STFR

Tina-quant Soluble Transferrin Receptor

Specific proteins

Order information

REF	CONTENT		Analyzer(s) on which **cobas c** pack(s) can be used
20763454 122	Tina-quant Soluble Transferrin Receptor (80 tests)	System-ID 07 6345 4	COBAS INTEGRA 400 plus COBAS INTEGRA 800
12148331 122	Preciset sTfR (5 × 1 mL)	System-ID 07 6353 5	
12148340 122	sTfR Control Set Control Level I (2 × 3 mL) Control Level II (2 × 3 mL)	 System-ID 07 9023 0 System-ID 07 9024 9	
20756350 322	NaCl Diluent 9 % (6 × 22 mL)	System-ID 07 5635 0	

English

System information

Test STFR, test ID 0-145

Intended use

In vitro test for the quantitative immunological determination of soluble transferrin receptor in human serum and plasma on COBAS INTEGRA systems.

Summary[1,2,3,4,5,6,7,8]

The transferrin receptor is an integral membrane glycoprotein having a molecular weight of 190 kilodaltons (kD). It consists of two identical subunits linked by disulfide bridges. Each of the monomers has an 85 kD C-terminal component which can bind an iron-laden transferrin molecule. Proteolysis leads to the soluble form of the transferrin receptor (sTfR). In plasma, the soluble transferrin receptor is present in the form of a complex with transferrin having a molecular weight of approximately 320 kD. The serum concentration of sTfR is directly proportional to the concentration of the receptor on the membrane.

The uptake of iron by the body's cells is controlled by expression of the transferrin receptor (TfR). If the intracellular iron stores are exhausted - corresponding to a ferritin concentration of less than 12 µg/L - then more TfR is expressed. The affinity of the transferrin receptor to transferrin depends on the latter's loading state. As 80-95 % of the transferrin receptor molecules are localized on erythropoietic cells, the TfR concentration (and hence also the sTfR concentration) reflects the iron requirement of these cells. When iron deficiency exists, the sTfR concentration in serum rises even before the hemoglobin concentration is significantly depressed. The sTfR concentration can therefore describe the functional iron status while ferritin reflects the iron storage status. A precise assessment of the iron status can be obtained by determining the sTfR index (= sTfR-concentration/log ferritin concentration).

As - in contrast to ferritin - the concentration of sTfR is not affected by acute-phase reactions, acute liver function disorders or malignant tumors, it is possible to differentiate between anemia of chronic disease (ACD) and iron deficiency anemia (IDA). Elevated sTfR values are also found in polycythemia, hemolytic anemia, thalassemia, hereditary spherocytosis, sickle cell anemia, megaloblastic anemia, myelodysplastic syndrome and vitamin B_{12} deficiency. Elevated sTfR concentrations occur during pregnancy when there is a deficiency of functional iron. Therapy with rhEPO can be monitored via the sTfR concentration.

Parameter	Change	IDA	ACD	IDA + ACD
Ferritin	iron stores	↓	↑	— or ↑
TIBC/TRSF	iron status	↑	↓	↑ or —
Serum iron	iron status	↓	↓	↓
sTfR	functional iron deficiency	↑	—	↑

↓ decreased, ↑ increased, — unchanged

Test principle[9]

Particle enhanced immunoturbidimetric assay

Human soluble transferrin receptor agglutinates with latex particles coated with anti-soluble transferrin receptor antibodies. The precipitate is determined photometrically at 583 nm.

Reagents - working solutions

R1 TES/HCl buffer: 20 mmol/L, pH 7.7; NaCl: 500 mmol/L; preservative

R2 Latex particles coated with monoclonal anti-human sTfR antibodies (mouse); TRIS/HCl buffer: 20 mmol/L, pH 8.0; preservative

R1 is in position A and R2 is in position B.

Precautions and warnings

Pay attention to all precautions and warnings listed in Section 1 / Introduction of this Method Manual.

Reagent handling

COBAS INTEGRA 400 plus system:

Mix all brand new (non-punctured) **cobas c** packs for 1 minute on a cassette mixer before loading on the analyzer.

