NUTRITION OF FOOD 2014
You are what you eat
Objectives

• *define* nutrition

• *compare* and *distinguish* between autotrophic and heterotrophic nutrition

• *compare* the functions and chemical compositions of the major groups of organic compounds: carbohydrates, lipids, proteins, as well as vitamins and minerals (not organic)

• *distinguish* between monosaccharides, disaccharides and polysaccharides
Objectives

• compare storage polysaccharides with structural polysaccharides
• why do you need protein in your diet?
• distinguish between polyunsaturated and monounsaturated fatty acids
• list diseases as a result of deficiencies of important nutrients
• what is the relationship between calcium and osteoporosis?
What is nutrition:
The word 'Nutrition' comes from a Latin word which means to 'nourish' or to "to feed". Essential substances that your body needs in order to grow and stay healthy.
Nutrients

Six categories of nutrients:

- Carbohydrates
- Fats
- Proteins
- Minerals
- Vitamins
- Water

Macronutrient

Micronutrient
Carbohydrates

• Carbohydrates are sugars and starches that the body uses for ENERGY!

• PLANTS are the major source of carbohydrates in the food we eat.

• Composed of the elements C, H and O.
Carbohydrates

Classification
Monosaccharides
Disaccharides
Polysaccharides
Types of Carbohydrates

- **Monosaccharides**
  Contain one sugar unit

- **Disaccharides**
  Contain 2 monosaccharide units

- **Polysaccharides**
  Contain more than 10 monosaccharide units
Monosaccharides:

- These are sugars that cannot be hydrolyzed (broken down) to simpler units.
- **Glucose, fructose, galactose**
Glucose - Grape sugar

- Glucose is the most important carbohydrate in biology.
- Glucose is produced in the process of photosynthesis.
- The cell uses it as a source of energy.
Fructose; Fruit sugar

Found in honey & fruits.

Fructose is the sweetest naturally occurring sugar, estimated to be twice as sweet as sucrose.
Galactose

It is a sugar found in dairy products, in the form of Lactose (a disaccharide formed of Glucose & Galactose).
Disaccharides
Disaccharides are produced from the condensation of 2 monosaccharide molecules.

Define Condensation reaction

• A condensation reaction occurs when two monosaccharide subunits combine and a bond is formed when a molecule of water is removed. Or A chemical reaction joining two organic compound and release water.
Saccharide Formation Condensation links monosaccharides

A chemical reaction joining two organic compound and release water
Hydrolysis - A reaction that is used to break down polymers into simpler units by adding water.
Sucrose (glucose + fructose)

Maltose (glucose + glucose)

Lactose (glucose + galactose)
Important Disaccharides

• Maltose = Glucose + Glucose

• Lactose = Glucose + Galactose

• Sucrose = Glucose + Fructose
Polysaccharides

Polysaccharides contain more than 10 monosaccharide units and can be hundreds of sugar units in length and includes
Polysaccharides

- Starch (plant)
- Glycogen (animal)
- Cellulose (plant cell wall)
Polysaccharides:

Starch:

• Formed by plants.
• **Plants** store glucose for later use as energy.
• Sources of starch include rice, beans, wheat, corn, potatoes, and so on.
Starch

- When an animal eats starch, an enzyme called amylase that occurs in saliva and in the intestines breaks the bonds between the repeating glucose units (hydrolysis) and thus allow the sugar to be absorbed into the bloodstream. Once absorbed into the bloodstream, the animal body distributes glucose to the areas where it is needed for energy.
Glycogen:

- Animals to store energy
- Excess glucose is bonded together to form glycogen molecules.
- The main stores of glycogen in the body are found in skeletal muscle and liver as an "instant" source of energy.
Difference between Starch & Glycogen

- Both starch and glycogen are polymers of glucose; however, starch is a long, straight chain of glucose units, whereas glycogen is a branched chain of glucose units.
Cellulose

• Cellulose, also known as plant fibre, cannot be digested by human beings; therefore cellulose passes through the digestive tract without being absorbed into the body.

