

Excess Nutrition and its Effects

Prof Terry Wilkin

Obesity

Obesity is a disease.....

a classic example of interaction between nature and nurture, susceptibility and risk, genes and environment

Obesity

Diabetes

Heart disease

Hypertension

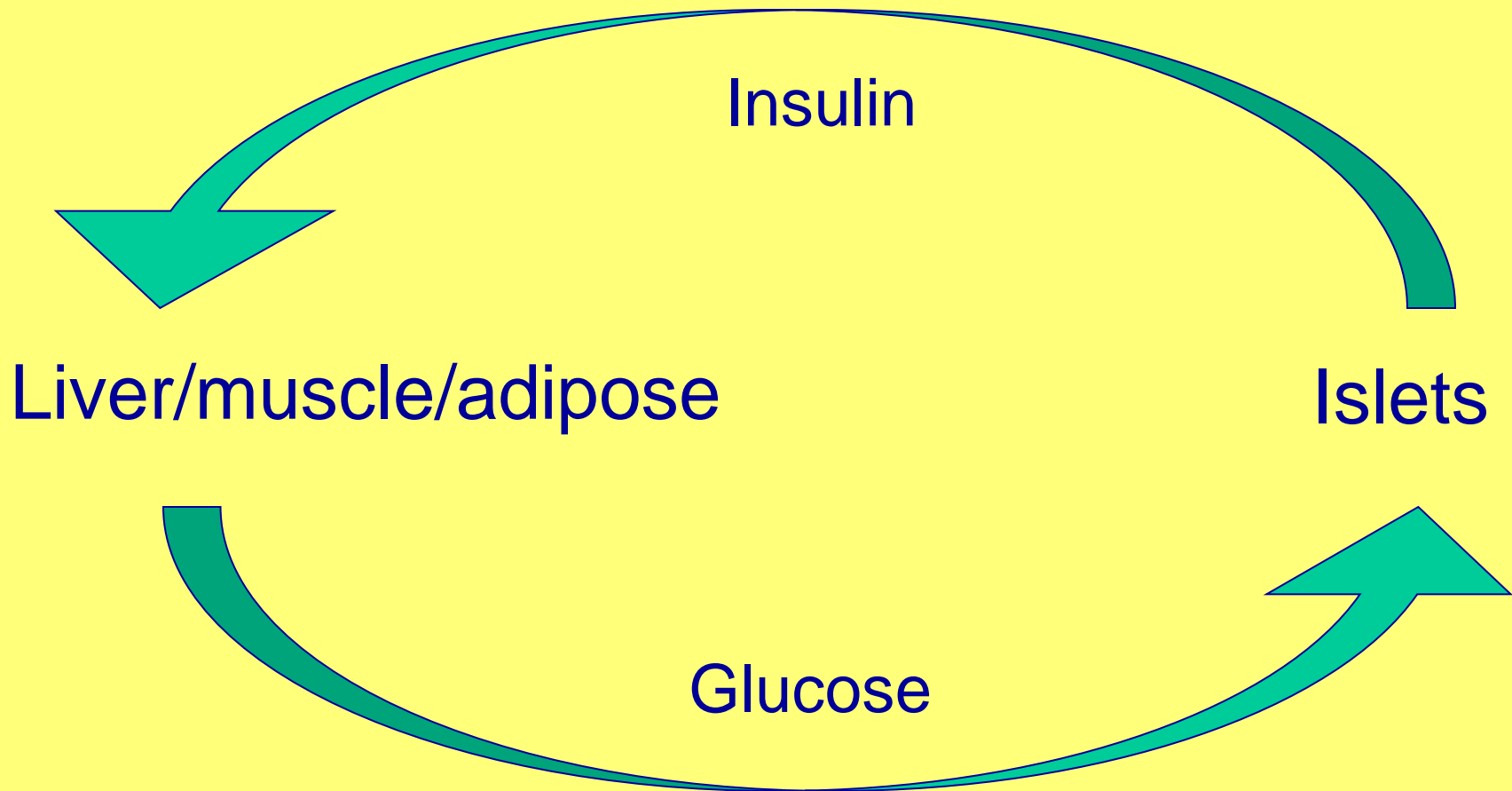
Haemorrhagic stroke

Insulin resistance

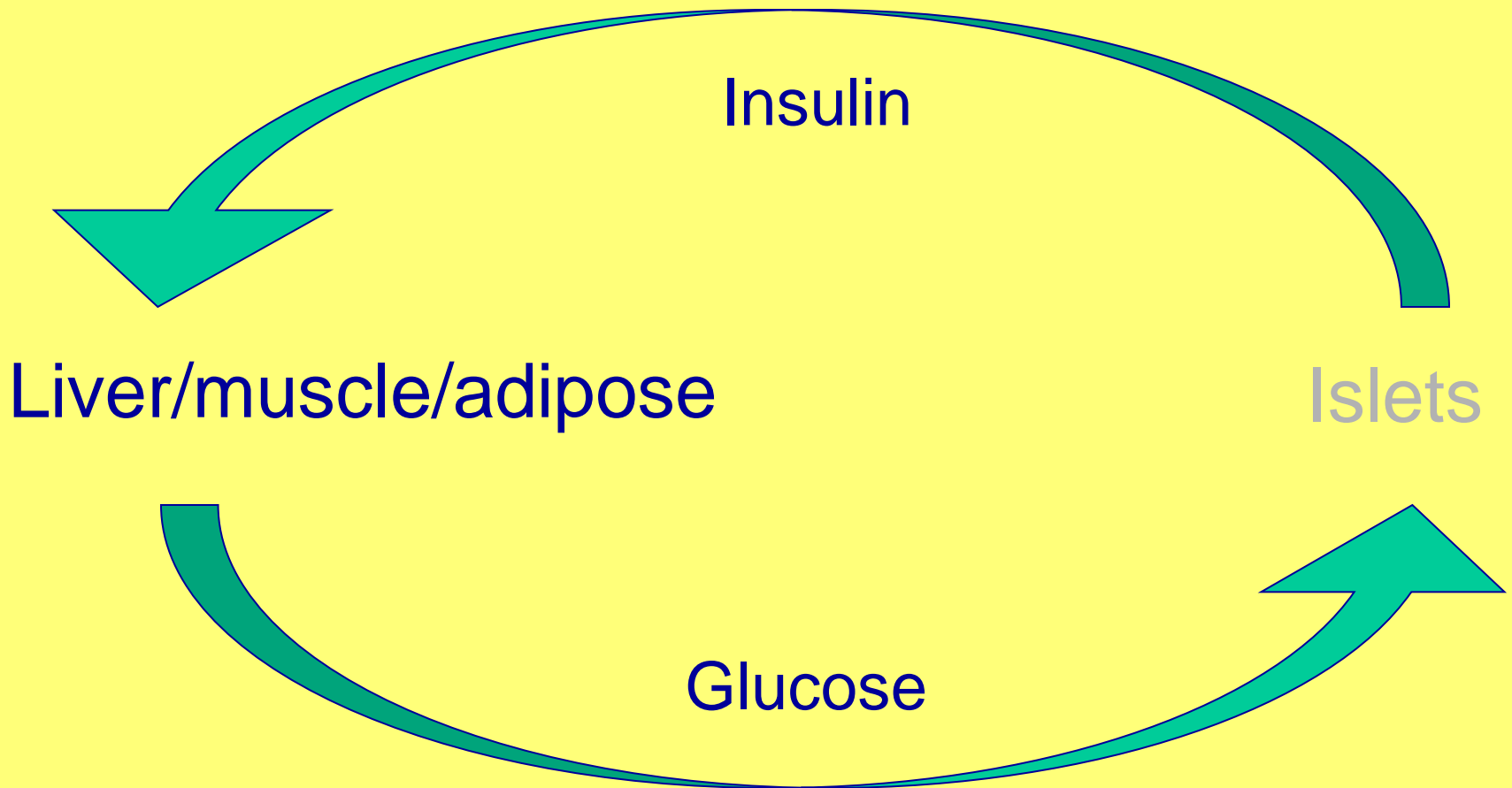
Four questions

1. What is insulin resistance?
2. What are its effects?
3. What causes insulin resistance?
4. Can it be prevented?

Control of Blood Glucose



