

Assessing Health & Functional Fitness

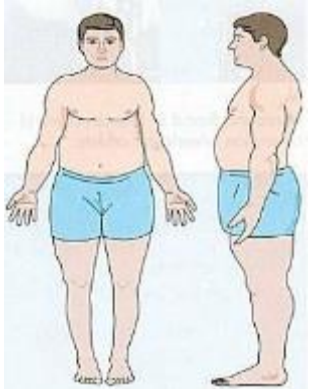
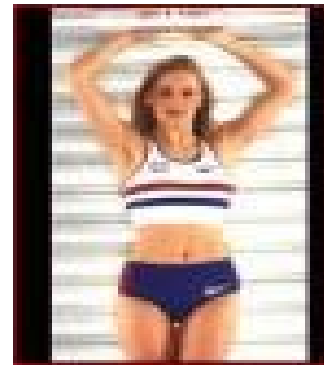
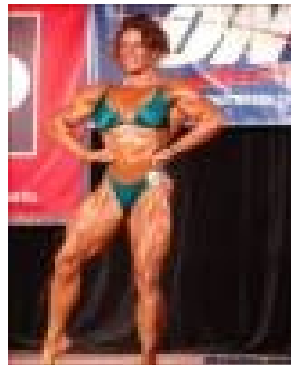
Lecture – Body Fat



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Physique

- ▣ Size
- ▣ Structure
- ▣ Composition



Body Composition

The constituents in the body with respect to

- ▣ Atomic
- ▣ Molecular
- ▣ Cellular
- ▣ Tissues systems
- ▣ Whole body (fitness/health Assessment)

Fat mass (FM) and Fat Free Mass (FFM)

Lab Assessments

- Densitometry
- Hydrometry
- Spectroscopy
 - Complicated to administer
 - Required specialist equipment / operators
 - Techniques
 - Not generally used outside laboratory / clinical
 - Settings
 - Accurate

Field Measures

- Hip to waist ratio
- Body Mass Index (wt/ht^2)
- Skinfold measures
- Bioelectrical impedance





Hip to Waist Ratio (WHR)

- **Waist:** Measure at the "natural waist" (smallest circumference) or at the level of the umbilicus
- **Hip:** Measure at the maximum circumference of the buttocks

Waist to Hip Ratio (WHR)

- Waist to Hip Ratio is an effective way to examine regional fat distribution.

HEALTH RISK	MEN	WOMEN
High Risk	> 1.0	> .85
Moderate Risk	.90 -1.0	.80-.85
Low Risk	< .90	< .80



