

	<b>New Mexico VA Healthcare System Pathology &amp; Laboratory Medicine Service</b>	Issue Date: <b>01/08/11</b>	Document Identifier <b>SOP POC.0029</b>
Authorized by: <b>Larry Massie</b>	Version: <b>2</b>		Page 1 of 3
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<b>Title: Microscopic Examination of Urine Sediment</b>			
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## I. Principle

Urine constituents as found in the sediment of centrifuged urine specimens are important in ascertaining abnormal body function or disease states which may affect the urinary tract or kidneys. Unusual microscopic results should correlate with unusual or abnormal chemical dipstick results.

## II. Sample Collection and Processing

- A. Confirm the patient's identity prior to specimen collection using at least two unique identifiers.
- B. Label all specimens with the patient's name and Social Security number.
- C. A freshly voided urine specimen is required for routine microscopic urinalysis testing. The patient should be instructed to void into a clean, dry container. Mix well immediately before testing.
- D. The specimen should be examined within 1 hour of collection or may be refrigerated up to 4 hours. Bring the specimen to room temperature prior to testing.

## III. Equipment and Supplies

- A. Table-top centrifuge
- B. Centrifuge tubes and caps
- C. Microscope with 10X and 40X objective
- D. Microscope slides and coverslips
- E. Test tube rack

## IV. Procedure

### A. Centrifugation of Urine

1. Agitate the urine to stir up any sediment that may have settled to the bottom.
2. Pour approximately 10 ml of urine into a disposable conical centrifuge tube and cap. Place in the centrifuge with a balance tube. Close centrifuge and centrifuge for 5 minutes at 2500 RPM.
3. Pour the supernatant off into a sink or waste container. Mix the sediment by gently tapping the bottom of the tube on a flat surface 3-4 times.

4. Draw up a small amount of the sediment into a disposable glass or plastic pipette and put one small drop onto the glass slide. Cover the drop with a coverslip and examine microscopically.
- B. MICROSCOPIC EXAM:** Examine certain elements of the sediment under low power (10X) and others under high power (40X) as indicated below:
1. Low Power (10X): Casts, epithelial cells, crystals (high power may be needed for identification), amorphous material and mucous threads.
  2. High Power (40X): Erythrocytes, leukocytes, bacteria, yeast, Trichomonas and sperm.
- C. REPORTING OF RESULTS:**
1. Record all results on the patient log sheet. Date and initial by the person performing the tests. Report results as follows:
    - a. Casts are reported as number per low power field (lpf).
    - b. Erythrocytes and leukocytes are reported as number per high power field (hpf).
    - c. Amorphous material, crystals, mucous threads and bacteria are reported as small, moderate or large amounts.
    - d. Yeast, trichomonas and sperm as present.
- NOTE:** Urine microscopic presenting with casts, crystals and other unusual elements will, at the discretion of the physician, be submitted to the laboratory/contract laboratory for complete evaluation.
2. When the testing is complete, record urine sediment examination results in the patient's electronic medical record.

#### V. Quality Control

- A. Commercial Quality Control material is not applicable for urine microscopic examination. However, there must be adequate and varied reference material posted at the microscopic bench in order to compare and identify microscopic elements correctly. In addition, the persons performing the testing must have urinalysis reference books and materials available at all times.
- B. Unknown CAP challenges will be performed periodically in order to measure competency in the performance of microscopic examination. Annual competency slides/photographs will be performed by each provider and evaluated.
- C. Centrifuge maintenance and QC must be performed as specified on the Centrifuge Maintenance Check-Off Sheet. Centrifuge speed should be checked with a tachometer monthly to read  $2500 \pm 500$  RPM. Contact Biomedical Engineering for centrifuge speed check. Centrifuge timer should be checked by comparison to a clock or stopwatch  $\pm 30$  seconds. If the centrifuge QC does not conform to the proper times, contact the main laboratory urinalysis supervisor. Centrifuges should be cleaned weekly.

VI. Interpretation/Normal Ranges

A. CORRELATION: Microscopic results should correlate with the dipstick result. Correlation should be as follows:

1. Positive blood on Dipstick should correlate with RBC's found on microscopic exam as follows:
  - dipstick 1+ = approximately 5 to 25 RBC's/HPF;
  - dipstick 2+ = approximately 25 to 50 RBC's/HPF
  - dipstick 3+ = approximately 50 to TNTC/HPF.Microscopic exam may have a lower number of RBC's due to lysing.
2. Positive protein on Dipstick usually is associated with WBC's, RBC's or casts present microscopically.
3. Positive nitrite on Dipstick usually is associated with gram negative bacteria in the urine.
4. Positive leukocyte on dipstick is usually associated with granulocytic leukocytes of 5 or greater/hpf present in the urine. Leukocytes may lyse in urine resulting in strong positive dipstick result with few or no WBC's present.

B. Normal Findings:

1. Epithelial cells may be present in normal urine; few in male urine; moderate in female urine.
2. WBC - 0-3/hpf, RBC - 0-2/hpf, crystals, not representative of a disease state and mucus may be present. Hyaline casts may be present on prolonged standing or exertion.
3. Increase in above or presence of other cellular elements is evaluated in terms of the patient's clinical findings.

VII. References

- A. Free and Free, Urodynamics - Concepts relating to Urinalysis; Ames Company, Division of Miles Laboratories, 1974.
- B. Davidsohn and Henry, Clinical Diagnosis by Laboratory Methods; 18th Edition, W. B. Saunders Company, 1991.
- C. Hepler, A., Manual of Clinical Laboratory Methods; C. C. Thomas Publisher, 4th edition, 12th printing, 1962.
- D. Roche CHEMSTRIP 10 SG package insert, 2007.