

To Cut or Not To Cut Can Surgery Provide a Better Solution?

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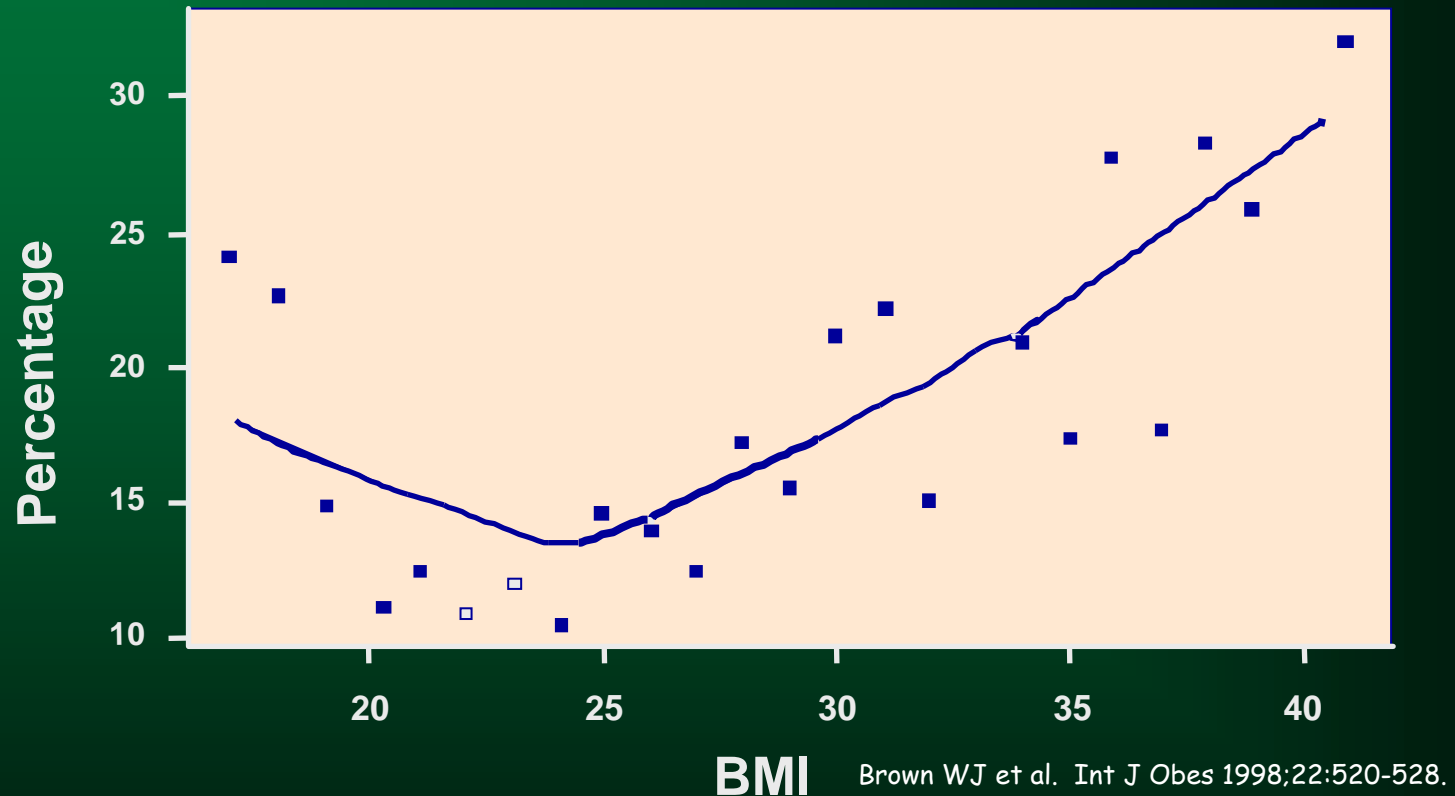
Upper Gastrointestinal, Bariatric and Metabolic Surgery Lead

North London Obesity Surgery Service

Whittington Hospital NHS Trust

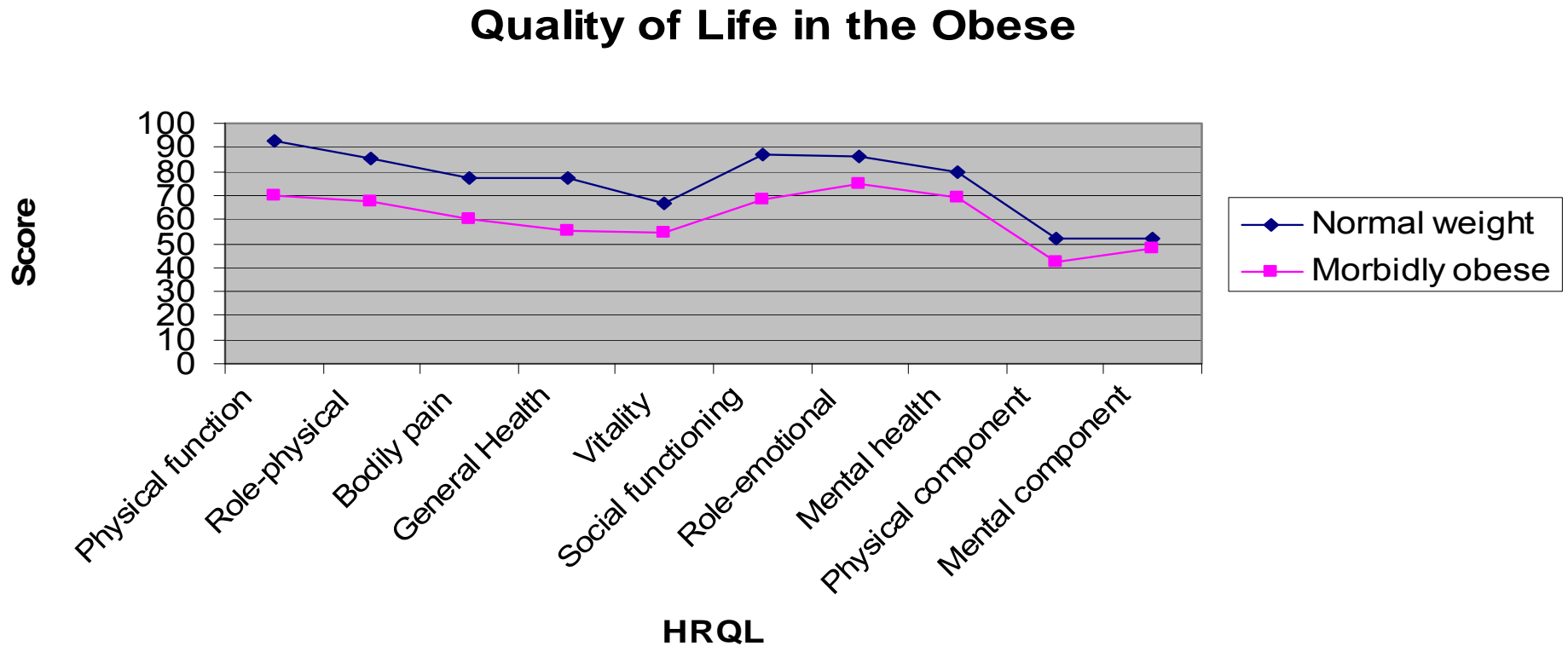


Obese Patients Need More GP Consultations



- Obese individuals consult GPs more frequently
- They require more health resources – investigations, medications, physiotherapy, dieticians, nurses

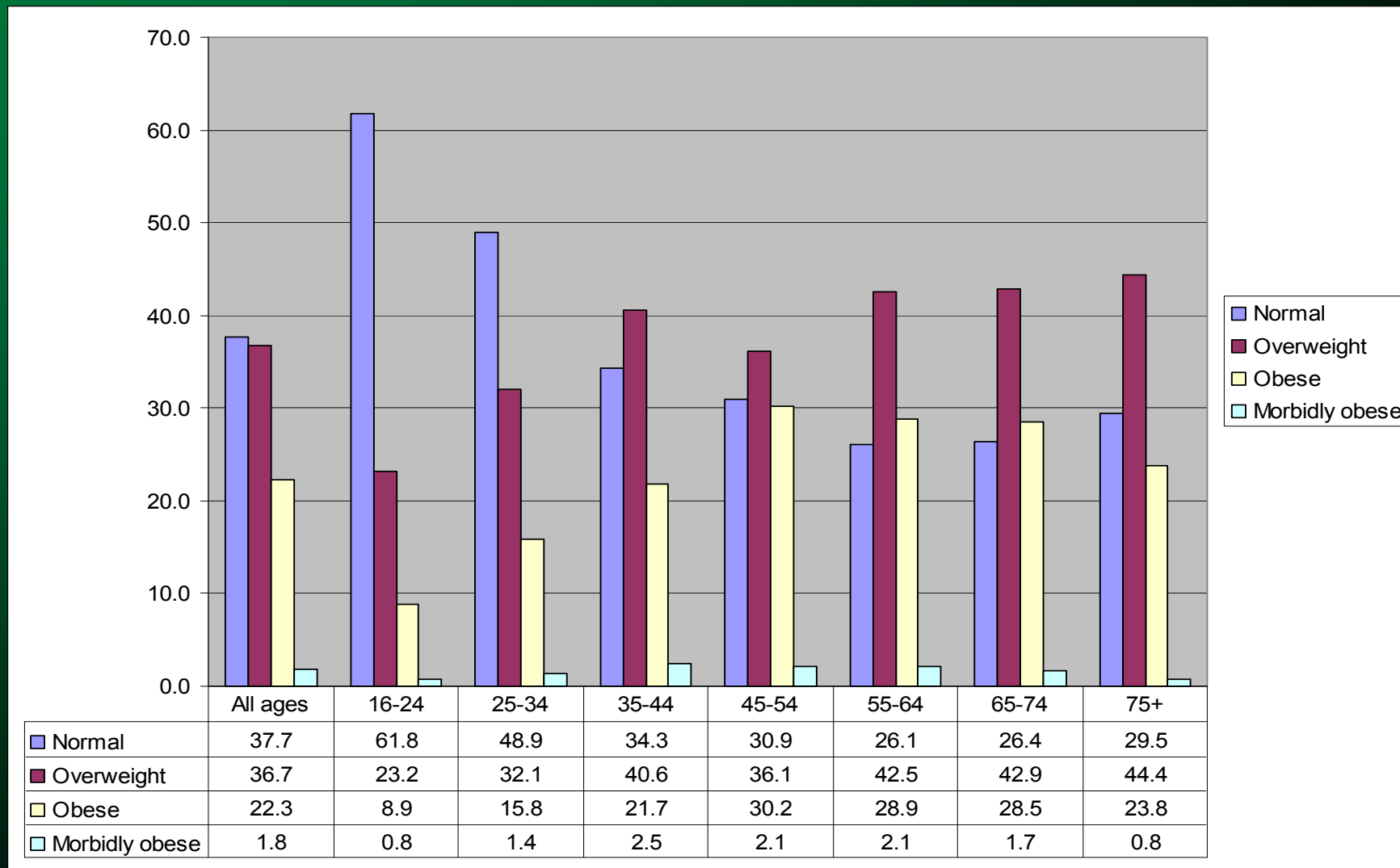
Obese Suffer from Poorer Quality of Life!



