Status **Active** PolicyStat ID **13365411**

Beaumont

Origination	2/8/2023
Last Approved	4/17/2023
Effective	4/17/2023
Last Revised	4/17/2023
Next Review	4/16/2025

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Area	Laboratory-Chemistry
Applicability	Royal Oak

Leukocyte Esterase in Urine (Multistix 10 SG) - Royal Oak

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

A. Granulocytic leukocytes contain esterases that catalyze the hydrolysis of the derivatized pyrrole amino acid ester to liberate 3-hydroxy-5-phenyl pyrrole. This pyrrole then reacts with a diazonium salt to produce a purple product. The esterase level in urine correlates with the number of neutrophils present, and the test will detect both lysed and intact white blood cells.

B. Increased leukocytes in the urine, especially neutrophils, are seen in almost all renal diseases including calculi, tumors, and urinary tract infections. WBCs may also transiently appear following strenuous exercise and with fever. The common finding of leukocytes in urine is not as reliable an indicator of urinary tract infection as the detection of bacteriuria by gram stain or culture of a fresh midstream specimen.

C. This document describes the steps for this procedure to assist technologists.

II. SPECIMEN COLLECTION AND HANDLING:

Fresh, well-mixed, uncentrifuged urine. It is recommended that testing be done within one hour after voiding. Otherwise immediately refrigerate the specimen and return to room temperature before testing.

III. REAGENTS/SUPPLIES:

A. Siemens Multistix 10 SG (#2161)

B. 0.4% weight for weight (w/w) derivatized pyrrole amino acid ester

C. 0.2% w/w diazonium salt

D. 40.9% w/w buffer

E. 58.5% w/w nonreactive ingredients

IV. QUALITY CONTROL (QC):

A. Both Normal and Abnormal KovaTrols are run and results are recorded:
    1. At the beginning of each shift
    2. Whenever a new lot number of reagent strips is opened
    3. Whenever a new shipment of reagent strips is received
    4. Whenever troubleshooting warrants it

V. PROCEDURE:

A. Briefly dip the test area of the strip in fresh, **well-mixed** uncentrifuged urine

B. While removing the strip, run the edge against the rim of the urine container to remove excess urine. Hold the strip in a horizontal position to prevent mixing of chemicals from adjacent reagent areas and/or contaminating the hands with urine.
    1. If reading visually compare the **LEUKOCYTE** reagent area to the corresponding Color Chart on the bottle label at **2 minutes**. Hold strip close to color blocks and match carefully.
    2. If reading instrumentally, follow directions given in the Clinitek Advantus procedure.

VI. REPORTABLE RANGE:

A. The Clintek reports leukocyte esterase as Negative, Trace, 1+, 2+, 3+.

B. Multistix 10SG (backup) has a color comparison chart with **FIVE** color blocks ranging from buff through purple. These represent leukocyte esterase as negative or present in increasing amounts. Report results as follows:
    1. Negative
    2. Trace
    3. 1+ (small)
    4. 2+ (moderate)
    5. 3+ (large)

VII. REFERENCE RANGE:

Negative

VIII. SENSITIVITY:

5-15 cells/hpf (high power field)

IX. INTERPRETATION:

A. Positive results (small or greater) are clinically significant. Individually observed trace results may be of questionable significance; however, trace results observed repeatedly may be clinically significant. Positive and repeated trace results indicate the need for further testing of the patient and/or urine specimen, according to medically accepted procedures for pyuria. Positive results may occasionally be found with random specimens from females due to contamination of the specimen by vaginal discharge. Microscopic examination should however aid in differentiation from a urinary tract source, as squamous epithelial cells and bacteria are increased in the vaginal source.

B. Dipstick results should be correlated with WBC findings in the microscopic exam prior to releasing the Urinalysis report.

X. LIMITATIONS/INTERFERING SUBSTANCES:

A. Trichomonas and eosinophils may represent sources of esterases and cause a false positive result.

B. Refer to the table below from Ames, Miles Inc. 1991

Factors Affecting Urine Chemistry Tests for Leukocytes	
Constituents Affecting Leukocyte Results	**Clinitek Advantus**
Elevated glucose concentrations (≥ 3 g/dL)	May cause false positive
High specific gravity	May cause decreased test results
Presence of cephalexin (Keflex**), cephalothin (Keflin**), or high concentrations of oxalic acid	May cause decreased test results
Boric Acid	May cause decreased test results
High levels of Tetracycline	May cause false negative
Any substance causing abnormal urine color	May obscure the color reaction
Formalin, oxidizing agent	May cause decreased test results

XI. REFERENCES:

1. Multistix 10 SG, Miles Inc. Diagnostic Division, Elkhart, IN 46515, rev. 04/99.
2. Henry, J.B. Clinical Diagnosis and Management by Laboratory Methods, 20th edition, Philadelphia, W.B. Saunders Co., 2001, p. 385.
3. Hundley, J.M. and Fleming, J.K., Urine Analysis American Society of Clinical Pathologists Workshop, Dearborn, MI, 1991.

4. Ames, Miles, Inc.,1991.

Approval Signatures

Step Description	Approver	Date
Medical Director	Ann Marie Blenc: System Med Dir, Hematopath	4/17/2023
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