**K-ASSAY® Fibrinogen**

For the Quantitative Determination of Human Fibrinogen in Plasma

**Cat. No. KAI-088 / KAI-135**

**INTENDED USE**

For the quantitative determination of fibrinogen levels in disseminated intravascular coagulation (non-localized clotting within the blood vessels) and primary fibrinolysis (the dissolution of fibrinogen in a blood clot). FOR IN VITRO DIAGNOSTIC USE.

**INTRODUCTION AND SUMMARY**

Fibrinogen is a soluble precursor of the insoluble fibrin, the major component of a blood clot. It is a long, 340,000 dalton glycoprotein composed of six subunits. When fibrinogen is activated by the hydrolytic enzyme thrombin, four subunits are removed. The remaining units polymerize into fibrin strands that form the basic structure of a blood clot. Most fibrinogen is intravascular. It is synthesized in the liver, approximately 2.5 grams per day.1

Elevated levels of fibrinogen are associated with inflammation, trauma, surgery, and malignancy. Decreased levels are associated with congenital deficiencies or an increased use due to thrombosis or disseminated intravascular coagulation. The most common cause of low plasma fibrinogen is disseminated intravascular coagulation (DIC), a condition in which blood clots form throughout the microvascular system. DIC can be associated with some of the serious complications of childbirth. When fibrinogen levels fall to the point where blood is unable to clot, dangerous bleeding may occur. Fibrinogen levels below 100 mg/dL are associated with an increased risk of bleeding. 2

The K-ASSAY® Fibrinogen test is intended for the quantitative determination of human fibrinogen by immunoturbidimetric assay. The antiserum used in the kit was produced against purified human fibrinogen. The fibrinogen antibody interacts with the fibrinogen in the plasma forming immune complexes. The immune complexes cause an increase in light scattering, which correlates with the concentration of plasma fibrinogen.

Fibrinogen has been measured using a variety of methods including radioimmunoassay (RIA), radial diffusion, nephelometric assay, and enzyme-linked immunosorbent assay. The K-ASSAY® Fibrinogen test uses an immunoturbidimetric assay format.

**PRINCIPLE OF TEST**

The K-ASSAY® Fibrinogen test quantifies the fibrinogen in the patient’s plasma based on immunoturbidimetric assay. Calibrators, controls, and patient samples are pipetted into sample cups. Microvolumes of samples and antibody diluent are automatically pipetted into individual cuvettes. Following an initial incubation and measurement of sample blank, antiserum is added to the cuvettes. The sample (antigen) solution and antiserum are then mixed in the disposable antibody-immune complexing form. The immune complexes cause an increase in light scattering, which correlates with the concentration of plasma fibrinogen. Following an incubation period lasting approximately 5 minutes, the absorbance of the solution is measured at 340 / 700 nm.

A calibration curve is generated by assaying a series of calibrators with known concentrations of proteins and using the instrument’s data reduction capability to plot the change in absorbance versus concentration. Concentration of controls and patient samples are interpolated from the calibration curve. The antiserum used in the kit is a goat polyclonal antibody specific to human fibrinogen.

**KIT COMPOSITION**

Reagents (Liquid Stable)

- R1: Buffer Reagent
  - Tris(hydroxymethyl)aminomethane (100 mM)
- R2: Antiserum Reagent
  - Anti-human fibrinogen goat antiserum (30%)

**WARNINGS AND PRECAUTIONS**

FOR IN VITRO DIAGNOSTIC USE. Rx only.

- Not to be used internally in humans or animals. Normal precautions exercised in handling laboratory reagents should be followed. Do not pipette by mouth. Avoid ingestion and contact with skin.
- Use plastic tubes for storing the sample, do not use glass.
- To avoid erroneous patient values, we recommend that fibrinogen measurements are performed uniformly on one type of plasma sample.
- Immediately after collection, centrifuge samples and remove plasma from cells.

**Dilute plasma 1/21 with saline.**

(Ex. 50 µL plasma + 1000 µL saline)

Generally, separated plasma should remain at room temperature for no longer than 8 hours. After 8 hours, the plasma should be refrigerated at 2-8°C. If the sample is not assayed within 48 hours, it should be frozen at -20°C.