• Cellulose is a relatively stiff material, and in plants it is used as a structural molecule to add support to the leaves, stem, and other plant parts.
Cellulose

- Despite the fact that it cannot be used as an energy source in most animals, cellulose fibre is essential in the diet because it helps exercise the digestive track and keep it clean and healthy. We cannot digest it but its presence in our food gives the food a solid property. This allows the muscles of the gut to push the food along, aiding digestion and preventing constipation. Cellulose in food is known as dietary fiber.
Fibers

- Polysaccharides found in plant foods that the body can’t digest or absorb.
- Some fiber is digested by bacteria in the large intestine.
Fibre

- Food rich in fibre is usually bulky and makes you feel 'full up' so that you are unlikely to overeat.
If you decide to eat more fiber.....

• Do so slowly and
• Drinks lots of fluids to give time for your intestine to adapt.
Categories of Carbohydrate

- **Simple carbohydrates (mono & disaccharide)**
  - Natural sugars
  - Added (Refined) sugars
  - Jam, biscuits and cakes

- **Complex carbohydrates (polysaccharides)**
  - Starch (potatoes, rice, maize, bread)
  - Fiber (cellulose in the cell wall of plant)
Simple Carbohydrates

• Sugars that are quickly digested and provide a BOOST of energy for the body

• Foods with LOTS of sugar: oranges, milk, cookies, candy
Complex Carbohydrates

Starches that are composed of many sugars linked together

• They provide the body with long-term energy since they are digested more slowly than sugars.

• Foods with LOTS of starch: rice, beans, potatoes
Here's a list of simple carbohydrates foods

• Table sugar, Corn syrup, Fruit juice, Sweet, Cake, Bread made with white flour, Pasta made with white flour, Most packaged cereals, Honey, Milk, Yoghurt, Jam, Chocolate, Biscuit.
Here's a list of complex carbohydrate foods

• Barley, Beans, Bran, Brown Bread, Brown Rice, Buckwheat, Cornmeal, High Fibre Breakfast Cereals, Lentils, Macaroni, Maize, Muesli, Oatmeal, Peas, Porridge Oats, Potatoes, Spaghetti, Whole Meal bread, Wholegrain Cereals
Functions of Carbohydrate

• Functions as primary source of body’s energy
  – Central nervous system and red blood cells rely almost exclusively on glucose.
  – Glucose is stored in liver and muscles as glycogen.
Functions of Carbohydrate

- Fibre helps the movement of food through the intestine.
- Fibre rich and starchy foods provide a "full feeling".
- A structural component of many organisms:
  a) cell walls of bacteria
  b) exoskeleton of insects
  c) cellulose of plants.
Carbohydrate deficiency and side effects

- Carbohydrate deficiency diseases rarely occur, as carbohydrate is present in a wide variety of foods.
- Carbohydrates deficiency can cause a lack of calories (malnutrition), and feeling tiredness, lack of energy or excessive intake of fats to make up the calories. Excessive carbohydrates can cause an increase in the total caloric intake, causing obesity. You can get malnutrition if you don’t eat enough or become obese if you have too much.
Simple and Complex Carbohydrates.flv
Summary

• Our diets must contain proteins, carbohydrates, fats, minerals, vitamins and water.

• The major groups of biologically important organic compounds are carbohydrate, lipids and proteins and provide energy.

• Carbohydrates contain carbon, hydrogen and oxygen in a ratio of approximately one carbon, two hydrogen and one oxygen.

• The most important monosaccharides in the human body are glucose, fructose and galactose.
Summary

• Polysaccharide are polymers of monosaccharides and yield monosaccharides when hydrolyzed.

• Three common polysaccharides are starch, cellulose and glycogen.

• Plants store their food as starch; plant use cellulose as supporting and structural parts; animals use glycogen as a reserve supply of carbohydrates.

