MAYO CLINIC LABORATORIES

Test Definition: LDBF

Lactate Dehydrogenase (LDH), Body Fluid

Overview

Useful For

Identification of exudative pleural effusions

Lactate dehydrogenase in pericardial fluids is **not diagnostically useful**.

Method Name

Photometric

NY State Available

No

Specimen

Specimen Type

Body Fluid

Necessary Information

1. Date and time of collection are required.

2. Specimen source is required.

Specimen Required

Specimen Type: Body fluid

Preferred Source:

-Peritoneal fluid (peritoneal, abdominal, ascites, paracentesis)

-Pleural fluid (pleural, chest, thoracentesis)

-Drain fluid (drainage, Jackson Pratt [JP] drain)

-Pericardial

-Synovial

-Cerebral spinal fluid

Acceptable Source: Write in source name with source location (if appropriate)

Collection Container/Tube: Sterile container

Submission Container/Tube: Plastic vial

Specimen Volume: 1 mL

Collection Instructions:

1. Centrifuge to remove any cellular material and transfer into a plastic vial.
2. Indicate the specimen source and source location on label.

Specimen Minimum Volume

0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject
Anticoagulant or additive, Breast milk, nasal secretions, gastric secretions, bronchoalveolar lavage (BAL) or bronchial washings, colostomy/ostomy, feces, saliva, sputum, urine, or vitreous fluid	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Body Fluid	Ambient (preferred)	7 days	
	Refrigerated	48 hours	

Clinical & Interpretive

Clinical Information

Lactate dehydrogenase (LDH) activity is present in all cells of the body with the highest concentrations in the heart, liver, muscle, kidney, lung, and erythrocytes.

Pleural fluid:
Pleural fluid is normally present within the pleural cavity surrounding the lungs, serving as a lubricant between the lungs and inner chest wall. Pleural effusion develops when the pleural cavity experiences an overproduction of fluid due to increased capillary hydrostatic and osmotic pressure that exceeds the ability of the lymphatic or venous system to return the fluid to circulation. Laboratory-based criteria are often used to classify pleural effusions as either exudative or transudative. Exudative effusions form due to infection or inflammation of the capillary membranes allowing excess fluid into the pleural cavity. Patients with these conditions benefit from further investigation and treatment of the local cause of inflammation. Transudative effusions form due to systemic conditions such as volume overload, end stage kidney disease, and heart failure that can lead to excess fluid accumulation in the pleural cavity. Patients with transudative

effusions benefit from treatment of the underlying condition.(1) Measurement of LDH in body fluids is primarily indicated to aid in the differentiation of transudative and exudative effusions as LDH activity is considered an indicator of the extent of inflammation. Dr. Richard Light derived criteria in the 1970s for patients with pleural effusions that are still used today.(2)

The criteria include the measurement of total protein and LDH in pleural fluid and serum. Exudates are defined as meeting one of the following criteria:
1. Pleural fluid-to-serum protein ratio above 0.5
2. Pleural fluid LDH above two-thirds the upper limit of normal serum LDH
3. Pleural fluid-to-serum LDH ratio above 0.6

Pericardial fluid:
The routine analysis of LDH to differentiate exudative and transudative pericardial effusions is not considered helpful.(3)

Peritoneal fluid:
Spontaneous bacterial peritonitis or ascitic fluid infection is common (12%) at the time of admission of a patient with cirrhosis and ascites. The diagnosis is made in the presence of an elevated ascitic fluid absolute polymorphonuclear (PMN) leukocyte count (ie, >250 cells/mm(3) [0.25 x 10(9)/L]) without an evident intra-abdominal, surgically treatable source of infection.(4)

Secondary bacterial peritonitis (ie, ascitic fluid infection caused by a surgically treatable intra-abdominal source) can masquerade as spontaneous bacterial peritonitis. Signs and symptoms do not help separate patients who need surgical intervention from those who have spontaneous bacterial peritonitis and need only antibiotic treatment. In contrast, the initial ascitic fluid analysis and the response to treatment can assist with this important distinction. The characteristic analysis in the setting of free perforation is PMN count of 250 cells/mm(3) (usually many thousands) or higher, multiple organisms (frequently including fungi and enterococcus) on Gram stain and culture, and at least 2 of the following criteria: total protein above 1 g/dL, LDH above the upper limit of normal for serum, and glucose below 50 mg/dL. Studies have reported higher than 95% sensitivity but low specificity using these criteria; a computerized tomographic scan was diagnostic in 85% of patients with secondary peritonitis.(5)

Reference Values

An interpretive report will be provided.

