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Human Transferrin receptor (TFR) Immunoassay

Catalog Number:SEKH-0330

For the quantitative determination of human Transferrin receptor (TFR) concentrations in cell culture supernates, serum, and plasma.

For research use only. Not for use in diagnostic procedures.

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LINEARITY:To assess the linearity of the assay, three samples were spiked with high concentrations of Transferrin receptor (TFR) in various matrices and diluted with the appropriate Sample Diluent to produce samples with values within the dynamic range of the assay. (The plasma samples were initially diluted 1:1)

Typical data using the Transferrin receptor (TFR) ELISA

Dilution ratio	Recovery(%)	Citrate plasma	Cell culture supernatants
1:2	Average% of Expected	93	103
	Range(%)	87-102	93-110
1:4	Average% of Expected	94	102
	Range(%)	84-109	96-111
1:8	Average% of Expected	98	104
	Range(%)	90–105	97–109
1:16	Average% of Expected	96	103
	Range(%)	89–102	95–110

Performance Characteristics

SENSITIVITY: The minimum detectable dose was 7.8pg/ml.

SPECIFICITY: This assay recognizes both natural and recombinant human Transferrin receptor (TFR). The factors listed below were prepared at 100ng/ml in Standard /sample Diluent and assayed for cross-reactivity and no significant cross-reactivity or interference was observed.

Factors assayed for cross-reactivity

Recombinant human	Recombinant mouse	Recombinant porcine
Holo-Transferrin	GM-CSF	
IFN- γ	IFN- γ	
IL-1 β		
IL-2		
IL-4		
IL-5		
IL-6		

REPEATABILITY: The coefficient of variation of both intra-assay and inter-assay were less than 10%.

RECOVERY: The recovery of Transferrin receptor (TFR) spiked to three different levels in four samples throughout the range of the assay in various matrices was evaluated.

Sample Type	Average % of Expected Range(%)	Range(%)
Citrate plasma	94	83-106
Cell culture supernatants	95	84-105

BACKGROUND

Transferrin receptor (TFR) is a carrier protein for transferrin. It is needed for the import of iron into the cell and is regulated in response to intracellular iron concentration. It imports iron by internalizing the transferrin-iron complex through receptor-mediated endocytosis. Soluble Transferrin Receptor (sTFR) arises from proteolysis of TFR at a specific site in the extracellular domain, leading to monomers that can be measured in plasma and serum. A constant relationship has been reported between total TFR and the concentration of sTFR in plasma or serum. Thus, the concentration of sTFR in plasma or serum is an indirect measure of total TFR. sTFR is elevated in subjects with hyperplastic erythropoiesis (e.g., hemolytic anemia, β -thalassemia, polycythemia, etc.) and depressed in subjects with hypoplastic erythropoiesis (e.g., chronic renal failure, aplastic anemia or post-transplant anemia). Measurement of sTFR is especially valuable as an indication of iron deficiency in individuals with chronic disease (inflammatory diseases, infections, malignancies), many of whom are anemic. Since the level of sTFR is not affected by chronic disease, it can substantially improve the laboratory diagnosis of iron deficiency, even in patients with concurrent chronic disease.

PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. A monoclonal antibody specific for Transferrin receptor (TFR) has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any Transferrin receptor (TFR) present is captured by the coated antibody after incubation. Following extensive washing, a biotin-conjugate antibody specific for Transferrin receptor (TFR) is added to detect the captured Transferrin receptor (TFR) protein in sample. For signal development, horseradish peroxidase (HRP)-conjugated Streptavidin is added, followed by tetramethyl-benzidine (TMB) reagent. Following a wash to remove any unbound combination, and enzyme conjugate is added to the wells. Solution containing sulfuric acid is used to stop color development and the color intensity which is proportional to the quantity of bound protein is measurable at 450nm.

