



## User's Manual

# Human TRAIL ELISA



DEIA4825



96T



This product is for research use only and is not intended for diagnostic use.

For illustrative purposes only. To perform the assay the instructions for use provided with the kit have to be used.

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## PRODUCT INFORMATION

### Intended Use

The human TRAIL ELISA is an enzyme-linked immunosorbent assay for the quantitative detection of human TRAIL. **The human TRAIL ELISA is for research use only. Not for diagnostic or therapeutic procedures.**

### General Description

TRAIL (TNF-related-apoptosis-inducing-ligand) was found to be a member of the TNF family which mediates cell death in a wide variety of malignant cell lines and primary tumor cells.

TRAIL induces two different signals, cell death mediated by caspases and gene induction. The cytotoxic ligand TRAIL interacts with five receptors, only two of which (TRAIL-R1 and R2) have a death domain.

TRAIL, which is ubiquitous expressed, exhibits very complex signalling and tumor-selective induction of apoptosis.

TRAIL is involved in lymphatic neoplastic disorders and thyroid diseases, and the treatment of cancer like melanoma.

### Principles of Testing

1. An anti-human TRAIL coating antibody is adsorbed onto microwells.
2. Human TRAIL present in the sample or standard binds to antibodies adsorbed to the microwells. A biotin-conjugated anti-human TRAIL antibody is added and binds to human TRAIL captured by the first antibody.
3. Following incubation unbound biotin-conjugated anti-human TRAIL antibody is removed during a wash step. Streptavidin-HRP is added and binds to the biotinconjugated anti-human TRAIL antibody.
4. Following incubation unbound Streptavidin-HRP is removed during a wash step, and substrate solution reactive with HRP is added to the wells.
5. A coloured product is formed in proportion to the amount of human TRAIL present in the sample or standard. The reaction is terminated by addition of acid and absorbance is measured at 450 nm. A standard curve is prepared from 7 human TRAIL standard dilutions and human TRAIL sample concentration determined.

### Reagents And Materials Provided

1. 1 aluminium pouch with a **Antibody Coated Microtiter Strips** with monoclonal antibody to human TRAIL
2. 1 vial (70 µl) **Biotin-Conjugate** anti-human TRAIL monoclonal antibody
3. 1 vial (150 µl) **Streptavidin-HRP**
4. 2 vials human TRAIL **Standard** lyophilized, 2 ng/ml upon reconstitution
5. 1 vial (50 ml) **Sample Diluent**
6. 1 bottle (50 ml) **Wash Buffer Concentrate** 20x (PBS with 1% Tween 20)
7. 1 vial (15 ml) **Substrate Solution** (tetramethyl-benzidine)

8. 1 vial (15 ml) **Stop Solution** (1M Phosphoric acid)
9. 4 **Adhesive Films**

## Materials Required But Not Supplied

1. 5 ml and 10 ml graduated pipettes
2. 5 µl to 1000 µl adjustable single channel micropipettes with disposable tips
3. 50 µl to 300 µl adjustable multichannel micropipette with disposable tips
4. Multichannel micropipette reservoir
5. Beakers, flasks, cylinders necessary for preparation of reagents
6. Device for delivery of wash solution (multichannel wash bottle or automatic wash system)
7. Microwell strip reader capable of reading at 450 nm (620 nm as optional reference wave length)
8. Glass-distilled or deionized water
9. Statistical calculator with program to perform regression analysis

## Storage

Store the complete kit at 2-8°C. Under these conditions, the kit is stable until the expiration date (see label on the box).

## Specimen Collection And Preparation

Cell culture supernatant, serum and plasma (EDTA, citrate, heparin), were tested with this assay. Other biological samples might be suitable for use in the assay. Remove serum or plasma from the clot or cells as soon as possible after clotting and separation. Samples containing a visible precipitate must be clarified prior to use in the assay. Do not use grossly hemolyzed or lipemic specimens.

Samples should be aliquoted and must be stored frozen at -20°C to avoid loss of bioactive human TRAIL. If samples are to be run within 24 hours, they may be stored at 2-8°C.

Avoid repeated freeze-thaw cycles. Prior to assay, the frozen sample should be brought to room temperature slowly and mixed gently.

