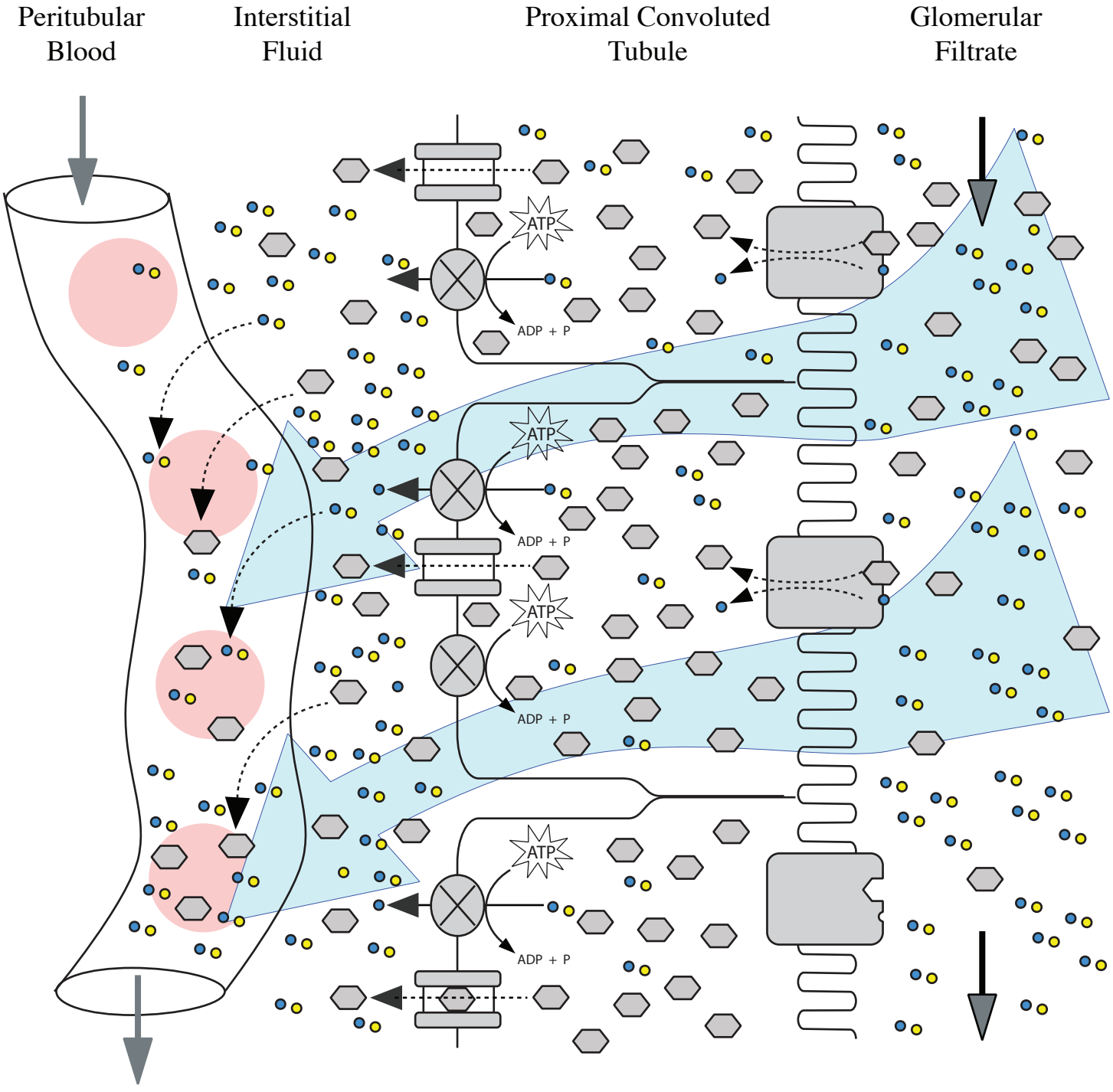
Handout Collection to Accompany

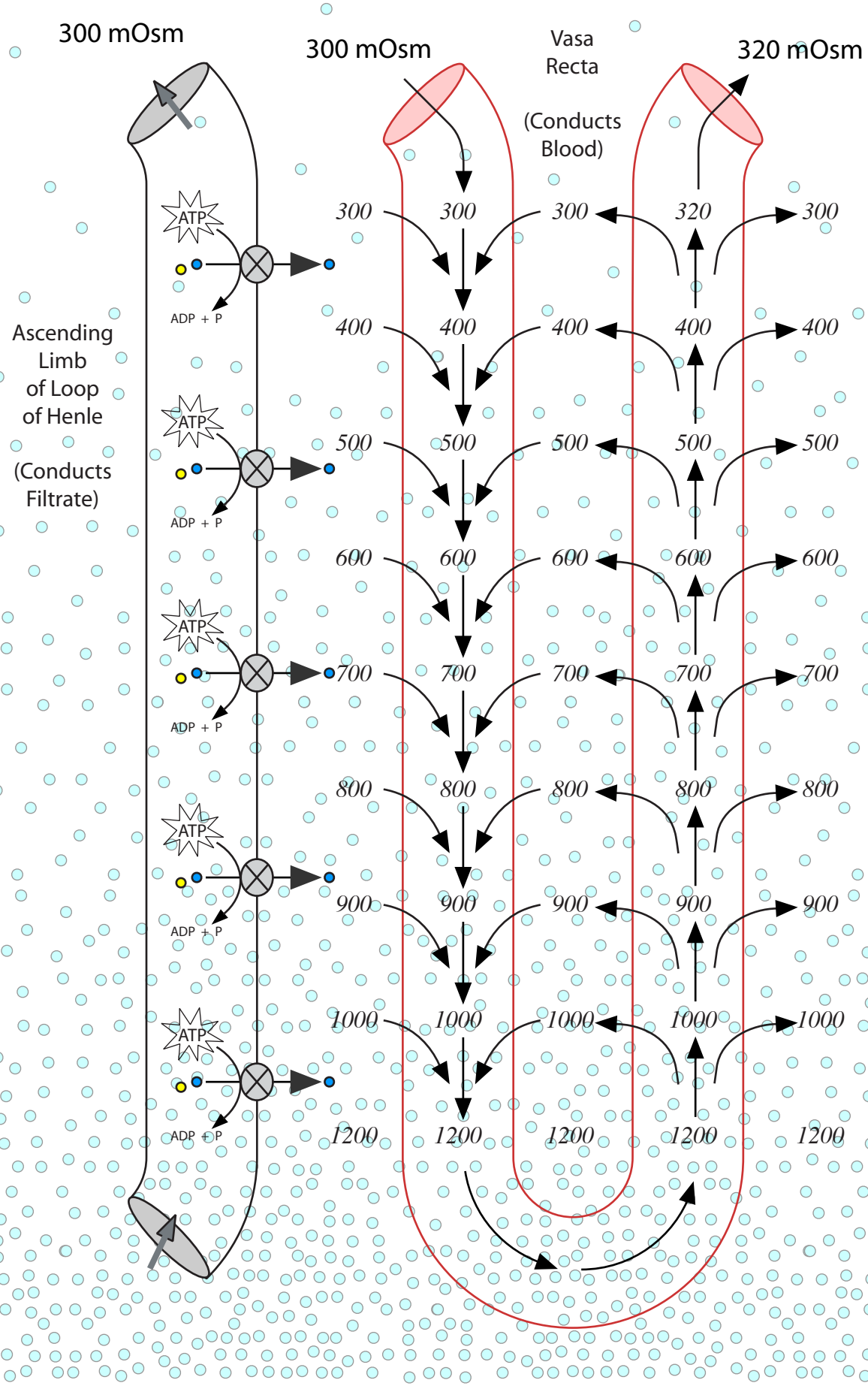
Renal Physiology

Discussion

Noel Ways


Peritubular Blood
Interstitial Fluid
Proximal Convoluted Tubule
Glomerular Filtrate
ATP
ADP + P
ATP
ADP + P
ATP
ADP + P
ATP
ADP + P
Sodium Low
Glucose Low
Sodium High
Glucose Moderate
