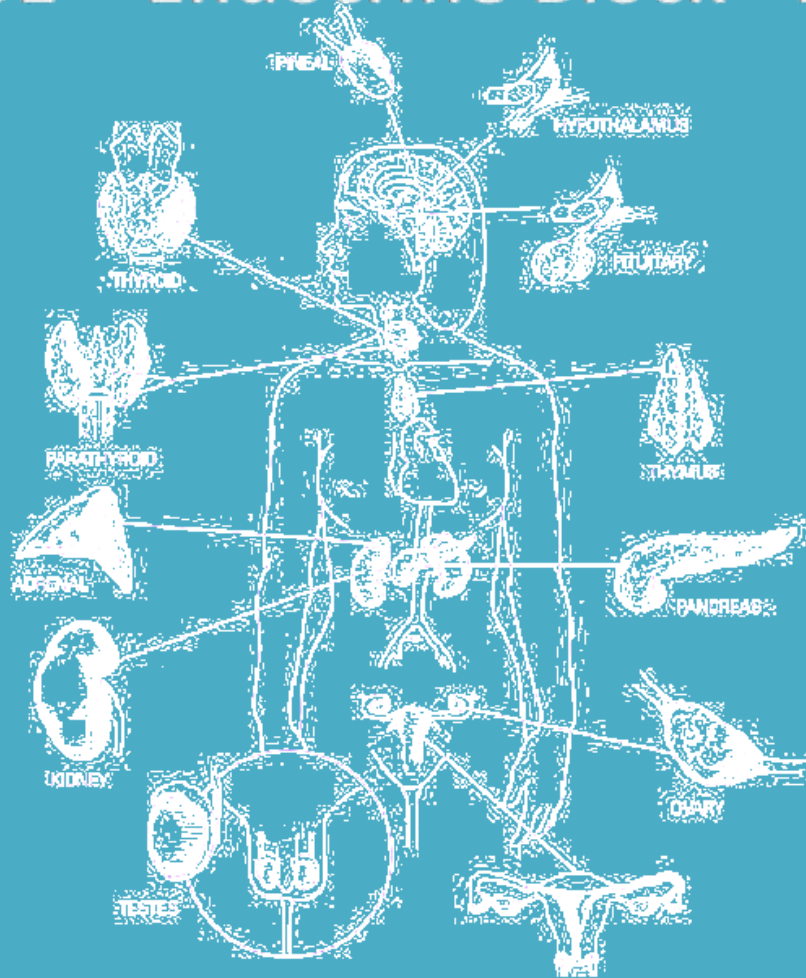


MEDICINE TEAM

431 – Endocrine Block - 2013



EPIDEMIOLOGY OF OBESITY

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Obesity & Overweight

- Obesity is **excessive fat accumulation in adipose tissue to the extent that it can affect health.**
- When a person is "overweight", it means that they **have more body fat than they need for their body to function.**
- Weight ranges are greater than what is generally considered healthy for a given height.
- Such ranges of weight increase the likelihood of certain diseases and health problems.

Measuring Obesity

- **Body Mass Index (BMI)** - the most common method –
- **Skin fold thickness :**

This test estimates the percentage of body fat by measuring skin fold thickness at specific locations on the body. The thickness of these folds is a measure of the fat under the skin, also called subcutaneous adipose tissue. Skin fold thickness results rely on formulas that convert these numbers into an estimate of a person's percentage of body fat according to a person's age and gender.

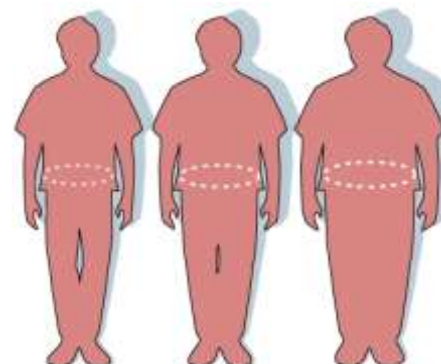


- **Waist circumference and waist to hip ratio :**

The circumference of the waist is sometimes used as a simple measure of body fatness, though it can be subject to measurement error. Adult waist circumference cut points are:

- **Increased risk of health problems: Men ≥ 94 cm
Women ≥ 80 cm**
- **Greatly increased risk of health problems: Men ≥ 102 cm
Women ≥ 88 cm**

Waist to hip ratio examines fat distribution and in practice is **used less frequently**, given the established links between waist circumference alone and health risk.