Use plastic tubes for storing the sample, do not use glass.

**AUTOMATED ANALYZER APPLICATION**

Suitable for two-reagent automated analyzers that use a multi-point calibration method.

**PROCEDURE**

Materials Supplied

KAI-088 Fibrinogen (L)

- Reagent 1 (R1) Buffer Reagent
  - 4 x 50 mL
- Reagent 2 (R2) Antiserum Reagent
  - 1 x 40 mL

KAI-135 Fibrinogen

- Reagent 1 (R1) Buffer Reagent
  - 2 x 20 mL
- Reagent 2 (R2) Antiserum Reagent
  - 1 x 8 mL

**REAGENT STABILITY**

Opened reagents can be used for 1 month if stored at 2-8°C. Discard reagents if they become contaminated. Evidence of cloudiness or particulate matter in solution is cause to discard.

**SPECIMEN COLLECTION AND PREPARATION**

It is recommended that specimen collection be carried out in accordance with NCCLS document M29-T2. No method can offer complete assurance that human blood samples will not transmit infection. Therefore, all blood samples should be considered potentially infectious.

**Plasma is required for this assay.**

Collect blood aseptically by venipuncture according to standard procedures in a tube containing sodium citrate. EDTA up to 500 mg/dL, or heparin can also be used.

**NOTE:** Unlike when using (liquid) sodium citrate tubes, there is no complete assurance that human blood samples will not transmit infection. Therefore, all blood samples should be considered potentially infectious.

**Materials Required But Not Supplied**

Calibrators: K-ASSAY® Fibrinogen Calibrator, Cat. No. KAI-088 or KAI-135.

Two-reagent clinical chemistry analyzer capable of accurately dispensing the required volumes, reading at 340 and 700 nm, and maintaining 37°C.

For reconstitution and preparation of calibrators:

- Purified water
- Saline

Pipette capable of dispensing the required volumes

Test tubes or appropriate vials for storage of diluted calibrator

**Assay Procedure**

An example of automated application (Hitachi 717):

For reconstitution:

- Sample
  - 6 µL
  - +  R1 (Buffer Reagent)
  - 250 µL
  - +  R2 (Antiserum Reagent)
  - 50 µL
  - 37°C, 5 min.
  - 2-point endpoint, 340/700 nm

Note: Allow all reagents and specimens to warm to room temperature. Mix all reagents gently before using.

**Automated Method (Example)**

Chemistry Parameters for Automatic Analyzer

**INSTRUMENT** Hitachi 717

**TEMPERATURE** 37°C

**TEST** Fibrinogen

**ASSAY CODE** (POINT) 24 (50)

**SAMPLE VOLUME** (6)

**R1 VOLUME** 250 µL (NO)

**R2 VOLUME** 50 µL (NO)

**WAVELENGTH** 700 (340)

**CALIB. METHOD** (NONLINEAR) 1 (4)

**STD. (1) Conc. POS.** (*1) - (1)

**STD. (2) Conc. POS.** - (2)

**STD. (3) Conc. POS.** - (3)

**STD. (4) Conc. POS.** 7 (4) - (4)

**STD. (5) Conc. POS.** - (5) - (5)

**STD. (6) Conc. POS.** - (5) - (5)

**SD LIMIT** 9999

**DUPLICATE LIMIT** 10000

**SENSITIVITY LIMIT** 0

**ABS. LIMIT (SLOPE)** 32000 (INCREASE)

**PROZONE LIMIT** 32000 (LOWER)

**EXPECTED VALUE** 99999 (99999)

**PANIC VALUE** 99999 (99999)

**INSTRUMENT FACTOR** 1.00

1-4 µL input concentration of calibrators

Parameters for other automated analyzers are available.

**CALIBRATION**

It is recommended that a multi-point calibration curve be made prepared using the K-ASSAY® Fibrinogen Calibrator. It is recommended that the user determine calibration frequency, as this will depend on the instrument and type/number of assays being run. Initially, calibration should be performed each day.
INTERNATIONAL STANDARDIZATION

If the user wishes to calculate or report results consistent with the National Institute for Biological Standards and Control (NIBSC) international standard for plasma fibrinogen (89/644) the Fibrinogen Calibrator values for prepared calibrators A, B, C, and D should be multiplied by 0.81 before entering these values into the analyzer.