Sodium Low
Glucose High
Sodium Diet Dependent
Glucose Diet Dependent

Vasa Recta and Ascending Limb of Loop of Henle: Establishment of Medullary Concentration Gradient



Sodium and Potassium in Water Balance

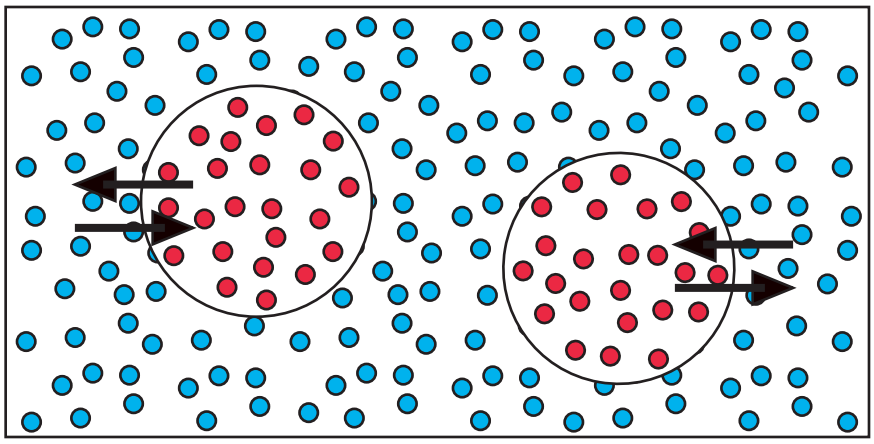
- Sodium
- Potassium

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.

