



# New insights in metabolic surgery

G.Hubens

11th Starters Package

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ANNALS OF **SURGERY**  
A Monthly Review of Surgical Science Since 1885

**Who would have thought it? An operation proves to be the most effective therapy for adult onset diabetes”**

W Pories 1995 222: 339-350

**KEY POINT: Surgery (RYGBP) is more effective than medical therapy in treating diabetes type 2**

**83%** of type 2 diabetes patients euglycaemic /nl HbA1c

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**The gastric bypass operation reduces the progression and mortality of non insulin dependent diabetes mellitus**

McDonald 1997 1 213-220

**KEY POINT:** 3 fold reduction in mortality in surgical group compared to matched (age, sex, weight and %hypertension) conservatively treated group after 7 years




**ANNALS OF SURGERY**  
A Monthly Review of Surgical Science Since 1885

**Diabetes and Hypertension in severe obesity and effects of gastric bypass induced weight loss (n> 1000 15% diabetic)**

H Sugarman 2003 237 751-758


**83%** resolution@ 1year      **86%** resolution @ 5 years



	DM resolved	DM not resolved
n	106	21
age	44 +/- 9	50 +/- 13
% EWL	59 +/- 17	49 +/- 17
% WL	32 +/- 8	27 +/- 9
BMI	35 +/- 7	38 +/- 10

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**Effect of laparoscopic Roux en Y gastric bypass on type 2 diabetes mellitus** Schauer 2003 238 467-485

treatment	Net reduction
OA usage	80%
OA quantity	84%
Insulin usage	79%
Insulin quantity	90%

**30%** discontinued medication at discharge of hospital

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		Improved 33	Resolved 158
Severity			
	IFG	0	100%
	Diet	3%	97%
	Oral	13%	87%
	Insulin	38%	62%




  

		Improved 33	Resolved 158
Duration			
	<5y	5%	95%
	5-10y	25%	75%
	>10y	46%	54%

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Schauer Ann Surg 2003

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**Health outcomes of severely obese type 2 diabetic subjects 1 year after laparoscopic adjustable gastric banding**

Dixon 2002


<b>Remission (nl fasting glucose, HbA1c C peptide)</b>	<b>64%</b>
<b>Improved</b>	<b>26%</b>
<b>No change</b>	<b>10%</b>

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**Laparoscopic gastric banding prevents type2 diabetes and arterial hypertension and induces their remission in morbid obesity**  
A 4 year case controlled study  
Pontiroli 2005 28 2703-2709



**Effect of lap band induced weight loss on type 2 diabetes mellitus and hypertension**  
Ponce 2004 1335-1342

**Weight loss**  
**Duration disease**

**SLOWER!!!**

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## Medical weight loss and T2DM

- Diet, exercise, drugs
- 5-10 kg weight loss
- Modest improvement in FBS & HbA1c
- Modest reduction in T2DM

**SURGERY MERITS FURTHER INVESTIGATION !**

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## MECHANISM ??????

TAKEN INTO ACCOUNT:

- Different responses of different operations
- Quick results of RYGBP

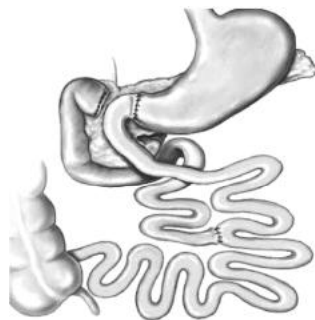
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Rubino et al Ann Surg 2004

Goto –Kakizaki ratten: lean rat model type 2 diabetes



A. DJB



B. GJ



C. ILB

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**Duodenal jejunal exclusion in nonobese animal model  
of type 2 diabetes**

- Normalises fasting glycemia
- Improves glucose tolerance
- Improves insulin activity

independent of therapy of obesity  
independent of weight loss

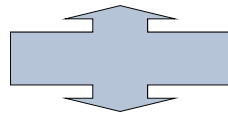
Rubino Ann Surg 2004

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UPPER INTESTINAL HYPOTHESIS



LOWER INTESTINAL HYPOTHESIS

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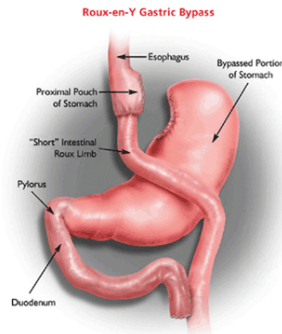
## Lower intestinal hypothesis

