The Energy – Yielding Nutrients:

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Objectives:

1. **Knowledge of types of nutrients that are responsible for energy release in the body**
2. **To be familiar with the recommended intake and health effects of each type**

The Energy – Yielding Nutrients: Nutrients that are broken down in the body to provide usable energy (carbohydrates, fats & proteins).

- Metabolism is the chemical process by which the body breaks down food to releases energy .
- Metabolism also involves the use of this energy for growth and repair of body tissue.

Carbohydrates

- Carbohydrates are nutrients made of carbon, hydrogen, and oxygen.
- A nutrient that is the main source of energy for the body is a carbohydrate.
- Simple Carbohydrates are sugars that enters the bloodstream rapidly and provide quick energy (Fruits, Honey, Milk, Sugars added to cookies, candies,
  soft drinks)
- Simple carbohydrates provide energy but few vitamins and minerals.
- Complex Carbohydrates are made up of sugars that are linked together chemically to form long chains (provide long lasting energy
- {Grains (bread&pasta), Rice, Vegetables (potatoes&beans), Cereals, Wheat
  - Starch – a food substance that is made and stored in most plants (the chief energy food)
  -Glycogen (an animal polysaccharide) : a major storage form of energy.
  - The fibers

- Fiber is a type of complex carbohydrate
- Fibers are the structural parts of plants, found in vegetables, fruits and grains .

- are not digested by human digestive enzymes.
- Fibers are partially fermented by colon bacteria to short-chain fatty acids that the body can use.

	Soluble fibers	Insoluble fibers
Food sources	Fruits (apples, citrus), oats, barley.	Vegetables, wheat, Wheat bran & cereals.
Action in the body	Delay GI transit, Delay glucose absorption, lower blood cholesterol.	Accelerate GI transit, Increase fecal weight, Slow starch hydrolysis Delay glucose absorption, Lower blood cholesterol.
Type of fiber	some hemicelluloses, Gums, pectins.	Cellulose, many hemicelluloses, lignins.

Health effects of CHOs

1.Major source of energy.

2.Eating large amounts→ Nutrient deficiencies

3. CHOs & their derivatives serve as precursors for the connective tissue, matrix, and nervous tissue.

4. Dental caries-Bacteria in the mouth ferment the sugars → acid that dissolves tooth enamel.

5.Obesity---- rises when consumption increases.

6. Heart diseases---- high doses of sugar can alter blood lipids to promote heart disease.

Health effects of fibers

a) Weight control

b)Heart disease: dietary fibers reduce the risk of coronary heart diseases.

c) Cancer ---- fibers may help prevent colon cancer by diluting, binding & rapidly removing cancer-producing agents from the colon.

d) Diabetes ---- reduce the risk of diabetes by slowing glucose absorption

e)GI health ---- dietary fibers enhance the health of the large intestine →

•Their short chain fatty acid products help maintain mucosal integrity→→ the better they can block absorption of unwanted constituents, such as bacteria.

• Fibers prevent constipation → prevent the swelling of rectal veins (haemorrhoids).

♦ Fibers prevent obstruction of the appendix → ↓risk ofappendicitis).
♦ Fibers stimulate the GI muscles and prevent diverticulosis.

R.I of fibers: 20 – 25 gm/day
Daily Carbohydrate Intake

- 45-65% of daily calorie intake come from carbohydrates
- Sugars should occupy only 10 % or less of the day's total energy intake.

Fats

• Fats are made of carbon, hydrogen, and oxygen
• Fats supply the body with energy, form the cells, maintain body temperature, and protect the nerves.
• Fats help the body store and use vitamins.

Unsaturated fats
• Unsaturated fats have at least one unsaturated bond in a place where hydrogen can be added to the molecule.
• Unsaturated fats are usually liquid at room temperature.
• Are classified into either monounsaturated fats or polyunsaturated fats.
Polyunsaturated fats
• Composed of essential F.As (Linoleic/Omega6 and linolenic /Omega3acids)
*maintain the structural parts of cell membranes.
* help regulate blood pressure, clotting, blood lipids, and the immune response to injury and infection.
*The Omega-3 have a positive impact on heart health and play an important role in brain and eye function
• Omega-6 FAs found in cereals, eggs, poultry, grain breads, and some vegetable oils.
*Sources of omega-3 FAs----- Dark green leafy vegetables, walnuts & soybeans.
Oily fish, venison and buffalo are excellent sources.
Some healthy alternatives---daily doses of fish oil.
R.I of essential FA 2-5 gm/day
R.I of Omega-3 FA 1- 1.5 gm/ day

Pregnant & lactating women need lots of omega-3s.

Saturated fats

• They are called saturated because they are fully saturated with hydrogen atoms and cannot incorporate more.
• They are solid at room temperature
• Examples: Butter, cheese, meat, meat products, whole milk and yoghurt, coconut and palm oil
• Saturated fat should be limited to 10% of calories.
Daily Fat Intake
• 20-35% of calories come from fat primarily unsaturated fat.

Trans Fats

• Are made when manufacturers add hydrogen to the fat molecules in vegetable oils.
• Are found in margarine, chips, and commercially baked goods.
• An excess of these fats in the diet is thought to increase the risk of heart disease

HYDROGENATED AND PARTIALLY HYDROGENATED FATS

• This refers to oils that have become hardened (such as hard butter and margarine).
Partially hydrogenated means the oils are only partly hardened.
Foods made with hydrogenated oils contain high levels of trans fatty acids.

Health effects of fats:

1/Heart disease & strokes :elevated blood cholesterol is a major risk factor for cardiovascular disease, LDL cholesterol raises the risk.
**Polyunsaturated FAs. lower LDL cholesterol.
2/Cancer : there is an association between total fat and some cancers (breast, prostate &colon). This association is due primarily to saturated fat from meat, lead to changes in the lipid content of the cell membrane.
Omega-3 FAs are likely to delay cancer
• development and reduce the rate of growth

• 3/ Obesity: high-fat diets → weight gain→ diabetes .
4/ Gall stones: cholesterol deposited from bile that is supersaturated with it.

Proteins

• Nutrients that contain nitrogen as well as carbon, hydrogen , and oxygen.
• Can serve as a source of energy.
• Needed for growth, and to build and repair body tissues. The building blocks that make up proteins are amino acids.
• The amino acids that the body cannot manufacture are called essential amino acids.
• Protein from animal sources is complete protein.
• It contains all nine essential amino acids.
• Most protein from plant sources is incomplete one.
It lacks one or more of the essential amino acids.
• Denatured proteins
A protein is said to be denatured when its chemical shape changes in response to heat or extremes of pH (acid or alkaline). Some proteins lose their biological function when denatured
• Denatured proteins tend to be poorly utilized and absorbed → fermented into various toxic substances (produce significant amounts of toxic by products in the intestines)
Daily protein intake
• It is recommended that 10-35% of calories come from proteins.
• RDA for a healthy adult is 0.8 gm/kg body weight/ day.