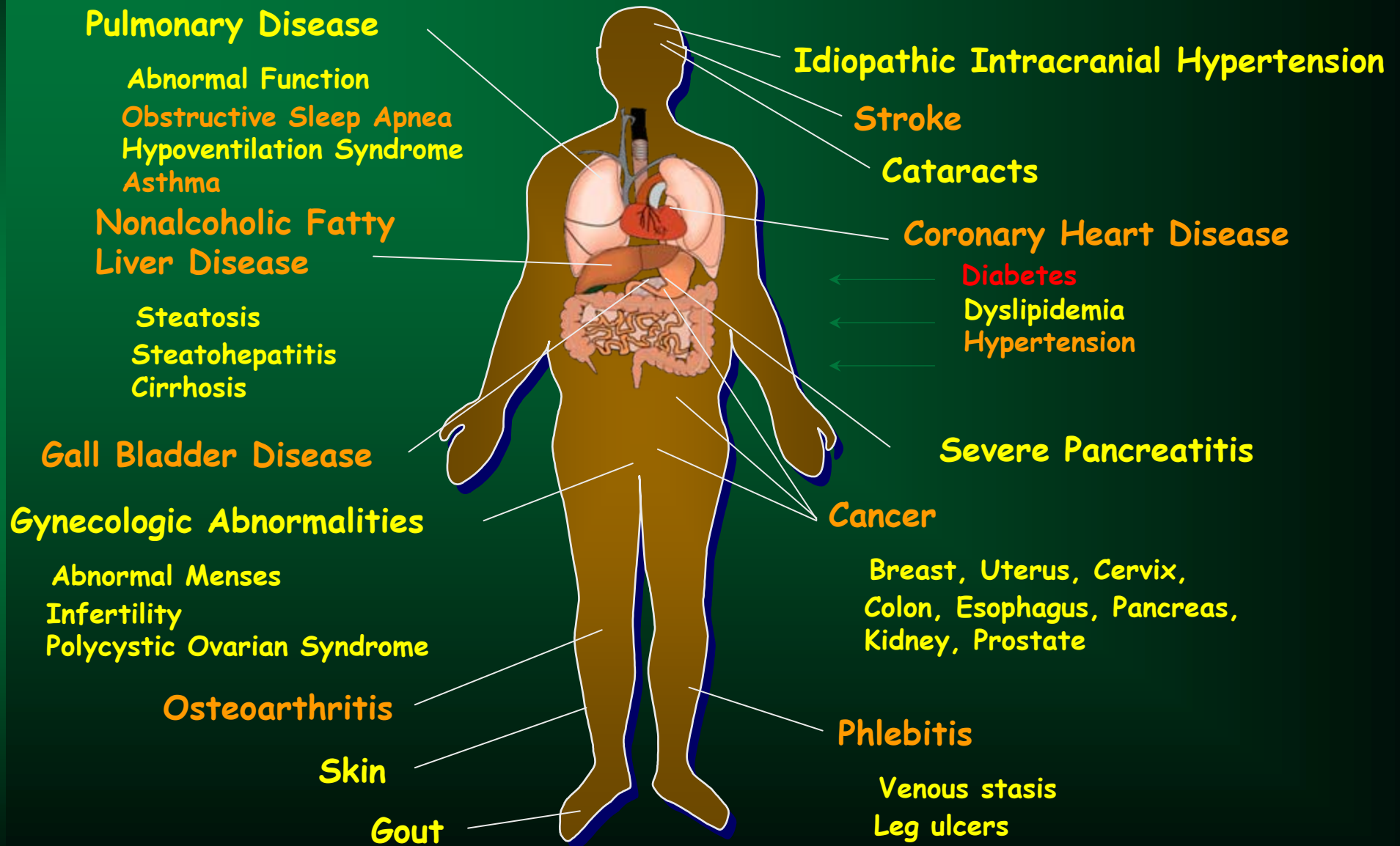
Larsson U et al. International Journal of Obesity (2002) 26, 417 - 424.

- Obese individuals have poorer quality of life in all measures

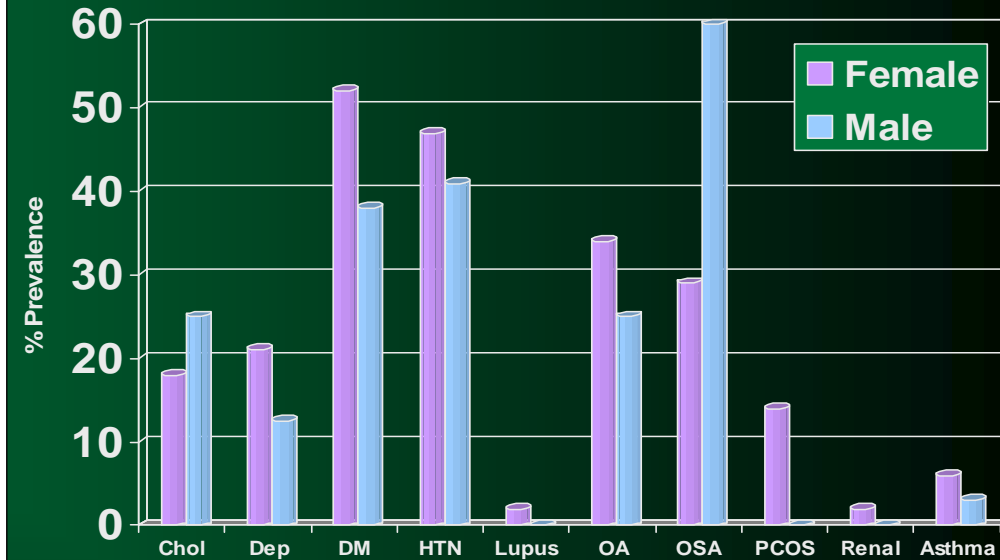
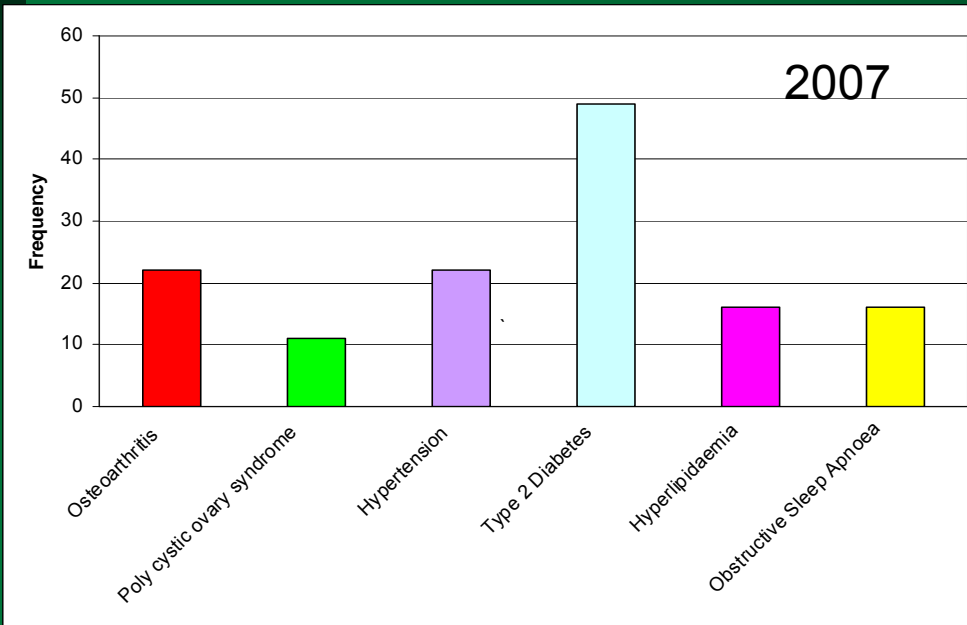
Obese Die Early - After Long Drain on Resources!



