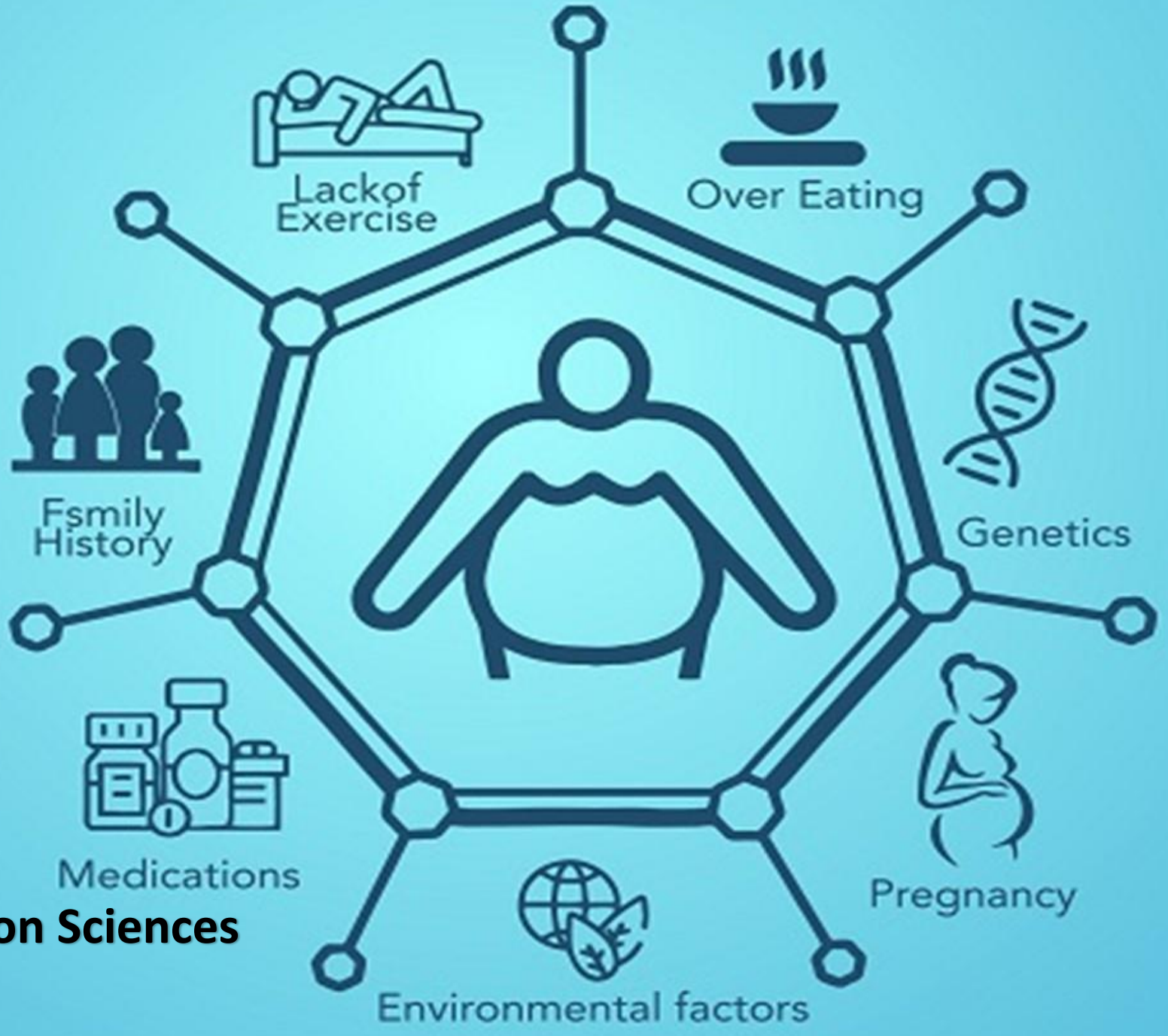
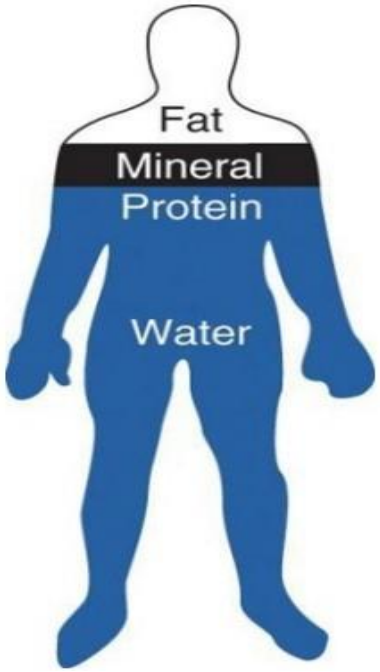
Obesity

