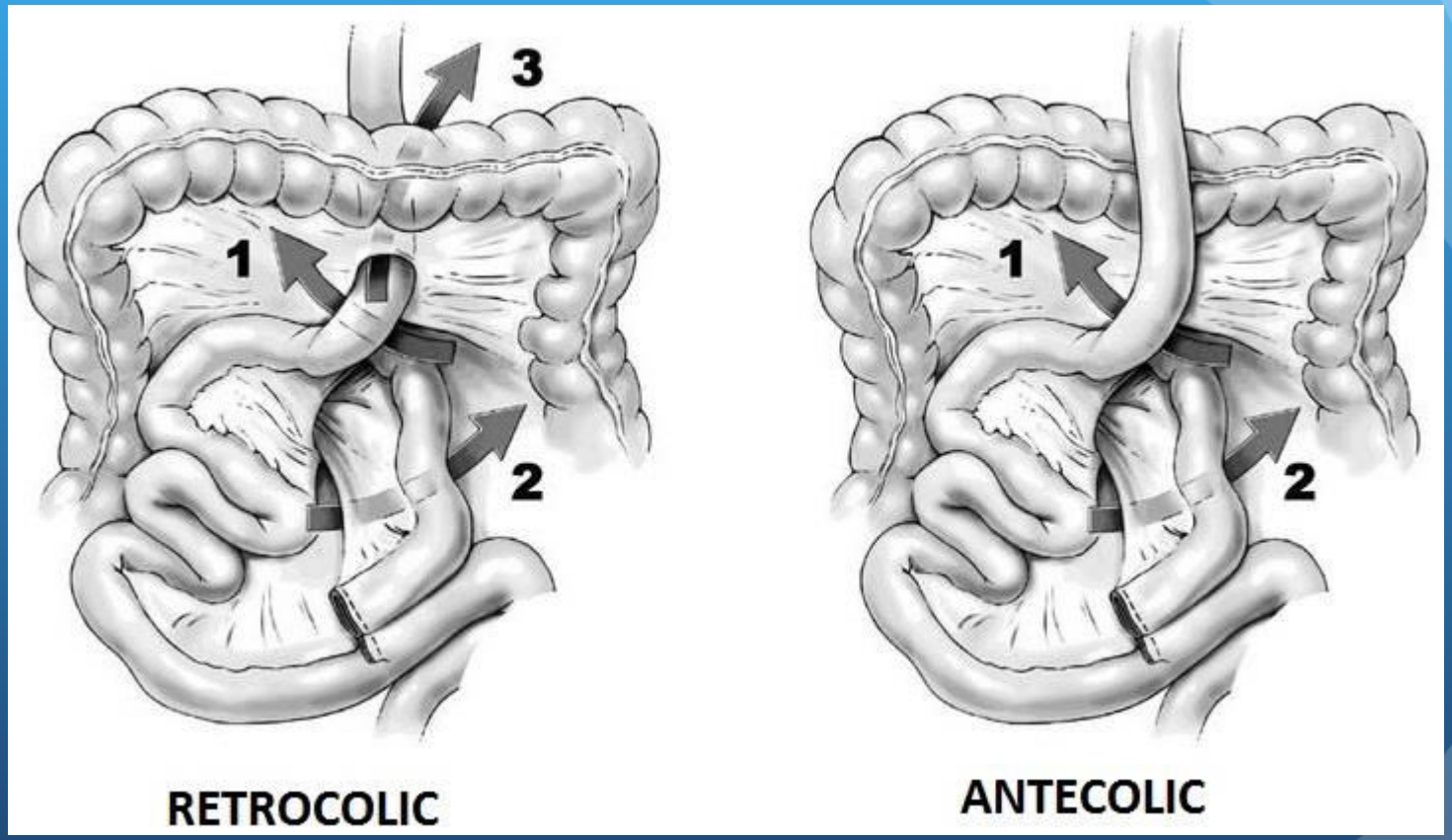
BACKGROUND:
Weight loss is associated with short-term amelioration and prevention of metabolic and cardiovascular risk, but whether these benefits persist over time is unknown.

METHODS:
The prospective, controlled Swedish Obese Subjects Study involved obese subjects who underwent gastric surgery and contemporaneously matched, conventionally treated obese control subjects. We now report follow-up data for subjects (mean age, 48 years; mean body-mass index, 41) who had been enrolled for at least 2 years (4047 subjects) or 10 years (1703 subjects) before the analysis (January 1, 2004). The follow-up rate for laboratory examinations was 86.6 percent at 2 years and 74.5 percent at 10 years.

RESULTS:
After two years, the weight had increased by 0.1 percent in the control group and had decreased by 23.4 percent in the surgery group ($P<0.001$). After 10 years, the weight had increased by 1.6 percent and decreased by 16.1 percent, respectively ($P<0.001$). Energy intake was lower and the proportion of physically active subjects higher in the surgery group than in the control group throughout the observation period. Two- and 10-year rates of recovery from diabetes, hypertriglyceridemia, low levels of high-density lipoprotein cholesterol, hypertension, and hyperuricemia were more favorable in the surgery group than in the control group, whereas recovery from hypercholesterolemia did not differ between the groups. The surgery group had lower 2- and 10-year incidence rates of diabetes, hypertriglyceridemia, and hyperuricemia than the control group; differences between the groups in the incidence of hypercholesterolemia and hypertension were undetectable.

CONCLUSIONS:
As compared with conventional therapy, bariatric surgery appears to be a viable option for the treatment of severe obesity, resulting in long-term weight loss, improved lifestyle, and, except for hypercholesterolemia, amelioration in risk factors that were elevated at baseline.

Innere Hernien



Obes Surg. 2006 Nov;16(11):1482-7.

Internal hernia after laparoscopic Roux-en-Y gastric bypass for morbid obesity: a continuous challenge in bariatric surgery.

Paroz A[1], Calmes JM, Giusti V, Suter M.

BACKGROUND:
Roux-en-Y gastric bypass (RYGBP) has long been associated with the possible development of internal hernias, with a reported incidence of 1-5%. Because it induces fewer adhesions than laparotomy, the laparoscopic approach to this operation appears to increase the rate of this complication, which can present dramatically.

METHODS:
Data from all patients undergoing bariatric surgery are introduced prospectively in a data-base. Patients who were reoperated for symptoms or signs suggestive of an internal hernia were reviewed retrospectively, with special emphasis on clinical and radiological findings, and surgical management.

RESULTS:
Of 607 patients who underwent laparoscopic primary or reoperative RYGBP in our two hospitals between June 1999 and January 2006, 25 developed symptoms suggestive of an internal hernia, 2 in the immediate postoperative period, and 23 later on, after a mean of 29 months and a mean loss of 14.5 BMI units. 9 of the latter presented with an acute bowel obstruction, of which 1 required small bowel resection for necrosis. Recurrent colicky abdominal pain was the leading symptom in the others. Reoperation confirmed the diagnosis of internal hernia in all but 1 patient. The most common location was the meso-jejunal mesenteric window (16 patients, 56%), followed by Petersen's window (8 patients, 27%), and the mesocolic window (5 patients, 17%). Patients in whom the mesenteric windows had been closed using running non-absorbable sutures had fewer hernias than patients treated with absorbable sutures at the primary procedure (1.3% versus 5.6%, P=0.03). Except in the acute setting, clinical and radiological findings were of little help in the diagnosis.

CONCLUSIONS:
Except in the setting of acute obstruction, clinical and radiological findings usually do not help in the diagnosis of internal hernia. A high index of suspicion, based mainly on the clinical history of recurrent colicky abdominal pain, is the only means to reduce the number of acute complications leading to bowel resection by offering the patient an elective laparoscopic exploration with repair of all the defects. Prevention by carefully closing all potential mesenteric defects with running non-absorbable sutures during laparoscopic RYGBP, which we consider mandatory, seems appropriate in reducing the incidence of this complication.

Dumping

Als **Dumping-Syndrom** bezeichnet man eine krankhaft beschleunigte Magenentleerung. Sie führt zu einer Vielzahl von Beschwerden, die sich entweder bereits innerhalb der ersten Stunde (Frühdumping) oder eine bis drei Stunden nach einer Mahlzeit (Spätdumping) bemerkbar machen. Das Dumping-Syndrom tritt besonders häufig nach Magenoperationen auf.

Früh-Dumping

Beim frühen Dumping-Syndrom stellen sich Beschwerden bereits innerhalb der ersten Stunde nach einer Mahlzeit ein. Typische Symptome sind etwa:

Völlegefühl
Übelkeit
Erbrechen
Blähungen
Bauchschmerzen
Durchfall
Magenknurren
Herzrasen
Ermüdbarkeit
Ohnmacht
Schwitzen
Kopfschmerzen
Blässe

Durch Teilentfernung des Magens mit Entfernung des Magenpförtners (Pylorus) am Magenausgang gelangt unverdünnter Speisebrei zu schnell vom Magen in den Dünndarm – er „stürzt“ gewissermaßen unkontrolliert in den Dünndarm, genauer: in die abführende Schlinge des Leerdarms (Jejunum). Das führt zu einer plötzlichen Dehnung des Dünndarms. Besonders problematisch sind sogenannte Speisen mit hohem osmotischem Druck, etwa Süßspeisen, Zucker, Milch. Sie bewirken ein starkes Konzentrationsgefälle zwischen dem Darminhalt und den Blutgefäßen in der Darmwand. Zum Ausgleich wird viel Flüssigkeit aus den Gefäßen in das Innere des Darms abgegeben. Die Folge ist eine Verringerung des Plasmavolumens in den Gefäßen, wodurch der Blutdruck deutlich sinken kann.
Außerdem kommt es zur plötzlichen Freisetzung verschiedener Substanzen aus der Darmwand wie dem Hormon Neurotensin. Dieses stimuliert unter anderem die Darmkontraktion.

Spät-Dumping

Beim selteneren späten Dumping-Syndrom kommt es erst ein bis drei Stunden nach einer Mahlzeit zu Beschwerden wie:

Schwitzen
Zittern
Schwäche
Konzentrationsstörung
Heißhunger
Bewusstseinstrübung

Beim späten Dumping-Syndrom stehen die Symptome einer Unterzuckerung (Hypoglykämie) im Vordergrund: Die schnelle Magenentleerung führt zu einer hohen Konzentration von Kohlenhydraten und Zucker (Glukose) im Darm. Diese werden rasch in den Blutkreislauf aufgenommen, was den Blutzuckerspiegel stark in die Höhe treibt (Überzuckerung = Hyperglykämie). Die Folge ist die Freisetzung einer exzessiven Menge des blutzuckersenkenden Hormons Insulin. Dieses sorgt für eine rasche Aufnahme des vielen Blutzuckers in die Körperzellen. Da Insulin längere Zeit im Blut zirkuliert, kann dies schließlich zu einem zu niedrigen Blutzuckerspiegel (Unterzuckerung = Hypoglykämie) führen. Daraus resultieren die verschiedenen Symptome beim späten Dumping-Syndrom wie Schwäche und Heißhunger.

Therapie

Beim frühen Dumping-Syndrom sind bestimmte Ernährungsregeln einzuhalten. Die Patienten sollten:

- die tägliche Kohlenhydratzufuhr einschränken und dabei komplexe Kohlenhydrate wie Vollkornprodukte, Kartoffeln, Gemüse den einfachen Kohlenhydraten (Zucker, Honig, Weißmehlprodukte) vorziehen;
- den Konsum von Milch und Milchprodukten verringern;
- mehrere kleine statt wenige große Mahlzeiten pro Tag zu sich nehmen;
- während einer Mahlzeit und in der ersten halben Stunde danach nichts trinken;

Beim späten Dumping-Syndrom, dessen Beschwerden vor allem auf der plötzlichen Unterzuckerung beruhen, kann im Akutfall Nahrungsaufnahme (vor allem Zucker) helfen.

Hepatogastroenterology. 2012 Nov-Dec;59(120):2530-2.

Diet behavior and low hemoglobin level after laparoscopic mini-gastric bypass surgery.

Chen MC[1], Lee YC, Lee WJ, Liu HL, Ser KH.

