NUTRITION AND WEIGHT MANAGEMENT

NUTRITION

Nutrition can be broadly defined as the study of food and the way the body uses it to produce energy and build or repair body tissues. Nutrition is the branch of science concerned with nutrients and their ingestion; and examines the relationship between diet and health. Getting enough of the right foods with vitamins and minerals a body needs to stay healthy is essence of nutrition.

CLASSIFICATION OF NUTRIENTS

Nutrients

- Nutrients
  - Macronutrients
    - Carbohydrates
      - Simple
      - Complex
        - Dietary Fibre
    - Fats
      - Simple
      - Compound
      - Derived
    - Proteins
      - Essential Amino Acids
      - Non-Essential Amino Acids
  - Micronutrients
    - Vitamins
    - Minerals

CARBOHYDRATES

Carbohydrates, as the name implies, are composed of carbon and water. Atoms of carbon, hydrogen and oxygen combine to form carbohydrate compounds. They are stored in limited quantity in liver and muscle, and serve:

a) as a major source of energy;

b) to spare the breakdown of proteins;

c) as a metabolic primer for fat metabolism; and

d) as the fuel for the central nervous system.

e) There are two categories of carbohydrates–simple carbohydrate or sugars, complex carbohydrates or sugars, starches and fibres.

f) The most common simple sugar is glucose, as it is the only carbohydrate which can be utilized by the body in its natural form. Other types of simple sugars include fructose, galactose, lactose, maltose and sucrose.

g) Complex carbohydrates are starches and fibre which provide the necessary micronutrients and glucose required to produce energy.

FATS

A molecule of **fat** possesses the same structural elements as the carbohydrate molecule except that the linking of the specific atoms is markedly different. Specifically, the ratio of hydrogen to oxygen is considerably higher in the fat compound.

Fat is one of the three macronutrients required by the body for energy supply. It is a rich source of energy as each gram of fat packs twice the amount of energy than proteins or carbohydrates.

- Simple FAT
  - Triglycerides
    - Saturated Fatty Acids
    - Unsaturated Fatty Acids
      - Monounsaturated Fatty Acids
      - Polyunsaturated Fatty Acids
- Compound FAT
  - Cholesterol
- Derived Fat
  - Lipoproteins
    - High Density Lipoproteins
    - Low Density Lipoproteins

PROTEINS

Protein is an important nutrient as it is required for the structural build up and growth of tissues. Protein makes up a part of every muscle cell. The dry weight of a muscle cell reveals that about three fourths contain protein. Overall, it comprises about 20% of total body weight.

The basic building blocks of proteins are nitrogen-containing units called amino acids. Twenty-two different amino acids in all kinds of permutations and combinations create hundreds of different proteins for different needs and functions.

Essential Amino Acids: Eight amino acids (nine in children and stressed older adults) cannot be synthesized in the body or cannot be manufactured by the body and therefore must be provided in foods. They are called essential amino acids.

Non-Essential Amino Acids: Thirteen of the remaining amino acids are manufactured by the body and not required in the diet are known as non-essential amino acids.

VITAMINS

Vitamins are small molecules that are found in food substances as our body is unable to produce them with the exception of vitamins A, D and K. Our diets have to be varied and rich enough to be supplied with adequate amounts of vitamins. The different vitamins as a part of enzymes are engaged in processes like:

- Energy production
- Exercise performance
- Immune system regulation
- Hormonal production
- Regulation of nervous system

They have been categorized into **water soluble and fat soluble.** Water soluble vitamins like B complex vitamins and Vitamin C are dissolved in body water and can be eliminated through the kidneys. But vitamins like A, D, E and K are fat soluble only and get stored in fat cells.

MINERALS

Minerals are chemicals or inorganic elements found in tiny amounts in food substances only and they are required for bodily processes like:

- Maintaining fluid balance in tissues
- Muscle contraction
- Nerve function
- Enzyme secretion
- Genesis of red blood cells
- Some minerals like calcium, phosphorus and fluoride constitute bones and teeth.