Dr, Marjan Mahdavi Roshan

Associate Professor in Nutrition Sciences



- **Body weight components**



- Body weight often is described in terms of its composition.
- Two-compartment model divides the body into

❑fat mass(FM) , the fat from all body sources including the brain, skeleton, intramuscular fat, and adipose tissue,

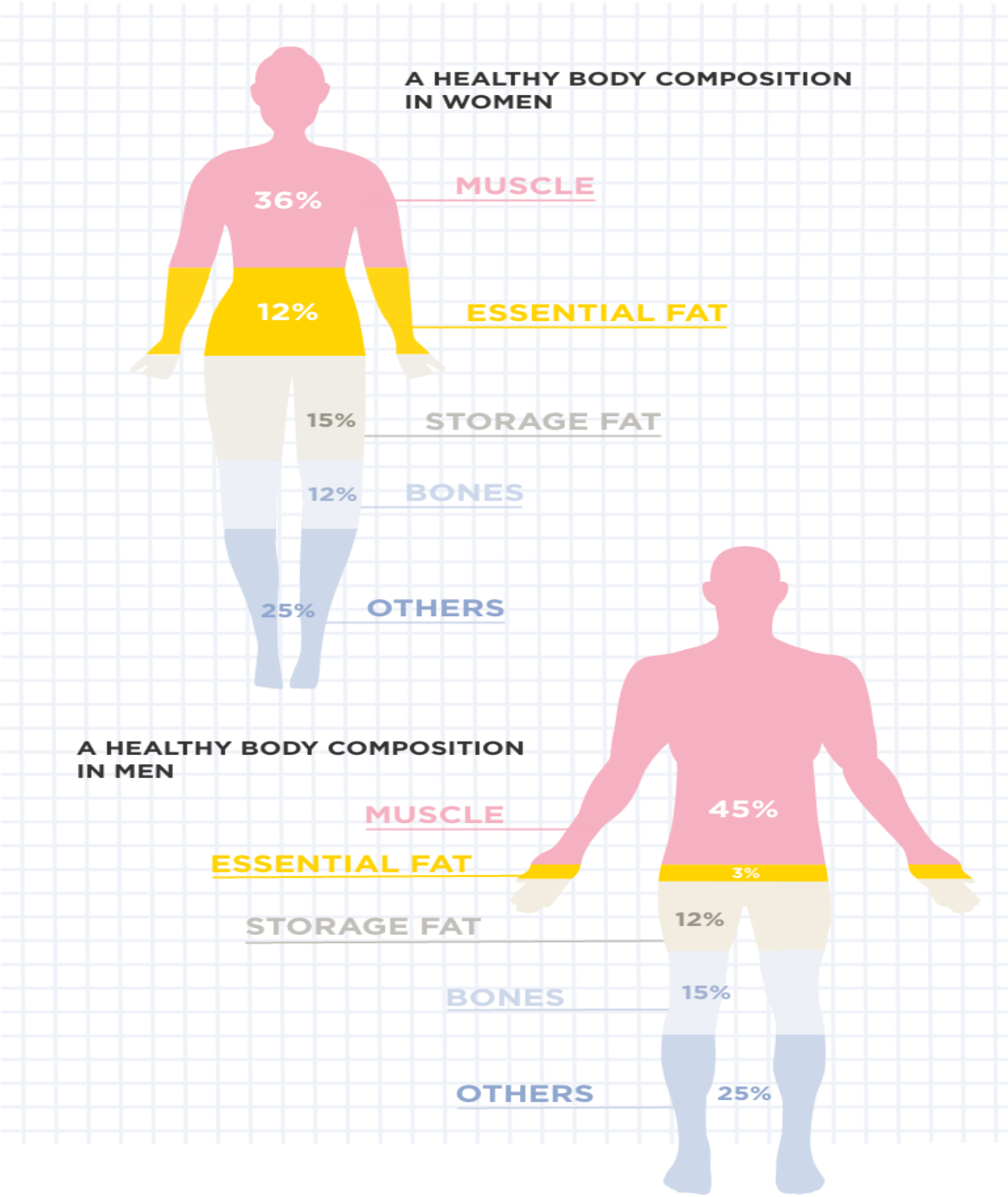
❑fat-free mass (FFM), which includes water, protein, and mineral components .

