

Maternal nutrition for a healthy start to life

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Te Whare Wānanga o Tāmaki Makaurau

International guidelines on nutrition in pregnancy

- Most international guidelines on maternal nutrition reflect the fact that pregnancy is a normal health state
 - advice on healthy eating (6 portions of fruit & veg)
 - restricting caffeine
 - restricting alcohol
 - avoiding certain foods with an increased risk of infection (certain unpasteurised animal products)
 - avoiding / limiting intake of foods with risk of toxicity (some fish due to risk of mercury / cadmium toxicity)
 - guidelines around weight management

NGĀ KAI TOTIKA MĀ TE WAHINE HAPŪ

Eating for Healthy Pregnant Women



Published guidelines on pregnancy nutrition

New Zealand Ministry of Health Guidelines (200 pages!)

[http://www.moh.govt.nz/moh.nsf/pagesmh/4676/\\$File/food-and-nutrition-guidelines-preg-and-bfeed.pdf](http://www.moh.govt.nz/moh.nsf/pagesmh/4676/$File/food-and-nutrition-guidelines-preg-and-bfeed.pdf)

Short version (20 pages):

<http://www.healthed.govt.nz/uploads/docs/HE1805.pdf>

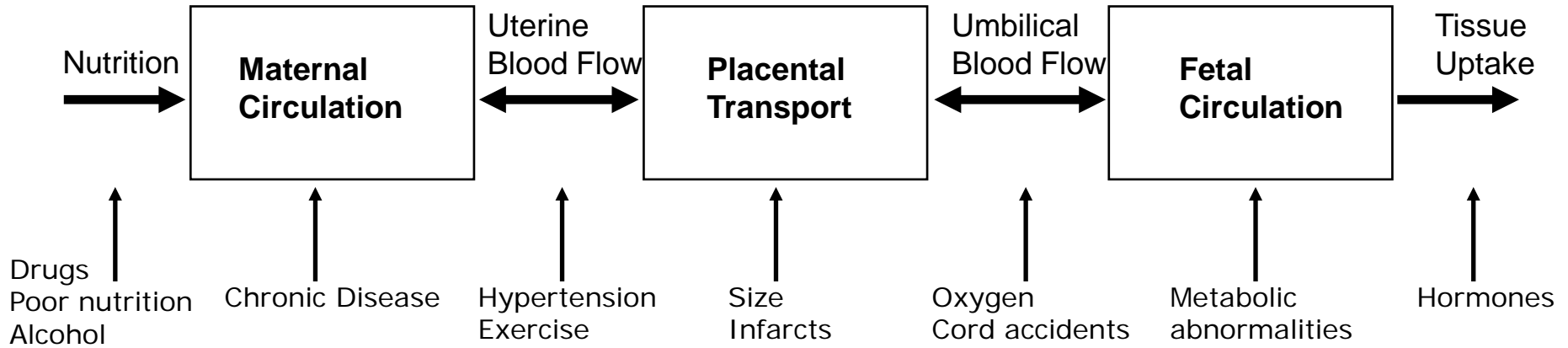
US Institute of Medicine Guidelines

<http://www.iom.edu/Reports/1992/Nutrition-During-Pregnancy-and-Lactation-An-Implementation-Guide.aspx>