Body Mass Index

- Relationship between Height and Weight

$$\text{Wt (kg)} / \text{Ht}^2 \text{ (m)}$$

BMI Weight Status

<18.5 Underweight

18.5 – 24.9 Normal

25.0 – 29.9 Overweight

>30.0 Obese

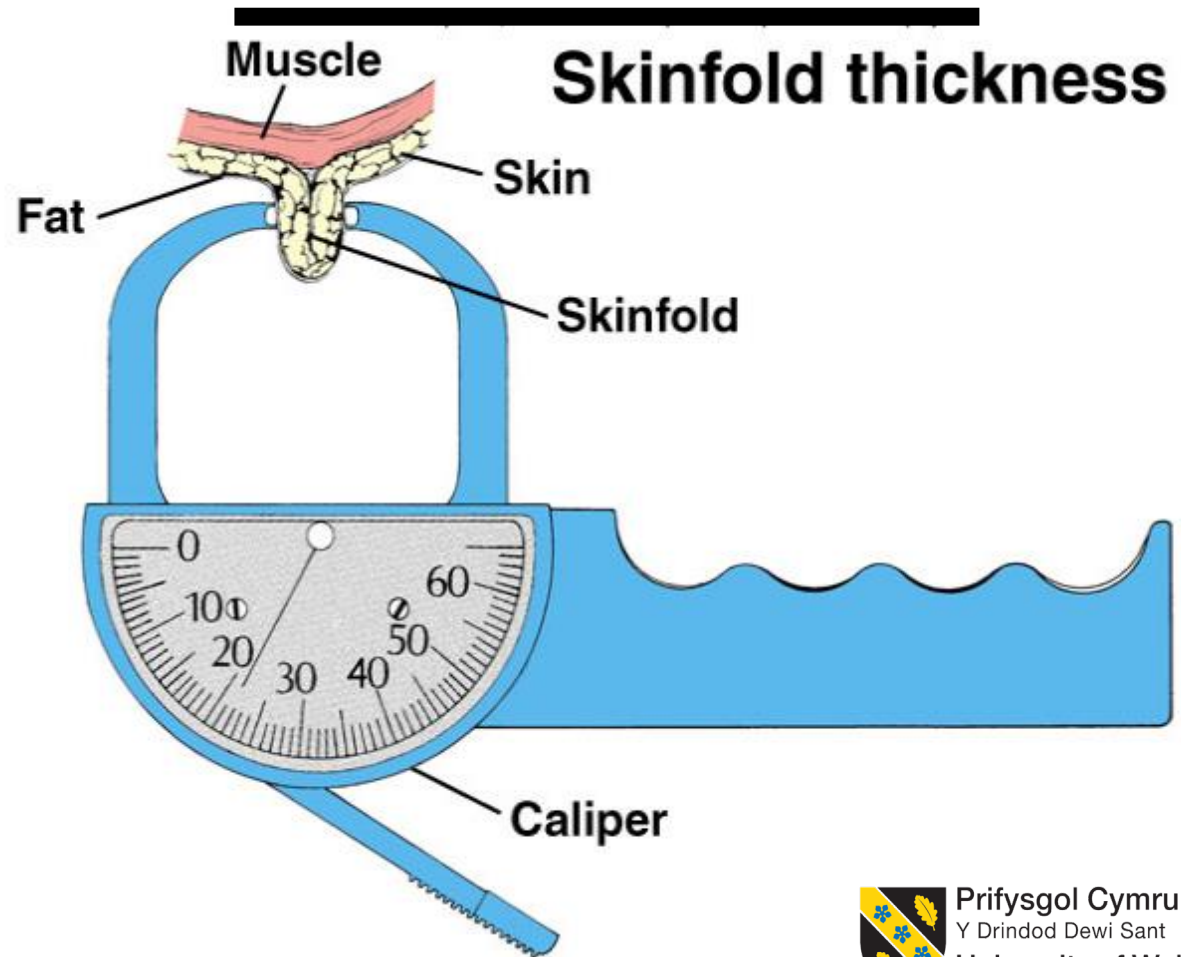
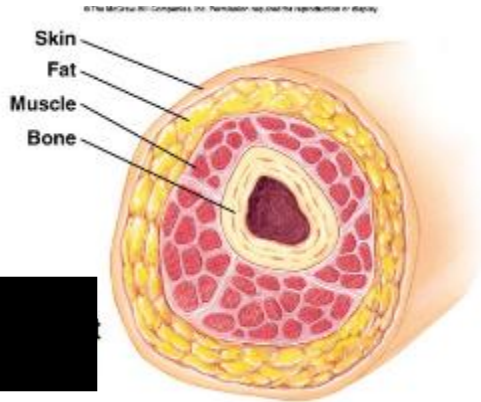


Skinfold measures

- Assumes thickness of subcutaneous adipose tissue infers a constant relationship to total body fat mass.
- Subcutaneous fat measured using callipers
- Skinfold thickness totals entered into equations to predict percentage body fat.

Skinfold technique

Layers of subcutaneous fat are measured at different sites of body to estimate total body fat levels



Cross sectional view

Prediction Errors

- Body Water content
- Body mineral content
- Technical errors in measuring
- Non-consistent fat distribution
- Ratio of internal to external fat different

from group used to develop predictive equations



Accuracy

Using good techniques with an appropriate client:

$$\pm 3 \%$$

i.e. if a %fat is measured at 15% then what we are confident about is that the persons fat is between 12% and 18%.

The data should be expressed as a range rather than a specific value.

Therefore measuring body fat on a regular frequency can be problematic is providing an accurate assessment of fat changes

Ideal Body Fat

A generic specific values does not exist.

