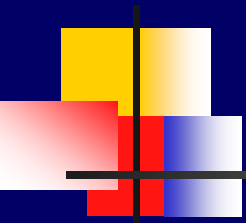بسم الله الرحمن الرحيم

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Obesity

- Measurement and definition
- Physiology
- Genetic causes of obesity
- Endocrine causes of obesity
- Epidemiology

Measurement and Definition

- Increased amount of body fat.
  - Weight (exceptions, such as body builders)
  - BMI
    - BMI=WEIGHT (in kilograms)/HEIGHT in meters)^2

Classification of Obesity

- BMI 25.0- 29.9 kg/m2 Overweight

- BMI 30.0-34.9 kg/m2 Grade I
- BMI 35.0-39.9 kg.m2 Grade II
- BMI   >40 kg/m2   Grade III
                        (morbid)
                        (extreme)

Measurement and Definition

- Distribution of body fat.
  - Upper body (abdomen and flanks, android obesity, "apples")
  - Lower body obesity (legs and buttocks, gynoid obesity, "pears").
  - Visceral adiposity

Measurement and Definition

- **Research techniques**
  - **Skin fold thickness**
  - **Waist to hip ratio**
  - **Waist circumference**
    - **> 88 cm in women**
    - **>102 cm in men**
  - **Bioelectric impedance**
  - **Underwater weighing**
  - **Isotope distribution**
  - **DEXA**
  - **CT**
  - **MRI**

New Definition of Obesity:

Endocrinologist (AACE) and

American College of Endocrinology (ACE) replaced the word of Obesity with

Adiposity- based Chronic Disease(ABCD).

Physiology

- Central weight-control center
  - Hypothalamus
- Feed-back control of body weight
  - Leptin and other adipocyte signals
  - Signals from the "gut"
- Balance between energy intake and expenditure

Physiology: Central Pathways

Anorexigenic

- Leptin
- α-MSH
- GLP-1
- Serotonin
- CCK

Calcitonin
Entero-statin
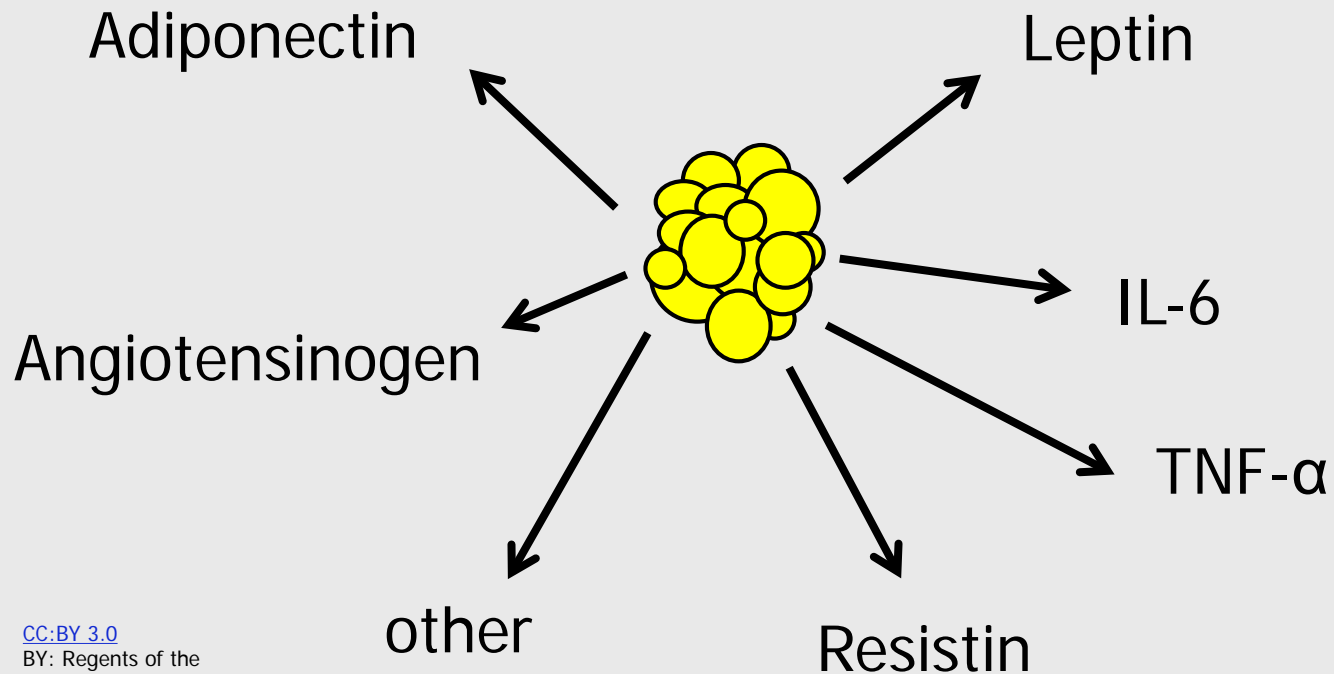IL-1B
Neurotensin
Oxytocin
Vasopressin