COBAS INTEGRA 800 system:

Ready for use

After **cobas c** packs puncture, the analyzer automatically mixes the reagent for 1 minute.

Storage and stability

Shelf life at 2-8 °C	See expiration date on **cobas c** pack label
COBAS INTEGRA 400 plus system	
On-board in use at 10-15 °C	12 weeks
COBAS INTEGRA 800 system	
On-board in use at 8 °C	12 weeks

Specimen collection and preparation

For specimen collection and preparation only use suitable tubes or collection containers.

Only the specimens listed below were tested and found acceptable.
Serum
Plasma: Heparin (Li-, Na-, NH_4^+-) plasma

The sample types listed were tested with a selection of sample collection tubes that were commercially available at the time of testing, i.e. not all available tubes of all manufacturers were tested. Sample collection systems from various manufacturers may contain differing materials which could affect the test results in some cases. When processing samples in primary tubes (sample collection systems), follow the instructions of the tube manufacturer.

Centrifuge samples containing precipitates before performing the assay.

Stability:[10]	3 days at 15-25 °C
	7 days at 2-8 °C
	4 weeks at (-15)-(-25) °C (freeze only once)

Materials provided

See "Reagents – working solutions" section for reagents.

Materials required (but not provided)

1. NaCl Diluent 9 %, Cat. No. 20756350 322, system-ID 07 5635 0 for automatic postdilution and standard serial dilutions. NaCl Diluent 9 % is placed in its predefined rack position and is stable for 4 weeks on-board COBAS INTEGRA 400 plus/800 analyzers.
2. NaCl 0.9 % (isotonic saline solution) for calibration.

STFR

Tina-quant Soluble Transferrin Receptor

cobas®

Specific proteins

Assay

For optimum performance of the assay follow the directions given in this document for the analyzer concerned. Refer to the appropriate operator's manual for analyzer-specific assay instructions.

Application for serum and plasma

COBAS INTEGRA 400 plus test definition

Measuring mode	Absorbance
Abs. calculation mode	Endpoint
Reaction mode	R1-R2-S
Reaction direction	Increase
Wavelength A/B	583 nm
Calc. first/last	T_0 /61
Typical prozone effect	> 80.0 mg/L
Antigen excess check	No
Unit	mg/L

Pipetting parameters

		Diluent (H_2O)
R1	110 µL	
R2	110 µL	
Sample	2.25 µL	20 µL
Total volume	242.25 µL	

COBAS INTEGRA 800 test definition

Measuring mode	Absorbance
Abs. calculation mode	Endpoint
Reaction mode	R1-R2-S
Reaction direction	Increase
Wavelength A/B	583 nm
Calc. first/last	T_0 /65
Typical prozone effect	> 80.0 mg/L
Antigen excess check	No
Unit	mg/L

Pipetting parameters

		Diluent (H_2O)
R1	110 µL	
R2	110 µL	
Sample	2.25 µL	20 µL
Total volume	242.25 µL	

Calibration

Calibrator	Preciset sTfR, ready to use
Calibration mode	Logit/log 5
Calibration replicate	Duplicate recommended
Calibration interval	Each lot and every 6 days and as required following quality control procedures

Calibrators must be placed from the highest concentration first, to the lowest last, on the CAL/QC rack. Zero calibrator is not provided with Preciset sTfR. Please use 0.9 % NaCl.

Traceability: This method has been standardized against an in-house reference preparation.[10]

Quality control

Quality control	sTfR Control Set
Control interval	24 hours recommended
Control sequence	User defined
Control after calibration	Recommended

For quality control, use control materials as listed in the "Order information" section. In addition, other suitable control material can be used.

The control intervals and limits should be adapted to each laboratory's individual requirements. Values obtained should fall within the defined limits. Each laboratory should establish corrective measures to be taken if values fall outside the defined limits.

Follow the applicable government regulations and local guidelines for quality control.

Calculation

COBAS INTEGRA analyzers automatically calculate the analyte concentration of each sample. For more details, please refer to Data Analysis in the Online Help (COBAS INTEGRA 400 plus/800 analyzers).