• Vegetable fibre helps to maintain a healthy intestine.
Monosaccharides and Disaccharides

Figure 3-1

Glucose  Fructose  Galactose

Sucrose (glucose + fructose)

Maltose (glucose + glucose)

Lactose (glucose + galactose)
Question

1. What are the three main classes of large biological molecules?

2. What is the major source of carbohydrates in the food we eat?

3. Name the 6 categories of nutrients.

4. What are nutrients?

5. Where is glucose found in nature? Fructose? galactose? Sucrose? Lactose?
6. What is condensation polymerisation?
7. What is the difference between simple carbohydrate and complex carbohydrates?
8. What is the major function of carbohydrates?
9. What is dietary fiber?
10. Why should a 'high fibre' diet help to stop you putting on weight?
THANK YOU
Fat Structure:
• Fats belong to a group of organic compounds called lipids which are substances that do not dissolve in water but dissolve in inorganic solvent like ether, chloroform.
Fat

- Fatty acids and Glycerol are the building blocks of fats.
- Fats contain only three kinds of elements: oxygen, hydrogen and carbon.
Fat

Functions:

• ENERGY source for the body (more than carbs and proteins)

• Help protect and cushion vital organs as well as joints

• Insulate the body

• Fat is also needed to absorb fat-soluble vitamins A, D, E, and K.
They are classified into two groups:

- **Saturated** - single bonds ONLY in carbon chain (synthesis of cholesterol)

- **Unsaturated** = double or triple bonds (healthier)
Saturated fats:

• Contain fatty acids with the MAXIMUM amount of hydrogen atoms
• Fats that contain no double bonds
• At room temperature, they are typically in solid form and have a high melting point.
• Diets with TOO MUCH saturated fat have been known to cause heart disease.

• Foods with a lot of saturated fat: **beef fat, egg yolks, dairy products**

• Other sources are tropical vegetable oils such as **coconut oil, palm oil** and foods made with these oils.
Properties of Saturated Fatty Acids

- Contain only **single C–C bonds**
- All C bonded to H or **saturated with hydrogen atoms**.
- Closely packed
- Strong attractions between chains
- High melting points
- **Solids at room temperature**
  - long, straight chain
  - most animal fats
    - contributes to cardiovascular disease

\[ \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{C}-\text{OH} \]
Unsaturated fats:

- Contain fatty acids that are missing hydrogen atoms
- Fats contain a number of double bonds in their structure.
- At room temperature, they are typically in liquid form.
Unsaturated fats:

• They are less harmful to the circulatory system than saturated fats.

• Foods with a lot of unsaturated fat: canola, safflower, and peanut oils
Properties of Unsaturated Fatty Acids

• Contain one or more double C=C bonds
• Few hydrogen atom or Where double bonds are formed, hydrogen atoms are eliminated
• Nonlinear chains do not allow molecules to pack closely
• Few interactions between chains
• Low melting points
• Liquids at room temperature

\[
\begin{align*}
8 & \quad 7 \\
CH_3 & \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad CH_2 \quad OH \\
1 & \quad 2 & \quad 3 & \quad 4 & \quad 5 & \quad 6
\end{align*}
\]
Number of Double Bonds

• Unsaturated fats can be either mono or polyunsaturated

• Monounsaturated (MSFA)
  – Single double bond
  – Thick liquids or soft solids
  – Liquid at room temperature but start to solidify at refrigerator

• Polyunsaturated (PSFA)
  – More than one double bond
  – Liquid at room temperature & in the refrigerator
Unsaturated Fatty Acids

Monounsaturated

Polyunsaturated
• Primary sources are plant oils like canola oil, peanut oil, and olive oil. Other good sources are avocados.
• Primary sources are sunflower, corn, soybean, and flaxseed oils, and also foods such as walnuts, flax seeds, and fish.
Saturated vs. unsaturated

saturated

unsaturated
Deficiency of fats

• Fat deficiency diseases rarely occur as fat is present in a wide variety of foods.

• However we should not eliminate fats completely from our diet because they are also a source of the fat-soluble vitamins.
Trans Fats

- Trans fats are created by heating liquid vegetable oils in the presence of hydrogen gas, a process called **hydrogenation**. Partially hydrogenating vegetable oils makes them more stable and less likely to spoil, which is very good for food manufacturers - and very bad for you.

- Primary sources of trans fat are vegetable shortenings, some margarines, crackers, candies, cookies, snack foods, fried foods, baked goods, and other processed foods made with partially hydrogenated vegetable oils.

