

# D-Dimer FS\*

## Order Information

Cat. No. 1 7268 99 10 935      Kit size R1 2 x 12 mL + R2 1 x 8 mL

Kit for use in conjunction with DiaSys CE applications.

## Intended Use

Diagnostic reagent for quantitative in vitro determination of D-dimer, a fibrin degradation product (FDP), in human citrate plasma on automated photometric systems. Determination of D-dimer is used to exclude thrombotic events like deep vein thrombosis or pulmonary embolism in conjunction with a clinical probability assessment in outpatients who do not exceed the cut-off value.

## Summary

Thrombosis is the formation of a blood clot in the human body. A blood clot consists of a fibrin mesh that stabilizes a cluster of erythrocytes and platelets [1]. D-dimer is a small protein fragment that appears in plasma during fibrinolysis, the degradation process of a fibrin mesh. In this process, the enzyme plasmin catalyzes the breakdown of the fibrin mesh and produces so-called fibrin degradation products, including D-dimer [2]. Thus, fibrinolysis prevents uncontrolled growth of blood clots and D-dimer can be used as an indicator of activated coagulation and fibrinolytic system. Under normal physiological conditions, circulating D-dimer levels are typically low; however, pathologically elevated levels are observed in conditions characterized by increased fibrin formation and fibrinolytic activity like venous thromboembolism (VTE), preeclampsia and certain conditions of cancer and infections. Furthermore, high levels may indicate the presence of disseminated intravascular coagulation (DIC). Since elevated D-dimer levels can be attributed to various causes, a measured value can never be used for a specific diagnosis [3]. In conjunction with patients history and profile, D-dimer values below the cut-off (0.5 µg FEU/mL) are used to exclude a deep vein thrombosis (DVT) and pulmonary embolism (PE) with high sensitivity [4]. To overcome the lack of reference material or methods, clinical studies are conducted to determine cut-off values and diagnostic value, thereby providing evidence for exclusion diagnostics [5]. In addition, for patients with a history of thrombosis, D-dimer levels can be used to help predicting the risk of recurrence and monitoring effectiveness of anticoagulation therapy [6].

## Method

Particle enhanced immunoturbidimetric test

Determination of D-dimer concentration by photometric measurement of antigen antibody reaction between antibodies against D-Dimer bound to particles and D-Dimer present in the sample.

## Reagents

### Components and Concentrations

**R1:** Buffer      pH 8.5      0.38 mol/L  
**R2:** Particle suspension      pH 7.5      < 1%  
Polystyrene particle coated with  
monoclonal anti-human D-dimer antibody (mouse)

## Storage and Stability

Reagents are stable up to the date of expiry indicated on the kit, if stored at 2 – 8°C and contamination is avoided. Do not freeze.

The open-vial stability of the reagent is 15 months until expiry date.

## Warnings and Precautions

1. The reagents contain sodium azide (0.95 g/L) as preservative. Do not swallow! Avoid contact with skin and mucous membranes.
2. The reagents contain material of biological origin. Handle the product as potentially infectious according to universal precautions and good clinical laboratory practice.
3. In very rare cases, samples of patients with gammopathy might give falsified results [7].
4. Heterophile antibodies in patient samples can cause falsified results.
5. In case of product malfunction or altered appearance that could affect the performance, contact the manufacturer.

6. Any serious incident related to the product must be reported to the manufacturer and the competent authority of the Member State where the user and/or patient is located.
7. Please refer to the safety data sheets (SDS) and take the necessary precautions for the use of laboratory reagents. For diagnostic purposes, the results should always be assessed with the patient's medical history, clinical examinations and other findings.
8. For professional use only.

## Waste Management

Refer to local legal requirements for chemical disposal regulations as stated in the relevant SDS to determine the safe disposal.

Warning: Handle waste as potentially biohazardous material. Dispose of waste according to accepted laboratory instructions and procedures.

## Reagent Preparation

Reagent 1 is ready to use.

The latex enhanced reagent 2 has to be mixed up by successive inversions before first use. Avoid formation of foam.

## Materials Required

General laboratory equipment

## Specimen

Human citrate plasma

Only use suitable tubes or collection containers for specimen collection and preparation.

When using primary tubes, follow the manufacturer's instructions.

Stability [8]:

8 hours	at	20 – 25°C
4 days	at	4 – 8°C
6 months	at	-20°C

Only freeze once. Discard contaminated specimens.