- Total body fat (essential fat plus storage fat)

as a percentage of body weight associated with the average individual is:

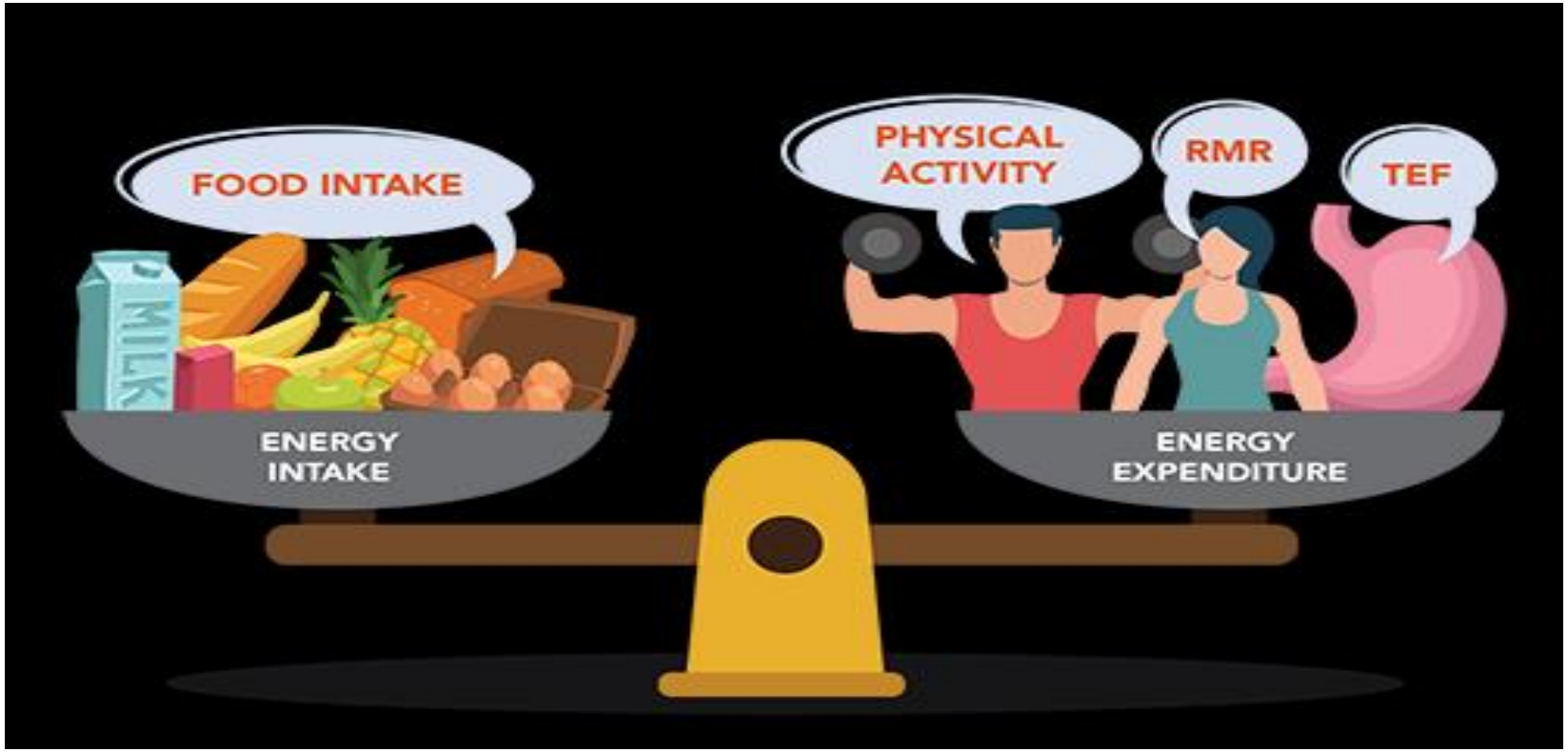
❖between 18% and 24% for men

❖between 25% and 31% for women.

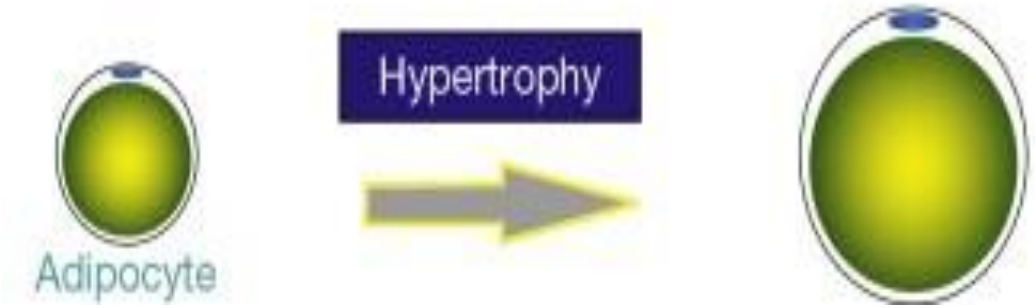


Overweight and obesity

- Overweight and obesity occur as a result of an imbalance between total energy intake (food and beverages consumed) and total energy expenditure

