"You are what you eat" is a saying everyone has heard, yet many people ignore the fact that the human body is made and maintained by the food we eat. Health problems arise when we fail to provide our body with essential nutrients.

- **Nutrition** is the science, which deals with the nature and composition of foods- the amount required by the body, and the physical and chemical changes brought about by the intake of food.

- **Diet** is the usual kind of foods and drinks that a person eats. From the Greek word '*diatia*' which means 'way of life'.

- **A Balanced Diet** is a habit of eating, which supplies all the essential nutrients in the correct proportion for the needs of the body at a particular time. It is not static; an individual's dietary needs change quite frequently depending on circumstances (e.g. child, teenager, adult, pregnancy).

- **Malnutrition** can be defined as a long-term dietary imbalance. It is brought about when the total intake of one or more nutrients is out of proportion to the needs of the individual.

- **Digestion** Breaking down complex molecules into their simplest compounds. Digestion allows absorption to take place. If food was not broken down, larger particles could not pass out of the digestive system into the body tissues. Food is broken down by mechanical means and by chemical digestion.

  Mechanically food is physically broken down by
  1. The action of the teeth (chewing, grinding).
  2. Churning action in the stomach.
  3. Peristaltic movement of the digestive tract.
  4. Emulsification with bile.

  Chemically food is broken down by the action of enzymes. Enzymes are protein molecules that act as catalysts. They are added to the food at different stages along the digestive tract. Enzymes work on carbohydrates, proteins and fats breaking them into small molecules that can be utilised by the body

- **Food** is any substance (solid or liquid) which performs one or more of the following functions
  1. Provides raw materials for the body to produce heat, energy or movement.
  2. Promotes growth.
  3. Makes good wear and tear on the body.

4. Allows reproduction to take place.
5. Regulates the health of the body.
6. Maintain normal body processes.
7. Prevents disease.

The components of foods that have these functions are called **Nutrients**.

The main Nutrients are **Protein, Fats, Carbohydrates, Vitamins, Minerals and Water.**

Protein

Proteins are complex organic compounds. They are absolutely essential in the human diet because they are the only nutrient that supplies nitrogen, which is essential for cell formation and therefore growth. The building blocks of protein are **amino acids**. A number of amino acids must be supplied by the diet because they cannot be made by the body. They are known as the **essential amino acids** and for the human adult there are eight, nine in children.
If a protein food contains all the essential amino acids in the proportion required by humans, it is said to have a **high biological value**. If it is comparatively low in one or more of the essential amino acids it is said to have a **low biological value**.

Functions of Protein

- Essential for growth. It is particularly important in the diet of babies and infants, expectant and nursing mothers.
- Essential for repair of body cells.
- Protein forms enzymes, hormones and antibodies.
- Proteins form the body's main structural elements and are found in every cell and tissue.
- Protein can provide heat and energy through a process called **deamination** (a secondary function).

Fats

The main form of fat found in food is a **triglyceride** that consists of 1 glycerol and 3 fatty acids.

- If the fatty acid has all the hydrogen atoms it can hold it is called '**saturated'**.
- If some of the hydrogen atoms are missing and have been replaced by a double bond between the carbon atoms it is said to be '**unsaturated'**.
- If there is one double bond the fatty acid is known as '**monounsaturated'.**
- If there is more than one double, than it is known as a '**polyunsaturated'** fatty acid.

Essential Fatty Acids

An essential fatty acid is absolutely essential to health. Many Essential Fatty Acids (Efa's) cannot be made by the body and therefore must be eaten every day. Essential fatty acids are only found in polyunsaturated fats, good sources include plant and fish oils. These fatty acids are named according to the position of the double carbon bonds, **omega 6**(n-6) or **omega 3**(n-3).

Function of Fats

Fat is an essential nutrient for the body:

- Fats provide a concentrated source of energy.
- It provides a source of stored energy for the body in the form of adipose tissue.
- It gives shape to your body.
- It cushions your skin.
- It protects the organs e.g. kidneys.
- Fats contribute to food characteristics such as texture, flavour and palatability.
- Adipose tissue under the skin prevents heat loss.
- Fat forms the outer skin of every cell membrane.
- It is a component of myelin, the fatty material that sheathes nerve cells.
- It is a constituent of hormones.
- It is needed to transport and store fat-soluble vitamins.
- Fat promotes healthy skin nails and hair.
- Essential fatty acids are needed to move fats into the mitochondria of the cells, making it available for combustion.
- Essential fatty acids are needed to lower cholesterol, lower blood pressure, increase energy levels, and help weight loss!
- Recent trials have found that omega 3 essential fatty acids may be very beneficial in cancer treatment.
- It is estimated that approximately twenty percent of the brains weight is made up of polyunsaturated fatty acids.
- Efa's are required as precursors of prostaglandins which are hormone like substances

Saturated fats: raise cholesterol levels far more than anything else we eat including foods high in cholesterol. If you are trying to lower your blood cholesterol levels through diet, you must curb the amount of saturated fats you eat.