BACKGROUND/AIMS:
Nutrition problems caused by laparoscopic mini-gastric bypass surgery (LMGB) include lack of iron, calcium and poor nutrition. Iron deficiency anemia is the common. The purpose of this study was to investigate why our patients' hemoglobin level was at a low value after surgery and the relationship between diet frequency, diet behavior, and low hemoglobin level.
METHODOLOGY:
From January 2009 to April 2010, 120 patients who received laparoscopic mini-gastric bypass surgery were included in this study. Among all patients, there were 34 men and 86 women. Hemoglobin level of male patients less than 13mg/dL and that of female patients less than 11.5mg/dL was defined as anemia. The clinical characteristics and diet behavior were analyzed.
RESULTS:
The mean age was 30.9±10.5 years and the mean body mass index was 41.4±7.2kg/m2. Before and after surgery, the proportion of anemia was 4.1% and 26.6%, respectively. The proportion of anemia in females increased more than in males. Hemoglobin level after surgery showed positive correlation ($p<0.05$) with the diet frequency of high protein, sugar drinks with balanced formula, alcoholic drinks and exercise, but negative correlation ($p<0.01$) with iron supplements.
CONCLUSIONS:
The study concluded that patients after laparoscopic mini-gastric bypass surgery should increase the ingestion of high-protein drinks or food, alcoholic drinks and exercise, to prevent a low hemoglobin level.

Fettleber / Gallensteine / Reflux

Ist die Fettleber bald

Volkskrankheit

Nummer eins?

Int J Obes (Lond). 2015 Nov;39(11):1565-74.

The role of bile acids in reducing the metabolic complications of obesity after bariatric surgery: a systematic review.

Penney NC[1], Kinross J[1], Newton RC[1], Purkayastha S[1].

BACKGROUND:
Bariatric surgery is currently the most efficacious treatment for obesity and its associated metabolic co-morbidities, such as diabetes. The metabolic improvements occur through both weight-dependent and weight-independent mechanisms. Bile acids (BAs) have emerged as key signalling molecules that have a central role in modulating many of the physiological effects seen after bariatric surgery. This systematic review assesses the evidence from both human and animal studies for the role of BAs in reducing the metabolic complications of obesity following bariatric surgery.
METHODS:
We conducted a systematic search of Medline and Embase databases to identify all articles investigating the role of BAs in mediating the metabolic changes observed following bariatric surgery in both animal and human studies. Boolean logic was used with relevant search terms, including the following MeSH terms: 'bile acids and salts', 'bariatric surgery', 'metabolic surgery', 'gastrointestinal tract/surgery' and 'obesity/surgery'.
RESULTS:
Following database searches (n=1197), inclusion from bibliography searches (n=2) and de-duplication (n=197), 1002 search results were returned. Of these, 132 articles were selected for full-text review, of which 38 articles were deemed relevant and included in the review. The findings support the effects of BAs on satiety, lipid and cholesterol metabolism, incretins and glucose homoeostasis, energy metabolism, gut microbiota and endoplasmic reticulum stress following bariatric surgery. Many of these metabolic effects are modulated through the BA receptors FXR and TGR5. We also explore a possible link between BAs and carcinogenesis following bariatric surgery.
CONCLUSIONS:
Overall there is good evidence to support the role of BAs in the metabolic effects of bariatric surgery through the above mechanisms. BAs could serve as a novel therapeutic pharmacological target for the treatment of obesity and its associated co-morbidities.

Am J Surg. 2015 Dec;210(6):1010-6;

Management of biliary symptoms after bariatric surgery.

Brockmeyer JR[1], Grover BT[2], Kallies KJ[3], Kothari SN[4].

BACKGROUND/AIM:
Bariatric surgery has proven efficacy in the modulation of a number of gut peptides that can contribute to improvement of diabetes and its associated metabolic changes. In order to evaluate dietary intake, nutritional assessment and plasma levels of gastrointestinal peptides, we enrolled severely obese patients before and after bariatric surgery.
PATIENTS AND METHODS:
We evaluated food intake, plasma levels of peptide YY (PYY), glucagon-like peptide-1/2 (GLP-1/2), ghrelin (GHR), orexin (ORE) and cholecystokinin (CCK), body composition and fecal microbiota in 28 severely obese patients and 28 healthy normal-weight controls. All parameters were evaluated at 0 time and 6 months after bariatric surgery.
RESULTS:
In obese patients we found a higher intake of nutrients, a decrease of free fat mass and an increase of BMI (body mass index), a significant decrease of GLP-1 and an increase of GLP-2, GHR and PYY with respect to controls, further increase in GLP-2, GHR and PYY, as well as increase over control values of GLP-1 after bariatric surgery. Obese individuals were found to harbor a community dominated by members of the Clostridial clusters XIVa and IV, whereas prominent bands after surgery were identified as Lactobacillus crispatus and Megasphaera elsdenii-related phylotype.
CONCLUSION:
The beneficial effects of bariatric surgery may at least in part be accounted for changes in circulating gastrointestinal (GI) peptides and fecal microbiota.

Surg Obes Relat Dis. 2016 Jan;12(1):62-9.

Effects of omega-loop bypass on esophagogastric junction function.

Tolone S[1], Cristiano S[2], Savarino E[3], Lucido FS[2], Fico DI[2], Docimo L[4].

BACKGROUND:
At present, no objective data are available on the effect of omega-loop gastric bypass (OGB) on gastroesophageal junction and reflux.
OBJECTIVES:
To evaluate the possible effects of OGB on esophageal motor function and a possible increase in gastroesophageal reflux.
SETTING:
University Hospital, Italy; Public Hospital, Italy.
METHODS:
Patients underwent clinical assessment for reflux symptoms, and endoscopy plus high-resolution impedance manometry (HRiM) and 24-hour pH-impedance monitoring (MII-pH) before and 1 year after OGB. A group of obese patients who underwent sleeve gastrectomy (SG) were included as the control population.
RESULTS:
Fifteen OGB patients were included in the study. After surgery, none of the patients reported de novo heartburn or regurgitation. At endoscopic follow-up 1 year after surgery, esophagitis was absent in all patients and no biliary gastritis or presence of bile was recorded. Manometric features and patterns did not vary significantly after surgery, whereas intragastric pressures (IGP) and gastroesophageal pressure gradient (GEPG) statistically diminished (from a median of 15 to 9.5, P<.01, and from 10.3 to 6.4, P<.01, respectively) after OGB. In contrast, SG induced a significant elevation in both parameters (from a median of 14.8 to 18.8, P<.01, and from 10.1 to 13.1, P<.01, respectively). A dramatic decrease in the number of reflux events (from a median of 41 to 7; P<.01) was observed after OGB, whereas in patients who underwent SG a significant increase in esophageal acid exposure and number of reflux episodes (from a median of 33 to 53; P<.01) was noted.
CONCLUSIONS:
In contrast to SG, OGB did not compromise the gastroesophageal junction function and did not increase gastroesophageal reflux, which was explained by the lack of increased IGP and in GEPG as assessed by HRiM.

Fettstühle – sekundäre exokrine Pankreasinsuffizienz

Verschiedene Ursachen können zur Ausbildung der Erkrankung beitragen. Bei Kindern ist die Mukoviszidose, eine angeborene Erbkrankheit, die häufigste Ursache für eine exokrine Pankreasinsuffizienz.Bei Erwachsenen steigt die Wahrscheinlichkeit für die Entwicklung einer exokrinen Pankreasinsuffizienz nach einer akuten Entzündung der Bauchspeicheldrüse (Pankreatitis) mit der Schwere der Entzündung und dem Ausmaß an Gewebsuntergang (Nekrose) an. Neben einer akuten oder chronischen Pankreatitis können auch genetische oder idiopathische Erkrankungen zur Zerstörung der in der Bauchspeicheldrüse liegenden Azinuszellen führen. Dadurch wird eine eingeschränkte Produktion der Enzyme bzw. Enzymvorläufer Trypsinogen, Chymotrypsinogen, Carboxypeptidase, α-Amylase und Pankreaslipase verursacht. Das Fehlen dieser Enzyme bedingt wiederum eine erhebliche Störung der Verdauung mit der Nahrung aufgenommener Nährstoffe (Maldigestion). Sekundär kommt es zu Veränderungen der Darmschleimhaut: Darmzotten atrophieren, es kommt zu lokalen Entzündungen und Veränderungen der Enzymaktivität innerhalb der Darmschleimhaut. Eine bakterielle Fehlbesiedlung (Dünndarmfehlbesiedlung) des Darmes kommt häufig erschwerend dazu.

Zur Behandlung stehen für Menschen Verdauungsenzyme der Bauchspeicheldrüse als Medikamente mit dem Wirkstoff Pankreatin zur Einnahme mit den Mahlzeiten zur Verfügung. Darin sind die notwendigen Enzyme magensaftresistent überzogen verpackt, so dass sie erst im Dünndarm freigesetzt werden und zur Wirkung kommen. Im Weiteren sollte die Kost aus kohlenhydratreichen kleinen Mahlzeiten (5–7 pro Tag) bestehen. Gegebenenfalls sollten die fettlöslichen Vitamine A, D, E, und K substituiert werden.

Surg Obes Relat Dis. 2015 Oct 31. pii: S1550-7289(15)01026-6. doi: 10.1016/j.soard.2015.10.084. [Epub ahead of print]

Exocrine Pancreatic Insufficiency after Roux-en-Y gastric bypass.

Borbély Y[1], Plebani A[2], Kröll D[2], Ghisla S[2], Nett PC[2].

BACKGROUND:
Gastric resection, short bowel syndrome, and diabetes mellitus are risk factors for development of exocrine pancreatic insufficiency (EPI). Reasons are multifactorial and not completely elucidated.
OBJECTIVES:
To determine the prevalence of EPI after distal (dRYGB) and proximal Roux-en-Y gastric bypass (pRYGB) and to assess the influence of respective limb lengths.
SETTING:
University hospital, Switzerland.
METHODS:
The study comprised 188 consecutive patients who underwent primary dRYGB (common channel<120 cm, biliopancreatic limb 80-100 cm) or pRYGB (alimentary limb = 155 cm, biliopancreatic limb 40-75 cm) and who were followed-up for at least 2 years. Patients with a history of gastrointestinal or hepatobiliary resection (except for cholecystectomy), postoperative pregnancy, and any revision of RYGB (gastric pouch, limb lengths) were excluded. EPI was defined by clinical symptoms in combination with fecal pancreatic elastase-1<200 μg/g stool or fecal pancreatic elastase-1>200 and<500 μg/g stool and positive dechallenge-rechallenge test with pancreatic enzyme replacement therapy.
RESULTS:
Mean follow-up was 52.2 months (range 24-120). Seventy-nine patients (42%) underwent dRYGB, and 109 (58%) underwent pRYGB. Of those, 59 (31%) patients were diagnosed with EPI after a mean 12.5±16.3 months. There was a significant difference between dRYGB and pRYGB groups in initial body mass index (dRYGB 47.1±8.1 kg/m^2 versus pRYGB 42.7±6.1 kg/m^2; P<.01), patients in Obesity Surgery Mortality Risk Score group C (13% versus 3%; P = .02), and prevalence of EPI (48% versus 19%; P<.01). Neither overall small bowel length nor absolute or relative limb lengths were influencing factors on EPI after dRYGB.

Zusammenfassung

Globalisiertes Problem

Prävention

Multidisziplinäre Zusammenarbeit

Qualitätssicherung

....

Zusammenfassung

Globalisiertes Problem

Prävention

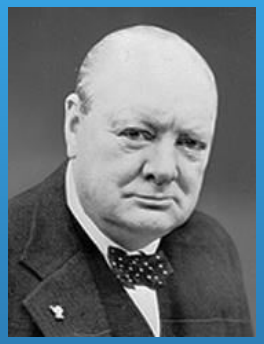
Multidisziplinäre Zusammenarbeit

Qualitätssicherung

....

Endokrinologische Themen reduzieren die Lebenserwartung eines Chirurgen

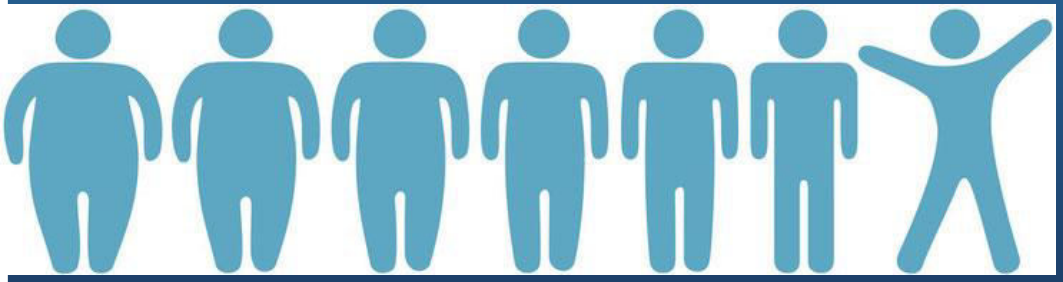
Österreich wird vermutlich nicht Fußball-Europameister



Ein leidenschaftlicher Raucher, der immer von der Gefahr des Rauchens für die Gesundheit liest, hört in den meisten Fällen auf - zu lesen.

