

Choosing What You Eat and Why

Chapter 1

BIOL1400

Dr. Mohamad H. Termos

Objectives

Following this lecture, you should be able to describe:

- Nutrition definition
- Sources of nutrients
- Energy sources and uses
- Hunger, appetite, and satiety

What is Nutrition

- Nutrition is the science of food or nutrients that we eat.
- It also studies the process by which we ingest, digest, absorb, transport, utilize and excrete food substances.
- Balance of nutrients is required for good health.
- A poor diet and a sedentary lifestyle are known to be risk factors for life threatening diseases (cardiovascular, hypertension, diabetes, cancer).



Sources of Nutrients

Nutrients come from the food which provides the energy and the materials needed to build and maintain all body cells.



Essential Nutrients

To be considered essential, nutrients must meet the following characteristics:

- When not present in the diet, certain body functions decline
- When restored before permanent damage occurs, the functions return
- Specific biological functions of the nutrient must be identified



Classes of Nutrients

- Macronutrients: carbohydrates, lipids, proteins, and water
- Micronutrients: vitamins and minerals.



Importance of Nutrients

- Provide energy expressed in kilocalories (carbohydrates, proteins, lipids). Also called energy yielding nutrients (macronutrients)
- Important for growth, development, and maintenance (water, proteins, lipids, some vitamins and minerals)
- Regulate body processes (water, proteins, lipids, some vitamins and minerals)



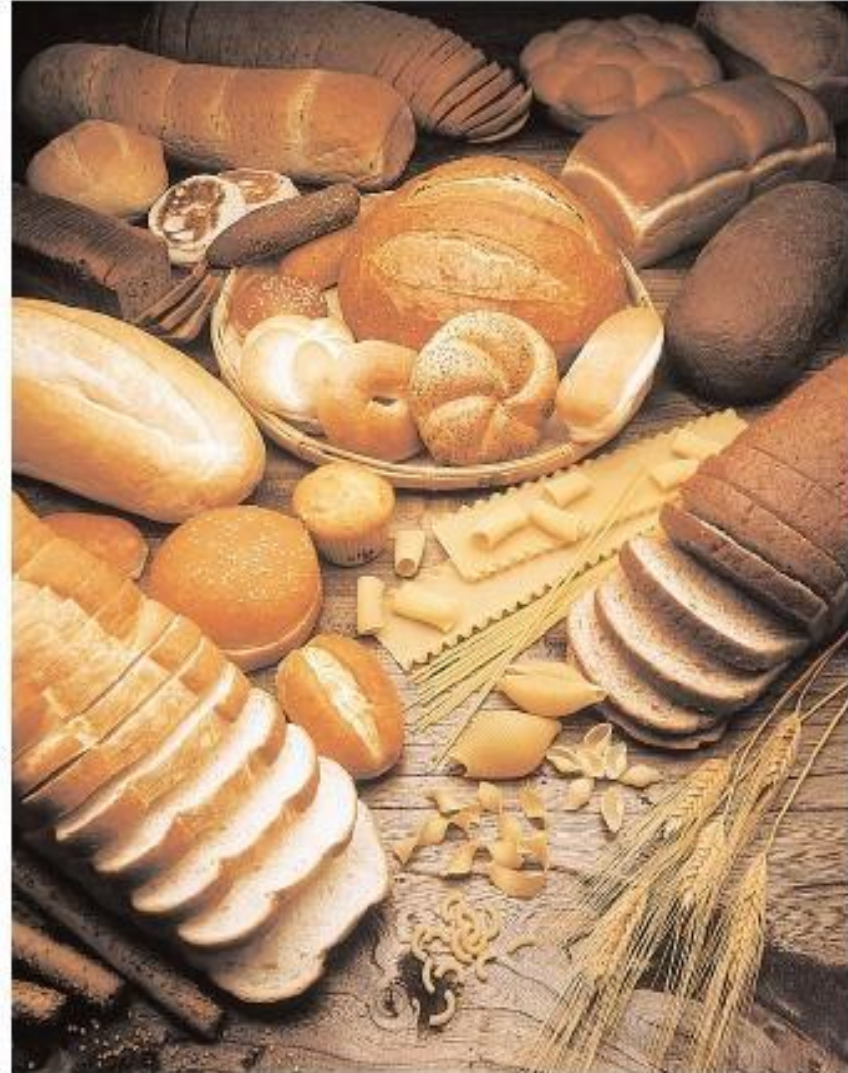
Carbohydrates

- Made up of carbon, hydrogen, and oxygen
- Major source of calories for the body (4 Kilocalories per gram)

Classified into:

- Monosaccharides: e.g. glucose
- Disaccharides: e.g. sucrose (table sugar)
- Polysaccharides: e.g. starch

Carbohydrate digestion begins in the mouth and absorption begins in the small intestine.