Waist-to-Hip Ratio (WHR) Norms				
Gender	Excellent	Good	Average	At Risk
Males	<0.85	0.85–0.89	0.90–0.95	≥ 0.95
Females	<0.75	0.75–0.79	0.80–0.86	≥ 0.86

Body Mass Index (BMI)

- Calculated from a person's **weight and height**.
- **Reliable indicator** of body fatness for most people (Because BMI does not distinguish between body fat and muscle mass, as in many athletes who have huge BMIs because of muscle mass, but in many cases are not fat).
- **Inexpensive & easy-to-perform** screening for weight categories that may lead to health problems.
- **Does not measure body fat directly**, but correlates to direct measures of body fat like;
 - ✓ Skin Fold Thickness
 - ✓ Underwater Weighing
 - ✓ Dual Energy X-Ray Absorptiometry (DXA)

Alternative for direct measures of body fat.

BMI & Body Fat

- At the **same BMI**, women tend to have more body fat than men.
- At the **same BMI**, older people, on average, tend to have more body fat than younger adults.
- Highly trained **ATHLETES** may have a **high BMI because of increased muscularity** rather than increased body fatness.

Obesity Classification

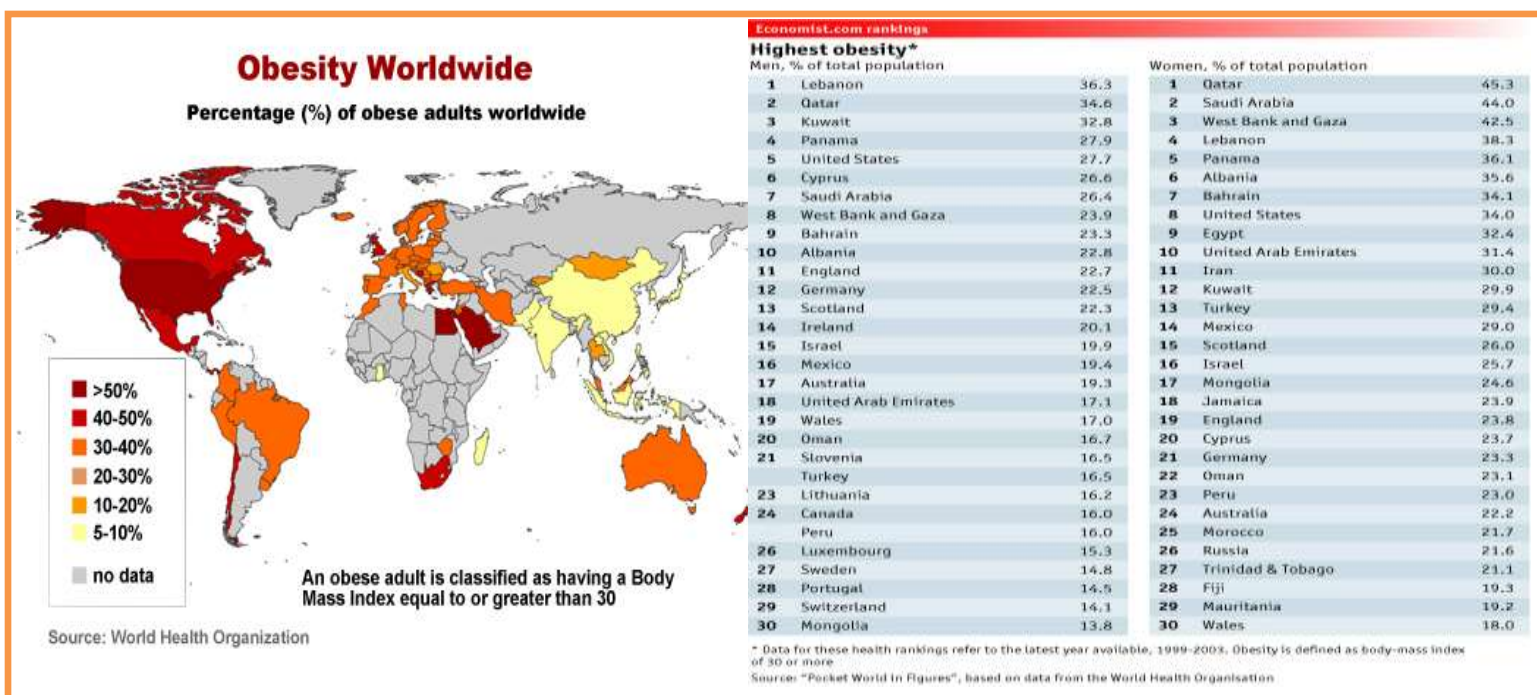
Obesity is divided into **three** separate classes, **Class III obesity** being the most extreme of the three.