UK NICE Guidelines

<http://guidance.nice.org.uk/PH11>

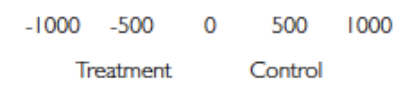
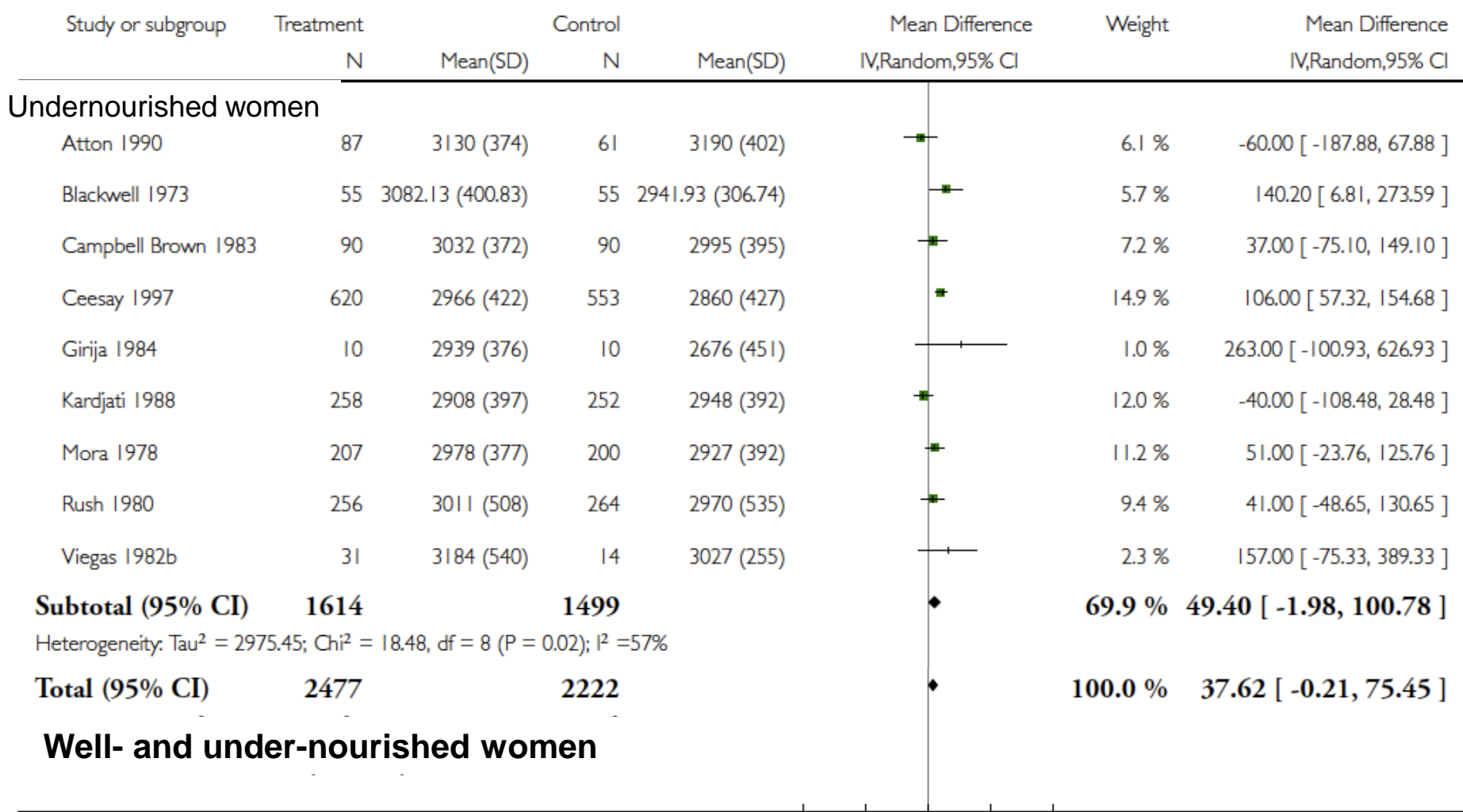
Maternal nutrition does not equal fetal nutrition