Interpretation

Pleural fluid lactate dehydrogenase (LDH) to serum LDH ratios above 0.6 are most consistent with exudative effusions.(2,6)

Peritoneal fluid LDH above 220 U/L suggests secondary, rather than spontaneous bacterial peritonitis, in conjunction with other laboratory, imaging, and clinical findings.(4,5)

Synovial fluid LDH may be elevated greater than plasma or serum LDH due to inflammatory causes. Values should be interpreted in conjunction with other clinical findings.(7)

All other fluids: LDH may be used to differentiate transudative from exudative effusions. The decision limits are not well defined in fluids other than pleural fluid and should be interpreted in conjunction with other clinical findings.

Cautions

Lactate dehydrogenase (LDH) activity is one of the most sensitive indicators of in vitro hemolysis. Causes can include transportation via pneumatic tube and vigorous mixing.

Contamination with erythrocytes will elevate results, because the analyte level in erythrocytes is higher than in normal sera. The level of interference may be variable depending on the content of analyte in the lysed erythrocytes.

In very rare cases of gammopathy, in particular Waldenstrom macroglobulinemia type IgM, may cause unreliable results.

Clinical Reference

1. Block DR, Florkowski CM. Body fluids. In: Rifai N, Horvath AR, Wittwer CT. eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:chap 43
2. Light RW, Macgregor I, Luchsinger PC, Ball WC. Pleural effusions: the diagnostic separation of transudates and exudates. Ann Intern Med. 1972;77(4):507-513
3. Ben-Horin S, Bank I, Shinfeld A, et al. Diagnostic value of the biochemical composition of pericardial effusions in patients undergoing pericardiocentesis. Am J Cardiol. 2007;99(9):1294-1297
4. Soriano G, Castellote J, Alvarez C, et al. Secondary bacterial peritonitis in cirrhosis: a retrospective study of clinical and analytical characteristics, diagnosis and management. J Hepatol. 2010;52(1):39-44
5. Sahn, SA. Getting the most from pleural fluid analysis. Respirology. 2012;17(2):270-277
6. Tarn AC, Lapworth R. Biochemical analysis of ascitic (peritoneal) fluid: what should we measure? Ann Clin Biochem. 2010;47:397-407
7. Pejovic M, Stankovic A, Mitrovic DR. Lactate dehydrogenase activity and its isoenzymes in serum and synovial fluid of patients with rheumatoid arthritis and osteoarthritis. J Rheumatol. 1992;19:529-533
8. Nandakumar V, Dolan C, Baumann NA, et al. Effect of pH on the quantification of body fluid analytes for clinical diagnostic testing. Am J Clin Path. 2019;152(1):S10-S11

Performance

Method Description

Lactate and nicotinamide adenine dinucleotide, in the presence of lactate dehydrogenase, are converted to pyruvate and NADH. The rate at which NADH is formed is determined by increase in absorbance and is directly proportional to enzyme activity.(Package insert, LDHI2, Lactate Dehydrogenase acc. to IFCC., Roche Diagnostics; v11.0, 01/2017)

PDF Report

No

Day(s) Performed

Monday through Saturday

Report Available

Same day/1 to 2 days

Specimen Retention Time

1 week

Performing Laboratory Location

Mayo Clinic Jacksonville Clinical Lab

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 modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

83615

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
LDBF	Lactate Dehydrogenase (LD), BF	14803-1

Result ID	Test Result Name	Result LOINC® Value
LD_BF	Lactate Dehydrogenase (LD), BF	14803-1
FLD11	Fluid Type, Lactate Dehydrogenase	14725-6