

Weight gain in young women: How big is the problem?

Tackling Obesity in Young Women
MLA Symposium: 23 March 1991

Kate Steinbeck
Medical Foundation Chair in Adolescent Medicine
University of Sydney
kates@chw.edu.au



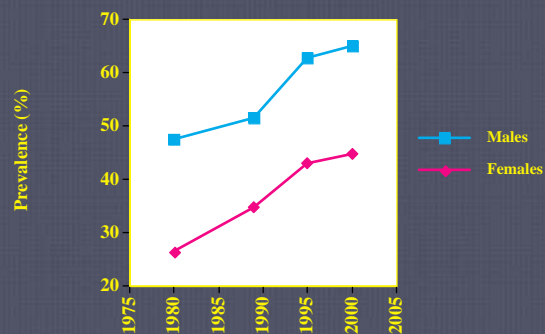
Outline

- Prevalence of overweight & obesity in young Australian women
- Is overweight & obesity on the increase in this age group?
- Health risks of obesity
 - Polycystic ovary syndrome (PCOs), insulin resistance (IR) & the metabolic syndrome (MS)
 - Fertility, pregnancy and obesity
 - Iron deficiency
- Longer term health costs
 - T2DM
 - Cardiovascular disease
- What should be done?

Prevalence

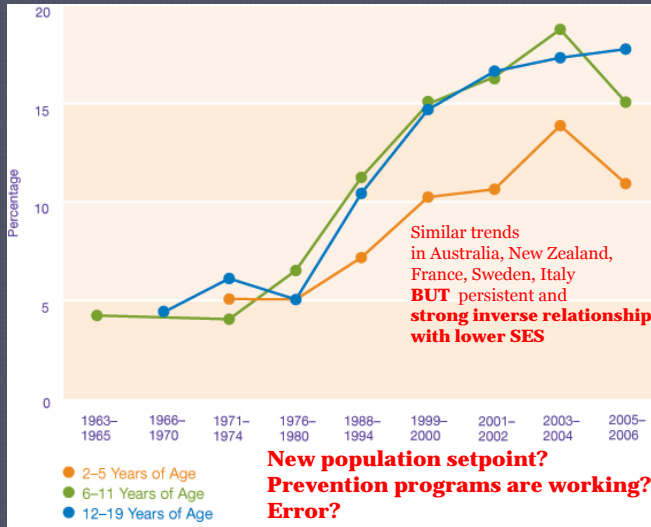


Overweight in Australia 1980-2000.

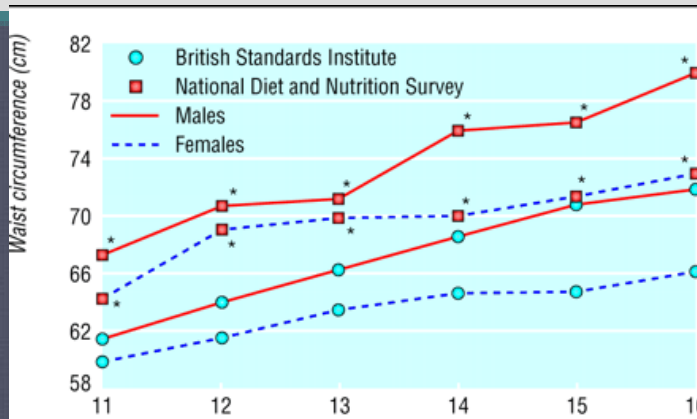


Source: ABS

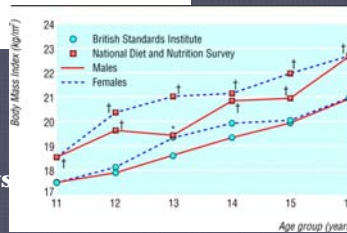
Source: Centers for Disease Control and Prevention. National Center for Health Statistics
 - National Health Examination Surveys II (ages 6-11) and III (ages 12-17),
 and National Health and Nutrition Examination Surveys I, II and III, and 1999-2006.