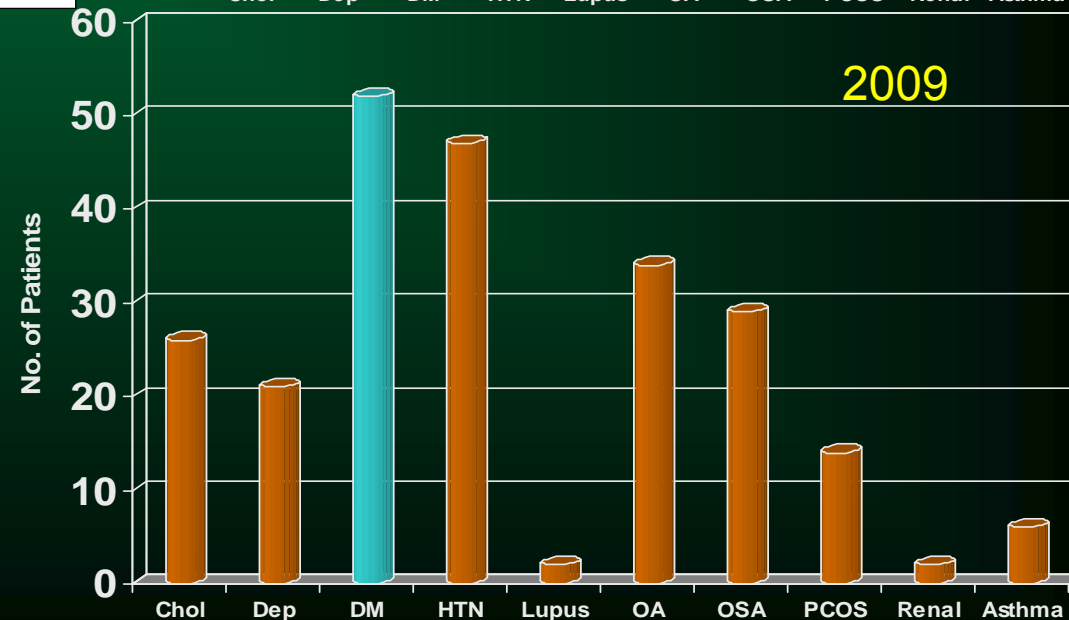
Obesity Associated Co-morbidities



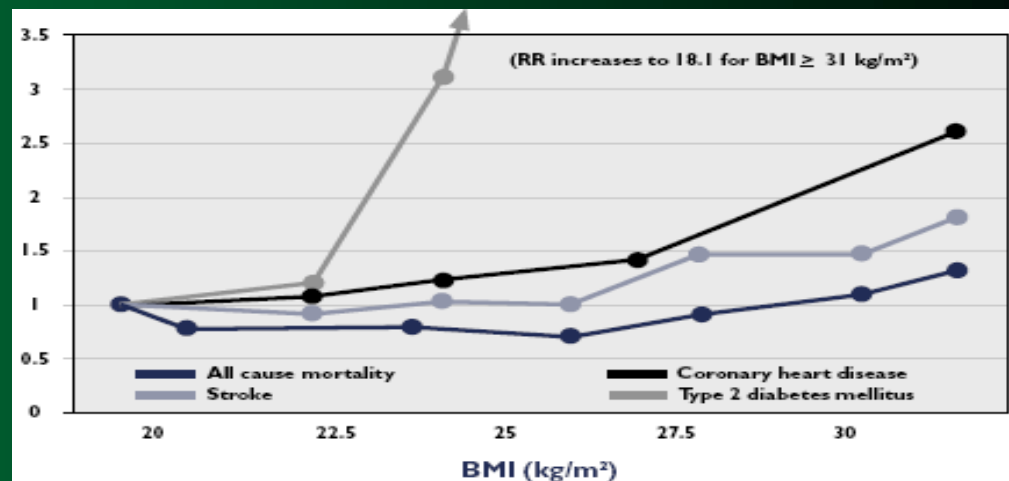
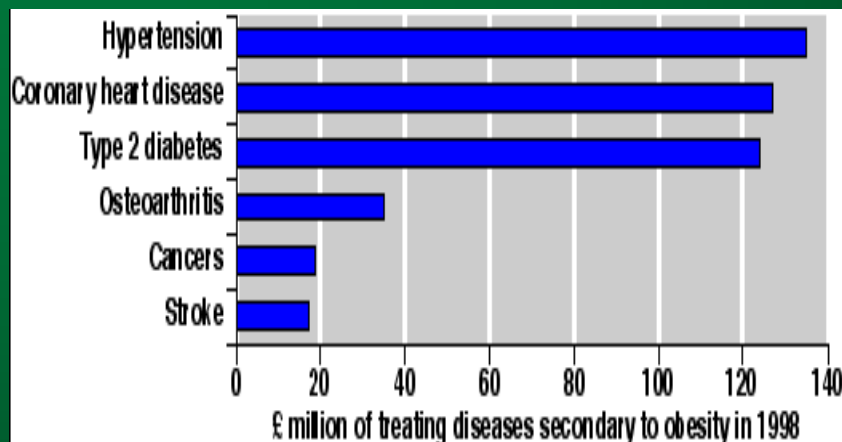
Worsening Prevalence of Co-morbidities at NLOSS



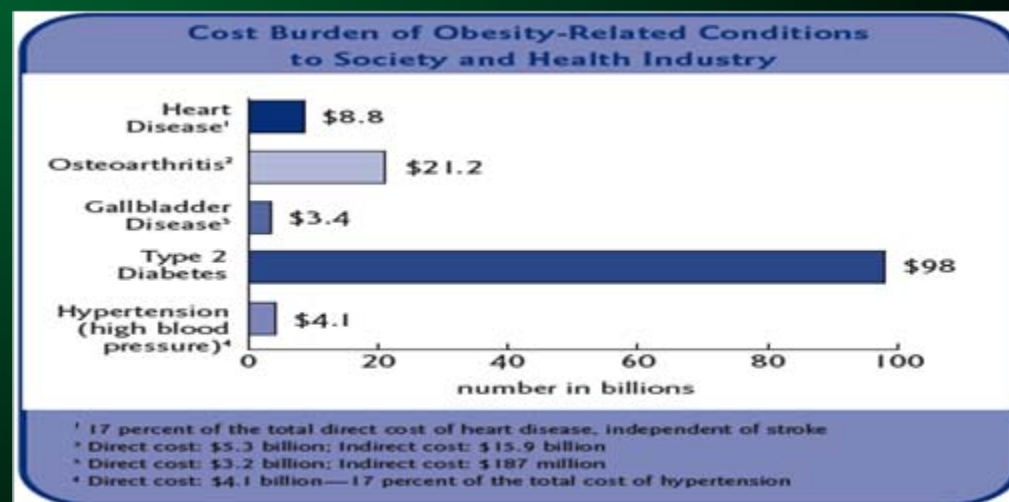
- Obese individuals develop more co-morbidities
- These co-morbidities require more health resources and are expensive to manage in the community and in the hospital



Cost of Obesity-related Disease



- 18 million lost working days and 30,000 premature deaths in 1998
- Direct cost £480m (1.5% of the total NHS expenditure) and indirect cost £2 billion in 2001
- Estimated economic cost £7.5 billion in 2005
- Foresight report (2007) - estimates for 2050
- Cost to NHS: £6.5bn
- Cost to UK economy: £49.9bn (7x greater)



Diabetes Consumed 10% of NHS Budget in 2009

- In 2006, 28.4 million items to treat diabetes were prescribed at a cost of £561.4 million.
- In 2009, diabetes prescribing accounted for 7% of all prescription costs (£9 billion).

Or:

- - £173 million a week
- - £25 million a day
- - £1 million an hour
- - £17,000 a minute
- - £286 a second!



Diabetes is Increasingly Cause of Death & Morbidity

- 5th most common cause of death in the world.
- Among 20 to 79-year-olds in England:
 - 11.6% deaths in 2009.
 - 12.2% deaths attributable by 2010.
- • Life expectancy is reduced, on average, by:
 - more than 20 years in people with Type 1 diabetes
 - up to 10 years in people with Type 2 diabetes alone.
- One in ten people admitted to hospital has diabetes. In some age groups, it is as many as one in five. This could be one in three coronary care admissions.
- Complications of diabetes make up around one in five of all CHD, foot and renal admissions – management of these consume scarce health resources.

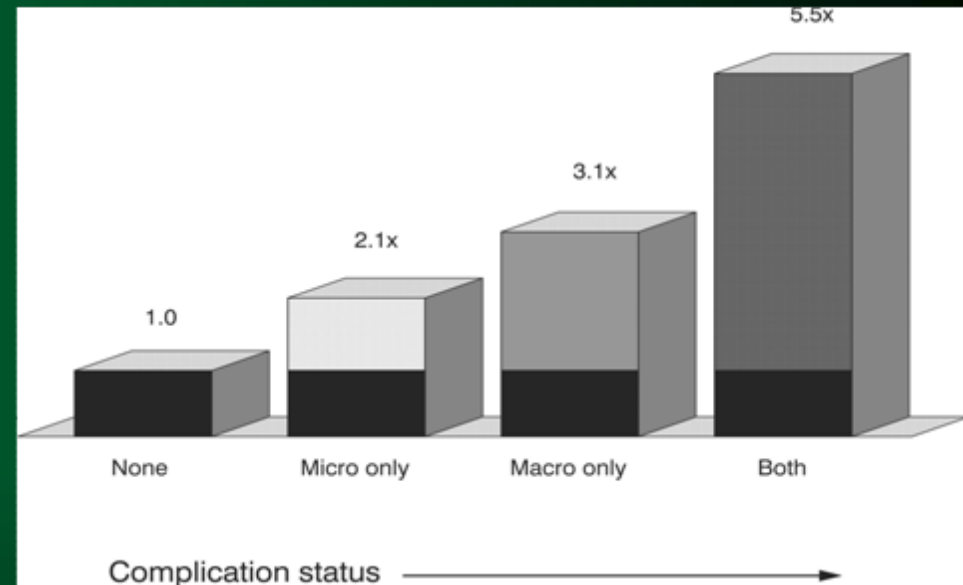
Complications of Diabetes - Expensive and Debilitating

➤ Macrovascular

- cardiovascular and
- cerebrovascular disease

➤ Microvascular

- diabetic retinopathy
- nephropathy and
- neuropathy



CODE2 - Effect of Complications on Hospitalization Costs

Williams R Eur Heart J Suppl 2005;7:D14-D17

- Treatment of these are expensive
- Increasing cost of social services to deal with consequences

