Caloric Balance

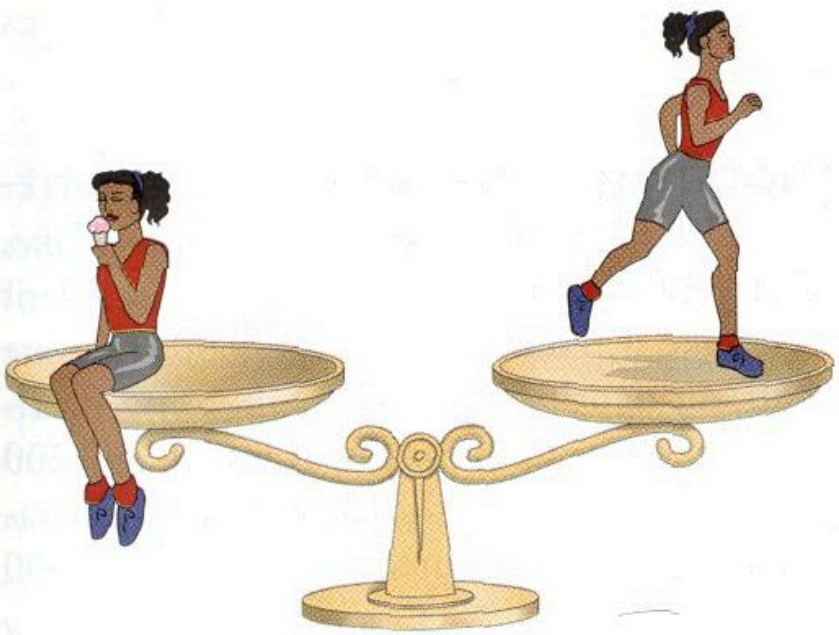


FIGURE 7.19

What you weigh is a balance between how many calories you eat and how many you expend.

“Calories In”: Only 3 Ways

Carbohydrates

Fats

Protein

"Calories Out": 3 Ways You Burn Calories

1. **Basal Metabolism**: basic functions- just to keep you alive

- Breathing
- Circulating Blood
- Maintaining Body Temperature
- Making New Tissue
- Removing Waste Products
- Sending Nerve Impulses

Basal Metabolic Rate (BMR)

- Calories you burn every hour to keep you alive
- 60-75% of total calories you burn (energy needs)
- Does **not** include: physical activity/exercise
- Warm blooded animals: "Keep fires lit all night"

BMR measured:

- Morning
- Warm Room
- Before you get up
- After 12 hr fast
- Difficult to Measure

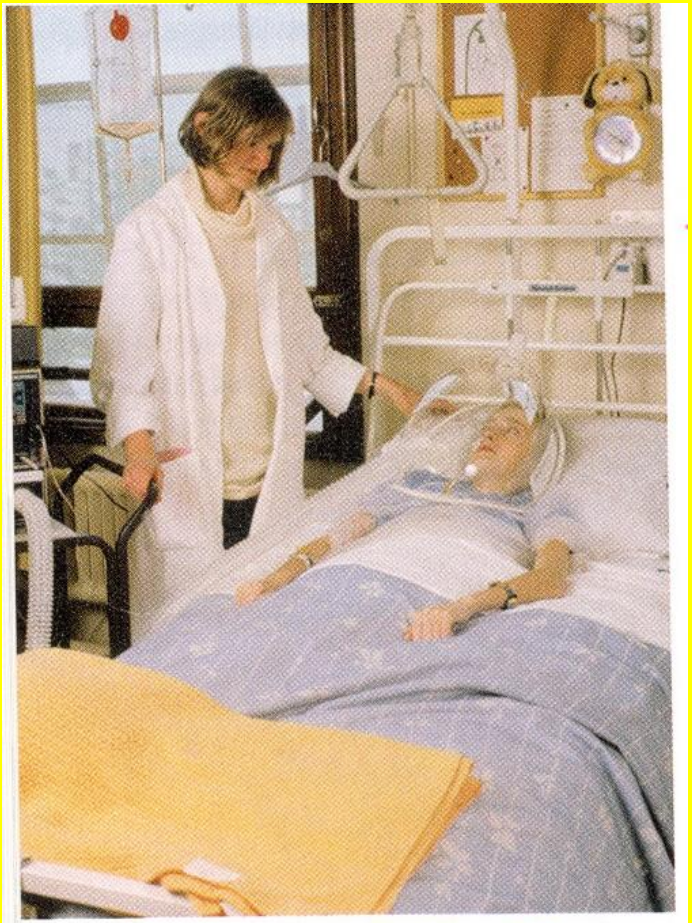


FIGURE 7.14

Measuring expired gases by having the subject breathe under a hood can be used to assess BMR, but this method is too cumbersome to be used to measure the energy costs of daily activity. (St. Bartholomew's Hospital/Custom Medical Stock Photo)

In General:

↑ BMR ↑ Lean body mass

↑ BMR ↑ Men vs. women (more lean mass)

↓ BMR ↓ Age (less lean mass)

↑ BMR ↑ Thyroid hormones

↑ BMR ↑ Body temperature (fever)

↓ BMR ↓ If calorie intake low (starvation)