BMI classification	
Underweight	< 18.5
Normal range	18.5 - 24.9
Overweight	≥ 25.0
<i>Preobese</i>	25.0 - 29.9
Obese	≥ 30.0
<i>Obese class I</i>	30.0 - 34.9
<i>Obese class II</i>	35.0 - 39.9
<i>Obese class III</i>	≥ 40.0

Epidemiology of Obesity

Why is obesity accelerating in developing countries?

- Increased consumption of **energy dense, nutrient poor foods**.
- **Reduced physical activity**.



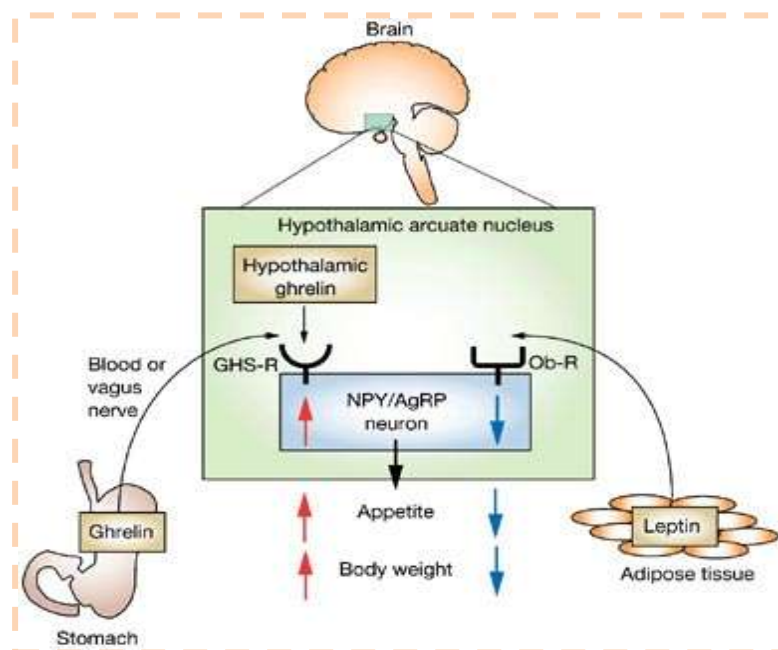
Causes of Obesity

- **Not necessarily overeating.**
 - **Factors that predispose a person to gain excessive weight gain.**
- ✓ Eating patterns & Eating environment.
 - ✓ Food packaging.
 - ✓ Food availability.
 - ✓ Body image.
 - ✓ Physical inactivity: (important component)
 - For young & middle aged men, physical activity relates inversely to body fat levels.
 - ✓ Basal body temperature.
 - ✓ Dietary thermogenesis.
 - ✓ Fidgeting.
 - ✓ Biochemical differences.

How can Body Image cause Obesity?

A normally healthy weight range for an individual can be perceived as overweight by someone with a distorted body image. An anorexic young woman may look at herself in a mirror and see a reflection that is greater than her actual size. Conversely, it is not uncommon for obese individuals to report that they did not realize they were as large as they are and had perceived their body as much smaller until an occasion arises where they see a photograph, video or window reflection that strikes a nerve and causes them to come to terms with their actual image.

