



DRG[®] ICAM-1 ELISA (human) (EIA-4781)

Revised 22 Nov. 2010 rm (Vers. 5.1)

USA: **RUO**

Please use only the valid version of the package insert provided with the kit.

INTENDED USE

The human ICAM-1 ELISA is an enzyme-linked immunosorbent assay for detection of human sICAM-1.

This kit is intended for Research Use Only. Not for use in diagnostic procedures.

PRINCIPLES OF THE TEST

An anti-human sICAM-1 coating antibody is adsorbed onto microwells.

sICAM-1 present in the sample or standard binds to antibodies adsorbed to the microwells and a HRP-conjugated anti-human sICAM-1 antibody is added and binds to human sICAM-1 captured by the first antibody.

Following incubation unbound HRP-conjugated anti-human sICAM-1 is removed during a wash step and substrate solution reactive with HRP is added to the wells.

A coloured product is formed in proportion to the amount of human sICAM-1 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 5 human sICAM-1 standard dilutions and sICAM-1 sample concentration determined.

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REAGENTS PROVIDED

- 1 aluminium pouch with a **Microwell Plate coated with** monoclonal antibody to human sICAM-1
- 1 vial (100 µL) **HRP-Conjugate** anti-human sICAM-1 monoclonal antibody
- 2 vials (500 µL) human sICAM-1 **Standard**, 100 ng/mL
- 1 vial **Control high**, lyophilized
- 1 vial **Control low**, lyophilized
- 1 vial (12 mL) **Sample Diluent**
- 1 vial (5 mL) **Assay Buffer Concentrate** 20 x (PBS with 1% Tween 20 and 10% BSA)
- 1 bottle (50 mL) **Wash Buffer Concentrate** 20x (PBS with 1% Tween 20)
- 1 vial (15 mL) **Substrate Solution** (tetramethyl-benzidine)
- 1 vial (15 mL) **Stop Solution** (1M Phosphoric acid)
- 1 vial (0.4 mL) **Blue-Dye**,
- 1 vial (0.4 mL) **Green-Dye**
- 2 adhesive **Plate Covers**

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Store kit reagents between 2°C and 8°C except controls.

Store lyophilized controls at -20°C.

Immediately after use remaining reagents should be returned to cold storage (2°C to 8°C), or to -20°C, respectively.

Expiry of the kit and reagents is stated on labels.

The expiry of the kit components can only be guaranteed if the components are stored properly, and if, in case of repeated use of one component, this reagent is not contaminated by the first handling.

SPECIMEN COLLECTION AND STORAGE INSTRUCTIONS

Cell culture supernatants, serum, plasma (EDTA, citrate, heparin), amniotic fluid, spontaneous urine and bile 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.

Pay attention to a possible “**Hook Effect**” due to high sample concentrations (see chapter 11).

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 sICAM-1. If samples are to be run within 24 hours, they may be stored at 2°C to 8°C (for sample stability refer to 13.5). Avoid repeated freeze-thaw cycles. Prior to assay, the frozen sample should be brought to room temperature slowly and mixed gently.

To measure human sICAM-1 in spontaneous urine use undiluted samples.

Cell culture media without serum components are not suitable for human sICAM-1 determination with the ELISA.

MATERIALS REQUIRED BUT NOT PROVIDED

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

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PRECAUTIONS FOR USE

- All reagents 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 statements(s) for specific advice.
- This kit is intended for Research Use Only. Not for use in diagnostic procedures. .
- Do not mix or substitute reagents with those from other lots or other sources.
- Do not use kit reagents beyond expiration date on label.
- Do not expose kit reagents to strong light during storage or incubation.
- Do not pipette by mouth.
- Do not eat or smoke in areas where kit reagents or samples are handled.
- Avoid contact of skin or mucous membranes with kit reagents or specimens.
- Rubber or disposable latex gloves should be worn while handling kit reagents or specimens.
- Avoid contact of substrate solution with oxidizing agents and metal.
- Avoid splashing or generation of aerosols.
- 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.
- Use clean, dedicated reagent trays for dispensing the conjugate and substrate reagents.
- Exposure to acid inactivates the conjugate.
- Glass-distilled water or deionized water must be used for reagent preparation.
- Substrate solution must be at room temperature prior to use.
- Decontaminate and dispose specimens and all potentially contaminated materials as if they could contain infectious agents. The preferred method of decontamination is autoclaving for a minimum of 1 hour at 121.5°C.
- 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.