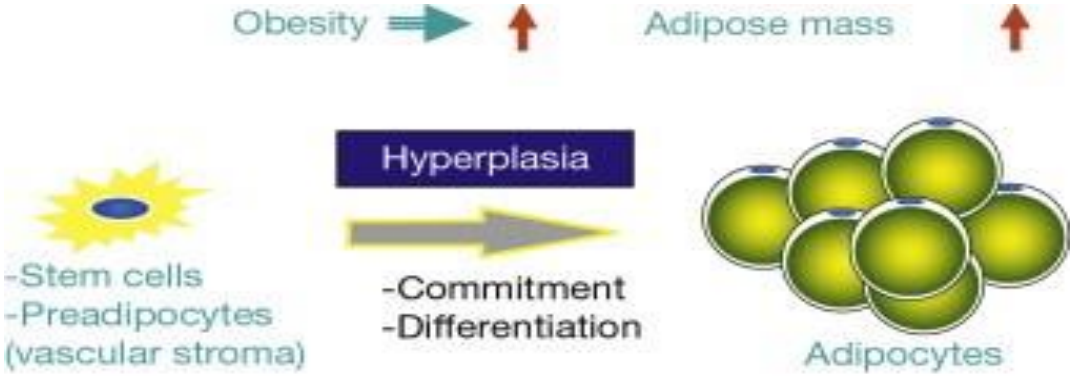


hypertrophy (increased cell size),



- fat depots can expand as much as 1000 times at any age, as long as space is available.
- The fat cell (adipocyte) can store fat equal to 80% to 95% of their volume.

Hyperplasia (increased number of cells)

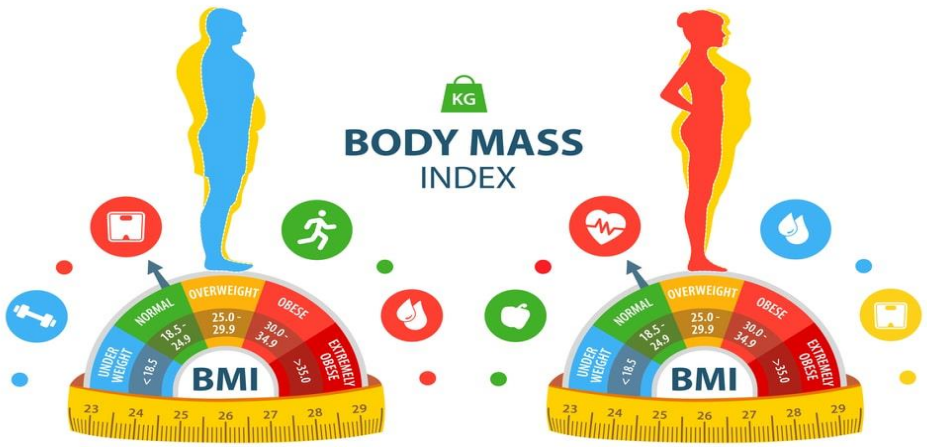


- occurs as a normal growth process during infancy and adolescence.
- Cell number increases in lean and obese children into adolescence, but the number increases faster in obese children.
- In teens, increases in fat cell size are more common,
- but hyperplasia also can occur after the fat content of existing cells has reached capacity.

- **Body mass index (BMI)**

$$BMI = \frac{\text{Weight in kilogram}}{\left(\text{Height in meter}\right)^2}$$

because BMI is derived from readily available measurements of height and weight it is the most convenient clinical approach to estimate body fat.



BMI chart For Adults(Both Male & Female)

Descriptions	BMI (Kg/m²)
Underweight	<18.5
Normal	18.5-24.9
Overweight	25-29.9
Obesity	
Mild (Class 1)	30-34.9
Moderate (Class 2)	35-39.9
Morbid (Class 2)	<40