Alternatively, if the calibrator values have not been changed, final fibrinogen assay results can be multiplied by 0.81.

Example: If the calibrator values have not been changed, a fibrinogen result of 300 mg/dL would be reported as 243 mg/dL standardized to NIBSC plasma fibrinogen standard.

(300 mg/dL x 0.81 = 243 mg/dL)

QUALITY CONTROL

Normal and abnormal controls of known concentration should be included with every assay performed. The value determined for the controls should fall within the stated limits of the values assigned to the controls. The validity of the assay is in question if the values for the controls generated by the assay's calibration curve do not fall within this range. Recalibrate if the values determined for the controls fall outside the stated range.

LIMITATIONS OF PROCEDURE

The measurable range for fibrinogen is 100 to 900 mg/dL. Grossly lipemic samples and samples with very high triglyceride concentrations should be diluted an additional 1/2 with isotonic saline or filtered to decrease nonspecific light scattering. If fibrinogen concentration is above highest calibrator value, dilute 1 part sample with 4 parts isotonic saline and reasay. Multiply results by 5 to compensate for dilution.

Samples from patients under hyperfibrinolysis need to be tested promptly as they may decompose and thus have a shorter sample shelf life. Studies have not been done to determine the effect of high levels of fibrinogen degradation products (FDP) on the measurement of fibrinogen using this test kit. Very high levels of FDP may cause interference.

PERFORMANCE

Sensitivity

When a saline blank is used as a sample, the absorbance is below 0.050. When a calibrator having a fibrinogen concentration of around 248 mg/dL is assayed, the absorbance (after subtracting the saline blank) is within 0.050 to 0.150.

Specificity

When control serum with a known value is assayed, the result is within ±10% of the assigned value.

Precision

When a sample containing 200 mg/dL fibrinogen is assayed 20 times (within-run), the absorbance C.V. is below 5%.

Precision Assay: Within Run

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample A</th>
<th>Sample B</th>
<th>Sample C</th>
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<tr>
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</tr>
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<tr>
<td>MIN</td>
<td>136</td>
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<tr>
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<td>CV%</td>
<td>2.96</td>
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Precision Assay: Between Runs

<table>
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<tr>
<th>Sample</th>
<th>Sample A</th>
<th>Sample B</th>
<th>Sample C</th>
</tr>
</thead>
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<td>10</td>
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</tr>
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<tr>
<td>MIN</td>
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<tr>
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<tr>
<td>CV%</td>
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Accuracy / Correlation

A comparison of the Fibrinogen test and an Incstar Fibrinogen test kit were performed on a Hitachi 717. The test results provided the following data:

\[
y = 0.967x + 33.91
\]

r = 0.995

n = 50

x = Incstar ITA

y = Fibrinogen

Additional correlation studies on assays using the Clauss method (clotting method) are available.

Assay Range

100-900 mg/dL or 81-729 mg/dL (using NIBSC international standard)

INTERFERENCE

Bilirubin C: No interference up to 25 mg/dL
Hemoglobin: No interference up to 500 mg/dL

EXPECTED VALUES

In our laboratory, the expected values of fibrinogen in citrated plasma and EDTA plasma was determined. Blood was collected in tubes containing (liquid) sodium citrate and in tubes containing (dry) EDTA from 80 healthy individuals.

The correlation coefficient between the two collection methods was as follows: \[ r = 0.980. \]

The expected values obtained were:

- Citrated Plasma: 196 – 441 mg/dL
- EDTA Plasma: 244 – 599 mg/dL

If using NIBSC international standardization, these ranges should be appropriately adjusted as explained in the “International Standardization” section.

Due to patient population differences as well as variations in analyzers and other factors, it is recommended that each laboratory determines its own expected range.

REFERENCES


LABELING SYMBOLS

LOT Lot Number
Reagent
Expiration or ‘Use By’ Date
Catalog Number
For In Vitro Diagnostic Use
Temperature Limitation. Store between 2 and 8 degrees C
Manufacturer
Consult Package Insert for Instructions for Use
Authorized Representative in the European Community

EU AUTHORIZED REPRESENTATIVE

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