Altered maternal nutrition is common in pregnancy

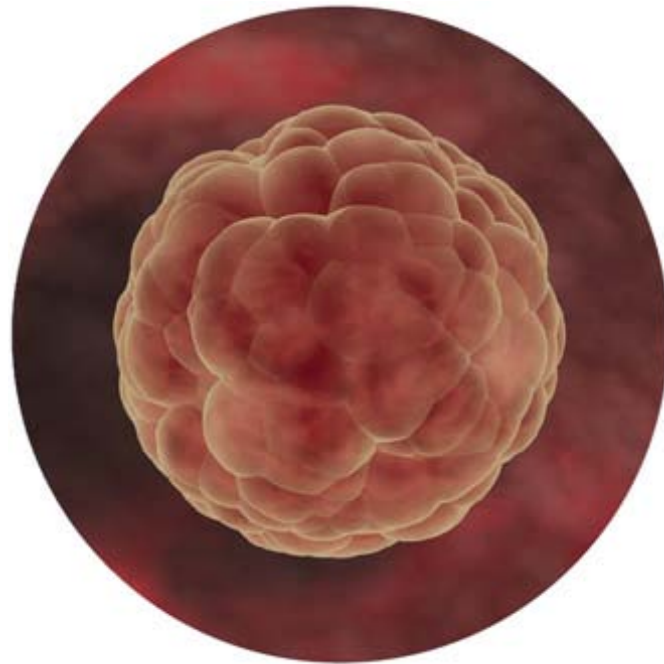
- Nausea and vomiting of pregnancy
- Cravings
- Hyperemesis gravidarum
 - 0.3-1.5% of pregnancies
