Overview

Electrolyte homeostasis is the interplay of electrolyte intake and absorption, electrolyte distribution, electrolyte excretion, and electrolyte loss through abnormal routes

If electrolyte excretion or loss through abnormal routes increases, electrolyte intake also must increase to prevent electrolyte imbalance

There are many things that may cause an electrolyte imbalance

Hormones involved in maintaining fluid balance

Hormone	Net effect
ADH (Antid-iuretic hormone)	Blood pressure increases (with fluid intake); blood volume increases (with fluid intake); blood osmolarity decreases
Renin-ang-iotensin system	Blood pressure increases
Aldost-erone	Blood plasma Na+ maintained, blood plasma K+ decreases. Blood volume and blood pressure maintained (by decreasing urine output)
Atrial natriuretic peptide (ANP)	Promotes natriuresis, elevated urinary excretion of Na+ (and Cl-), accompanied by water. Increases loss of water in urine

Water

Primary fluid in the body

Most physiological processes require water

Water delivers electrolytes & nutrients, and carried away waste.

Helps regulate body temp. and helps maintain blood volume

Water balance is affected by age, gender, muscle mass (more muscle = more water, more fat = less water)

60% of an adults body weight is water - there is more water in a child and less in an eldery person, placing these populations at increased risk of fluid & electrolyte imbalances

Daily intake requirements is 2000-3000mL (in ideal conditions, changes in situations such as fever, increased metabolism etc.)

Water (cont)

1L of water = 1kg weight so daily weighs can be a good indicator of whether a patient is maintaining good fluid & electrolyte balance

Intake sources: Liquids (1500mL/day), Solid foods (800mL/day), Metabolism (300mL/day)

Fluid loss sources: Kidney (1200-1500mL/day), Skin (500-600m-L/day), Lungs (400mL/day), GI Tract (100-200mL/day)

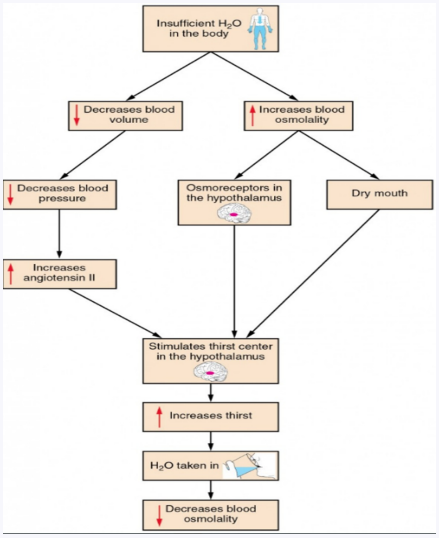
Measureable intake sources: Oral fluid, tube feedings, Parenteral fluid, Enemas, Retained irrigation fluid

Measureable output sources: Urine, Emesis, Feces, Drainage from body cavities

Not measureable intake sources: Solid foods, metabolism

Not measurable output sources: Sweating, vaporisation through lungs

Regulation of fluid balance



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Regulation of F&E movement

Osmosis	Movement of water through a semi-permeable membrane from an area of low concentration to an area of high concentration
Diffusion	important in the transport of gases; sometimes requires the assisstance of a transport system (facilitiated diffusion - used in insulin & glucose); similar to filtration but more about movement of particles that movement of fluid (also includes gas transport & electrolytes)
Flitration	Differences in water volume, i.e. hydrostatic pressure. Happens at tissue capillary level from capillaries to interstitial fluid, i.e. edema; hydrostatic pressure pushes fluid through the membranes (cell & vessel walls)
Active Transport	Molecules have to move against a conc. gradient, requiring active energy and a transport system - such as a Na-K pump requiring ATP - which moves 2 substances at the same time in opposite directions, againt conc. gradients.

Fluid Shifts

If intracellular fluid (ICF) becomes hypertonic relative to extracellular fluid (ECF), water moves from ICF to ECF via osmosis, causing cell death

If ECF becomes hypotonic relative to ICF, water moves from ECF into cells, expanding the cell and potenially causing cell to burst

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