Test Definition: FMB

Fetomaternal Bleed, Flow Cytometry, Blood

Overview

Useful For

Determining the volume of fetal-to-maternal hemorrhage for the purposes of recommending an increased dose of the Rh immune globulin

Method Name

Flow Cytometry

NY State Available

No

Specimen

Specimen Type

Whole Blood EDTA

Ordering Guidance

This test is for the detection of fetal bleed, it should not be used to detect the hereditary persistence of fetal hemoglobin (HPFH) or to detect fetal maternal hemorrhage in a mother with HPFH. For HPFH diagnosis, order HBEL1 / Hemoglobin Electrophoresis Evaluation, Blood.

NY State Clients: Testing is available; order FMBNY / Fetomaternal Bleed, New York, Blood.

Shipping Instructions

Specimen must arrive within 5 days (preferably 24-72 hours) of collection.

Specimen Required

Container/Tube: Lavender top (EDTA)
Specimen Volume: 6 mL
Collection Instructions:
1. **Fill evacuated tube as completely as possible.**
2. **Do not centrifuge.**
3. Invert several times to mix blood.
4. Send whole blood specimen in original tube. **Do not aliquot** as aliquoting into or out of a sample tube can adversely affect test results.

Specimen Minimum Volume

1 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject
Clotted blood	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole Blood EDTA	Refrigerated (preferred)	5 days	
	Ambient	5 days	

Clinical & Interpretive

Clinical Information

In hemolytic disease of the newborn, fetal red blood cells become coated with IgG alloantibody of maternal origin, which is directed against an antigen on the fetal cells that is of paternal origin and is absent on maternal cells. The IgG-coated cells undergo accelerated destruction, both before and after birth. The clinical severity of the disease can vary from intrauterine death to hematological abnormalities detected only if blood from an apparently healthy infant is subject to serologic testing.

Pregnancy causes immunization when fetal red blood cells possessing a paternal antigen foreign to the mother enter the maternal circulation, an event described as fetomaternal hemorrhage (FMH). FMH occurs in up to 75% of pregnancies, usually during the third trimester and immediately after delivery. Delivery is the most common immunizing event, but fetal red blood cells can also enter the mother's circulation after amniocentesis, spontaneous or induced abortion, chorionic villus sampling, cordocentesis, or rupture of an ectopic pregnancy, as well as blunt trauma to the abdomen.(1)

Rh immune globulin (RhIG, anti-D antibody) is given to Rh-negative mothers who are pregnant with a Rh-positive fetus. Anti-D antibody binds to fetal D-positive red blood cells, preventing development of the maternal immune response. RhIG can be given either before or after delivery. The volume of FMH determines the dose of RhIG to be administered.

Reference Values

< or =3.75 mL of fetal red blood cells in normal adults

Interpretation

Greater than 15 mL of fetal red blood cells (RBC) (30 mL of fetal whole blood) is consistent with significant fetomaternal hemorrhage (FMH).

A recommended dose of Rh immune globulin (RhIG) will be reported for all specimens. One 300 mcg dose of RhIG protects against a FMH of 30 mL of D-positive fetal whole blood or 15 mL of D-positive fetal RBC. Recommended standard of practice is to administer RhIG within 72 hours of the fetomaternal bleed for optimal protective effects. The effectiveness of RhIG decreases beyond 72 hours post exposure but may still be clinically warranted. This assay has been validated out to 5 days post collection.

Cautions

Clinical conditions exist that may result in an increased level of fetal hemoglobin-containing red blood cells (RBC), including hereditary persistence of fetal hemoglobin and thalassemia. Such RBC (also referred to as F cells) are detected by this assay. Results must be interpreted with caution in these situations.

Due to differential RBC densities, aliquoting into or out of a sample tube can adversely affect the results.

Clinical Reference

1. Roback J, Combs MR, Grossman B, Hillyer C, eds. In: Technical manual. 16th ed. AABB Press; 2008:625-637, 888
2. Iyer R, McElhinney B, Heasley N, Williams M, Morris K. False positive Kleihauer tests and unnecessary administration of anti-D immunoglobulin. Clin Lab Haematol. 2003;25(6):405-408
3. Cohn CS, Delaney M, Johnson ST, Katz LM, eds. Technical Manual. 20th ed. AABB Press; 2020

Performance

Method Description

The fetomaternal bleed test identifies cells containing fetal hemoglobin. The cells are fixed and permeabilized and then incubated with monoclonal antibodies directed against fetal hemoglobin (HbF) and subsequently analyzed by flow cytometric methods. This test uses the US Food and Drug Administration-approved Invitrogen Fetal Hemoglobin kit with fluorescein isothiocyanate-conjugated monoclonal antibody directed to HbF (HFH-01).(Package insert: Invitrogen Fetal Hemoglobin Test Kit with FITC-conjugated Monoclonal Antibody Directed to HbF. Life Technologies Corporation; MAN 0003641, Rev 3.02 03/06/2013)

Rh immune globulin (RhIG) dose calculation: mL of fetal bleed/15 equals the calculated doses of RhIG, then add a safety margin, ie, when the number to the right of the decimal point is less than 5, round down and add 1 dose (example: 2.2 = 2.0 + 1 = 3); when the number to the right of the decimal point is 5 or greater, round up to the next number and add 1 dose (example: 2.8 = 3.0 + 1 = 4). If fetal bleed is 1.5 mL or less, it will be reported as negative bleed and the RhIG dose will be 1.

RhD-Agglutination of red blood cells with an antiserum represents the presence of the corresponding antigen in the red blood cells.(Cohn CS, Delaney M, Johnson ST, Katz LM, eds. Technical Manual. 20th ed. AABB Press; 2020)

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 day

Specimen Retention Time

7 days

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 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

88184-Flow cytometry, cell surface, cytoplasmic

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
FMB	Fetomaternal Bleed,Flow Cytometry,B	75308-7

Result ID	Test Result Name	Result LOINC® Value
4058	Remarks	48767-8
28202	Fetal-Maternal Bleed	55730-6
28204	Mother's Rh	10331-7
28203	Rh Immune Globulin	55731-4