Control of Blood Glucose

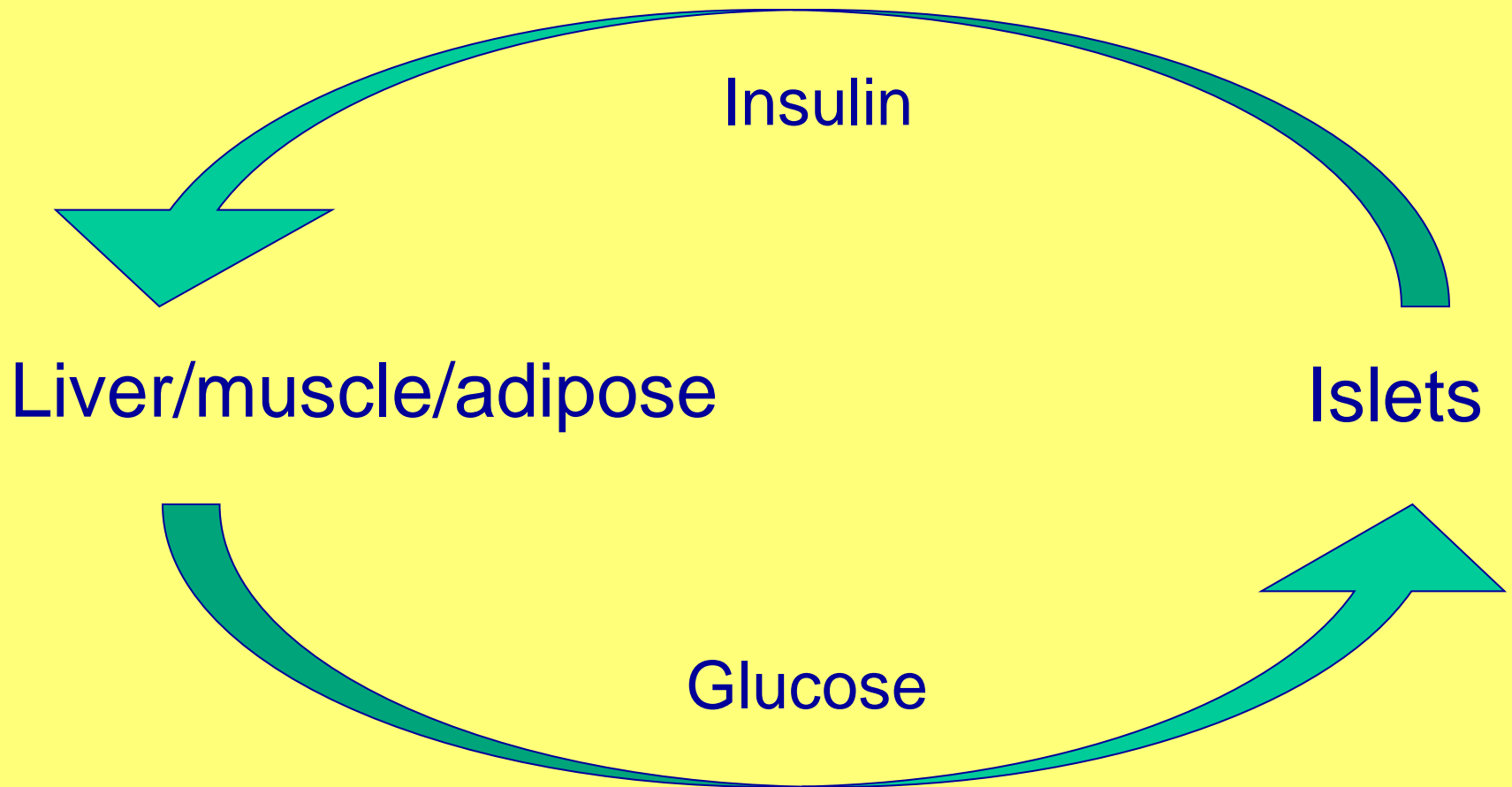


Beta cell loss

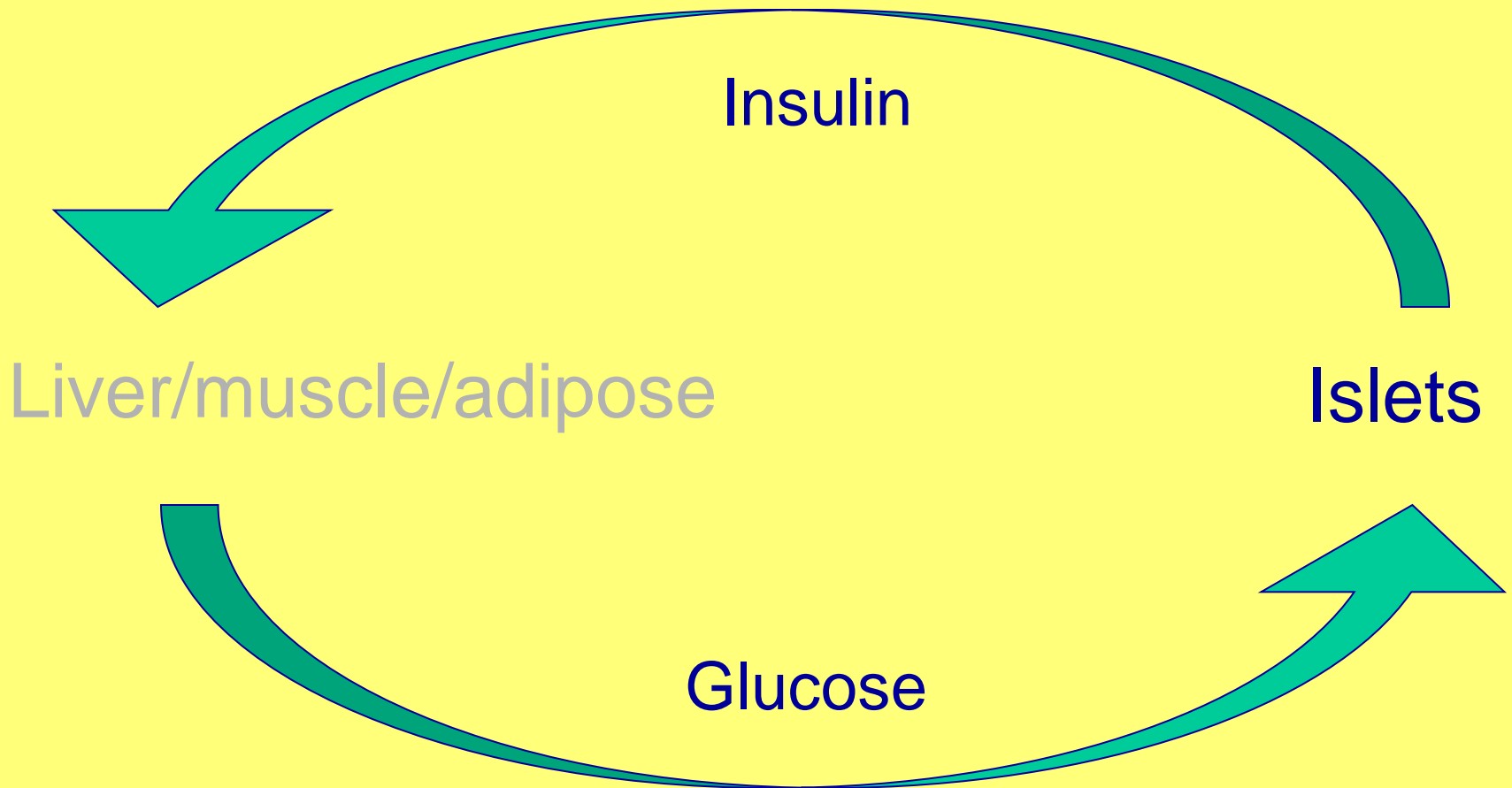
Glucose ↑

Insulin ↓

Control of Blood Glucose



Control of blood glucose



Insulin resistance

Glucose ↑

Insulin ↑

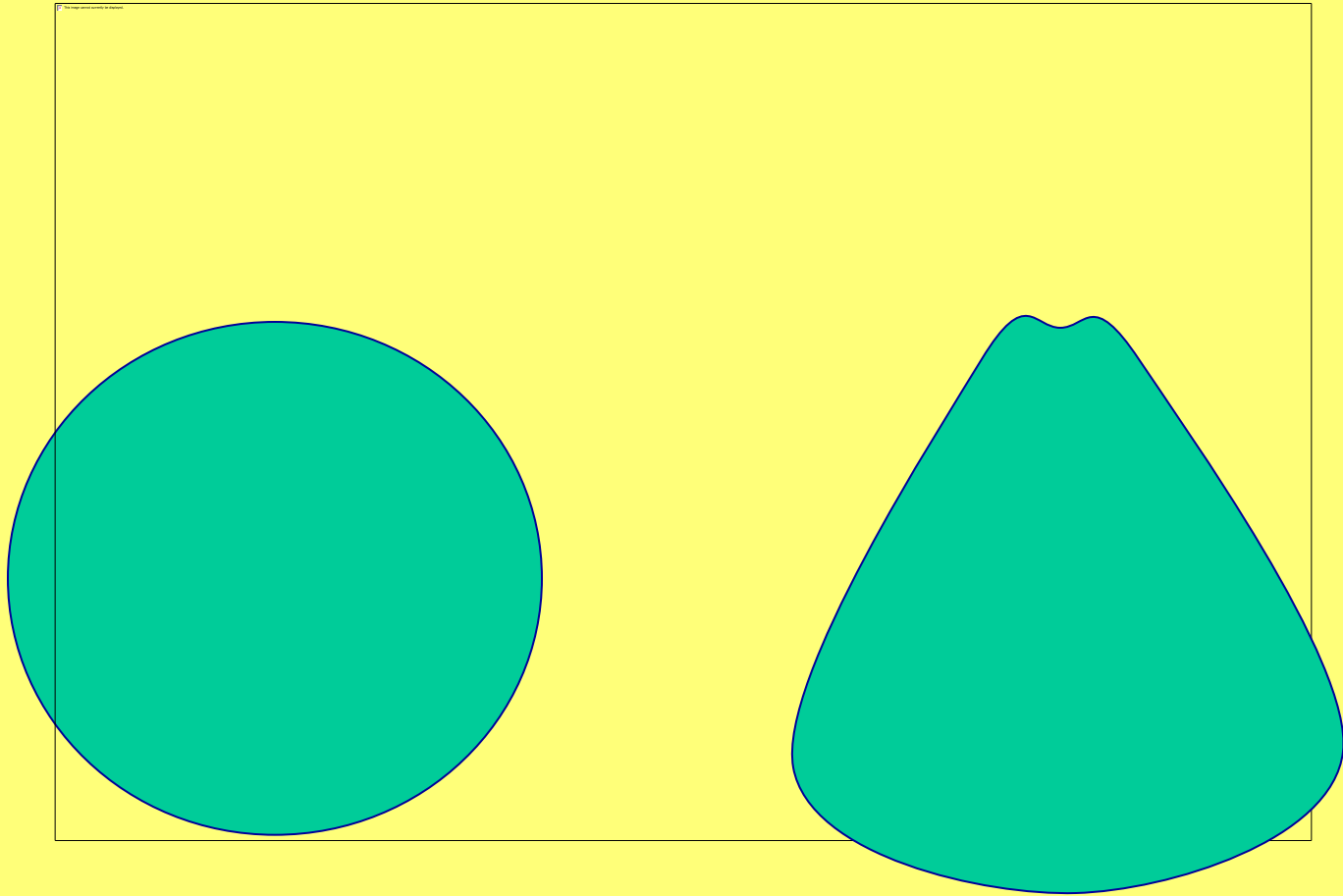
Message 1

- ◆ Diabetes is the end-result of a process - not the process itself
- ◆ The process is that of insulin resistance
- ◆ Insulin resistance is the result of obesity, and is characterised by high insulin levels