## Assay Procedure

### Basic settings for BioMajesty® JCA-BM6010/C

Wavelength	596 nm
Temperature	37°C
Measurement	Endpoint
Sample/Calibrator	2.7 µL
Reagent 1	80 µL
Reagent 2	26.7 µL
Addition Reagent 2	Cycle 19 (286 s)
Absorbance 1	Cycle 22/23 (327 s/ 340 s)
Absorbance 2	Cycle 36/37 (519 s/ 532 s)
Calibration	Spline

## Calculation

The D-dimer concentration of unknown samples is derived from the calibration curve using an appropriate mathematical model such as spline. The calibration curve is obtained with 5 calibrators at different levels, including a matrix-based zero-value.

## Calibrators and Controls

DiaSys TruCal D-Dimer is recommended for calibration. Calibrator values are traceable to fibrinogen, which was degraded by plasmin. Use DiaSys TruLab D-Dimer Level 1 and Level 2 for internal quality control. All target values of the controls are traceable to DiaSys reagent/calibrator system. Quality control must be performed after calibration. Control intervals and limits have to be adapted to the individual requirements of each laboratory. Results must be within the defined ranges. Follow the relevant legal requirements and guidelines. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat. No.	Kit size
TruCal D-Dimer (+ diluent)	1 7260 99 10 047	1 x 1.0 mL 2 x 2.5 mL
TruLab D-Dimer Level 1 (+ diluent)	5 9810 99 10 073	2 x 0.5 mL 1 x 2.5 mL
TruLab D-Dimer Level 2 (+ diluent)	5 9820 99 10 073	2 x 0.5 mL 1 x 2.5 mL

## Performance Characteristics

### Data evaluated on BioMajesty® JCA-BM6010/C

Measuring range from 0.2 µg FEU/mL up to 8.7 µg FEU/mL, depending on the concentration of the highest calibrator. Linearity is given within ± 10%. If values exceed this range, samples should not be diluted but released with > 8.7 µg FEU/mL.	
Limit of detection**	0.06 µg FEU/mL
No prozone effect up to 50 µg FEU/mL.	

Interference by	Interferences ≤ 10% up to	Analyte concentration [µg FEU/mL]
<b>Bilirubin</b> (conjugated)	60 mg/dL	1.12
<b>Bilirubin</b> (unconjugated)	60 mg/dL	1.09
<b>Hemolysis</b>	860 mg/dL	0.548
	1200 mg/dL	1.06
<b>Lipemia</b> (triglycerides)	370 mg/dL	0.970
For further information on interfering substances, refer to the literature [9,10].		

Precision			
Repeatability (n=20)	Sample 1	Sample 2	Sample 3
Mean [µg FEU/mL]	0.637	1.04	1.64
CV [%]	2.71	1.34	0.935
Between day (n=20)	Sample 1	Sample 2	Sample 3
Mean [µg FEU/mL]	0.617	1.05	4.18
CV [%]	4.43	2.36	2.29

Method comparison (n=122)	
Test x	DiaSys D-Dimer FS (Hitachi 917)
Test y	DiaSys D-Dimer FS (BioMajesty® JCA-BM6010/C)
Slope	1.04
Intercept	-0.030 µg FEU/mL
Coefficient of correlation	0.999

\*\* lowest measurable concentration which can be distinguished from zero; mean + 3 SD (n = 20) of an analyte free specimen.

## Reference Range

Cut-off value for exclusion of the deep vein thrombosis of the leg: < 0.5 µg FEU/mL

In a study\*\*\* for determination of the cut-off value for D-Dimer for exclusion of the deep vein thrombosis of the leg, 250 patients were tested. 50 of the patients had confirmed thrombosis, 100 patients were suspected to have a thrombosis, which has not been approved and 100 patients were not suspected to suffer from thrombosis. The study gave the following result: With the DiaSys D-Dimer FS test and a cut-off value of 0.5 µg FEU/mL, 49 thrombotic subjects out of 50 were found true positive and one thrombotic person was found false negative. Out of 200 non-thrombotic patients, 39 were found false positive and 161 were found true negative.

\*\*\*The specimen for the study was characterized by Prof. Gualtiero Palareti, Angiologia e Malattie della Coagulazione "Marino Golinelli", Bologna.


Each laboratory should check if the reference ranges are transferable to its own patient population and determine own reference ranges if necessary.

## Literature

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\* Fluid Stable