Transferrin and Transferrin receptor

Cells obtain iron from plasma where it circulates in a complex with a carrier protein transferrin (Tf). To be transported into cells, iron loaded Tf is bound to transferrin receptor (TfR), and their complex passes into cells by means of internalization, where iron releases by pH-dependent mechanism (1).

Transferrin receptor is a transmembrane protein that participates in iron transport from plasma into cells. It consists of two identical subunits of 95 kDa linked by two disulfide bonds. Each TfR subunit contains an N-terminal cytoplasmic domain (1-67 amino acid residues), a transmembrane domain (68-88 amino acid residues) and a C-terminal extracellular domain (89-760 amino acid residues) (2).

The main pool of TfR molecules is located on erythroblasts which demand a lot of iron for hemoglobin synthesis. After the erythroid cells have matured, the extracellular part of the TfR molecule is truncated from the cell surface by cleavage of an R100 – L101 bond. TfR released into the blood stream consists of 101-760 amino acid residues of cell TfR and is called soluble (or serum) transferrin receptor (sTfR) (3).

The expression of transferrin receptor depends on the concentration of iron in the cellular cytoplasm. The concentration of soluble transferrin receptor (sTfR) has been reported to be proportional to the total amount of cell-associated transferrin receptor.

In blood, soluble TfR is completely bound to Tf and circulates as sTfR-Tf complex.

The determination of the sTfR level in blood has become widely used in clinical practice (4 – 7). The normal concentration of sTfR in blood ranges within 2 – 5 µg/ml. An increase in the sTfR level was found in iron deficiency anemia, autoimmune hemolytic anemia, hereditary spherocytosis, b-thalassemia, sickle cell anemia and some others. Soluble TfR is indispensable marker of iron deficiency anemia and is mainly used for the differentiation between iron deficiency anemia (accompanied by an increase in the sTfR level) and anemia of chronic disease (proceeded at the normal sTfR level) (8).

The measurement of Tf is also widely used in diagnosis of anemia together with the determination of sTfR, ferritin and iron concentration in serum.

Soluble transferrin receptor and transferrin are measured in plasma and serum by immunoassays based on the specific anti-Tf or anti-TfR antibodies.

HyTest offers anti-TfR and anti-Tf MAbs, allowing detection of TfR, Tf and sTfR-Tf complex in human blood.
**Anti-transferrin receptor monoclonal antibodies**

**Host animal:** Mice Balb/c  
**Cell line used for fusion:** Sp2/0  
**Antigen:** Human TfR  
**Purification method:** Protein A affinity chromatography  
**Presentation:** MAb solution in PBS with 0.1% sodium azide  
**Application:** TfR immunoassay, TfR immunoaffinity purification and TfR immunodetection in Western blotting

Hybridoma cell lines producing MAbs were derived from hybridization of Sp2/0 myeloma cells with spleen cells of Balb/c mice immunized with purified human placental TfR. Specificity of antibodies was confirmed by ELISA and Western blotting. MAbs 2B6, 5B11, 7F8, 11F5, 10D2, 13E4 and 23D10 recognize placental TfR (pTfR) and soluble TfR in ELISA. All these MAbs recognize sTfR in Western blotting after SDS gel electrophoresis under non-reducing conditions. MAb 7-1 recognizes pTfR in ELISA. MAb 9H4 recognizes pTfR in Western blotting after SDS gel electrophoresis under both reducing and non-reducing conditions.

See ordering information on page 4.

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See ordering information on page 4.
**Applications**

1. **Transferrin (Tf) sandwich immunoassay**

   Recommended pairs to be used for Tf detection in human plasma (serum) by sandwich immunoassay (capture – detection):

   - 1C10 – 2A2
   - 1C10 – 12A6
   - 8B9 – 11D3
   - 8B9 – 12A6
   - 11D3 – 1C10
   - 11D3 – 8B9

2. **Soluble transferrin receptor (sTfR) sandwich immunoassay**

   Recommended pairs to be used for sTfR detection in human plasma (serum) by sandwich immunoassay (capture – detection):

   - 23D10 – 13E4
   - 11F5 – 7F8
   - 2B6 – 11F5
   - 7F8 – 23D10
   - 10D2 – 13E4
   - 5B11 – 2B6
   - 10D2 – 13E4

   20 ng/ml assay sensitivity could be reached.

3. **Detection of sTfR-Tf complex in sandwich immunoassay**

   The determination of sTfR-Tf complex in plasma or serum is based on using anti-sTfR MAbs for capture and anti-Tf MAbs for detection.

   Recommended pairs to be used for sTfR-Tf complex detection in human plasma (serum) by sandwich immunoassay (capture – detection):

   - 23D10 (a-TfR Cat.# 4Tr26) – 8B9 (a-Tf Cat.# 4T15)
   - 23D10 (a-TfR Cat.# 4Tr26) – 11D3 (a-Tf Cat.# 4T15)

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**Figure 1. Titration curve of purified soluble transferrin receptor (sTfR) using pair 23D10 – 13E4.**

- Capture: MAb 23D10; 200 ng/well
- Detection: MAb 13E4 conjugated with HRP
- Room temperature

**Figure 2. Titration curve of sTfR-Tf complex contained in normal human serum using sTfR-Tf assay.**

- Capture: MAb 23D10; 200 ng/well
- Detection: MAb 8B9 or 11D3 conjugated with HRP
- Room temperature
References:


Ordering information:

<table>
<thead>
<tr>
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<th>Cat.#</th>
<th>MAb</th>
<th>Subclass</th>
<th>Application</th>
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<td>IgG2a</td>
<td>Sandwich immunoassay, WB</td>
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