Four questions

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Pommes et poires



Vague J, 1947

Sumo

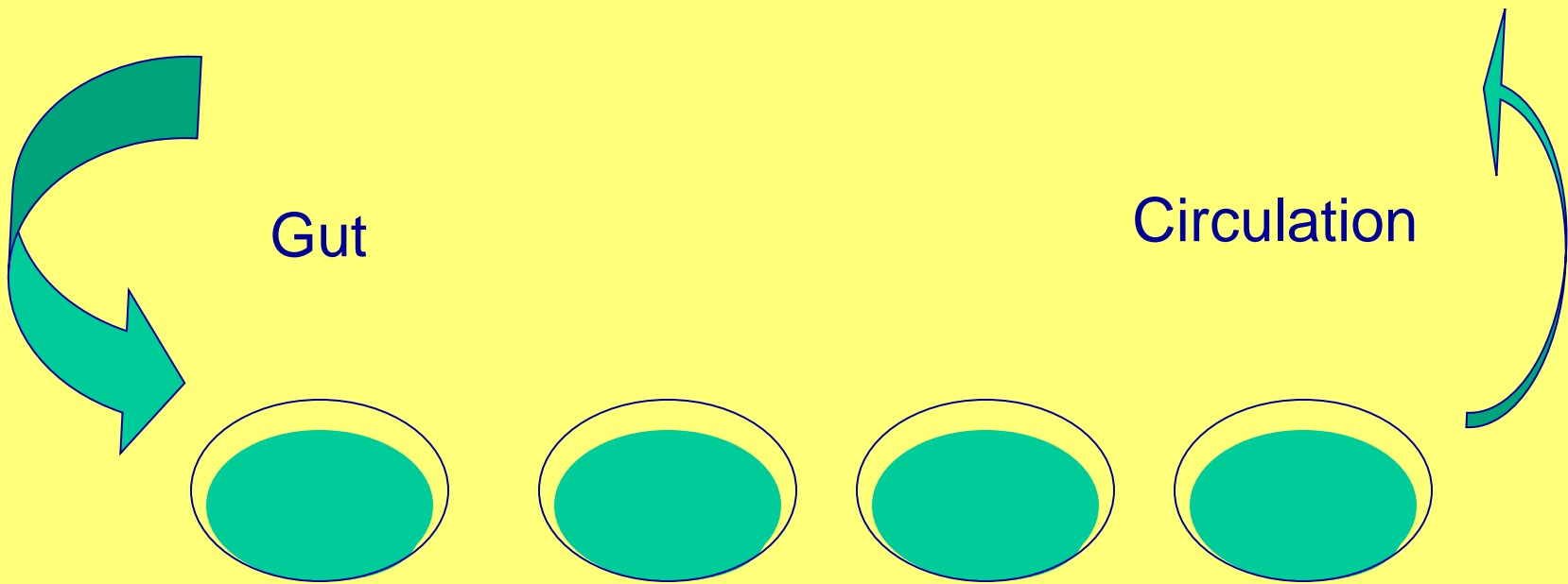


CT scan at L2



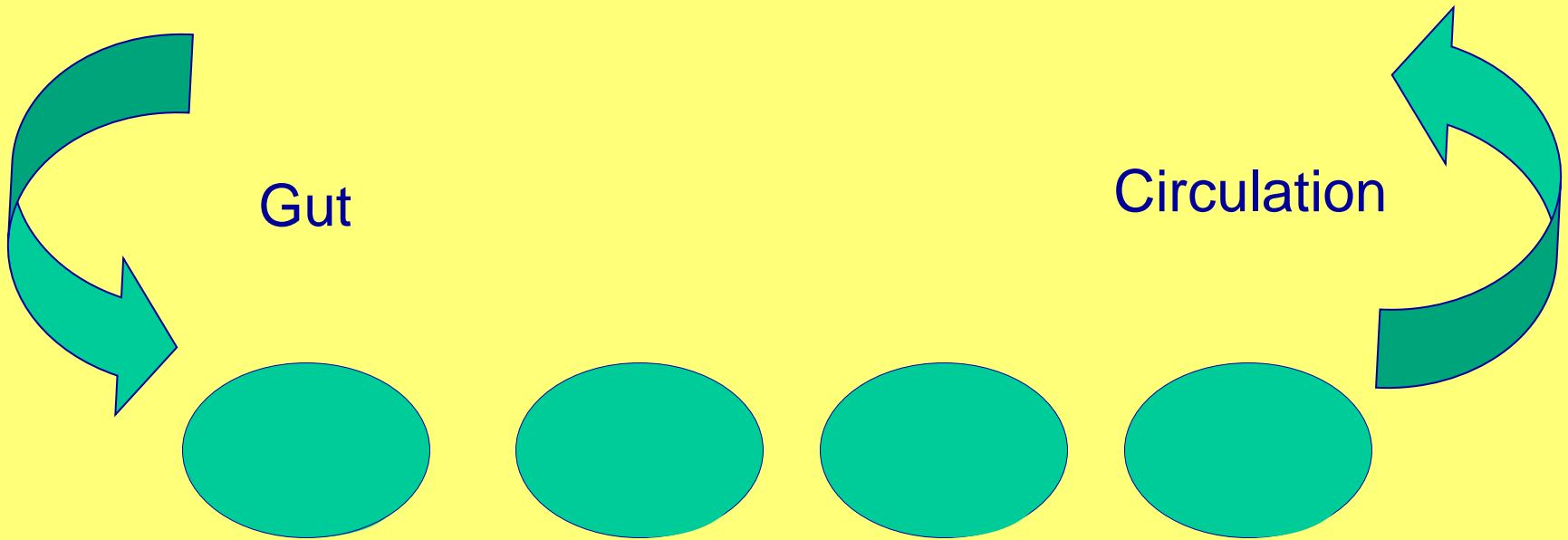
Triglyceride flux

Normal



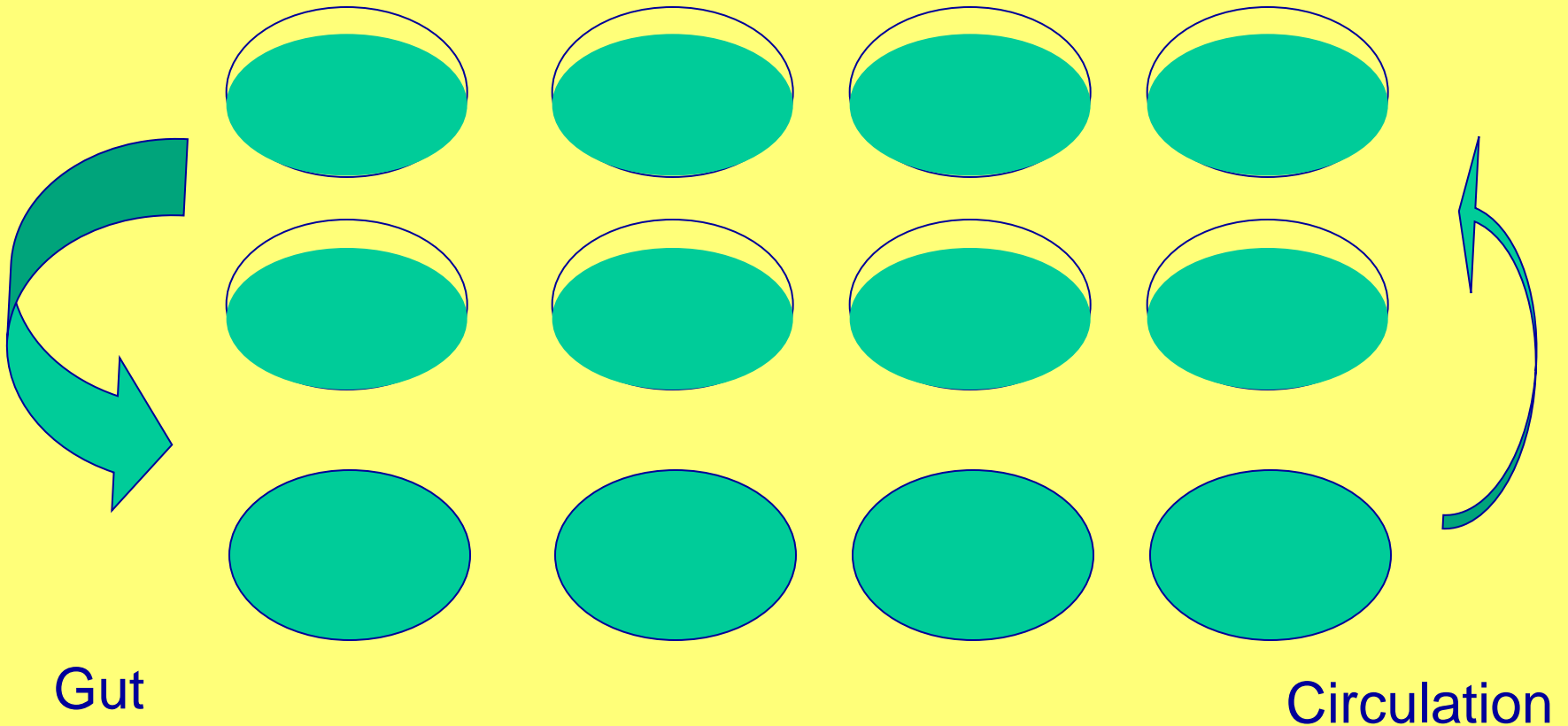
Triglyceride flux

Upper body obesity

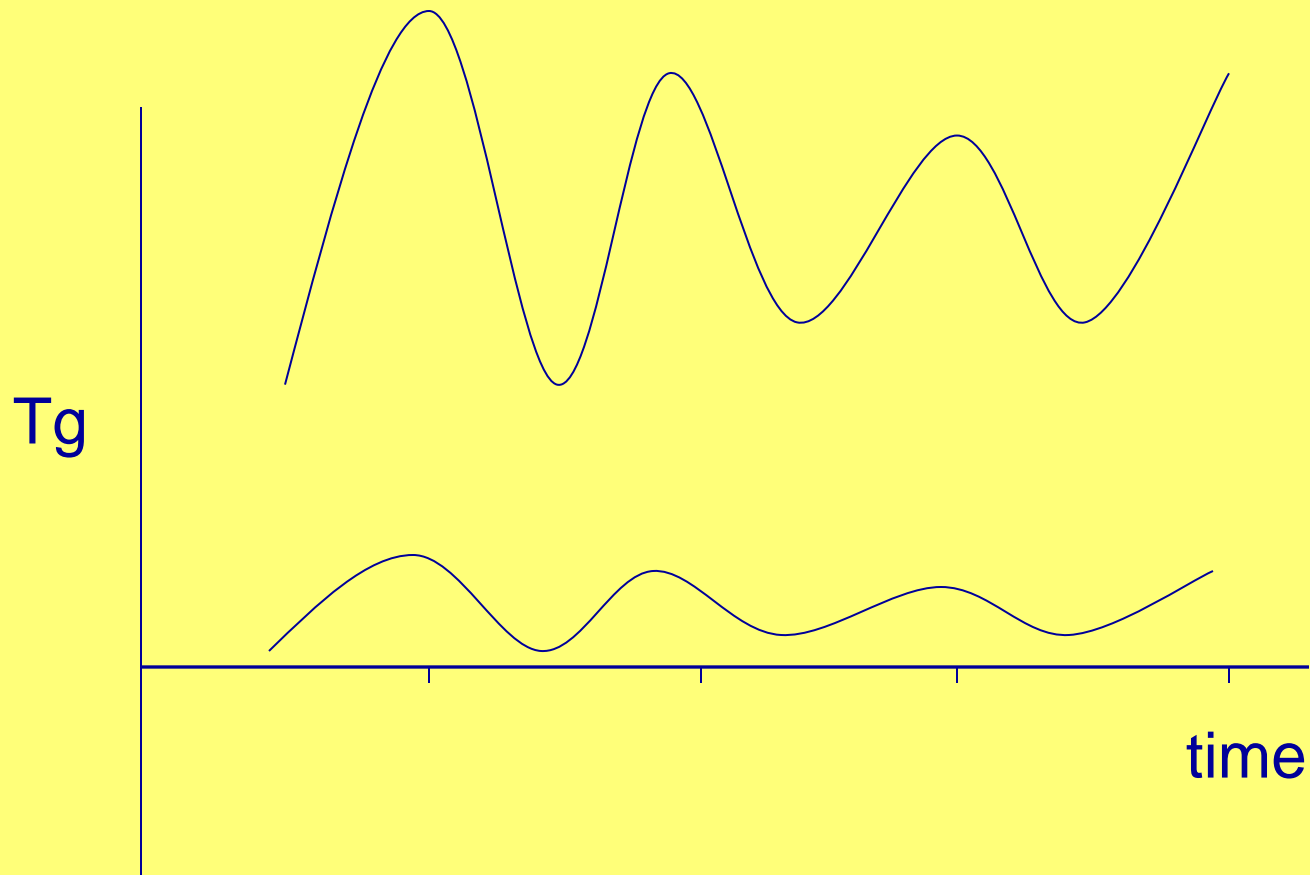


