Test Definition: SAT

Percent Saturation (Non-Orderable)

Overview

Useful For

Only orderable as part of profile. For more information see SFEC / Iron and Total Iron-Binding Capacity, Serum

Calculation of percent saturation

Method Name

Only orderable as part of profile. For more information see SFEC / Iron and Total Iron-Binding Capacity, Serum

Calculation

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Only orderable as part of profile. For more information see SFEC / Iron and Total Iron-Binding Capacity, Serum

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	21 days	
	Frozen	365 days	

Clinical & Interpretive

Clinical Information

Transferrin is the plasma iron transport protein, which binds iron strongly to keep iron nonreactive in circulation and deliver it to cells with transferrin receptors. The rate of transferrin synthesis in the liver can be altered according to the body's iron requirements and iron reserves. The circulating concentration increases in response to iron deficiency and decreases in response to iron overload. Transferrin is generally only 25% to 30% saturated with iron. Total iron binding capacity (TIBC) is estimated from transferrin concentration using the molecular weight of the transferrin, accounting for each transferrin molecule that can bind 2 atoms of iron.

Iron deficiency, iron overload, and anemia of chronic disease are the most prevalent disorders of iron metabolism.

Serum iron, TIBC, and percent saturation are widely used for the diagnosis of iron deficiency and iron overload, such as hemochromatosis. Iron concentration and percent saturation decrease with iron deficiency and increase when iron is in excess. Serum ferritin is a much more sensitive and reliable test for demonstration of iron deficiency.

Anemia of chronic disease is often observed in patients with autoimmune diseases, chronic kidney diseases, inflammatory bowel disease, and chronic heart failure. It is diagnosed when serum iron concentrations are low despite normal serum ferritin concentrations indicating adequate iron stores. However, in the presence of inflammation, ferritin can mask iron deficiency; therefore, measuring soluble transferrin receptors is suggested.

The biologic variation of iron and, therefore, iron saturation is notable in normal healthy persons and in various clinical disorders owing to both diurnal variation and post-prandial effects. The intraindividual day-to-day variation of iron and iron saturation is approximately 25% to 30%.(1) Recommendations on blood sampling for iron and iron saturation measurements are contradictory; however, minimizing influence of these effects can be accomplished by collecting during the morning after an overnight fast.

Reference Values

Only orderable as part of profile. For more information see SFEC / Iron and Total Iron-Binding Capacity, Serum

14-50%

Interpretation

Percent saturation often exceeds 45% in hereditary hemochromatosis and 90% in advanced iron overload states.(2)

Percent saturation less than 16% is generally used to screen for iron deficiency, but a threshold of 20% is used in the presence of inflammation.(3)

Cautions

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.

Measurement of serum iron, iron binding capacity, and percent saturation should not be used as the primary test for iron deficiency. It may be helpful in conjunction with ferritin and soluble transferrin receptor, especially in patients with inflammation.

Clinical Reference

1. Swinkels DW. Iron metabolism. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier. 2023:chap 40
2. Kowdley KV, Brown KE, Ahn J, Sundaram V. ACG Clinical Guideline: Hereditary Hemochromatosis [published correction appears in Am J Gastroenterol. 2019 Dec;114(12):1927. doi:10.14309/ajg.0000000000000469]. Am J Gastroenterol. 2019;114(8):1202-1218. doi:10.14309/ajg.0000000000000315
3. Lopez A, Cacoub P, Macdougall IC, Peyrin-Biroulet L. Iron deficiency anaemia. Lancet. 2016;387(10021):907-916. doi:10.1016/S0140-6736(15)60865-0

Performance

Method Description

This test calculates the percentage of iron saturation using results obtained from the serum iron measurement and calculated total iron binding capacity (TIBC). The following calculation is performed in the laboratory information system:
Percent saturation = (Iron [mcg/dL]/TIBC [mcg/dL]) x100

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 to 2 days

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 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.

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
SAT	Percent Saturation	No LOINC Needed

Result ID	Test Result Name	Result LOINC® Value
SAT	Percent Saturation	2502-3