Lipids (fats and oils)

- Composed of carbon, hydrogen, and oxygen
- Do not dissolve in water and contain 9 kilocalories per gram
- Triglycerides are the major form and each molecule contains glycerol and fatty acids

Fatty acids

Fatty acids can be classified into:

- 1- Saturated: Solid at room temperature because they don't have double bonds between their carbon atoms. Found in animal fats
- 2- Unsaturated: Liquid at room temperature since they contain one or more C-C double bonds so that they cannot pack closely. Found in plant oils. Trans-fat is unsaturated.

Saturated fats

Saturated fats are found in animal products such as butter, cheese, whole milk, ice cream, cream, and fatty meats, and oils such as coconut, palm, and palm kernel oil



Essential fatty acids

- Those fatty acids that we need in the diet because our body cannot make them are called essential fatty acids.
- They repair cells and regulate blood pressure
- 4 tablespoons of vegetable oils per day, or a serving of a fatty fish (salmon, tuna) twice a week would supply the needed amount.

Omega-3 fatty acids are found in oily fish like salmon and flaxseed and canola oils



Proteins and amino acids

- Composed of carbon, hydrogen, oxygen, and nitrogen.
- Contain 4 kilocalories per gram, but little used as energy.
- Part of bone, muscle, blood cells, enzymes, and immune factors.
- A protein is formed from bonding of amino acids together.

Proteins



Vitamins

- They are important because they enable chemical reactions.
- Do not provide energy (0 kilocalories per gram).

Can be classified into:

- 1- fat soluble: A, D, E, and K.
Can be toxic
- 2- water-soluble: C and all B vitamins. They are destroyed by cooking and be readily excreted from the body unlike the fat-soluble.



Minerals

- Inorganic: do not contain carbon.
- Do not provide energy (0 kilocalories per gram)
- Not destroyed by cooking but can leach into cooking water.

There are ~16 essential minerals.

- Major minerals
- Trace minerals needed in amounts less than 100mg
- Minerals that conduct electricity are called electrolytes such as sodium, potassium, and chloride.



Water

- Composed of hydrogen and oxygen (H₂O)
- Does not provide energy (0 Kilo-calories per gram)
- It is the universal solvent.
- Transport nutrients and waste.
- Human body is 60% water
- Men need 3 liters per day and women need ~2.2 liters per day.

Energy sources and uses

Carbohydrates, fats, proteins

Alcohol: 7 kilocalories per gram, not a nutrient, has no required function.

Energy is released from chemical bonds to:

- Build new compounds
- Move muscles,
- Transmit nerve impulses
- Maintain ion balance in cells.
- Energy is measured in kilocalories.

A calorie is the heat needed to raise the temperature of 1 gram water a 1°C. Kilocalorie is 1000 calories or the heat needed to raise the temp. of 1000g water 1°C