Triglyceride flux

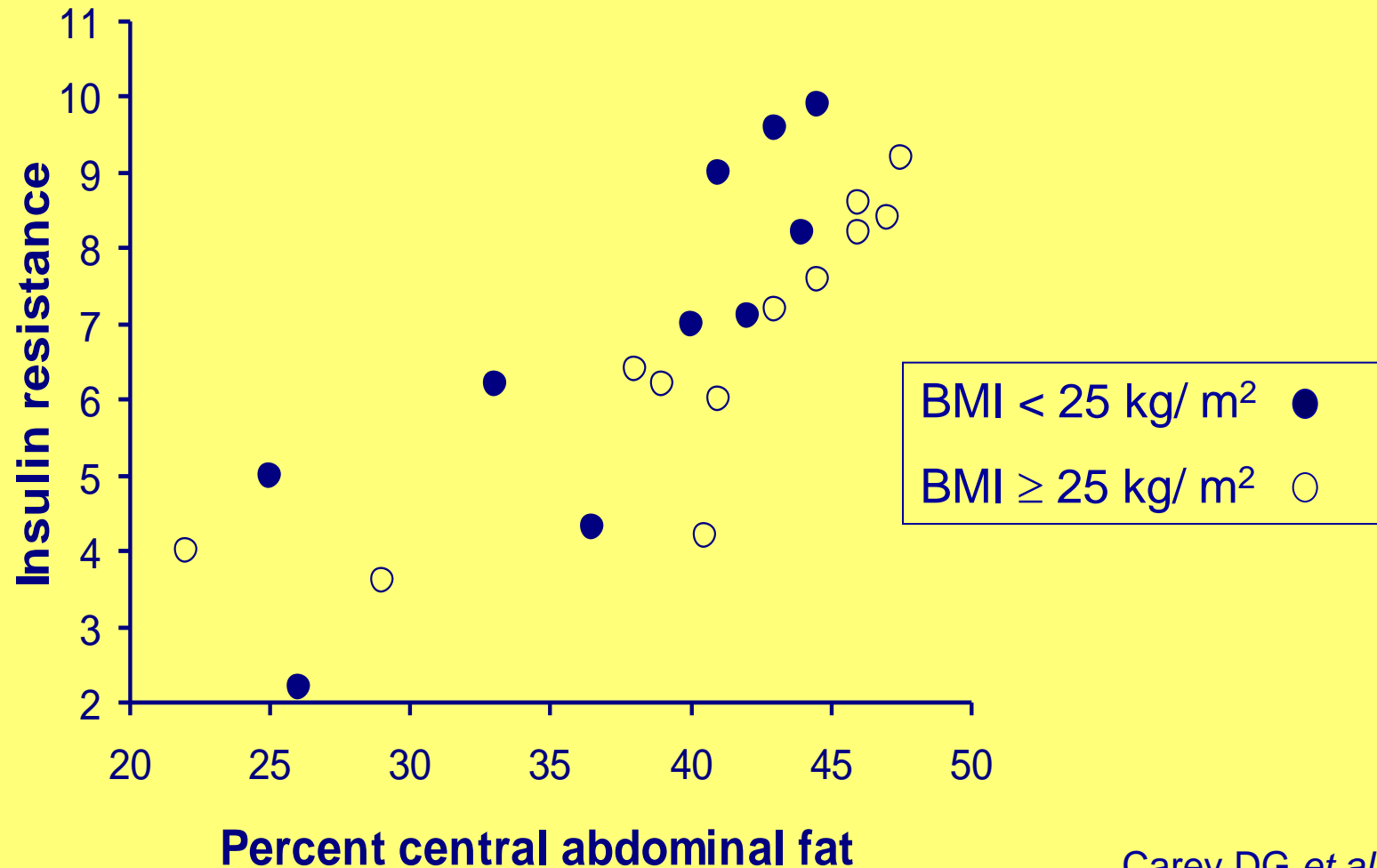
Lower body obesity



Triglyceride flux



Visceral fat and insulin resistance



Italian factory workers

Visceral fat	Low	High
Age	39	39
BMI	24.7	24.7
Insulin 1h	35	94*
Glucose 1h	94	110*
Triglycerides	1.2	1.7*
Cholesterol	4.8	5.1*
BP systolic	119	126*
diastolic	78	85*

Message 2