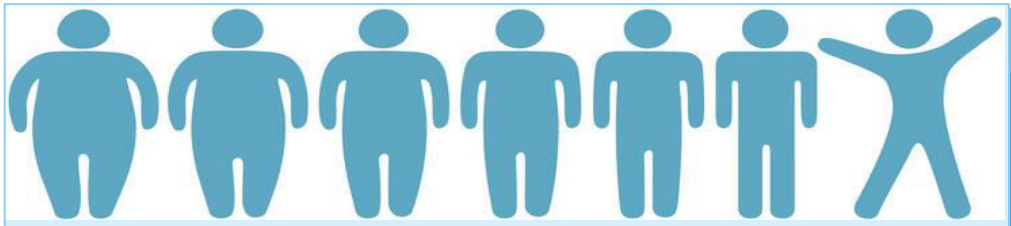
Winston Churchill

Danke für Ihre Aufmerksamkeit



OA Dr. Strutzmann Johannes

LKH Wolfsberg



Das Landeskrankenhaus Wolfsberg und die

Abteilung für Allgemein- und Viszeralchirurgie

lädt Sie herzlich ein

Wolfsberger Adipositastage

save the date

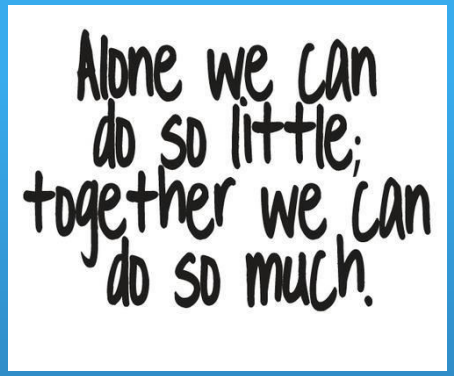
Adipositas –

Eine interdisziplinäre Herausforderung

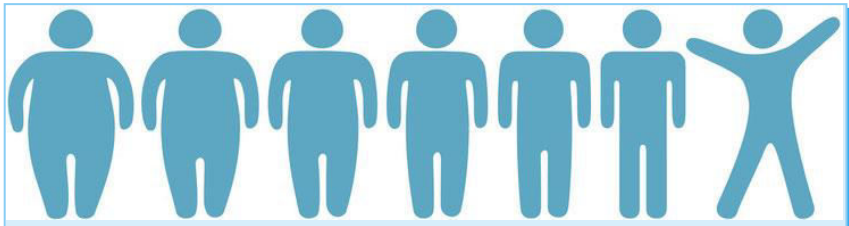
28. – 29.10.2016

Hotel Moselebauer, Bad St. Leonhard

Konklusio



...take home message



Das Landeskrankenhaus Wolfsberg und die

Abteilung für Allgemein- und Viszeralchirurgie

lädt Sie herzlich ein

Wolfsberger Adipositastage

Adipositas –

Eine interdisziplinäre Herausforderung

28. – 29.10.2016

Hotel Moselebauer, Bad St. Leonhard

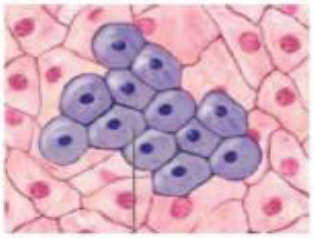
OP-Workshop 06./07.11.2016

"Adipositas-Zentrum in der Peripherie"

OA Dr. Johannes Strutzmann
LKH Wolfsberg
Abteilung für Chirurgie
Paul-Hackhofer Str. 9
A-9400 Wolfsberg

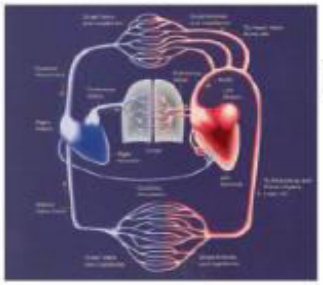
Sonntag	**06.11.2016**	
Ab 16:00	Anreise und Check-in	Seeparkhotel 9020 Klagenfurt
18:00	Abendessen	Seeparkhotel
Montag	**07.11.2016**	
07:50	Treffpunkt Chirurgisches Sekreteriat	LKH Wolfsberg Abteilung für Chirurgie Paul-Hackhofer Str. 9
	Begrüßung Besprechung Op-Programm	Prim. Dr. Schlapper Dusan OA Dr. Strutzmann Johannes
	Live Operationen es werden 3 Eingriffe durchgeführt folgende Techniken werden präsentiert Omega Loop Magenbypass Y-Roux Magenbypass Sleeve Gastrektomie Vorträge Während der Umlagerung der Patienten werden folgende Themen vertieft Indikation Operationstechnik Patienten Managment Outcome	OA Dr. Strutzmann Johannes OA Dr. Krainer Klaus Ass. Dr. Inkret Valeskini Karin
11:00-14:00	Snacks	werden im Krankenhaus angeboten
15:00	Zusammenfassung des Tages und Verabschiedung der Teilnehmer Abreise	OA Dr. Strutzmann Johannes

Änderungen vorbehalten



Modulation of cell proliferation and survival

Influence on food intake, sleep and behaviour

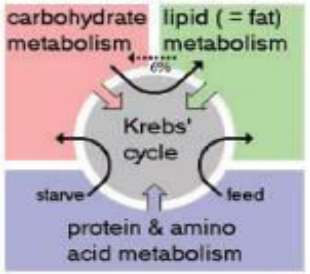


Influence on cardiac performances and vascular resistances

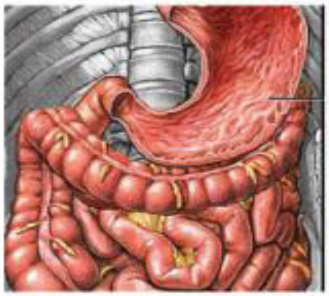
Stimulation of GH, PRL, ACTH and AVP secretion; Inhibition of gonadotropin secretion

ghrelin

Influence on energy metabolism

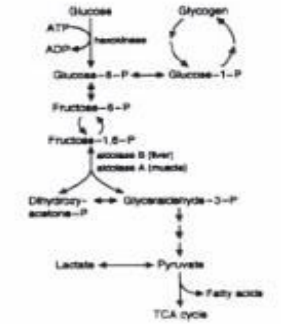


Influence on gastric acid secretion and motility



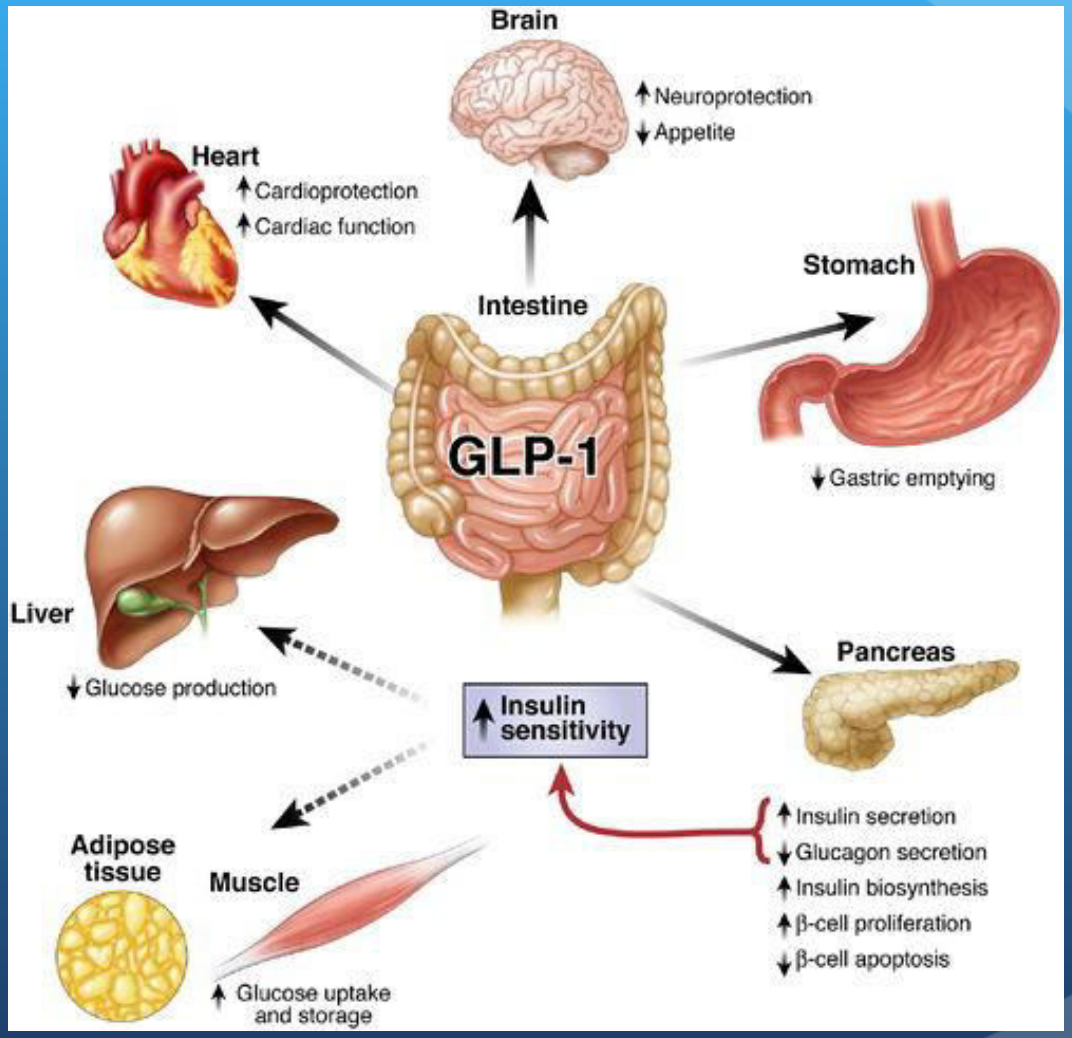
Influence of exocrine and endocrine pancreatic function

Influence on glucose metabolism



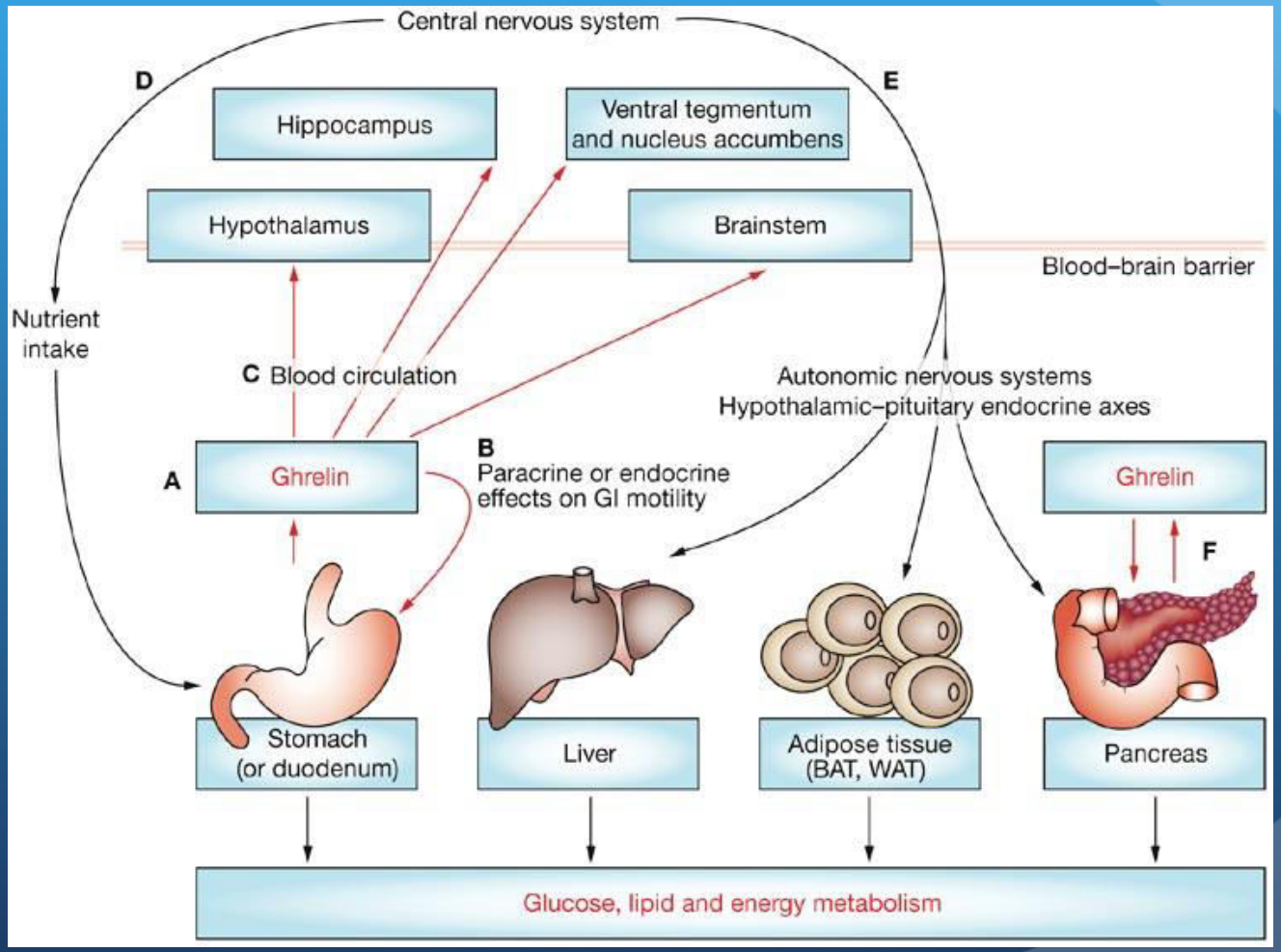
(Lely et al., 2004)

