**INTENDED USE**

The K-ASSAY® D-Dimer Assay is an in vitro diagnostic reagent for the quantitative determination of cross-linked fibrin degradation products containing D-dimer in human plasma or serum by immunoturbidimetric assay. *FOR IN VITRO DIAGNOSTIC USE.*

**INTRODUCTION AND SUMMARY**

During fibrinolysis, plasmin breaks down fibrin and fibrinogen. When insoluble fibrin is degraded, a variety of cross-linked fibrin degradation products (XL-FDP) are produced. The smallest cross-linked fibrin degradation product is D-dimer, a fragment that contains one intermolecular cross-link between the gamma chains of two fibrin monomers. This cross-linkage only occurs in fibrin, but not in fibrinogen, so D-dimer is a specific degradation product of fibrin.1

Quantitative D-dimer determination aids in detecting the presence and degree of intravascular coagulation and fibrinolysis (the dissolution of the fibrin in a blood clot) and in monitoring the therapy for disseminated intravascular coagulation (necroticized clotting in the blood vessels.) D-dimer is also routinely used for excluding deep venous thrombosis.2

**PRINCIPLE OF TEST**

Latex particles coated with antibody specific to human D-dimer fragment D form immune complexes in the presence of D-dimer from the sample. The immune complexes cause an increase in light scattering, which is proportional to the concentration of D-dimer in the plasma sample. The light scattering is measured by reading turbidity at 570 nm. The sample D-dimer concentration is determined versus dilutions of a D-dimer calibrator of known concentration.

**KIT COMPOSITION**

**Reagents (Liquid Stable)**
- R1: Buffer Reagent 2-amino-2-hydroxymethyl-1,3-propadiol, Sodium Azide 0.09%
- R2: Antiserum Reagent Anti-human D-Dimer mouse monoclonal antibody, Sodium Azide 0.09%

**REAGENT PREPARATION**

Reagents are ready to use and do not require reconstitution. Mix before using by gently inverting the bottles. After opening, gently invert Reagent 2 once a week.

**STORAGE AND STABILITY**

All reagents should be stored at 2-8°C and protected from light. Unopened reagents can be used for one year from the date of manufacture as indicated on the expiration date on the package and bottle labels if stored at 2-8°C. Once the reagent vial has been opened, store tightly capped at 2-8°C and use within 1 month. Discard reagents if they become contaminated. Evidence of obvious precipitation in reagent 2 (R-2) solution is cause to discard.

**SPECIMEN COLLECTION AND PREPARATION**

**Plasma**
- Whole blood is collected in sodium citrate anticoagulant. After collection, immediately centrifuge. In the U.S., follow NCCLS guideline H3-A2. Plasma samples can be stored for 1 week at 4°C.
- Blood should be collected from a patient and the serum separated as soon as possible. Soon after the blood is drawn, it should be allowed to clot, centrifuged, and the serum separated from the clot to a plastic tube (not glass). It is recommended that specimen collection be carried out in accordance with NCCLS document M29-T2. Samples can be stored for 1 week at 4°C.
- Use plastic tubes for storing the samples. Do not use glass.

**CALIBRATION**

A multi-point calibration curve should be made using the K-ASSAY® D-Dimer Calibrator. It is recommended that the user determine calibration curve frequency as this depends on the instrument and type/number of other assays being performed. Initially, calibration should be performed each day.

**QUALITY CONTROL**

It is recommended that at least two levels of control (with known concentrations of D-Dimer) be included in all assay runs.

**CALCULATIONS**

D-Dimer levels are determined by the analyzer using the prepared calibration curve.

**LIMITATIONS OF PROCEDURE**

If D-Dimer value of sample is greater than the highest calibrator value, dilute with saline and re-assay. Expected values listed apply only to serum samples tested in an Asian population. In addition to cross-linked fibrin degradation products containing D-Dimer, this assay also may react with fragments X and Y.

**PERFORMANCE**

**Sensitivity**
When a saline blank is used as a sample, the absorbance is below 0.003 / min. When a calibrator having a D-Dimer concentration of around 10 µg/mL is assayed, the absorbance (after subtracting the saline blank) is within the range of 0.005 to 0.045 / min.