EUROPEAN HEART JOURNAL
SUPPLEMENTS

Traditional Management Paradigm for Diabetes

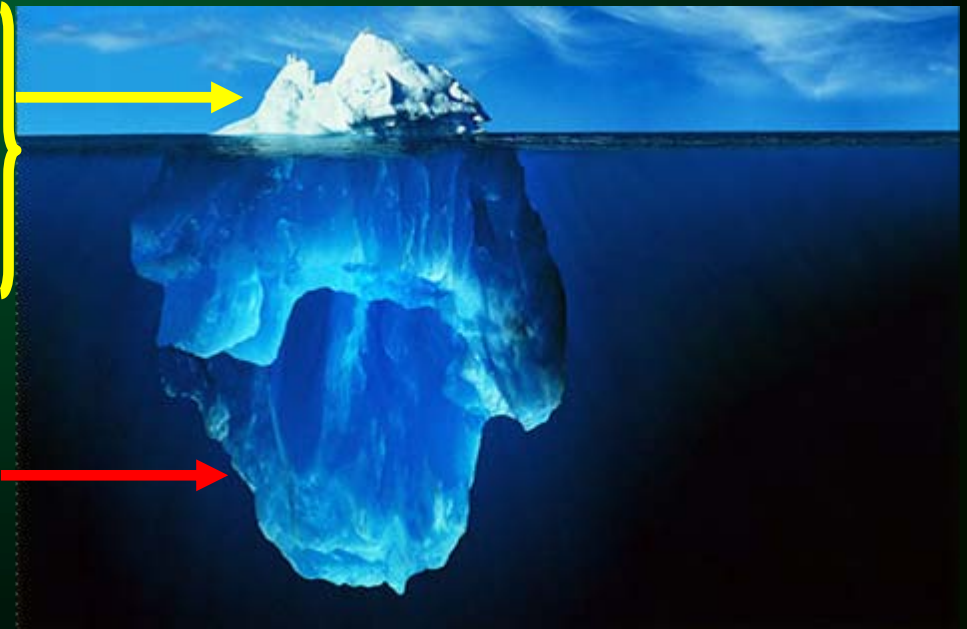
➤ A chronic disease

- invariably associated with development of long-term complications
- high morbidity and mortality
- important effects on patient's quality of life
- socio-economic implications

➤ Lifelong management through

- Education
- Controlled diet
- Physical exercise
- Pharmacological interventions

- Treatment of diabetes and its complications are expensive!
- There is an increasing burden on health and social services to deal with consequences like amputations, heart attack and strokes

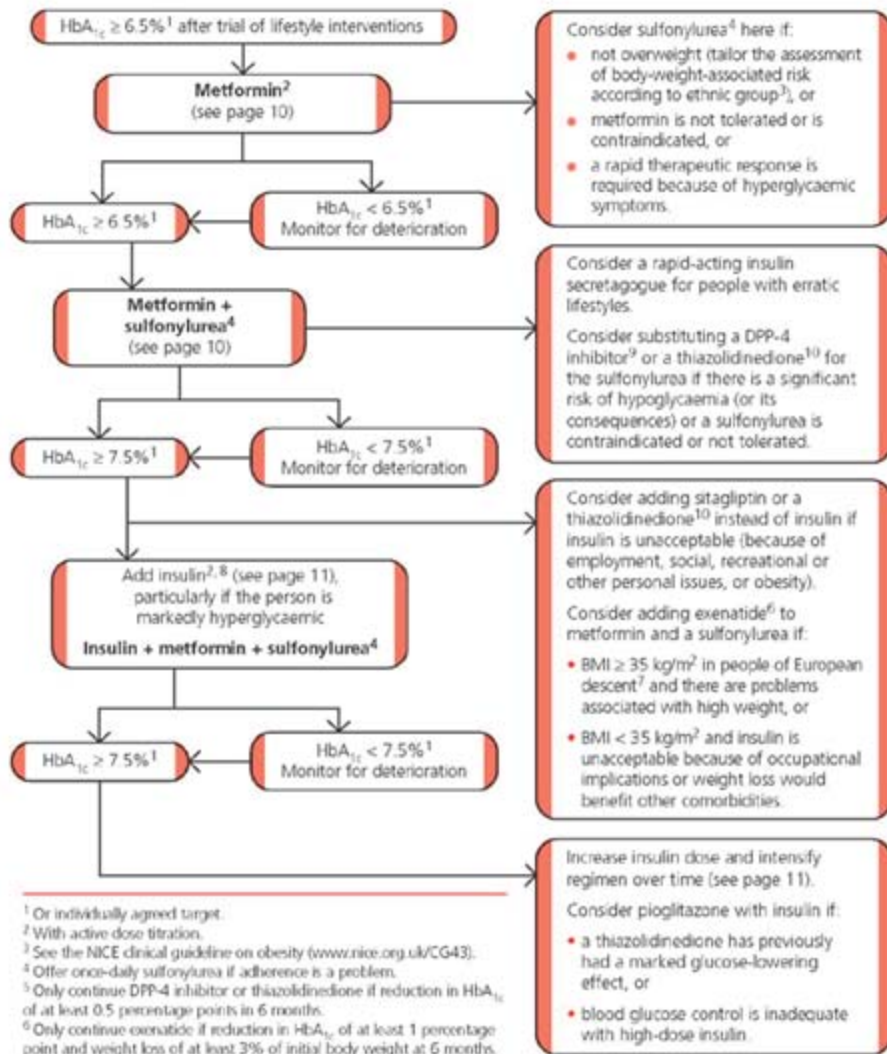


Who will benefit from Bariatric Surgery ?

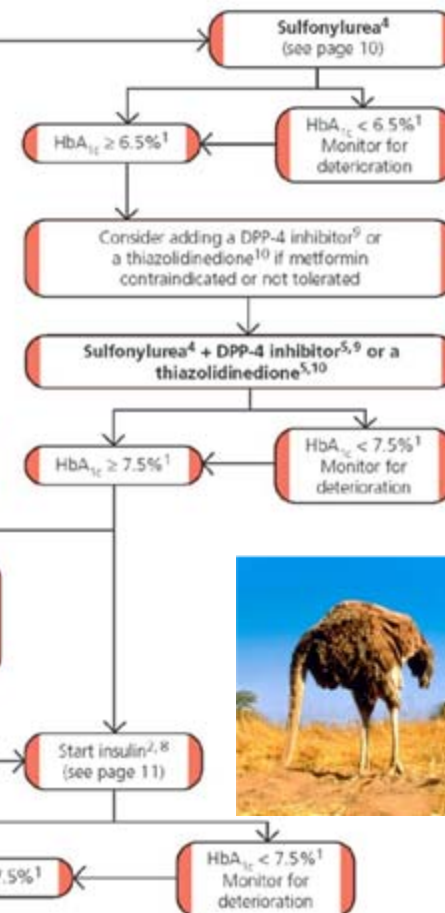
- 90% - 95% of BMI of ≥ 35 kg/m² with co-morbidities or BMI ≥ 40 kg/m² unlikely to achieve or maintain clinically beneficial weight loss through non-surgical means.
- For Asian ethnicity, the referral criteria should be 3 BMI points less!
- In England, 390,000 people (0.8%), have BMI 35-39.9 kg/m² with at least one co-morbidity:
 - Type II diabetes mellitus
 - Hypertension, Cardiomyopathy, Coronary heart disease
 - Obstructive sleep apnoea, Pulmonary hypertension
 - Osteoarthritis
 - Ischaemia and CVA
- Failure of conservative measures beyond 6 months.

NICE CG 87 - May 2009 - Something Missing?

Blood-glucose-lowering therapy



Surgery?



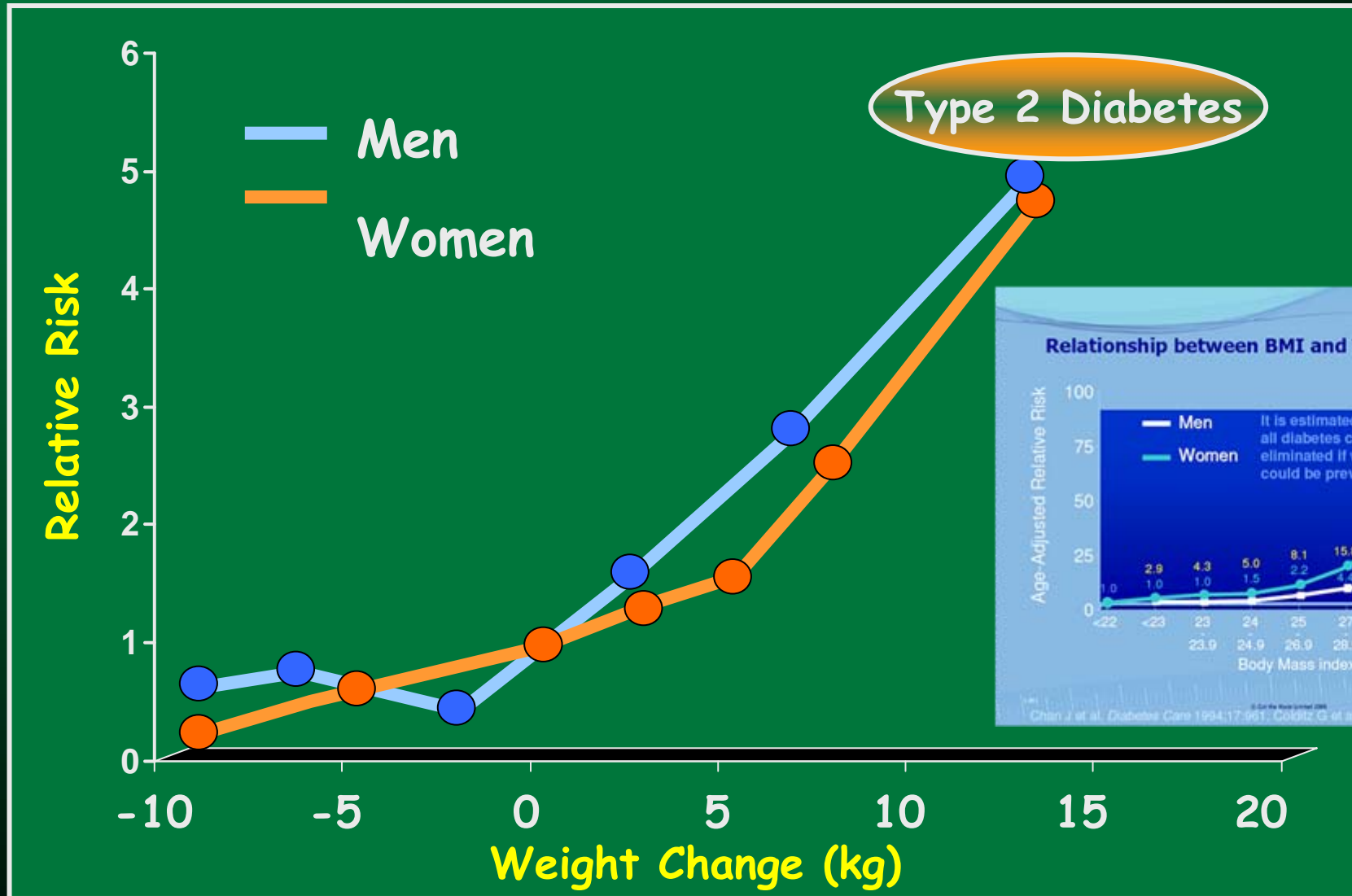
⁷ With adjustment for other ethnic groups.