Homeostasis: less energy needed to maintain weight

Frustration: Trying to lose weight

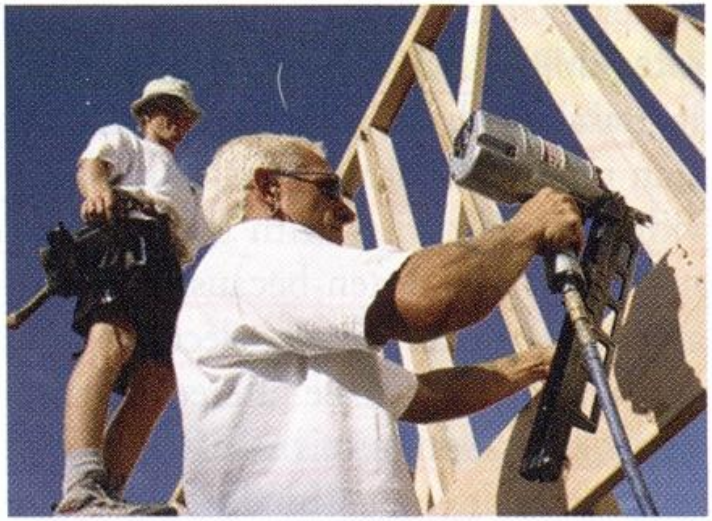
"Calories Out": 3 Ways You Burn Calories

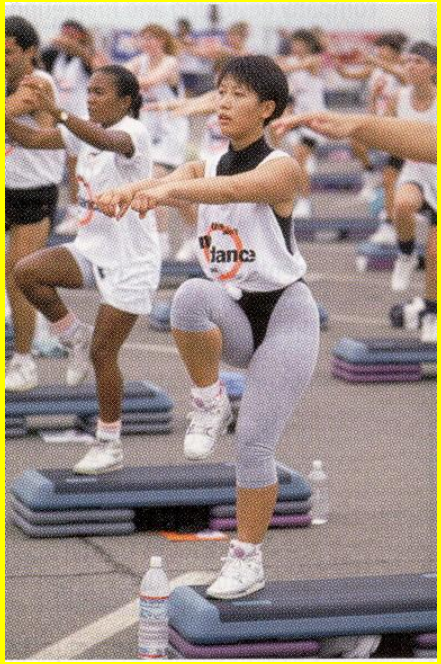
2. Physical Activity

- 15-30% energy you burn every day
- Higher: Athletes, laborers
- ↑ Body weight ↑ calories burned with physical activity

(a)

(b)





One Hour Walk

Body Weight	Calories Burned
120 pound	190 calories
180 pounds	290 calories

More energy → Move heavier person

"Calories Out": 3 Ways You Burn Calories

3. Digestion/absorption/metabolism of food nutrients

- About 10% of calories burned/day
- To "process" food you eat
- "**Thermic**" effect of food
- Diet-induced **thermogenesis**

Calories Burned

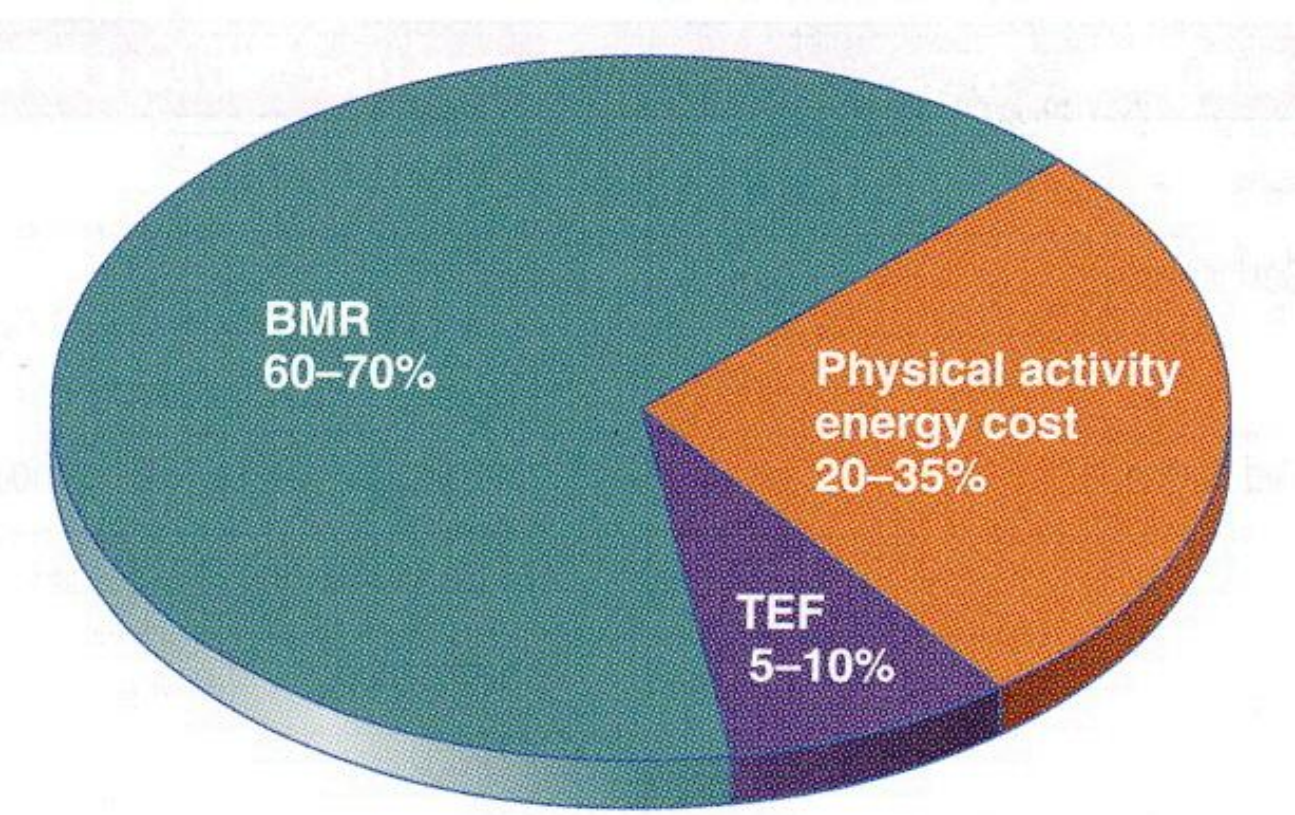
↑ Fat meal ↓ Energy cost

Dietary fat → Stored efficiently

"Fat goes to fat easily"