PREPARATION OF REAGENTS

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.

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Wash Buffer (1x)

Pour entire contents (50 mL) of the **Wash Buffer Concentrate (20x)** into a clean 1,000 mL graduated cylinder. Bring to final volume of 1,000 mL with glass-distilled or deionized water. Mix gently to avoid foaming. The pH of the final solution should adjust to 7.4.

Transfer to a clean wash bottle and store at 2°C to 25°C. Please note that Wash Buffer (1x) is stable for 30 days. Wash Buffer (1x) may also be prepared as needed according to the following table:

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

Assay Buffer (1x)

Pour the entire contents (5 mL) of the Assay Buffer Concentrate (20x) into a clean 100 mL graduated cylinder. Bring to final volume of 100 mL with distilled water. Mix gently to avoid foaming.

Store at 2°C to 8°C. Please note that the Assay Buffer (1x) is stable for 30 days.

Assay Buffer (1x) may also be prepared as needed according to the following table:

Number of Strips	Assay Buffer Concentrate (20x) (mL)	Distilled Water (mL)
1 - 6	2.5	47.5
1 - 12	5.0	95.0

HRP-Conjugate

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

Make a **1:100** dilution of the concentrated HRP-Conjugate solution with Assay Buffer (1x) in a clean plastic tube as needed according to the following table:

Number of Strips	HRP-Conjugate (mL)	Assay Buffer (1x) (mL)
1 - 6	0.03	2.97
1 - 12	0.06	5.94

Human sICAM-1 Standard

Standard dilutions can be prepared directly on the microwell plate (see 10.c) or alternatively in tubes (see 9.4.1).

External Standard Dilution

Label 4 tubes, one for each standard point.

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S2, S3, S4, S5

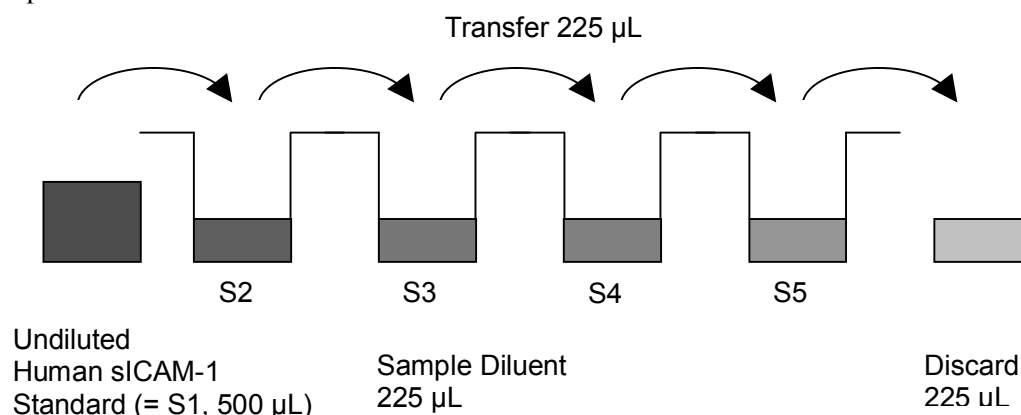
Then prepare 1:2 serial dilutions for the standard curve as follows:

Pipette 225 µL of Sample Diluent into tubes S2 – S5.

Pipette 225 µL of undiluted standard (serves as the highest standard S1, concentration of standard 1 = 100 ng/ml) into the first tube, labelled S2, and mix thoroughly before the next transfer (concentration of standard 2 = 50 ng/ml).

Repeat serial dilutions 3 more times thus creating the points of the standard curve (see Figure).

Sample Diluent serves as blank.



Control

Reconstitute by adding 100 µl distilled water to lyophilized controls (10-30 minutes). Further treat the controls like your samples in the assay. For control range please refer to certificate of analysis or vial label. Store reconstituted controls aliquoted at -20°C. Avoid repeated freeze and thaw cycles.

Addition of colour-giving reagents: Blue-Dye, Green-Dye

In order to help our customers to avoid any mistakes in pipetting a new tool is offered that helps to monitor the addition of even very small volumes of a solution to the reaction well by giving distinctive colours to each step of the ELISA procedure.

This procedure is optional, does not in any way interfere with the test results, and is designed to help the customer with the performance of the test, but can also be omitted, just following the instruction booklet.