⁸ Continue with metformin and sulfonylurea (and acarbose, if used), but only continue other drugs that are licensed for use with insulin. Review the use of sulfonylurea if hypoglycaemia occurs.

⁹ DPP-4 inhibitor refers to sitagliptin and vildagliptin.

¹⁰ Thiazolidinedione refers to pioglitazone and rosiglitazone.

Weight Gain Increases Risk of Developing Diabetes

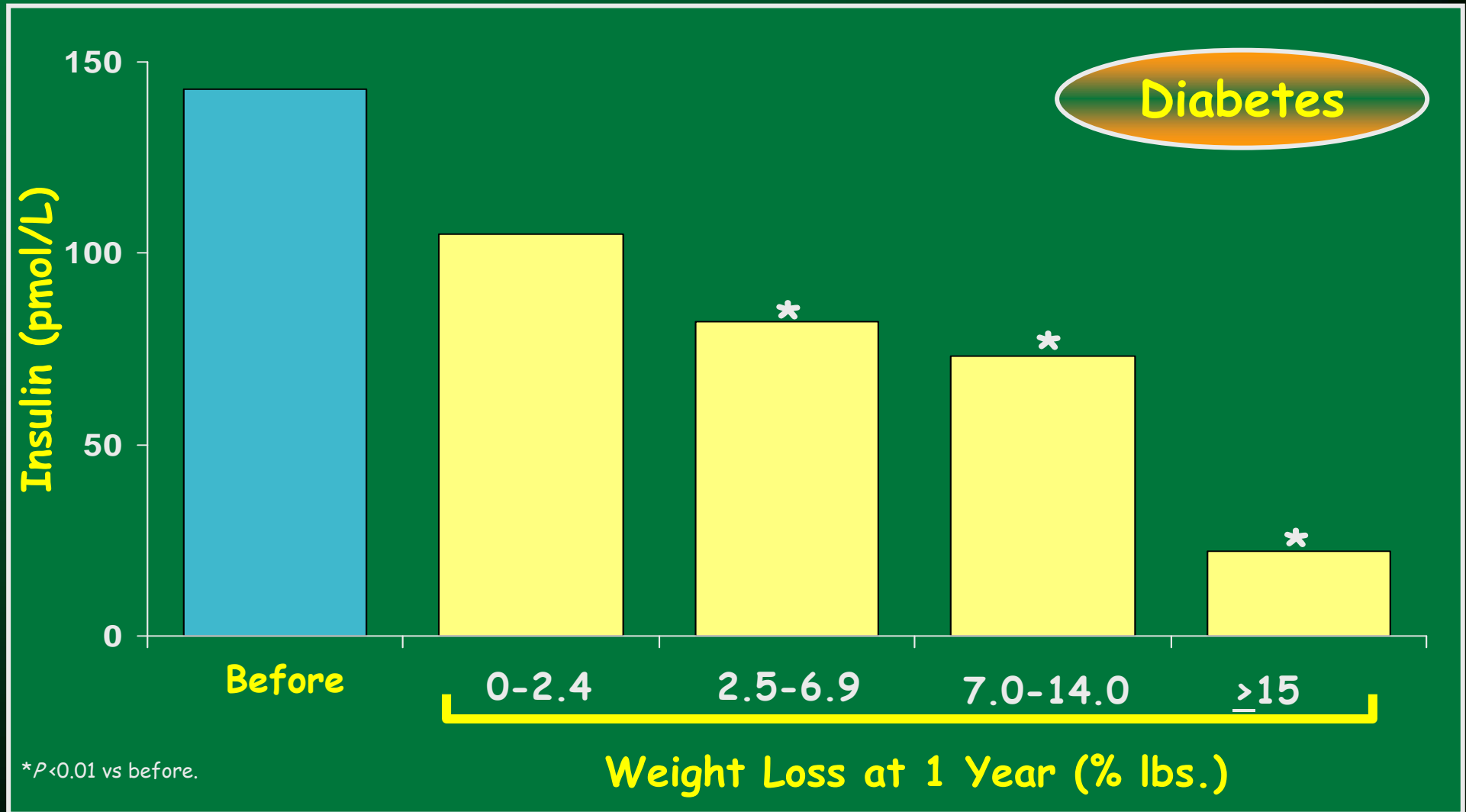


Benefits of Weight Loss (10%)

Diabetes	30-50% decrease in fasting glucose 50% decrease in risk of developing diabetes 15% decrease in levels of HbA1c
Blood pressure	decrease of 10mm Hg systolic and 20mm Hg diastolic pressure
Lipids	10% decrease in total cholesterol 15% decrease in LDL 30% decrease in triglycerides 8% increase in HDL
Mortality	>20% decrease in total mortality >30% decrease in diabetes related deaths >40% decrease in obesity related cancers

(Source: Jung 1997 and Stanford University Medical Centre 2004)

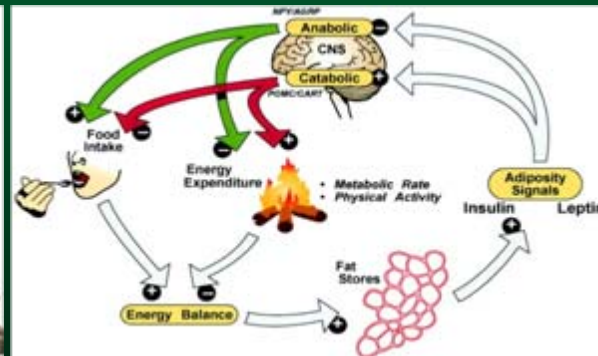
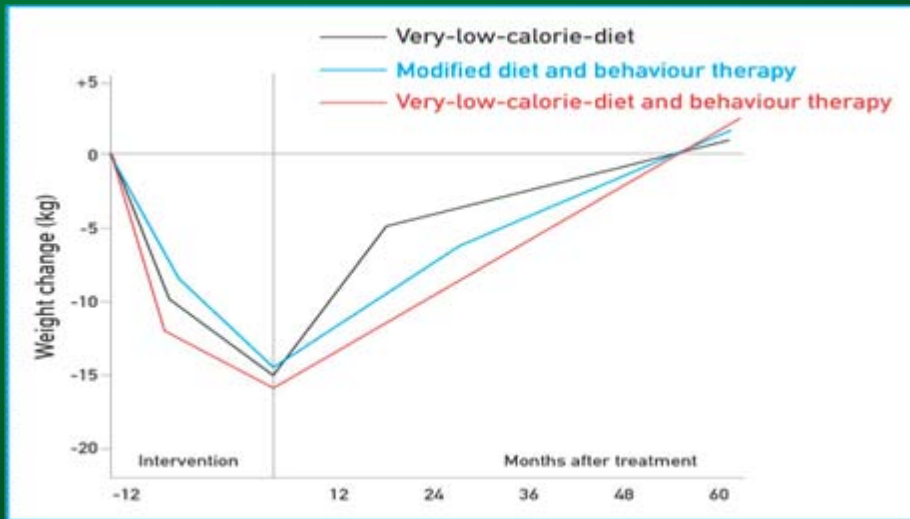
Insulin Sensitivity Improves with Weight Loss in Patients With Type 2 Diabetes¹



1. Wing RR, Koeske R, Epstein LH, et al. Long-term effects of modest weight loss in type II diabetic patients. *Arch Intern Med.* 1987;147(10):1749-53.

Compare Effect of Diet and Surgery on Weight

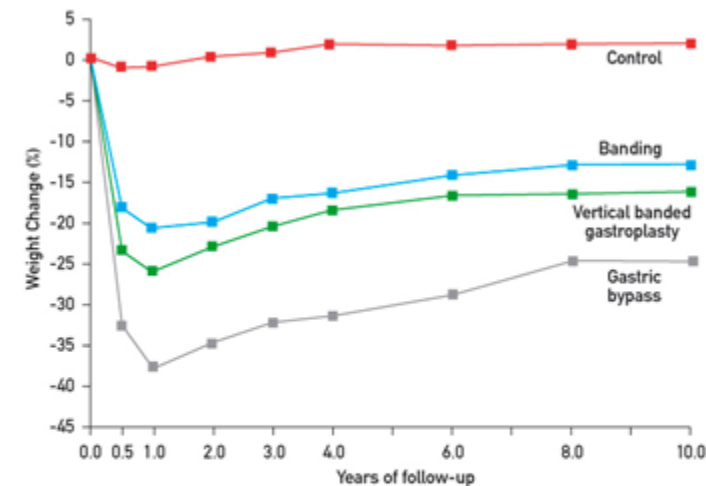
- Are we refusing to acknowledge the obvious?
- Diet & exercise effective only up to 6m
 - 60% failure at 1 yr
 - 80% failure at 2 yrs
 - 100% failure at 5 yrs
- Conservative measures fail due to complex homeostatic mechanisms leading to obligatory defence of weight!
- Only surgery is effective long-term (80%)



Changes In Energy Expenditure Resulting From Altered Body Weight
<http://content.nejm.org/cgi/reprint/332/10/621.pdf>

Is the Energy Homeostasis System Inherently Biased Toward Weight Gain
<http://diabetes.diabetesjournals.org/content/52/2/232.full.pdf+html>

