INTRODUCTION

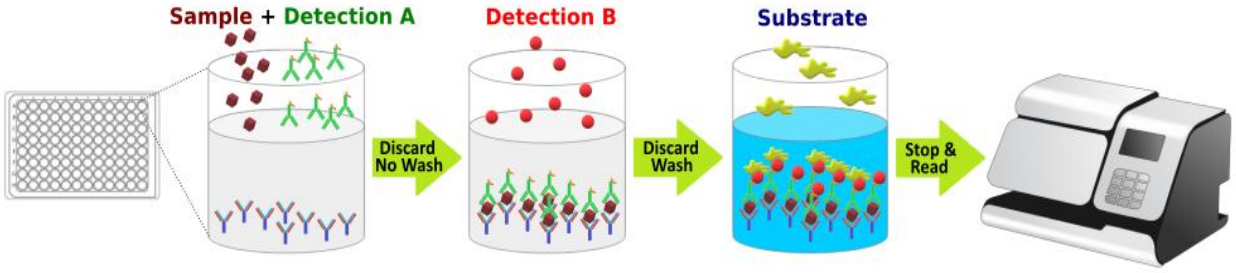
Double-stranded RNA (dsRNA) consists of two complementary RNA strands that form a double helix structure through base-pairing interactions. dsRNA is involved in various biological processes, including gene regulation, antiviral defense, and the innate immune response. It can be recognized by pattern recognition receptors (PRRs) in cells, triggering immune responses. dsRNA is used for gene function analysis due to its ability to induce RNAi in a sequence-specific manner. dsRNA can target viral RNA, as seen in studies with Hepatitis C Virus (HCV), where dsRNA forms a genomic reservoir contributing to viral persistence. Targeting dsRNA formation could lead to new antiviral drugs.

The Tribioscience dsRNA Fast ELISA is designed to quantitatively detect dsRNA levels in different tissues, cells, and other biological samples. The main feature is that the kit uses our novel proprietary approaches to combine samples and detections into a one-step instead of the complicated traditional methods. It makes the assay simple, easy, accurate and fast. The measurement can be finished in 3 hours, not needing 4-5 hours (Fig. 1). The detection range is from 20 to 1280 pg/mL. The levels of dsRNA samples are parallel to the standard curves obtained using the kit standards linearly. These results indicate that this kit can be used to determine relative mass values for natural dsRNA protein. The dsRNA Fast ELISA can be used to determine dsRNA in multiple-species.

PRINCIPLE OF THE ASSAY

This assay employs our novel proprietary sandwich enzyme immunoassay techniques (see Fig. 1). A monoclonal antibody specific to dsRNA is pre-coated onto a microplate. Standards or samples and a biotin-conjugated detection antibody are pipetted into the wells and concurrently incubated to form a sandwich complex in one step. Simply aspirate each well without washing and directly add Streptavidin-HRP into the complex. Following a wash, an **ultra-sensitive TMB substrate solution** is added to the wells for color development. The color intensity is proportional to the amount of dsRNA bound in the initial step. The intensity of the color is measured by plate reading at 450 nm.

Fig. 1: Assay Principle:



KIT CONTENT AND STORAGE CONDITIONS

PART	PART#	DESCRIPTION	STORAGE OF OPENED/ RECONSTITUTED
dsRNA Microplate	TBS32119A	96 well polystyrene microplate (12 strips of 8 wells) coated with a monoclonal antibody specific for dsRNA.	Return unused wells to the foil pouch. Reseal along the entire edge of the zip-seal. May be stored for up to 1 month at 2-8 °C.
dsRNA Standard	TBS32119B	30 µL of dsRNA control (64 ng/mL).	Aliquot and store at -20 °C for up to 1 month in a manual defrost the freezer. Avoid repeated freeze-thaw cycles.
Detection A	TBS32119C	220 µL of Biotin-dsRNA antibody (10x).	May be stored for up to 3 months at 2-8 °C.*
Detection B	TBS32119D	300 µL of Streptavidin-HRP (50x).	
Assay Diluent	TBS32119E	15 mL of a buffered protein base with preservatives.	
Wash Buffer	TBS3000W	15mL of concentrated solution (10x).	
TMB Substrate	TBS3000T	12 mL of ultra-sensitive TMB substrate.	
Stop Solution	TBS3000S	6mL of 2 N sulfuric acid.	