- Trans fat raises low-density lipoprotein (LDL or "bad") cholesterol that increases your risk of coronary heart disease (CHD), as well as lowering HDL, or good cholesterol.
Trans fats

- Margarine is made by “hydrogenation”: reducing the double bonds back to single bonds and adding in hydrogen’s, which raises the melting temperature, giving solid margarine instead of liquid vegetable oil.
Trans fats

• Several years ago, most companies replaced lard with partially hydrogenated vegetable oil, which was thought to be much healthier than lard.

• Unfortunately, partial hydrogenation leads to trans-fatty acids instead of the cis-fatty acids that occur naturally. And trans fatty acids proved to be even worse for your health than lard. Oops!
1. How do saturated fats differ from unsaturated fats, both in structure and in behaviour?

2. Compare monounsaturated and polyunsaturated fats and give an example of each.

3. Can one type of fat be changed into another type?

4. Saturated fatty acids are so named because they are saturated with ________________

5. What kind of fats hardens at room temperature?
6. What is a better source of energy - fat or sugar?

7. John is a very fat man and decides to go on a diet to lose weight. As part of his diet he leaves out all plant and animal fats completely. Do you think that this action is wise?

8. What products are formed when a fat is hydrolyzed?

9. How many molecules of water are needed to completely hydrolyze a polymer that is 10 monomers long?
Truth about Fat, Trans Fat, Saturated Fat  Nutrition.flv
SUMMARY

• Fats serve as **fuel for the body**. They are **insoluble in water** but are soluble in **in-organic solvents**.

• **FATS IN OUR BODY WE GET IN FOOD PRODUCTS.**

• **MADE OF GLYCEROL AND FATTY ACIDS COME IN**

• Fats are energy-storage molecules.

• Fats provides **9 calories** per gram, more than twice that of carbohydrates and proteins, which each provide **4 calories** per gram.
• TWO BASIC FORMS: **Saturated fatty acids** have only **single bonds** between carbon atoms. **SOLIDS, THINK BUTTER**

• **Unsaturated fatty acids** have one or more **double bonds** in the molecules. **LIQUIDS THINK OIL**

• UNSATURATED FATTY ACIDS INTO TWO GROUPS:
  • **MONO** – **ONE DOUBLE BOND**
  • **POLY** – **MORE THAN ONE DOUBLE BOND**

• THE ESSENTIAL FATTY ACIDS ARE **POLYUNSATURATED FATTY ACIDS**
SUMMARY

• Fat is also needed to absorb fat-soluble vitamins A, D, E, and K.

• Fat is stored in the body for extra energy, protection for internal organs and for healthy skin.
• If we eat more carbohydrates than we need for our energy requirements, the excess is converted in the liver to either glycogen or fat.

• The glycogen is stored in the liver and muscles; the fat is stored in fat depots in the abdomen, round the kidneys or under the skin.
• TRANS FAT
• WELL, WHAT ABOUT TRANS FATS? WHERE DO THEY FIT IT IN?
• TRANS FATS DO NOT OCCUR IN NATURE.
• TRANS FAT ARE MOSTLY A MAN-MADE CREATION.
• HYDROGENATE FATS TO MAKE THEM MORE STABLE.
OIL ARE NOT VERY STABLE AND CANNOT LAST LONG ON PROCESSED FOODS WITHOUT SPOILING.

SO, TO INCREASE THE SELF LIFE OF PROCESSED FOODS, MANUFACTURERS HYDROGENATE UNSATURATED FATS. THIS MAKE THE TRAN FAT.

TO DO THIS, THEY TAKE AN UNSATURATED FATTY ACID AND HYDROGENATE IT BY ADDING HYDROGEN UNDER PRESSUR THIS CREATE A SATURATED FAT AND A TRANS FAT
• TRANS FAT IS UNSATURATED BUT IS FLIPPED AND LOOKS MORE LIKE A SATURATED FAT THAN AN UNSATURATED FAT.