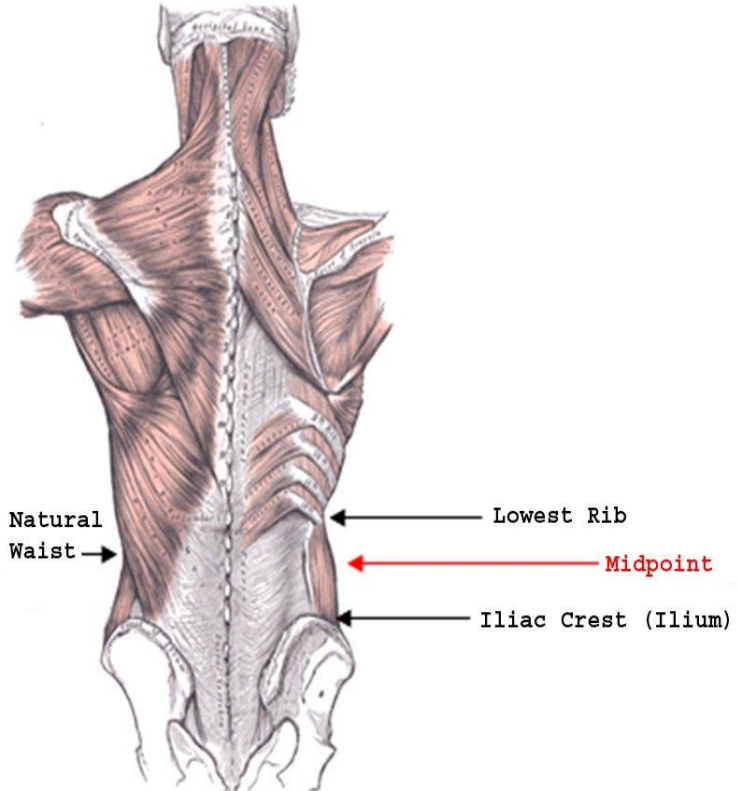
- **Waist Circumference (WC):**

Waist circumference (WC) is a critical anthropometric measurement used to assess central obesity and associated health risks. It serves as an indicator of abdominal fat, which is linked to various metabolic and cardiovascular conditions.

(WHO recommendation)

Midpoint Between Iliac Crest and Lowest Rib

Waist circumference (WC)	Men	Women	Comment
Normal	≤102 cm	≤88 cm	-
High	>102 cm	>88 cm	High risk of abdominal obesity coupled with other metabolic syndrome and cardiovascular disease



Obesity is a complex multifactorial chronic disease that develops from an interaction of genetic, social, behavioral, cultural, physiological, and metabolic factors .



- **Genetics**

- the development of obesity involves a complex interaction with numerous genetic variants and environmental factors related to energy intake and expenditure.
- The number and size of fat cells, regional distribution of body fat, and RMR also are influenced by genes.
- Studies of twins confirm that genes determine 50% to 70% of the predisposition to obesity.
- Although numerous genes are involved, several have received much attention

the Ob gene, the adiponectin (ADIPOQ) gene,

the “fat mass and obesity associated” gene or FTO gene,

and the beta3- adrenoreceptor gene.



- Nutritional and/or lifestyle choices can either activate or inhibit these obesity-triggering genes.

- Thus the formula for successful long-term weight management could necessitate the behavioral application of individual genetics.

Weight loss diets

TABLE 21-3 Popular Weight Loss Diets*

Atkins Diet
Belly Fat Cure
Blood Type Diet
Biggest Loser Diet
Caveman (Paleo) Diet
Detox Diets
The Diet Solution
Dr. Oz Ultimate Diet
Glycemic Index Diet
HCG Diet
Jenny Craig
LA Weight Loss
Mayo Clinic Diet
Medifast Diet
NutriSystem Diet
South Beach Diet
Volumetrics Diet
Weight Watchers
Zone Diet

*For a complete description of these diets and discussion of studies supporting their use see the following websites:
http://health.usnews.com/best-diet/best-weight-loss-diets?page=3
http://www.webmd.com/diet/evaluate-latest-diets

- **Dietary Modification Recommendations**
- Weight loss programs should combine a nutritionally balanced dietary regimen with exercise and lifestyle modification.

❑ A low calorie, macronutrient adjusted eating plan, increased physical activity, and lifestyle modification

- **Calorie Reduction**
- Lower-calorie diets reliably induce more significant short-term weight loss compared to higher-calorie regimens.

- Calorie deficits that result in a loss of approximately 0.5 to 1 kg per week for persons with a BMI of 27 to 35, and 1 to 2 kg per week for those with BMIs greater than 35

- Men reduce weight faster than women of similar size because of their higher LBM and RMR

Macronutrients

- The low-calorie diet should be individualized for carbohydrates (50% to 55% of total kilocalories).
- Generous protein, approximately 15% to 25% of kilocalories, is needed to prevent conversion of dietary protein to energy.
- Fat content should not exceed 30% of total calories.

Portion control

- Some foods have a lot of calories in a small serving, so controlling portion sizes is key





Limit sugar-sweetened drinks

- Cutting out sugar-sweetened drinks is a good way to reduce calorie intake.