↑ Carb, protein meal ↑ Energy Cost

"Calories Out": 3 Ways You Burn Calories



Components of energy expenditure

You are in energy balance if:

Calories in = Calories burned

Food + drink in all activities (basal metabolism + exercise)

Energy balance: look at <u>both</u> sides of equation

BMI: Estimate of body fat

Category	BMI
Underweight	< 18.5
Normal	18.5-24.9
Overweight	25.0-29.9
Obese	30.9 & greater

$$BMI = \frac{\text{Weight (lbs)}}{(\text{Height (inches)})^2} \times 703$$

Correlates: **body fat**

Adult woman: healthy level body fat: **21-33%** total weight

Adult man: **8-20%** total weight

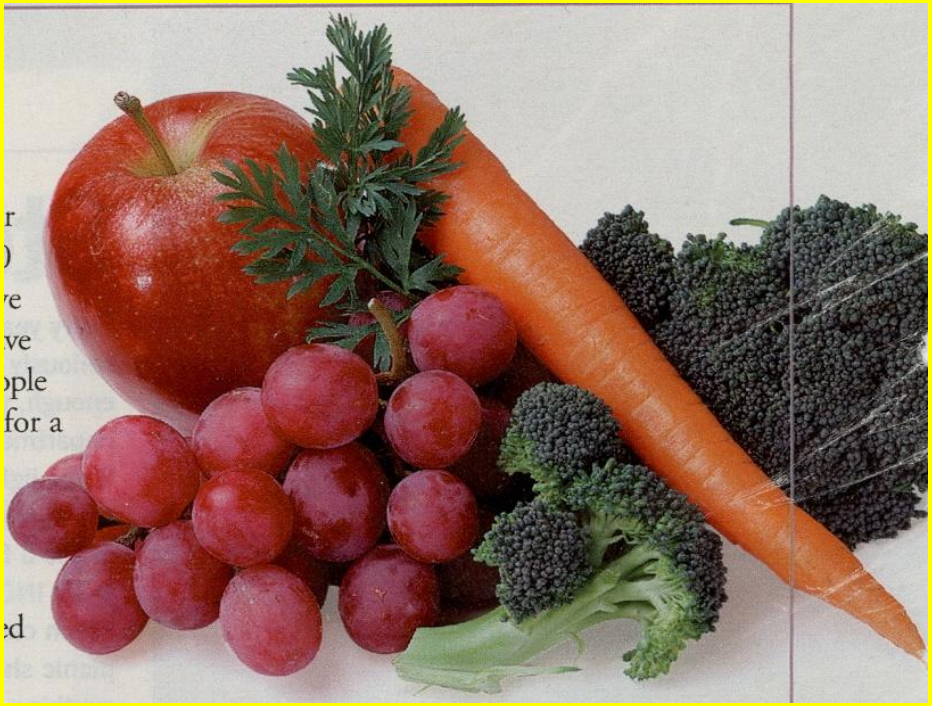
Is the BMI a good measurement?

Correlates:

- Above "30" ↑ risk type 2 diabetes, blood pressure, heart disease
- ↑ Fast food ↑ BMI
- ↑ BMI ↓ Testosterone in men
- ↑ Fruits/veggies: women ↓ BMI ↓ waist circumference ↓ blood pressure

Vegetarian Diet

- Lower: BMI, body weight, risk obesity, heart disease, high blood pressure, diabetes & medical costs



BMI: Not Perfect

- Athletes- muscles/lean body mass

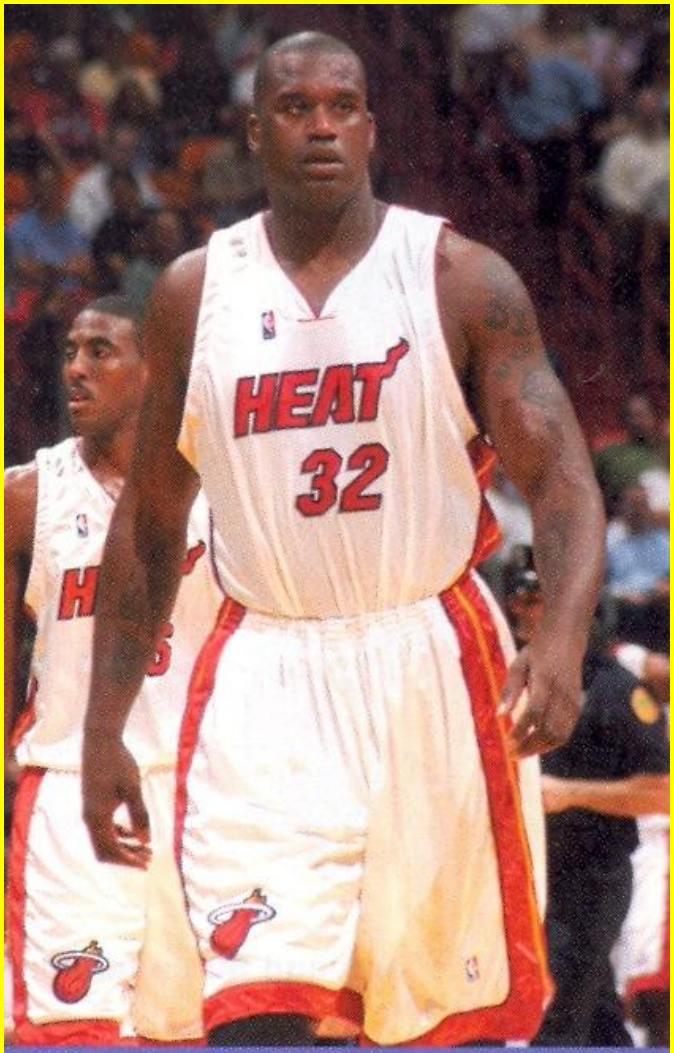
(overestimate of fat; muscle weighs more than fat)

Hulk Hogan

6’ 8” 275 pounds

BMI 30.3

obese?



