FOOD CONSTITUENTS

Food is composed of the following five constituents:

1. Carbohydrates
2. Fats
3. Proteins
4. Minerals
5. Vitamins

1. Carbohydrates:
Carbohydrates used in cooking include simple sugars such as glucose (from table sugar) and fructose (from fruit) and starches from sources such as cereal flour, rice, arrowroot and potato.

2. Fats:
Fats and oils come from both animal and plant sources. In cooking, fats provide tastes and textures. When used as the principal cooking medium (rather than water), they also allow the cook access to a wide range of cooking temperatures.

Common oil-cooking techniques include sauteing, stir-frying, and deep-frying. Commonly used fats and oils include butter, olive oil, sunflower oil, lard, beef fat (both dripping and
tallow), rapeseed oil or canola, and peanut oil. The inclusion of fats tends to add flavour to cooked food.

3. Proteins:
Edible animal material, including muscle, offal, milk and egg white, contains substantial amounts of protein. Almost all vegetable matter (in particular legumes and seeds) also includes proteins, although generally in smaller amounts. These may also be a source of essential amino acids.

4. Minerals:
Minerals are the chemical elements required by living organisms, other than the four elements carbon, hydrogen, nitrogen, and oxygen which are present in common organic molecules. Sometimes these "minerals" come from natural sources such as ground oyster shells. Sometimes minerals are added to the diet separately from food, such as mineral supplements, the most famous being iodine in "iodized salt."
Other minerals are calcium, chloride, magnesium, phosphorus, potassium, sodium and sulphur. These minerals are obtained from milk, other dairy products, cereals, legumes, bone meal, meat, fish, all fruits, vegetables, table & sea salt etc.

5. Vitamins:
Vitamins are essential for the normal growth and development. It is a key nutrient that the body needs in small amounts to grow and stay strong. Examples are vitamins A, C, and E. Vitamins are found in many fruits and vegetables; especially green peppers, citrus, strawberries, tomatoes, broccoli, leafy greens, potatoes, animal foods; such as liver, whole eggs and milk.

EFFECTS OF COOKING

The effect of cooking upon the food constituents are discussed below:-

Action of Heat on Carbohydrates

The interaction of heat and carbohydrate is complex. Long chain sugars such as starch tend to break down into more simple sugars when cooked, while simple sugars can form syrups. If sugars are heated so that all water of crystallisation is driven off, then caramelisation starts, with the sugar undergoing thermal decomposition with the formation of carbon and other breakdown products producing caramel.

An emulsion of starch with fat or water can, when gently heated, provide thickening to the dish being cooked. In European cooking, a mixture of butter and flour called a roux is used to thicken liquids to make stews or sauces. In Asian cooking, a similar effect is obtained from a mixture of rice or corn starch and water. These techniques rely on the properties of starches to create simpler mucilaginous saccharides during cooking, which causes the familiar thickening of sauces. This thickening will break down, however, under additional heat.

Action of Heat on Proteins

When proteins are heated they become de-natured and change texture. In many cases, this causes the structure of the material to become softer or more friable - meat becomes cooked. Cooking at ordinary temperatures renders protein foods more digestible. At high temperatures the protein itself gets denatured thus making it of nutritive value. In some cases, proteins can form more rigid structures, such as the coagulation of albumen in egg whites.

Action of Heat on Fats

Fat melts when it comes in contact with heat. If heated to a very high degree for a long time, fats undergo partial decomposition and fatty acids and glycerol are produced. Glycerol further decomposes into caroling which is an irritating compound to the digestive system. When fat heated for long time at too slow temperature it thickens, becoming gummy. This condition is known as polymerization, and fat that has reached this stage is no longer fit for use.

Action of Heat on Minerals

There is no appreciable loss of minerals due to cooking. Some minerals are made more readily available by cooking.

Action of Heat on Vitamins

There is some unavoidable loss of vitamins during cooking. The loss is considerable in respect of thiamine and vitamin C. Vitamin A and D are not destroyed by the ordinary methods of cooking. Vitamin B may be destroyed during cooking if cooked at high temperature. The use of baking soda in cooking causes further destruction of vitamins.

EFFECTS OF COOKING ON DIFFERENT TYPES OF INGREDIENTS

Cereals:

Rice is washed before cooking. Excessive washing removes the water-soluble vitamins and mineral. The proactive of cooking rice in large quantities of water and draining away the excess of water at the end of cooking leads to further loss of B-group vitamins and minerals. Rice, therefore, must be cooked with just enough water so that all the water is absorbed at the end of cooking-this is usually 2 or 2 ½ times the volume of rice. All cereals (eg. water flour) absorb water and during cooking the starch granules swell up and burst. This renders the digestion of starch rapid and complete.

Pulses:

Pulses are rich in protein (20 to 25 per cent). They also contain small quantities of starch. It is very important to boil pulses very thoroughly. This destroys the antitypic substance present in them.

Green Leafy Vegetables:

Green leafy vegetables are prized for vitamins and minerals. The vitamin A which occurs in the form of thiamine and vitamin C are partially destroyed by cooking. If the cooking water is drained away, there will be loss of not only vitamins but also minerals. It is therefore recommended that green leafy vegetables should be cooked in a small amount of water and for the proper length of time. Baking soda should not be used to hasten cooking.

Other Vegetables:

Vegetables like potatoes should be cooked with their outer skin intact; this retains all the vitamins and minerals contained in them. As a rule, vegetables should be cooked in a small amount of water to prevent loss of vitamins and minerals. They can also be cooked by steaming.

Cooking of Fruits:

Most fruits are eaten fresh and raw. This makes the vitamins present in fruits easily available. Fruits can also be cooked by stewing; this will result in loss of some vitamins, particularly, vitamin C.

Cooking of Meat:

Meat is cooked in a number of ways. While cooking, meat coagulation of protein is at 60°C.

• There is reduction in water content; consequently there is shrinkage of meat,
• Collagen which is a protein of the connective tissues is changed into gelatin,
• Elastic, which is also component of connective tissue is not affected,
• The fat of meat melts,
• There is loss of mineral in cooking water but this water can be used as soup or gravy,
• Loss of B-group vitamins especially thiamine.

Cooking of Fish:
Fish contains so little connective tissue, that the cooking time is very short. The proteins coagulate at 60°C.

Cooking of Milk:
When milk is heated, a scum consisting of fat, forms on the surface. This makes it difficult for steam to escape; hence milk boils over easily. Some of the lactalbumin sticks to the sides and bottom. Prolonged boiling alters the taste of milk. The cooked flavour is due to burning or caramelization of milk sugar. There is destruction of thiamine and vitamin C during boiling. Milk, which is already a poor source of vitamin C becomes poorer at the end of boiling. Boiling destroys enzymes and the useful lactic acid bacteria present in milk.

Cooking of Eggs:
The albumin of the egg begins to coagulate at 60°C; and solidifies at 64°C – 65°C. At boiling point (100°C), the albumin becomes tough. However there is little change in the nutrients present in the egg.