WATER

Water, though classified under the micronutrients, is required in large quantities, i.e. at least 2 litres per day, so that the toxins in blood are excreted. It also helps keep the body temperature in control.

Water is one of the most important nutrients for us as it is involved in almost all the functions in the body. It is difficult to survive without water even for a few days.

- Water regulates body temperature
- Carries nutrients to the tissues
- Eliminates body wastes
- Lubricates and cushions body parts
- Involved in the absorption and digestion of food

BALANCED DIET

A balanced diet provides all the essential nutrients in adequate amounts plus enough calories to meet the body's energy needs. Balanced diet is a eating habit that includes getting a proper proportion of all the food groups and vitamins. Usually this involves consuming necessary nutrients by eating the appropriate amounts from all of the food groups, including an adequate amount of water.

DIETARY AIDS

Dietary aids can also be referred to as dietary supplements which are required when there is deficiency of the required nutrient/s in the body. Some of the nutrients which commonly become deficient in the body and are advised as supplements are mentioned below.

Vitamins: Vitamins are available in natural food as was mentioned earlier. But there are some circumstances when the intake is not enough like in the elderly, convalescents, sportspeople, vegetarians, pregnant or nursing women or when there are chronic illnesses which suppress appetite or with low absorption, and a prolonged low calorie diet as when dieting.

Iron: Iron is necessary to carry oxygen in the blood. When we become deficient in iron, the oxygen carrying capacity is affected; this leads to increased feelings of tiredness and exhaustion. Dietary modifications must be made to include more iron in the diet like eating fresh green vegetables and fruits, and always eating foods high in Vitamin C as it helps in iron absorption. Tea is not advised with meals as it hinders iron absorption.

Calcium: Calcium is required to build bones and teeth as also for normal muscle and nerve function. It is especially important for pregnant and nursing women. Adequate calcium intake between the ages of 11 and 24 may be crucial to avoid osteoporosis in the later years. But a lifelong intake of calcium is necessary to maintain the strength of the bones and prevent fractures. Low fat dairy products and vitamin C to aid absorption of calcium should be added to the diet.

Antioxidants: Antioxidants are an antidote to free radicals produced in our body as a result of normal metabolism and energy production. Free radicals are atoms or molecules with an unpaired electron which when roaming free cause damage to the cells of our body. The best source of antioxidants is food. There is good evidence that antioxidant supplements may

help protect against cancer, heart diseases and muscle soreness. These antioxidants are found mainly in fresh fruits and vegetables.

GIMMICKS

By gimmicks we mean any trick, device, publicity stunt and attention-grabber to attain a desired goal. The so called health supplements available in the market nowadays purportedly provide the desired effect on the body shape.

Nutritional or ergogenic aids are certain food substances used by athletes to enhance performance. As the regulation and tests for drug abuse become more stringent & scientific, it is becoming difficult to consume performance enhancing drugs & engage in dubious methods.

Creatine: Creatine, which is synthesized in the human body from the amino acids arginine, methionine and glycine, is mainly present in skeletal muscle. Creatine supplementation supposedly leads to an increase in muscle size and lean body mass.

Phosphate Salts: Phosphate loading is said to enhance performance by stimulation of glycolysis, enhancement of oxidative metabolism, promoting oxygen binding in red blood cells and by enhancing buffer capacity.

Sodium Bicarbonate: The accumulation of lactic acid in the body due to exercise is neutralized by the Bicarbonate ions leading to delayed fatigue and improved performance.

Caffeine: Caffeine occurs naturally in coffee beans, tea leaves, chocolate and cocoa beans. Caffeine enhances performance by increasing fat metabolism while at the same time saving the glycogen stores.

ENERGY AND ACTIVITY

Energy Balance: The energy balance equation states that body mass remains constant when caloric intake equals calorie expenditure.

