

**D-dimer Rapid Test Cassette (Whole Blood/Plasma) Package Insert**

REF COM-402 English

A rapid test for the qualitative detection of D-dimer in whole blood or plasma.  
**INTENDED USE**  
 The D-dimer Rapid Test Cassette (Whole Blood/Plasma) is a rapid chromatographic immunoassay for the qualitative detection of human D-dimer in whole blood or plasma as an aid in the diagnosis of Disseminated Intravascular Coagulation (DIC), Deep Venous Thrombosis (DVT) and pulmonary embolism (PE).

**SUMMARY**  
 D-dimer (or Dimer) is a fibrin degradation product (or FDP), a small protein fragment present in the blood after a blood clot is degraded by fibrinolysis. It is so named because it contains two cross linked D fragments of the fibrin protein. D-dimer concentration may be determined by a blood test to help diagnose thrombosis. Since its introduction in the 1990s, it has become an important test performed in patients with suspected thrombotic disorders. While a negative result practically rules out thrombosis, a positive result can indicate thrombotic disease, but other potential causes. Its main use, therefore, is to exclude thrombotic disease where the probability is low. In addition, it is used in the diagnosis of the disorder Disseminated Intravascular Coagulation.  
 The D-dimer Rapid Test Cassette (Whole Blood/Plasma) is a simple test that utilizes a combination of anti-D-dimer antibody coated particles and capture reagents to qualitatively detect D-dimer in whole blood or plasma. The minimum detection level is 500ng/ml.

**PRINCIPLE**  
 The D-dimer Rapid Test Cassette (Whole Blood/Plasma) is a qualitative, membrane based immunoassay for the detection of D-dimer in whole blood or plasma. The membrane is pre-coated with specific capture antibodies with the test line region of the test. During testing, the whole blood or plasma specimen reacts with the particle coated with specific antibodies. The mixture migrates upward on the membrane chromatographically by capillary action to react with specific capture antibodies on the membrane and generate a colored line. The presence of this colored line in the test line region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a colored line will always appear in the control line region, indicating that proper volume of specimen has been added and the control line reagent has occurred.

**REAGENTS**  
 The test contains anti-D-dimer antibody conjugated colloid gold particles and capture antibodies coated on the membrane.

**PRECAUTIONS**  
 For professional *in vitro* diagnostic use only. Do not use after expiration date.  
 Do not eat, drink or smoke in the area where the specimens or kits are handled.  
 Do not use test if pouch is damaged.  
 Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout all procedures and follow the standard procedures for proper disposal of specimens.  
 Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are assayed.  
 The used test should be discarded according to local regulations.  
 Humidity and temperature can adversely affect results.

**STORAGE AND STABILITY**  
 Store as packaged in the sealed pouch either at room temperature or refrigerated (2-30 °C). The test is stable through the expiration date printed on the sealed pouch. The test must remain in the sealed pouch until use. **DO NOT FREEZE.** Do not use after the expiration date.

**SPECIMEN COLLECTION AND PREPARATION**  
 The D-dimer Rapid Test Cassette (Whole Blood/Plasma) can be performed using whole blood (from venipuncture or fingerstick) or plasma.  
 To collect **Fingerstick Whole Blood specimens**:  
 • Wash the patient's hand with soap and warm water or clean with an alcohol swab. Allow to dry.  
 • Massage the hand without touching the puncture site by rubbing down the hand towards the fingertip of the middle or ring finger.  
 • Puncture the skin with a sterile lancet. Wipe away the first sign of blood.  
 • Gently rub the hand from wrist to palm to finger to form a rounded drop of blood over the puncture site.  
 • Add the Fingerstick Whole Blood specimen to the test by filling a capillary tube.  
 • Avoid air bubbles.  
 • Touch the end of the capillary tube to the blood until filled to approximately 25µL.  
 • Place the bulb onto the top end of the capillary tube, then squeeze the bulb to dispense the whole blood to the specimen area of the test cassette.

To collect **Whole Blood from venipuncture**:  
 • Collect blood from venipuncture with the anticoagulants tube (EDTA, Heparin, Citrate and Oxalate) use it directly for the test.  
 • Separate plasma from blood as soon as possible to avoid hemolysis. Use only clear non-hemolyzed specimens.  
 • Testing should be performed immediately after the specimens have been collected. Do not leave the specimens at room temperature for prolonged periods. Plasma specimens may be stored at 2-8 °C for up to half-day, for long term storage, specimens should be kept below -20 °C. Whole blood collected by venipuncture should be stored at 2-8 °C. If the test is to be run within half day of collection. Do not freeze whole blood specimens. Whole blood run collected by fingerstick should be tested immediately.  
 • Bring specimens to room temperature prior to testing. Frozen specimens must be completely thawed and mixed well prior to testing. Specimens should not be frozen and thawed repeatedly.