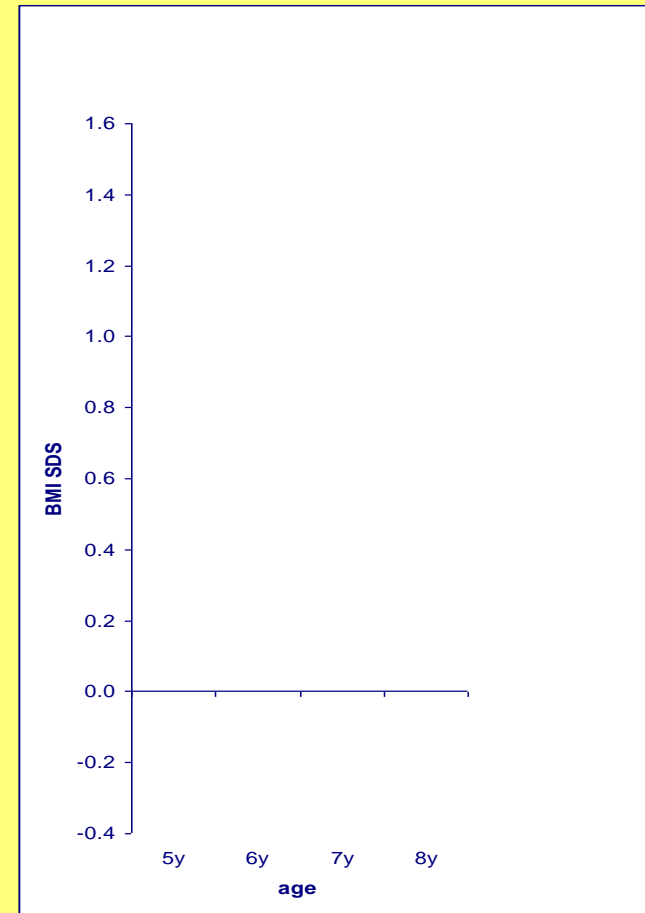
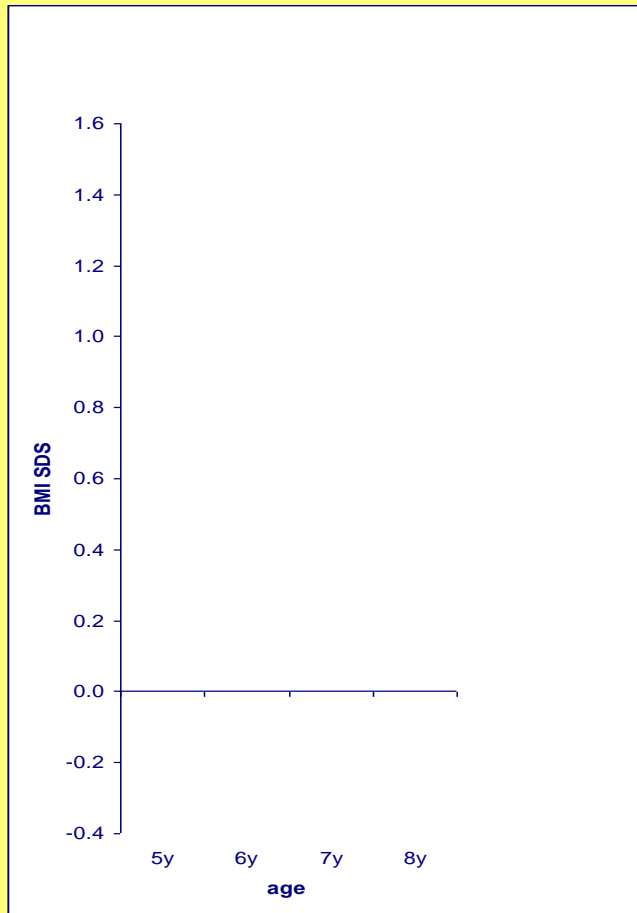
- ◆ Total fat is not the cause of insulin resistance – distribution is crucial
- ◆ BMI does not tell you about fat distribution



Parents – children

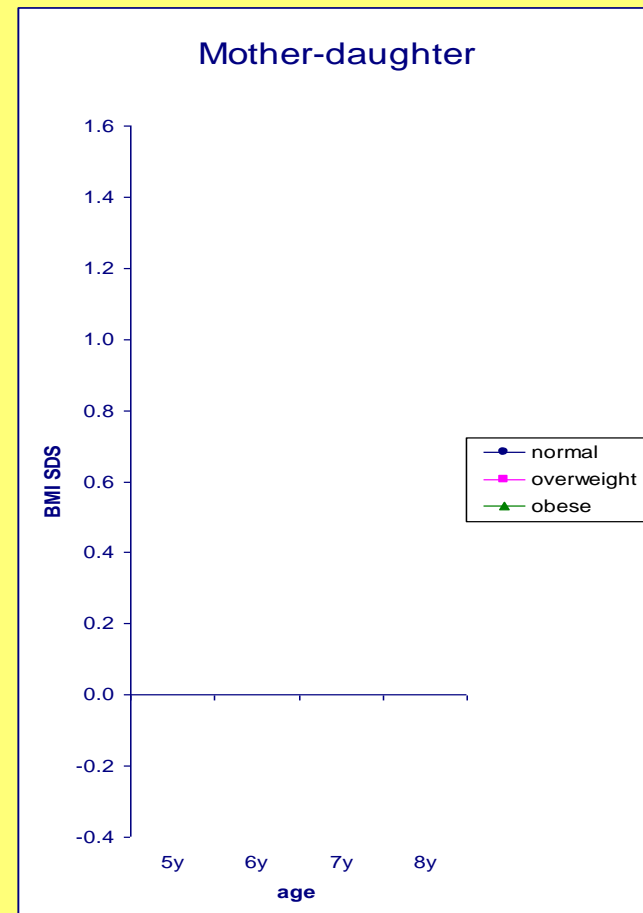
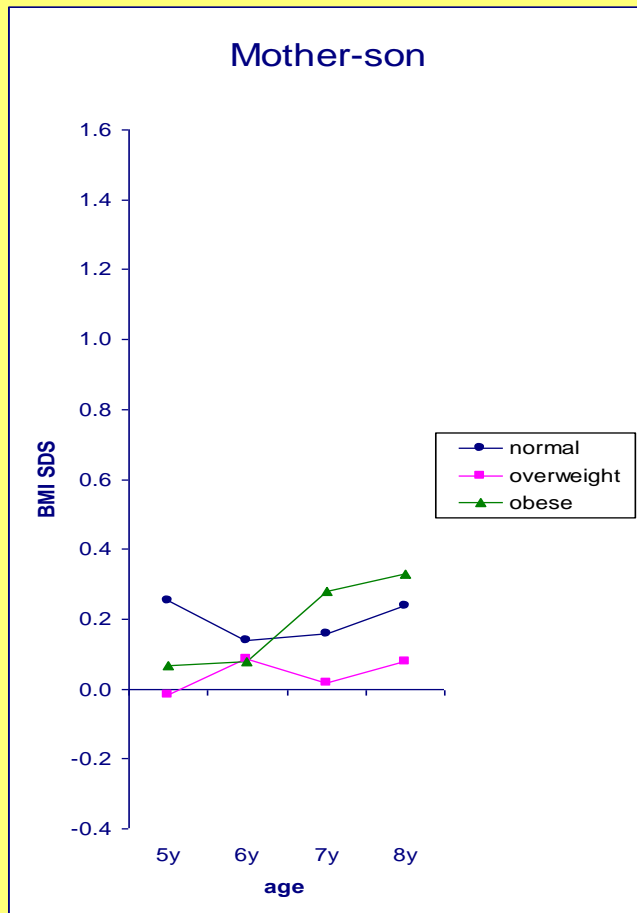
Mothers – children
Fathers – children

