Glomerular filtration and urine formation
After studying this lecture, you should be able to . .

1. describe the theories of regulation of Glomerular filtration (GFR).
2. find the errors in clinical methods of assessment of renal function and measurement of GFR.
3. Simplified the mode of movement of different molecules through the filtration membrane.
4. Describe the mechanisms of glucose reabsorption and define the terms *transport maximum* and *renal plasma threshold*. 
Regulation of glomerular filtration
Regulation of GFR


2. Hormonal and Autacoid Control of Renal Circulation.

3. Myogenic Autoregulation of Renal Blood Flow and GFR
Renal Autoregulation

- Arterial pressure
- Glomerular hydrostatic pressure
  - GFR
    - Proximal NaCl reabsorption
      - Macula densa NaCl
        - Renin
          - Angiotensin II
            - Efferent arteriolar resistance
            - Afferent arteriolar resistance

- Smooth muscle fiber
- Distal tubule
- Basement membrane
- Juxtaglomerular cells
- Afferent arteriole
- Efferent arteriole
- Internal elastic lamina
- Glomerular epithelium
- Macula densa

Diagram showing the renal autoregulation process, including key components and the regulatory pathways involved.
Measurement of GFR

- Inulin clearance.
- Creatinine clearance.
- Creatinine plasma level.
- Urea.
Passive diffusion
Active Transport

• Primary Active Transport through the Tubular Membrane Is Linked to Hydrolysis of ATP.
Secondary Active Reabsorption through the Tubular Membrane:

- Interstitial fluid
- Tubular cells
- Tubular lumen

Co-transport:
- Glucose
- Amino acids

Counter-transport:
- ATP
- Na⁺
- K⁺

Potential of −70 mV

Glucose
Amino acids
Pinocytosis
Proximal tubular transport

- Proximal tubule
  - Isosmotic
  - $\text{Na}^+\text{, }\text{Cl}^-, \text{HCO}_3^-, \text{K}^+$, $\text{H}_2\text{O}$, glucose, amino acids
  - $\text{H}^+$, organic acids, bases

$65\%$
Tubular Load and Tubular Threshold

- The tubular maximum
Thank You