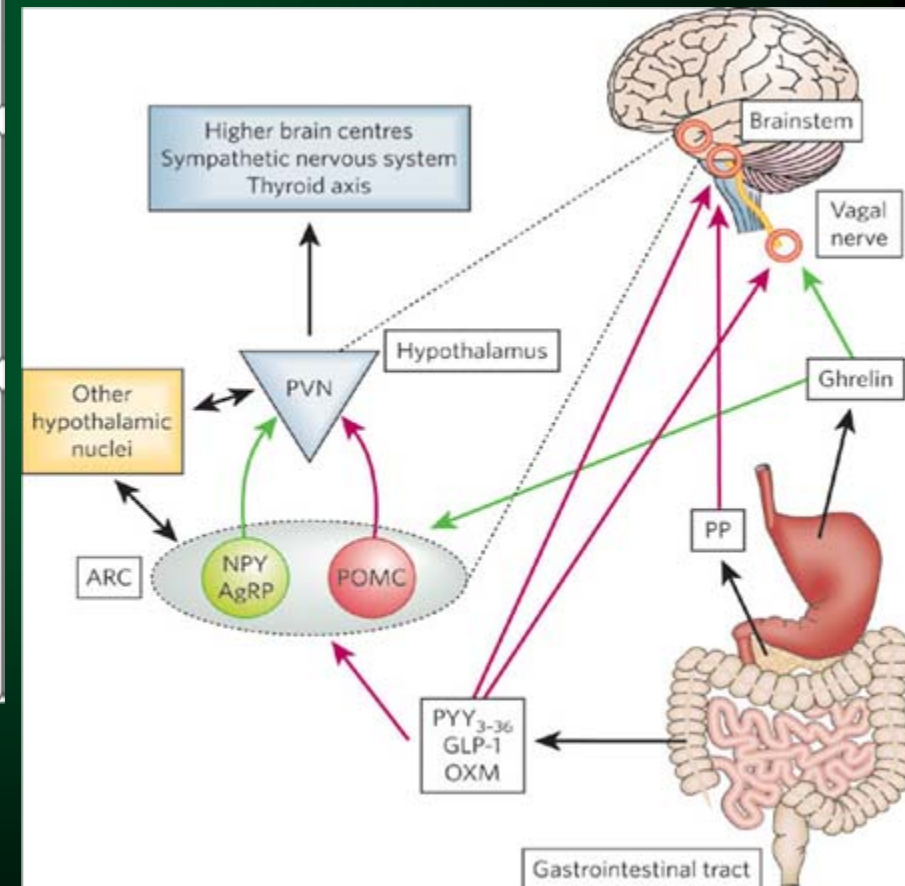
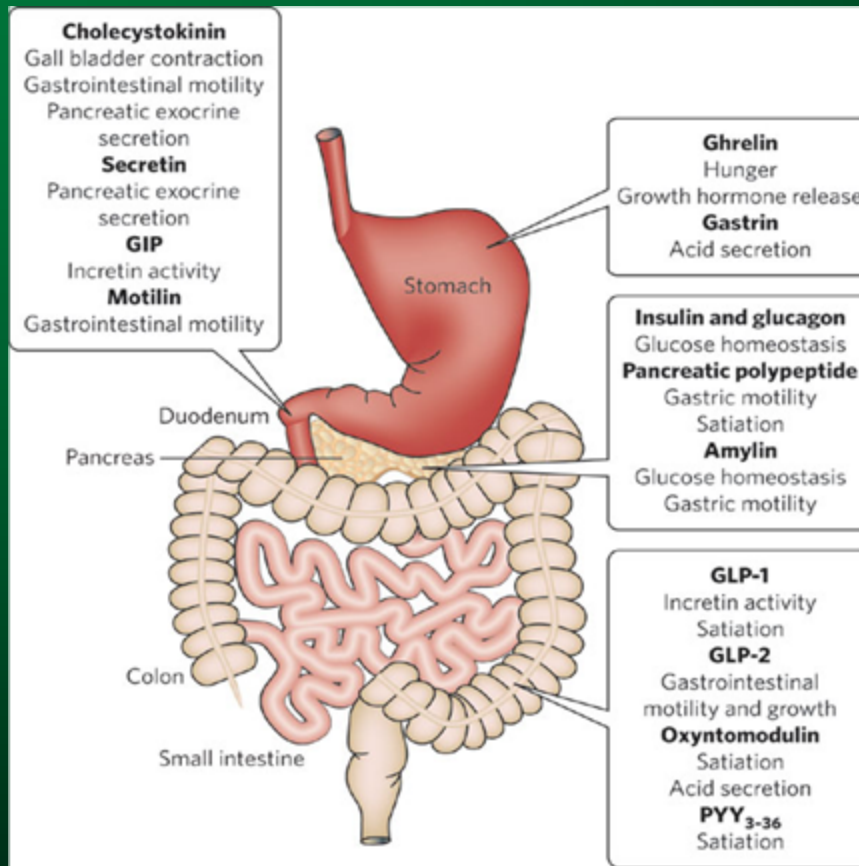
Pyruvate and Satiety: Can We Fool the Brain?
<http://endo.endojournals.org/cgi/reprint/146/1/1.pdf>



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

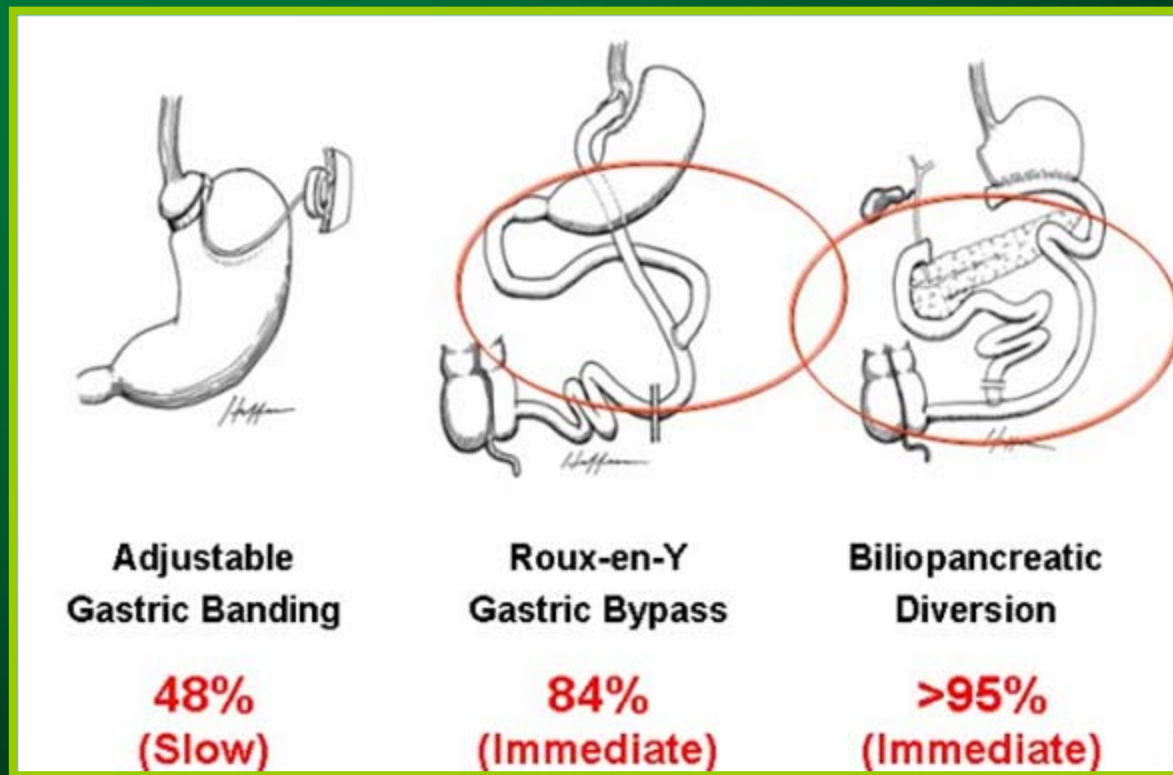
Figure 1. Weight Changes among Subjects in the SOS study over a 10-Year Period. All data are for subjects who completed 10 years of the study. The average weight change in the entire group of surgically treated subjects was almost identical to that in the subgroup of subjects who underwent vertical banded gastroplasty. The bars represent the 95 percent confidence intervals.

Human Body Vigorously Defends Its Weight - Neuro-Endocrine Energy Homeostasis:



- Energy balance is complex
- The body vigorously defends status quo (final weight)
- Hence diet and conservative measures fail

Weight Loss is Beneficial for Glycaemic Control



- Surgery changes the homeostatic mechanism and effectively -
 - Controls hyperglycaemia in the long-term (80% average)
 - Arrests progression of co-morbidities
 - Frees up health resources to deal with other conditions
 - Is economically less expensive in the medium to long term

Metabolic Syndrome

- Central obesity (defined as waist circumference ≥ 94 cm for Europid men and ≥ 80 cm for Europid women, with ethnicity specific values for other groups)
- plus any two of the following four factors:
 - raised TG level: ≥ 150 mg/dL (1.7 mmol/L), or specific treatment for this lipid abnormality
 - reduced HDL cholesterol: < 40 mg/dL (1.03 mmol/L*) in males and < 50 mg/dL (1.29 mmol/L*) in females, or specific treatment for this lipid abnormality
 - raised blood pressure: systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg, or treatment of previously diagnosed hypertension
 - raised fasting plasma glucose (FPG) ≥ 100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes

Metabolic Syndrome



- Abdominal obesity
- Hyperinsulinemia
- High fasting plasma glucose
- Impaired glucose tolerance
- Hypertriglyceridemia
- Low HDL-cholesterol
- Hypertension

Metabolic Surgery

- Treatment of metabolic derangements (metabolic syndrome) with alterations of the gut anatomy
 - Emphasis of weight loss and on the improvement of metabolic conditions resulting from these interventions, particularly the *remission of diabetes*
 - A range of procedures
 - Restrictive
 - Decreases the size of the stomach
 - Patients are sated with smaller volumes of food
 - Malabsorptive
 - Segments of the bowel are bypassed
 - Patients are less able to absorb nutrients
 - Combined restrictive/malabsorptive or diversionary procedures
 - Includes some element of both restrictive and malabsorptive procedures
- Energy balance is complex
 - The body vigorously defends status quo (final weight)
 - Surgery resets the balance

Metabolic Surgical Procedures:



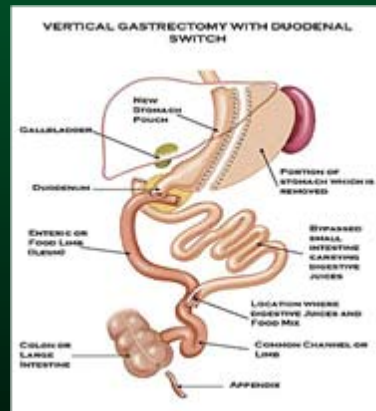
Adjustable Gastric Band



RY Gastric bypass



Bilo-Pancreatic Diversion (BPD)



BPD-Duodenal Switch

Gastric bypass has a complex mechanism of action:

1. Restriction due to a small gastric pouch
2. Malabsorption - due to diversion of gastric and biliary-pancreatic juice about 100cms from GOJ.
3. Duodenal bypass - leads to:
 - a. Increased Incretin levels e.g. GLP-1, PPY etc
 - b. Reduced levels of Leptin (satiety hormone) and Ghrelin (hunger hormone)
4. Altered neuronal and vagal stimulation
5. Change of bacterial flora of gut

Management of Diabetes - International Recommendations

ADA - Standards of Medical Care in Diabetes—2009

Bariatric surgery should be considered for adults with BMI ≥ 35 kg/m² and type 2 diabetes, especially if the diabetes is difficult to control with lifestyle and pharmacologic therapy. (B)

International Conference on Gastrointestinal Surgery to Treat Type 2 Diabetes-2009 (DSS)

GI surgery (i.e., RYGB, LAGB, or BPD) should be considered for the treatment of T2DM in acceptable surgical candidates with BMI ≥ 35 kg/m² who are inadequately controlled by lifestyle and medical therapy (A).*

A surgical approach may also be appropriate as a non-primary alternative to treat inadequately controlled T2DM in suitable surgical candidates with mild-to-moderate obesity (BMI 30-35 kg/m²) (B). RYGB may be an appropriate surgical option for diabetes treatment in this patient population (C).