• UNFORTUNATELY IN THE BODY TRANS FATS ARE MUCH WORSE FOR A BODY THAT SATURATED FAT. THEY INCREASE HEART DISEASE BY RAISING LDL AND LOWERING HDL AND BY INCREASING INFLAMMATION.
Proteins
NOW ONTO PROTEINS

WHAT DO THEY DO?

✓ They are the major **structural molecules** in living things for growth and repair: muscles, ligaments, tendons, bones, hair, skin, nails...IN FACT ALL **CELL MEMBRANES** have protein in them

✓ They make up **antibodies** in the immune system

✓ They make up **enzymes** for helping chemical reactions

✓ They makeup **non-steriod hormones** which

**THINK:** Proteins = membranes, enzymes, antibodies, non-steriod hormones, structural molecules, “**MEANS**”
PROTEINS

MADE UP OF...

Proteins are made of long chains (polymers) made of monomers. All proteins are made of the monomer…

AMINO ACID
PROTEINS

AT THE ATOM LEVEL

Each protein is made up of...

Carbon, Hydrogen, and Oxygen,
Nitrogen and sometimes Sulfur, phosphorous

THINK: “CHON-PS”
• The word **Protein** has originated from the Greek word "Porto's" which means to come first.

• What your body is composed of:-
  1. Around 60% of the human body constitutes **water** & 40% is dry matter. This makes **water** the most essential nutrient for the human body.
  2. As 40% of the body’s dry matter is **protein**, so, after water, **protein** is the 2nd most important nutrient for the human body.
Fibrous proteins

• Fibrous proteins are the main structural and supporting materials of the body.

• Fibrous proteins are very strong, water insoluble, long, narrow proteins and spirally coiled chains of amino acids. It is this molecular arrangement which makes fibrous proteins extremely tough.
Fibrous proteins

• Three examples of fibrous proteins are:
  • Keratin, in hair, nails, claws, beak and horn
  • Fibrin, in blood plasma, where its fibres trap red blood cells during the process of clotting
  • Collagen, in connective tissue in the skin, in the tendons that attach muscle to bone, in the ligaments that attach bone to bone, and in the bones themselves where it provides tensile strength.
Globular proteins

- Globular proteins are soluble in water. They have more compact and rounded shapes. Their amino acid chains are folded in on themselves to form a spherical shape, with forces of attraction of different kinds helping to keep the shape. The polypeptides coil into a globular sheet.
Globular proteins

- **Haemoglobin** - red blood cells and helps to transport oxygen in the body.
- **Myosin** - Occurs in muscle tissue and is responsible for the ability of muscles to contract.
- **Insulin** - that helps regulate the storage of the sugar glucose in the human body.
- **Enzymes** help to carry out specific chemical reactions in the body. For example, **amylase** is an enzyme that occurs both in human saliva and in the intestines that helps to break apart the glucose-glucose bonds in the carbohydrate starch, thus allowing your body to absorb the glucose and use it for **energy**.
Complete proteins: - animal source
  • Foods containing all the essential amino acids Examples: fish, meat, eggs, milk, cheese

Incomplete proteins: - plant source
  • Foods that are missing some essential amino acids Examples: Legumes, nuts, whole grains
Sources of protein:

• Proteins are classified as high biological value and low biological value.

• Proteins with high biological value come mainly from animal foods such as meat, fish, eggs, cheese and milk.

• Low Biological Value Proteins come mainly from plant foods such as peas, beans and lentils (pulse vegetables), whole cereals and nuts.
Functions of proteins:

- Growth of new cells such as skin, hair, and blood.
- Repair of damaged cells.
- Production of heat and energy.
- Manufacture of important body chemicals such as enzymes, hormones, and antibodies.
Deficiency of proteins:

• Retarded growth in children.
• Worn out cells are not replaced. This prevents healing of wounds.
• Malfunction of various organs due to hormone / enzyme deficiency.
• Susceptibility to disease, due to lack of antibodies.
1. What is a globular protein? Fibrous protein? How do they differ structurally?
2. All proteins contain which elements? Which additional elements may be present?
3. Of what importance are proteins to the body?
4. Where is Fibrin proteins found in your body?
5. What is Proteins are made of?
The Power of Protein.flv
1. Which of the following is not a protein: hemoglobin, cholesterol, an enzyme, an antibody?

