

Beaumont

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Ketones in Urines (Multistix 10 SG) - Royal Oak

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

- A. Ketone bodies are the products of incomplete fat metabolism. In ketonuria, the three-ketone bodies present in the urine are acetoacetic acid (20%), acetone (2%), and B-hydroxybutyrate (78%). Acetone is formed non-reversibly from acetoacetic acid. B-hydroxybutyrate forms reversibly from acetoacetic acid.
- B. Ketonuria may be seen in uncontrolled diabetes mellitus, vomiting, starvation, dieting, pregnancy, strenuous exercise, and certain inherited metabolic diseases with abnormalities of carbohydrate or lipid metabolism. Ketones may appear in urine in large amounts before serum ketone is elevated.
- C. The Multistix test is based on the development of colors ranging from buff-pink to purple when acetoacetic acid reacts with nitroprusside in the presence of a buffer. This test does not react with acetone. Nor does it measure the predominant ketone, B-hydroxybutyrate. (Serum beta hydroxybutyrate measurements are performed in Urgent Chemistry).
- D. 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 refrigerate the urine in a closed container, and return to room temperature before testing. Bacterial action on urine will cause loss of acetoacetic acid in vivo and in vitro.

III. REAGENTS/SUPPLIES:

- A. Siemens Multistix 10 SG (#2161)

- B. 7.1% weight for weight (w/w) sodium nitroprusside
- C. 92.9% w/w buffer
- D. This test pad is extremely sensitive to moisture and can quickly become inactivated.

IV. QUALITY CONTROL (QC):

- A. Both Normal and Abnormal Kova-Trols 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 **KETONE** reagent area to the corresponding Color Chart on the bottle label at **40 seconds**. Hold strip close to color blocks and match carefully.
 - 2. If reading instrumentally, follow directions given in the Clinitek Advantus procedure.

VI. REPORTABLE RANGE:

The Multistix 10SG has a color comparison chart with **SIX** color blocks ranging from buff pink to purple. These represent Ketones (acetoacetic acid) as negative or present in increasing amounts. To maintain consistency of reporting between visual and instrument reads, blocks 5 and 6 will be combined so that results will be reported as follows:

Negative	---
Trace	5 mg/dL
1+ (Small)	15 mg/dL
2+ (Moderate)	40 mg/dL
3+ (Large)	≥80 mg/dL

VII. REFERENCE RANGE:

Negative

VIII. SENSITIVITY:

5-10 mg/dL acetoacetic acid

IX. INTERPRETATION:

Detectable levels of ketone may occur in urine during physiological stress conditions such as fasting, starvation or with other abnormalities of carbohydrate or lipid metabolism, ketones may appear in urine in large amounts before serum ketone concentrations are elevated.

X. LIMITATIONS/INTERFERING SUBSTANCES:

- A. False positive results (trace or less) may occur with highly pigmented urines.
- B. False positive reactions occur after the use of phthaleins (BSP or PSP dyes), in the presence of large amounts of phenylketones, the preservative 8-hydroxyquinoline, L-dopa metabolites, and with antihypertensive drugs (methyl dopa, captopril).
- C. Compounds such as mesna (2-mercaptoethane sulfonic acid) that contain sulfhydryl groups may cause false positive results or an atypical color reaction.
- D. Moisture will markedly deteriorate the Multistix reagents to cause false negatives.

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. 379-380.
- 3. Hundley, J.M. and Fleming, J.K., Urine Analysis American Society of Clinical Pathologists Workshop, Dearborn MI, 1991.

Approval Signatures

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