

### C. The Proximal Convoluted Tubule

1. From Bowman's capsule, the filtrate goes into the proximal (close) convoluted (twisted) tubule (little tube)
2. Most of the **reabsorption** occurs here. (liquids and solids go back into the blood)
  - a. ALL glucose, amino acids, vitamins, hormones
  - b. MOST of (80%) sodium chloride, mineral ions and water
3. Active transport of glucose and  $\text{Na}^+$ , (also amino acids and other nutrients)
4.  $\text{Cl}^-$  follows the sodium passively
5. Water follows the  $\text{NaCl}$  by osmosis (passive)
6. Cells of the PCT
  - a. cells lining the PCT have a "brush border" (a row of microvilli) greatly increasing the surface area
  - b. (smaller surface area outside decreases leakage back in)
  - c. mitochondria high in cells to provide ATP for active transport
7. QUANTITATIVE CHANGES OCCUR HERE

### D. The Loop of Henle

1. DESCENDING LIMB
  - a. permeable to water, not salt
  - b. inner medulla is hypertonic, so the water inside the Loop leaves by osmosis
  - c. the water immediately enters the capillaries and is taken away (so the water never dilutes the hypertonicity of the medulla)
  - d. SO, the  $\text{NaCl}$  concentration inside the tubule increases
2. ASCENDING LIMB
  - a. permeable to salt, not water
  - b. first, salt diffuses out of the tubule increasing the hypertonicity of the inner medulla
  - c. then, salt is actively transported out of the tubule
  - d. thus the filtrate becomes more dilute

### E. The Distal Convoluted Tubule

1. ACTIVE TRANSPORT:
  - a. out:  $\text{NaCl}$  and  $\text{HCO}_3^-$  (bicarb)
  - b. in:  $\text{K}^+$  and  $\text{H}^+$
2. PASSIVE (Osmosis): Water out
3. QUALITATIVE CHANGES HERE: fine adjustments to water & electrolytes

## F. The Collecting Duct

### 1. OUTER MEDULLA:

- a. permeable to water, not salt
- b. active transport - NaCl out
- c. passive (osmosis) - water follows out

### 2. INNER MEDULLA:

- a. at bottom, permeable to urea
- b. passive- urea out
- c. this increases the hypertonicity (osmolarity) of the medulla

3. Urine is 1200 mosm/L to 70 mosm/L

### 4. Hormone control:

IF blood osmolarity  $>300$  mosm/L (getting dehydrated)

Hypothalamus tells pituitary

ADH released

DCT & CD increase permeability to water

therefore less urine (more concentrated)

(If osmolarity of blood decreases, signal to hypothalamus - no more ADH)