TRICORE REFERENCE LABORATORIES

NEW QUANTITATIVE TEST KETONE BETA-HYDROXYBUTYRATE

Effective December 13, 2016, TriCore changed to a new quantitative test to measure ketones in plasma or serum. The new test, Ketone Beta-hydroxybutyrate (KETBHB), measures Beta-hydroxybutyrate (BHB) and is not directly comparable to the previous test measuring acetoacetate. BHB shows different clearance during treatment of ketoacidosis. As diabetic ketoacidosis (DKA) is treated, serum BHB decreases more consistently than acetoacetate which is converted to BHB and does not change as rapidly.

CLINICAL UTILITY

BHB is the predominate ketone present during DKA and trends with a patient's clinical status. Because KETBH is quantitative, it can be used for monitoring ketosis to resolution. Additionally, BHB can be used to clinically diagnose and monitor the disease status or severity of alcoholism, glycogen storage disease, high fat/low carbohydrate diets, pregnancy, alkalosis, ingestion of isopropyl alcohol, and salicylate poisoning. In these situations the levels are usually above the normal range which is up to 0.27 mml/L, but often do not reach the threshold for DKA diagnosis.

RESULTS INTERPRETATION FOR BETA-HYDROXYBUTYRATE LEVELS

Range mmol/dL	Interpretation	Sensitivity for DKA	Specificity for DKA
<0.27	no ketoacidosis, normal range		
0.28-1.5	DKA not entirely excluded, other conditions should be considered		
1.5-3.0 children	DKA possible in diabetics with >250mg/dL glucose	98-100%	78-93%
1.5-3.8 adults	DKA possible in diabetics with >250mg/dL glucose	98-100%	78-93%
>3.0 children >3.8 adults	Near diagnostic of DKA in diabetic patient	near 100%	93-94%

1. A Beta-hyroxybutyrate level of more than 1.5 mmol/L had sensitivity ranging from 98-100% and specificity ranging from 78.6-93.3% for the diagnosis of diabetic ketoacidosis in diabetic patients presenting to the Emergency Department (ED) with blood glucose levels of more than 250mg/dL. In two other large studies, a cut-off value of 3 mmol/L (children) or 3.8mmol/L (adults) in patients presenting to the ED with hyperglycemia had sensitivity of almost 100% and specificity of 92.89-94% for the diagnosis of diabetic ketoacidosis. A serum bicarbonate HCO3 level of 18 mEq/L corresponded with BHB levels of 3.0 and 3.8 mmol/L.

2. The predictive value of levels between 1.5 and 3.8mmol/L depends on the clinical situation, in particular whether the patient is a known diabetic or has other conditions that can cause ketoacidosis. The available test reports up to 2.0 mmol/L. Please call your on-site laboratory if there is a need for more precise quantification for levels >2.0 mmol/L.

In TriCore's validation studies we found that the new test (KETBHB) was 80% concordant with the discontinued test (KETONE). There was 100% agreement with the discontinued test KETONE (acetoacetate) on positive test results.

Of the 20% discrepant tests with negative acetoacetate tests and BHB >0.27 (normal range), only one BHB significantly exceed the threshold of 1.5 mmol/L; this patient did have a clinical diagnosis of DKA without coma. All other patients had a variety of conditions leading to increased ketone without serious acidosis, such as fasting due to gastrointestinal disorders, alcoholic liver disease, or diabetics with elevated glucose levels <250mg/dL. We conclude that a positive acetoacetate test correlates with a BHB value of 1.5 mmol/L or higher.

- over -

TRICORE REFERENCE LABORATORIES

NEW QUANTITATIVE TEST
KETONE BETA-HYDROXYBUTYRATE, CONTINUED

For more information, please refer to TriCore's test directory on TriCore.org.

TEST CODE	CPT CODE	METHODOLOGY	TESTING PERFORMED	REPORTED
KETBHB	82010	Reflectance photometry	daily	20-30 min from receipt at lab
COLLECTION				
Specimen	plasma or serum			
Collection Containers	aliquot plasma aliquot serum serum separator lithium heparin plasma red top, serum plasma separator tube			
Rejection Criteria	refrigerated specimens >7 days old anticoagulants other than heparin			
PROCESSING				
Specimen Processing Instructions	Allow serum specimen to clot. Centrifuge specimen immediately to separate serum or plasma from cells. If using non-gel barrier tube, transfer serum or plasma into transport tube ASAP. Keep refrigerated during shipping and storage			
Processed Amounts	Preferred 2.0 ml Minimum 1.0 ml			
SHIPPING/TRANSPORT AND STORAGE				
Stabilities/Storage (*Collection to initiation of testing*)	**Temperature** **Stability** Ambient 24 hours Refrigerated 7 days			
Shipping Instructions	Ship refrigerated			

REFERENCES

[1] Mae Sheikh-Ali, MD; John M. Miles, MD et al. Can Serum-Hydroxybutyrate Be Used To Diagnose Diabetic Ketoacidosis? Diabetes Care, Volume 31, Number 4, April 2008

[2] Beta-Hydroxybutyrate: Reference Range, Interpretation, Collection and Panels; http://emedicine.medscape.com/article/2087381-overview