Mothers – daughters
Mothers – sons
Father – sons
Fathers – daughters



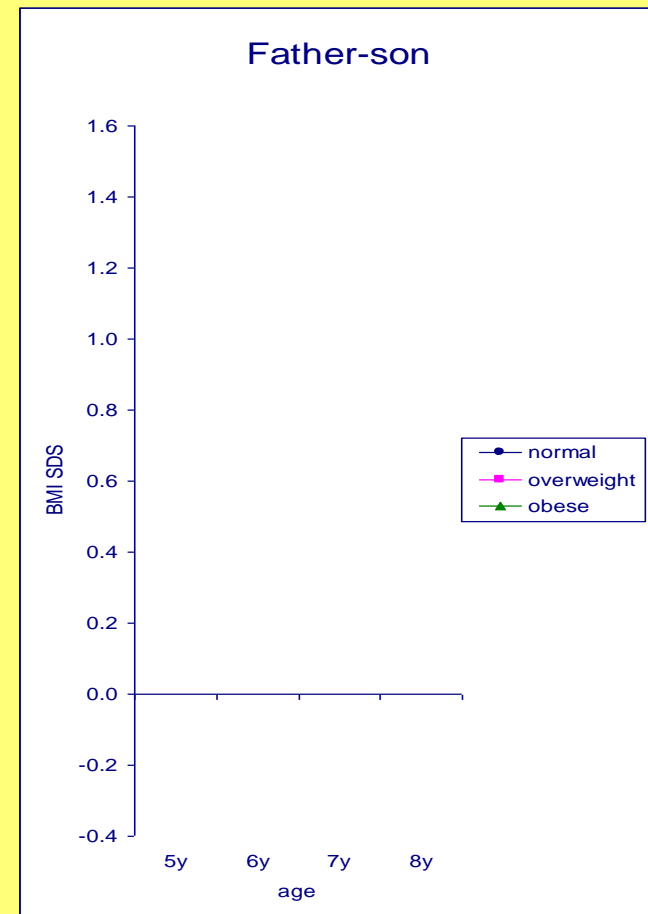
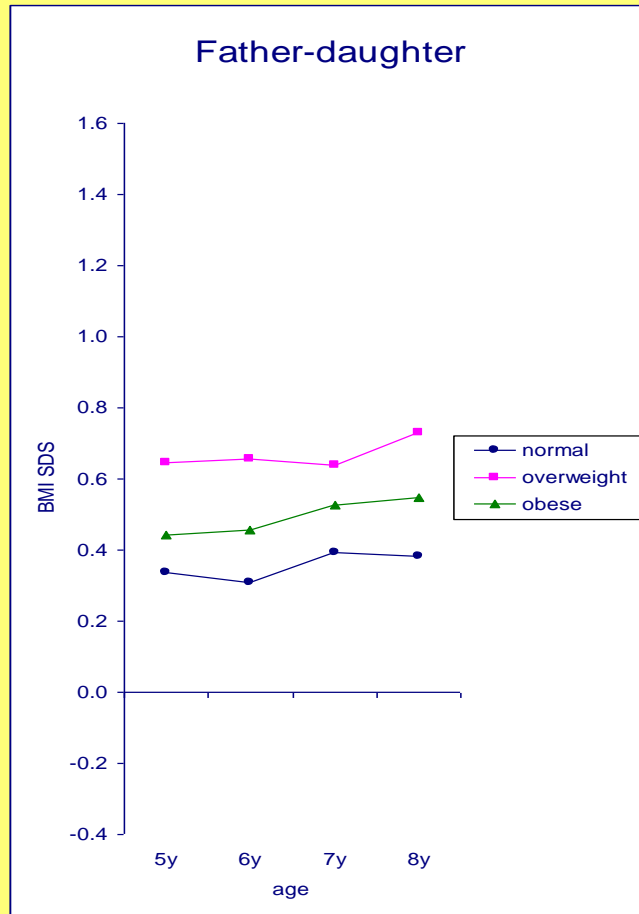


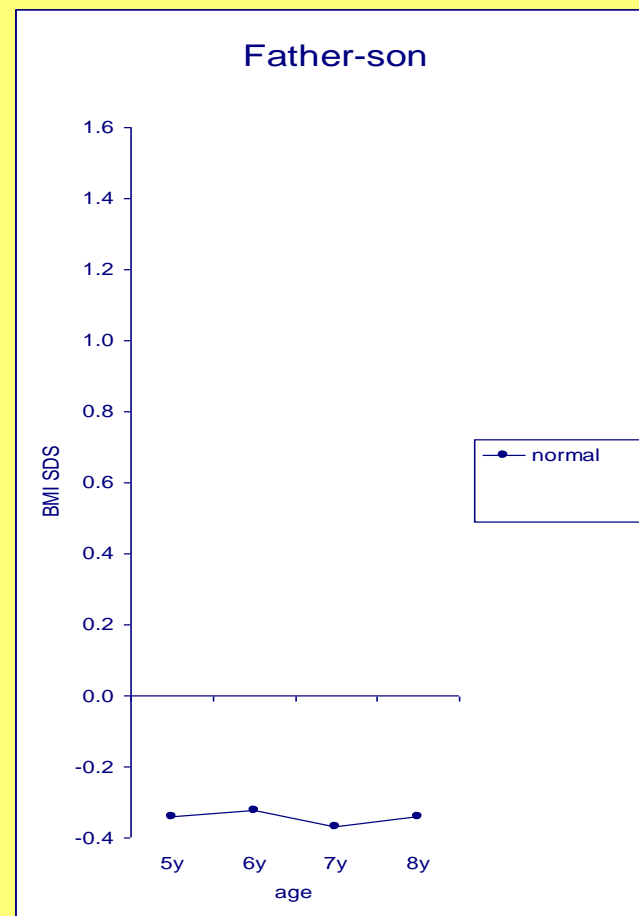
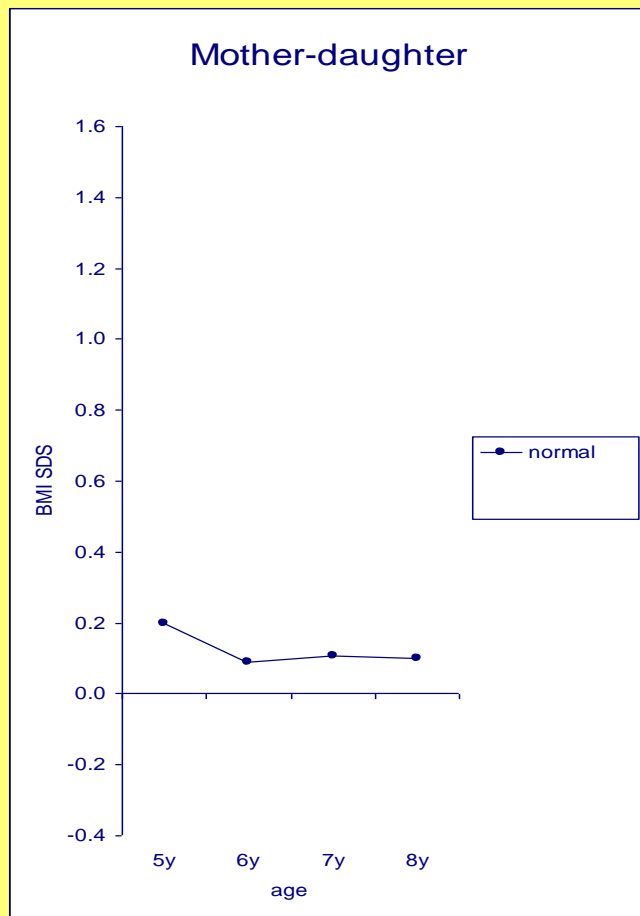
Mother