 - Weight loss
 - Intractable vomiting
 - Ketonuria
 - Hospitalisation

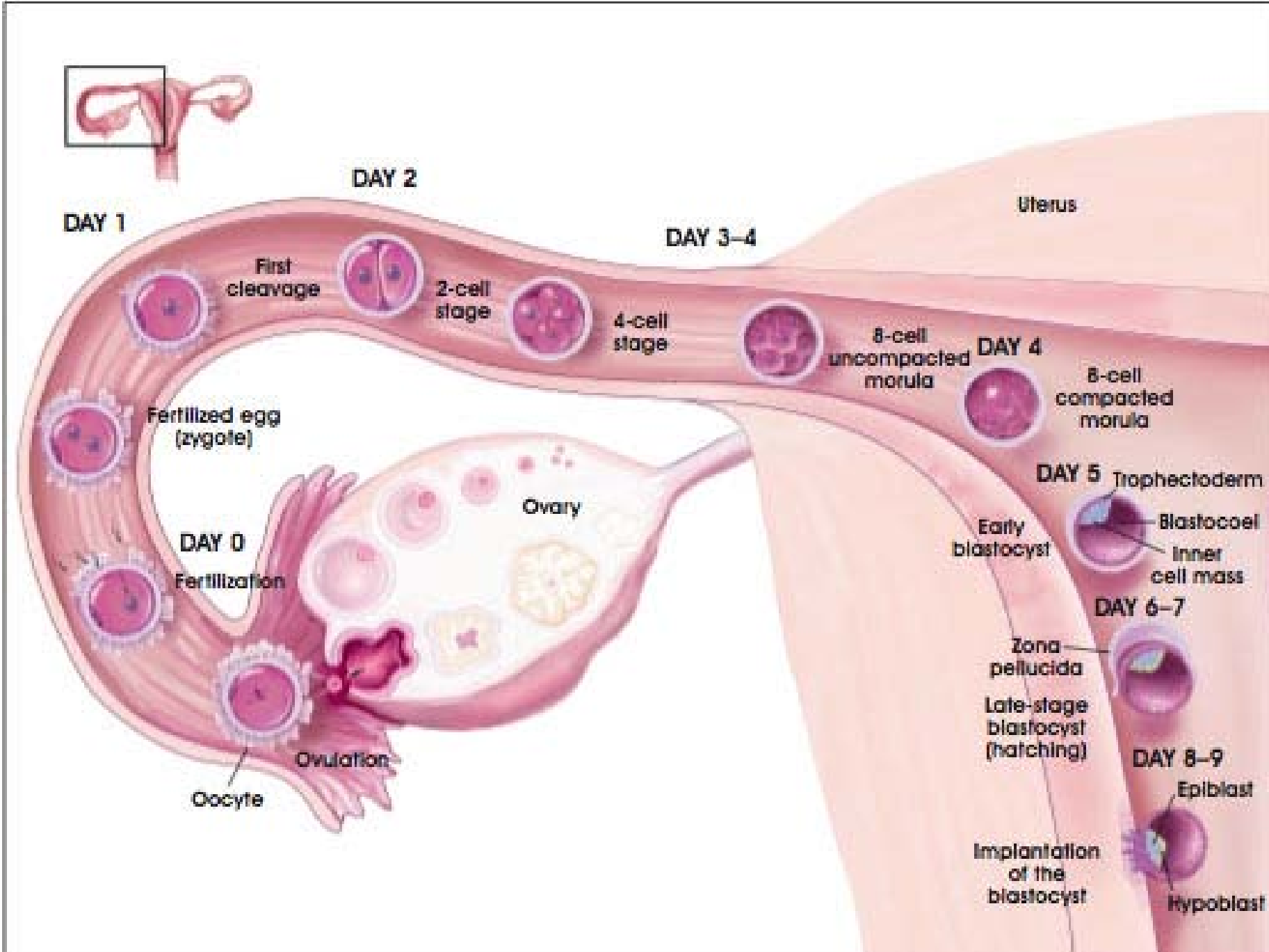
Balanced nutrient supplementation in pregnancy has little effect on birthweight