Ogden et al JAMA 2008; Trends in Child and Adolescent Overweight



Waist circumference increased by 6.9 and 6.2 cm in boys and girls respectively. This corresponds to SDS increase of 0.84 and 1.02. BMI increased by 1.5 and 1.6 in boys and girls respectively. Corresponds to SDS increase of 0.47 and 0.53

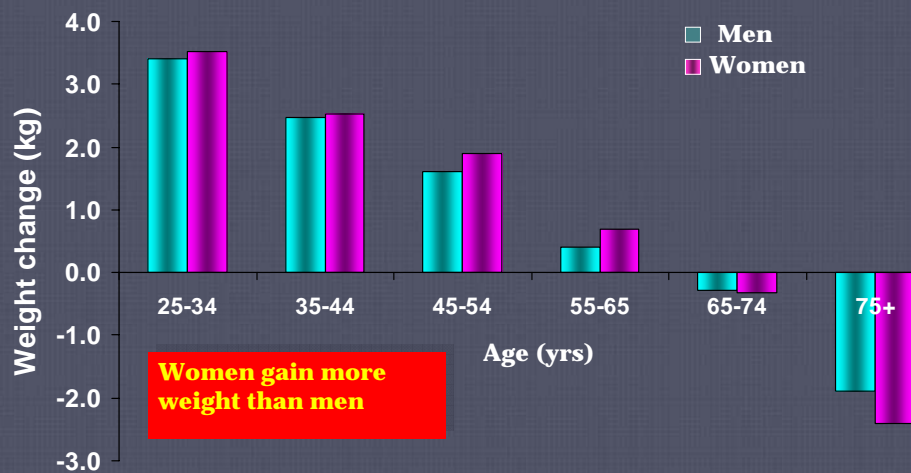


From McCarthy et al BMJ 2003

Is the prevalence of overweight and obesity increasing in young women?



AusDiab - Weight gain over 5 years



The Australian longitudinal Study on Women's Health (Women's Health Australia)

- Self report
- 1996, 2000 and 2003
- Younger women gained 649g/yr [mid-age 494g/yr; old age lost 162g/yr]
- Young women in rural and remote areas gained significantly more than urban young women

<http://www.alswh.org.au>

Factors associated with weight gain

- **Young women**
 - high BMI at start
 - Sitting > 4.5 hours per day
 - Eating takeaway food
 - Restrictive eating practices
- Mid age women
 - Quitting smoking
 - Hysterectomy
 - Menopause
 - Low physical activity levels (<150 min per week)
 - High sitting time
 - High BMI at start

Ball et al Int J Obesity 2002 (data from alswh)

Environmental correlates of weight and weight gain (Bell K & Crawford D IJO 2006 30:1240-49 - alswh)

- There are physical, psychological and environmental correlates of obesity and weight gain in young women
 - Higher BMI
 - Self-efficacy in avoiding weight gain
 - Attention paid to weight control
 - Family support
 - Peer support and/or sabotage of a healthy life style
 - Perceived difficulty in using stairs

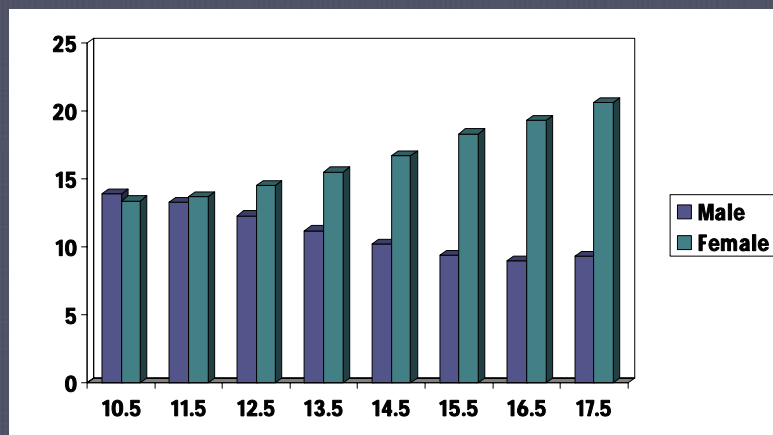
Selected publications from alswh

- Powers L et al MJA 192:690 Assessing pregnant women's compliance with different alcohol guidelines' 22-33yo **20% unwise use** before & after 2001
- Polimeni A et al 2009 J Women's Health 18:355. Hetero**sexuality** and bisexuality predict less health weight control practice
- Bell S & Lee C 2008 **Transitions in emerging adulthood** & stress J Behav Med 15:280. Surprisingly major transitions not as stressful. **What was stressful were unusual changes, delays in changing or transitions occurring earlier than peers**