### Sample Stability

#### a. Freeze-Thaw Stability

Aliquots of serum samples were stored at -20°C and thawed 5 times, and the human TRAIL levels determined. There was no significant loss of human TRAIL immunoreactivity detected by freezing and thawing.

#### b. Storage Stability

Aliquots of serum samples were stored at -20°C, 2-8°C, room temperature (RT) and at 37°C, and the human TRAIL level determined after 24 h. There was no significant loss of human TRAIL immunoreactivity detected during storage under above conditions.

## Reagent Preparation

**Buffer Concentrates** should be brought to room temperature and should be diluted before starting the test procedure.

If crystals have formed in the **Buffer Concentrates**, warm them gently until they have completely dissolved.

#### 1. Wash Buffer (1×)

Pour entire contents (50 ml) of the **Wash Buffer Concentrate** (20×) into a clean 1000 ml graduated cylinder. Bring to final volume of 1000 ml with glass-distilled or deionized water. Mix gently to avoid foaming. Transfer to a clean wash bottle and store at 2° to 25°C. Please note that Wash Buffer (1×) is stable for 30 days. Wash Buffer (1×) may also be prepared as needed according to the following table:

Number of Strips	Wash Buffer Concentrate 20× (ml)	Distilled Water (ml)
1-6	25	475
1-12	50	950

#### 2. Biotin-Conjugate

**Please note that the Biotin-Conjugate should be used within 30 minutes after dilution.**

Make a 1:100 dilution of the concentrated **Biotin-Conjugate** solution with Sample Diluent in a clean plastic tube as needed according to the following table:

Number of Strips	Biotin-Conjugate (ml)	Assay Buffer 1× (ml)
1-6	0.03	2.97
1-12	0.06	5.94

#### 3. Streptavidin-HRP

**Please note that the Streptavidin-HRP should be used within 30 minutes after dilution.**

Make a 1:100 dilution of the concentrated **Streptavidin-HRP** solution with Sample Diluent in a clean plastic tube as needed according to the following table:

Number of Strips	Streptavidin- HRP (ml)	Assay Buffer 1× (ml)
1-6	0.06	5.94
1-12	0.12	11.88

#### 4. Human TRAIL Standard

Reconstitute **human TRAIL standard** by addition of distilled water.

Reconstitution volume is stated in the Quality Control Sheet. Swirl or mix gently to insure complete and homogeneous solubilization (concentration of reconstituted standard = 2 ng/ml).

Allow the standard to reconstitute for 10-30 minutes. Mix well prior to making dilutions.

After usage remaining standard cannot be stored and has to be discarded.

**Standard dilutions** can be prepared directly on the microwell plate (see **Assay Procedure 3**) or alternatively in tubes.

#### 5. External Standard Dilution

Label 7 tubes, one for each standard point.

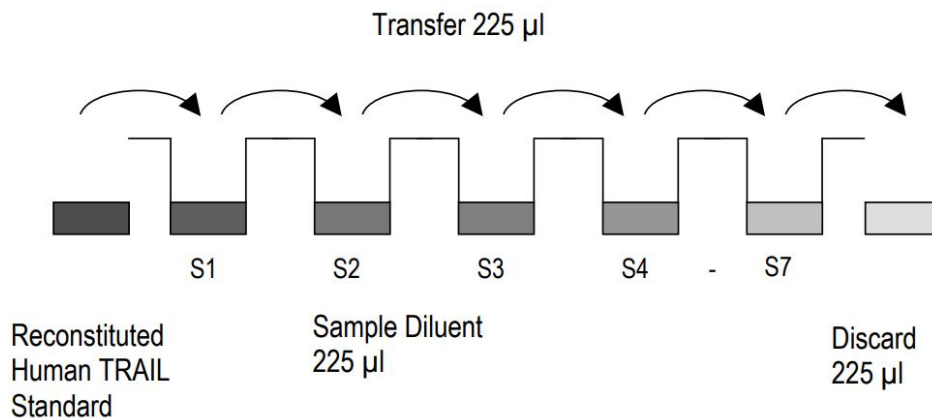
S1, S2, S3, S4, S5, S6, S7

Then prepare 1:2 serial dilutions for the standard curve as follows:

Pipette 225 µl of Sample Diluent into each tube.