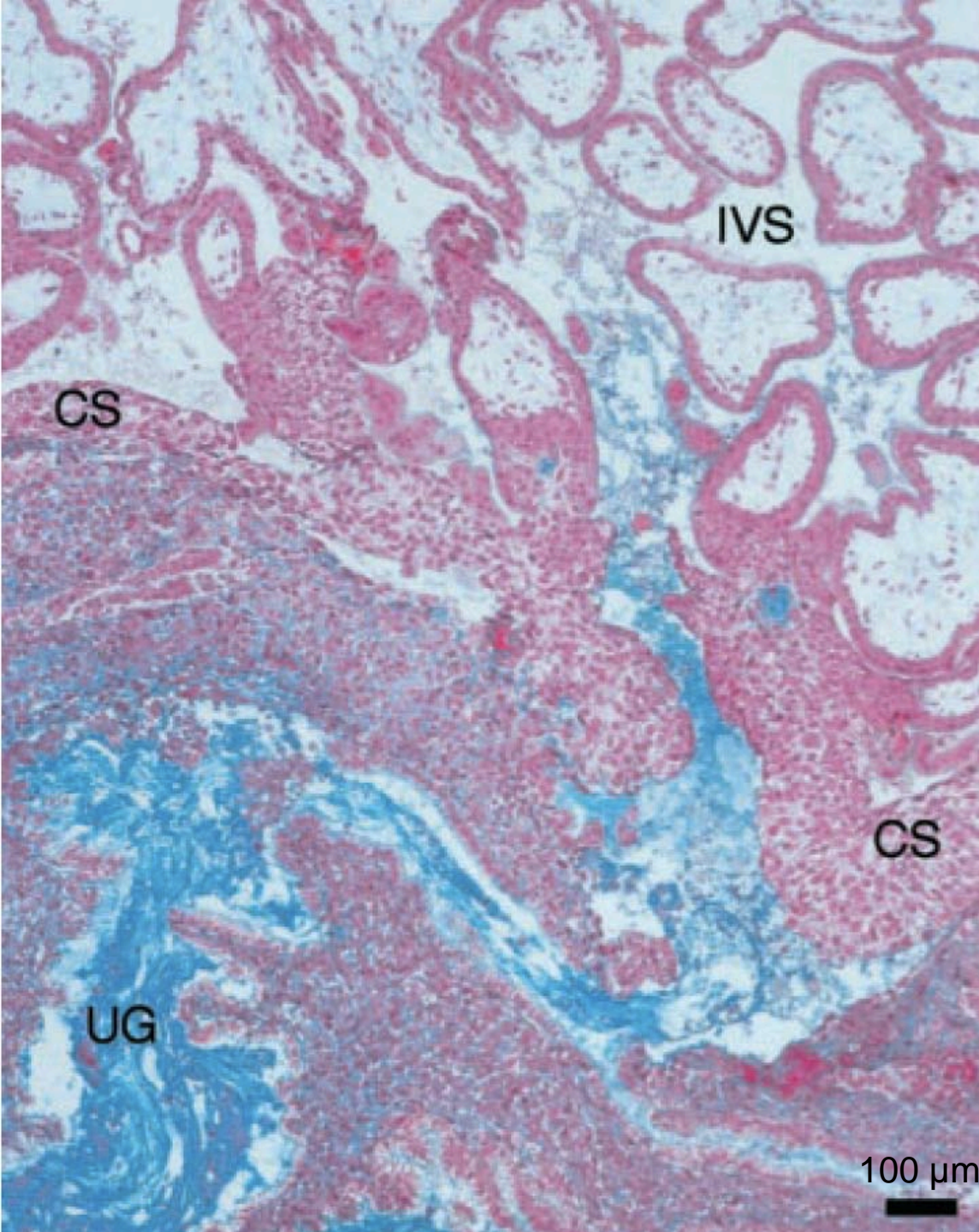


For much of the first trimester, the embryo / fetus receives nutrients from its immediate environment