Athletes with a high percentage of muscle mass will have higher body weights. NBA player Shaquille O'Neal has a BMI of over 30 (obese). But though his BMI is high, his weight doesn't put him at an increased health risk.

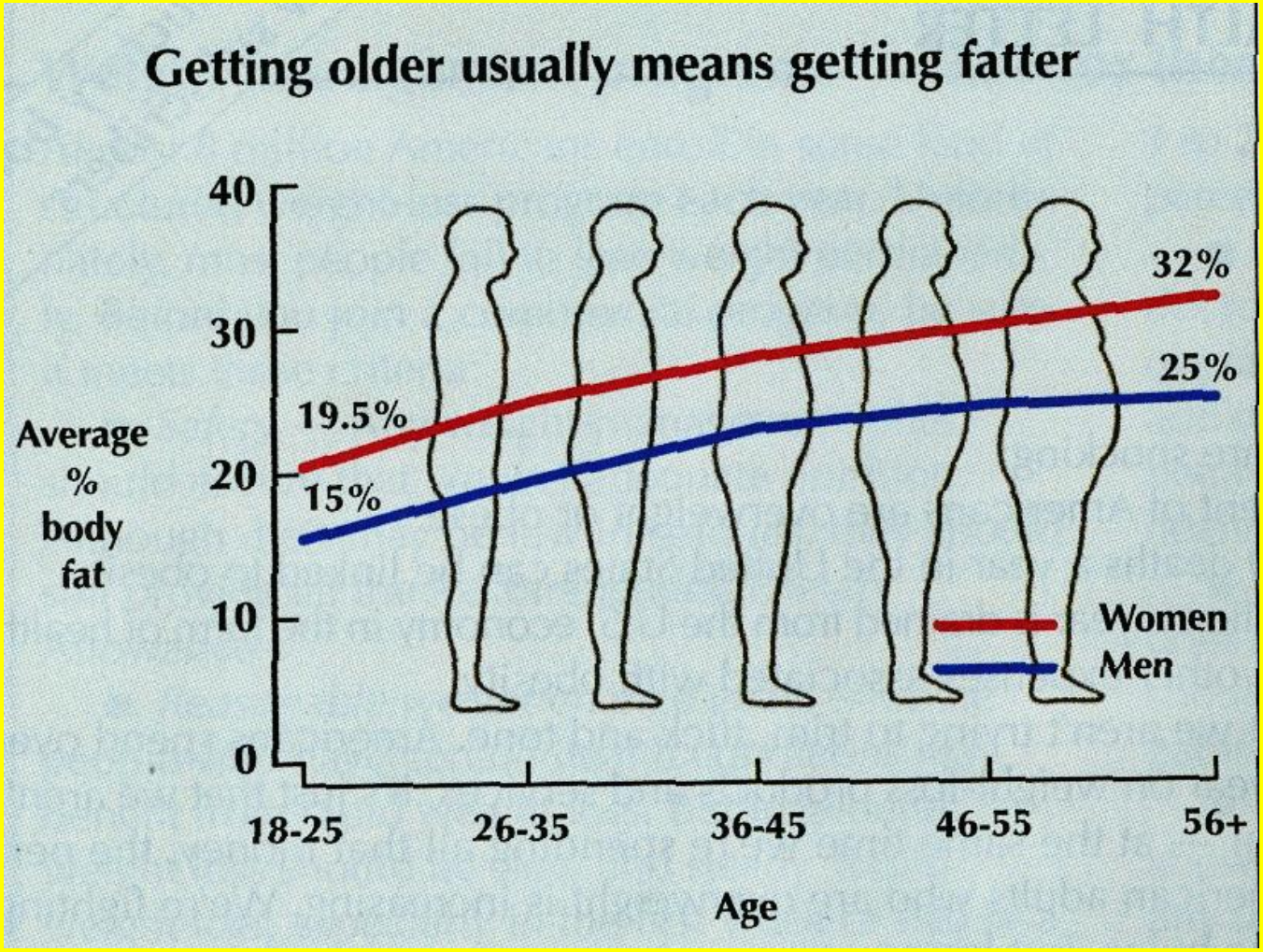
BMI: Not Perfect

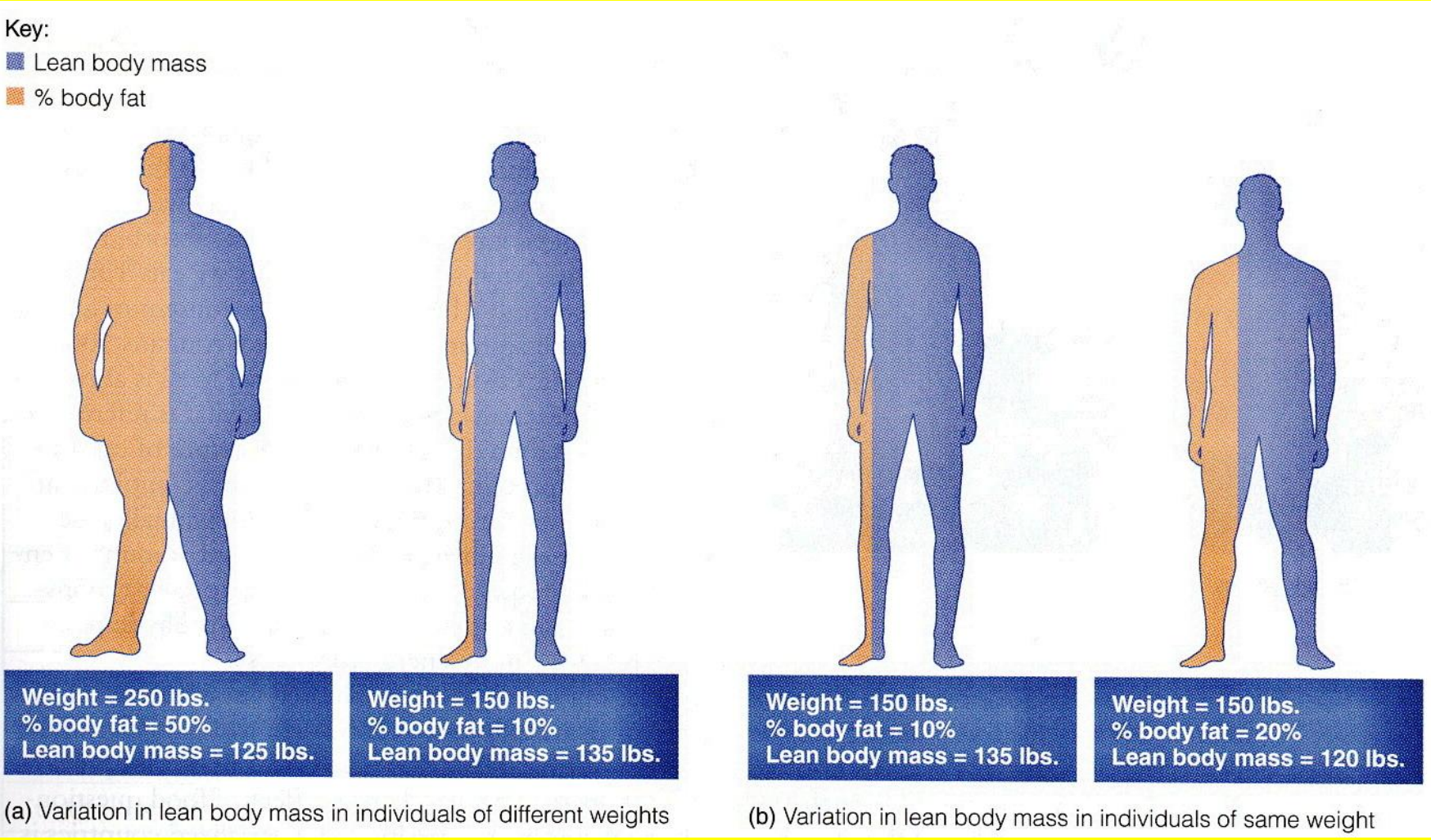
Based on BMI: **Half** NFL players would be classified as obese

BMI: Not Perfect

- Pregnancy/Breast Feeding- higher than normal body weight
- Older adults: loss muscle mass (underestimates body fat)