Transaturated fats. New evidence suggests that TFA's may be even worse for your heart and cholesterol levels than saturated fats.

Monounsaturated fats help lower LDL cholesterol leaving HDL cholesterol unchanged.

Polyunsaturated fats lower LDL's but also lower HDL's as well.

Carbohydrates

Carbohydrates include all sugars and starches and also some other substances such as cellulose and glycogen. Carbohydrates can be made from carbon dioxide and water by green plants when exposed to sunlight in a process called **photosynthesis**. Animals obtain carbohydrates by eating these plants or other animals.

Functions of Carbohydrates:

- Carbohydrates are **oxidised** in the body to provide heat and energy. One gram of Carbohydrate provides 16KJ/3.75kcal. Both simple and complex Carbohydrates have the same energy value.
- Excess Carbohydrates are converted into fat, most of which is stored as adipose tissue beneath the skin. This has the advantage of reducing heat loss, but too much leads to obesity.
- Non-Starch polysaccharides stimulate the peristaltic movements of the intestine.
- Carbohydrates provide nutrients for the friendly bacteria in your intestinal tract that help digest food.
- Carbohydrates assist in the body's absorption of calcium.
- Soluble fibre may help to lower cholesterol levels and regulate blood pressure.
- Complex Carbohydrates can regulate the amount of sugar circulating in the blood.
- Carbohydrates have a protein sparing effect.
- Carbohydrates are needed to produce serotonin one of the brains happy chemicals.

Types of Carbohydrates

There are two types of carbohydrates **simple** and **complex**. Simple carbohydrates have a simple molecular structure. Complex carbohydrates have a complicated molecular structure that consists of simple sugars joined together in long chains. There are two types of simple carbohydrates; monosaccharides and disaccharides both are sugars.

Monosaccharides are the simplest carbohydrates. The most commonly occurring monosaccharides in food are **glucose**, **fructose** and **Galactose** **Disaccharides** are formed when two monosaccharide molecules join together

Polysaccharides are complex carbohydrates made up of many monosaccharides (usually glucose) joined together. Polysaccharides include **starch**, **glycogen**, **cellulose** and **pectin**.

Non-Starch Polysaccharides (NSP) are complex carbohydrates that cannot be digested in the small intestine in humans, but pass into the colon where they are

fermented by bacteria. Examples of NSP (once known as **Fibre**) include **cellulose**, **pectin**, **guar gum** and **beta glucan**.

Vitamins and Minerals

Nutrient	Functions	Food Sources
Vitamin A Retinol & Beta-carotene	Good vision, night vision, resistance to infections, supports growth and repair of body tissues. Also maintains integrity of white and red blood cells	Milk, eggs, meat, fish liver oils. Beta-carotene found in all brightly coloured fruit and veg
Vitamin D	Regulates absorption of calcium and phosphorus for bone health.	Formed in skin when exposed to sunlight, dairy products, egg yolks, fish liver oils, tuna, mackerel, herring, sardines, oysters
Vitamin E	Antioxidant, maintain cell membranes & red blood cell integrity, protects vitamin A and fatty acids from oxidation.	Vegetable oils, but also butter, avocados, eggs, nuts, whole grain cereals, wheat germ. Fat malabsorption can lead to vitamin E deficiency.
Vitamin K	Helps make factors that promote blood clotting. Used in hemorrhagic disorders.	Gut produces some. Green leafy vegetables. Fat malabsorption can lead to vitamin K deficiency.
Vitamin B1 Thiamine	Helps metabolize carbohydrates, maintains appetite and normal digestion. Essential for nervous tissue function.	Found in many foods: whole grain cereals, peas, beans, peanuts, legumes, brewer's yeast, and wheat germ. Alcohol, malnutrition, diarrhoea, & malabsorption contribute to vitamin B1 deficiency.
Vitamin B2 Riboflavin	Helps break down of amino acids, regulates energy, growth, hormones, and formation of red blood cells. Prevents red, cracked lips and burning tongue.	Egg whites, greens, lean meat, fish, wheat germ, milk.
Vitamin B3 Niacin	Important for fat synthesis, protein and carbohydrate breakdown, tissue respiration, health of skin, tongue, digestive system.	Yeast, lean meat, chicken, salmon, tuna, legumes, whole grain cereals, peanuts.
Vitamin B5	Helps body metabolize carbohydrates, fats. Offsets deficiency-related dermatitis	Eggs, chicken, avocados, soybeans, whole grains.