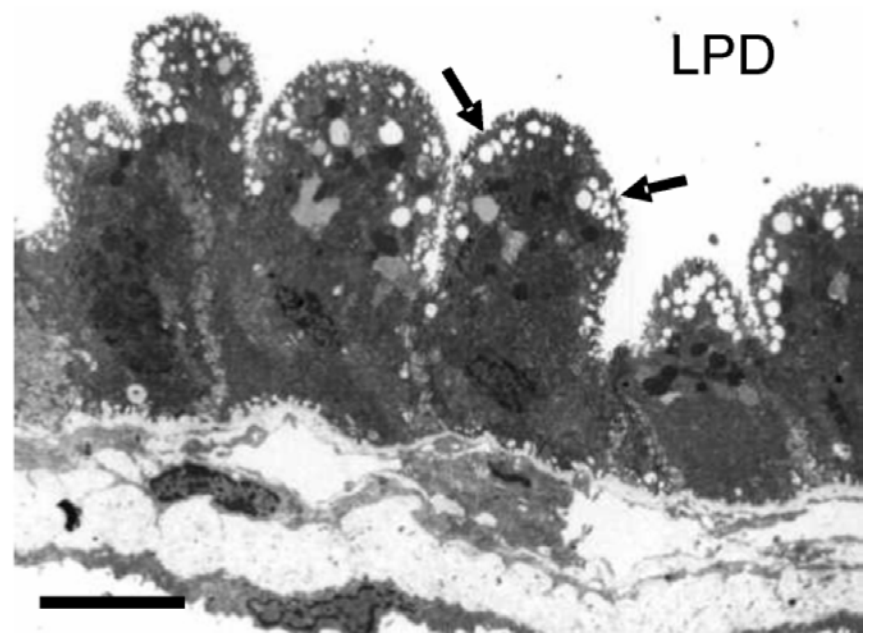
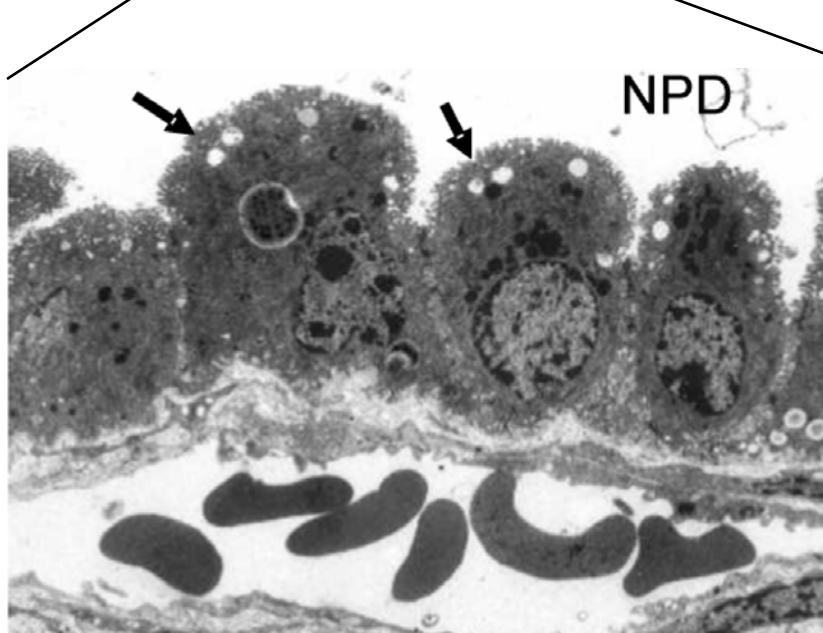
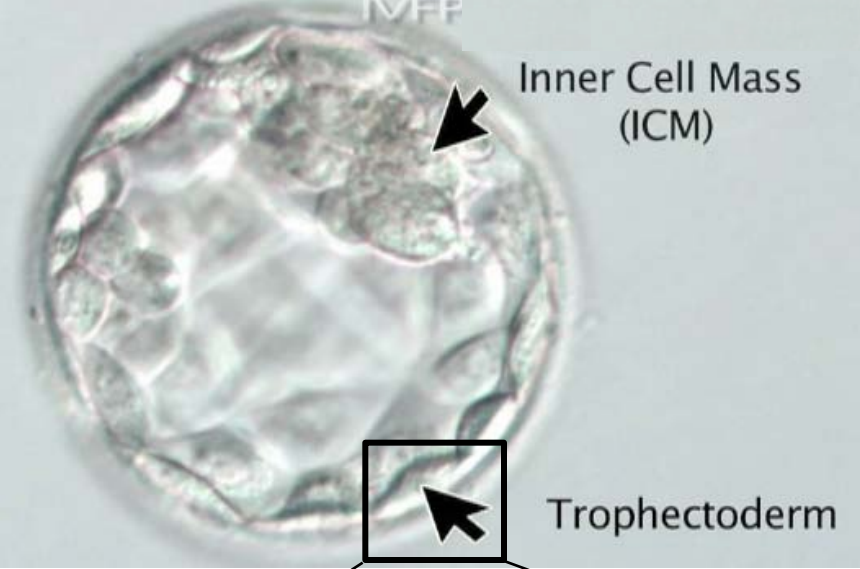
- nutrient requirements are tiny







