

Urinalysis

Normal Ranges

Specific gravity: 1.003-1.029

pH: 4.5-7.8

Protein: *Negative / trace (in concentrated urine)*

Glucose: *Negative*

Ketones: *Negative*

Bilirubin: *Negative*

Occult blood: *Negative*

Leukocyte esterase: *Negative*

Nitrite: *Negative*

Urobilinogen: 0.1-1.0 EU/dL

White Blood Cells: 0-4/hpf

Red Blood Cells: 0-2 RBCs / hpf

Casts: 0-4/ hpf hyaline

Bacteria: Negative

Crystalluria

1. *Calcium oxalate crystals:* may occur with high intake of dietary oxalate (gelatin, strawberries, pepper, rhubarb, beans, beets, tomatoes, spinach, chocolate, cocoa, tea, pecans, peanuts, lime peel, okra.

Excretion is increased by vitamin C intake). It may also occur with malabsorption, pyridoxine deficiency and ethylene glycol intoxication.

2. *Uric acid crystals:* Occurs due to hyperurcemia.

3. *Calcium phosphate crystals:*

4. *Cystine crystals:* This happens due to cystinuria. Cystinuria is a disorder in which jejunal transport of dibasic amino acids (including the amino acid cystine) is defective in addition to excessive loss in urine. Clinical disease occurs due to the formation of cystine stones.

5. *Triple phosphate crystals* (Calcium magnesium ammonium phosphate):

These are usually associated with urine infected by urea splitting bacteria which cause infection, or 'triple phosphate' infection, or triple phosphate stones.

6. *Indinavir crystals*: are found in more than 30% of patients treated by this protease inhibitor.

Leukocyturia

Indicates inflammatory disease in the genito-urinary tract.

White cell casts

Indicates the renal origin of leukocytes (acute pyelonephritis).

Red cell casts

Indicate the renal origin of hematuria (glomerulonephritis).

Hyaline casts

Physiologic or due to many types of renal disease.

Epithelial (tubular) casts

They suggest tubular injury as in acute tubular necrosis. They may also be found in eclampsia, heavy metal poisoning, ethylene glycol intoxication and acute allograft rejection.

Granular casts

Fine granulations - Exercise and in a variety of glomerular and tubulointerstitial diseases.

Coarse granulations - Renal disease (acute tubular necrosis).

Waxy casts

Chronic renal failure

Fatty casts (lipiduria)

Nephrotic syndrome

Broad casts

Also known as renal failure casts. These originate from dilated chronically damaged tubules or collecting ducts. They can be granular or waxy.

Spermatozoa

Retrograde ejaculation.