- BMI doesn't differentiate: fat vs. muscle mass

Body fat and age



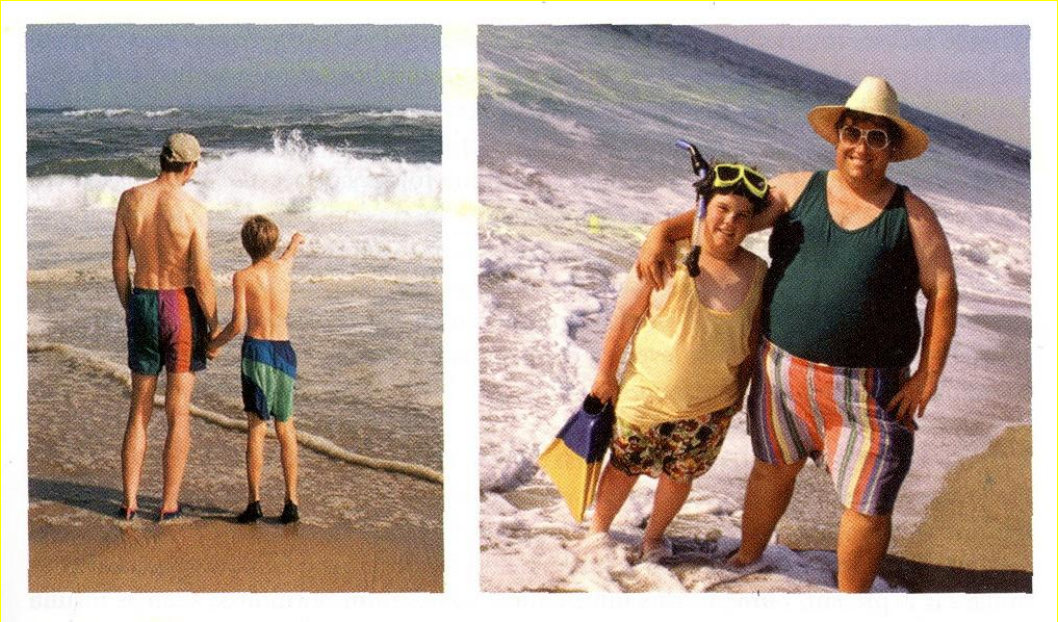


(a) Variation in lean body mass in individuals of different weights

(b) Variation in lean body mass in individuals of same weight

BMI: Not Perfect

- Location: BMI doesn't tell where fat stored
- Location- fat storage: genetic



Apple vs. Pear Shape

Apple pattern: visceral fat

Viscera= internal organs: fat around organs in abdomen

Fat stored around/above waist (upper body)

