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Examination of Urinary Sediment by Phase Microscopy - Royal Oak

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

A. Centrifuged urine sediments may contain formed elements that have filtered through the glomerulus and/or passed through the tubules of the kidney and lower urinary tract. Exfoliated epithelial cells, erythrocytes, leukocytes, and casts formed in the renal tubules and collecting ducts are the formed elements frequently seen. Organisms (bacteria, fungi, parasites) represent foreign elements. Proper identification of these elements may provide diagnostic clues as to the etiology of urinary system disorders.

B. Crystals are identified based on urinary pH, morphology, and patient drug therapy history or additional testing, where such is useful.

C. Contaminants and artifacts must be recognized and differentiated from elements of clinical significance.

II. SPECIMEN COLLECTION AND HANDLING:

A freshly voided urine specimen must be examined because cells and casts begin to lyse within two hours. If the urine cannot be examined within one to two hours of voiding, it should be refrigerated before and after transportation. A volume of 10 – 12 mL urine is optimal for microscopic exam of sediment.

III. REAGENTS:

A. 12 mL graduated disposable centrifuge tube

B. Coverslips

C. 3% acetic acid

D. Nikon phase / polarizing microscope

IV. PROCEDURE:

A. Pour 8 mL of a well-mixed urine specimen into a graduated disposable centrifuge tube. (See Routine Urinalysis Procedure for preliminary physical and chemical testing protocol).

B. Centrifuge at 450 g (1600 – 1700 rpm in Dynac III Centrifuge) for **five** minutes.

C. Decant supernatant from centrifuged urine, leaving 0.5 mL total volume in the tube.

D. Resuspend sediment thoroughly by flicking the tube several times.

E. Place one drop of resuspended sediment onto a microscope slide and coverslip the slide. The specimen should NOT ooze out from under the coverslip edges if the drop is of a proper size.

F. Scan the slide for even sample distribution using the low power (10x) phase objective.

G. Change to high power phase (40x) and examine a minimum of 10 fields. Identify and count red blood cells (RBC), white blood cells (WBC), and renal epithelial cells. Average and report as cells per hpf (high power field). Report other hpf elements as indicated below (see table).

H. Return to low power phase (10x) to examine a minimum of 10 fields. Identify each cast type. Report as "present" for each type of cast seen. Use high power as needed to identify casts by type. Report other lpf (low power field) elements as indicated below (see table).

I. Polarize any specimen as necessary to aid in the identification of suspected fat, fatty casts, oval fat bodies, and crystals. (See Use of Nikon Phase Microscopes Procedure).

J. It may be helpful to treat an aliquot of sediment with 3% acetic acid and replate a slide. The RBC's will lyse and WBC nuclei will become readily visible. This aids in the differentiation of RBC's from yeast and WBC's from renal tubular epithelial cells.

K. Report the confirmatory test as necessary for positive bilirubin. See specific procedure and protocol for this test.

L. Review the entire report, including the physical, chemical and microscopic results. **ALWAYS** correlate the microscopic findings with the physical / chemical findings (dipstick). Correlate urinalysis results with available clinical information (Lab Result Query in LIS [Laboratory Information System]) when appropriate. **DISCREPANCIES MUST BE RESOLVED** before releasing the report.

M. Repeat dipstick, centrifuge another aliquot of urine and re-examine the sediment, or request a fresh specimen as appropriate.

MICROSCOPIC REPORT FOR URINARY SEDIMENT		
ELEMENT		**QUANTITY**
RBC/hpf		0-2, 3-5, 6-10, 11-20, >20
WBC/hpf		0-5, 6-10, 11-20, 21-50, >50
Squamous, epithelial/lpf		None seen, 1-5 (occasional), 6-30 (small), 31-50 (moderate), >50 (lg)
Hyaline Casts/lpf		0-2, 3-5, 6-10, 11-20, >20

Bacteria/hpf		Negative, 1+, 2+, 3+, 4+
NOTE For quantitation of bacteria, when examining the high-power field if ¼ of the field has bacteria, this is = to 1+; ½ of field is = to 2+; ¾ of field is equal to 3+; and if the bacteria is covering the entire viewing area, this is = to 4+.		
ELEMENT	**TYPE**	**IF SEEN, THEN REPORT:**
Path Casts	Granular	Present
	WBC	Present
	RBC*	Present
	Renal Tubular	Present
	Waxy	Present
	Broad	Present
	Fatty	Present
***If RBC casts are seen, confirmation must be done by a manager, a Lead or another experienced urinalysis technologist before releasing the Urinalysis report.**		
ELEMENT	**TYPE**	**QUANTITY / PRESENT**
EPI, Other	Squamous, lpf	Occasional, 1-5, 6-15, >15
	Transitional/lpf	Occasional, 1-5, 6-15, >15
	Renal Tubular/hpf	Occasional, 1-5, 6-15, >15
Crystals	NH3 Biurate or Tyrosine	Present
	Amorphous or Hippuric Acid	Present
	Bilirubin or Triple Phosphate	Present
	Calcium Carbonate or Cystine	Present
	Calcium Oxalate or Leucine	Present
	Calcium Phosphate or Sulfa	Present
	Cholesterol or Uric Acid	Present
Other/hpf	Yeast, budding/hpf	Rare, Few (1-5), Moderate (6-10), Many (>10)
	Yeast, pseudohyphae	Rare, Few (1-5), Moderate (6-10), Many (>10)
Other	Spermatozoa	Present
	Trichomonas	Present

V. CALCULATIONS AND INTERPRETATIONS:

Several excellent reference texts and atlases are readily available to the urinalysis technologist for help in identification of sediment elements. See suggested list of references below.

VI. REFERENCE RANGE:

ELEMENT	REFERENCE RANGE
WBC	< 5 per hpf
RBC	< 2 per hpf
Bacteria	Negative per hpf
Casts	0-2
Epithelia	None seen

VII. REFERENCES:

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6. Graff, Sister Laurine, A Handbook of Routine Urinalysis, Philadelphia, J.B. Lippincott Co., 1983.
7. Strasinger, S.K., Urinalysis and Body Fluids, 2nd edition, Philadelphia, F.A. Davis Co., 1989.

Approval Signatures

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