Unit 2_ Water and Electrolytes

Major Functions and Food Sources of Electrolytes (Dissolved in Body Fluids)

ELECTROLYTE	MAJOR FUNCTIONS	Food sources
Cations Sodium (Na^+) (Major ion in extracellular fluid [ECF])	Maintenance of osmotic pressure; thus, maintains body fluid balance Assists with normal functioning of neurons and muscle cells Essential for buffer system (acid-base balance)	Table salt, meat, dairy foods, eggs; many processed and preserved foods including bacon, pickles, and ketchup
Potassium (K^+) (Major ion in intracellular fluid [ICF])	Maintenance of osmotic pressure; thus, maintains body fluid balance Normal functioning of neurons and muscle cells, including the heart. Essential for buffer system (acid-base balance)	Dry fruits, nuts, many vegetables, meat
Calcium (Ca^{++})	- Assists with normal functioning of neurons and muscle cells, including the heart - Essential for neurotransmitter release Maintenance of bones; bone formation - Essential for blood clotting	Milk and other dairy products, broccoli and other green leafy vegetables, sardines
Magnesium (Mg^{++}) (Mainly in ICF)	- Assists with normal functioning of neurons and muscle cells, including the heart; required for ATP use; enzyme production - Maintenance and formation of bones	Green leafy vegetables, legumes, chocolate, peanut butter, whole grains
Anions Chloride (Cl^-) (Mostly in ECF, combined with Na+)	- Maintenance of osmotic pressure; thus, maintains body fluid balance Essential for buffer system (acid-base balance) - Maintains acidity of gastric juice (stomach acid-HCl)	- Cheese, milk, fish - An excess of chloride ions is called acidosis. (NaCl = table salt)
Bicarbonate ($HCO3^-$) (Most important in ICF	Maintenance of osmotic pressure; thus, maintains body fluid balance Essential for buffer system (acid-base balance)	- Does not need to be specifically included in the diet. - Excess bicarbonate ions can result from overuse of antacids, such as sodium bicarbonate (NaHCO3, baking soda). The body also can lose acids as a result of illness. An

ELECTROLYTE	MAJOR FUNCTIONS	Food sources
		excess of bicarbonate ions is called alkalosis.
Phosphate (HPO4–) (mostly occurs in ICF)	- Maintenance of bones and teeth - Assists with normal functioning of nerves and muscle cells - Assists with formation of ATP (adenosine triphosphate); energy storage - Assists with metabolism of nutrients	Whole grains, milk and other dairy foods, meat, fish, poultry
Sulfate (SO4) Proteins	Important in protein metabolism; amino acids Maintenance of osmotic pressure; organic acids	- Protein-rich foods - Meat, fish, legumes, eggs, nuts, dairy products

Normal Serum Electrolyte Values

Electrolyte	Serum Value
Cations	
Sodium (Na^+)	**135 – 145 mEq/L**
Potassium (K^+)	**3.5 – 5.0 mEq/L**
Calcium (Ca^{++})	**4.3 – 5.3 mEq/L (8.9 – 10.1 mg/dL)**
Magnesium (Mg^{++})	**1.5 – 1.9 mEq/L (1.8 – 2.3 mg/dL)**
Anions	
Chloride (Cl^-)	**95 – 108 mEq/L**
Bicarbonate (HCO_3^-)	**22 – 26 mEq/L**
Phosphate (HPO_4^-, $H_2PO_4^-$)	**1.7 – 2.6 mEq/L (2.5 – 4.5 mg/dL)**