Easier to

Mobilize

More common:

men

↑ Visceral Fat

↑ Risk

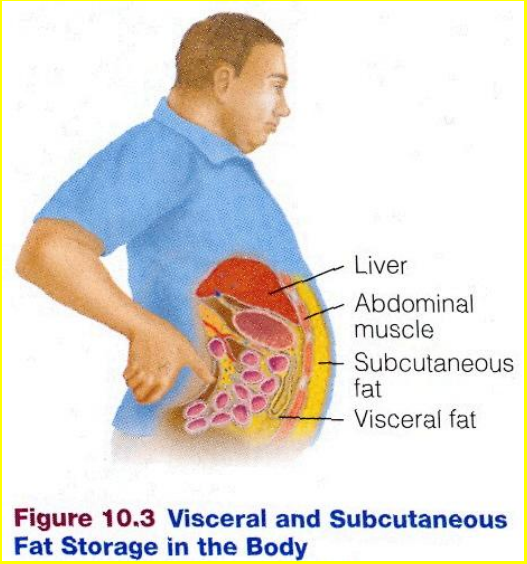


Figure 10.3 Visceral and Subcutaneous Fat Storage in the Body

Heart disease, high blood pressure, stroke, diabetes, breast cancer

↑ Visceral fat-women after **menopause**

↑ Visceral Fat

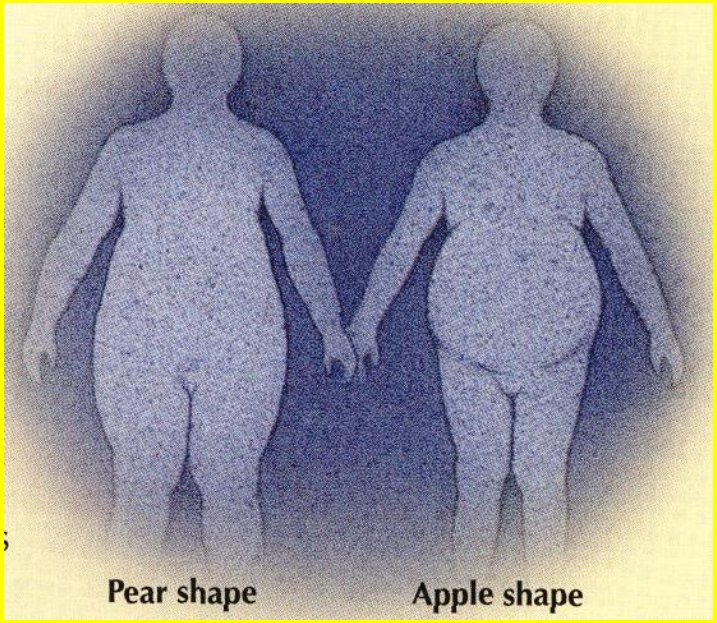
- Stress
- Tobacco
- Alcohol

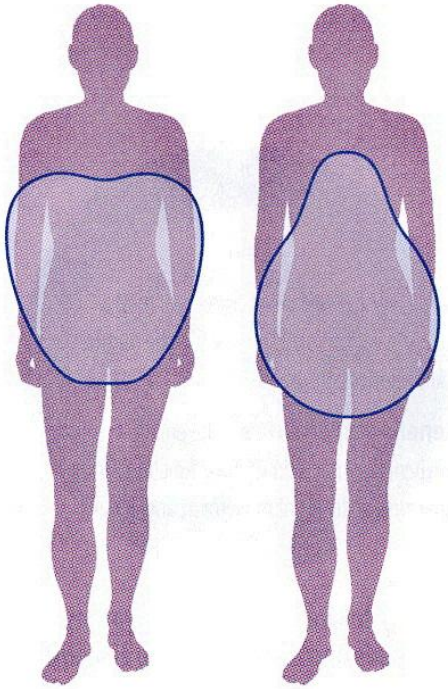
↓ Visceral Fat

- Exercise

Pear Pattern

- More fat in hips, thighs, buttocks (below waist- subcutaneous)
- Lower risk- these diseases