Hunger, appetite, and satiety

Hunger: physical biological drive to eat

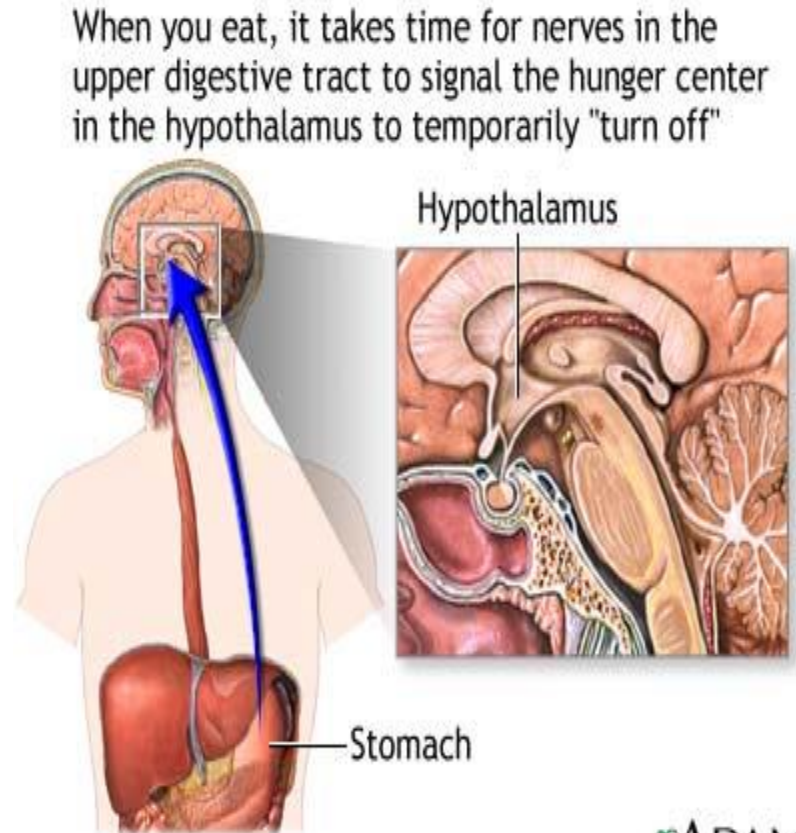
Appetite: psychological drive to eat

Satiety: temporary halt of the desire to eat



Hypothalamus and satiety

- Two centers in the hypothalamus promote eating or cessation of eating when stimulated. These are the feeding center and the satiety center.
- These centers are affected by macronutrients present in the blood, chemicals, surgery, cancer, ...

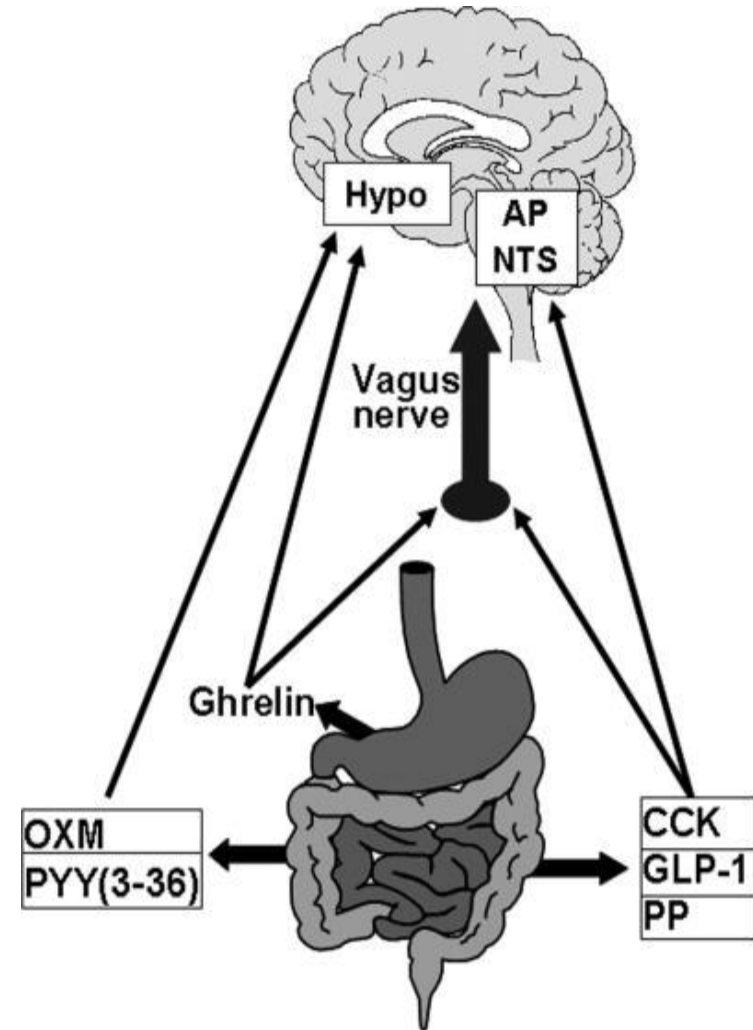


Factors affecting satiety

Meal size and composition affect satiety: bulky meals (high fiber and water) produce more satiety than concentrated foods.

Hormones affect satiety:

- 1- Hormones producing hunger: endorphins, ghrelin and neuropeptide Y
- 2- Hormones producing satiety: leptin (with insulin), serotonin and cholecystokinin (CCK)



Nutrition claims and advice

In order to improve your diet you should reduce:

1- trans-fat

2- saturated fat

3- cholesterol

[http://www.youtube.com/watch?
v=1JpOHxNU8mc](http://www.youtube.com/watch?v=1JpOHxNU8mc)