Pipette 225 µl of reconstituted standard (concentration = 2 ng/ml) into the first tube, labelled S1, and mix (concentration of standard 1 = 1 ng/ml). Pipette 225 µl of this dilution into the second tube, labelled S2, and mix thoroughly before the next transfer. Repeat serial dilutions 5 more times thus creating the points of the standard curve (see Figure).

Sample Diluent serves as blank.



## Assay Procedure

1. Determine the number of microwell strips required to test the desired number of samples plus appropriate number of wells needed for running blanks and standards. Each sample, standard, blank and optional control sample should be assayed in duplicate. Remove extra microwell strips from holder and store in foil bag with the desiccant provided at 2-8°C sealed tightly.
2. Wash the microwell strips twice with approximately 400 µl **Wash Buffer** per well with thorough aspiration of microwell contents between washes. Allow the Wash Buffer to sit in the wells for about **10-15 seconds** before aspiration. Take care not to scratch the surface of the microwells. After the last wash step, empty wells and tap microwell strips on absorbent pad or paper towel to remove excess Wash Buffer. Use the microwell strips immediately after washing. Alternatively microwell strips can be placed upside down on a wet absorbent paper for not longer than 15 minutes. **Do not allow wells to dry.**
3. **Standard dilution on the microwell plate** (Alternatively the standard dilution can be prepared in tubes): Add 100 µl of Sample Diluent in duplicate to all **standard wells**. Pipette 100 µl of prepared **standard** (see **Reagents Preparation 5**, concentration = 2000.0 pg/ml) in duplicate into well A1 and A2 (see Table). Mix the contents of wells A1 and A2 by repeated aspiration and ejection (concentration of standard 1, S1 = 1000.0 pg/ml), and transfer 100 µl to wells B1 and B2, respectively (see Figure). Take care not to scratch the inner surface of the microwells. Continue this procedure 5 times, creating two rows of human TRAIL standard dilutions ranging from 1000.0 to 15.6 pg/ml. Discard 100 µl of the contents from the last microwells (G1, G2) used.

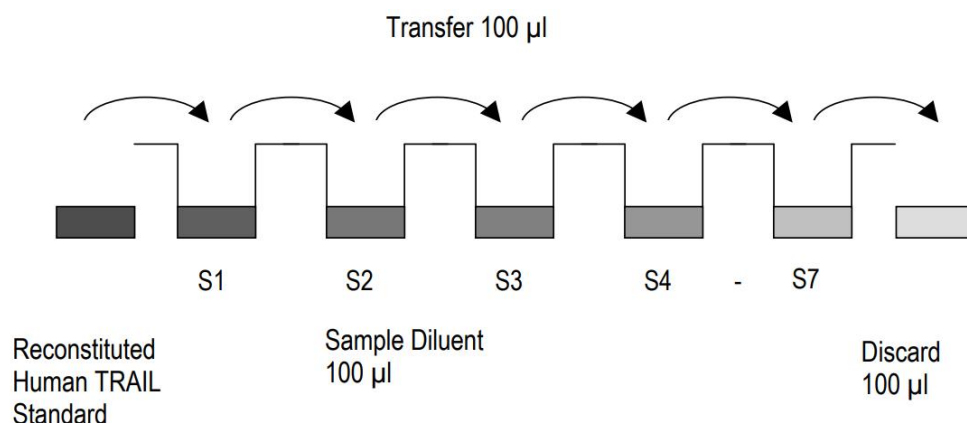


Table depicting an example of the arrangement of blanks, standards and samples in the microwell strips:

	1	2	3	4
A	Standard 1 (1000.0 pg/ml)	Standard 1 (1000.0 pg/ml)	Sample 1	Sample 1
B	Standard 2 (500.0 pg/ml)	Standard 2 (500.0 pg/ml)	Sample 2	Sample 2
C	Standard 3 (250.0 pg/ml)	Standard 3 (250.0 pg/ml)	Sample 3	Sample 3
D	Standard 4 (125.0 pg/ml)	Standard 4 (125.0 pg/ml)	Sample 4	Sample 4
E	Standard 5 (62.5 pg/ml)	Standard 5 (62.5 pg/ml)	Sample 5	Sample 5
F	Standard 6 (31.3 pg/ml)	Standard 6 (31.3 pg/ml)	Sample 6	Sample 6
G	Standard 7 (15.6 pg/ml)	Standard 7 (15.6 pg/ml)	Sample 7	Sample 7
H	Blank	Blank	Sample 8	Sample 8