	and "burning foot" syndrome.	Deficiency is uncommon
Vitamin B6 Pyridoxine,	Production of hydrochloric acid (HCL). Absorption of vitamin B12. Production of antibodies and red blood cells. Metabolises proteins, carbohydrates and fats. Helps metabolise and transport selenium. Required for growth, good health and healthy skin.	Chicken, fish, pork, liver, eggs, rice, soybeans, oats, whole wheat, peanuts, walnuts, bananas, avocados.
Vitamin B12 Cobalamin	Red blood cell health and development, treats pernicious anaemia,	Liver, kidney, dairy, eggs. B12 is synthesized by intestinal bacteria.
Biotin	Deficiency can result in hair loss, dermatitis.	Yeast, liver, kidney, eggs, milk, fish, nuts.
Vitamin C ascorbic acid	Essential element in collagen formation. Important for wound healing, bone fractures, and resistance to infections. Strengthens blood vessels. Helps body absorb non-haem iron	Abundant in most fresh fruits and vegetables.
Folic acid Folate	Essential for blood cell formation, protein metabolism, and prevention of neural tube defects.	Green leafy vegetables, liver, kidney, yeast, orange juice, fortified grain products, beans.
Calcium (and phosphate)	Necessary for strong bone structure, teeth, muscle tissue. Regulates heartbeat, nerve function. Plasma levels affected by thyroid, parathyroid glands.	Green leafy vegetables, fortified orange juice, dairy products. Sardines, salmon with bones, tofu. Alcohol, soda (colas) & caffeine deplete calcium stores in body. Need vitamin D to make use of calcium in the body.
Chromium	Glucose metabolism. Deficiency results in glucose intolerance.	Brewer's yeast, whole grain cereals, nuts, black pepper, thyme, meat, cheese.
Copper	Supports healthy bones, muscles, and blood vessels. Assists in iron absorption.	Liver, legumes, nuts, seeds, raisins, whole grains, shellfish, shrimp.
Iodine	Essential component of thyroid hormones that regulate tissue growth and cell activity.	Iodized salt, seafood, bread, milk, cheese.

Iron	Supports red blood cell health through formation of haemoglobin in blood and myoglobin, which supplies oxygen to muscles. Key for menstruating women in preventing iron-deficiency anaemia.	Red meats, Liver, poultry, fish, beans, peas, dried apricots, blackstrap molasses. Certain foods, like grains, contain phytates, which may inhibit iron absorption. Vegetarians may not get enough iron from their diet.
Magnesium	Important for parathyroid hormone release, muscle contraction, bone formation, blood pressure control. Deficiency occurs with malabsorption/alcoholism/ kidney disorders and may result in lowered calcium & potassium levels.	Nuts, legumes, un-milled grains, beans, green leafy vegetables, avocados, bananas.
Manganese	Involved in the formation of bone, as well as in enzymes involved in amino acid, cholesterol, and carbohydrate metabolism.	Nuts, whole grain cereals, beans, rice, dried fruits, green leafy vegetables.
Molybdenum	Important in a variety of enzyme systems. Mobilization of iron from storage, growth and development.	Milk, beans, whole grain breads and cereals, nuts, legumes (depending on soil content).
Phosphate	Bone health. Maintains acid-base balance.	Don't supplement if you eat meat or drink sodas. Abundant in all animal foods
Potassium	Along with sodium and chloride, referred to as electrolytes. Maintains fluid balance, blood pressure, cell integrity, muscle contractions, and nerve impulse transmission.	Fruits and juices, vegetables
Selenium	Antioxidant properties protect body tissues against oxidative damage caused by radiation, pollution and normal body reactions. Red blood cell health.	Seafood, kidney, liver, selected grains. Keshan's syndrome occurs in regions with selenium-depleted soils.
Zinc	Maintaining immune function; wound repair. Deficiency results in anorexia, growth retardation, lowered libido, hair loss, and impaired taste.	Meat, liver, eggs, seafood (esp. oysters), whole grains

Water

Two thirds of the body consists of water. Therefore water is our most important nutrient.