Health female less than 17 -22%

male less than 15 – 20%

Sport lower but depends on sport

Essential Fat female less than 7%

male less than 3%

MEN



3-4%



6-7%



9-10%



14-15%



20-22%



30-32%



Women



11-12%

14-15%

17-18%



20%



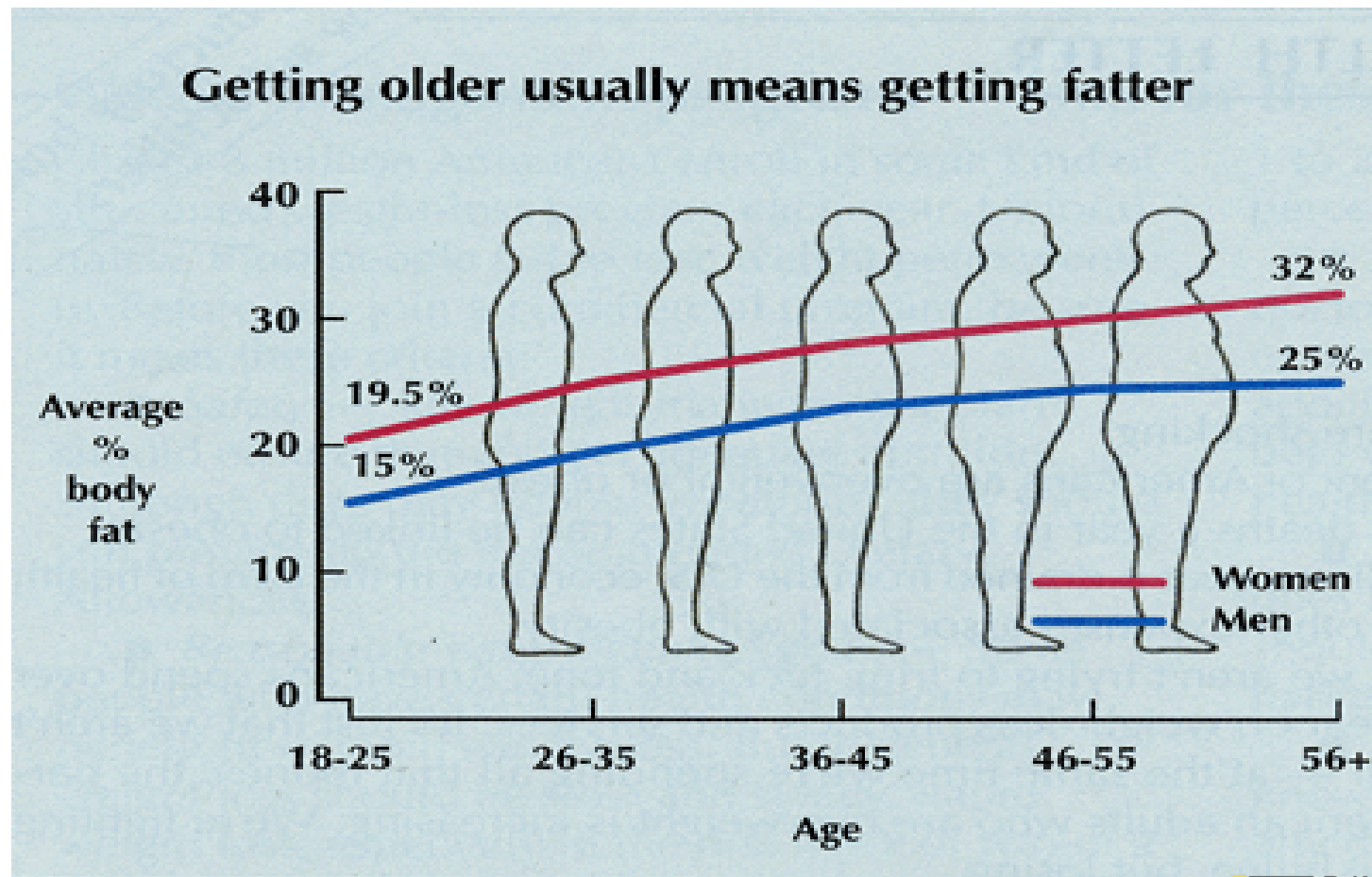
25%



30%

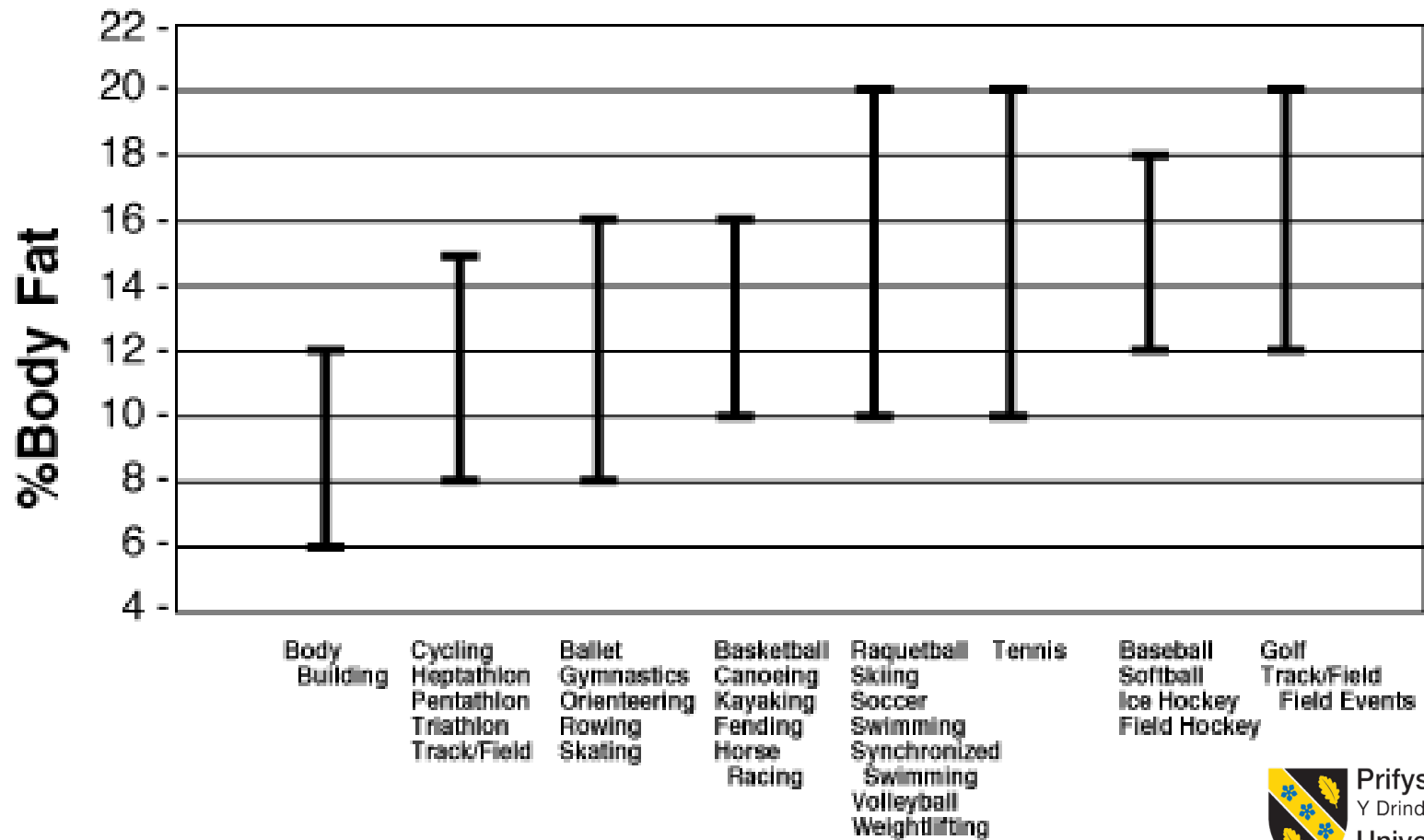


Age and Fatness



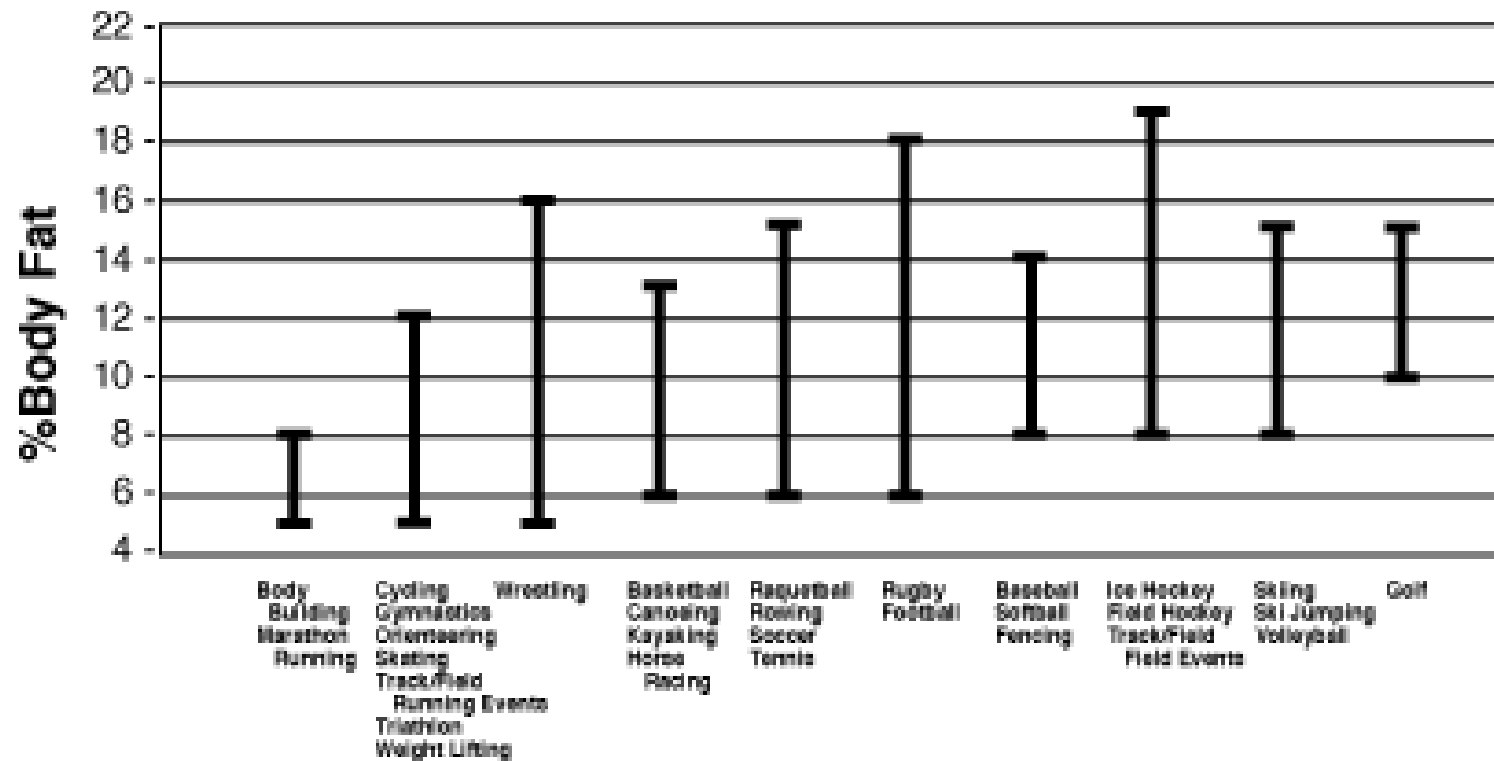
% body fat measured in female athletes

Reported ranges of %body fat levels measured in female athletes from various sports.



% body fat measured in male athletes

Reported ranges of %body fat levels measured in male athletes from various sports.



Body Fat and Performance

Low fat for running, jumping events due to;

1. Extra weight to be moved / lifted
2. Acceleration affected by power to mass relationship.
3. Increase metabolic cost of movement

Body Fat and Performance