DESCRIPTION



TECHNICAL HINTS AND LIMITATIONS

1. This Solarbio ELISA should not be used beyond the expiration data on the kit label.
2. To avoid cross-contamination, use a fresh reagent reservoir and pipette tips for each step.
3. To ensure accurate results, some details, such as technique, plasticware and water sources should be emphasized.
4. A thorough and consistent wash technique is essential for proper assay performance.
5. A standard curve should be generated for each set of samples assayed.
6. It is recommended that all standards and samples be assayed in duplicate.
7. Avoid microbial contamination of reagents and buffers. Buffers containing protein should be made under aseptic conditions and be prepared fresh daily.
8. In order to ensure the accuracy of the results, the standard curve should be made every time.

PRECAUTIONS

The Stop Solution suggested for use with this kit is an acid solution. Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

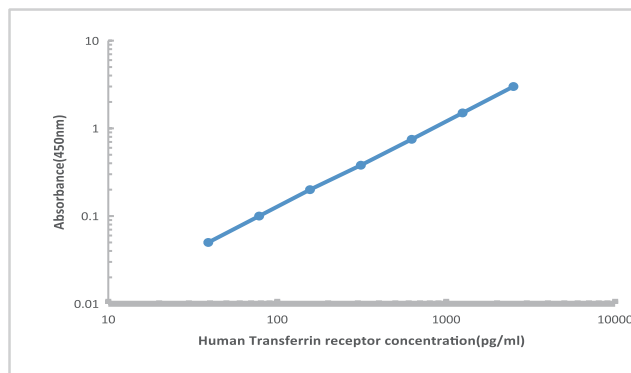
DESCRIPTION

be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data. If samples have been diluted, the concentration read from the standard curve must be multiplied by 5 the dilution factor.

This standard curve is provided for demonstration only. A standard

Typical data using the Human Transferrin receptor (TFR) ELISA

Standardized (pg/ml)	OD.	OD.	Average	Corrected
0	0.071	0.062	0.066	-
39.06	0.161	0.160	0.160	0.094
78.1	0.233	0.233	0.233	0.167
156	0.347	0.346	0.347	0.280
312.5	0.551	0.549	0.550	0.484
625	0.896	0.892	0.894	0.828
1250	1.458	1.453	1.456	1.389
2500	2.376	2.367	2.372	2.305



Representative standard curve for Transferrin receptor (TFR) ELISA.

ASSAY PROCEDURE

Prepare all reagents and standards as directed, wash the plate 3 times before the assay.



Add 100µl standard or samples to each well, shaking with Micro-oscillator (100r/min) to incubate 120 minutes at room temperature(25±2°C).



Aspirate and wash 4 times

Add 100µl working solution of Biotin-Conjugate anti-human Transferrin receptor (TFR) antibody to each well, shaking with Micro-oscillator (100r/min) to incubate 60 minutes at room temperature(25±2°C).



Aspirate and wash 4 times

Add 100µl working solution of Streptavidin-HRP to each well, shaking with Micro-oscillator (100r/min) to incubate 30 minutes at room temperature (25±2°C).



Aspirate and wash 5 times

Add 100µl Substrate solution to each well, incubate 10-30 minutes (depending on signal) at room temperature(25±2°C). Protect from light.



Add 50µl Stop solution to each well. Read at 450nm within 5 minutes.

CALCULATION OF RESULTS

1. The standard curve is used to determine the amount of specimens.
2. First, average the duplicate readings for each standard, control, and sample. All O.D. values are subtracted by the mean value of blank control before result interpretation.
3. Construct a standard curve by reducing the data using computer software capable of generating a four parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis and draw a best fit curve through the points on the graph.
4. The data may be linearized by plotting the log of the Transferrin receptor (TFR) concentrations versus the log of the O.D. and the best fit line can