Functions of Water

- Water acts as a medium for transporting substances around the body i.e. oxygen, carbon dioxide, blood cells and lymph antibodies.
- It regulates body temperature, cooling the body with perspiration that evaporates on the skin. Responsible for maintaining core temperature of 37°C by circulating heat produced in the liver.
- It is necessary for the removal of waste from the body as urine and faeces.
- It dissolves food during digestion. Water forms secretions such as bile & saliva and enzymes, it also assists absorption.
- Water provides a medium in which biochemical reactions such as metabolism can take place.
- Water lubricates all the bodies moving parts and lining membranes
- Water helps to alleviate constipation by moving faeces through the intestinal tract.
- Water maintains blood volume.

Symptoms of Dehydration

Headaches: the brain is 75% water, so even moderate dehydration can cause headaches; in addition, dehydration causes your liver to become overloaded with toxins. Everything we ingest or absorb into the body goes through the liver to be purified. Water helps flush toxins, such as alcohol and chemicals present in food and the environment, through the liver.

Lethargy/ Poor Concentration: linked to a sluggish liver. If you are dehydrated, your liver cannot eliminate as many toxins, making you feel less energetic.

Dark, Pungent Urine: one of the many jobs of the kidneys is to filter waste products out of the blood. Waste is caused by chemical reactions that occur in the cells of your body to break down nutrients. This waste is combined with water to make urine, which goes to the bladder. If you don't have enough water in your body, then the waste products are highly concentrated, making the urine darker and more pungent.

Urinary infections: if the kidneys do not have enough water then the urine they produce is highly concentrated with waste products this sits in the bladder making it more susceptible to infection.

Dry mouth: saliva is made up almost entirely of water dehydration will reduce the desired level to lubricate the mouth.
Constipation: the main cause of constipation is lack of fluid in the intestines, which slows the free flow of the bowel.

Bad breath: waste products that are normally washed out of the body are left in a higher concentration in the mouth and throat allowing bacteria to build up and lead to bad smelling breath.

Furry tongue: build up of bacteria on the tongue can easily occur when you are dehydrated because there is less fluid passing through the mouth to wash away residues, this can lead to a white film on the tongue.

Higher temperature: dehydration impairs our ability to dissipate heat causing a raised temperature

Ashen skin: because blood is made up of 92% water, flow to the skin may be decreased, causing a grey complexion.

Decreased Skin Tugour: If pulled, the skin on the back of your hand should snap back rapidly. Skin with decreased tugour returns slowly because there is not enough water to feed the skin cells and gives it its elasticity.

Muscle Cramp: Blood transports oxygen to the muscles, so of there's little water then the whole process slows down causing muscle cramps.

Sunken Eyes: Insufficient water in the body to keep the eyes suspended in fluid within the eye socket.

Dark Under-Eye Circles: The skin around the eye becomes drained of fluid that causes the thin and sensitive under-eye skin to bruise.

A Rapid Heart Rate/Fast Breathing: Signs of extreme dehydration. The body can go into shock when it is starved of fluid for too long.

Deafness, Blindness, Cracked skin, renal failure and finally Death

Healthy eating for Adults

- The nutritional requirements of an adult change very little between the ages of 19-50 years, except in women during pregnancy and lactation.
- Energy requirements can vary from one person to the next and depends on gender, age and activity levels.
- It is important to maintain a healthy body mass index of between 20-25.

- Studies of the average adult diet has shown that energy derived from fat, or most importantly saturated and trans saturated fats, is too high.
- Being overweight or obese increases the risk of coronary heart disease, type 2 diabetes and also some forms of cancers.

Food Group	**Example**	**How much**	**Choose**
Bread, Cereals & Potatoes.	Pasta, Rice, Breakfast cereal, Wholegrain bread.	Eat lots, 6+ portions a day	Wholegrain or whole meal varieties
Fruit and Veg	Fresh, frozen tinned, dried juice, soups and salads.	Eat lots 5+ portions a day	Fresh or frozen are best choose a wide variety of colours.
Milk and Dairy	Milk, cheese, yoghurt, fromage frais	Moderate amounts. 3 portions per day	Low fat versions
Meat, Fish and Alternatives	Red meat, poultry, fish, eggs, pulses & nuts	Moderate amounts. 2 portions per day.	Cut fat off meat; remove skin off poultry, fish without batter/breadcrumbs. Don't fry or cook with fat
Fatty and sugary foods & alcohol	Margarine, spreads, butter, oils, cream chocolate crisps, cakes etc	Eat sparingly. Alcohol below 14 units per week for women and 21 units per week for men	Choose poly-unsaturated and mono-unsaturated fats. Avoid saturated and trans saturated fats

Getting the most from the food you eat

We all spend a lot of time and energy worrying about what we should and shouldn't eat. Did you know that ***how we eat*** can have a huge impact on our general health? By changing just a few of our eating habits we can improve our ability to absorb and utilise the nutrients from the food we do eat.
The following recommendations are designed to improve the health of your digestive system, thereby leaving us feeling happier and healthier Try as many you can for 2 weeks and see how much better you feel.