GLP - 1


Brain
↑Neuroprotection
↓Appetite
Heart
↑Cardioprotection
↑Cardiac function
Intestine
Stomach
GLP-1
↓Gastric emptying
Liver
↓Glucose production
Pancreas
↑Insulin sensitivity
↑Insulin secretion
↓Glucagon secretion
↑Insulin biosynthesis
↑β-cell proliferation
↓β-cell apoptosis
Adipose tissue
Muscle
↑Glucose uptake and storage

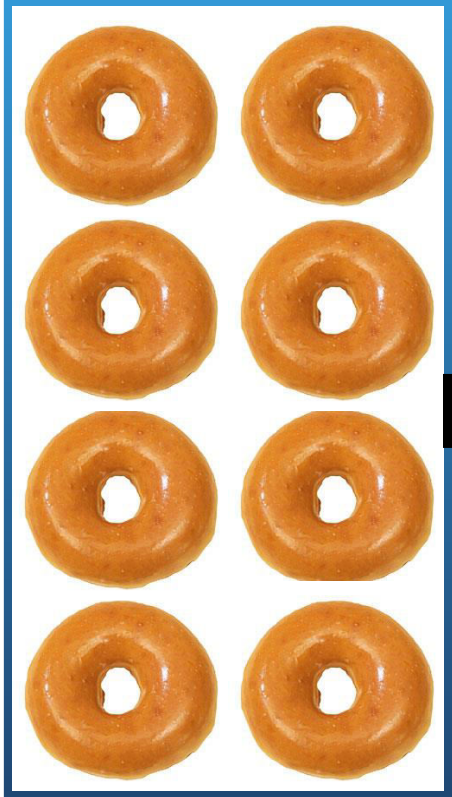
ghrelin
the hunger hormone

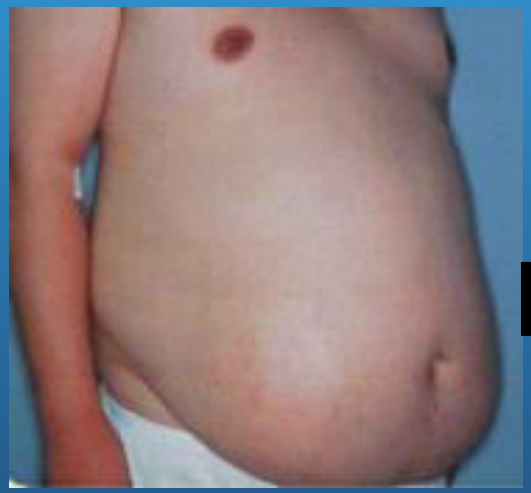
Ghrelin

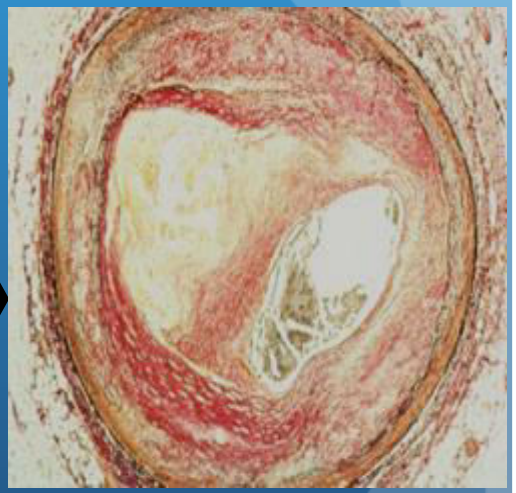


Arteriosklerose

The Simplified Model







Mikrobiomforschung

Die Mikrobiomforschung hat sich im Tempo eines wissenschaftlichen Senkrechtstarters etabliert. Die neue Forschungsrichtung lässt bislang ungeahnte Zusammenhänge in der Steuerung des menschlichen Körpers erkennen

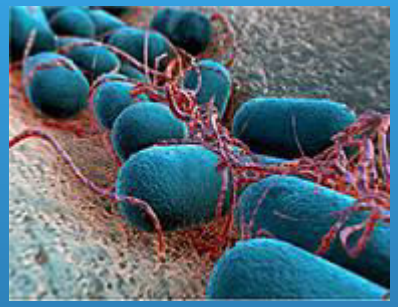
Seit Langem wird ein Zusammenhang zwischen Zusammensetzung und Funktion von Darmmikrobiom und Fettstoffwechsel vermutet. Mittlerweile belegen zahlreiche Studien, dass es solche Interaktionen gibt. Die Untersuchungen zeigen ein grundsätzliches Problem der Mikrobiomforschung auf: Es ist ausgesprochen schwierig, eine Ursache-Wirkungs-Kette zu beweisen.

Eine der zahlreichen Achsen, über die das Darmmikrobiom seine Wirkung auf andere Körpersysteme entfaltet, führt geradewegs ins Zentralnervensystem. Zumindest im Tierversuch ist nachgewiesen, dass die Zusammensetzung der Darmflora, genauer das Genom aller Bakterienpopulationen und die Summe ihrer Funktonen, auch das psychische Wohlbefinden erheblich beeinflusst

Forscher aus der Gruppe von Jeffrey Gordon von der Washington University in St. Louis, USA, gingen noch einen Schritt weiter. Sie transplantierten das Darmmikrobiom von übergewichtigen Labormäusen in das von keimfrei aufgezogenen Versuchstieren, die keine eigene Darmflora hatten. Bei normalem Futter wurden die Transplantatempfänger anschließend übergewichtig.

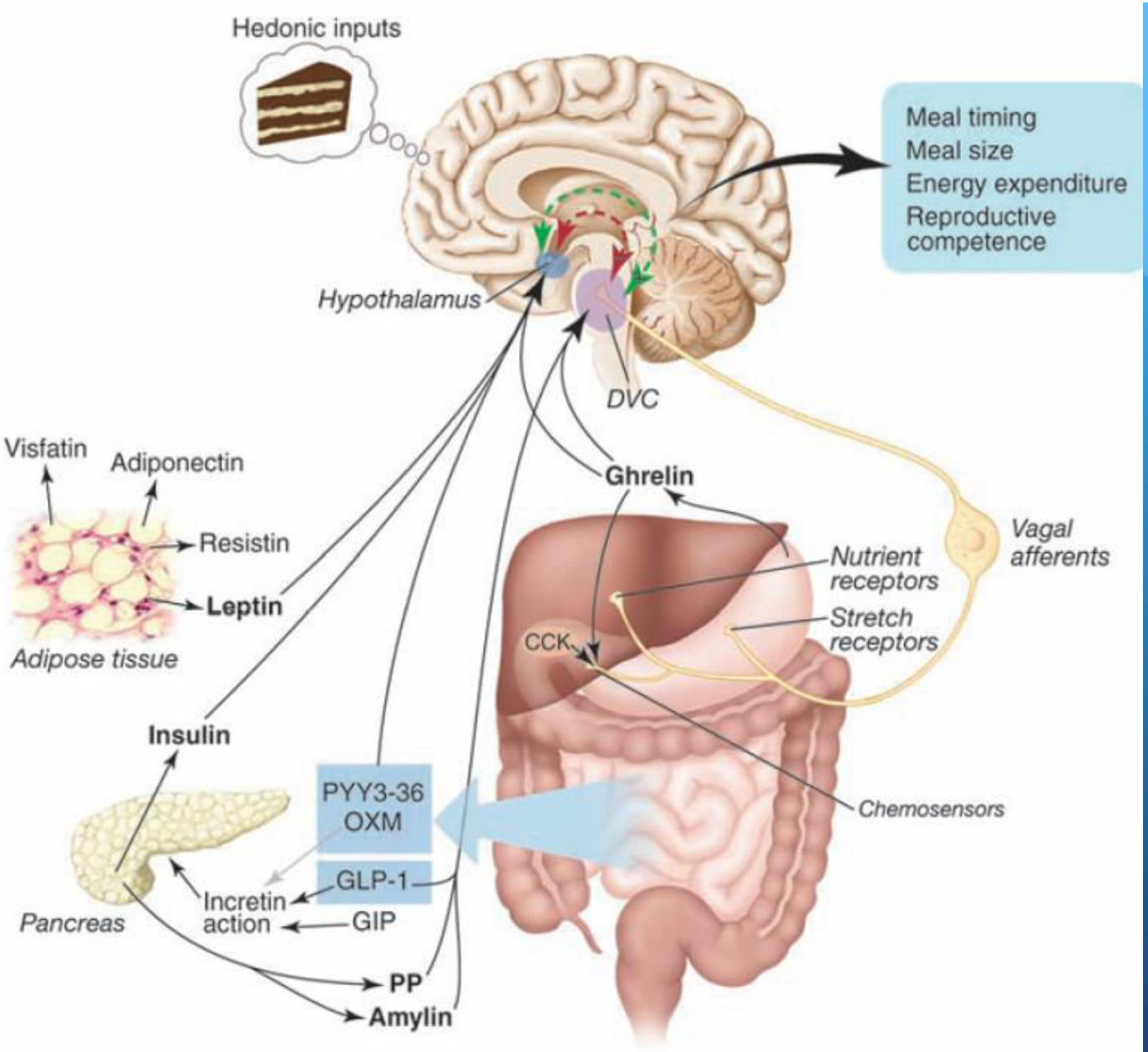
Fettreiches Futter macht Mäuse dick. Dabei verändert sich ihre Darmflora. Bei normaler Ernährung normalisiert sich auch ihr Darmmikrobiom wieder.

Bekannt ist, dass Magenbypass-Operationen an Mäusen mit einer Veränderung der Darmflora und Gewichtsabnahme einhergehen und metabolische Störungen wie Typ-2-Diabetes verbessern können. Nun haben Wissenschaftler um Valentina Tremaroli von der Universität Göteborg 14 Patientinnen, die sich einer Roux-Y-Operation oder einer vertikalen Gastroplastik unterzogen hatten, etwa neun Jahre nachbeobachtet und ihr Darmmikrobiom untersucht. Als Kontrolle dienten Frauen mit ähnlichem Body-Mass-Index (BMI), die aber nicht operiert worden waren.