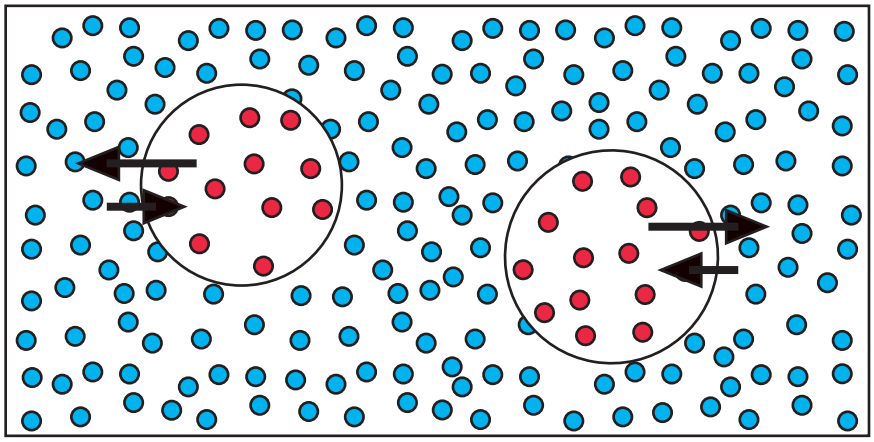
Sodium is found in substantial concentrations outside of the cell where it helps create osmotic pressure to draw water out of cells and into the interstitial fluid and plasma.

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.

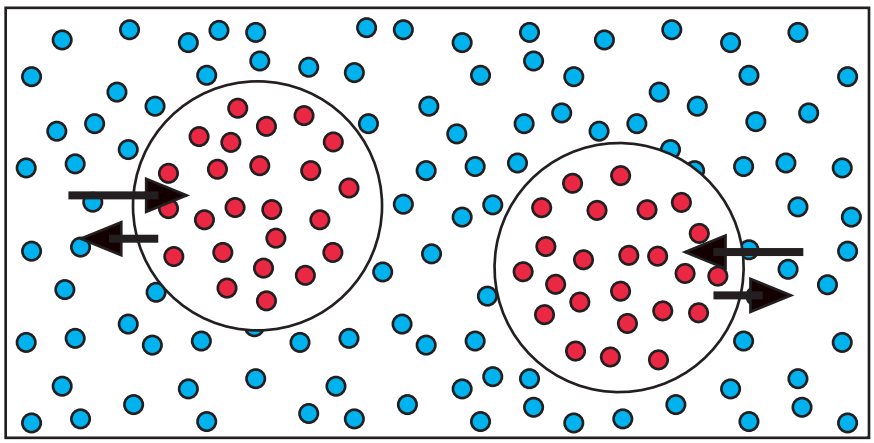
If water is to be moved across the membrane, it is adjustments to the relative concentrations of Na and K that will do the job.

