

RENAL FUNCTION TESTS

Why test renal function?

- Screening & diagnosing impaired kidney function.
- monitoring the course and management of progressive chronic kidney disease.
- Monitor the safe and effective use of drugs which are excreted in urine.

Functions of Kidney at a glance

1. Excretion of nitrogenous wastes like urea, creatinine
2. Maintaining water balance
3. " of sodium balance.
4. " of potassium balance.
5. Activation of vit D.
6. Regulation of erythropoietin.
7. Filtration.
8. Reabsorption.
9. Excretion of hydrogen ions.

Classification

1. To screen for kidney disease
 - Complete urine analysis.
 - Plasma urea & creatinine.
 - Plasma electrolyte.
2. To assess glomerular function
 - Glomerular filtration rate.
 - Clearance tests
 - Glomerular permeability; proteinuria

3. To assess tubular function.

- Reabsorption studies.
- Secretion tests
- Concentration & dilution tests
- Renal acidification

* Earliest manifestation of abnormality of glomeruli - appearance of albumin in urine

Renal threshold → plasma level above which compound is excreted in urine.

Glucose → 180 mg/dl.

Urine analysis

- Physical examination

Appearance → clear.
Colour → straw coloured
Odour → faintly aromatic
Volume → 600 - 1500 ml/day
Specific gravity → 1.015 - 1.025
pH → 5.5 to 6.5.

- Chemical examination

1. Proteins.
2. Reducing sugars.
3. Ketone bodies.
4. Bile salts.
5. Bile pigments.
6. Urobilinogen.
7. Blood.

Tests for Non protein nitrogen

Urea : depends on protein intake
(normal $\rightarrow$ 20-40 mg/dL)

Creatinine : specific and sensitive
(M - 0.7 - 1.4 mg/dL)
F 0.6 - 1.3 mg/dL.

Chic acid : represent purine catabolism

Other minor compounds :
Urobilinogen, Indican,
Ammonia & Amino acids.

$\rightarrow$ Blood urea nitrogen -
serum urea expressed in
terms of N nitrogen.

$$\text{BUN} \times 2.14 = \text{urea}.$$

GFR

Measure of Glomerular fn.
affected by age, sex, body size,
protein intake.

cannot be measured directly
estimated from clearance of
a filtration marker.

uses :

- $\rightarrow$ staging renal impairment
- $\rightarrow$ detecting renal
- $\rightarrow$ monitoring progression
- $\rightarrow$ predicting requirement of
renal replacement therapy.

Clearance measures GFR
indirectly.

Normal GFR.

$= 120 - 130 \text{ ml/min} / 1.75 \text{ m}^2$
(in a person with 70kg
body weight) & absorbed
by tubules,
clearance $<$ GFR.

$\rightarrow$ if a substance is secreted
by the tubules,
clearance $>$ GFR.

clearance : the quantity
of blood or plasma completely
cleared of a substance per
unit time.
expressed as ml/min

$$C = \frac{UV}{P}$$

Ideal filtration marker :
substance should be freely
filtered against capillary
wall, neither secreted nor
reabsorbed.

Endogenous markers :

creatinine, urea

Exogenous markers

Inulin, Diodrast, GEDTA