The Perils of Puberty



Percent body fat – 50th percentile –
measured by BIA*



*Mueller Am J Human Biol 2004

Transition in Obesity

	Wave III Non-Obese	Wave III Obese
Wave II Obese	<u>1.6%</u>	9.4%
Wave II Non-Obese	76.3%	<u>12.7%</u>

NHANES 1996 (Wave II); 2001/2 (Wave III) – BMI > 95/BMI > 30
Gordon-Larsen Am J Clin Nutr 2004

Incidence (%) of severe adult obesity related to adolescent weight status

- The NS et al JAMA 2010; 304:2042-47
- NHANES data
- Wave 2 12-21 yo, Wave 3 18-23 yo and Wave 4 24-33 yo (2007-2009)
- Highest in non-Hispanic black females

	N weight in adolescence	O/W	Obese
White Male	1.2	6.2	35.6
White Female	2.4	14.2	51.3

Polycystic Ovarian Syndrome (PCOs)



PCOs; Clinical features

- The commonest endocrine disorder in women (5-8%) of uncertain aetiology
- Anovulation: amenorrhoea, oligomenorrhoea (< 9 cycles per year), irregular menstrual cycles, dysfunctional uterine bleeding with unopposed oestrogen, endometrial hyperplasia
- Androgen Excess: hirsutism, acne, seborrhoea, male pattern baldness
- Hyperinsulinaemia/Insulin resistance: skin tags, acanthosis nigricans

Prevalence of PCOs

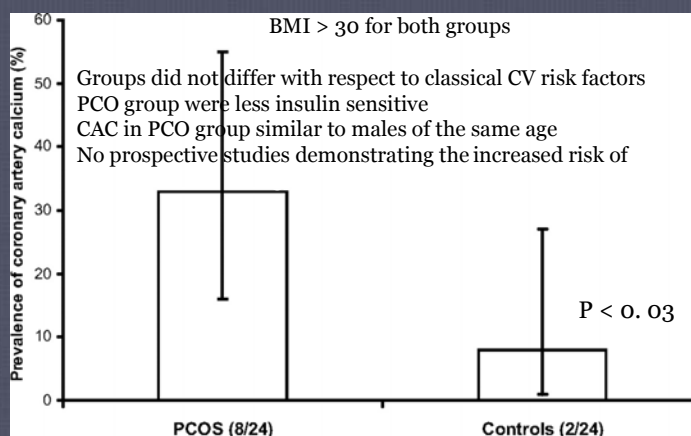
- Population (US) prevalence study (n= 675); NIH criteria; probability algorithm based on previous studies (Yildiz et al JCEM 2008)



BMI class	N (%)	%PCO
<19	36 (5.3)	8.2
19-24.9	282 (41.8)	9.8
25-29.9	160 (23.7)	9.9
30-34.9	87 (12.9)	5.2
35-39.9	57 (8.5)	12.4
40+	53 (7.8)	11.5

FIG. 1. Prevalence of CAC in women with PCOS and controls

Coronary artery calcification (CAC) is a marker for subclinical atherosclerosis and is measured by CT scan



Shroff, R. et al. J Clin Endocrinol Metab 2007;92:4609-4614

THE JOURNAL OF
 CLINICAL
 ENDOCRINOLOGY
 & METABOLISM

Fertility and Pregnancy



Insulin -sensitising drugs (metformin, pioglitazone, rosiglitazone and D-chiro-inositol) for women with polycystic ovary syndrome, oligo- amenorrhoea and subfertility

- Tang T. Lord JM. Norman RJ. Yasmin E. Balen AH. Cochrane Database of Systematic Reviews. (1):CD003053, 2010
- There is also evidence that **ovulation rates are improved** with metformin in women with PCOS for metformin versus placebo (Pooled OR 2.12, 95% CI 1.50 to 3.0) and for metformin and clomiphene versus clomiphene alone (Pooled OR = 3.46, 95% CI 1.97 to 6.07).
- Metformin was also associated with a significantly higher incidence of **gastrointestinal disturbance**, but no serious adverse effects were reported.
- In agreement with the previous review, metformin is still of benefit in improving clinical pregnancy and ovulation rates. However, there is **no evidence that metformin improves live birth rates** whether it is used alone or in combination with clomiphene, or when compared with clomiphene. Therefore, the use of metformin in improving reproductive outcomes in women with PCOS appears to be limited.