Metabolic Surgery - Cost-Effective & Saves Money!

Recommendations with a significant resource impact

Yr 10 cost (£000s)

Recurrent costs

Treatment of overweight/obese children with comorbidities

9,632

Bariatric surgery for obese adults with a BMI above 50 kg/m²

25,878

Total estimated costs

35,510

Cash-releasing savings

Reduced prescription costs in primary care

-13,992

Opportunity savings

Reduced GP contacts

-41,636

Total estimated savings

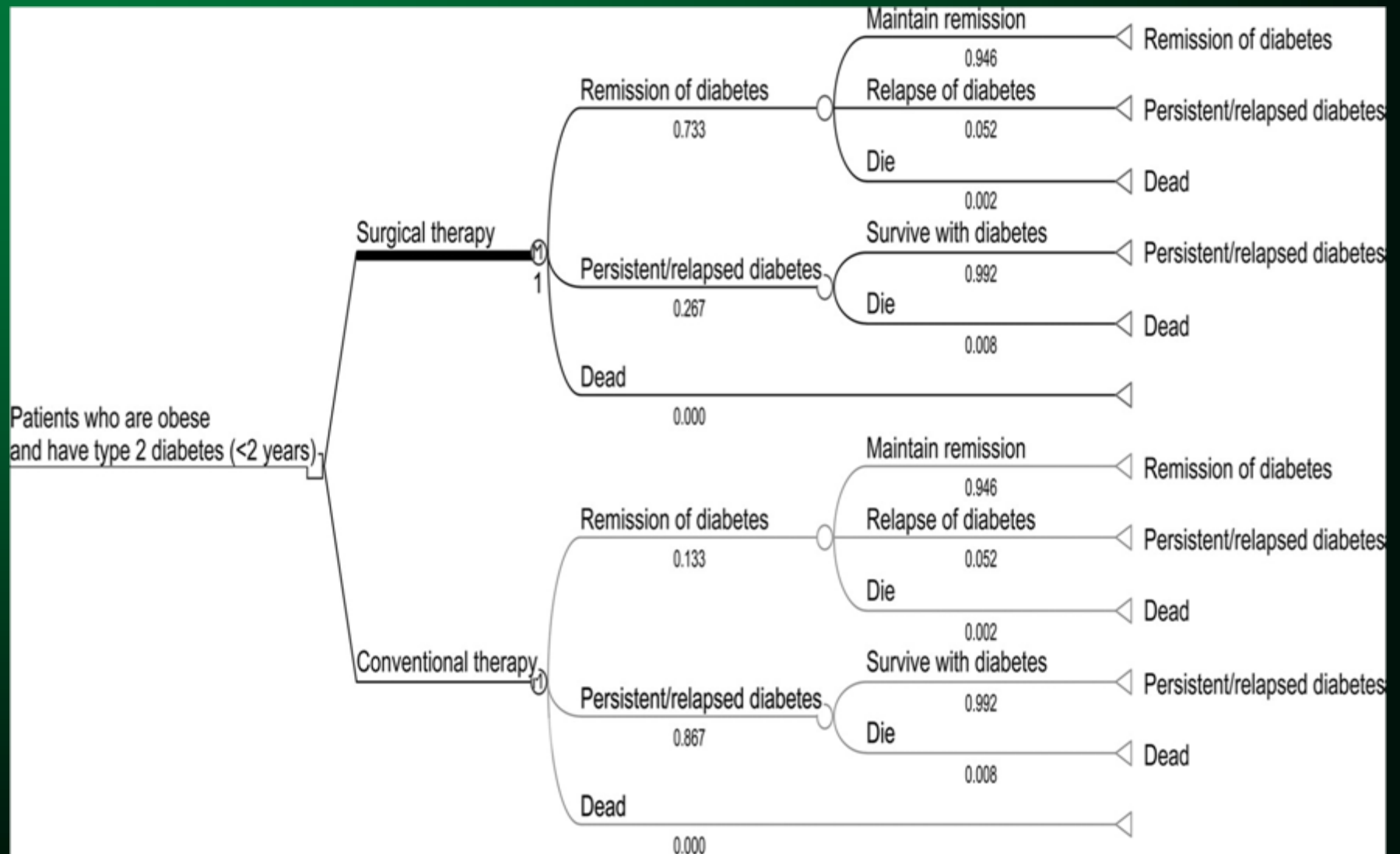
-55,628

NICE Guideline CG43 - Cost Report

- In the USA, after taking into account age, sex, and comorbidities, the initial investment is returned within 4 years for patients who undergo open surgery and within 2 years for patients who undergo laparoscopic surgery.
- Even ignoring potential quality-of-life and length-of-life benefits, as well as disability and work loss, third-party payers can rely on bariatric surgery paying for itself through decreased comorbidities within 2 to 4 years.

Crémieux PY et al A Study on the Economic Impact of Bariatric Surgery

Economic Impact of Metabolic Surgery



Economic Impact of Metabolic Surgery – Cost-effective

Model results (lifetime means per patient)	Surgical	Conventional	Difference
Undiscounted			
Years in diabetes remission	11.4	2.1	9.4
Total life-years	32.1	30.5	1.6
QALYs	24.9	22.6	2.3
Discounted at 3% for both costs and benefits			
Costs (AUD)			
2-year RCT intervention	13,383	3,397	9,987
Surgical intervention maintenance	6,477		6,477
Surgical intervention complications	1,768		1,768
Type 2 diabetes remission—monitoring costs	16,479	2,874	13,605
Health care costs to treat type 2 diabetes	60,824	95,105	-34,281
Total cost	98,931	101,376	-2,444
Effectiveness			
Total life-years	20	19.2	0.7
QALYs	15.7	14.5	1.2
Cost-effectiveness			
Cost per life-year gained	Dominant		
Cost per QALY	Dominant		
Probability of dominance	57%		
Probability of cost-effectiveness at willingness-to-pay threshold	98%		
Dominant: generates health care savings and health benefits. Willingness-to-pay threshold, 50,000 AUD per QALY.			

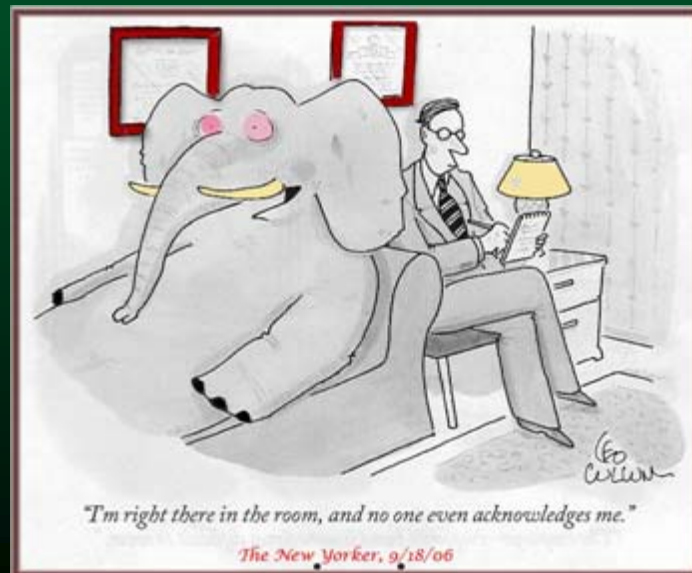
A Stitch in Time Saves Nine!