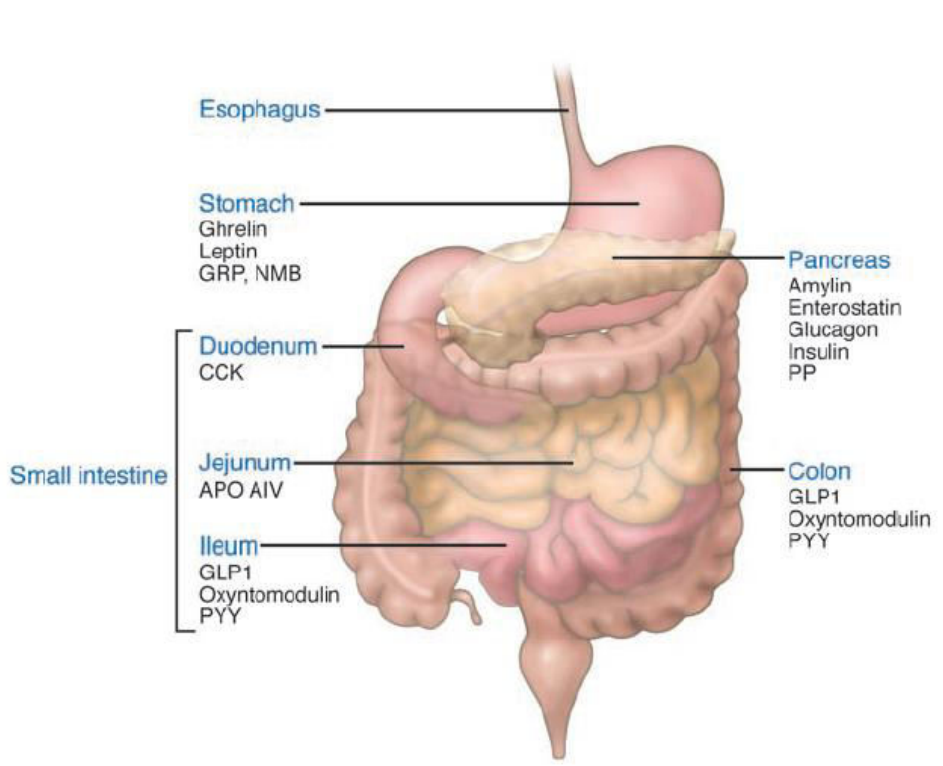


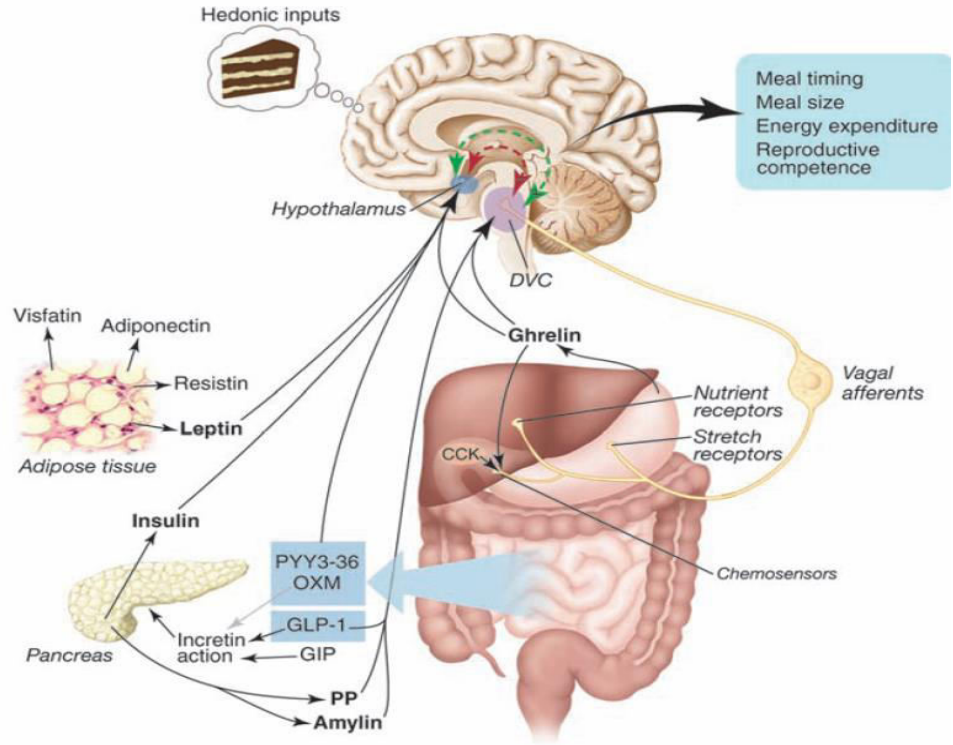
In der Darmflora der operierten Patientinnen war insbesondere der Anteil von Protobakterien erhöht, die wegen ihrer proentzündlichen Eigenschaften generell als weniger förderlich gelten. Plasma-Analysen von C-reaktivem Protein zeigten jedoch bei den Operierten keine erhöhten Entzündungswerte im Vergleich zur Kontrollgruppe. Die Unterschiede in der Zusammensetzung der Darmflora waren unabhängig vom BMI: Bei gleichem BMI zeigten Stuhlproben von operierten Patientinnen eine Veränderung der Darmbakterien, jene von nicht operierten hingegen nicht, berichten die Forscher im Fachjournal »Cell Metabolism« (DOI: 10.1016/j.cmet.2015.07.009).

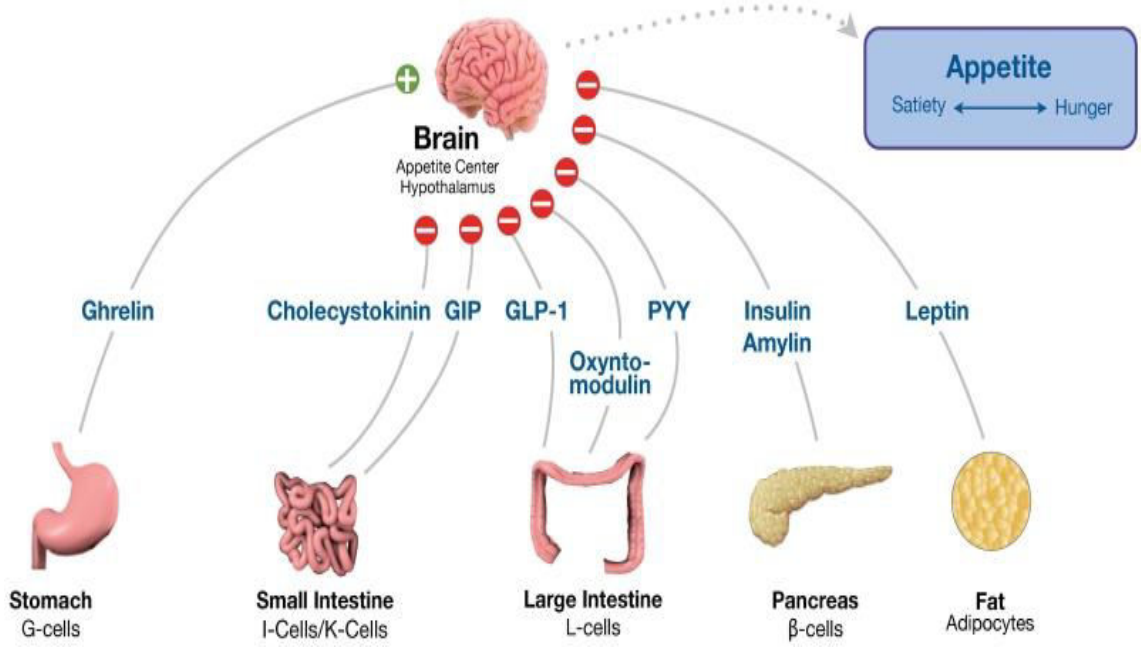
Die Veränderung der Bakterienzusammensetzung beeinflusst Stoffwechselvorgänge wie das Phosphotransferase-System und der Fettsäure-Stoffwechsel. Das demonstrierten die Forscher in einem Tierexperiment mittels Transfer von Stuhlproben auf keimfreie Mäuse: Bei gleicher Ernährung nahmen Mäuse, die das Darmmikrobiom von operierten Patientinnen erhalten hatten, weniger an Gewicht zu als Mäuse, die das Darmmikrobiom von nicht operierten Patientinnen übertragen bekommen hatten. Offensichtlich hat die Darmbakterienzusammensetzung nach bariatrischer Operation eine günstige Wirkung auf den Fettstoffwechsel, wie auch die Analyse des respiratorischen Quotienten in beiden Gruppen ergab. Dieser setzt Sauerstoff-Aufnahme und CO_2-Abgabe über die Lunge in ein Verhältnis. Bei der Verbrennung von Fetten fällt er niedriger aus als bei der Verbrennung von Zucker. Der erhöhte Fettstoffwechsel nach bariatrischer Operation war auch daran erkennbar, dass Stuhlproben von operierten Patientinnen weniger kurzkettige Fettsäuren enthielten als Proben des nicht operierten Kollektivs. /



(Badman et al.,2005)







GLP-1 Actions

Pancreas

- ↑ Insulin synthesis & secretion
- ↓ Glucagon secretion
- ↑ β-cell survival

CNS

- ↓ Food intake
- ↑ Satiety

Stomach & Intestine

- ↓ Gastric emptying
- ↓ Bowel motility
- ↓ Acid secretion

Liver/Fat/Muscle (? Indirect)

- ↑ Glucose uptake
- ↑Glycogen synthesis
- ↑ Lipogenesis (in fat)

Surg Obes Relat Dis. 2015 Dec 7

Remission of type 2 diabetes in patients undergoing biliointestinal bypass for morbid obesity: a new surgical treatment.

Del Genio G[1], Gagner M[2], Limongelli P[3], Tolone S[3], Pournaras D[4], le Roux CW[5], Brusciano L[3], Licia Mozzillo A[3], Del Genio F[6], Docimo L[3].

BACKGROUND:
Nutrient interaction with the mid-gut may play a role in improving type 2 diabetes mellitus (T2D) after bariatric surgery. However, Roux-en-Y gastric bypass, biliopancreatic diversion, and sleeve gastrectomy include diversion of food from the duodenum and/or partial gastrectomy. Biliointestinal bypass (BIBP) was introduced to eliminate the major side effects of jejunoileal bypass. It does not involve any change to the anatomy of the stomach or the duodenum. A prospective evaluation of the role of BIBP in glycemic control has not been reported.
OBJECTIVES:
Longitudinal evaluation of T2D after BIBP.
SETTING:
University hospitals in Europe and Canada.
METHOD:
The effects of BIBP on metabolism and glycemia in 28 consecutive patients with T2D were evaluated over 2 years.
RESULTS:
Decreases (P<.001) in fasting glycemia, insulinemia, and homeostasis model assessment were observed 3 months after surgery, were improved after 1 year, and remained stable after 2 years. Glycosylated hemoglobin levels decreased at 3, 12, and 24 months after surgery (from 9.2±2.1 to 6.3±1.1 (P<.0001), 4.9±1.7 (P<.0001), and 4.8±1.1 (P<.0001), after 3, 12, and 24 months, respectively). Medical therapy was discontinued in 83% (20 of 24) of the patients; for the remaining 17% (4 of 24), therapy was reduced to oral hypoglycemic agents.
CONCLUSION:
BIBP had a favorable risk-benefit relationship and positive metabolic effects in the short term. How BIBP achieves optimal glycemic control and whether it improves ß-cell function and/or insulin sensitivity require further study.

Gut hormones signal to central appetite circuits

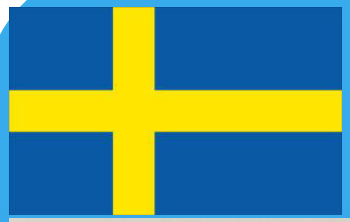
- Gut hormones can activate circuits in the hypothalamus and brainstem, the main central nervous system centers responsible for the regulation of energy homeostasis.
- For many gut hormones, the precise mechanisms of central action are unknown or contentious.
- A number of gut hormones also act as neurotransmitters in the brain, where they do not necessarily serve the same functions as in the periphery, making it difficult to tease out their endocrine effects.