2. Where is keratin proteins found in your body?

3. What sources of protein-rich foods are available to a vegetarian who
   - Will eat animal products but not meat itself,
   - Will eat only plants and their products?
Vitamins and Minerals
Micronutrients

• Minerals and vitamins are called micronutrients since they are needed by your body in SMALL amounts.

The minerals and most of the vitamins your body needs must be obtained from the FOODS you eat since your body cannot make them.
Vitamins:

• The word "vitamin" comes from the Latin for "life". Everybody must eat a certain amount of vitamins to stay healthy.

• If people live on a very limited range of foods they may not get their proper share of vitamins.
What are Vitamins?

• Non-caloric chemical compound needed in small quantities for normal metabolism and other biochemical functions.

Two Groups of Vitamins:

• Water-Soluble
• Fat-Soluble
Water-Soluble Vitamins:

• Vitamins that dissolve in water and are **NOT** stored in your body for future use
• Excessive amounts excreted in the urine, not stored in the body
• Toxic reactions are very rare
  
  **Vitamin B** and **Vitamin C**
Water-Soluble Vitamins:

- **Vitamin C/ascorbic acid**: Fights against infection, maintains healthy gums, strengthens and maintains blood vessel structure
  - Food sources: *citrus fruits, tomatoes, leafy vegetables, potatoes, red pepper, strawberries*
Vitamin C (Ascorbic Acid): Deficiency

- Prolonged deficiency results in **scurvy** which causes pain in the joints and muscles and bleeding from the nose, gums and internal organs.
Vitamin C Sources, Benefits and RDI.flv
Micronutrients: Vitamins

Vitamin B Complex/Folic acid: Helps prevent birth defects, and is needed in the formation of red blood cells and nucleic acids

– Food sources: beets, broccoli, avocado, turkey, whole grain and lentils.
Vitamin B Food Complex - YouTube.flv
Water-Soluble Vitamins

• B-complex group and vitamin C
• Can be dissolved in water
• Cannot be stored by the body in large amounts
• Daily intake required to prevent deficiencies
Fat-Soluble Vitamins:

- Vitamins that dissolve into and are transported by fat
- They can be stored in fat tissue, the liver, and the kidneys.
- Vitamins A, D, E, and K
- Daily intake not required
Fat-Soluble Vitamins

- Deficiency occurs only after prolonged deprivation (loss)
- Can become toxic if excessive amounts are consumed
Examples of Fat-Soluble Vitamins:

- Vitamin A: Maintains **good vision**, promotes body cell growth, helps protect teeth
Vitamin A

• Vitamin A (retinol) derived from animal fats (butter and milk), eggs, meat liver, fish liver oils

• Vitamin A derived from carotenes, which are found in plants (green and yellow vegetables and yellow fruits) - carrot, spanspek, sweet potatoes
Vitamin A

• Vitamin A deficiency can lead to night blindness
Vitamin A. flv
Vitamin D:

- Promotes the development of healthy bones and teeth
- Helps in the use (absorb) of Ca and phosphorous
  - Food sources: eggs, salmon, fortified breakfast cereal and milk. Other sources include sunlight
Vitamin D

• “Sunshine vitamin“- Produced in the skin by ultraviolet irradiation (sunshine)

• Responsible for proper utilization of calcium and phosphorus.
Vitamin D: Deficiency

• Your body cannot absorb calcium. Calcium hardens bones. Children without enough vitamin D can not absorb calcium, and will develop rickets.
• Vitamin D is routinely added to milk to ensure that its calcium content is properly deployed and that children do not develop rickets.
Vitamin D Good For The Heart.flv
The Benefits Of Vitamin D.flv
Vitamin E: Function

• **Exact biological function of vitamin E is unknown**
• Believed to act as an **antioxidant**
• **Maintains a lot of your body's tissues, like the ones in your eyes, skin, and liver. It protects your lungs from becoming damaged by polluted air.**
• And it is important for the formation of red blood cells.
Antioxidants