Burton *et al* J Clin Endocrinol
Metab 2002; 87: 2954

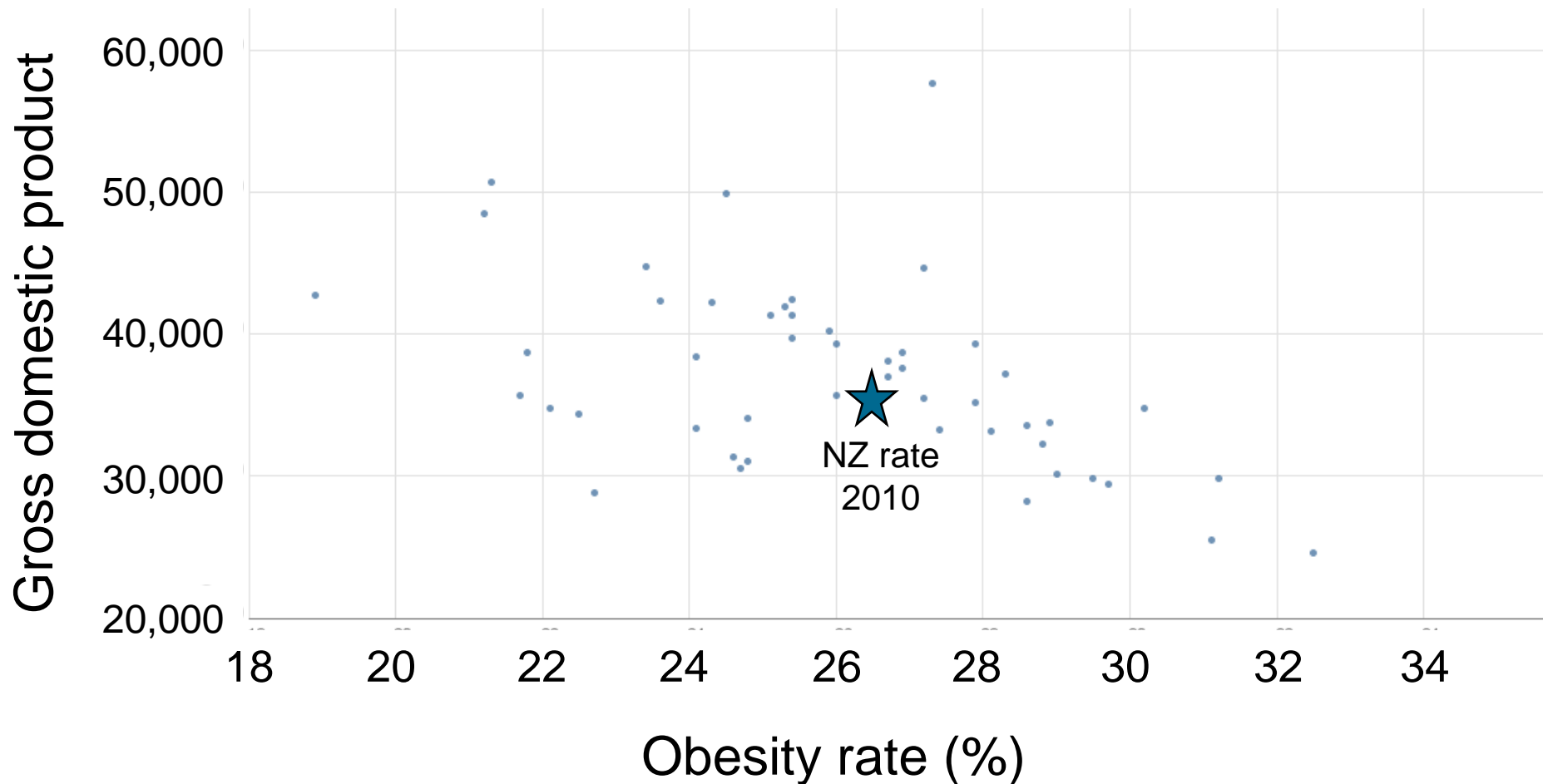


Nutrition of women of child-bearing age in Southampton

- 12,583 non-pregnant women aged 20-34 followed
- Almost 3,000 became pregnant during the follow-up

Variables	Not pregnant within 3 months (n=12 207)	Pregnant within 3 months (n=238)
Healthy eating:		
Mean (95% CI) prudent diet score (SD)	0.00 (-0.02 to 0.02)	0.07 (-0.06 to 0.19)
Consumes ≥ 5 portions of fruit and vegetables daily	53 (52 to 54)	53 (46 to 59)
Any strenuous activity in past 3 months*	64 (63 to 65)	57 (50 to 63)
Specific prepregnancy recommendations		
Alcohol intake:		
Median (interquartile range) units consumed per week†	4.8 (1.3-12.0)	4.0 (1.0-9.5)
Folic acid supplements in past 3 months:		
≥ 400 $\mu\text{g}/\text{day}$ §	1.1 (0.91 to 1.3)	5.5 (2.9 to 9.2)