Physiology: Leptin

- A 16-KD hormone produced predominantly by adipocytes
- Circulating levels are determined chiefly by fat mass
- Increased leptin synthesis/secretion
  - Re-feeding (after fasting)
  - Adiposity
  - Glucocorticoids
  - Insulin
- Inhibition of leptin synthesis/secretion
  - Sympathetic stimulation
- Circulates partially protein bound

Physiology: Leptin

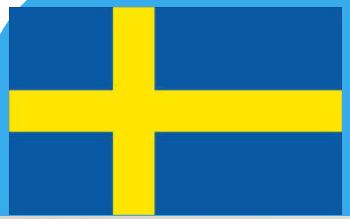
- Leptin's central actions :
  - Increase energy expenditure (via physical activity, sympathetic nervous system activity)
  - Decrease food intake
  - Decrease body weight
  - Increase insulin sensitivity
  - Help signal the onset of puberty
  - Regulate other pituitary hormone axes
- Leptin’s peripheral actions
  - Stimulate angiogenesis
  - Hematopoietic cell proliferation
  - T-cell immnunity



Swedish Obesity Study

Table 3. Stepwise Multivariate Analyses of Overall Mortality Performed Separately on Data from Matching and Baseline Examinations.*

Variable	Matching Examination			Baseline Examination		
	Hazard Ratio (95% CI)	Chi-Square	P Value	Hazard Ratio (95% CI)	Chi-Square	P Value
Bariatric surgery	0.73 (0.56–0.95)	5.45	0.02	0.71 (0.54–0.92)	6.45	0.01
Male sex	NA	NA	NA	1.61 (1.21–2.16)	10.47	0.001
Age at examination (per yr)	1.07 (1.04–1.09)	27.98	<0.001	1.07 (1.04–1.09)	32.60	<0.001
Daily smoking	2.41 (1.83–3.18)	38.62	<0.001	2.31 (1.75–3.05)	34.51	<0.001
Coexisting condition						
Diabetes	2.08 (1.43–3.03)	14.53	<0.001	1.61 (1.07–2.42)	5.15	0.023
Previous myocardial infarction	2.39 (1.37–4.17)	9.40	0.002	2.17 (1.27–3.69)	8.04	0.005
Previous stroke	3.01 (1.13–7.99)	4.88	0.03	3.19 (1.37–7.42)	7.22	0.007
Previous cancer	NA	NA	NA	2.28 (1.02–5.10)	4.00	0.05
Measurement of size (per 10 cm)						
Hip circumference	1.23 (1.07–1.41)	8.35	0.004	NA	NA	NA
Sagittal diameter	NA	NA	NA	1.87 (1.34–2.61)	13.40	<0.001
Neck circumference	2.14 (1.56–2.92)	22.81	<0.001	NA	NA	NA
Thigh circumference	0.70 (0.55–0.89)	8.60	0.003	NA	NA	NA
Laboratory values						
Glucose (per 1 mmol/liter)	NA	NA	NA	1.08 (1.01–1.14)	5.79	0.02
Total cholesterol (per 1 mmol/liter)	1.21 (1.08–1.35)	10.36	0.001	1.17 (1.04–1.33)	6.28	0.01
Psychosocial measurement						
Psychasthenia (per 5 score units)	1.16 (1.01–1.32)	4.54	0.03	1.16 (1.02–1.32)	4.95	0.03



Swedish Obesity Study

Table 1. Characteristics of the Subjects at Matching and Baseline Examinations.*

Variable	Matching Examination					Baseline Examination				
	Surgery Group (N=2010)	No. with Missing Data	Control Group (N=2037)	No. with Missing Data	P Value	Surgery Group (N=2010)	No. with Missing Data	Control Group (N=2037)	No. with Missing Data	P Value
Sex (no.)										
Male	590	0	590	0		590	0	590	0	
Female	1420	0	1447	0	0.79	1420	0	1447	0	0.79
Women who were post-menopausal (% of women)†	31.8	0	35.5	0	0.04	37.2	0	41.3	0	0.02
Age at examination (yr)	46.1±5.8	0	47.4±6.1	0	<0.001	47.2±5.9	0	48.7±6.3	0	<0.001
Daily smoking (%)	27.9	0	20.2	0	<0.001	25.8	2	20.8	10	<0.001
Coexisting conditions										
Diabetes (%)	7.4	0	6.1	0	0.12	10.7	5	11.4	12	0.52
Sleep apnea (%)†	23.8	8	22.4	31	0.30	25.1	46	22.2	48	0.03
Lipid-lowering therapy (%)	1.8	0	1.6	0	0.67	1.8	0	1.6	0	0.67
Previous myocardial infarction (no.)	29	0	22	0	0.30	31	0	29	0	0.76
Previous stroke (no.)	15	0	19	0	0.52	15	0	23	0	0.21
Previous stroke or myocardial infarction (no.)†	44	0	39	0	0.54	46	0	49	0	0.81
Previous cancer (no.)	23	0	20	0	0.62	24	0	21	0	0.62
Weight (kg)	119.2±16.1	0	116.9±15.4	0	<0.001	121.0±16.6	0	114.7±16.5	0	<0.001
Height (m)	1.69±0.09	0	1.69±0.09	0	0.64	1.69±0.09	0	1.69±0.09	0	0.68
Body-mass index†	41.8±4.4	0	40.9±4.3	0	<0.001	42.4±4.5	0	40.1±4.7	0	<0.001
Waist-to-hip ratio†	0.99±0.07	0	0.98±0.07	1	0.17	0.99±0.08	7	0.98±0.07	0	<0.001
Measurement of size (cm)										
Waist circumference	124.1±10.7	1	122.2±10.2	0	<0.001	125.8±11.0	6	120.2±11.3	0	<0.001
Hip circumference	125.9±9.7	1	124.4±9.3	1	<0.001	127.1±10.0	7	123.2±10.0	0	<0.001
Sagittal diameter	28.4±3.6	2	27.9±3.4	1	<0.001	28.9±3.7	8	27.4±3.7	0	<0.001
Neck circumference	43.4±4.2	5	43.4±4.2	1	0.97	43.7±4.3	10	42.9±4.29	0	<0.001
Upper-arm circumference	39.6±3.8	2	39.3±3.6	0	0.01	39.8±3.8	6	38.7±3.8	0	<0.001
Thigh circumference	74.9±7.0	1	74.1±7.0	2	<0.001	75.5±7.5	7	73.4±7.5	0	<0.001
Blood pressure (mm Hg)										
Systolic	140.6±18.7	2	140.0±18.0	0	0.25	145.0±18.8	6	137.9±18.0	4	<0.001
Diastolic	87.5±11.2	3	87.1±10.7	3	0.30	89.9±11.1	7	85.2±10.7	7	<0.001
Pulse pressure†	53.1±13.4	3	52.9±13.1	3	0.53	55.2±14.5	8	52.8±13.0	7	<0.001
Laboratory values										
Glucose (mmol/liter)	5.32±1.98	0	5.32±2.00	3	0.99	5.45±2.11	8	5.20±1.92	5	<0.001
Insulin (mU/liter)	21.4±14.4	6	20.0±12.7	3	0.002	21.5±13.7	9	18.0±11.4	3	<0.001
Triglycerides (mmol/liter)	2.23±1.44	2	2.15±1.50	0	0.09	2.25±1.54	4	2.02±1.41	2	<0.001
Cholesterol (mmol/liter)										
Total	5.84±1.12	2	5.75±1.08	0	0.004	5.86±1.12	4	5.61±1.06	2	<0.001
High-density lipoprotein†	1.20±0.29	69	1.20±0.31	39	0.88	1.20±0.28	87	1.19±0.29	60	0.84
Uric acid (μmol/liter)	352.5±80.6	2	350.4±81.0	2	0.42	359.2±79.8	5	352.3±79.9	3	0.006
Aspartate aminotransferase (μkat/liter)	0.42±0.25	0	0.41±0.24	2	0.94	0.43±0.23	3	0.39±0.21	2	<0.001
Alanine aminotransferase (μkat/liter)	0.60±036	0	0.60±0.40	2	0.85	0.63±0.39	4	0.56±0.42	2	<0.001
Alkaline phosphatase (μkat/liter)	3.06±0.86	0	3.03±0.86	2	0.31	3.12±0.84	3	3.01±0.87	2	<0.001
Bilirubin (μmol/liter)	9.24±4.08	0	9.53±3.96	2	0.02	9.51±4.28	4	9.93±5.27	2	0.005
Psychosocial measurement‡										
Current health score	21.4±6.10	0	22.7±6.2	0	<0.001					
Monotony avoidance score	22.5±5.1	0	22.6±5.0	0	0.525					
Psychasthenia score	23.9±5.2	0	23.2±5.3	0	<0.001					
Social support										
Quantity	6.02±2.4	0	6.08±2.45	1	0.48					
Quality	4.25±1.32	0	4.28±1.31	0	0.55					
Stressful life events	2.49±1.30	0	2.43±1.28	0	0.09					

* Plus–minus values are means ±SD. Body-mass index is the weight in kilograms divided by the square of the height in meters. To convert the values for glucose to milligrams per deciliter, divide by 0.05551. To convert the values for insulin to picomoles per liter, multiply by 6. To convert the values for triglycerides to milligrams per deciliter, divide by 0.01129. To convert the values for cholesterol to milligrams per deciliter, divide by 0.02586. To convert the values for uric acid to milligrams per deciliter, divide by 59.48. To convert the values for aspartate aminotransferase, alanine aminotransferase, and alkaline phosphatase to units per liter, divide by 0.01667. To convert the values for bilirubin to milligrams per deciliter, divide by 17.1.

† This variable was not used in the multivariable stepwise-regression analysis either because it was derived from other variables or because a large number of data were missing.

‡ For psychosocial measurements, higher scores represent better current health (range, 9 to 36), more of the personality trait on monotony avoidance (range, 10 to 40) and psychasthenia (range, 10 to 40), a higher quantity of social support (range, 0 to 12), a better quality of social support (range, 0 to 5), and a greater number of stressful life events (range, 0 to 8).

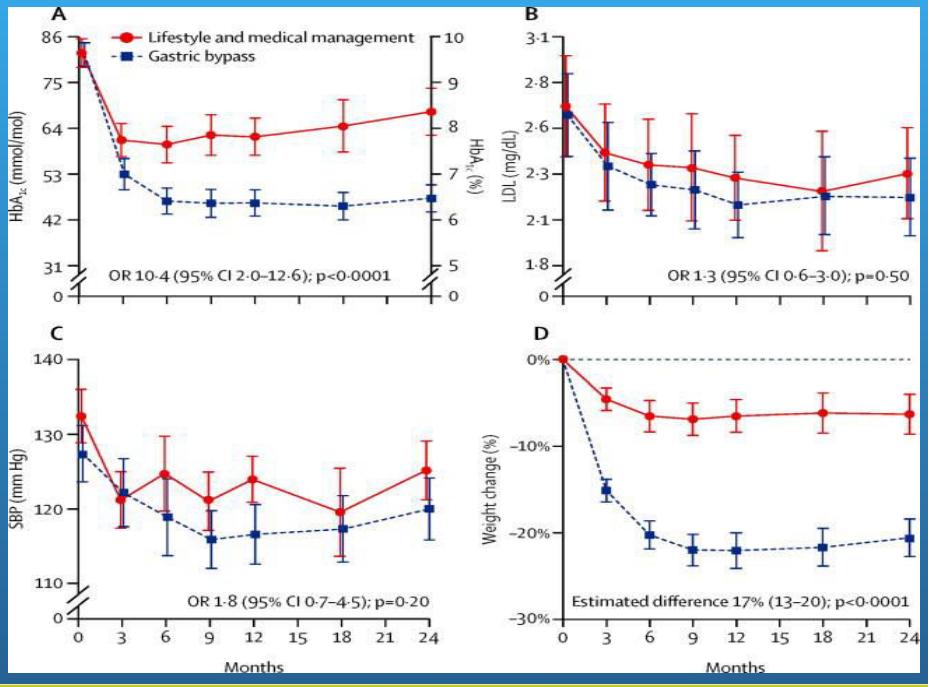
covariate for the study group. The Wald test was

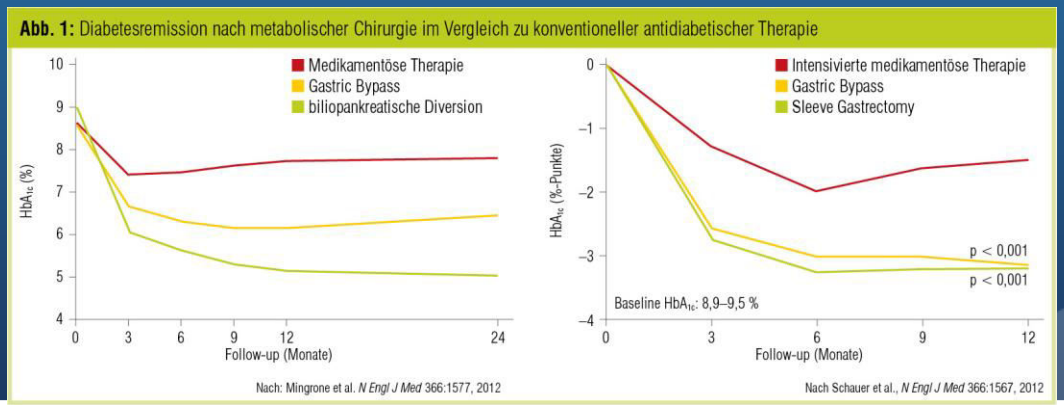
The following variables listed in Table 1 were not

JAMA. 2014 Jun 11;311(22):2297-304.

Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications.

