

## 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

Yes

## Specimen

### Specimen Type

Whole Blood EDTA

### Advisory Information

This test is for the detection of fetal bleed, it should not be used to detect the hereditary persistence of fetal hemoglobin (see HPFH / Hemoglobin F, Red Cell Distribution, Blood) or to detect fetal maternal hemorrhage in a mother with hereditary persistence of fetal hemoglobin.

### Shipping Instructions

**Specimen must arrive within 120 hours (preferably 24-72 hours) of draw.**

### Specimen Required

**Container/Tube:** Lavender top (EDTA)

**Specimen Volume:** Full tube

### Collection Instructions:

1. Do not centrifuge or aliquot.
2. Invert several times to mix blood.
3. Send specimen in original tube.

### Specimen Minimum Volume

1 mL

### Reject Due To

|                 |         |
|-----------------|---------|
| Gross hemolysis | Reject  |
| Gross lipemia   | Reject  |
| Gross icterus   | Reject  |
| Blood           | Clotted |

### Specimen Stability Information

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

### Clinical and Interpretive

#### Clinical Information

In hemolytic disease of the newborn, fetal red cells become coated with IgG alloantibody of maternal origin, directed against an antigen on the fetal cells that is of paternal origin and 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 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 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 an Rh-positive fetus. Anti-D antibody binds to fetal D-positive red 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 =1.5 mL of fetal RBCs 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 RBCs. 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 cells, including hereditary persistence of fetal hemoglobin and thalassemia. Such red cells (also referred to as F cells) are detected by this assay. Results must be interpreted with caution in these situations.

#### Clinical Reference

1. Technical manual. Sixteenth edition. Edited by J Roback, MR Combs, B Grossman, C Hillyer. Bethesda, MD,

AABB Press, 2008, pp 625-637, pp 888

2. Iyer R, Mcelhinney B, Heasley N, et al: False positive Kleihauer tests and unnecessary administration of anti-D immunoglobulin. Clin Lab Haematol 2003;25:405-4082

## 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 FDA-approved Invitrogen Fetal Hemoglobin kit with fluorescein isothiocyanate-conjugated monoclonal antibody directed to HbF (HFH-10). (Package insert: Life Technologies Corporation, MAN 0003641, Rev 2.00 effective date March 16, 2012)

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.

### PDF Report

No

### Day(s) and Time(s) Test Performed

Monday through Sunday; Varies

### Analytic Time

Same day/1 day

### Maximum Laboratory Time

1 day

### Specimen Retention Time

7 days

### Performing Laboratory Location

Rochester

## Fees and 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 Regional Manager. 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 U.S. 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 | In Process        |

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