**Specificity**
When a sample with a known value is assayed, the result is within ±10% of the assigned value.

**Precision Assay**
(Within Run)

The following results were obtained on a Hitachi 717 analyzer with pooled human plasma:

<table>
<thead>
<tr>
<th>Sample I</th>
<th>Sample II</th>
<th>Sample III</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td>2.29 µg/mL</td>
<td>9.60 µg/mL</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.06</td>
<td>0.14</td>
</tr>
<tr>
<td>CV</td>
<td>2.7%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

**Plasma**

<table>
<thead>
<tr>
<th>Sample A</th>
<th>Sample B</th>
<th>Sample C</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Mean</td>
<td>3.55 µg/mL</td>
<td>11.34 µg/mL</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.09</td>
<td>0.12</td>
</tr>
<tr>
<td>CV</td>
<td>2.5%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

**Use plastic tubes for storing the samples. Do not use glass.**

**AUTOMATED ANALYZER APPLICATION**

Suitable for two-reagent automated analyzers that can measure a rate reaction at an absorbance of 570 nm. Refer to the instrument manual from the manufacturer regarding the following:

1. Use or function
2. Installation procedures and requirements
3. Principles of operation
4. Performance characteristics, operating instructions
5. Calibration procedures including materials and / or equipment to be used
6. Operational precautions, limitations, and hazards
7. Service and maintenance information

**PROCEDURE**

**Materials Supplied**

- KAI-090
  - Reagent 1 (R-1) Buffer Reagent 2-amino-2-hydroxymethyl-1,3-propadiol
  - Reagent 2 (R-2) Antiserum Reagent Anti-D-Dimer mouse monoclonal antibody

- **Calibrators:** K-ASSAY® D-Dimer Calibrator, Cat. No. KAI-091C
- **Purified water**
- **Two Reagent Clinical Chemistry Analyzer**
  - Capable of accurate absorbance readings at 570 nm
  - Capable of accurately dispersing the required volumes
  - Capable of maintaining 37°C

**PERFORMANCE**

- **Sensitivity**
  - When a saline blank is used as a sample, the absorbance is below 0.003 / min.
  - When a calibrator having a D-Dimer concentration of around 10 µg/mL is assayed, the absorbance (after subtracting the saline blank) is within the range of 0.005 to 0.045 / min.

- **Specificity**
  - When a sample with a known value is assayed, the result is within ±10% of the assigned value.

**Precision Assay**
(Within Run)

The following results were obtained on a Hitachi 717 analyzer with pooled human plasma:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Serum</th>
<th>Plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td>2.29 µg/mL</td>
<td>22.04 µg/mL</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.06</td>
<td>0.36</td>
</tr>
<tr>
<td>CV</td>
<td>2.7%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

**K-ASSAY® D-Dimer**

1 Rev. 2017-02-01

**K-ASSAY® D-Dimer**

2 Rev. 2017-02-01
The following results were obtained on a Hitachi 717 analyzer with pooled human plasma:

<table>
<thead>
<tr>
<th></th>
<th>Serum</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample I</td>
<td>Sample II</td>
<td>Sample III</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.44 µg/mL</td>
<td>10.19 µg/mL</td>
<td>28.43 µg/mL</td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.06</td>
<td>0.19</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>2.5%</td>
<td>1.9%</td>
<td>0.95%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Plasma</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample A</td>
<td>Sample B</td>
<td>Sample C</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.60 µg/mL</td>
<td>11.56 µg/mL</td>
<td>21.55 µg/mL</td>
<td></td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.08</td>
<td>0.11</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>2.27%</td>
<td>0.96%</td>
<td>1.30%</td>
<td></td>
</tr>
</tbody>
</table>

Accuracy / Correlation
A comparison of the K-ASSAY® D-Dimer reagent (KAI-090) and the K-ASSAY® D-Dimer reagent (KAI-078) was performed with the following results:

\[ y = 0.964x - 0.1742 \]
\[ r = 0.9801 \]
\[ n = 80 \]
\[ x = \text{K-ASSAY}® \text{D-Dimer (KAI-078)} \]
\[ y = \text{K-ASSAY}® \text{D-Dimer (KAI-090)} \]

Lower Limit of Detection
The lower limit of detection is 0.5 µg/mL DDU.

Assay Range
0.5 µg/mL to 30 µg/mL DDU (or value of highest calibration point)

INTERFERENCE
- Bilirubin F: No interference up to 18 mg/dL
- Bilirubin C: No interference up to 21.2 mg/dL
- Hemoglobin: No interference up to 500 mg/dL
- RF: No interference up to 520 IU/mL
- Citric Acid (sodium): No interference up to 500 mg/dL
- Ascorbic Acid: No interference up to 100 mg/dL
- NaCl: No interference up to 400 mg/dL
- Heparin: No interference up to 400 mg/dL
- EDTA-2Na: No interference up to 100 mg/dL
- Chylo (Formazine Turbidity): No interference up to 3,000
- Fibrinogen: No interference up to 500 mg/dL

EXPECTED VALUES
In our laboratory, the expected value of D-Dimer in normal plasma is less than 0.463 µg/mL DDU for 88 normal plasma samples from patients aged 33-58. It is recommended that each laboratory establish its own expected range to reflect its patient population.

REFERENCES

EU AUTHORIZED REPRESENTATIVE

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