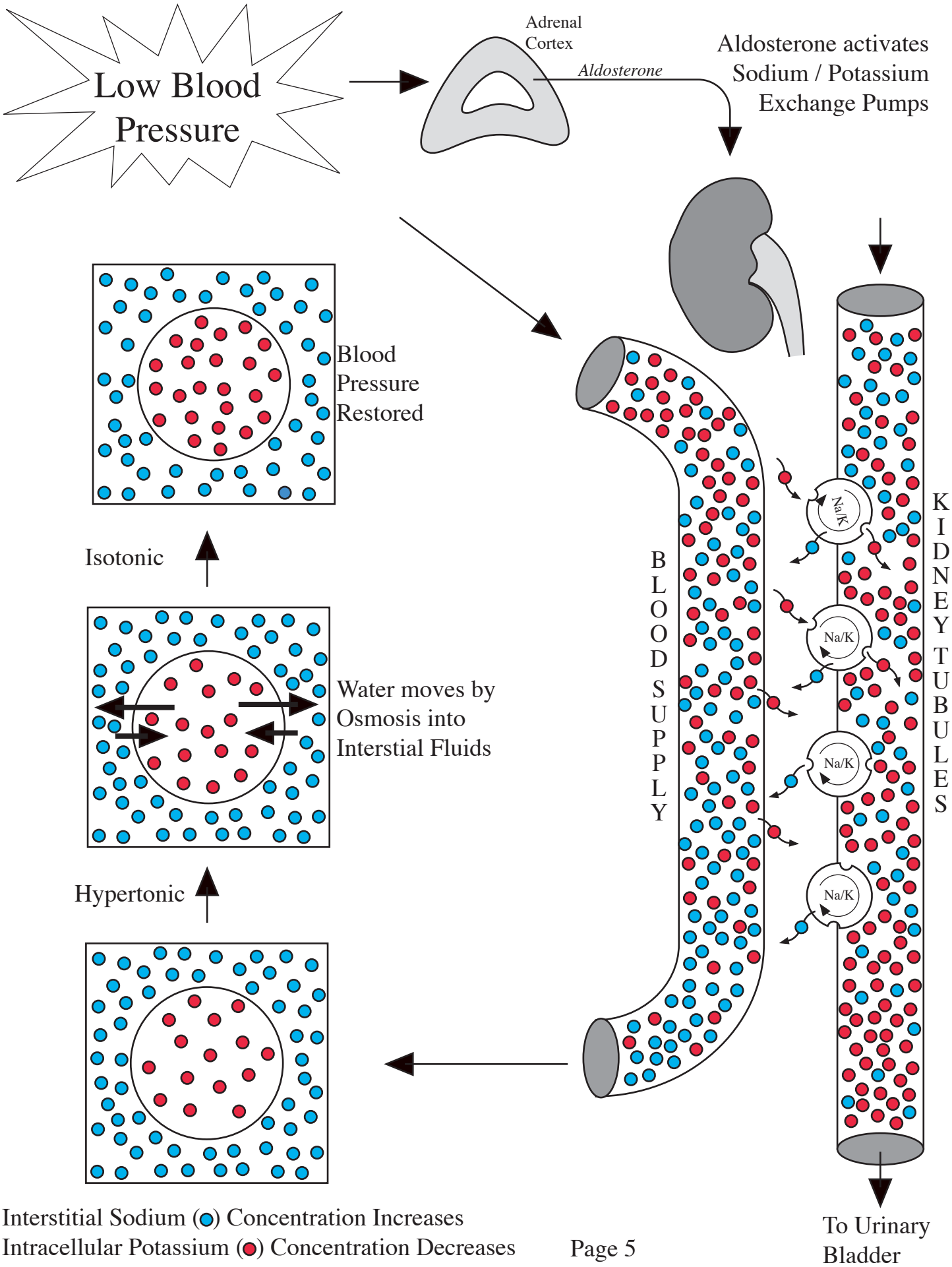


Should there be insufficient water within the plasma resulting in low blood pressure, the kidneys will adjust the location of water by altering the relative concentration of both Na and K. By retaining Na and excreting potassium in the urine, this will soon create a hypertonic condition, and water now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

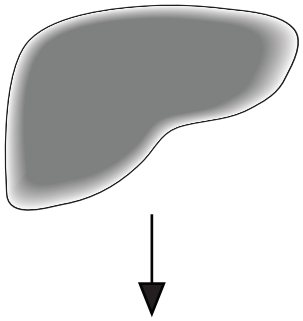


If blood pressure is excessive, then sodium will be excreted in the urine and potassium will be retained. This will soon create a hypotonic condition and water will move from the plasma into cells and blood pressure will lower.





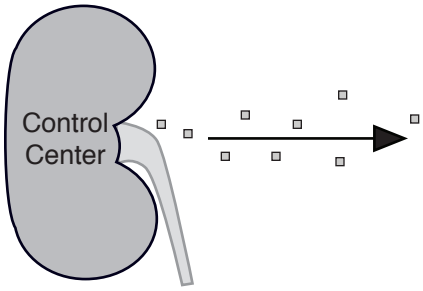
Interstitial Sodium (●) Concentration Increases
Intracellular Potassium (●) Concentration Decreases



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

Liver Secretes
into the blood
Angiotensinogen

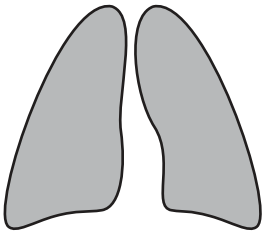
Low Blood
Pressure results
in Low solute Cl-
concentration at
DCT



Juxtaglomerular
Apparatus Secretes Renin
into Blood

Angiotensin I

Efferent Arteriole
Vasoconstricts.
This assists in elevation
of hydrostatic
pressure in glomerulus

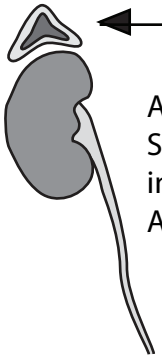


ACE in Lungs
(Angiotensin
Converting
Enzyme)

Angiotensin II

Active Transport
Na/K Exchange Pumps
Activated

Aldosterone



Adrenal Cortex
Secretes Aldosterone
in response to
Angiotensin II

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