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BCH 445
Biochemistry of nutrition

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Waters

Water is an essential nutrient, more important to lifen than any of the others. The body needs more water each day than any other nutrient.

- **Water constitutes about 60 percent of an adult's body weight.**
- **In the body, water is the fluid in which all life processes occur.**

Fluids in the body: Intracellular (inside cells), Extracellular (outside cells), Interstitial (between cells) and Intravascular (inside blood vessels)

The water in the body fluids:

- **Carries nutrients and waste products throughout the body.**
- **Maintains the structure of large molecules such as proteins and glycogen**
- **Participates in metabolic reactions**
- **Serves as the solvent for minerals, vitamins, amino acids, glucose, and many other small molecules so that they can participate in metabolic activities**
- **Acts as a lubricant and cushion around joints and inside the eyes, the spinal cord, and, in pregnancy, the amniotic sac surrounding the fetus in the womb**

- **Aids in the regulation of normal body temperature, as the evaporation of sweat from the skin removes excess heat from the body.**
- **Maintains blood volume**

Intracellular fluid: **fluid within the cells, usually high in potassium and phosphate. Intracellular fluid accounts for approximately two-thirds of the body's water.**

Extracellular fluid: **fluid outside the cells. Extracellular fluid includes two main components—the interstitial fluid between cells and the intravascular fluid of plasma.**

Extracellular fluid accounts for approximately one-third of the body's water.

Variation in Water Levels

Tissue type: lean tissues (the muscle tissue without fat) have higher fluid content than fat tissues

Gender: males have more lean tissue and therefore more body fluid

Age: lean tissue is lost with age and body fluid is lost with it.

Water balance: the balance between water intake and output (losses).

Water Sources	Amount (mL)	Water Losses	Amount (mL)
Beverages	550 to 1500	Kidneys (urine)	500 to 1400
Foods	700 to 1000	Skin (sweat)	450 to 900
Metabolism	200 to 300	Lungs (breath)	350
		GI tract (feces)	150
Total	1450 to 2800	Total	1450 to 2800

NOTE: For perspective, 100 milliliters is a little less than ½ cup and 1000 milliliters is a little more than 1 quart (1 mL = 0.03 oz).

Water intake

Drunk water, water in food and metabolic water (water formed by carbohydrate, fat and protein oxidation).

- **Regulation of water intake by kidney.**

Thirst: Sensation of thirst arises as a result of increase in the concentration of sodium in the blood. Thirst receptors are in the hypothalamus are associated with water depletion and not with salt depletion.

Adult men: 3.7L/day

Adult women: 2.7L/day

Water needs vary depending on:

- **Type of food (i.e. salty food need more water)**
- **The environment temperature and humidity.**
- **The activity level of a person.**

Water output Urine, water in feaces and water evaporated through skin and lungs

Water intoxication: the rare condition in which body water contents are too high in all body fluid compartments.

- **Excessive water intake and kidney disorders that reduce urine production.**

- **The symptoms may include confusion, convulsions, and even death in extreme cases.**
- **Excessive water ingestion (10 to 20 liters) within a few hours dilutes the sodium concentration of the blood and contributes to a dangerous condition known as hyponatremia. For this reason, guidelines suggest limiting fluid intake during times of heavy sweating to between 1 and 1.5 liters per hour.**