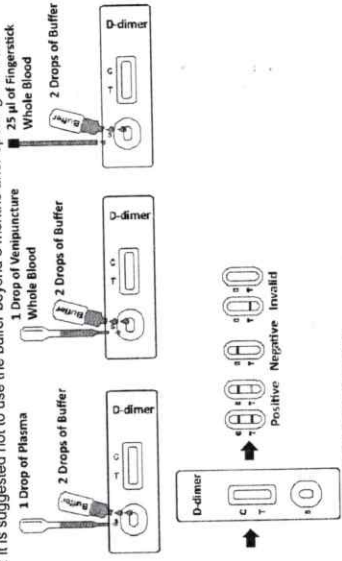
If specimens are to be shipped, they should be packed in compliance with local regulations covering the transportation of etiologic agents.  
 EDTA, Heparin, Citrate sodium and Potassium Oxalate can be used as the anticoagulant for collecting the specimen.

**MATERIALS**  
 • Test cassettes  
 • Droppers  
 • Buffer  
 • Package insert

**Materials provided**  
 • Droppers  
 • Buffer  
 • Package insert

**Materials required but not provided**  
 • Specimen collection containers  
 • Lancets/Fingerstick Whole Blood Only  
 • Heparinized Capillary Tubes and Dispensing Bulb (For Fingerstick Whole Blood Only)  
**DIRECTIONS FOR USE**  
 Allow the test, specimen, buffer and/or controls to reach room temperature (15-30 °C) prior to testing.  
 1. Bring the pouch to room temperature before opening it. Remove the test cassette from the sealed pouch and use it within one hour.  
 2. Place the cassette on a clean and level surface.

**For Plasma specimen:**  
 • Hold the dropper vertically and transfer, **1 drop of plasma** (approximately 25µL) to the specimen area, below the test line, and start the timer.  
 • See illustration below.  
**For Fingerstick Whole Blood specimen:**  
 • To use a capillary tube: Fill the capillary tube and transfer approximately 25 µL of fingerstick whole blood specimen to the specimen area of test cassette, then add 2 drops of buffer (approximately 80 µL) and start the timer. See illustration below.  
 • Wait for the colored line(s) to appear. Read result at 10 minutes. Do not interpret the result after 20 minutes.  
**Note:** It is suggested not to use the buffer beyond 6 months after opening the vial.



**INTERPRETATION OF RESULTS**  
**POSITIVE:** A colored line in the control line region (C) and the presence of one colored line in the test line region indicate a positive result. This indicates that the concentration of D-dimer is above the minimum detection level.  
**NOTE:** The intensity of the color in the test line region will vary depending on the concentration of D-dimer, present in the specimen. Therefore, any shade of color in the test line region should be considered positive.  
**NEGATIVE:** One colored line appears in the control line region (C). No line appears in the test line region (T). This indicates that the concentration of D-dimer are below the minimum detection levels.  
**INVALID:** Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

**QUALITY CONTROL**  
 A procedural control is included in the test. A colored line appearing in the control line region (C) is considered an internal quality procedural control. It confirms sufficient specimen volume, adequate membrane wicking applied with this kit, however, it is recommended that positive and negative controls be tested as a good laboratory practice to confirm the test procedure and to verify test performance.  
**WARNINGS**  
 1. This D-dimer Rapid Test Cassette (Whole Blood/Plasma) is for *in vitro* diagnostic use only. This test should be used for the detection of D-dimer in whole blood or plasma specimens only. Neither the quantitative value nor the rate of increase in D-dimer can be determined by this qualitative test.  
 2. The D-dimer Rapid Test Cassette (Whole Blood/Plasma) will only indicate the qualitative level of D-dimer in the specimen and should not be used as the sole criteria for the diagnosis of Disseminated Intravascular Coagulation (DIC), Deep Venous Thrombosis (DVT) and Pulmonary Embolism (PE).  
 3. The D-dimer Rapid Test Cassette (Whole Blood/Plasma) cannot detect less than 500ng/ml D-dimer in specimens. A negative result at any time does not preclude the possibility of Disseminated Intravascular Coagulation (DIC), Deep Venous Thrombosis (DVT) and Pulmonary Embolism (PE).  
 4. False negative readings can occur if the sample is taken either too early after thrombus formation, if testing is delayed for several days or if the sample was taken too late after the occurrence of thromboembolic infarction, because the D-dimer concentration may decrease to normal values after one week later. Additionally, a treatment with anti-coagulants prior sample collection can render the test negative. Because it precedes thrombus extension, clinical information available to the physician (e.g. use Wells score for DVT resp. PE, Ultrasound, quantitative laboratory D-dimer results etc.) of whole blood specimens with very high viscosity or which have been stored for more than 2 days may not run properly on the test cassette.  
 6. Repeat the test with a plasma specimen from the same patient using a new test cassette.  
 7. The hematocrit of the whole blood should be between 25% and 65%.