Sjöström L[1], Peltonen M[2], Jacobson P[1], Ahlin S[1], Andersson-Assarsson J[1], Anveden Å[1], Bouchard C[3], Carlsson B[1], Karason K[1], Lönroth H[4], Näslund I[5], Sjöström E[1], Taube M[1], Wedel H[6], Svensson PA[1], Sjöholm K[1], Carlsson LM[1].





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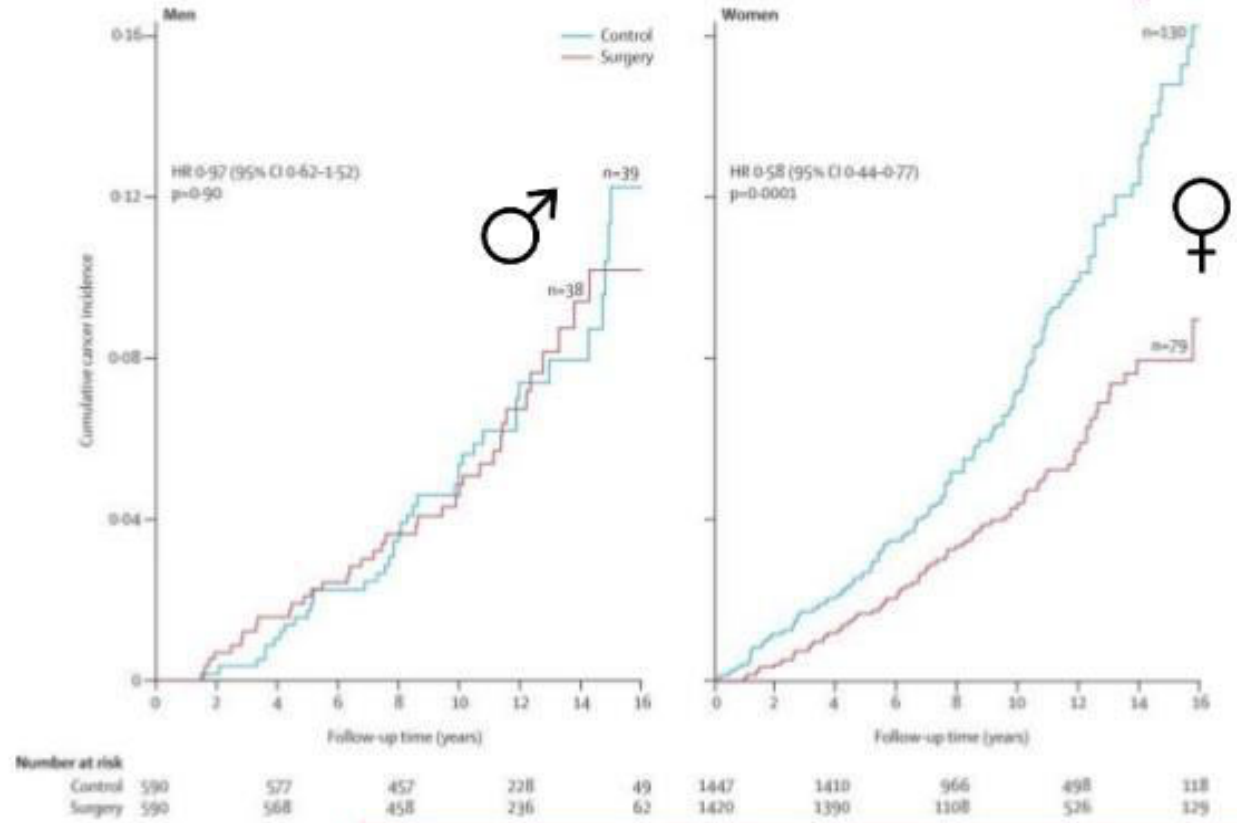
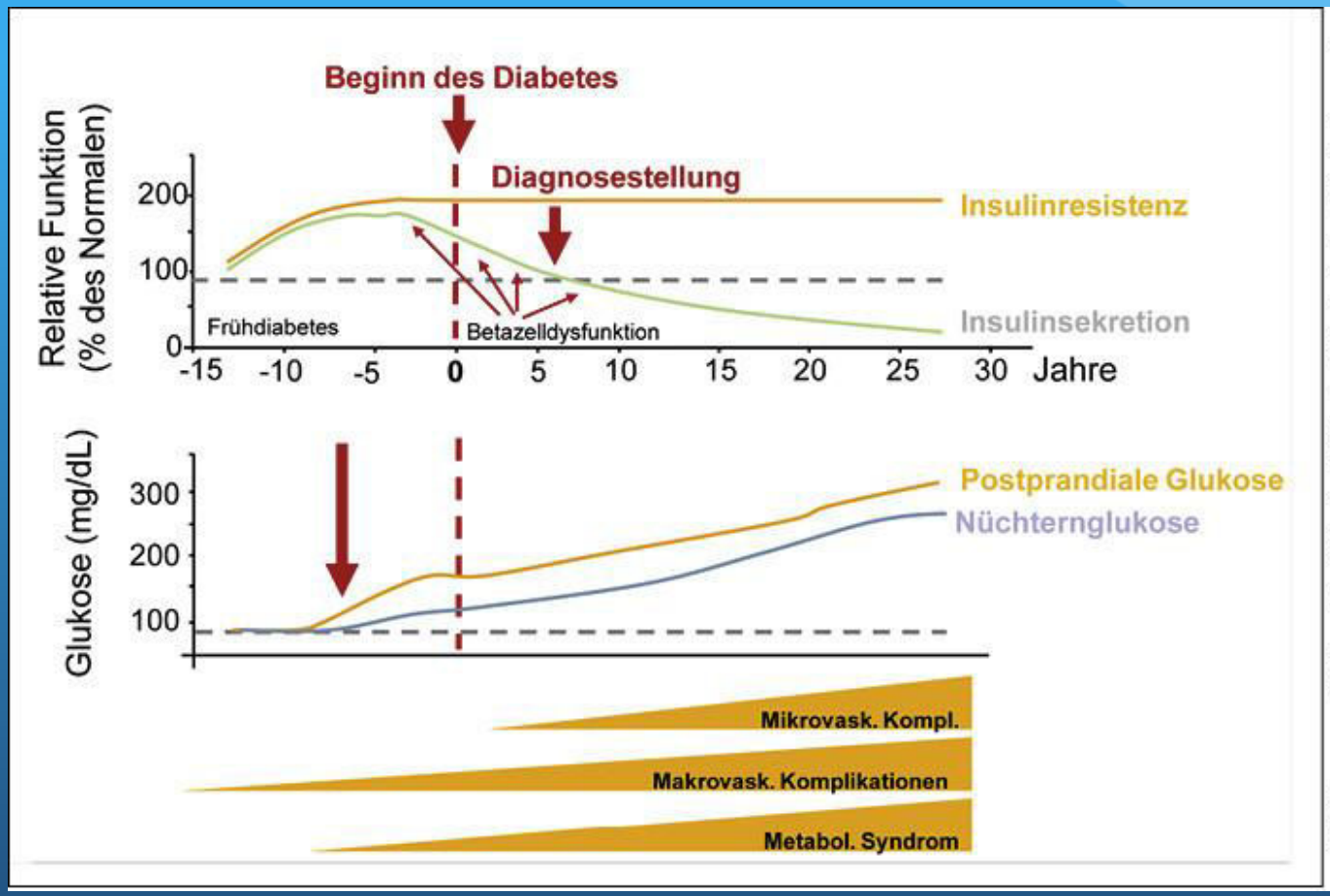
Effect on cancer incidence in SOS study



Decreased cancer incidence following bariatric surgery, but only significant in women

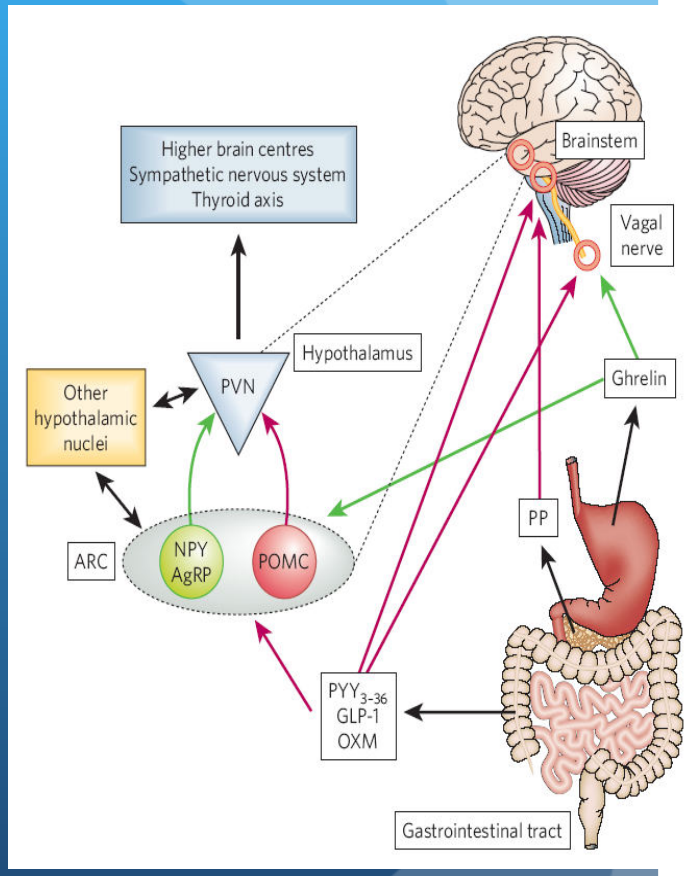
TYP 2 Diabetes Mellitus

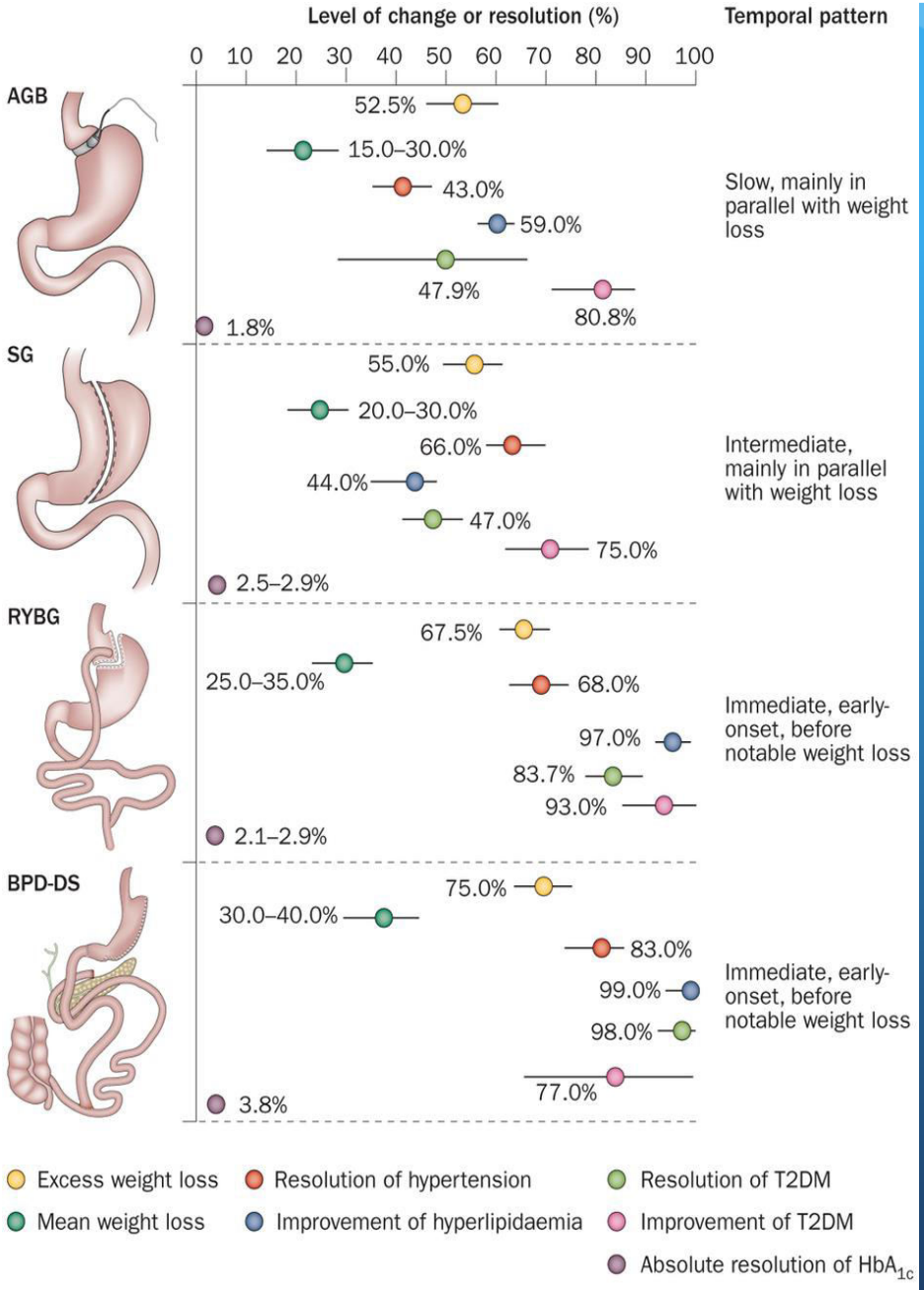


nach B. Weinmann, M. Winter, Medizinische Klinik I, Endokrinologie, Angiologie, Pneumologie, Krankenhaus der Barmherzigen Brüder Regensburg