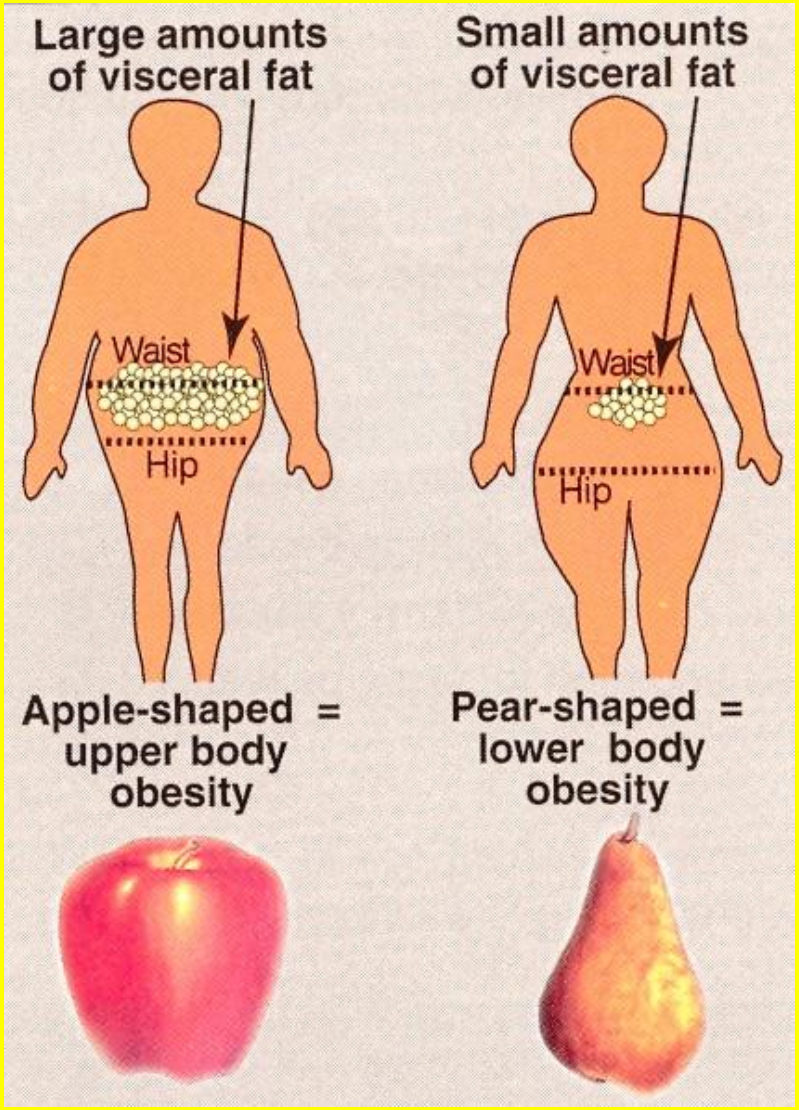




(a) Apple-shaped fat patterning (b) Pear-shaped fat patterning

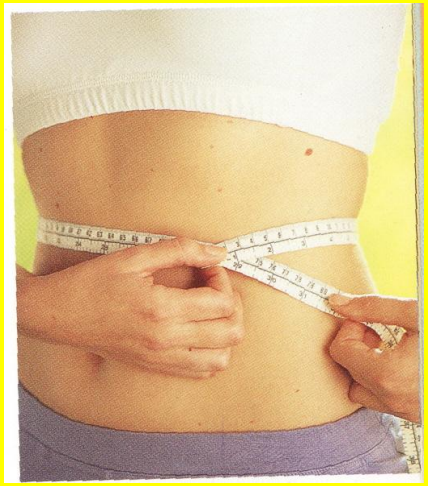
Figure 9.6 Fat distribution patterns. (a) An apple-shaped fat distribution pattern increases an individual's risk for many chronic diseases. (b) A pear-shaped distribution pattern does not seem to be associated with an increased risk for disease.

Apple vs. Pear Fat Storage



Apple & Disease Risk: Measure 2 ways

#1) **Waist to Hip Ratio**



Waist: Find highest point- each hip bone;

Measure around waist: just **above** these points;

Tape parallel to floor, snug, normal breathing

Hip: Measure circumference: maximal width of buttocks

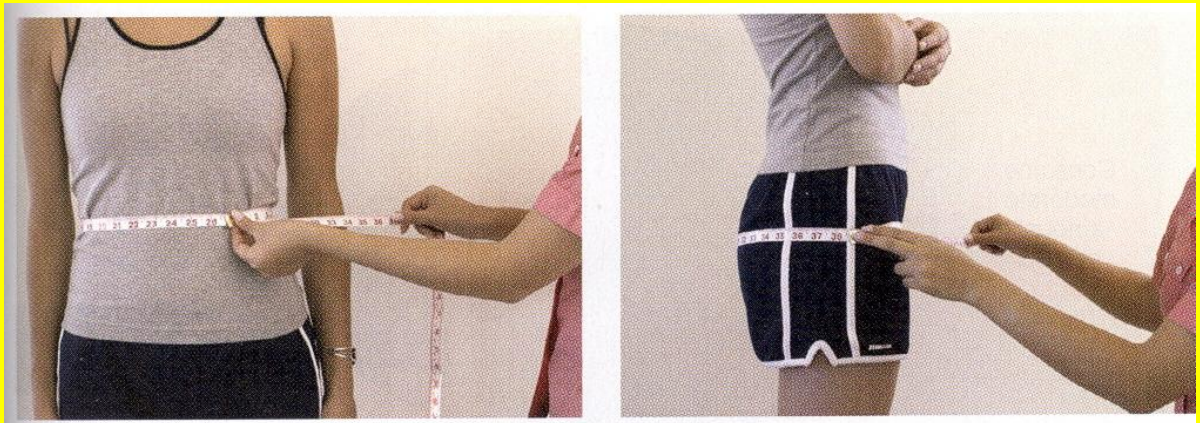
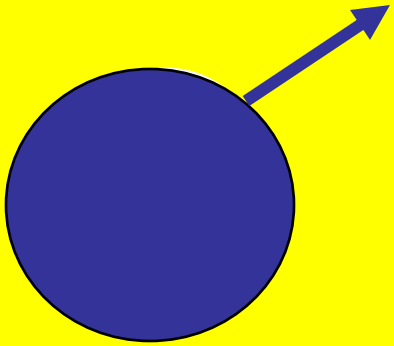


Figure 9.7 Determining your type of fat patterning. (a) Measure the circumference of your natural waist. (b) Measure the circumference of your hips at the maximal width of the buttocks as observed from the side. Dividing the waist value by the hip value gives you your waist-to-hip ratio.

Example: **36** inch waist

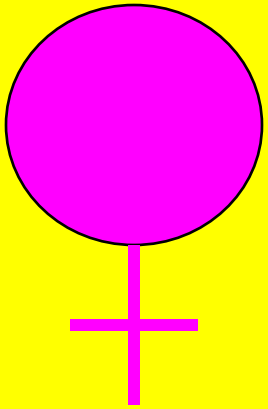
40 inch hips **W/H= 0.9**

Waist to Hip Ratio



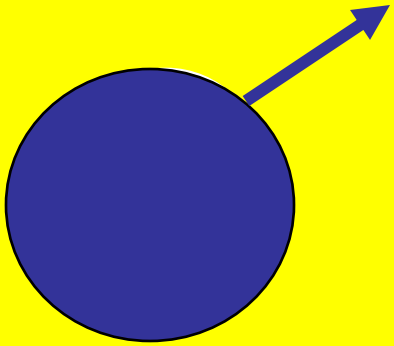
> 0.90

greater risk



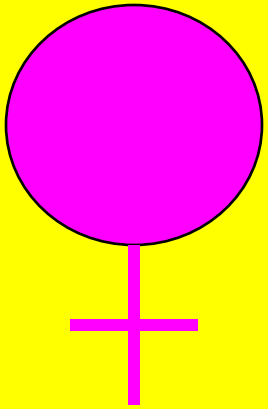
> 0.80

Apple & Disease Risk: Measure 2 ways
#2 **Waist Circumference**



> 40 inches

greater risk



> 35 inches

Skinny Person
with pot belly

> Heart Disease Risk

than person with higher BMI

BMI and Thin Models NY Times 1/9/07

Academy for Eating Disorders (International group doctors) concern:

Anorexia nervosa: **0.3-1%** young women

MJ Kim/Getty Images

A model at a London fashion show last fall. A doctors' group said it would issue strict age and weight requirements for models today.