**EXPECTED VALUES**  
 Increased D-dimer concentration above the widely accepted cut-off value of 500ng/ml FEI (Fibrinogen Equivalent Unit) is a sign of an active fibrinolysis and has been verified at patients with DIC, DVT and PE. Such increased concentrations after surgery and injury and during sickle cell anaemia, liver disease, heavy infections, sepsis, inflammation, malignant disease or in older people too. The concentration of D-dimer rises also during a normal pregnancy.  
**PERFORMANCE CHARACTERISTICS**  
**Sensitivity and Specificity**  
 421 clinical specimens with known status of D-dimer (positive or below cut-off value of 500ng/ml) collected from local hospitals were tested with D-dimer Rapid Test Cassette (Whole Blood/Plasma) in house. Results indicated that sensitivity was 97.2%, relative specificity was 94.0%, and the overall accuracy was 96.4% compared with ITM.

Method	Results		Total Results
	Positive	Negative	
D-dimer Rapid Test Cassette (Whole Blood/Plasma)	312	6	318
ITM	9	104	103
<b>Total Results</b>	<b>321</b>	<b>110</b>	<b>421</b>

Relative sensitivity: 97.2% (95%CI\*: 94.7%-98.7%)  
 Relative specificity: 94.0% (95%CI\*: 87.4%-97.8%)  
 Relative accuracy: 96.4% (95%CI\*: 94.2%-98.0%)  
 \*Confidence Intervals  
 396 clinical specimens were evaluated with D-dimer Rapid Test Cassette (Whole Blood/Plasma) at a German site, results indicated relative sensitivity was 92.0%, relative specificity was 89.9%, and the overall accuracy was 90.2% compared with ITM.

Method	Results		Total Results
	Positive	Negative	
D-dimer Rapid Test Cassette (Whole Blood/Plasma)	104	207	311
ITM	109	237	346
<b>Total Results</b>	<b>213</b>	<b>444</b>	<b>657</b>

Relative Sensitivity: 92.0% (95%CI\*: 80.8%-97.8%)  
 Relative Specificity: 89.9% (95%CI\*: 86.2%-92.9%)  
 Accuracy: 90.2% (95%CI\*: 86.8%-92.9%)  
 \*Confidence Intervals

**Precision**  
**Intra-Assay**  
 Within-run precision has been determined by using 10 replicates of below five specimens. D-dimer specimen levels at 0ng/ml, 500ng/ml, 1,000ng/ml, 1,500ng/ml and 3,000ng/ml. The D-dimer specimens were correctly identified at the prescribed reading time.

**Inter-Assay**  
 Between-run precision has been determined by 3 independent assays on the same five specimens. 0ng/ml, 500ng/ml, 1,000ng/ml, 1,500ng/ml and 3,000ng/ml have been tested. Different lots of the D-dimer Rapid Test Cassette (Whole Blood/Plasma) have been used using these specimens. The specimens were correctly identified at the prescribed reading time using these specimens.

**Cross-reactivity**  
 The D-dimer Rapid Test Cassette (Whole Blood/Plasma) has been tested with HBSA anti-syphilis, RF, anti-HIV, anti-HCV, anti-Rubella IgG, anti-CMV IgG and anti-Toxo IgG positive specimens. The results showed no cross-reactivity.

**Interfering Substances**  
 The following potentially interfering substances were added to D-dimer negative and positive specimens, respectively:  
 Acetaminophen: 20 mg/dL  
 Acetylsalicylic Acid: 20 mg/dL  
 Ascorbic Acid: 20 mg/dL  
 Creatinine: 200 mg/dL  
 Bilirubin: 1,000 mg/dL  
 Cholesterol: 800 mg/dL  
 None of the above substances at the concentration tested interfered in the assay.

**REFERENCES**  
 1. Adam SS, Key NS, Greenberg CS (March, 2009). "D-dimer antigen, current concepts at 19008457". Blood 113 (13): 2878-2887. doi:10.1182/blood-2008-06-165845. PMID: 19008457  
 2. Fritscher, Claudia (2007). Bedeutung der D-dimer Untersuchung in der Diagnostik d. tiefen Beinvenenthrombose. LaborAktuell Nr. 7/2007, 1-8  
 3. Demppel e, Carl-Erik (2005). Bestimmung des D-dimer-Antigens in der klinischen Routine. Dtsche Arzteztg. 102 (Heft 7, 18. Februar 2005: A428-A432  
 4. Blackwell Publishing Ltd. (2004). The diagnosis of deep vein thrombosis in symptomatic outpatients and the potential for clinical assessment and D-dimer assays to reduce the need for diagnostic imaging. British Journal of Haematology, 124, 15-25.

**Index of Symbols**  

	Caution		Tests per kit		Authorized Representative in use
	For <i>in vitro</i> diagnostic use only		Use by		Do not reuse
	Store between 2-30°C		Lot number		Catalog #
	Do not use if package is damaged		Manufacturer		Consult instructions for use

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Number: 145638104  
 Revision date: 2023-04-23

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