- RYGBP (en BPD) leveren sneller nutriënten aan distale darm (ileum, colon)

- stimuleren L cellen:
- glucagon like peptide 1 (GLP-1)
  - peptide YY (PYY)
  - oxyntomoduline

“incretines”

- Stimuleren insuline secretie
- Reduceren voedselinname
- Vertragen upper GI motiliteit



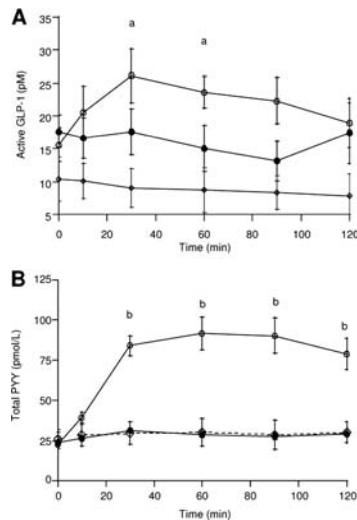
Cummings J Clin Invest 2007

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FIG. 1. Active GLP-1 and total PYY in response to a liquid test meal



- 6wkn na RYGBP
- Obese ptn preop
- ◇ BMI gematchte ptn niet geopereerd

THE JOURNAL OF  
 CLINICAL  
 ENDOCRINOLOGY  
 & METABOLISM

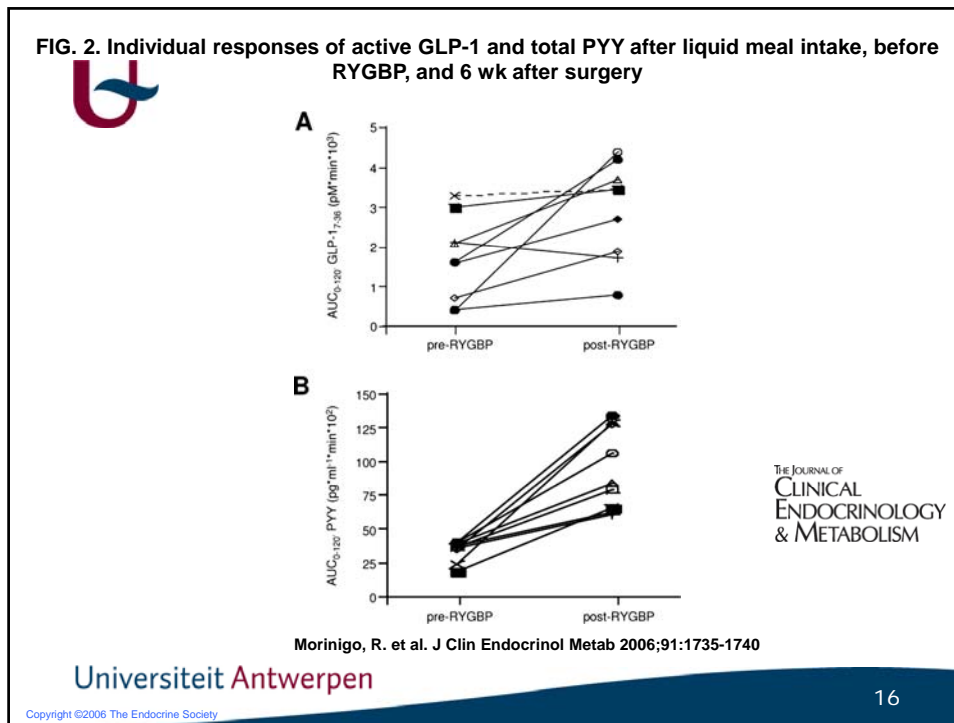
Morinigo, R. et al. J Clin Endocrinol Metab 2006;91:1735-1740

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**Upper intestinal hypothesis**

- Nutrients bypass duodenum and prox jejunum

→ inhibition of yet unknown molecule with anti incretin activity which is secreted in duodenum and proximal small bowel