- ✓ Quantity & sensitivity to satiety hormones (**Ghrelin and Leptin**) that influences the appetite control in the hypothalamus.
- **Characteristics of fast food linked to increased adiposity:**
 - ✓ Higher energy density.
 - ✓ Greater saturated fat.
 - ✓ Reduced complex carbohydrates & fibers.
 - ✓ Reduced fruits and vegetables.
- **Genetics plays a role.**
 - There is a role of a mutant “**obese**” **gene** in obesity development.
 - **Largest transmissible variation is CULTURAL.**
 - How much variation in weight gain among individuals can be accounted for by genetic factors?
 - genetic factors may be involved in the etiology of obesity and, exclusive of very rare severe obesity cases, the genes involved are probably genes that **interact with environment factors** related to energy intake and expenditure to increase the risk of obesity.



A defective **Obese gene** causes **inadequate leptin production**. Thus, **the brain receives an under assessment of body’s adipose stores and urge to eat.**

In addition to deficient leptin production, scientists also propose the possibility of **defective receptor action** (via a leptin receptor molecule on brain cells), → **which increases a person’s resistance to satiety.**

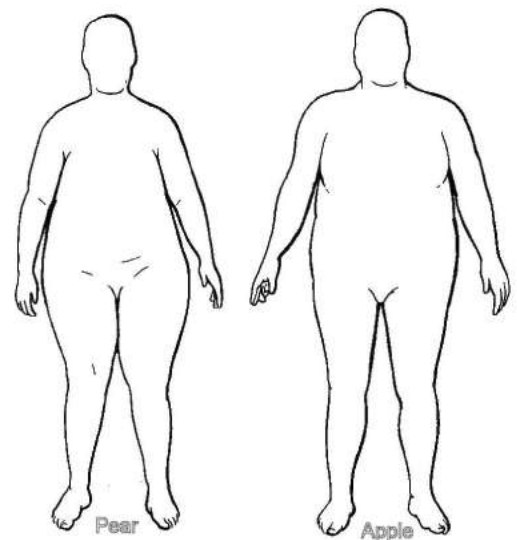
Complications of Obesity

- Obesity is a **long term** process.
- Obesity frequently begins in **childhood**.
- Obese parents likely have overweight children.
- Regardless of final body weight as adults, **overweight children exhibit more illnesses as adults than normal kids**.

- **Abdominal body fat increases health risks :**

Degree of abdominal fat accumulation is correlated with increased risk of:

- ◆ Cardiovascular disease.
- ◆ Type 2 diabetes.
- ◆ Premature death.
- ◆ Some types of malignancies.



Obese Syndrome Components

- ◆ Glucose intolerance
- ◆ Insulin resistance
- ◆ Dyslipidemia
- ◆ Type 2 diabetes
- ◆ Hypertension
- ◆ Elevated plasma leptin concentration
- ◆ Increased visceral adipose tissue
- ◆ Increased risk of CHD & some cancers

10kg Weight Loss in 100kg Patient With Obesity Related Co-morbidities ;

- ◆ Mortality 20-25% fall in total mortality 30-40% fall in diabetes related deaths
- ◆ 40-50% fall in obesity related cancer deaths
- ◆ Blood pressure fall of approximately 10mm/Hg in both systolic and diastolic values
- ◆ Reduces the risk of developing diabetes by >50%
- Fall of 30-50% F. glucose
- Fall of 15% HbA1C
- ◆ Lipids:
 - Fall of 10% in total cholesterol
 - Fall of 15% LDL
 - Fall of 30% triglycerides
 - Increase of 8% in HDL

Remember!

$$\text{BMI} = \left(\frac{\text{Weight in Pounds}}{(\text{Height in inches}) \times (\text{Height in inches})} \right) \times 703$$

or

$$\text{BMI} = \frac{\text{Weight in Kilograms}}{(\text{Height in Meters}) \times (\text{Height in Meters})}$$

Questions!

1. Which of the following that obesity increases the risk of developing?

- A. Type 2 diabetes
- B. Cardiovascular disease
- C. Premature death
- D. All of the above

2. Which one of the following is a component of obese syndrome?

- A. Decreased visceral adipose tissue
- B. Hypotension
- C. Insulin resistance
- D. Decreased plasma leptin concentration

3. A 54 years old male came to the follow up clinic for obesity. The doctor received the report of 98 kg weight and with known height of 179 cm. According to BMI classification the patient is classified as:

- A. Preobese
- B. Obese class I
- C. Obese class II
- D. Obese class III

1.D 2.C 3.B