***For Research Use Only Not for Diagnostic Use***

**Human D-Dimer ELISA Kit**

**Catalog No. EA290004**

**Principle of the Assay**

D-Dimer is a fibrin degradation product (FDP), a small protein fragment present in the blood after a blood clot is degraded by fibrinolysis. The structure of D-Dimer is either a 180 kDa or 195 kDa molecule of two D domains. D-Dimers are not normally present in human blood plasma, except when the coagulation system has been activated. D-Dimer levels are used as a predictive biomarker for deep venous thrombosis (DVT), pulmonary embolism (PE), disseminated intravascular coagulation (DIC) and in the coagulation disorders associated with COVID-19 infection.

This one-step 90 min sandwich ELISA is used to measure human D-Dimer in serum, plasma and other biological fluids. Microtitration wells coated with anti-human D-Dimer monoclonal capture antibody are exposed to test specimens and HRP conjugated human D-Dimer monoclonal detection antibody mixture. The D-Dimer antigen bound with detection antibody is specifically captured onto the immobilized antibody during incubation. After wash, specifically bound enzyme conjugate is detected by reaction with the Substrate Solution, tetramethylbenzidine (TMB). The assay is measured spectrophotometrically to indicate the level of D-Dimer present in a sample.

# Materials Supplied

# The reagents supplied in this pack are for Research Use Only.

|  |  |
| --- | --- |
| **Description** | Quantity |
| D-Dimer Monoclonal Antibody Coated 96-well Plate in foil pouch with desiccant | 1 |
| Human Native D-Dimer Standard (500ng/mL) | 100 µL |
| HRP Conjugated D-Dimer Monoclonal Detection Antibody  | 2.5 mL |
| Assay Buffer | 30 mL |
| Sample Diluent | 25 mL |
| Substrate Solution (TMB) | 12 mL |
| Stop Solution (1N HCl) | 12 mL |
| Wash Buffer (20x) | 25 mL |
| Plate Sealer | 1 |

**Additional Materials not Supplied**

1. Horizontal orbital plate shaker capable of maintaining a speed of 450±50 rpm.
2. Disposable pipet tips to deliver volumes of 5µL, 10 µL, 25 µL, 100 µL and 200 µL (multichannel pipette preferred for dispensing reagents into microtiter plates).
3. Distilled or deionized water.
4. Clean, disposable plastic/glass test tubes, approximate capacities 5mL and 10mL.
5. Range of standard, clean volumetric laboratory glassware consisting of, at least, 15 mL and 100 mL beakers, 1 L graduated cylinder, 1 mL, 5 mL, and 10 mL pipettes.
6. Absorbent paper towels.
7. Automatic microplate washer or laboratory wash bottle.
8. Microplate reader with 450nm filter.
9. Latex gloves, safety glasses and other appropriate protective garments.
10. Biohazard waste containers.
11. Safety pipetting devices for 1 mL or larger pipettes.
12. Timer.

**Storage and Stability**

Upon receipt, store the kit at 2-8°C. The kit should not be used beyond the expiration date. Once opened, the unused microplate strips should be returned to their original foil pouch along with the desiccant. The diluted Wash Buffer should not be stored for longer than 3 weeks at 2-8°C. It is recommended that Wash buffer be freshly diluted before each assay. If the diluted Wash Buffer becomes visibly cloudy during the 3 weeks, discard it. (Note: Concentrated Wash Buffer, when stored at 2-8°C, normally may develop crystalline precipitates, which can be re-dissolved at 37°C.)

*Indications of Deterioration*

The human D-Dimer Assay kit may be considered to have deteriorated if:

1. Reagents are visibly cloudy.

2. The Substrate Solution turns blue. This is likely to be caused by chemical contamination of the Substrate Solution.

**Precautions**

1. The reagents supplied in this kit are for ***Research use only***.

2. All blood products should be treated as potentially infectious.

2. Disposal or decontamination of fluid in the waste reservoir should be in accordance with guidelines described in the Department of Labor, Occupational Safety and Health Administration, occupational exposure to blood-borne pathogens; final rule (29 CFR 1910,1030) FEDERAL REGISTER, pp. 64176-84177,12/6/91.

3. The Substrate Solution and Stop Solution in this kit can irritate the skin and cause eye damage. Handle them with care and wear protective gloves, clothing and eye/face protection. Wash hands thoroughly after handling. Immediately flush the affected area with plenty of water in case of contact with skin or eyes. Obtain medical attention if necessary.