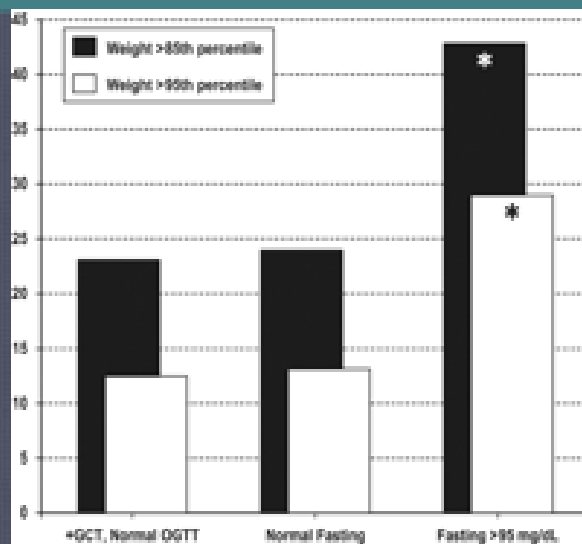
2 Adjusted odds ratios (95% CIs) for maternal, peripartum and neonatal outcomes, according to body mass index (BMI) category (n = 11 252)*†

	BMI category (kg/m ²)			
	Normal (20.01–25) (n = 6443)	Overweight (25.01–30) (n = 2882)	Obese (30.01–40) (n = 1679)	Morbidly obese (>40) (n = 248)
Maternal outcomes				
Hypertensive disorders of pregnancy	1.00	1.74 <i>(1.45–2.15)</i>	3.00 <i>(2.40–3.74)</i>	4.87 <i>(3.27–7.24)</i>
Gestational diabetes	1.00	1.78 <i>(1.25–2.52)</i>	2.95 <i>(2.05–4.25)</i>	7.44 <i>(4.42–12.54)</i>
Length of stay > 5 days	1.00	1.36 <i>(1.13–1.63)</i>	1.49 <i>(1.21–1.86)</i>	3.18 <i>(2.19–4.61)</i>
Peripartum outcomes				
Caesarean section	1.00	1.50 <i>(1.36–1.66)</i>	2.02 <i>(1.79–2.28)</i>	2.54 <i>(1.94–3.32)</i>
Neonatal outcomes				
Stillborn	1.00	1.16 <i>(0.62–2.17)</i>	1.19 <i>(0.56–2.55)</i>	0.89 <i>(0.12–6.60)</i>
Birth defect	1.00	1.26 <i>(0.85, 1.87)</i>	1.58 <i>(1.02–2.46)</i>	3.41 <i>(1.67–6.94)</i>
Hypoglycaemia	1.00	0.78 <i>(0.36–1.66)</i>	2.57 <i>(1.39–4.78)</i>	7.14 <i>(3.04–16.74)</i>
Jaundice	1.00	1.02 <i>(0.92–1.12)</i>	0.98 <i>(0.88–1.13)</i>	1.44 <i>(1.09–1.89)</i>
Prematurity (< 34 weeks' gestation)	1.00	1.22 <i>(0.90–1.64)</i>	1.16 <i>(0.81–1.67)</i>	2.13 <i>(1.13–4.01)</i>
Prematurity (< 37 weeks' gestation)	1.00	1.07 <i>(0.89–1.28)</i>	0.95 <i>(0.76–1.19)</i>	1.54 <i>(1.00–2.39)</i>
Admission to intensive care	1.00	0.92 <i>(0.73–1.16)</i>	1.25 <i>(0.97–1.62)</i>	2.77 <i>(1.81–4.25)</i>

* Statistically significant results are in **bold italics**. Results are corrected for maternal age, parity, educational status, smoking status and ethnicity. † Our analysis excluded 2978 women with BMI ≤ 20 kg/m². ◆

Prevalence & impact of overweight and obesity in an Australian population
Callaway et al
MJA 2006 (SA)