- Fruit should be consumed in moderation



- Eating vegetables during day in abundant



- Using low fat dairy products

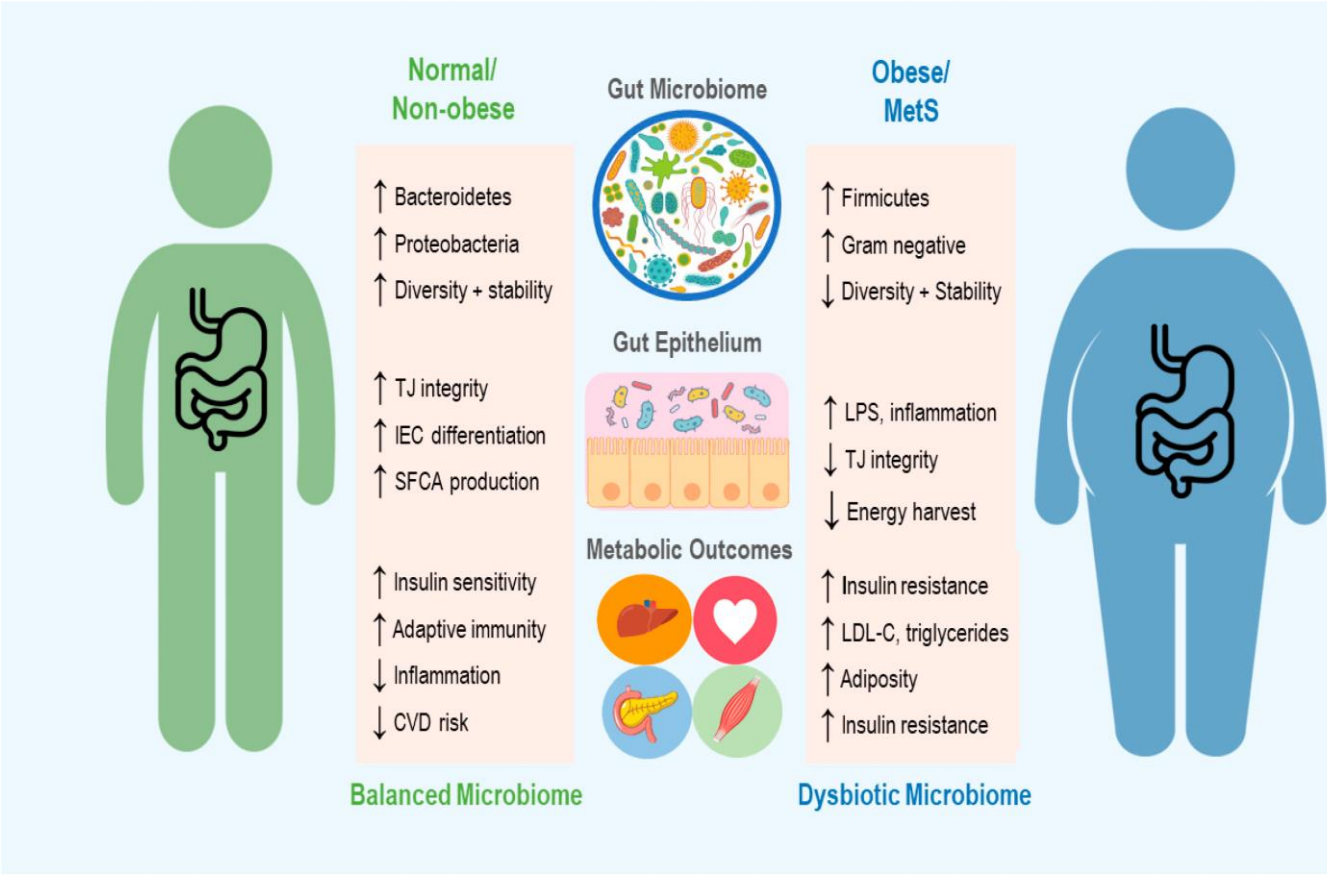


- Eating breakfast almost every day.
- Eating 3 main meals and several snacks



Gut microflora

- The composition and function of gut Microbiota can influence various metabolic processes,ultimately affecting body weight and the risk of obesity.