- Antioxidants are substances or nutrients in our foods which can prevent or slow the oxidative damage to our body.
- When our body cells use oxygen, they naturally produce free radicals (by-products) which can cause damage. Antioxidants act as "free radical scavengers" and hence prevent and repair damage done by these free radicals.
- Health problems such as heart disease, diabetes, cancer are all contributed by oxidative damage. Antioxidants may also enhance immune defense and therefore lower the risk of cancer and infection.
Antioxidants - vs - Free Radicals - The Formulation
Antioxidants and free radicals.flv
Vitamin E

• Dietary plant sources
  – Whole grains, such as wheat and oats, wheat germ, leafy green vegetables, nuts and seeds

• Animal sources
  – Egg yolks, Sardines
Vitamin E: Deficiency

- Antioxidant
- Highest risk of deficiency in premature infants
- It causes neurological problems due to poor nerve conduction.
- Deficiency can also cause anemia, due to oxidative damage to red blood cells.
Vitamin E.flv
Vitamin K: Functions

• Essential for making proteins that are involved in blood clotting.

• Vitamin K is the clot master!
Vitamin K

• Dietary sources of K
  – Green leafy vegetables (cabbage, spinach, broccoli), meats, milk
  – Interestingly, intestinal bacteria will synthesis the vitamin for us
  – Sometimes taking antibiotics kill the bacteria in intestine along with the pathogenic bacteria which leads to Vitamin K deficiency.
Vitamin K: Deficiency

- Excessive bleeding.
- Slow clotting of blood after injury.
Vitamin K. flv
1. What is a vitamin?
2. What are the two basic classifications of vitamins?
3. Which vitamins is water soluble? Fat soluble?
4. Which class of vitamins has the potential to be toxic? Why?
5. Why vitamins are often called 'trace' or 'micro' nutrients?
6. Identify specific roles in the human body of each of the following vitamins: A, B, C, D, E, and K.

7. How do fat- and water-soluble vitamins differ in the way they are transported in the blood?

8. Would it be easier to develop a vitamin A deficiency or a vitamin C deficiency? Explain.

9. What is the relationship between vitamin D and bone development?

10. What are the sources of vitamin A? What are the effects of a deficiency?
11. Where is vitamin A stored in the body?
12. Why might taking antibiotics for a long period of time lead to vitamin K deficiency?
13. What are the sources of vitamin D? Why is it called the sunshine vitamin?
14. Which vitamin are easily destroyed by heat, for example when cooked is it vitamin A or vitamin C?
15. Why is milk a good product to add vitamin D to?
SUMMARY

• Vitamins are essential in small quantities for chemical reactions in cells.

• The fat-soluble vitamins A and D occur mainly in animal products.

• Lack of vitamin A can lead to blindness; shortage of vitamin C causes scurvy; inadequate vitamin D causes rickets.
Micronutrients: Minerals

- Minerals are INORGANIC substances that are required by your body in order to develop and grow properly.

Some Important Minerals:
- Calcium
- Iron
- Potassium
- Magnesium
Minerals:

- Minerals in the diet are classified as macro minerals or micro minerals.

- Macro minerals
  - Calcium, phosphorus, potassium, sodium, chloride, magnesium, sulfur

- Micro minerals/trace mineral
  - Chromium, cobalt, copper, fluorine, iodine, iron, manganese, molybdenum, nickel, Selenium, silicon, tin, vanadium, zinc
Micronutrients: Minerals

Calcium

• Function: Helps build strong bones and teeth, regulates blood clotting

• Food sources: dairy products, leafy and green vegetables
Calcium

• Most abundant mineral element in the body
• Accounts for 2% of body weight
• Highest concentration in bones and teeth
• Efficient absorption requires adequate amounts of vitamin D
Calcium Requirements

• Calcium requirements are high for:
  – Growing children
  – Women who are pregnant or breast-feeding
Calcium Deficiency

- Calcium deficiency:
  - Infantile rickets
  - Osteoporosis
Calcium 101 (Health Short).flv
Micronutrients: Minerals

Potassium

- Function: Helps regulate fluid balance in the body, assists with the normal functioning of muscles and nerves
- Food sources: bananas, carrots, milk, avocado
Micronutrients: Minerals