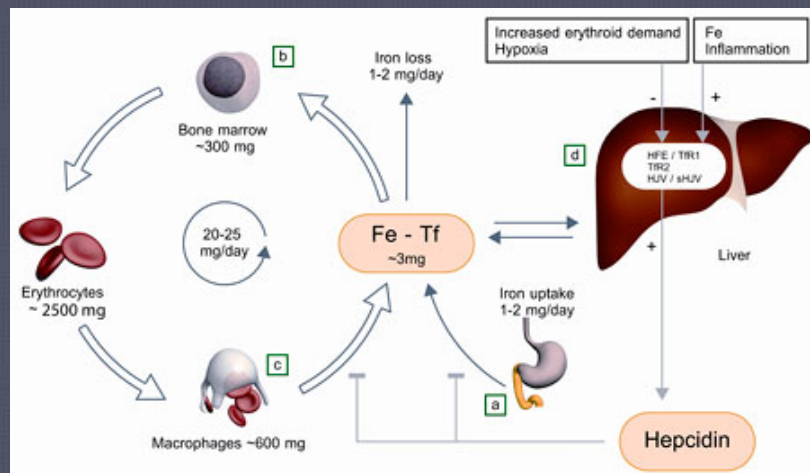
Also Athukorala et al
BMC Preg & Childbirth
2010



Relationship of fasting maternal hyperglycemia in pregnancy with childhood obesity at age 5–7 years, among the subsample with abnormal GCT and complete follow-up OGTT results: 1) GCT > 7.7 mmol/l but follow-up OGTT normal at all 4 time points (fasting, 1 h, 2 h, and 3 h post-OGTT) (n = 731); 2) normal fasting glucose 5.3 mmol/l but ≥ 1 OGTT (n = 547); and 3) elevated fasting glucose [n = 184] on OGTT and 0, 1, or 2 postprandial values equaled or exceeded.

Hillier et al Childhood Obesity and Metabolic Imprinting; the ongoing effects of maternal hyperglycaemia Diabetes Care 2007; 30:2287-92

Fe deficiency and Obesity



Hepcidin inhibits 1. absorption of dietary iron and 2. release of iron out of storage sites, BOTH by severe reduction of the cellular iron exporter, ferroportin-1

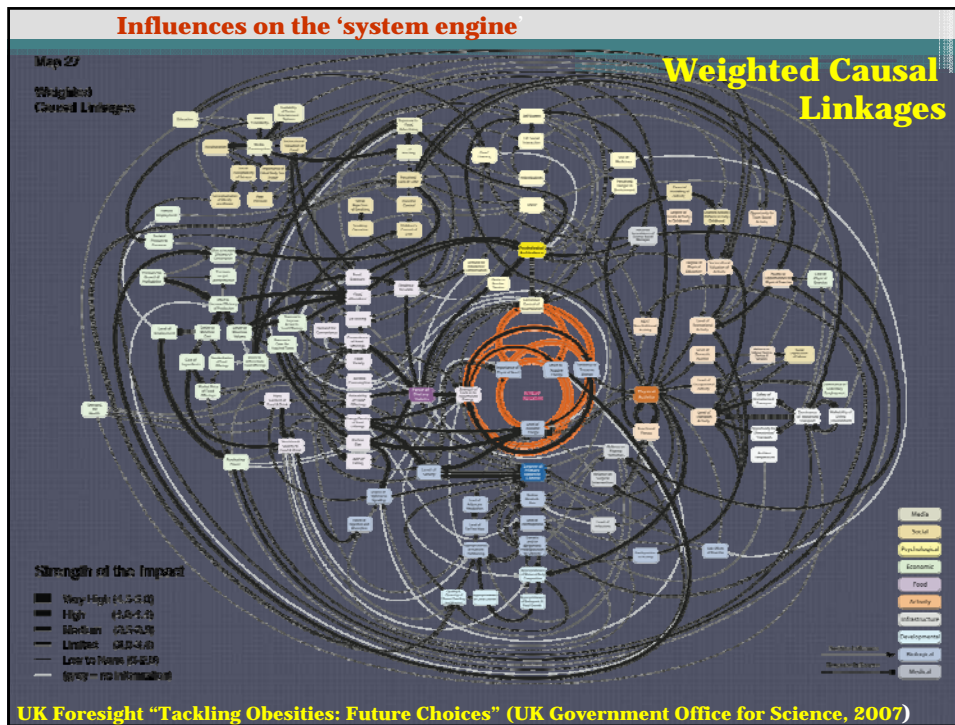
No major production of hepcidin from adipose tissue

Iron deficiency in young women

- Nutritional
 - Reduced red meat intake
 - Vegetarianism
- Menstrual loss
 - Menorrhagia with PCOs
- Obesity: (Tussing-Humphreys et al Obesity 2010; 18:1449)
 - Iron deficiency common
 - High hepcidin state with increased transferrin receptor indicating true iron deficiency
 - Primarily a true iron deficit (cf. anaemia of chronic disease where iron stores not released and are high)
 - Inflammation with central obesity probably perpetuates the hepcidin increase

What should be done?