Alternatively, the dye solutions from the stocks provided (*Blue-Dye, Green-Dye*) can be added to the reagents according to the following guidelines:

1. Diluent: Before standard dilution add the *Blue-Dye* at a dilution of 1:250 (see table below) to the appropriate diluent (1x) according to the test protocol. After addition of *Blue-Dye*, proceed according to the instruction booklet.

5 mL Sample Diluent	20 µL <i>Blue-Dye</i>
12 mL Sample Diluent	48 µL <i>Blue-Dye</i>
50 mL Sample Diluent	200 µL <i>Blue-Dye</i>

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2. HRP-Conjugate: Before dilution of the concentrated HRP-Conjugate, add the **Green-Dye** at a dilution of 1:100 (see table below) to the Assay Buffer (1X) used for the final conjugate dilution. Proceed after addition of **Green-Dye** according to the instruction booklet, preparation of HRP-conjugate.

3 mL Assay Buffer (1x)	30 µL Green-Dye
6 mL Assay Buffer (1x)	60 µL Green-Dye
12 mL Assay Buffer (1x)	120 µL Green-Dye

TEST PROTOCOL

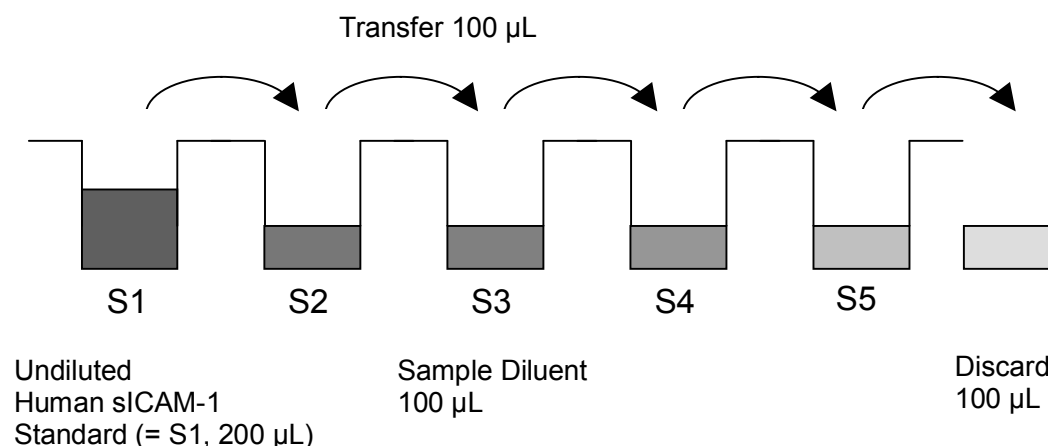
- Determine the number of microwell strips required to test the desired number of samples plus appropriate number of wells needed for running blanks and standards. Each sample, standard, blank and optional control sample should be assayed in duplicate. Remove extra microwell strips from holder and store in foil bag with the desiccant provided at 2°C-8°C sealed tightly.
- 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.

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- c) **Standard dilution on the microwell plate** (Alternatively the standard dilution can be prepared in tubes - see 9.4.1): Add 100 µL of Sample Diluent in duplicate to standard wells B1/2-E1/2, leaving A1/A2 empty. Pipette 200 µL of undiluted standard (see Preparation of Standard 9.4, concentration of standard 1, S1 = 100.0 ng/ml) in duplicate into well A1 and A2 (see Table 1). Transfer 100 µL to wells B1 and B2. Mix the contents of wells B1 and B2 by repeated aspiration and ejection (concentration of standard 2, S2 = 50.0 ng/ml), and transfer 100 µL to wells C1 and C2, respectively. (see Figure). Take care not to scratch the inner surface of the microwells. Continue this procedure 2 times, creating two rows of human sICAM-1 standard dilutions ranging from 100.0 to 6.3 ng/ml. Discard 100 µL of the contents from the last microwells (E1, E2) used.



In case of an **external standard dilution** (see 9.4.1), pipette 100 µL of these standard dilutions (S1 – S5) in the standard wells according to Table 1.

