Chapter 18 - Water, Electrolyte, and Acid-Base Balance

Electrolytes are molecules that release _____ in water. To be in balance, the quantities of fluids and electrolytes leaving the body should be equal to _____ _____. Anything that alters the concentrations of electrolytes will also alter the concentration of water, and vice versa.

Distribution of Body Fluids:

Fluids occur in _____ in the body, and movement of water and electrolytes between them is regulated. The two major compartments are the _____ _____ and the _____ _____.

The _____ fluid compartment includes all the water and electrolytes within cells. What are the three major types of ions found in high concentration in this fluid compartment?

The _____ fluid compartment includes all water and electrolytes outside of cells (interstitial fluid, plasma, and lymph). What are the three major types of ions found in high concentrations in this fluid?

_____ fluid includes the cerebrospinal fluid of the central nervous system, fluids within the eyeball, synovial fluid of the joints, serous fluid within body cavities, and exocrine gland secretions.

What two pressures control the movement of fluids within the compartments?

Water Balance:

Water balance exists when water _____ equals water _____.

Water Intake: The volume of water gained each day varies from one individual to the next. About 60% of daily water is gained from _____, another 30% comes from moist foods, and 10% from the water of _____.

The _____ mechanism is the primary regulator of water intake. It derives from the _____ pressure of extracellular fluids and a thirst center in the _____.

Once water is taken in, the resulting distention of the _____ will inhibit the thirst mechanism.

Water Output: In what four ways is water lost?

The _____ convoluted tubules and _____ ducts of the nephrons regulate water output.

_____ _____hormone causes a reduction in the amount of water lost in the urine.

When drinking adequate water, the mechanism is inhibited, and more water is expelled in _____.

Electrolyte Balance:

An electrolyte balance exists when the quantities of electrolytes gained equals the amount lost.

Electrolyte Intake: What are the electrolytes of greatest importance to cellular metabolism?

How are electrolytes obtained? A person ordinarily obtains sufficient electrolytes from foods eaten.

A _____ craving may indicate an electrolyte deficiency.

Electrolyte Output: In what three ways are electrolytes lost?

_____ions account for 90% of the positively charged ions in extracellular fluids; the action of _____ on the kidneys regulates their reabsorption. This hormone also regulates potassium ions, how?

_____concentration is regulated by parathyroid hormone, which _____ its concentration in extracellular fluids and by _____, which does basically the reverse. Generally, the regulatory mechanisms that control positively charged ions secondarily control the concentrations of anions.

Acid-Base Balance:

Electrolytes that ionize in water and release hydrogen ions are _____; Those that combine with hydrogen ions are _____.

Maintenance of homeostasis depends on the control of acids and bases in body fluids. Most hydrogen ions originate as by-products of metabolic processes, including: the aerobic and anaerobic respiration of glucose, incomplete oxidation of fatty acids, oxidation of amino acids containing sulfur, and the breakdown of phosphoproteins and nucleic acids. Acids that ionize more completely are _____ acids; those that ionize less completely are _____ acids.

Bases release hydroxyl and other ions, which can combine with hydrogen ions, thereby lowering their concentration.

What are three ways to regulate pH in the body?

Acid-Base Buffer Systems: The chemical components of a buffer system can combine with a _____ acid and convert it to a _____one. The chemical buffer systems in body fluids include what three buffer systems?

The Respiratory Center: The respiratory center in the brain stem helps to regulate hydrogen ion concentration by controlling the rate and depth of breathing.

During exercise, the carbon dioxide, and thus the _____ acid, levels in the blood increase.

In response, the respiratory center increases the rate and depth of breathing, so the lungs excrete more of this gas.

The Kidneys: Nephrons secrete excess _____ ions in the urine.

Rates of Regulation

Which of the three mechanisms listed above are considered the body's first line of defense against shifts in pH? What are the other two considered to be?

Acid-Base Imbalances

Chemical and physiological buffer systems usually keep body fluids within very narrow pH ranges but abnormal conditions may prevent this.

A pH below _____ produces acidosis while a pH above _____ is called alkalosis.

Two major types of acidosis are respiratory and metabolic acidosis.

What causes respiratory acidosis? What causes metabolic acidosis?

Increasing _____ rate or the amount of _____ ions released by the kidney can help compensate for acidosis.

Alkalosis also has respiratory and metabolic causes. Respiratory alkalosis results from _____ causing an excessive loss of carbon dioxide. Metabolic alkalosis is caused by a great loss of hydrogen ions or a gain in base perhaps from vomiting or use of drugs.