Physiology: Central Pathways

Orexigenic

- Neuropeptide Y
- Orexin A, B (Hypocretin 1,3)
- Galanin
- Dynomorphin
- Norepinephrine
- B-endorphin

Adipose Tissue: An Endocrine Organ

Adiponectin

Leptin

Angiotensinogen

IL-6

TNF-α

other

Resistin

Physiology: Leptin

- A 16-KD hormone produced predominantly by adipocytes
- Circulating levels are determined chiefly by fat mass
- Increased leptin synthesis/secretion
    - Re-feeding (after fasting)
    - Adiposity
    - Glucocorticoids
    - Insulin

- Inhibition of leptin synthesis/secretion
    - Sympathetic stimulation
    - Circulated partially protein

Physiology: Leptin

- Leptin's central actions :
  - Increase energy expenditure (via physical activity, sympathetic nervous system activity)
  - Decrease food intake
  - Decrease body weight
  - Increase insulin sensitivity
  - Regulate other pituitary hormone axes
- Leptin's peripheral actions
  - Stimulate angiogenesis
  - Hematopoietic cell proliferation
  - T-cell immnunity

Genetic bases of obesity

- Big genetic component
  - Estimated at 40-70%
- Most of obesity polygenetic or logogenic

- Monogenetic forms of obesity
  - Isolated genes
  - Syndromic obesity

Monogeneic obesity

- Leptin
  - A few families
- Leptin receptor
  - A single family
- MC4-Receptor (Melanocortin)
  - Most common defect

Endocrine Causes of Obesity

- Hypothalamic injury or tumor
  - Cushing's syndrome
  - Growth hormone deficiency
  - Hypothyroidism
- Insulin Resistance
  - Polycystic ovarian syndrome
  - Diabetes type2

A Global Epidemic

Obesity prevalence

Years	Prevalence
1995	200 million
2000	300 million
2008	857 million
2013	2.1 billion
2030	3.3 billion

(2.2 Overweight and 1.1 obese)

Prevalence of obesity in the U.S.

- Past Targets: 2010
- 15% of adults
- 5% of children

- Current Targets: 2020
- 30.5% of adults
- 14.5% of children

Prevalence of Obesity

- In 2014, more than 1.9 billion adults (18 years and older) were overweight.

- Of these over 600 million were obese.

- 42 million children under the age of 5 were overweight or obese in 2013.

- The same report states that the prevalence for overweight among children under the age of 5 is 12.4%.

Race/ethnicity

- Adults (age-adjusted)
- 47.8% non-Hispanic black
- 42.5% Hispanic
- 32.6% non-Hispanic white
- 10.8% non-Hispanic Asian

- Children/Adolescents
- 22.4% Hispanic
- 20.2% non-Hispanic black
- 14.1% non-Hispanic white
- 8.6% non-Hispanic Asian

Prevalence of Obesity (future)

- It has been further projected that 60% of the world's population, i.e. 3.3 billion people, could be overweight (2.2 billion) or obese (1.1 billion) by 2030 if recent trends continue.

Prevalence of Obesity in I.R.Iran

1401   6-18 years
18.3 %(over weight and Obese)

1401 Over 18years
37.05% (over weight), 33.95% (Obese)

Data from KSA National Surveys

Studies by National Surveys KSA	Age group	Prevalence Obesity BMI>30kg/m^2		Prevalence Overweight BMI 25-29.9 kg/m^2		Self eported Physical inactivity	
		Male	Female	Male	Female	Male	Female
1990-93 (n=13177)	>15years	16%	20.26%	27.23	25.20	43.3%	84.7%
1995-2000 (n=17232)	>30 years	26.4%	44.0%	42.4%	31.8%	93.9%	98.1%

Gateway to diseases

- Obesity is a gateway to diseases, and

it has become one of the leading causes of disability and death, affecting not only adults but also children and adolescents worldwide.

Obesity Complications

- Obesity has important consequences for morbidity, disability and quality of life and entails a higher risk of developing type 2 diabetes, cardiovascular diseases, several common forms of cancer, osteoarthritis and other health problems.