- The presence of beneficial bacteria such as *Lactobacillus* and *Bifidobacteria* is often inversely associated with obesity, suggesting that a diverse microbiota may protect against weight gain

Foods with Probiotics & Prebiotic Foods



Barley &Oats



Kombucha



Kimchi



Garlic & Onion



Whole Wheat Bread





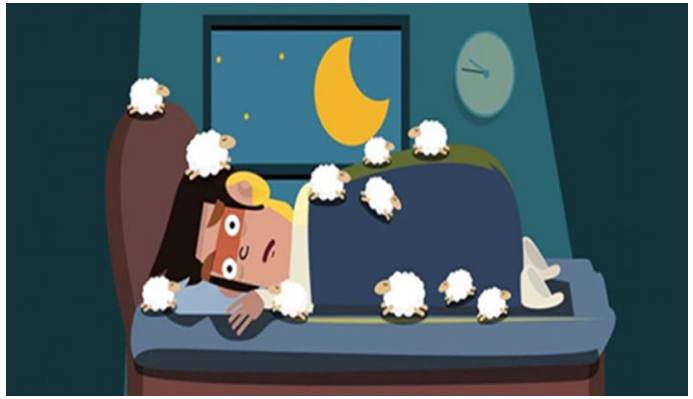
- Portion Size



Factors related to diet composition, portion size, dietary variety, and cost and convenience of food may all affect energy intake and thus the propensity to positive energy balance and obesity.



Sleep deprivation



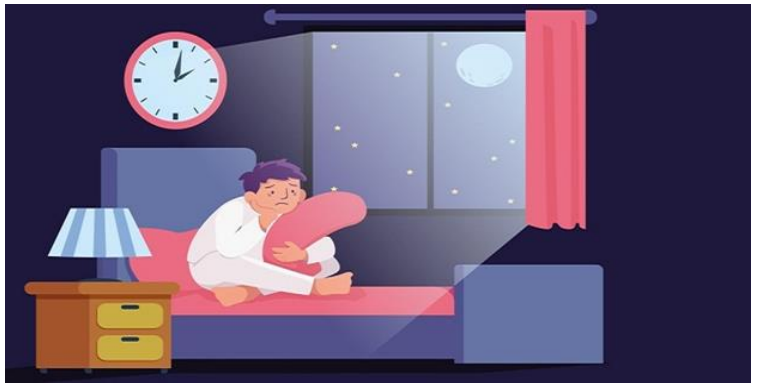
- The connection between sleep and obesity is increasingly recognized as a critical area of research, with numerous studies indicating that insufficient sleep can lead to weight gain and obesity.

❑**Behavioral Changes**

- **Food Choices:** Individuals who experience sleep deprivation are more likely to choose high-calorie foods. Research indicates that restricted sleep duration correlates with a preference for unhealthy food options
- **Physical Activity:** Lack of sleep often leads to fatigue, resulting in decreased physical activity. This reduction in exercise can compound the effects of poor diet choices, leading to a positive energy balance and subsequent weight gain

Dr. Mahdavi Roshan

❑hormonal Imbalances



- **Ghrelin and Leptin:** Sleep deprivation disrupts the balance of two key hormones: ghrelin and leptin. Ghrelin, which stimulates hunger, tends to increase when sleep is inadequate, while leptin, which signals fullness, decreases. This imbalance leads to increased appetite and a higher likelihood of overeating. Specifically, leptin levels typically rise during sleep; thus, inadequate sleep results in lower leptin levels, making individuals feel hungrier

- **Cortisol and Growth Hormone:** Sleep loss is also associated with elevated cortisol levels, a stress hormone linked to weight gain, and decreased production of growth hormone. Both factors contribute to metabolic dysfunction and obesity

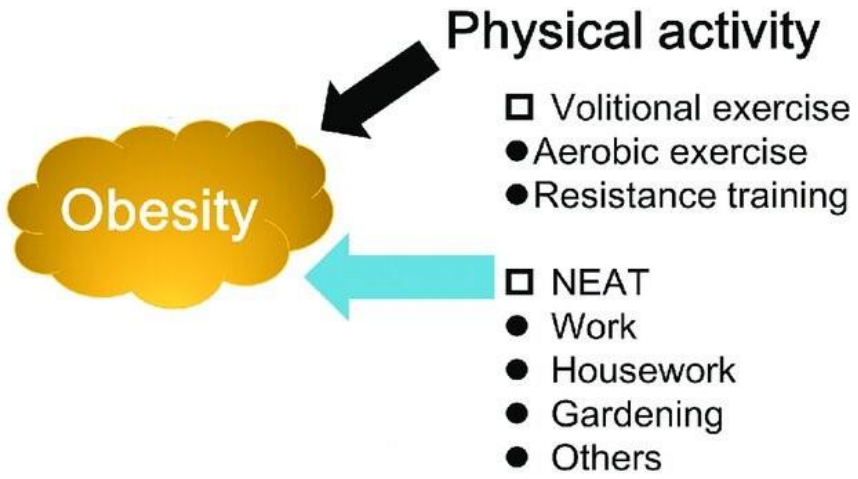
Dr. Mahdavi Roshan

Inadequate physical activity

- The view that inactivity is a major factor in the development of overweight and obesity is debated.