New Guidelines

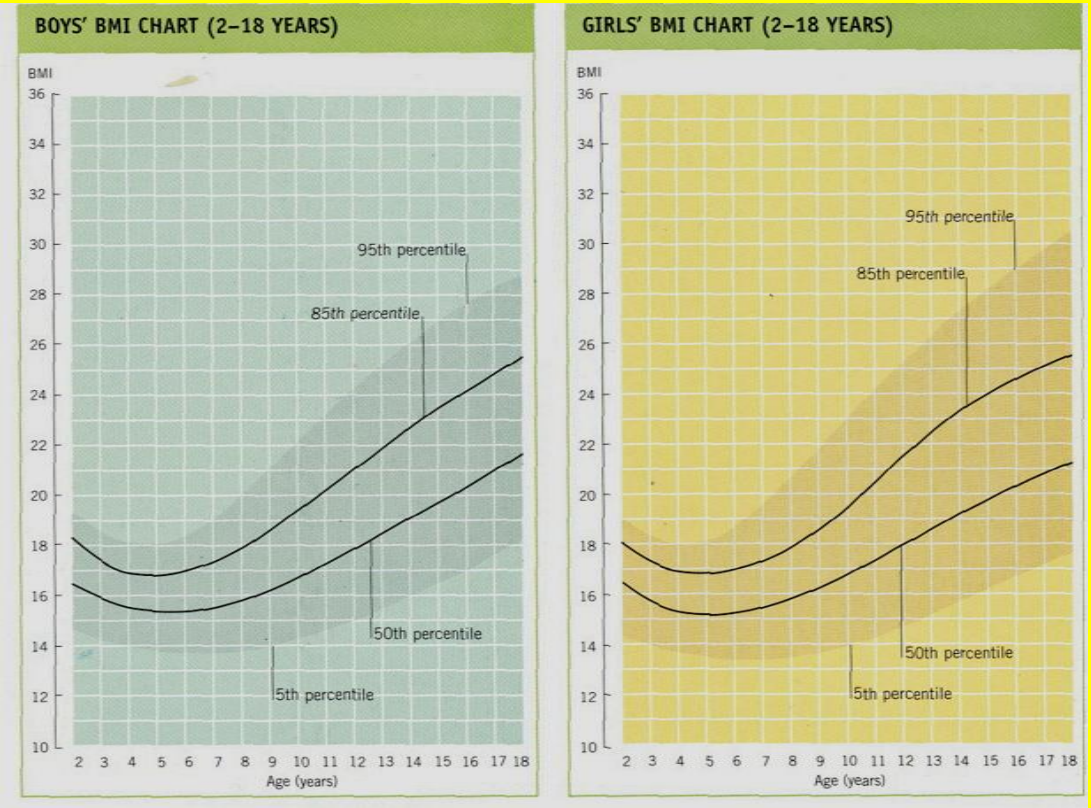
Age	BMI
Under 18 years	> 17.4
Over 18 years	18.5

Minimum age: 16 years

Example: 18.6 BMI= 126 pounds
5’ 9” tall

Obesity Report Cards NY Times 1/8/07

- BMI 5th → 85th percentile on growth charts = normal



Obesity Report Cards

One view: BMI- effective, low-cost screening; "healthy children- learn better"

Second view: Children confused, anxious about eating; overzealous school systems ?

Angry parents: "Doctor & parent should decide, not school nurse"

A B C

A: Cassie Allen, 15, “other children call her anorexic”

B: Holly Berguson, 17, homecoming queen, “who you are counts more than how you look” (insulin resistant)

C: Karlind Dunbar, 6, normal percentile range but “anxious about eating”

Response to new federal law:

"all schools receiving $ for federally-funded school meals program" must:

Implement: wellness policy (nutrition & physical activity)

By start 2006-07 school year

- Third View: Inconsistent message
- Blossburg, PA: **34%** kindergartners-overweight; **60%** eighth graders BMI $\geq 85^{th}$ percentile
- State requires BMI reports
- **School cafe**: funnel cakes & pizza for breakfast
- **P.E.** only half year
- Local pizza chain: **"Pudgies"**
- **Local restaurant**: grilled chicken salad + fries piled on

NY Times 2/8/07 "Athletes embrace size, rejecting stereotypes"

- " Female athletes face enormous pressures: remain **thin** with body type unrealistic for sports"
- NCAA recommends **not** weighing women regularly
- Dr. Thompson (Indiana psychologist): "Weighing doesn't accomplish anything- public degradation"

Courtney Paris: 19 year basketball center- University of Oklahoma

- 6’ 4” 240 pounds
- “Female Shaquille O’Neal”
- Averages: 23 points, 16 rebounds/game; 100 blocked shots- one season
- Her dad: 3 time Superbowl lineman

- Courtney Paris: “We’re women not apologizing for being bigger and being different or for being athletic”
- Developed skills: practice- older brothers
- Today: role models e.g. Women’s National Basketball Association- practice regularly against men