Roux-en-Y Gastric Bypass

Esophagus

Proximal Pouch of Stomach

Bypassed Portion of Stomach

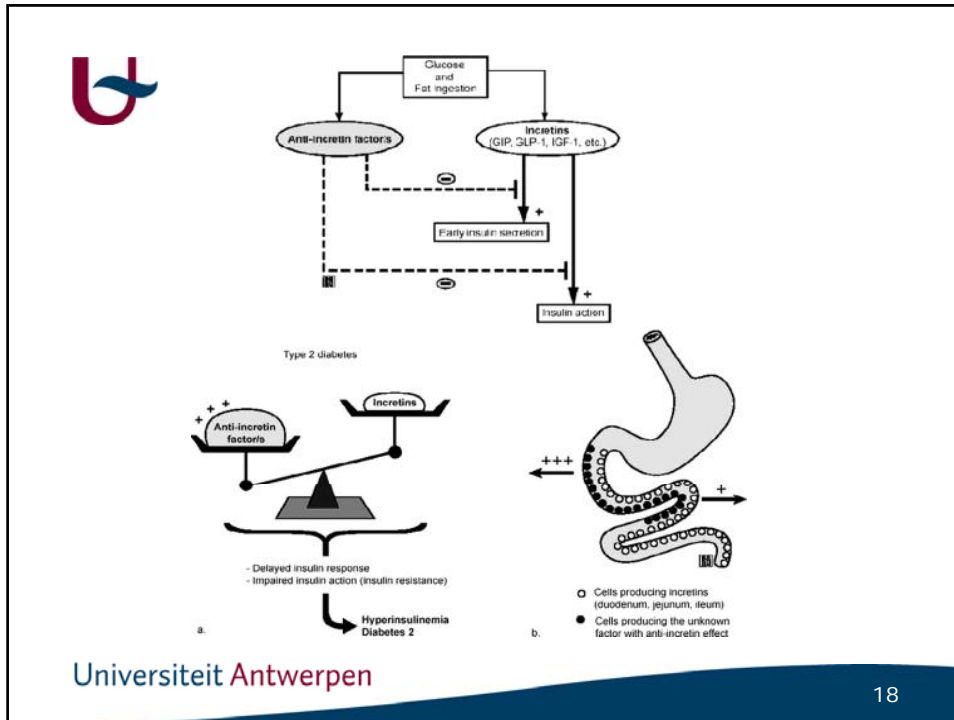
"Short" Intestinal Roux Limb

Pylorus

Duodenum

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“Darmcondoom maakt maagring overbodig”

Nieuwsblad 29/04/09

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**Can we propagate bariatric surgery in diabetes type 2 patients who do not fulfill the criteria for this type of surgery??**

Less invasive type of surgery with same results ?



**A pilot study of long-term effects of a novel obesity treatment: omentectomy in connection with adjustable gastric banding**

A Thörne<sup>1</sup>, F Lönnqvist<sup>2</sup>, J Apelman<sup>1</sup>, G Hellers<sup>1</sup> and P Arner<sup>2</sup>

<sup>1</sup> *Department of Surgery, Karolinska Institute at Huddinge University Hospital, Stockholm, Sweden*

Int. J Obes Relat Metab Disord 2002

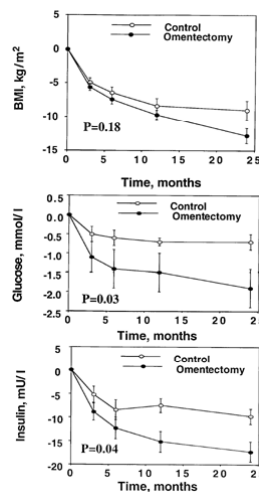


## Omentum

- Important source of visceral fat
- Storage place for macrophages
- Direct link between presence of macrophages and adipositas
- Macrophages and adipocytes produce cytokines which influence glucose metabolism
- Release FFA in portal circulation which influence hepatic insulin release negatively

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- In obese ptn (BMI >35) heeft omentectomie gecombineerd met Lap Band een gunstig effect op glucose en insulinemetabolisme

Thörne et al J Obes Relat Metab Disord 2002

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A prospective randomized study comparing patients with morbid obesity submitted to laparotomic gastric bypass with or without omentectomy

Csendes A, Maluenda F, Burgos AM  
Chili  
Obes Surg 2009 Apr 19(4) 490-494

KEY POINT: no differences in BMI in both groups  
Blood sugar levels, serum insulin, total CH and serum TG had similar values in both groups 2 YEARS POSTOP

OMENECTOMY NOT JUSTIFIED

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