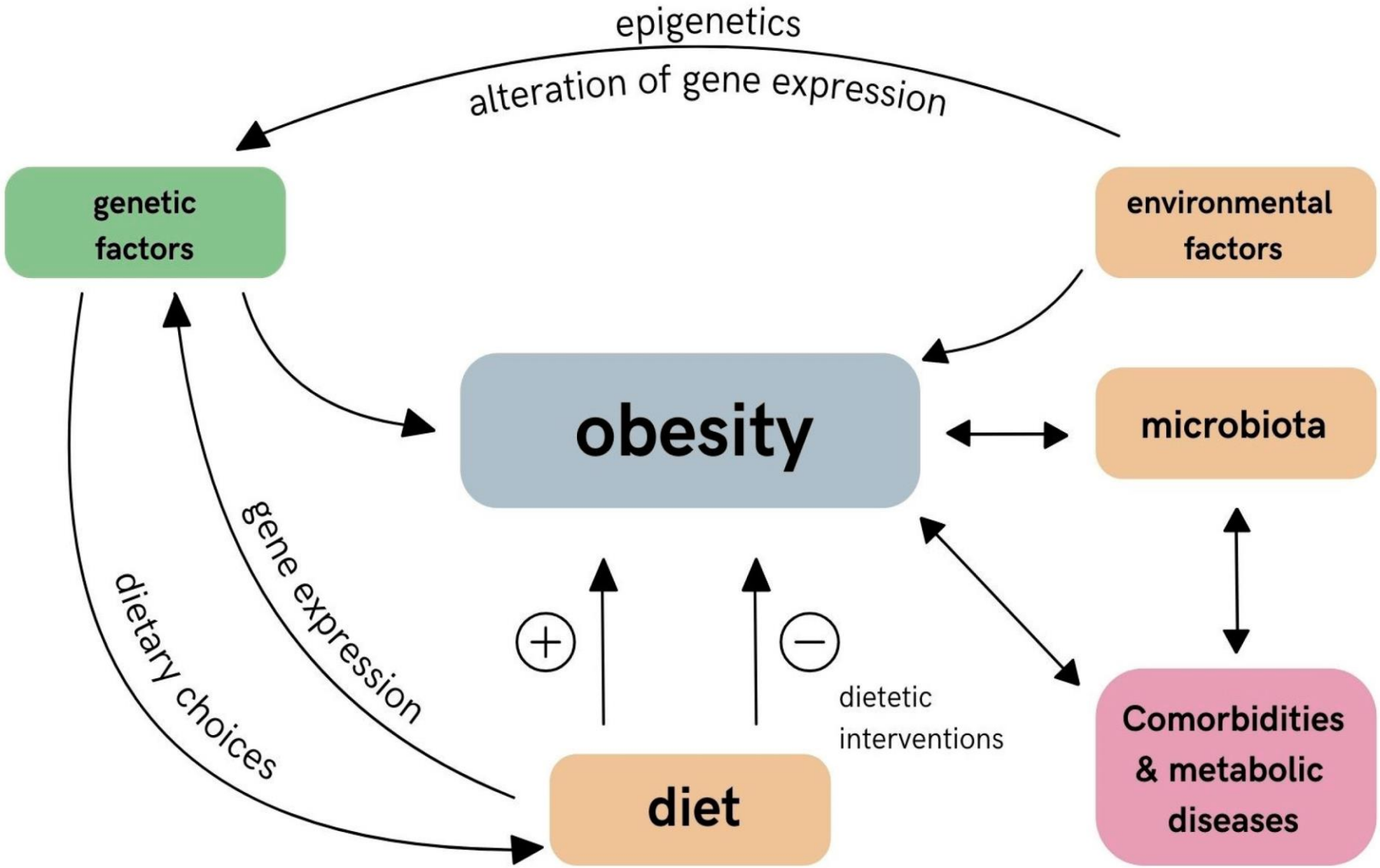
❑ **aerobic activity per week is recommended**

for weight loss and weight loss maintenance.



- However, researchers pushing back on the physical activity emphasis point out that “you can’t outrun a bad diet,” and argue that avoiding sugary drinks, fast food, and overeating in general will save far more calories than people will expend hitting weekly physical activity targets

Dr. Mahdavi Roshan


epigenetics
alteration of gene expression
genetic factors
environmental factors
obesity
microbiota
gene expression
dietary choices
dietetic interventions
diet
Comorbidities & metabolic diseases


Thank you
for your
attention