Moderate fat for impact and contact sports

- Absorption of impact forces - rugby
- Increase buoyancy and thermal insulation - long distance swimming

Disorders - leanness

- Anorexia nervosa / bulimia

- Menstrual dysfunction

- Bone demineralisation

Recommendations are that body fat is

Males > 5%

Females > 12%



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Excess fat

Obesity (+5% Over recommended % fat)

Associated with an increased risk of;

- CHD
- Diabetes
- Joint Problems
- Hypertension



Risks associated with low Body Fatness

- Dizziness
- Moodiness
- Malnutrition

Extreme Cases Associated with Eating Disorders:

- Heart Attack
- Kidney failure



Managing your weight

Trying to Gain Weight

- Control exercise
- Eat more calories
- Supplement your diet

Trying to lose weight

- Increase energy out by increasing exercise or activity levels.
- Decrease energy in by reducing calorific content of food consumed

Recommendations for Weight / fat Loss

- Based on data from BMI or preferably % fat determination.
- Each kg of body fat contains approx.
7200 kcals of energy.
- Advisable to limit calorific deficit by 500kcals/day



Weight Loss Calculations

Target weight = Lean mass + [fat mass x (desired % fat / actual % fat)]

Therefore if a 40 yr old male weighs 80kg and has 28% fat then;

Fat Free weight is 57.6kg and fat weight is 22.4kg

If the recommended % fat is 20% then;

Desired fat weight = $22.4 \times (20\%/28\%) = 16\text{kg}$ and fat loss = 6.4 kg

(Total weight x %fat loss required i.e. $80\text{kg} \times 0.08 = 6.4\text{kg}$)

Target weight is therefore $57.6\text{kg} + 16\text{kg} = 73.6\text{kg}$

6.4kg equates to approx. 46080kcal. So at a constant deficit of

500kcal/day weight loss can be achieved in 93 days