

Body Fluids

Body is formed by solids and fluids. Fluid part is more than two third of the whole body. Water forms most of the fluid part of the body. In human beings, the total body water varies from 45% to 75% of body weight. In a normal young adult male, body contains 60% to 65% of water and 35% to 40% of solids. In a normal young adult female, the water is 50% to 55% and solids are 45% to 50%. In females, water is less because of more amount of subcutaneous adipose tissue. In thin persons, water content is more than that in obese persons. In old age, water content is decreased due to increase in adipose tissue. Total quantity of body water in an average human being weighing about 70 kg is about 40 L.

Significance of Body Fluids

1- In Homeostasis

Body cells survive in the fluid medium called **internal environment**. Internal environment contains substances such as glucose, amino acids, lipids, vitamins, ions, oxygen, etc. which are essential for growth and functioning of the cell.

2- In Transport Mechanism

Body water forms the transport medium by which nutrients and other essential substances enter the cells; and unwanted substances come out of the cells. Water forms an important medium by which various enzymes, hormones, vitamins, electrolytes and other substances are carried from one part to another part of the body.

3- In Metabolic Reactions

Water inside the cells forms the medium for various metabolic reactions, which are necessary for growth and functional activities of the cells.

4- In Texture of Tissues

Water inside the cells is necessary for characteristic form and texture of various tissues.

5- In Temperature Regulation

Water plays a vital role in the maintenance of normal body temperature.

Compartments of Body Fluids –Distribution of Body Fluids

Total water in the body is about 40 L. It is distributed into two major compartments:

1. Intracellular fluid (ICF): is the fluid found inside the cell membrane. Its volume is 22 L and it forms 55% of the total body water. The concentration of sodium is low and the concentration of potassium is high.

2. Extracellular fluid (ECF): is the fluid found outside cell membrane. Its volume is 18 L and it forms 45% of the total body water. The concentration of sodium is high and the concentration of potassium is low. Examples: lymph, Plasma, Fluid in bones and fluid in dense connective tissues like cartilage.

Composition of Body Fluids

Body fluids contain water and solids. Solids are organic and inorganic substances.

- 1- **Organic Substances:** are glucose, amino acids and other proteins, fatty acids and other lipids, hormones and enzymes.
- 2- **Inorganic Substances:** present in body fluids are sodium, potassium, calcium, magnesium, chloride, bicarbonate, phosphate and sulfate.

Measurement of Body Fluid Volume

Total body water and the volume of different compartment of the body fluid are measured by **indicator dilution method** or **dye dilution method**.

-Principle of indicator dilution method

A known quantity of a substance such as a **dye** is administered into a specific body fluid compartment. These substances are called the **marker substances** or **indicators**. After administration into the fluid compartment, the substance is allowed to mix thoroughly with the fluid. Then, a sample of fluid is drawn and the concentration of the marker substance is determined. For example (**Radioactive substances**) or other substances whose concentration can be determined by using colorimeter are generally used as marker substances.