

## Overview

### Useful For

Screening for chronic iron overload diseases, particularly hereditary hemochromatosis

### Testing Algorithm

See [Hereditary Hemochromatosis Algorithm](#) in Special Instructions.

### Special Instructions

- [Hereditary Hemochromatosis Algorithm](#)

### Method Name

Immunoturbidimetric Assay

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Necessary Information

Patient's age and sex are required.

### Specimen Required

#### Patient Preparation:

1. Fasting (12 hours)
2. Iron-containing supplements should be avoided for 24 hours prior to draw.

#### Container/Tube:

**Preferred:** Serum gel

**Acceptable:** Red top

**Specimen Volume:** 1 mL

#### Collection Instructions:

1. Draw blood before 12 noon (preferred).
2. Serum gel tubes should be centrifuged within 2 hours of collection.
3. Red-top tubes should be centrifuged and aliquoted within 2 hours of collection.

### Forms

If not ordering electronically, complete, print, and send a [Benign Hematology Test Request Form](#) (T755) with the specimen.

Specimen Minimum Volume

0.5 mL

Reject Due To

|                 |        |
|-----------------|--------|
| Gross hemolysis | Reject |
| Gross lipemia   | OK     |
| Gross icterus   | OK     |

Specimen Stability Information

| Specimen Type | Temperature              | Time     | Special Container |
|---------------|--------------------------|----------|-------------------|
| Serum         | Refrigerated (preferred) | 7 days   |                   |
|               | Frozen                   | 180 days |                   |

Clinical & Interpretive

Clinical Information

Ingested iron is absorbed primarily from the intestinal tract and is temporarily stored in the mucosal cells as ferritin (Fe[III]). Ferritin provides a soluble protein shell to encapsulate a complex of insoluble ferric hydroxide-ferric phosphate. On demand, iron is released into the blood by mechanisms that are not clearly understood, to be transported as Fe(III)-transferrin.

Transferrin is the primary plasma iron transport protein, which binds iron strongly at physiological pH. Transferrin is generally only 25% to 30% saturated with iron. The additional amount of iron that can be bound is the unsaturated iron-binding capacity (UIBC). The total iron-binding capacity (TIBC) can be indirectly determined using the sum of the serum iron and UIBC. Knowing the molecular weight of the transferrin and that each molecule of transferrin can bind 2 atoms of iron, TIBC and transferrin concentration is interconvertible.

Percent saturation ( $100 \times \text{serum iron} / \text{TIBC}$ ) is usually normal or decreased in persons who are iron deficient, pregnant, or are taking oral contraceptive medications. Persons with chronic inflammatory processes, hemochromatosis, or malignancies generally display low transferrin.

Serum iron, total iron-binding capacity, and percent saturation are widely used for the diagnosis of iron deficiency. However, serum ferritin is a much more sensitive and reliable test for demonstration of iron deficiency.

Reference Values

IRON

Males: 50-150 mcg/dL

Females: 35-145 mcg/dL

TOTAL BINDING CAPACITY

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250-400 mcg/dL

PERCENT SATURATION

14-50%

**Interpretation**

In hereditary hemochromatosis, serum iron is usually above 150 mcg/dL and percent saturation is above 60%. In advanced iron overload states, the percent saturation often is above 90%.

For more information about hereditary hemochromatosis testing, see [Hereditary Hemochromatosis Algorithm](#) in Special Instructions.

**Cautions**

Measurement of serum iron, iron-binding capacity, and percent saturation should not be used as a test for iron deficiency. It is often unreliable for this purpose.

**Clinical Reference**

1. Tietz Textbook of Clinical Chemistry. Edited by CA Burtis, ER Ashwood. Philadelphia, WB Saunders Company. 1999
2. Fairbanks VF, Baldus WP: Iron overload. In Hematology. Fourth edition. Edited by WJ Williams, AJ Erslev, MA Lichtman. New York, McGraw-Hill Book Company, 1990, pp 482-505

**Performance****Method Description**

Under acidic conditions, iron is liberated from transferrin. Lipemic samples are clarified by the detergent. Ascorbate reduces the released Fe(3+) ions to Fe(2+) ions which then react with FerroZine to form a colored complex. The color intensity is directly proportional to the iron concentration and can be measured photometrically. (Package insert: Roche Fe reagent. Indianapolis, IN, 2010)

Anti-transferrin antibodies react with the antigen in the sample to form an antigen/antibody complex. Following agglutination, this is measured turbidimetrically. Addition of polyethylene glycol (PEG) allows the reaction to progress rapidly to the end point and increases sensitivity. (Package insert: Roche TRSF2 reagent. Indianapolis, IN, 2005)

Calculations:

$TIBC = (Transferrin \times 1.18)$

$\% \text{ Saturation} = \text{Iron} / TIBC \times 100$

**PDF Report**

No

**Day(s) Performed**

Monday through Saturday

**Report Available**

Same day/1 to 2 days

Specimen Retention Time

7 days

Performing Laboratory Location

Rochester

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

83540-Iron  
83550-Iron-binding capacity

LOINC® Information

| Test ID | Test Order Name                  | Order LOINC® Value |
|---------|----------------------------------|--------------------|
| FEC     | Iron and Total Fe Binding Cap, S | 50190-8            |

| Result ID | Test Result Name            | Result LOINC® Value |
|-----------|-----------------------------|---------------------|
| IRON      | Iron                        | 2498-4              |
| TIBC      | Total Iron Binding Capacity | 2500-7              |
| SAT       | Percent Saturation          | 2502-3              |