Basic Metabolic Rate (BMR): The BMR is the energy expended in the basic body processes like breathing, digestion of food, sleeping, etc. It tends to be proportional to the total body weight. The heavier you are, the higher the BMR.

Resting Metabolic Rate (RMR): The RMR is the energy expended when a person is sedentary but the basic body functions are still going on. It would also include the energy required to perform activities such as watching TV, reading, typing, etc. RMR represents approximately 90% of the total energy expenditure in sedentary individuals.

Exercise Metabolic Rate (EMR): The EMR denotes the energy expenditure during any form of activity like walking, running, jumping, etc. The EMR represents 10% of the total energy

expenditure in a sedentary individual. Increased daily exercise is important for gaining, reducing or maintaining weight

CALORIE INTAKE AND EXPENDITURE

Calorie Intake: Calorie intake can be easily calculated by keeping a record of all the foods that are eaten for three days and by keeping a tally of the calories per serving per meal from the calorie table. Accuracy should be maintained while calculating by not overlooking any source of calories including sugar and milk in tea and coffee, consumption of snacks or large helpings. A dietician's help for a computerized dietary analysis can also be taken to calculate calorie intake, energy percentages and intake of vitamins and minerals from the consumed food.

Calorie Expenditure: Calories are burnt or spent when we engage in any activity. Daily caloric expenditure can be estimated based on physical activity and BMR. The calculation of calorie expenditure is presented below.

Inactive	Moderately Active	Active
Very inactive occupation; sitting most of the day; no exercise; 1.3 x BMR	Light activity at home; occasional exercise; 1.5 x BMR	Active occupation; regular strenuous exercise; 1.7 x BMR

OBESITY

Obesity may be defined as an abnormal growth of adipose tissues due to an enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity) or a combination of both. Obese individuals have a high percentage of body fat deposited under the skin and around internal organs. Obesity is often expressed in terms of body mass index (BMI).

HEALTH RELATED PROBLEMS

Anorexia Nervosa: An eating disorder marked by an intense fear of gaining weight, a refusal to maintain a healthy weight, and a distorted body image. People with anorexia nervosa have an abnormal loss of appetite for food, try to avoid eating, and eat as little as possible.

Bulimia Nervosa: Bulimia nervosa is an eating disorder characterized by excessive eating. People who have bulimia will eat an excessive amount of food in a single episode and almost immediately make themselves vomit or use laxatives or diuretics (water pills) to get rid of the food in their bodies. This behavior often is referred to as the "binge/purge" cycle. Like people with anorexia, people with bulimia have an intense fear of gaining weight.

Diabetes Mellitus: A chronic condition associated with abnormally high levels of sugar (glucose) in the blood. Absence or insufficient production of insulin (which is produced by the pancreas and lowers blood glucose) causes diabetes. The major complications of diabetes mellitus include dangerously elevated blood sugar, abnormally low blood sugar due to diabetes medications, and disease of the blood vessels which can damage the eye, kidneys, nerves and heart.

Atherosclerosis: A disease characterized by the deposition of lipids and platelets at the innermost coat of certain arteries, which causes progressive narrowing of their lumen and a decrease in their elasticity.

High Blood Pressure: High blood pressure or hypertension is abnormal pressure exerted by blood on the arterial walls thickened with cholesterol deposits or atherosclerotic plaque. Systolic blood pressure above 140mm Hg and diastolic blood pressure above 90 mm Hg, are the threshold values of hypertension.

Coronary Heart Disease: A condition in which the main arteries supplying the heart are blocked and no longer able to supply sufficient blood, and therefore oxygen, to the heart muscle (myocardium), which may then quickly die. The main cause of reduced blood flow is the accumulation of plaques, a disease known as atherosclerosis.

Stroke: Stroke is the clinical designation for a rapidly developing loss of brain function due to an interruption in the blood supply to all or part of the brain.

Cancer refers to a abnormal growths which have a tendency to grow uncontrolled and metastasize. It can involve any tissue of the body and can have many different forms in each body area. Cancer is a group of more than 100 different diseases.