ASSESSMENT OF RENAL FUNCTION

Presented by: Amir Hossein Mahdavi (PhD)

Assessment of renal function

- Renal Clearance
  - Glomerular filtration
  - Reabsorption from tubular fluid back into blood
  - Secretion from blood back into tubular fluid
Glomerular Filtration Rate (GFR)

\[
\text{GFR} = \frac{U_{\text{cr}} \times \dot{V}}{P_{\text{cr}}}
\]

where

- \(P_{\text{cr}}\) = plasma concentration of creatinine
- \(U_{\text{cr}}\) = urine concentration of creatinine
- \(\dot{V}\) = urine flow

Filtration fraction = \(\frac{\text{GFR}}{\text{RPF}}\)

Amount filtered = Amount excreted

\[
\text{Amount filtered} = \frac{P_{\text{cr}} \times \text{GFR}}{U_{\text{cr}} \times \dot{V}}
\]
Starling Forces:
- Hydrostatic Pressure
- Oncotic Pressure

\[ P_{\text{uf}} = P_G - (P_{BS} + \Pi_G) \]
C. Autoregulation of renal blood flow (RBF) and glomerular filtration rate (GFR)

RBF

Myogenic Mechanism

Range of autoregulation

(Afferent Artery)

Autoregulation

GFR

Tubuloglomerular feedback

Tubular fluid

Macula densa

Extraglomerular mesangial cell

Granular and VSM cells

Afferent arteriole

Renin release ↓

Vasoconstriction

Na^+ 2Cl^- K^+

ATP

Na^+  K^-

ATP

ADP

ADO  A_2

Ca^{++}

ATP  PGX
Autoregulation is absent when arterial pressure is less than 90 mm Hg.

Autoregulation is not perfect; RBF and GFR do change slightly as arterial blood pressure varies.

Despite autoregulation, RBF and GFR can be changed by certain hormones and by changes in sympathetic nerve activity.