# YBN University, Ranchi

# Lipids

Learning objectives At the end of this unit, students will be able to: ƒ Classify lipids ƒ Identify the source of lipids ƒ Explain the importance of lipids

ƒ Describe digestion and absorption of lipids

ƒ Tell the importance of essential fatty acids Definition Lipids: - are a group of organic compounds that are insoluble in water but soluble in organic solvents. Lipids are fats and oils. Lipids ƒ Are the form of stored energy in animals ƒ Have high energy value 9 kcal/gm of fat

ƒ Act as carriers for fat soluble vitamins ƒ Are palatable giving good taste and satiety ƒ Serve as insulator preventing heat loss from the body ƒ Lubricate the gastrointestinal tract ƒ Protect the delicate organs such as Kidney, Eyes, heart and the like.

## Classification of lipids

Lipids are classified into 3 on the basis of their chemical structure. ƒ Simple lipids = Fats and oils ƒ Compound lipid = Phospho-lipids and lipoproteins ƒ Derived lipids= fatty acids and sterols ƒ Human beings cannot synthesize the Poly Unsaturated Fatty Acids (PUFA), hence they are termed as essential FA. ƒ Saturated fatty acids tend to raise blood cholesterol level. ƒ Polyunsaturated Fatty Acids lowers blood cholesterol and large amounts of unsaturated Fatty Acids are of vegetable origin and have lower melting point. Phospholipids, sterols and lipoproteins Phospholipids are structural compounds found in cell membranes. They are essential components of enzyme systems and are involved in the transport of lipids in plasma. Sterols ƒ These are precursors of vitamin D, which are found both in plants and animals. Cholesterol in animal's tissues, egg yolk butter. Ergosterol in plants ƒ Lipids are transported in the blood in the form of lipoprotein (soluble fat protein complexes). ƒ They are 25-30% proteins and the remaining as lipids.

## Lipoprotein

**These are compound lipids that contain** both protein and various types and amounts of lipids. They are made mostly in the liver and are used to transport water-soluble lipids throughout the body and the types of lipoproteins are VLDL, LDL, HDL, and Chylomicrons.

Low-density lipoprotein (LDL) This is composed mainly of cholesterol. LDL. Transports cholesterol from the liver to the tissues. High serum level of LDL greatly increases the risk of atherosclerosis " is a disease in which fatty deposits collect along the inside walls of large or medium - sized arteries. These deposits clog or narrow the passageway. If blood clots become lodged in the narrowed vessels, the blood flow to the heart or brain many be partially or completely blocked, resulting in a heart attach or stroke". Diets that are high in saturated fatty acids are associated with elevation in LDL cholesterol. Cholesterol is found only in animal products. Plant foods, regardless of their fat content, do not contain cholesterol. Cholesterol is a fatlike lipid that normally occurs in the blood and all cell membranes. It is a major part of brain and nerve tissues. Cholesterol is necessary for normal body functioning as structural material in the body cells, and in the production of bile, vitamin D and a number of hormones including cortisone and sex hormone.

Hereditary, diet, exercise, and other conditions affect blood cholesterol levels. Persons with high blood cholesterol levels appear to be more likely than those with normal levels to develop atherosclerosis. No recommended dietary allowance has been established for total fat or essential fatty acids; however, the reduction in total fat is recommended. The essential fatty acids are: Š Linoleic acid Š Linolnic acid Š Arachidonic acid – Essential Fatty Acids are needed for the normal functioning of all tissues – Essential Fatty Acids form a part of the structure of each cell membrane. – Essential Fatty Acids help transport nutrients and metabolites across the cell membrane – Essential Fatty Acids are also involved in brain development – Essential Fatty Acids are needed for the synthesis of prostaglandin

**Linoleic acid:**

occurs abundantly in vegetable oils such as: ƒ Corn oils ƒ Cottonseed oils ƒ Soybeans oils ƒ Sesame oils ƒ Sunflower oils Digestion of fats In the mouth Enzyme – lingual lipase End products – diglycerides In the stomach Enzyme – Gastric lipase End products – Fatty acids, glycerol, diglycerides and monglycerides In small intestine Triglycerides, diglycerides Enzyme – Pancreatic lipase End products – monglycerides, fatty acids, glycerol Food source of fats ƒ Animal – Fish, butter, beef, pork, and lamb ƒ Plant - vegetable, fruit avocado, nuts, margarine, cooking oils.

DR. Abha Kumari, **Food and Nutrition , YBN University, Ranchi Jharkhand**