4. Add 100  $\mu$ l of **Sample Diluent** in duplicate to the **blank wells**.
5. Add 50  $\mu$ l of **Sample Diluent** to the **sample wells**.
6. Add 50  $\mu$ l of each **sample** in duplicate to the **sample wells**.
7. Prepare **Biotin-Conjugate** (see **Reagents Preparation 3**).
8. Add 50  $\mu$ l of **Biotin-Conjugate** to all wells.
9. Cover with an adhesive film and incubate at room temperature (18-25°C) for 2 hours, if available on a microplate shaker set at 400 rpm.
10. Prepare **Streptavidin-HRP** (refer to **Reagents Preparation 4**).
11. Remove adhesive film and empty wells. Wash microwell strips 3 times according to point 2 of the test protocol. Proceed immediately to the next step.
12. Add 100  $\mu$ l of diluted **Streptavidin-HRP** to all wells, including the **blank wells**.
13. Cover with an adhesive film and incubate at room temperature (18-25°C) for 1 hour, if available on a microplate shaker set at 400 rpm.
14. Remove adhesive film and empty wells. **Wash** microwell strips 3 times according to point 2 of the test protocol. Proceed immediately to the next step.
15. Pipette 100  $\mu$ l of **TMB Substrate Solution** to all wells.

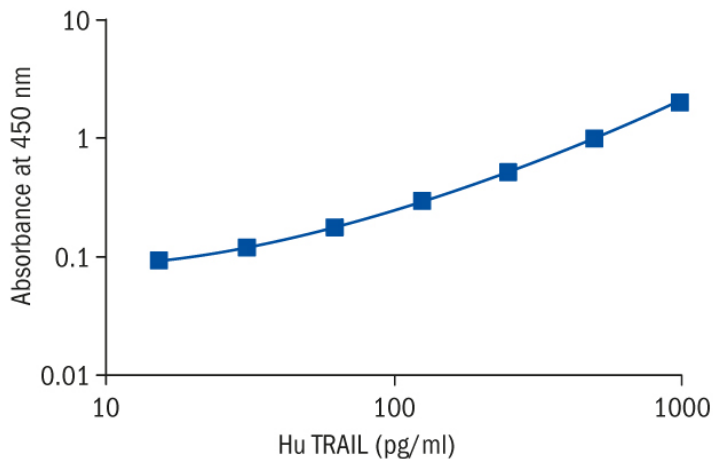
16. Incubate the microwell strips at room temperature (18-25°C) for about 20 min. Avoid direct exposure to intense light. **The colour development on the plate should be monitored and the substrate reaction stopped (see next point of this protocol) before positive wells are no longer properly recordable. Determination of the ideal time period for colour development has to be done individually for each assay.** It is recommended to add the stop solution when the highest standard has developed a dark blue colour. Alternatively the colour development can be monitored by the ELISA reader at 620 nm. The substrate reaction should be stopped as soon as Standard 1 has reached an OD of 0.90-0.95.
17. Stop the enzyme reaction by quickly pipetting 100 µl of **Stop Solution** into each well. It is important that the Stop Solution is spread quickly and uniformly throughout the microwells to completely inactivate the enzyme. Results must be read immediately after the Stop Solution is added or within one hour if the microwell strips are stored at 2 - 8°C in the dark.
18. Read absorbance of each microwell on a spectro-photometer using 450 nm as the primary wave length (optionally 620 nm as the reference wave length; 610 nm to 650 nm is acceptable). Blank the plate reader according to the manufacturer's instructions by using the blank wells. Determine the absorbance of both the samples and the standards.

