

Determination of Blood Urea

Urea is the detoxification product of the ammonia derived from the demineralization of amino acids. Urea is therefore the most common nitrogen containing end product of protein catabolism.

Its synthesis from ammonia occurs in the liver, and it is then excreted by the kidneys. Urea production is increased when excess protein is ingested or when body protein is catabolized, regardless the cause.

Urea is free to pass through all membranes of the body and is equally distributed in the body water. The concentration of urea inside red cells is slightly less than in plasma due to the presence of large amounts of hemoglobin inside the cells.

Whole blood urea concentration is therefore slightly less than plasma (or serum) urea. Usually serum is used instead of whole blood for the determination of urea, and the amount of urea is expressed in terms of its nitrogen content. The familiar term BUN (blood urea nitrogen) persists in spite of the fact that it is serum urea nitrogen which is usually measured.

The concentration of urea in the body water depends upon the rate of production by the liver and the rate of removal by the kidneys. In most patients the rate of production is a reflection of the protein intake and the rate of degradation of the cell protein. In some patients liver function may be rate-limiting: in severe liver disease that ability of the liver cells to form urea from ammonia is impaired: ammonia accumulates and urea levels fall. The rate of removal depends upon the concentration in the plasma, the amount of plasma which passes through the kidney per unit time (the rate of renal perfusion) and the capacity of the kidney to remove the urea from the plasma (kidney function).

In most clinical situations, changes in urea levels are more dependent upon kidney function than upon liver function. Most commonly the BUN is measured as a screening test for renal disease, more specifically glomerular filtration. If the



BUN is elevated ,or if more precise information is needed ,a more quantitative technic the "urea clearance test

Clinical Significance:

1-Increased urea levels:

Urea itself is relatively nontoxic, but other substances which are retained when kidney function fails (a condition called uremia) are toxic .Urea levels rise under the following circumstances:

- A- Increased production
- B-Reduced renal perfusion
- C-Kidney disease
- D-Mechanical obstruction

2. Decreased plasma/serum urea concentration

- A. Pregnancy
- B. Low-protein diet
- C. Overhydration
- D. Advanced liver disease (cirrhosis, liver failure)
- E. Inherited defect in “urea cycle” enzymes (reduced urea synthesis)