Table 1. Table depicting an example of the arrangement of blanks, standards and samples in the microwell strips:

	1	2	3	4
A	Standard 1 (100.0 ng/ml)	Standard 1 (100.0 ng/ml)	Sample 3	Sample 3
B	Standard 2 (50.0 ng/ml)	Standard 2 (50.0 ng/ml)	Sample 4	Sample 4
C	Standard 3 (25.0 ng/ml)	Standard 3 (25.0 ng/ml)	Sample 5	Sample 5
D	Standard 4 (12.5 ng/ml)	Standard 4 (12.5 ng/ml)	Sample 6	Sample 6
E	Standard 5 (6.3 ng/ml)	Standard 5 (6.3 ng/ml)	Sample 7	Sample 7
F	Blank	Blank	Sample 8	Sample 8
G	Sample 1	Sample 1	Sample 9	Sample 9
H	Sample 2	Sample 2	Sample 10	Sample 10

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- d) Add 100 µL of **Sample Diluent**, in duplicate, to the blank wells.
- e) Add 90 µL **Sample Diluent** to the sample wells.
- f) Add 10 µL of each **sample**, in duplicate, to the sample wells.
- g) Prepare **HRP-Conjugate**. (Refer to preparation of reagents 9.3.)
- h) Add 50 µL of **HRP-Conjugate** to all wells.
- i) Cover with an adhesive film and incubate at room temperature (18°C to 25°C) for 1 hour, if available on a rotator set at 100 rpm.
- j) Remove adhesive film and empty wells. Wash microwell strips 3 times according to point b. of the test protocol. Proceed immediately to the next step.
- k) Pipette 100 µL of **TMB Substrate Solution** to all wells.
- l) Incubate the microwell strips at room temperature (18° to 25°C) for about 10 minutes. 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 620nm. The substrate reaction should be stopped as soon as Standard 1 has reached an OD of 0.9 – 0.95.
- m) 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.
- n) 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 sICAM-1 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.

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USA: **CALCULATION OF RESULTS**

- Calculate the average absorbance values for each set of duplicate standards and samples. Duplicates should be within 20 per cent of the mean value.
- Create a standard curve by plotting the mean absorbance for each standard concentration on the ordinate against the human sICAM-1 concentration on the abscissa. Draw a best fit curve through the points of the graph (a 5-parameter curve fit is recommended).
- To determine the concentration of circulating human sICAM-1 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 sICAM-1 concentration.
- **If instructions in this protocol have been followed samples have been diluted 1:10 (10 µL sample + 90 µL Sample Diluent), the concentration read from the standard curve must be multiplied by the dilution factor (x 10).**
- **Calculation of samples with a concentration exceeding standard 1 will result in incorrect, low human sICAM-1 levels (Hook Effect). Such samples require further external predilution according to expected human sICAM-1 values with Sample Diluent in order to precisely quantitate the actual human sICAM-1 level.**
- It is suggested that each testing facility establishes a control sample of known human sICAM-1 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.
- A representative standard curve is shown in the Figure below. This curve cannot be used to derive test results. Each laboratory must prepare a standard curve for each group of microwell strips assayed.

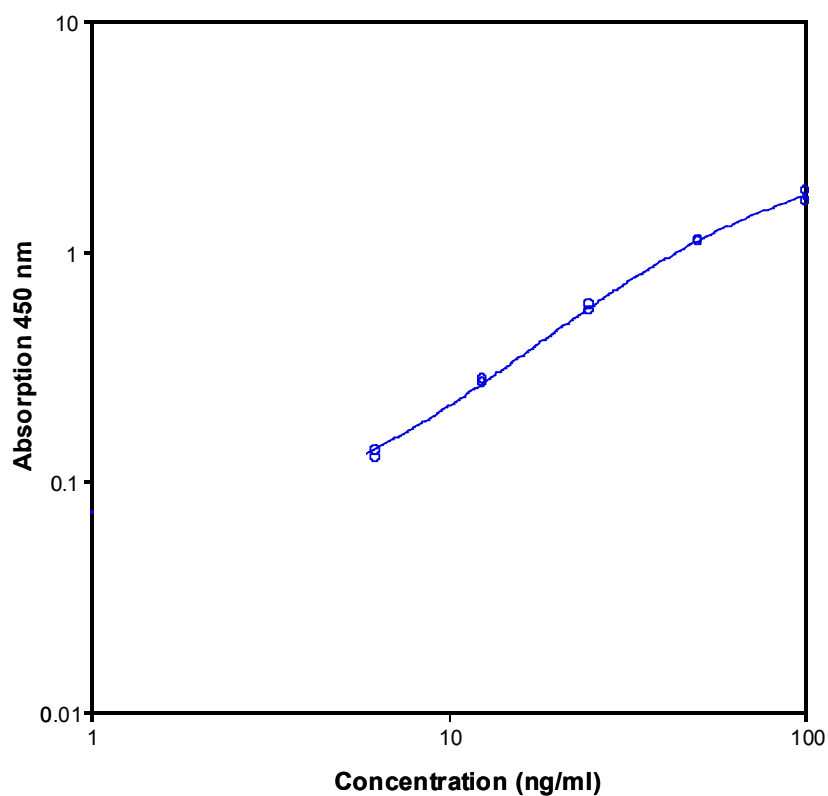
Representative standard curve for human sICAM-1 ELISA.