- **Drink 6-8 glasses of water throughout the day.** Drink the water in small amounts spread through-out the day rather than all in one go (otherwise it can be a bit like watering an over dry plant- it goes in at the top and rushes out the other end!). Water will keep the body hydrated and improve the functioning of the digestive tract, particularly the large intestine. Insufficient water can lead too headaches, fatigue, poor

concentration, dry skin, bad breath, body odour and lack of water is a major cause of constipation. Very often we confuse the triggers for thirst with hunger and end up eating, when all we needed was a drink of water.

- **Practise deep breathing.** This can reduce stress levels and bring more energy to the digestive system (believe it or not, by deep breathing you can fool your brain into thinking its not stressed). Breathing deeply, using the diaphragm, massages the internal organs and can reduce bloating and digestive discomfort. Sit and take 10-15 deep breaths before you start your meal and again when you have finished your meal. Breathe in through your nose, into your tummy and hold and then exhale through your mouth, as if you're blowing out a candle.

- **Eat your meals at the same time each day**. This will allow your body to get into a routine and also reduces the need to eat between meals. Don't skip meals as this can lead to low blood sugar levels, which can cause mood swings and energy slumps.

- **Always sit down to eat**. This relaxes the digestive system by relaxing the muscles of the abdomen. It also allows you to focus on the process of eating. Even if it's only a small snack sit down to eat.

- **Chew your food well**. Chewing your food well gives your system a head start and can prevent indigestion and excess wind. Chew with your mouth closed. It is best to avoid talking while chewing (for everyone's sake).

- **Eat in a comfortable and quiet atmosphere**. It is very important to take your meals during a settled time of the day when you are free from distractions. Try not to eat in front of the television, we tend to forget that we are eating and we don't notice how much we have consumed, or how fast we have eaten until our plate is empty.

- **Eat at a moderate pace**. This will allow you to know when you have eaten enough without over eating; it also allows you time to chew your food well. If you eat too quickly put your knife and fork down after each mouthful and don't pick them up until that mouthful has been chewed and swallowed.

- **Don't eat when you are upset**. If you feel upset at meal times wait a little while until you feel calmer. When you are stressed or upset there is an increase in the amount of acid produced by the stomach (HCL) and a slowing of normal stomach contractions. These acid secretions remain in the stomach longer than usual and cause irritation and discomfort. Eating when you are upset can lead to pain, trapped wind and loose bowel movements.

- **Avoid overeating**. You should eat to about three quarters of your stomachs capacity, which for you is approximately two handfuls (your hands, you can't borrow the local bricklayers). Eating beyond this point prevents the stomach from contracting properly and can cause heartburn, indigestion, bloating and pain. Three quarters full is also the point that gives us a feeling of satisfaction without the horrible sensation of over eating.

- **Don't drink while you're eating**. It's very easy to get into the habit of washing food down with a drink before we chew it properly. In doing this we moisten the food with the drink instead of our own saliva. Saliva's function is to break down carbohydrates and if we don't use it we can end up feeling bloated and uncomfortable.

- **Take a few minutes to rest at the end of your meal**. This allows the process of digestion to begin in an effortless way and can prevent heartburn and indigestion. Try not to bend over or lie down for an hour after eating, as this can increase the risk of heart burn and acid reflux.

- **Avoid cold foods and iced drinks**. Your stomach and digestive system works best at body temperature. Cold foods slow down digestion. Warm, lightly cooked foods are the easiest to digest. Save your ice cream for at least 30 minutes after dinner.

- **Eat meals that are cooked from a wide variety of fresh ingredients**. Eat at least five portions of fruit and vegetables per day. Eating 5 a day has huge health benefits including cutting down our risk of cancers and heart disease. Choose fruit and vegetables that are grown locally and in season. This is when they are cheapest and at there most nutritious.

- **Don't eat in the three hours before bedtime.** This can increase the risk of digestive discomfort and acid reflux; it can also put pressure on the heart. Eating late at night usually leaves you feeling groggy in the morning and unable to eat breakfast.