Renal absorption and regulation of electrolytes
after studying this lecture, you should be able to . . .

1. Define the obligatory water loss.
2. Describe the mechanism of $\text{Na}^{++}$ reabsorption in the distal tubule and explain why this reabsorption occurs together with the secretion of $\text{K}^+$.
3. Explain the role of aldosterone hormone in $\text{Na}/\text{K}$ balance.
4. Show the physiological effects of fluid overload in the body.
The obligatory water loss

- 400 ml per day
Proximal tubular transport

- 65%
- Proximal tubule

- Isosmotic
  - Na⁺, Cl⁻, HCO₃⁻, K⁺, H₂O, glucose, amino acids

- H⁺, organic acids, bases
Role of Aldosterone in Na/K Balance

• Sodium Reabsorption
Aldosterone

Renin-angiotensin-aldosterone system

- Angiotensinogen → Angiotensin I → Angiotensin II → Aldosterone secretion
- Decrease in renal perfusion (juxtaglomerular apparatus) → Renin
- Surface of pulmonary and renal endothelium: ACE
- Tubular Na⁺, Cl⁻ reabsorption and K⁺ excretion, H₂O retention
- Sympathetic activity
- Arteriolar vasoconstriction, increase in blood pressure
- ADH secretion
- Collecting duct: H₂O absorption
- Water and salt retention. Effective circulating volume increases. Perfusion of the juxtaglomerular apparatus increases.

Legend:
- Secretion from an organ
- Stimulatory signal
- Inhibitory signal
- Reaction
- Active transport
- Passive transport
Potassium Secretion

- **Na Reabsorption** decreases
- **Aldosterone** increases
- **K Secretion** (Collecting Tubule)
  - Tubule Flow Rate increases
  - Na reabsorption (Collecting Tubule) increases
  - ECFV (Extracellular Fluid Volume) decreases
Atrial Natriuretic Peptide (ANP)

- Sympathetic tone
- Salt-water appetite
- Vasodilatation
  Endothelial Permeability
- Inhibition of Cell growth
- Aldosterone inhibition
- Natriuresis, Diuresis
  Renin inhibition
Thank you