**Technical Suggestions**

1. This kit should be used in strict accordance with the instructions in the Package Insert.
2. Do not use the kit after the expiration date printed on the outer carton label.
3. Do not cross contaminate reagents.
4. Some reagents in the D-Dimer ELISA kit are optimized for each kit lot. Do not exchange reagents from kits with different lot numbers.
5. To ensure accurate results and avoid cross-contamination, use proper adhesive plate sealer during incubation step, and change pipette tips when adding each standard and sample. Multi-channel pipettes are recommended for large assays. Always use fresh pipette tips when drawing from stock reagent bottles.
6. Warm up the foil bag to room temperature before opening.
7. All reagents should be added to the plate in the same order.
8. If the Stop Solution does not mix thoroughly with the Substrate Solution, the color in the wells may appear green after adding stop solution. Gently tap the plate or pipette up and down to mix until the color in the wells change to yellow (avoid bubbles during this step).
9. Reagents should be dispensed with the tip of the micropipettes touching the side of the well at a point about mid-section. For automatic processors, follow manufacturer's recommendations.
10. It is recommended that all pipetting devices (manual or automatic), and thermometers are regularly calibrated according to the manufacturer's instructions.

**Sample Collection and Storage**

The Human D-Dimer ELISA is intended for use with serum, plasma, urine and other biological fluids. The specimen should be tested as soon as possible. However, if the specimen needs storage, the specimens should be stored frozen at -20°C or below. Do not use self-defrosting freezers. Specimens that have been frozen and thawed should be thoroughly mixed before testing.

**Serum:** Use a serum separator tube (SST) and allow samples to clot for 30 minutes at room temperature before centrifugation for 15 minutes at 1000 x g. Remove serum and assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

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

**Urine:** Collect the first urine of the day (mid-stream) aseptically. Centrifuge to remove particulate matter. Assay immediately or aliquot and store at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

**Cell culture supernatants and other biological fluids:** Remove particulates by centrifugation and assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

**Rinse Cycle**

Aspirate each well and wash. Wash by filling each well with Wash Buffer (300μL) using a squirt bottle, manifold dispenser, or automatic plate washer. Complete removal of liquid at each step is essential to good performance. After the last wash, invert the plate and blot it against clean paper towels.

**Preparation for the Assay**

1. *Standard preparation*

Prepare protein standard by diluting 10µL of standard stock into 490 µL (1:50 dilution) of **Assay Buffer**. This will give a final concentration of 10ng/mL as shown in Table 1. Make 2x serial dilution of Standard 1 using **Assay Buffer** to generate a standard concentration range of 0.156 to 10 ng/mL. Each standard should be run in duplicate.

**Table 1: Human D-Dimer Quantitative Standard Curve Generation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Standard Number** | **Concentration of D-Dimer (ng/mL)** | **D-Dimer Standard (µL)** | **Assay Buffer (µL)** |
| 1 | 10 | 10 | 490 |
| 2 | 5 | 250 of #1 | 250 |
| 3 | 2.5 | 250 of #2 | 250 |
| 4 | 1.25 | 250 of #3 | 250 |
| 5 | 0.625 | 250 of #4 | 250 |
| 6 | 0.3125 | 250 of #5 | 250 |
| 7 | 0.1563 | 250 of #6 | 250 |
| 8 | 0 |  | 250 |

2. *Sample preparation*: D-Dimer concentration must be estimated prior to performing the full experiment by testing a serially diluted representative sample using **Sample Diluent** (for plasma sample) or **Assay Buffer** (for serum, urine and other biological samples). Select an optimal dilution level such that the final target protein concentration falls near the middle of the assay linear dynamic range. Or refer to published literature for expected concentrations and derive the optimal dilution level based on the expected dynamic range of the kit.

For normal serum sample, a starting 100-fold dilution is recommended. For normal plasma sample, a starting 2000-fold dilution is recommended.

If sample need more than 300-fold dilution, two or more dilution steps are suggested. Following is an example for 1000-fold dilution:

* Step 1 (20-fold dilution): 5 µL of sample + 95 µL of assay buffer
* Step 2 (50-fold dilution): 5 µL of 20-fold diluted sample + 245 µL of assay buffer

3. *Wash buffer* *preparation*

Prepare working-strength Wash buffer by diluting 1 part concentrate with 19 parts of distilled or de-ionized water. If a kit is likely to be utilized over a period in excess of 4 weeks, then it is recommended that only enough stock concentrate be diluted sufficient for immediate needs.