Conversion factors:	mg/L × 11.8 = nmol/L[11,a)]
	nmol/L × 0.085 = mg/L
	mg/L × 0.1 = mg/dL
	mg/dL × 10 = mg/L

a) Based on a molecular mass of 85 kDa for circulating transferrin receptor.

Limitations - interference

Criterion: Recovery within ± 10 % of initial value.

Serum, plasma

Icterus:[12] No significant interference up to an I index of 60 for conjugated and unconjugated bilirubin (approximate conjugated and unconjugated bilirubin concentration: 1026 µmol/L or 60 mg/dL).

Hemolysis:[12] No significant interference up to an H index of 1000 (approximate hemoglobin concentration: 621 µmol/L or 1000 mg/dL).

Lipemia (Intralipid):[12] No significant interference up to an L index of 2000. There is poor correlation between the L index (corresponds to turbidity) and triglycerides concentration.

Rheumatoid factors: No significant interference up to a rheumatoid factors level of 500 IU/mL.

Drugs: No interference was found at therapeutic concentrations using common drug panels.[13,14]

HAMA: As for any assay employing mouse antibodies, erroneous findings may be obtained from samples taken from patients who have been treated with monoclonal mouse antibodies or have received them for diagnostic purposes.

In very rare cases, gammopathy, in particular type IgM (Waldenström's macroglobulinemia), may cause unreliable results.[15]

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

ACTION REQUIRED

Special Wash Programming: The use of special wash steps is mandatory when certain test combinations are run together on COBAS INTEGRA analyzers. Refer to the CLEAN Method Sheet for further instructions and for the latest version of the Extra wash cycle list.

Where required, special wash/carry-over evasion programming must be implemented prior to reporting results with this test.

Limits and ranges

Measuring range

0.5-20.0 mg/L

Determine samples having higher concentrations via the rerun function. Dilution of samples via the rerun function is a 1:2 dilution. Results from samples diluted using the rerun function are automatically multiplied by a factor of 2.

Lower limits of measurement

Lower detection limit of the test:
0.5 mg/L

The lower detection limit represents the lowest measurable analyte level that can be distinguished from zero. It is calculated as the value lying 3 standard deviations above that of a zero sample (zero sample + 3 SD, repeatability, n = 21).

Expected values[16]

Males (n = 208)	(age 18-60 years)	2.2-5.0 mg/L
Females (n = 211)	(age 18-45 years)	1.9-4.4 mg/L

Each laboratory should investigate the transferability of the expected values to its own patient population and if necessary determine its own reference ranges.

Specific performance data

Representative performance data on the COBAS INTEGRA analyzers are given below. Results obtained in individual laboratories may differ.

Precision

Precision was determined using human samples and controls in an internal protocol with repeatability (n = 21) and intermediate precision (1 aliquot per run, 1 run per day, 21 days). The following results were obtained:

Repeatability	***Mean mg/L***	***CV %***
Level 1	3.17	0.76
Level 2	18.9	1.1

Intermediate precision	***Mean mg/L***	***CV %***
Level 1	2.52	2.0
Level 2	11.4	2.2

Method comparison

STfR values for human serum samples obtained on a COBAS INTEGRA 700 analyzer with the COBAS INTEGRA Tina-quant Soluble Transferrin Receptor reagent (y) were compared with those determined using the corresponding reagent on a Roche/Hitachi 917 analyzer (x).

	Roche/Hitachi 917 analyzer
Sample size (n)	69
Corr. coefficient (r)	0.999
Lin. regression	y = 0.93x + 0.20 mg/L
Passing/Bablok[17]	y = 0.94x + 0.21 mg/L

The sample concentrations were between 0.31 and 19.86 mg/L.

Analytical specificity/cross-reactivity

The antibodies are specific for sTfR. There is no cross-reactivity with diferrotransferrin, apotransferrin or ferritin.

References

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A point (period/stop) is always used in this Method Sheet as the decimal separator to mark the border between the integral and the fractional parts of a decimal numeral. Separators for thousands are not used.

Symbols

Roche Diagnostics uses the following symbols and signs in addition to those listed in the ISO 15223-1 standard.

CONTENT	Contents of kit
→	Volume after reconstitution or mixing
GTIN	Global Trade Item Number

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