Human sICAM-1 was diluted in serial 2-fold steps in Sample Diluent. Do not use this standard curve to derive test results. A standard curve must be run for each group of microwell strips assayed.

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Typical data using the human sICAM-1 ELISA

Measuring wavelength: 450 nm

Reference wavelength: 620 nm

Standard	sICAM-1 Concentration (ng/mL)	O.D. (450 nm)	O.D. Mean	C.V. (%)
1	100.0	1.737 1.806	1.772	2.8
2	50.0	1.114 1.087	1.101	1.7
3	25.0	0.570 0.546	0.558	3.0
4	12.5	0.247 0.235	0.241	3.5
5	6.3	0.110 0.100	0.105	6.7
Blank	0	0.004 0.006	0.005	20

The OD values of the standard curve may vary according to the conditions of assay performance (e.g. operator, pipetting technique, washing technique or temperature effects). Furthermore shelf life of the kit may affect enzymatic activity and thus colour intensity. Values measured are still valid.

Sample Stability

Freeze-Thaw Stability

Aliquots of serum samples (spiked or unspiked) were stored at -20°C and thawed 5 times, and the human sICAM-1 level determined.

There was no significant loss of human sICAM-1 immunoreactivity detected by freezing and thawing.

Storage Stability

Aliquots of serum samples (spiked or unspiked) were stored at -20°C, 2°C - 8°C, room temperature (RT) and at 37°C, and the human sICAM-1 level determined after 24, 48 and 96 h. There was no significant loss of human sICAM-1 immunoreactivity detected during storage under above conditions.

Comparison of Serum and Plasma

From three individuals, serum as well as EDTA, citrate and heparin plasma obtained at the same time point were evaluated. Human sICAM-1 levels were not significantly different and therefore all these blood preparations are suitable for sICAM-1 determinations.

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USA: **RUO****REAGENT PREPARATION SUMMARY****Wash Buffer (1x)**Add **Wash Buffer Concentrate** 20x (50 ml) to 950 ml distilled water.

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

Assay Buffer (1x)Add **Assay Buffer Concentrate** 20x (5 ml) to 95 ml distilled water.

Number of Strips	Assay Buffer Concentrate (ml)	Distilled Water (ml)
1 - 6	2.5	47.5
1 - 12	5.0	95.0

HRP-ConjugateMake a 1:100 dilution of **HRP-Conjugate** in Assay Buffer (1x):

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

ControlsAdd 100 µl distilled water to lyophilized **control**.**TEST PROTOCOL SUMMARY**

1. Determine the number of microwell strips required.
2. Wash microwell strips twice with Wash Buffer.
3. Standard dilution on the microwell plate: Add 100 µL Sample Diluent, in duplicate, to all standard wells leaving the first wells empty. Pipette 200 µL undiluted standard into the first wells and create standard dilutions by transferring 100 µL from well to well. Discard 100 µL from the last wells.
Alternatively external standard dilution in tubes (see 9.4.1): Pipette 100 µL of these standard dilutions in the microwell strips.
4. Add 100 µL Sample Diluent, in duplicate, to the blank wells.
5. Add 90 µL Sample Diluent to sample wells.

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6. Add 10 µL sample in duplicate, to designated sample wells.
7. Prepare HRP-Conjugate.
8. Add 50 µL HRP-Conjugate to all wells.
9. Cover microwell strips and incubate 1 hour at room temperature (18° to 25°C).
10. Empty and wash microwell strips 3 times with Wash Buffer.
11. Add 100 µL of TMB Substrate Solution to all wells.
12. Incubate the microwell strips for about 10 minutes at room temperature (18°to 25°C).
13. Add 100 µL Stop Solution to all wells.
14. Blank microwell reader and measure colour intensity at 450 nm.

Note: If instructions in this protocol have been followed samples have been diluted 1:10 (10 µL sample + 90 µL Sample Diluent), the concentration read from the standard curve must be multiplied by the dilution factor (x 10).