**Assay Procedure**

**Note: All standards, controls and samples should be tested in duplicate.**

1. Allow all reagents to reach room temperature (18-25°C).

2. Select sufficient microtitration well strips to accommodate all test specimens, controls and reagent blank. Fit the strips into the holding frame. Label wells according to specimen identity using the letter/number cross-reference system molded into the plastic frame.

3. Pipette 20 µL of HRP conjugated detection antibody into each well, then dispense 80 µL of each standard and sample into appropriate wells. Note: Depending on the D-Dimer concentration of your sample, dilute your sample using corresponding sample diluent.

4. Incubate for 1 hours at room temperature with moderate shaking (450±50rpm) on a horizontal orbital plate shaker.

5. Wash the microtitration plate 4 times as described in the Rinse Cycle section.

6. Dispense 100 µL Substrate Solution into each well. A multichannel pipette should be used for best results. Leave at room temperature (18-25°C) and protected from direct sunlight for 20-25 minutes.

7. Stop the reaction by adding 100 µL of Stop Solution to each well. The blue solution should change to a uniform yellow color. Ensure that the undersides of the wells are dry and that there are no air bubbles in the well contents.

8. Read the absorbance values at 450 nm using a microplate reader. If wavelength correction is available, set correction wavelength to 540 nm or 570 nm.

**Calculation of Results**

Average the duplicate optical density (O.D.) readings for each standard and sample.

A 4-parameter logistic (4-PL) or a linear regression model providing a point-to-point curve fitting provides acceptable results. Create a standard curve by reducing the data using computer software capable of generating a four-parameter logistic (4-PL) or a linear regression 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. Do not force the line to be linear. The concentration of the samples can be found directly from the standard curve.

**Table 2. Example Data at 450nm.**

|  |  |
| --- | --- |
| **Standards** | **450 nm absorbance** |
| Standard 1 (10 ng/mL) | 2.4852 |
| Standard 2 (5 ng/mL) | 1.347 |
| Standard 3 (2.5 ng/mL) | 0.7574 |
| Standard 4 (1.25 ng/mL) | 0.4135 |
| Standard 5 (0.625 ng/mL) | 0.2449 |
| Standard 6 (0.312 ng/mL) | 0.1459 |
| Standard 7 (0.156 ng/mL) | 0.101 |
| Standard 8 (0 ng/mL) | 0.0574 |

**Typical Human D-Dimer ELISA Kit Standard Curve**

This standard curve was generated at OriGene for demonstration purpose only. A standard curve must be run with each assay.



**Add TMB Substrate**

**Incubate 30 minutes**

**Wash 6 times**

**Add SA-HRP**

**Incubate 30 minutes**

Note: This standard curve is only an example and should not be used to generate any results.

**Performance Characteristics**

1. **Recovery**

 The recovery of human D-Dimer spiked to three different-levels of the assay range in diluted samples was evaluated.



1. **Linearity**

To assess the linearity of the assay, human D-Dimer spiked samples were diluted to produce samples with values within the dynamic range of the assay.



1. **Sensitivity:** 12.4 pg/mL
2. **Precision**

Five samples with different levels of D-Dimer were assayed 10 times each on three different assays. The intra-assay CV percentage and inter-assay CV percentage were calculated.

Intra-assay



Inter-assay



**Limitations of Use**

1. This kit is for research use only. **Not for use in diagnostic procedures.**
2. Assay values measured using OriGene One-step D-Dimer ELISA kit may not be interchangeable with that obtained from other assay kits.
3. The assay cannot be used to quantitate samples with assay values greater than the highest standard without further dilution of the samples.

#  Version 03272023

**Nimble90 ELISA Assay Principle**

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**Assay Flowchart**

**Add 20 µL of HRP conjugated Detection Antibody Add 80 µL of Standards or Samples**

**Incubate 1 hours at RT with Shaking**

Wash 4 times towels

**Add 100 µL of TMB Substrate**

**Incubate 20-25 minutes at RT**

**Add 100 µL of Stop Solution**

**Read in Plate Reader**