Magnesium

• Function: Involved in the metabolism of proteins and carbohydrates, assists with bone growth and proper muscle functioning

• Food sources: milk, meat, nuts
Magnesium flv
Micronutrients: Minerals

Iron

• Function: Helps build hemoglobin which is the oxygen-carrying part of your red blood cells
Sources

- **Red meat**, especially liver and kidney, is the richest source of iron in the diet, but eggs, groundnuts, bread, spinach and other green vegetables are also import sources.
Deficiency

• A person may suffer from some form of anaemia. Insufficient haemoglobin is made and the oxygen-carrying capacity of the blood is reduced.

• A person suffering from anaemia look pale, becomes tried easily, feels breathless and is often depressed.
Magnesium The most powerful relaxation mineral available....flv
Iodine

• Iodine is essential for the production of the molecule thyroxine, which is a hormone produced by the thyroid gland in the neck. These hormones regulate basal metabolism.
Sources

• Sea fish and shellfish but it is also present in most vegetables, provided that the soil in which they grow is not deficient in the mineral. In some parts of the world, where soils have little iodine, potassium iodide may be added to table salt to bring the iodine in the diet to a satisfactory level.
Deficiency

- A lack of iodine in your diet causes the thyroid gland in the neck to swell up, because thyroxin cannot be produced. This swelling in the neck is called goiter. Lack of thyroxin slows down the rate of metabolic reactions in the body.
1. What roles does magnesium play in the body?
2. What is a trace mineral? Provide an example.
3. How does a trace mineral differ from a major mineral?
4. What is iron deficiency anemia?
5. What is the relationship between calcium and osteoporosis?
6. Why does an iron deficiency affect the oxygen-carrying capacity in your body?
7. What roles does calcium play in the body?
Mineral salts like calcium and iron are needed in tissues such as bone and blood.
Do you know the MOST IMPORTANT nutrient?

It’s Water!

• 60%-80% of the human body is WATER!
Water

• The main sources of water are drinking water it is also found in other beverages and beverages.

• Milk, Fruits and green vegetables are also high in water.

• Almost all foods contain water, except those with a high fat content (butter), and dry foods (sugar and flour).
• Function: Assists with the transport of materials in the body by making up most of the liquid part of blood (plasma), helps regulate body temperature, and helps break down food in the digestive system
Functions of water

• It is the chief component of all body fluids.
• It helps dissolve foods and aids digestion.
• It helps remove waste material from the body.
• It regulates body temperature by perspiration.
• It is a source of dissolved minerals.
• It keeps the body fluids liquid so that they may flow easily.
Making Good Food Choices

• The US federal government created a food pyramid which is a guide to healthy living.

• It gives recommendations for:
  – Eating healthy
  – Regular exercise
Fast Food Choices

• Fast food consumption should be limited since it generally includes foods that are high in calories, fat, and/or sodium.
• Try to choose smaller portions since larger portion sizes greatly increase the calorie, fat, and sodium content of your meal.
Fast Food Choices

• Some fast food choices are healthier than others so try to choose the healthier options.
Healthy options:
- Grilled chicken
- Regular-sized single hamburger
- Fruit and yogurt
- Plain baked potato (no butter or sour cream)
- Salad

Less healthy options:
- Chicken nuggets
- Croissant breakfast sandwiches
- Onion rings
- Large French fries
Physical Activity

• Regular exercise, included as part of the new food pyramid, is an important part in maintaining a healthy lifestyle.

• Exercise (physical activity) involves any form of movement such as walking, jogging, climbing stairs, or playing basketball.
Exercise hints:

• Include activities you enjoy doing
• Work your way up to at least 30 min. of physical activity per day
• Incorporate exercise into your social life by including your friends in the activity
• Listen to music or watch TV while you exercise
Physical Activity

Benefits of Regular Exercise

• Helps relieve stress and depression

• Adds years to your life by lowering your risk of heart disease, colon cancer, diabetes, and high blood pressure
• Helps you maintain a normal weight by burning calories which results in a loss of body fat
• Tones and develops the muscles in your body