

Urological Investigations

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Are generally divided into:

- **Laboratory studies**
- **Imaging studies**

Laboratory Studies

1-Examination of Urine:

I-Urinalysis:

Urinalysis is one of the most important and useful urologic tests available.

Reasons for inadequate urinalyses include:

- (1) improper collection,
- (2) failure to examine the specimen immediately.
- (3) incomplete examination.
- (4) inexperience of the examiner.
- (5) inadequate appreciation of the significance of the findings.

METHOD OF COLLECTION:

1. Adults —In men and women; it is usually simple to collect a clean-voided midstream urine sample . specimen can be obtain a by catheterization in women to eliminate nonvaginal sources of abnormal urinary constituents.

2. Children—Urine for analysis, other than bacterial cultures, can be obtained from males or females by covering the cleansed urethral meatus with a plastic bag; a urine specimen for culture may require catheterization or suprapubic needle aspiration.

Urinalysis include :

- Macroscopic examination
- Microscopic examination

Macroscopic Examination

A. COLOR & APPEARANCE

Urine is often colored owing to drugs ,eg. rifampin will turn it yellow-orange; Red urine does not always signify hematuria. A red discoloration may due to beet ingestion, ingestion of vegetable dyes, concentrated urate excretion, myoglobinuria from significant muscle trauma, or hemoglobinuria following hemolysis. Cloudy urine is commonly thought to represent pyuria.

B. SPECIFIC GRAVITY

The normal specific gravity of urine = 1.003–1.030

C. CHEMICAL TESTS: include :

- 1. pH** :the average urinary pH varies between 5.5 and 6.5. Patients with uric acid stones rarely have a urinary pH over 6.5, With urinary tract infections , the urinary pH tends to be over 7.
- 2. Protein** : *Transient* proteinuria can be caused by prolonged fever and excessive physical exertion. *Persistently* elevated protein levels in the urine (>150 mg/24 h) may indicate significant disease.
- 3. Glucose** : positive reading have been associated mostly with diabetes mellitus.
- 4. Hemoglobin** : microscopic analysis of the urinary sediment needed for confirmation because lyses of erythrocytes results in a positive reading for hemoglobin but no visible erythrocytes on microscopic analysis.
- 5. Bacteria and leukocytes:** Test strips to determine the number of bacteria (nitrite) or leukocytes (leukocyte esterase) as predictors of bacteriuria.

Microscopic Examination

- 1. Bacteria** —Just as the presence of bacteria in the sediment is not an absolute indication of infection, neither is the finding of pyuria.
- 2. Leukocytes** —In the sediment from clean-voided midstream specimens and those obtained by suprapubic aspiration or catheterization, a finding of more than 5 leukocytes per high-power field is generally considered abnormal (pyuria).
- 3. Erythrocytes**—The presence of even a few erythrocytes in the urine (hematuria) is abnormal and requires further investigation.
- 4. Epithelial cells**—Squamous epithelial cells in the urinary sediment indicate contamination of the specimen from the distal urethra in males and from the introitus in females.

5. Casts—Casts are not seen in normal urinary sediment; therefore, they commonly signify intrinsic renal disease. Examples of casts are leukocyte casts, epithelial cell casts, erythrocyte casts, hyaline casts and granular casts.

6. Other findings—like The finding of crystals in urine.

II-BACTERIAL CULTURES

The presumptive diagnosis of bacterial infection based on microscopic examination of the urinary sediment should be confirmed by culture. Cultures can be used to estimate the number of bacteria in the urine, to identify the exact organism present, and to predict which drugs will be effective in treating the infection.

III-Other Urine Tests

Many other tests of urine can be helpful in determining the presence of urologic disease like urine **cytology** and urinary **markers** for urological tumors. Samples of **24-hour urine collections** can be tested to determine abnormally high levels of calcium, uric acid, oxalate, magnesium, or citrate in patients with recurrent urolithiasis.

2-Examination of Discharge and Exudate:

I-EXAMINATION OF URETHRAL DISCHARGE

If the patient presents with the thick yellowish discharge typical of *Neisseria gonorrhoeae* infection, the discharge should be stained with Gram's stain and examined for gram-negative intracellular diplococci.

II-EXAMINATION OF VAGINAL EXUDATE

The underlying cause of vaginitis is often a viral, yeast, or protozoal infection or the presence of a foreign body (eg, retained tampon). Vaginal secretions can be examined either stained or unstained.

3-Examination of Blood, Serum and Plasma:

I-RENAL FUNCTION TESTS

- **Blood Urea Nitrogen**

Urea is the primary metabolite of protein catabolism and is excreted entirely by the kidneys. Unlike creatinine, however, BUN is influenced by dietary protein intake, hydration status, and gastrointestinal bleeding. therefore, an elevated BUN level is less specific for renal insufficiency than an elevated serum creatinine level.

- **Serum Creatinine**

The end product of the metabolism of creatine in skeletal muscle is normally excreted by the kidneys. the serum level is a direct reflection of renal function.

normal range of serum creatinine levels =0.8–1.2 mg/dL in adults; 0.4–0.8 mg/dL in young children . the serum creatinine level generally is not influenced by dietary intake or hydration status.

II-Complete Blood Count

Normochromic normocytic anemia is often seen with chronic renal insufficiency and hematuria. A specific increase in the number of erythrocytes, may be indicative of a paraneoplastic syndrome associated with renal cell cancer.

III-Electrolyte Studies

Serum electrolyte level should be evaluated in patients with renal insufficiency. Serum calcium determinations are useful in patients with calcium urolithiasis.

IV-Prostate Cancer Markers

Prostate-specific antigen (PSA) is an extremely important prostate cancer marker.

V-Hormonal Studies

Serum parathyroid hormone studies are useful in determining the presence of a parathyroid adenoma in patients with urolithiasis and an elevated serum calcium level. Studies of **adrenal steroid hormones** (eg, aldosterone, cortisol, epinephrine, norepinephrine) are useful in determining adrenal function or the presence of adrenal tumors.