Three major roles for gut hormones in appetite regulation

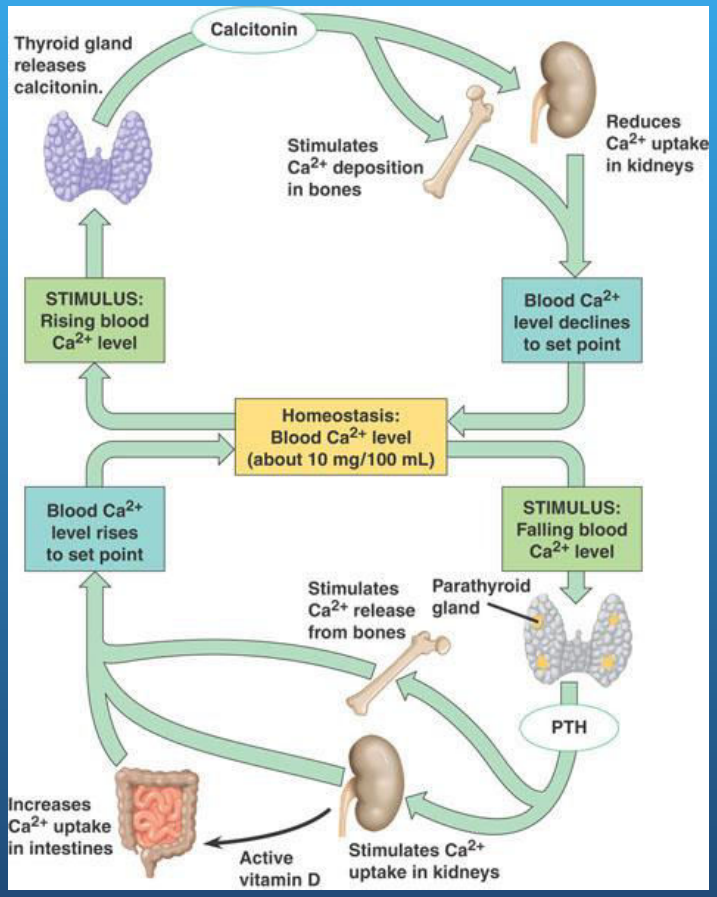
- First, the release of gut hormones can modulate normal hunger and satiety. Circulating ghrelin levels increase before a meal and correspond to hunger pangs. A number of anorectic gut hormones are released postprandially as satiety signals.
- Second, gut hormones may reduce food intake in patients with specific gut diseases, perhaps as an adaptation to reduce further stress on the gut. A number of anorectic gut hormones are elevated in gut disease.
- Third, very high levels of gut hormones may be released to generate conditioned taste aversion and nausea in response to the ingestion of harmful substances.

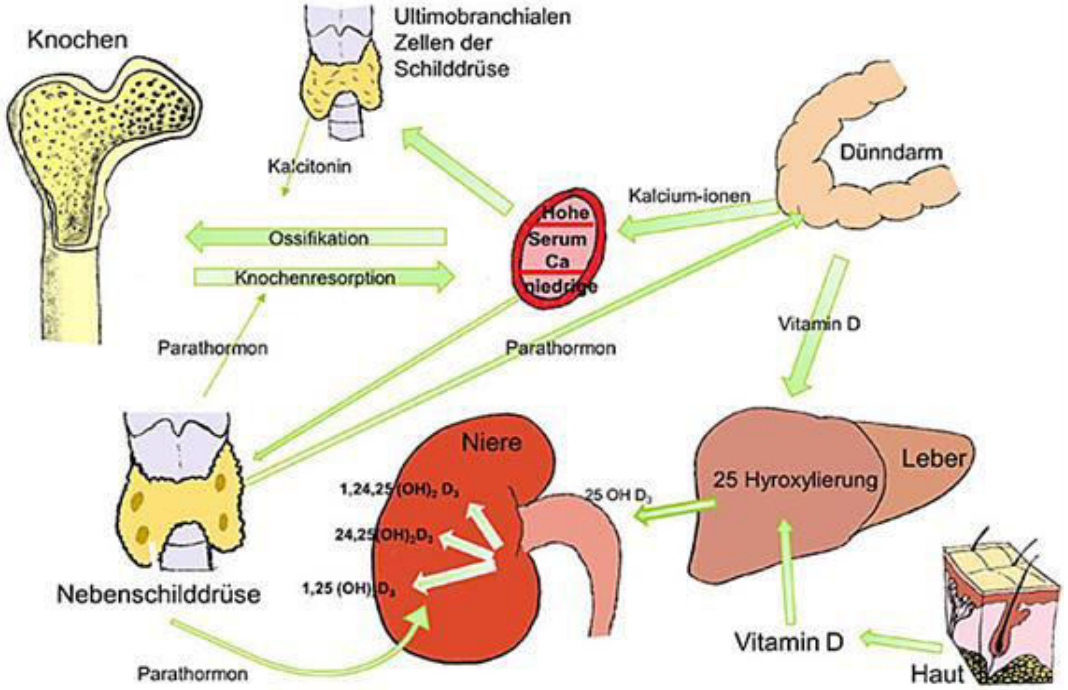


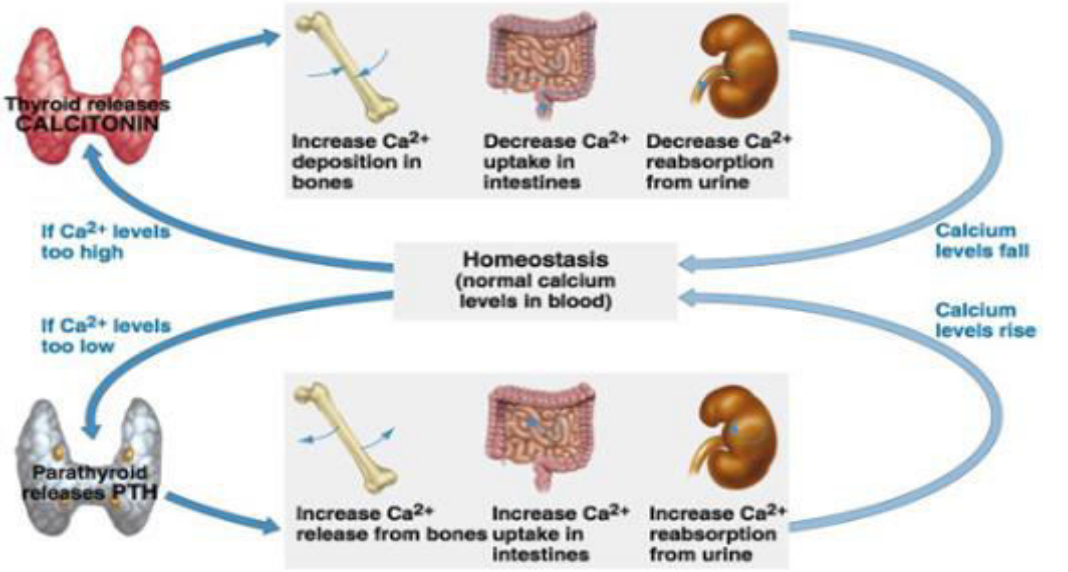


Excess weight loss
Mean weight loss
Resolution of hypertension
Improvement of hyperlipidaemia
Resolution of T2DM
Improvement of T2DM
Absolute resolution of HbA_{1C}

Parathormon

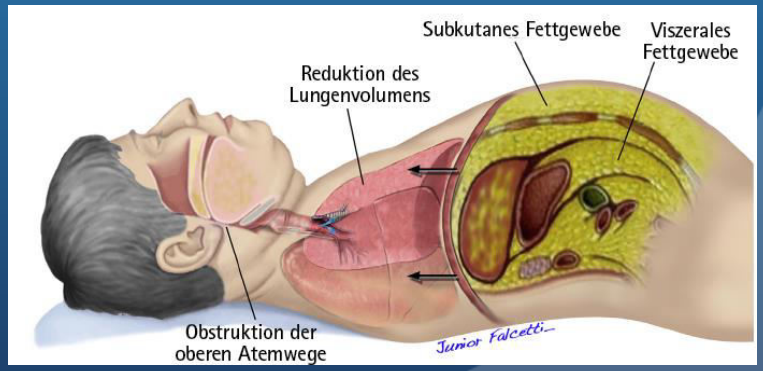






obstruktives Schlaf-Apnoe-Syndrom

Als Folge eines unbehandelten OSAS treten meistens weitere chronische Gesundheitsstörungen auf, und zwar Herz-Kreislauferkrankungen wie Bluthochdruck, Rechtsherzinsuffizienz, Herzinfarkte sowie Schlaganfälle. Ein plötzlicher Herztod kann bei unbehandeltem OSAS mit erhöhter Wahrscheinlichkeit auftreten. Beschrieben sind auch Depressionen, Hirnschäden und das gehäufte Auftreten von Stress-Erkrankungen wie Magengeschwür, Tinnitus und Hörsturz. Diabetes mellitus, Typ 2 wird seit Anfang 2002 immer häufiger in Zusammenhang mit dem OSAS gebracht. Es besteht ein linearer Zusammenhang zwischen dem Apnoe-Hypopnoe-Index (AHI) und der Insulin-Resistenz. Der Blutzucker ist also umso höher, je mehr Atempausen pro Stunde Schlaf auftreten. Nach einer eingeleiteten nCPAP-Therapie kann die nächtliche Zuckerneubildung (Gluconeogenese) deutlich vermindert werden und die morgendlichen Blutzucker-Werte sinken. Patienten, deren OSAS durch Behandlung gebessert wurde, berichten von reduzierten Migräneanfällen.



Obes Surg. 2016 May 10.

Roux-en-Y Gastric Bypass Surgery on Obstructive Sleep Apnea-Hypopnea Syndrome: Factors Associated with Postoperative Efficacy.

Jiao X[1], Zou J[1], Zhang P[2], Yu H[3], Di J[2], Han X[2], Yin S[1], Yi H[4].

BACKGROUND:
Bariatric surgery can effectively treat obesity and improve OSAHS. However, the exact underlying mechanisms remain unclear. The objective of this follow-up study is to explore the main factors associated with the efficacy of Roux-en-Y gastric bypass surgery (RYGB) on obstructive sleep apnea-hypopnea syndrome (OSAHS).
METHODS:
A total of 39 OSAHS patients with obesity and type 2 diabetes mellitus (T2DM) who had received RYGB surgery were recruited. A polysomnography test was carried out in all subjects before surgery and postoperative 6 to 12 months, and the following tests were performed: fasting glucose, lipid profile, electrolyte levels, and liver and kidney function tests. The paired Student's t test, Pearson test, Spearman correlation test, and multiple linear regression analysis were used to explore the effects of RYGB surgery on these indices and investigate the main factors associated with postoperative efficacy.
RESULTS:
RYGB surgery significantly lowered the apnea-hypopnea index (AHI), body mass index (BMI), and concentrations of total albumin, prealbumin, retinol-binding protein, total cholesterol, triglycerides, fasting blood glucose, albumin, and C-reactive protein, while postoperative blood magnesium levels were significantly increased ($p < 0.05$). Changes in the AHI (delta AHI) were correlated with delta BMI ($r = 0.408$, $p = 0.010$) and delta prealbumin levels ($r = 0.495$, $p = 0.001$). However, no significant correlation was found between delta BMI and delta prealbumin. The delta AHI were assessed by multiple linear analysis as follows: delta AHI = 0.105 × (delta prealbumin) + 1.509 × (delta BMI) + 1.006.
CONCLUSIONS:
RYGB is an effective therapeutic option for OSAHS patients with obesity and T2DM; the potential factors associated with postoperative efficacy include changes in BMI and prealbumin levels.