Father







International Journal of Obesity 34, 1-3 (January 2010)
doi:10.1038/ijo.2009.200

Childhood obesity: time to shrink a
parent Editorial

M E J Lean

Message 3

- ◆ The gender-assortative link in BMI between parent and child may well be behavioural
- ◆ The offspring of normal weight parents are no heavier than children were a generation ago

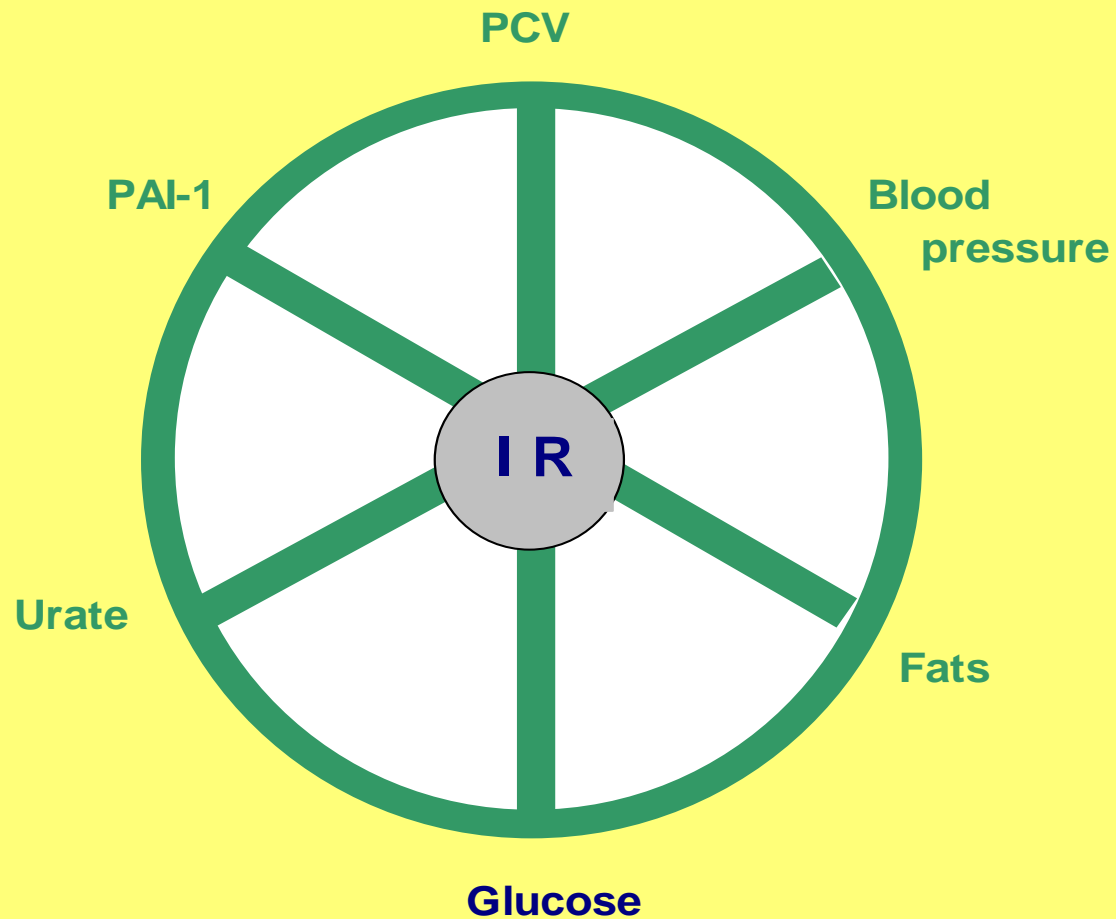
Four questions

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2. What causes insulin resistance?
- 3. What are its effects?**
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Metabolic syndrome

Hyperglycaemia
Hyperlipidaemia
Hypertension
Hyperviscosity
Hypercoagulation
Hyperuricaemia

The metabolic wheel



Metabolic Syndrome

PCOS

PolyCystic Ovary Syndrome



Metabolic Syndrome

Cancer

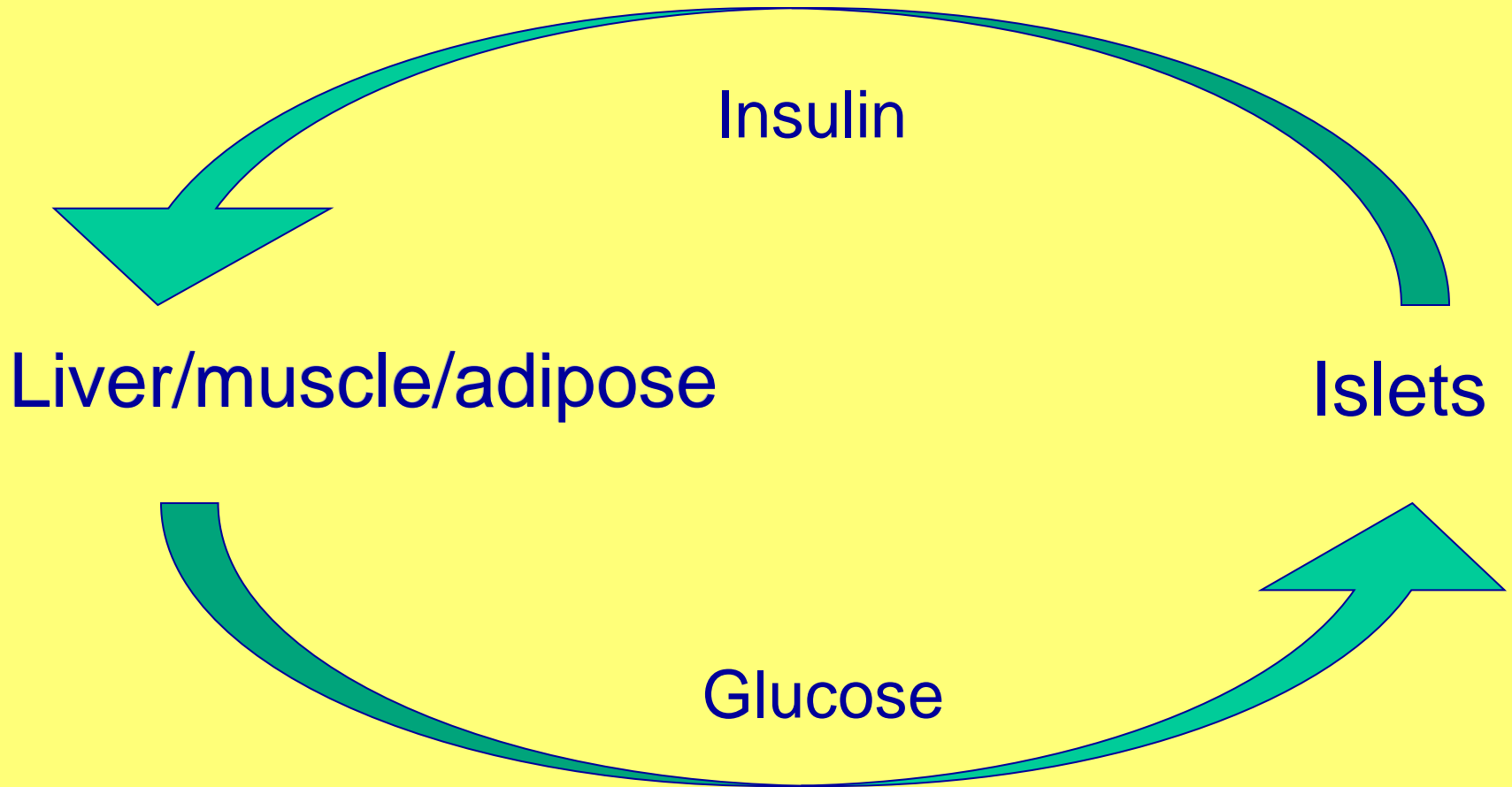
Message 4

- ◆ Diabetes is not a disease in isolation – it is part of a broader metabolic syndrome which kills prematurely
- ◆ Diabetes is not primarily a disease of glucose metabolism
- ◆ Diabetes is primarily a disorder of lipid metabolism