Choices -

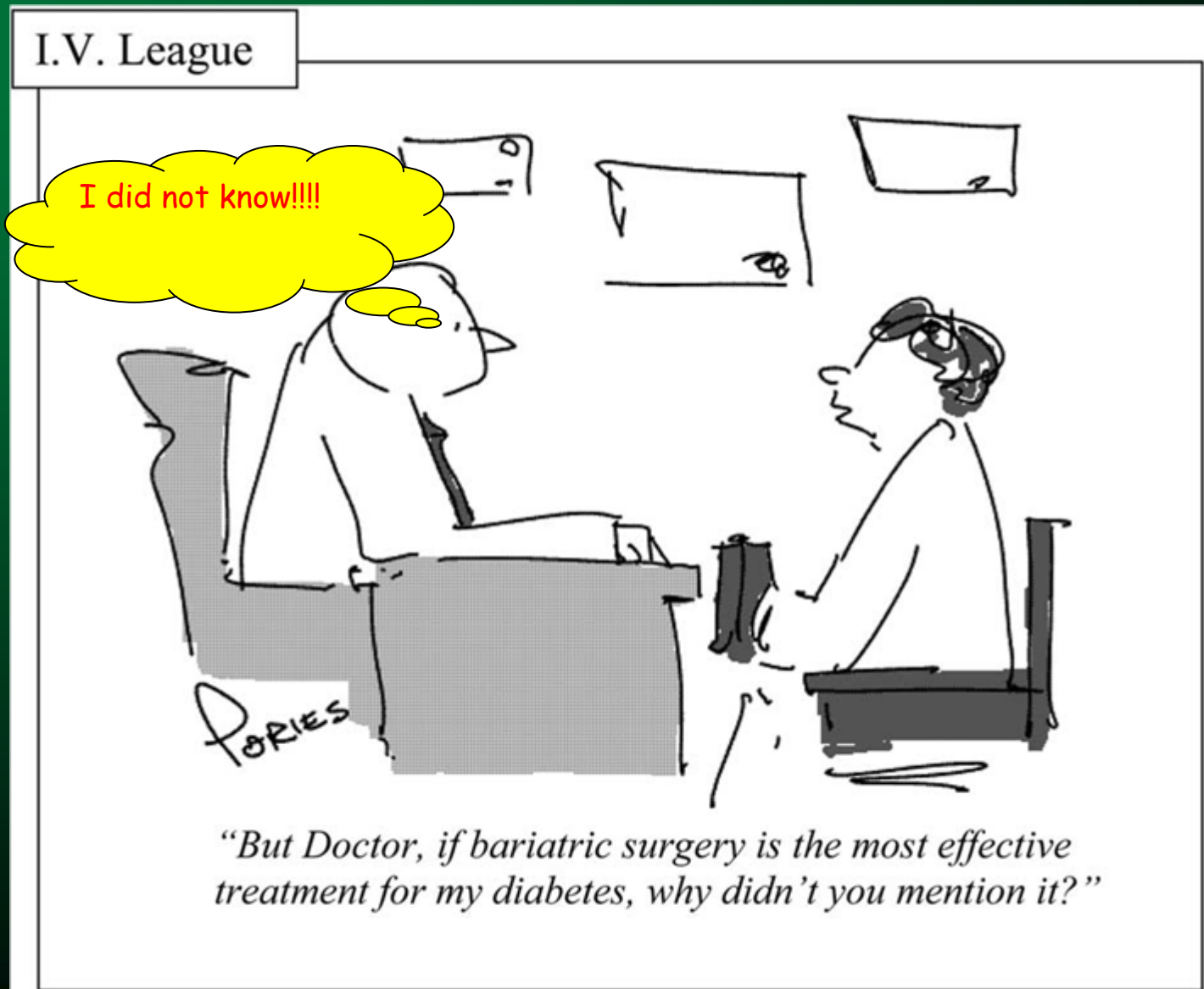
- Invest now to save within 2 years!

OR

- Continue to spend increasing resources and money on management of obesity and its complications - diabetes, stroke, cardiovascular diseases, arthritis and many more!

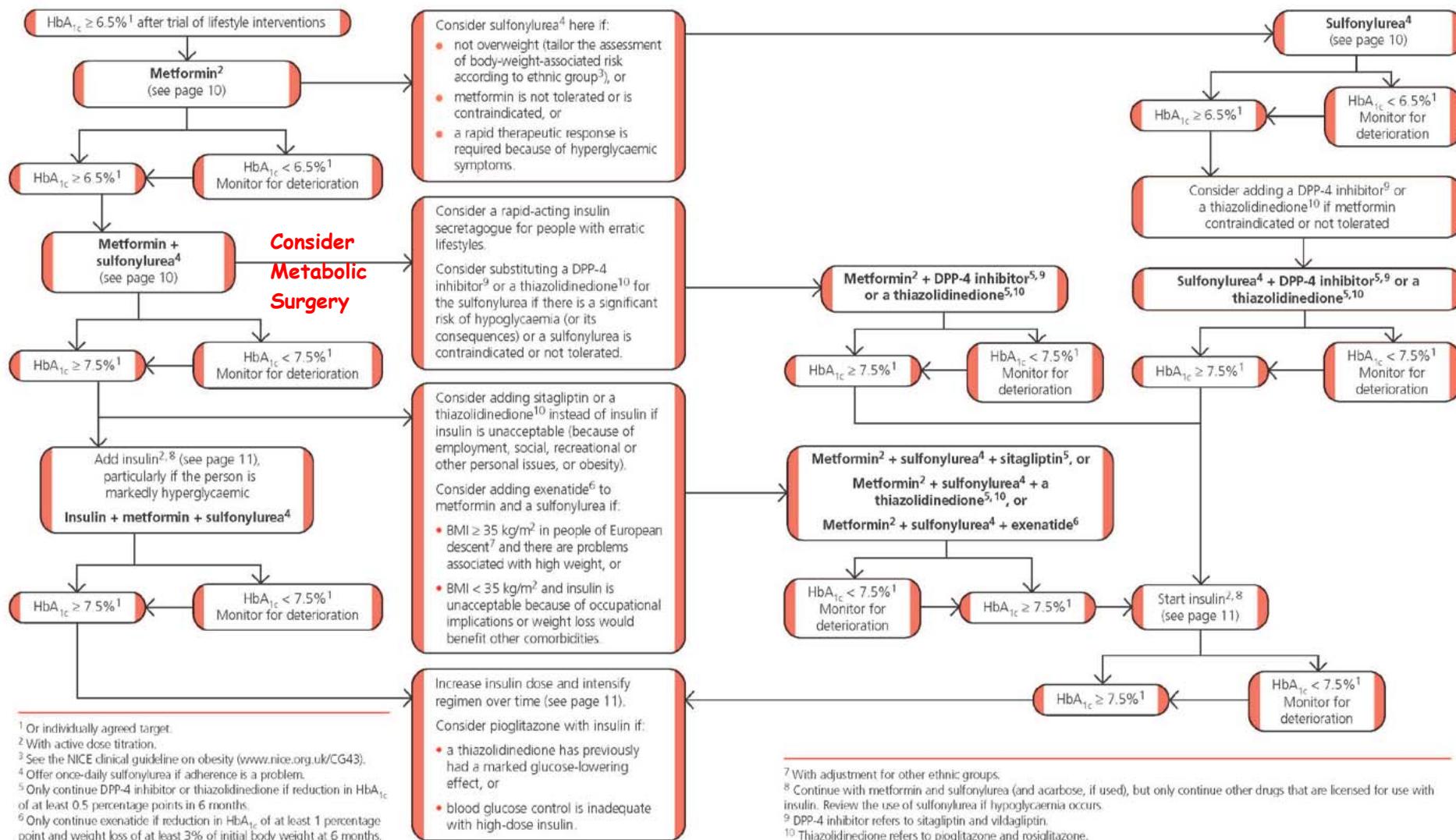


Why is Metabolic Surgery Not Mentioned?



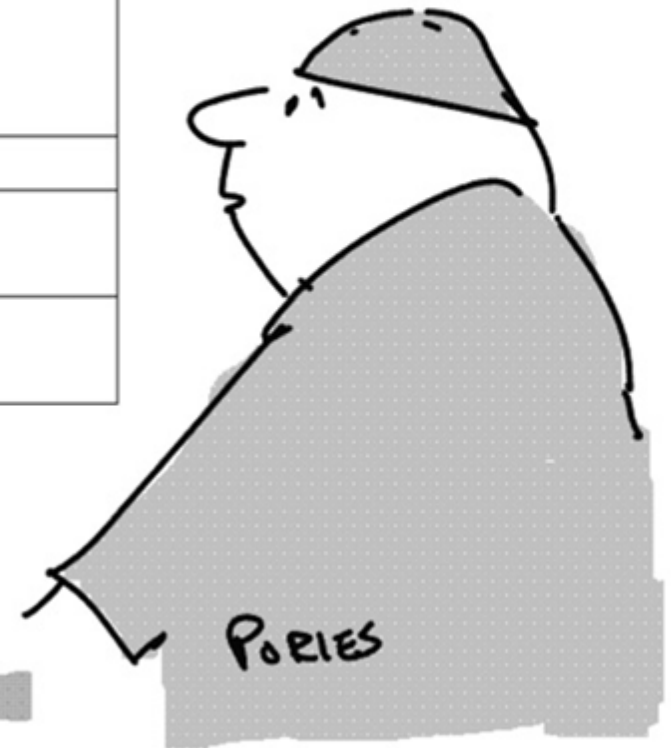
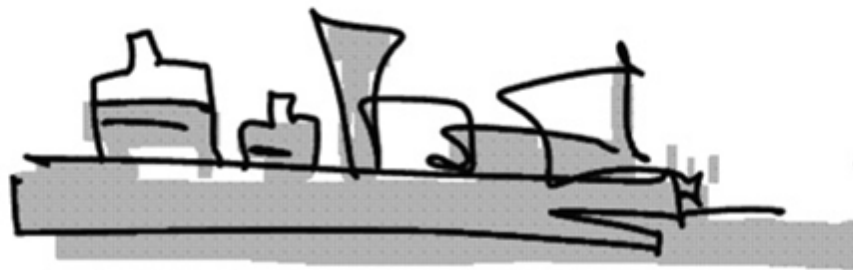
Diabetes Management - A Stitch in Time?

Blood-glucose-lowering therapy



Provocative - Who Knows What The Future Holds?

OR	Dx	Operation	Surgeon
14	Diabetes	Gastric Bypass	Jones
14	Hypertension	Gastric Bypass	Jones
14	Cardio-pulmonary Failure	Gastric Bypass	Jones
11	Asthma	Gastric Bypass	Brown
11	Pseudotumor Cerebri	Gastric Bypass	Brown
11	Crippling Arthritis	Gastric Bypass	Brown



Conclusion

- Obesity and especially diabetes is a major cause of morbidity and mortality
- The number of obese and diabetics are increasingly rapidly
- Treatment of obesity and diabetes consumes an increasingly large proportion of health resources
- Lifestyle interventions and pharmacotherapy has limited impact on obesity and diabetes
- Apart from standard bariatric surgery, "Metabolic Surgery" has the potential to provide remission in a large proportion of diabetics and should be considered earlier in management of these patients.
- Early "Metabolic Surgery" will be cost-effective within 2 years and is already practised in many centres in USA, Europe and Asia!

Some trials investigating effects of metabolic surgery in diabetics:

- STAMPEDE, TRIABETES, SOLID, SLIMM-T2D, DIBASY, LABS-3, 01041768, 00641251, 00540462, 00428571, DIA-BPD 25-30, SLIDE, Teen-LABS, MIDAS, OBEDIAB, 01130207