**Note: In case of incubation without shaking the obtained O.D. values may be lower than indicated below. Nevertheless the results are still valid.**

## Calculation

1. Calculate the average absorbance values for each set of duplicate standards and samples. Duplicates should be within 20 per cent of the mean value.
2. Create a standard curve by plotting the mean absorbance for each standard concentration on the ordinate against the human TRAIL concentration on the abscissa. Draw a best fit curve through the points of the graph (a 5-parameter curve fit is recommended).
3. To determine the concentration of circulating human TRAIL for each sample, first find the mean absorbance value on the ordinate and extend a horizontal line to the standard curve. At the point of intersection, extend a vertical line to the abscissa and read the corresponding human TRAIL concentration.
4. **If instructions in this protocol have been followed samples have been diluted 1:2 (50 µl sample + 50 µl Sample Diluent), the concentration read from the standard curve must be multiplied by the dilution factor (x2).**
5. **Calculation of samples with a concentration exceeding standard 1 may result in incorrect, low human TRAIL levels. Such samples require further external predilution according to expected human TRAIL values with Sample Diluent in order to precisely quantitate the actual human TRAIL level.**
6. It is suggested that each testing facility establishes a control sample of known human TRAIL concentration and runs this additional control with each assay. If the values obtained are not within the expected range of the control, the assay results may be invalid.

## Typical Standard Curve



## Reference Values

Panels of 40 serum as well as EDTA, citrate and heparin plasma samples from randomly selected apparently healthy donors (males and females) were tested for human TRAIL. The levels measured may vary with the sample collection used. For detected human TRAIL levels see Table.

Sample Matrix	Number of Samples Evaluated	Range (ng/ml)	Mean (ng/ml)	Standard Deviation (ng/ml)
Serum	40	6.6 - 126.7	51.6	31.1
Plasma (EDTA)	40	6.3 - 158.0	54.5	36.4
Plasma (Citrate)	40	7.4 - 84.1	25.9	18.3
Plasma (Heparin)	40	14.2 - 238.2	65.1	47.2

## Detection Range

15.6-1000 pg/ml

## Detection Limit

5.0 pg/ml

## Sensitivity

The limit of detection of human TRAIL defined as the analyte concentration resulting in an absorbance significantly higher than that of the dilution medium (mean plus 2 standard deviations) was determined to be 5 pg/ml (mean of 6 independent assays).

## Specificity

The interference of circulating factors of the immune system was evaluated by spiking these proteins at physiologically relevant concentrations into a human TRAIL positive serum. There was no crossreactivity

detected.

## Linearity

**3 serum samples with different levels of human TRAIL were analysed at serial 2 fold dilutions with 4 replicates each.** The recovery ranged from 94% to 120% with an overall recovery of 103% (see Table).

Sample	Dilution	Expected TRAIL Concentration (pg/ml)	Human Observed TRAIL Concentration (pg/ml)	Recovery of Expected TRAIL Concentration (%)
1	1:2	--	815.5	--
	1:4	407.8	404.6	99.2 %
	1:8	203.9	210.3	103.2 %
	1:16	101.9	117.5	115.2 %
2	1:2	--	478.5	--
	1:4	239.3	225.0	94.0 %
	1:8	119.6	112.5	94.0 %
	1:16	59.8	71.5	119.5 %
3	1:2	--	195.3	--
	1:4	97.6	93.8	96.1 %
	1:8	48.8	50.5	103.4 %
	1:16	24.4	24.5	100.5 %

## Recovery

The spiking recovery was evaluated by spiking 4 levels of human TRAIL into different normal human serum samples. Recoveries were determined in 3 independent experiments with 6 replicates each. The amount of endogenous human TRAIL in unspiked serum was subtracted from the spike values. The overall mean recovery was 77%.

## Reproducibility

### 1. Intra-assay

Reproducibility within the assay was evaluated in 3 independent experiments. Each assay was carried out with 6 replicates of 8 serum samples containing different concentrations of human TRAIL. 2 standard curves were run on each plate. Data below show the mean human TRAIL concentration and the coefficient of variation for each sample (see Table). The calculated overall intra-assay coefficient of variation was 6.5%.