Adolescent & young adult eating and diet

- Eating habits become established
- Increase in meal skipping and snacking
- Increasing autonomy in food choice and consumption (Johnson Eur J Clin Nutr 2002)
 - Away from home eating
 - Increase in discretionary income
- In young women fast food consumption associated with weight gain (Ball IJO 2002)
- Alcohol intake patterns

Youth & weight loss practice

Tsia Ann Int Med 2005; Blanck JAMA 2001; Neu-mark-Sztainer Prev Med 1999; Ostbye Mil Med 2003

- Underrepresented in weight loss studies (in NHMRC clinical guidelines mean age study subjects 45years)
- Underrepresented in clinic attendance
 - at RPAH Metabolism & Obesity Services
 - 18-30 year olds 10% of clinic population
 - 25% only of registered make first visit
 - mean BMI 43
- Female preponderance in commercial weight loss centres
- 25% use non-prescription medications
- Females favour food restriction over exercise
- Interest in weight loss often occurs in the early post-partum period

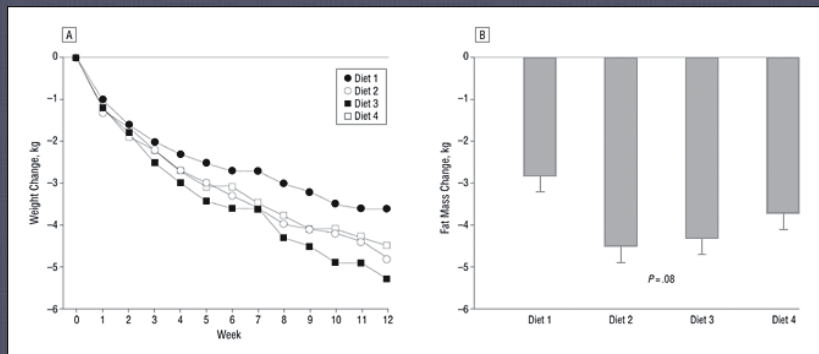
A 'tailored' approach for Gen Y

- 'Connected' 24 hours
- Not physically unwell
- Used to wide choices
- Managing weight will involve
 - Expectations
 - Individuality
 - High mobility
 - Peers & leisure, inc. alcohol
 - Prolonged dependence 'adulthood'



Changes in weight and fat mass over 12 weeks in 129 young adults (75% F) randomised to 4 different diets:

- Diet 1: High CHO; high GI
- Diet 2: High CHO; low GI
- Diet 3: High protein; high GI
- Diet 4: High protein; low GI



McMillan-Price, Petocz, Atkinson, O'Neill, Samman, Steinbeck, Caterson, Brand-Miller Arch Int Med 2006

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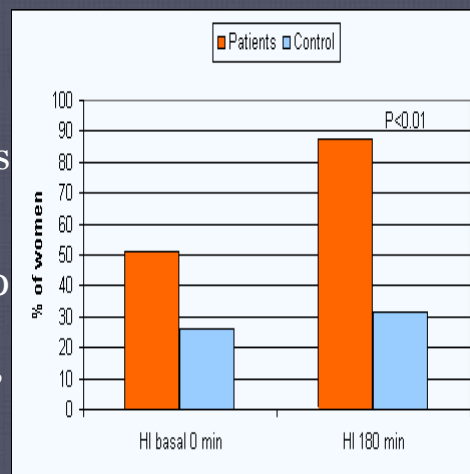
Body composition change in puberty

	<u>Male</u>	<u>Female</u>
Fat free mass	Doubles	< doubles
Fat mass	Stable	Increases
Central fat	5 x	3 x
Accretion pattern	FFM increases into adulthood	Peri-menarchal gain FM

Cheek, Human Growth 1968; Goran, IJO 1995; Guo, Appl Radiat Isot 1998

Insulin & PCO

- Acts via P450c17, the rate limiting enzyme in androgen synthesis
- Need OGTT to assess degree as poor correlation between 0 & 120 mins
- Perform if obese, AN, FH or contemplating metformin



HI = hyperinsulinaemia