KIT COMPONENTS & STORAGE CONDITIONS

PART	SIZE	STORAGE OF OPENED/ RECONSTITUTED MATERIAL
Microwell Plate - antibody coated 96-well Microplate (8 wells x12 strips)	1 plate	Return unused wells to the foil pouch containing the desiccant pack. Reseal along entire edge of the zip-seal. May be stored for up to 1 month at 2 – 8°C**
Standard - lyophilized, 5000 pg/ml upon reconstitution	2 vials	Store at 2-8°C **for six months
Concentrated Biotin-Conjugated antibody(100X) - 120 ul/vial	1 vial	Store at 2-8°C **for six months
Concentrated Streptavidin-HRP solution(100X) - 120 ul/vial	1 vial	Store at 2-8°C **for six months
Standard /sample Diluent - 16 ml/vial	1 bottle	Store at 2-8°C **for six months
Biotin-Conjugate antibody Diluent - 16 ml/vial	1 bottle	Store at 2-8°C **for six months
Streptavidin-HRP Diluent - 16 ml/vial	1 bottle	Store at 2-8°C **for six months
Wash Buffer Concentrate (20x) - 30 ml/vial	1 bottle	Store at 2-8°C **for six months
Substrate Solution - 12 ml/vial	1 bottle	Store at 2-8°C **for six months
Stop Solution - 12 ml/vial	1 bottle	Store at 2-8°C **for six months
Plate Cover Seals	1 bottle	Store at 2-8°C **for six months

**Provided this is within the expiration date of the kit.

OTHER SUPPLIES REQUIRED BUT NOT SUPPLIED

1. Microplate reader capable of measuring absorbance at 450 nm.
2. Pipettes and pipette tips.
3. Deionized or distilled water.
4. Squirrt bottle, manifold dispenser, or automated microplate washer.
5. 500 mL graduated cylinder.

SPECIMEN COLLECTION & STORAGE

Cell Culture Supernates - Centrifuge cell culture media at 1000 x g (or 3000rpm) to remove debris. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Serum - Use a serum separator tube (SST) and allow samples to clot for 2 hours at room temperature or overnight at 2-8°C. Centrifuge approximately for 15 minutes at 1000g (or 3000rpm). Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Plasma - Collect plasma using EDTA, heparin, or citrate as an anticoagulant. Centrifuge for 15 minutes at 1000 x g (or 3000rpm) within 30 minutes of collection. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Note: It is recommended to conduct a pre-test before the formal experiment to determine the dilution ratio.

REAGENTS PREPARATION

1. **Temperature returning** - Bring all kit components and specimen to room temperature (20-25°C) before use.
2. **Wash Buffer** - Dilute 30mL of Wash Buffer Concentrate with 570mL of deionized or distilled water to prepare 600mL of Wash Buffer. If crystals have formed in the concentrate Wash Buffer, warm to room temperature and mix gently until the crystals have completely dissolved.

3. **Standard\Sample** - Reconstitute the Standard with 1mL Standard/Sample Diluent . This reconstitution produces a stock solution of 5000pg/mL. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions. Pipette 500uL of Standard/Sample Diluent into 2500pg/ml tube and the remaining tubes. Use the stock solution of 5000pg/mL to produce a 2-fold dilution series (below). Mix each tube thoroughly and change pipette tips between each transfer. The 2500 pg/mL standard serves as the high standard. The Standard/Sample Diluent serves as the zero standard (0 pg/mL).

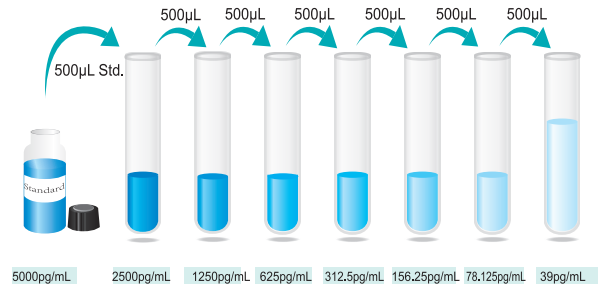
***If you do not run out of re-melting standard, store it at -20°C. Diluted standard shall not be reused.**

4. **Working solution of Biotin-Conjugate anti-human Transferrin receptor (TFR) antibody:** Make a 1:100 dilution of the concentrated Biotin-Conjugate solution with the Biotin-Conjugate antibody Diluent in a clean plastic tube.

***The working solution should be used within one day after dilution.**

5. **Working solution of Streptavidin-HRP:** Make a 1:100 dilution of the concentrated Streptavidin-HRP solution with the Streptavidin-HRP Diluent in a clean plastic tube.

***The working solution should be used within one day after dilution.**



Preparation of Human **Transferrin receptor (TFR)** standard dilutions