Store the unopened kit at 2-8 °C. Do not use past kit expiration date.
The kit contains sufficient materials to run an ELISA on one 96 well plate.

PRECAUTIONS

Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

REAGENT PREPARATION

Bring all reagents to room temperature before use.

Wash Buffer: Add 12 mL of Wash Buffer Concentrate (10x) to 108 mL of deionized distilled water to prepare 120 mL of Wash Buffer (*If crystals have formed in the concentrate, warm to room temperature and mix gently until the crystals have completely dissolved.).*

Detection A working solution preparation: Add 210 µL of **Detection A Stock** (Biotin-dsRNA antibody) to 1890 µL Assay Diluent to prepare Detrection A working solution. Add 20 µL to each well.

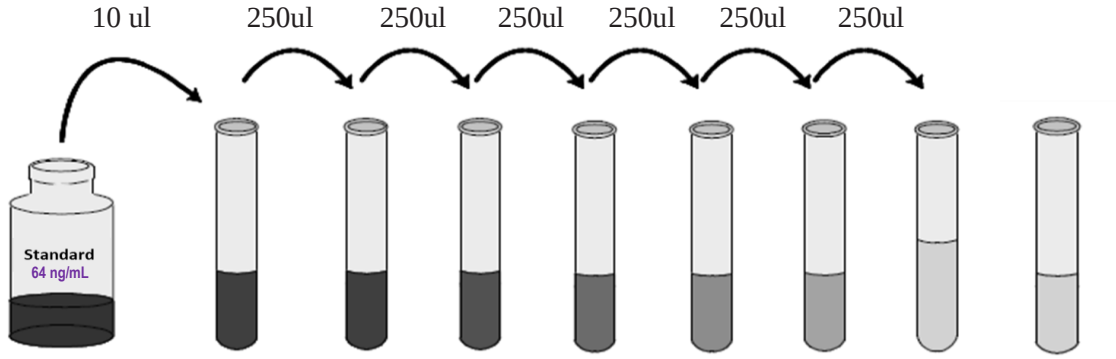
Detection B working solution preparation: Add 240 µL of **Detection B** streptavidin-HRP to 12 mL Assay Diluent to prepare Detrection B working solution. Add 100 µL to each well.

dsRNA Standard Preparation:

Label test tubes as #1 through #8. Pipet 490 µL of 1x Assay Diluent into tube #1, and 250 µL into tubes #2 to #7 **as diagram below (Fig.2).**

1. Add 10 µL of the dsRNA Standard stock solution (64 ng/mL) by dilution of 50X to tube #1 (1280 pg/mL), and mix.
2. Make 2x serial dilutions of the standard using the 1280 pg/mL standard solution (tube #1) from tube #2 through #7 with sequential transfer of 250 µL to the next concentration. Mix each tube thoroughly before the next transfer. The standard concentration in tubes 1 through 7 will be 1280, 640, 320, 160, 80, 40, and 20 pg/mL. Tube# 8 is Standard 0.

Fig.2 Diagram for dsRNA standard preparation



	Std1	Std2	Std3	Std4	Std5	Std6	Std7	Std8
Assay Buffer (µL)	490	250	250	250	250	250	250	250
Addition	Stock	Std1	Std2	Std3	Std4	Std5	Std6	
Addition Vol. (µL)	10	250	250	250	250	250	250	0
Final Conc (pg/mL)	1280	640	320	160	80	40	20	0

ASSAY PROCEDURE

Bring all reagents and samples to room temperature before use. It is recommended that all standards, controls, and samples be assayed in duplicate.

