Test Definition: BHYD

Beta-Hydroxybutyrate, Serum

Overview

Useful For

Monitoring therapy for diabetic ketoacidosis

Investigating the differential diagnosis of any patient presenting to the emergency room with hypoglycemia, acidosis, suspected alcohol ingestion, or an unexplained increase in the anion gap

In pediatric patients, the presence or absence of ketonemia/uria is an essential component in the differential diagnosis of inborn errors of metabolism

Serum beta-hydroxybutyrate is a key parameter monitored during controlled 24-hour fasts

Method Name

Photometric

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 1 mL
Collection Instructions:
1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged, and the serum aliquoted into a plastic vial within 2 hours of collection.

Specimen Minimum Volume

0.25 mL

Reject Due To

Gross hemolysis	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	7 days	
	Refrigerated	7 days	

Clinical & Interpretive

Clinical Information

Beta-hydroxybutyrate (BHB) is 1 of 3 sources of ketone bodies. Its relative proportion in the blood (78%) is greater than the other 2 ketone bodies, acetoacetate (20%) and acetone (2%). During carbohydrate deprivation (starvation, digestive disturbances, frequent vomiting), decreased carbohydrate utilization (diabetes mellitus), glycogen storage diseases, and alkalosis, acetoacetate production increases. The increase may exceed the metabolic capacity of the peripheral tissues. As acetoacetate accumulates in the blood, a small amount is converted to acetone by spontaneous decarboxylation. The remaining and greater portion of acetoacetate is converted to BHB.

Reference Values

<0.4 mmol/L

Interpretation

The beta-hydroxybutyrate (BHB)/acetoacetate ratio is typically between 3:1 and 7:1 in severe ketotic states.

Serum BHB increases in response to fasting, but should not exceed 0.4 mmol/L following an overnight fast (up to 12 hours).

In pediatric patients, a hypo- or hyper-ketotic state (with or without hypoglycemia) may suggest specific groups of metabolic disorders.

Cautions

Twenty four-hour fasting tests should not be performed in patients <2 years of age.

Dipstick serum ketone determination using nitroprusside reagent is often used to estimate ketone body status, but that method has inherent problems. The dipstick does not measure beta-hydroxybutyrate, the most abundant of the physiological ketone bodies; the nitroprusside reagent only reacts with acetoacetate and acetone.

Clinical Reference

1. Tietz Textbook of Clinical Chemistry. Edited by CA Burtis, ER Ashwood. Philadelphia, WB Saunders Co. 1999
2. Vassault A, Bonnefont JP, Specola N, et al: Lactate, pyruvate, and ketone bodies. In Techniques in Diagnostic Human Biochemical Genetics - A Laboratory Manual. Edited by F Hommes. New York, Wiley-Liss, 1991
3. Bonnefont JP, Specola NB, Vassault A, et al: The fasting test in paediatrics: application to the diagnosis of pathological hypo- and hyperketotic states. Eur J Pediatr 1990;150:80-85

Performance

Method Description
Beta-hydroxybutyrate (D-3-hydroxybutyrate) in the presence of nicotinamide adenine dinucleotide (NAD[+]) is converted to acetoacetate and NADH at pH 8.5 by beta-hydroxybutyrate dehydrogenase (D-3-hydroxybutyrate dehydrogenase). At this pH, the reaction is favored to the right. The NADH is converted to a colored compound using INT and diaphorase to produce color at 505 nm.(Package insert: Stanbio Beta-hydroxybutyrate LiquiColor. Procedure No. 2440; DN: RBR.2440.00. Stanbio Chemistry; 08/2025)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available
Same day/1 to 2 days

Specimen Retention Time
1 week

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
82010

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
BHYD	Beta-Hydroxybutyrate, S	6873-4

Result ID	Test Result Name	Result LOINC® Value
BHYD	Beta-Hydroxybutyrate, S	6873-4