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Prevention



Lifestyle intervention in children

Physical activity

Nutrition

Lifestyle intervention in children

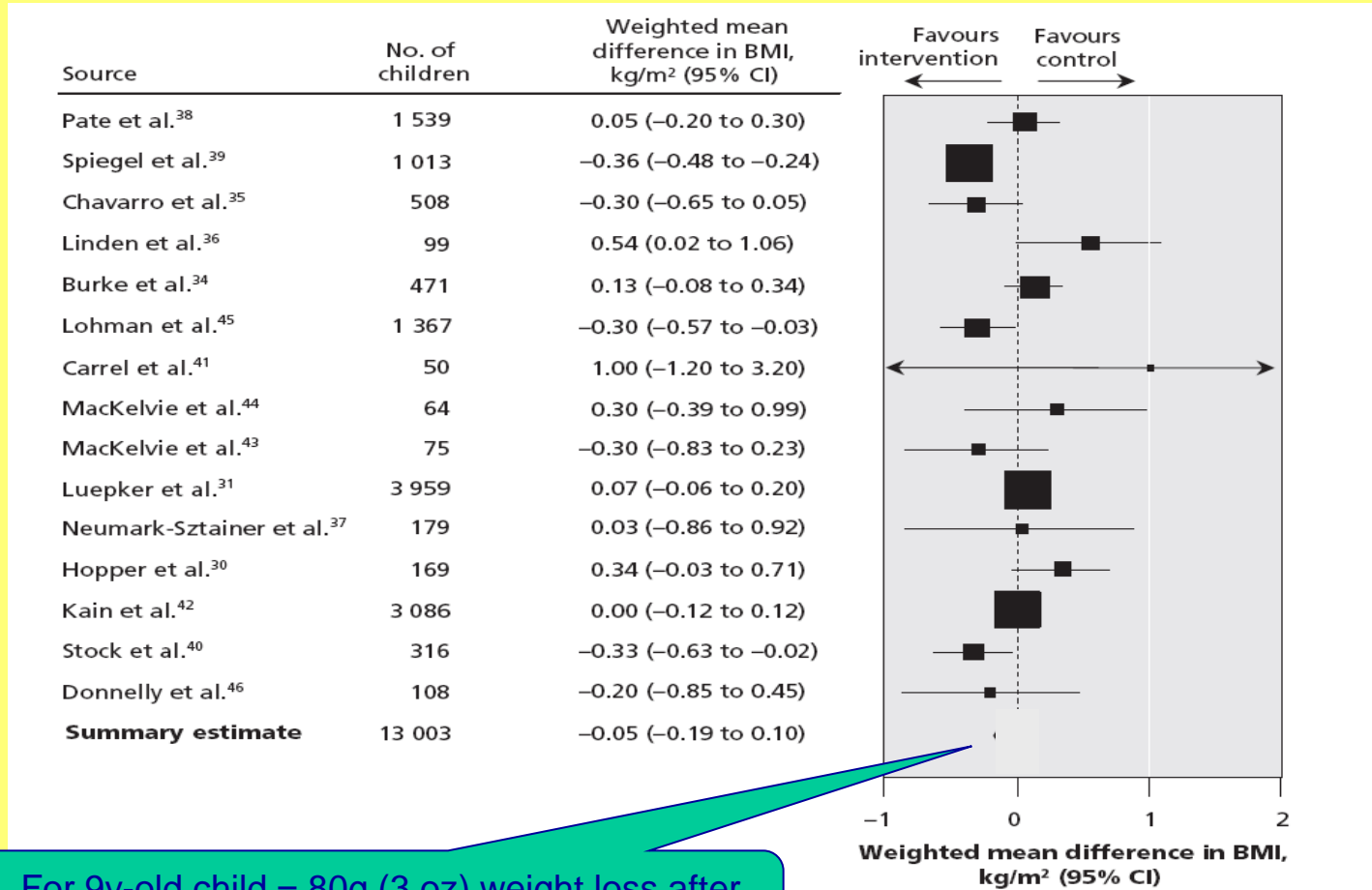
Physical activity

Nutrition

Lifestyle intervention in children

Does physical activity → weight loss?

Does physical activity → weight loss?

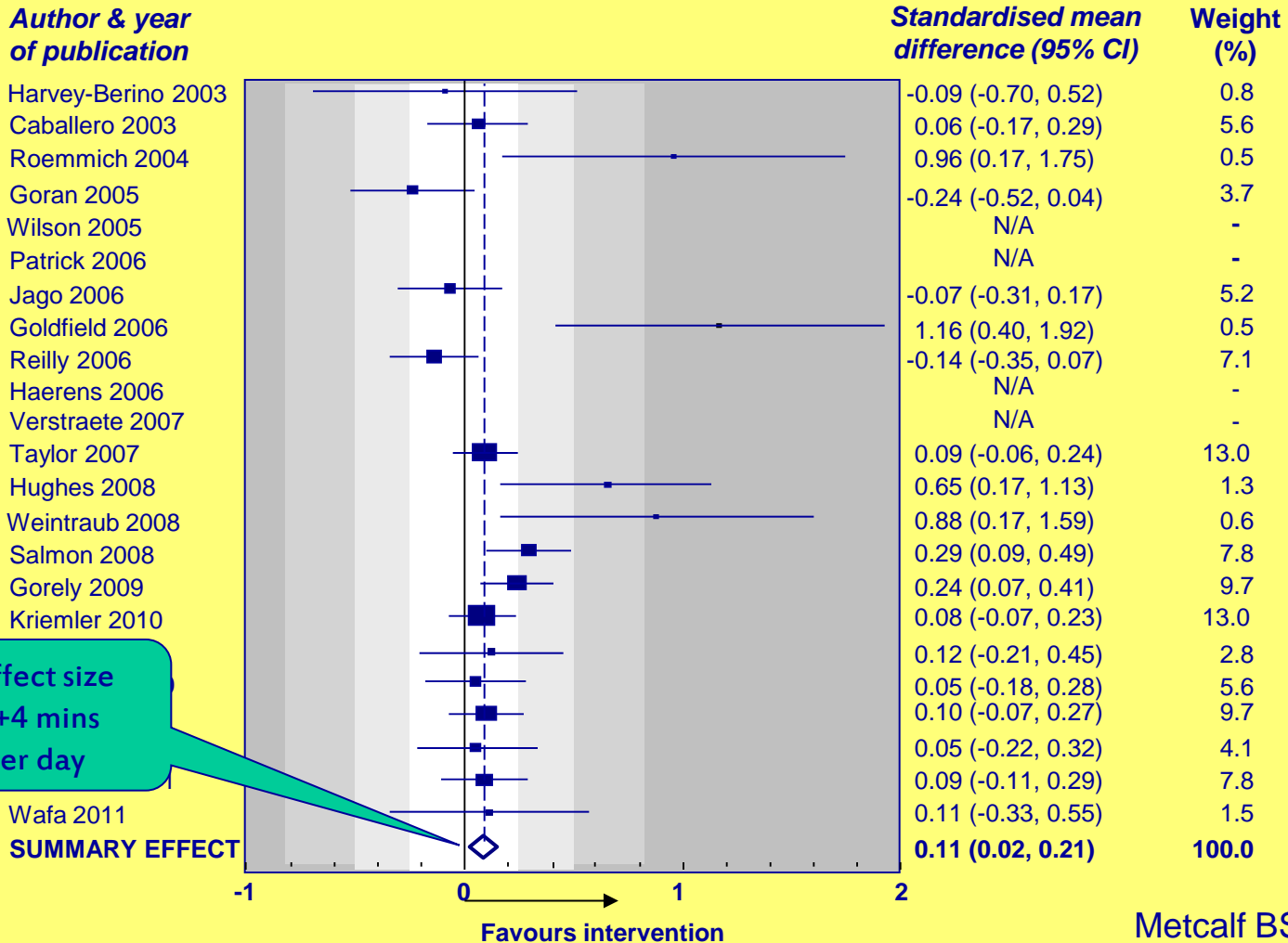


For 9y-old child = 80g (3 oz) weight loss after 18m intervention

Lifestyle intervention in children

Does physical activity → more activity?

Does physical activity → more activity?



Lifestyle intervention in children

Physical activity interventions in children do not appear to change the BMI.....

Nor do they appear even to change physical activity

Lifestyle intervention in children

Lifestyle strategies to reduce obesity
and insulin resistance for
prevention of childhood diabetes and heart disease

Physical activity interventions unlikely to be effective

Dietary intervention not so far effective

Early parental intervention could be effective

Conclusions

- ◆ Excess nutrition leads to obesity
- ◆ Obesity starts early in life
- ◆ Obesity causes insulin resistance
- ◆ Insulin resistance causes chronic metabolic illness and kills prematurely
- ◆ Obesity can be avoided and insulin resistance can be prevented
- ◆ Obesity is a classic example of interaction between genes and the environment....