Handout Collection to Accompany
Renal Physiology
Discussion

Noel Ways
Sodium Diet Dependent
Glucose Diet Dependent
Sodium Low
Glucose High
Sodium High
Glucose Moderate
Sodium Low
Glucose Low
Sodium Diet Dependent
Glucose Diet Dependent
Vasa Recta and Ascending Limb of Loop of Henle: Establishment of Medullary Concentration Gradient
Both sodium and potassium are osmotically active ions. Potassium is found within cells and helps create osmotic pressure to draw water into the cell from interstitial fluid or plasma.

Sodium is found in substantial concentrations outside of the cell where it helps create osmotic pressure to draw water out of cells and into the interstitial fluid and plasma.

If the concentrations of osmotically active substances on either side of a semipermeable membrane (ie., cell membrane) are equal, the condition is isotonic, and water will move at equal rates in both directions.

If water is to be moved across the membrane, it is adjustments to the relative concentrations of Na and K that will do the job.

Should there be insufficient water within the plasma resulting in low blood pressure, the kidneys will adjust the location of water by altering the relative concentration of both Na and K. By retaining Na and excreting potassium in the urine, this will soon create a hypertonic condition, and water now leaves the cells and enters the plasma and blood pressure raises.

If blood pressure is excessive, then sodium will be excreted in the urine and potassium will be retained. This will soon create a hypotonic condition and water will move from the plasma into cells and blood pressure will lower.
Adrenal Cortex

Aldosterone activates Sodium / Potassium Exchange Pumps

Blood Pressure Restored

Blood Pressure

Interstitial Sodium (○) Concentration Increases

Intracellular Potassium (●) Concentration Decreases

Isotonic

Water moves by Osmosis into Interstitial Fluids

Hypertonic

To Urinary Bladder
Juxtaglomerular Apparatus Secretes Renin into Blood

Afferent Arteriole Vasodilates spontaneously in the presence of Low solute concentrations. This assists in elevation of hydrostatic pressure in glomerulus.

Low Blood Pressure results in Low solute Cl- concentration at DCT

Liver Secretes into the blood Angiotensinogen

Juxtaglomerular Apparatus Secretes Renin into Blood

Angiotensin I

ACE in Lungs (Angiotensin Converting Enzyme)

Angiotensin II

Aldosterone

Adrenal Cortex Secretes Aldosterone in response to Angiotensin II

Active Transport Na/K Exchange Pumps Activated

Water moves out of Cells into Body Fluids. Blood Pressure goes up