The mean human TRAIL concentration and the coefficient of variation for each sample

Sample	Experiment	Mean Human TRAIL Concentration (pg/ml)	Coefficient of Variation (%)
1	1	867.0	3
	2	895.8	8
	3	861.8	9
2	1	229.2	8
	2	272.8	4
	3	204.6	5
3	1	156.4	8
	2	179.1	2
	3	133.2	9
4	1	396.1	6
	2	453.5	8
	3	410.9	5
5	1	259.2	6
	2	285.2	2
	3	228.5	4
6	1	677.3	8
	2	736.3	5
	3	625.6	3
7	1	515.8	10
	2	515.2	7
	3	497.2	7
8	1	70.3	8
	2	68.1	12
	3	70.1	10

## 2. Inter-assay

Assay to assay reproducibility within one laboratory was evaluated in 3 independent experiments. Each assay was carried out with 6 replicates of 8 serum samples containing different concentrations of human TRAIL. 2 standard curves were run on each plate. Data below show the mean human TRAIL concentration and the coefficient of variation calculated on 18 determinations of each sample (see Table). The calculated overall inter-assay coefficient of variation was 7.7%.

The mean human TRAIL concentration and the coefficient of variation of each sample

Sample	Mean Human TRAIL Concentration (pg/ml)	Coefficient of Variation (%)
1	874.9	2.1
2	235.5	14.7
3	156.2	14.7
4	420.2	7.1
5	257.6	11.0
6	679.7	8.2
7	509.4	2.1
8	69.5	1.7

## Precautions

1. All chemicals should be considered as potentially hazardous. We therefore recommend that this product is

handled only by those persons who have been trained in laboratory techniques and that it is used in accordance with the principles of good laboratory practice. Wear suitable protective clothing such as laboratory overalls, safety glasses and gloves. Care should be taken to avoid contact with skin or eyes. In the case of contact with skin or eyes wash immediately with water. See material safety data sheet(s) and/or safety statement(s) for specific advice.

2. Reagents are intended for research use only and are not for use in diagnostic or therapeutic procedures.
3. Do not mix or substitute reagents with those from other lots or other sources.
4. Do not use kit reagents beyond expiration date on label.
5. Do not expose kit reagents to strong light during storage or incubation.
6. Do not pipette by mouth.
7. Do not eat or smoke in areas where kit reagents or samples are handled.
8. Avoid contact of skin or mucous membranes with kit reagents or specimens.
9. Rubber or disposable latex gloves should be worn while handling kit reagents or specimens.
10. Avoid contact of substrate solution with oxidizing agents and metal.
11. Avoid splashing or generation of aerosols.
12. In order to avoid microbial contamination or cross-contamination of reagents or specimens which may invalidate the test use disposable pipette tips and/or pipettes.
13. Use clean, dedicated reagent trays for dispensing the conjugate and substrate reagent.
14. Exposure to acid inactivates the conjugate.
15. Glass-distilled water or deionized water must be used for reagent preparation.
16. Substrate solution must be at room temperature prior to use.
17. Decontaminate and dispose specimens and all potentially contaminated materials as they could contain infectious agents. The preferred method of decontamination is autoclaving for a minimum of 1 hour at 121.5°C.
18. Liquid wastes not containing acid and neutralized waste may be mixed with sodium hypochlorite in volumes such that the final mixture contains 1.0% sodium hypochlorite. Allow 30 minutes for effective decontamination. Liquid waste containing acid must be neutralized prior to the addition of sodium hypochlorite.

## Limitations

1. Since exact conditions may vary from assay to assay, a standard curve must be established for every run.
2. Bacterial or fungal contamination of either screen samples or reagents or crosscontamination between reagents may cause erroneous results.
3. Disposable pipette tips, flasks or glassware are preferred, reusable glassware must be washed and thoroughly rinsed of all detergents before use.
4. Improper or insufficient washing at any stage of the procedure will result in either false positive or false negative results. Empty wells completely before dispensing fresh wash solution, fill with Wash Buffer as indicated for each wash cycle and do not allow wells to sit uncovered or dry for extended periods.
5. The use of radioimmunotherapy has significantly increased the number of patients with human anti-mouse IgG antibodies (HAMA). HAMA may interfere with assays utilizing murine monoclonal antibodies leading to

both false positive and false negative results. Serum samples containing antibodies to murine immunoglobulins can still be analysed in such assays when murine immunoglobulins (serum, ascitic fluid, or monoclonal antibodies of irrelevant specificity) are added to the sample.