1. Add 80 µL of standard, sample, or control per well.
2. Add 20 µL of **Detection A** to the above standard and sample of each well, thoroughly mix. Cover with the adhesive sealer. Incubate at **RT for 2 hours**.
3. Aspirate each well (no wash). Invert the plate and blot it against clean paper towels.
4. Add 100 µL of **Detection B** to each well. Incubate at **RT for 1 hour.**
5. Aspirate each well, and wash for 3 times by filling each well with 200 µL Wash Buffer (*Complete removal of liquid at each step is essential to good performance*). After the last wash, remove any remaining Wash Buffer by aspirating or decanting. Invert the plate and blot it against clean paper towels.

6. Add 100 µL of **TMB Substrate** to each well. Incubate **at RT for 10-20 min** (*Protect from light*). The color becomes blue.
7. Add 50 µL of **Stop Solution** to each well. The color in the well should change from blue to yellow (gently tap the plate to ensure thorough mixing).
8. Determine the optical density of each well within 20 minutes, using a microplate reader at 450 nm. If wavelength correction is available, set to 540 nm or 570 nm. If wavelength correction is not available, subtract readings at 540 nm or 570 nm from the readings at 450 nm. This subtraction will correct for optical imperfections in the plate. Readings made directly at 450 nm without correction may be higher and less accurate.

CALCULATION OF RESULTS

Average the duplicate readings for each standard, control, and sample subtract the average zero standard optical density (O.D.).

Create a standard curve 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. The data may be linearized by plotting the log of the dsRNA concentrations versus the log of the O.D. and the best fit line can be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data.

TYPICAL DATA

This standard curve (R^2=0.9995) is provided for demonstration only. A standard curve should be generated for each set of samples assayed. Fig. 3 is an example of typical Data.

SENSITIVITY

The minimum detectable dose (MDD) of dsRNA is typically 10 pg/mL.
The Intra-assay CV is 3.79% the Inter-assay CV is <10%.

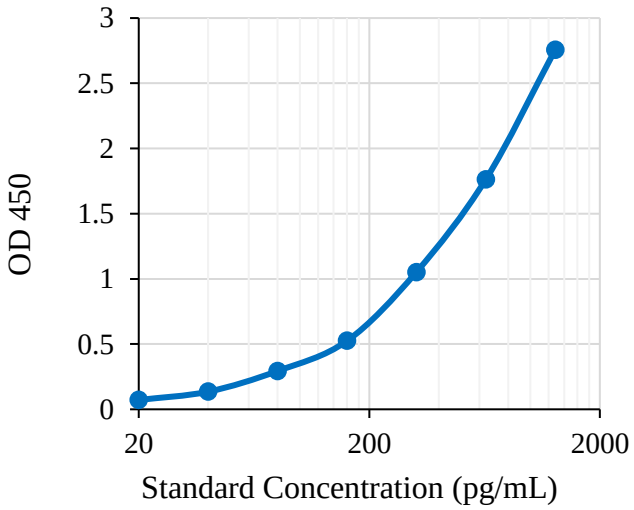
SPECIFICITY

This assay recognizes natural and recombinant dsRNA.

RELATIVE PRODUCTS

Human IL-1β ELISA (TBS3219)
Human IL-2 ELISA (TBS3220)
Human IL-4 ELISA (TBS3221)
Human IL-6 ELISA (TBS3223)
Human IL-7 ELISA (TBS3224)
Human IL-8 ELISA (TBS3225)
Human IL-10 ELISA (TBS3226)
Human IL-13 ELISA (TBS3227)
Human IL-17 ELISA (TBS3228)
Human IL-22 ELISA (TBS3229)
Human IFN-gamma ELISA (TBS3230)
Human TGF- ß1 ELISA (TBS3232)
Human GM-CSF ELISA (TBS3233)
Human MIP-1α ELISA (TBS3234)
Human PD-1 ELISA (TBS32116)
Human PD-L1 ELISA (TBS32117)

Fig. 3 dsRNA Standard Curve



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