Obesity is inversely related to GDP in developed countries



Young adults are most likely to wish to change nutritional behaviour

- In the NZ 1997 nutritional survey, more than half of women aged 19-24 were attempting to change their diet
 - data from overseas suggest that this is most likely to be in the direction of a reduction in total intake
 - $\frac{1}{3}$ of women of child-bearing age in Sydney
 - $\frac{1}{4}$ of women in Southampton
 - in Japan, 20% of women of child-bearing age have a BMI below the recommended range

Dieting / weight loss around the time of conception may not result in sub-optimal pregnancy outcomes

BREVIA

Science

A Periconceptional Nutritional Origin for Noninfectious Preterm Birth

Frank H. Bloomfield,^{1,2*} Mark H. Oliver,² Paul Hawkins,²
Melanie Campbell,¹ David J. Phillips,³ Peter D. Gluckman,²
John R. G. Challis,¹ Jane E. Harding²

- Dieting in the Southampton women's survey was associated with a doubled risk for preterm birth
- Low pre-pregnancy BMI associated with 30% increase in risk of preterm birth
- Conception during periods of weight loss in Africa associated with increased risk of preterm birth

Maternal undernutrition around conception is associated with long-term effects on offspring

- Increased obesity
- Impaired glucose tolerance
- Increased type 2 diabetes

Folic acid

- NZ recommendation is 800 $\mu\text{g}/\text{d}$ from 4 weeks before conception
- Lower levels recommended in countries with mandatory folate fortification of flour
 - fortification only provides 25% of RDI
- Folic acid from pre-conception:
 - Decreases the risk of neural tube defects
 - May reduce the risk of preterm birth, especially if supplementation has been of longer duration

Iron

- 40% of fertile women have no iron stores
- Another 40% have low stores
- In women with low or absent iron stores, supplementation pre-pregnancy may improve pregnancy outcomes (increasing birthweight and reducing preterm birth)
- Current recommendations are:
 - Screening of iron stores, preferably pre-pregnancy
 - Adequate dietary iron intake
 - Supplementation in women at risk

Omega-3 fatty acids

- Concerns internationally about high levels of fish consumption due to build up of environmental toxins
 - MoH guidelines are <3 servings (150 g) per week of larger, long-lived fish
 - <3 servings per fortnight for shark, marlin etc or trout caught in geothermal areas
- Data from Nordic countries suggest that a higher pre-pregnancy level of fish consumption may decrease the risk of preterm birth
- No good data on beneficial outcomes for children's neurodevelopment as yet

Artificial sweeteners

- MoH guidelines suggest that large amounts of artificially sweetened soft drinks need to be consumed to exceed recommended limits
- One study reports a dose-related increase in the risk of preterm birth with artificially sweetened carbonated drink intake (1-4 drinks per day)
- Animal studies suggest more research is needed

Iodine

- NZ soil low in iodine
- Iodine intake is falling – perhaps partly due to decreased salt intake
 - estimated to be only 1/3 of recommended intake
- Iodine deficiency in pregnancy associated with adverse pregnancy outcomes
- MoH recommendations are to choose sources of food with iodine (eggs, fish, seafood, seaweed)
- Latest guidelines recommend 150 µg iodine-only supplement during pregnancy and breastfeeding

To optimise nutrition in pregnancy, we need to think about it before pregnancy

- Even in developing countries where maternal nutrition is suboptimal, intervention trials during pregnancy to improve outcome are disappointing
 - a meta-analysis of trials involving thousands of women estimates at best a 50 g increase in birth weight (Kramer, Cochrane Database, 2010)
- Data from times of famine (e.g. 2nd World War), from observational studies and from animal studies suggest that poor maternal nutrition pre-pregnancy and around conception has much greater effects

For review of maternal nutrition and preterm birth, see Bloomfield FH, Annual Review of Nutrition 2011



Maternal nutrition for a healthy start to life really means healthy nutritional behaviour before pregnancy

And what about the father?