LEPU TECHNOLOGY

CE 2797

Leccurate®PCT Detection Kit (Fluorescence Immunochromatography)

[Device Information]
General name: PCT Detection Kit (Fluorescence Immunochromatography)

Brand name: Leccurate®

Basic UDI-DI: 692180760036EU

[Specifications]

Card type	10 tests/box		20 tests/box	50 tests/box
Cassette type	20 tests/ cassette X 1	20 tests/ cassette X 2	20 tests/ cassette X 3	20 tests / cassette X 4

[Intended Purpose]
This kit for use on the Fluorescent Immunochromatography Analyzer is used for in vitro quantitative assay of procalcitonin in human whole blood, serum and plasma sample.

The test can be used as an aid in the diagnosis of bacterial sepsis.

The results should not be used as the sole basis for patient management decisions. The results must be combined with other clinical and laboratory data for comprehensive judgment.

The kit is intended for use by qualified and trained clinical laboratory personnel specifically instructed and trained in the techniques of procalcitonin detection and in vitro diagnostic procedures.

[Test Principle]
Procalcitonin (PCT) is a hormone activity-free calcitonin pro-peptide (glycoprotein) consisting of 116 amino acids with a molecular weight of 13 kD. PCT content in the plasma of healthy people is extremely low. The increase in serum PCT is closely related to bacterial infection. In the systemic serious infection, PCT can increase in early stage. After antibiotic treatment, PCT will decrease in blood. PCT is only slightly elevated in patients with viral infections and local bacterial infections without systemic symptom. PCT has been used as an important observational indicator of serious systemic infection or sepsis. PCT has a half-life of 25 to 30 hours and is very stable in vitro.

Developed with immunochromatography assay technique with specificity, the test card contains the fluorescently-labeled human PCT monoclonal antibody, as well as the procalcitonin monoclonal antibody immobilized on the membrane test area (T) and corresponding antibody in the quality control area (C).

During the test, the specimen is instilled into the test card well (S). The procalcitonin (PCT) in the specimen combines with the fluorescently-labeled monoclonal antibody. The conjugate separates up under the capillary effect and then captured by the monoclonal antibody of procalcitonin (PCT) immobilized on the test area (T) of the membrane. The content of procalcitonin (PCT) in the specimen is in positive correlation with the conjugate captured. Optical signal is obtained by scanning the testing area with fluorescent quantitative analyzer, and then is converted to the concentration of procalcitonin (PCT) through the built-in standard curve. The model diagram is as follows：

[Main Components]
Card type: Each box contains 10/20/50 tests of test card bag； 1 lot number card (QR code, including standard curve information), 10/20/50 vials and 10/20/50 straw of sample buffer solution (75uL/vial). For each test bag, it contains 1 procalcitonin test card and 1 bag of desiccant.

Cassette type: For each box, it contains 1/2/3/4 X 20 tests/cassette and 1/2/3/4 vials of sample buffer solution (15mL/vial). For each 20 tests/cassette, it contains 1 cassette (with the standard curve information chip) and each cassette contains 20 test card and 11 pieces of desiccant.

Each test card can be used only once.

The test strip consists of a sample pad, a nitrocellulose membrane (T-line coated mouse anti-human procalcitonin monoclonal antibody; C-line coated goat anti-mouse polyclonal antibody), fluorescent pad (containing fluorescently-labeled mouse anti-human procalcitonin monoclonal antibody), absorbent paper, plastic carrier plate. The sample buffer solution contains 0.1% surfactant and 0.1 mol/L Tris solution (pH 7.0).

[Storage Conditions]
It should be stored at 2℃~ 30℃, be kept dry and away from sunlight. The shelf life is 18 months.

For card type test card is valid for 1 hour after opening. The sample buffer solution of card type should be used immediately after opening.

The cassette type test card is valid for 48 hours after opening. The sample buffer solution of cassette type should be used within 48 hours.

[Applicable Instruments]
Fluorescent Immunochromatography Analyzer (model: LEPU Quant-Fluo 800, LEPU Fluo-1800) made by Beijing Lepu Medical Technology Co., Ltd.

The Card type is for use on LEPU Quant-Fluo 800.

The Cassette type is for use on LEPU Fluo-1800.

[Materials required but not provided]
Pipettes, pipette tips, timer;

Fluorescent Immunochromatography Analyzer (model: LEPU Quant-Fluo 800, LEPU Fluo-1800);

Control materials made by Beijing Lepu Medical Technology Co., Ltd. (It is provided with Fluorescent Immunochromatography Analyzer.)

[Specimen Requirements]
This test is suitable for whole blood/serum/plasma.

It is recommended that the serum/plasma specimens are preferred for testing. The whole blood specimen from patients can be used for test only under urgent or special circumstances.

SPECIMEN COLLECTION AND PREPARATION:
For whole blood:
1. Using standard phlebotomy procedure, collect a venipuncture whole blood specimen by a blood collection tube with suitable anticoagulant (containing heparin lithium or sodium citrate). Other anticoagulants have not been validated and may give incorrect result.
2. It is recommended that whole blood specimen is tested at the time of specimen collection. If the specimens are not tested immediately, they may be stored at 2℃~8℃ for up to 3 days.
3.Prior to testing, mix the blood by gentle inversion several times, do not freeze or heat whole blood specimens.

For Serum and Plasma:
1.Using standard phlebotomy procedure, collect a venipuncture whole blood specimen by a blood collection tube. If collecting plasma use a blood collection tube containing suitable anticoagulant (containing heparin lithium or sodium citrate). Other anticoagulants have not been validated and may give incorrect result.
2.Serum/plasma should be separated from whole blood as soon as possible to avoid hemolysis. Specimens that have been hemolyzed cannot be used.
3.It is suggested to use the specimen immediately after collected. Do not leave the specimens at room temperature for prolonged periods.
4.Serum or plasma specimens may be stored at -20℃for up to 30 days.

Serum or plasma specimens may be stored at 2℃~8℃ for up to 3 days prior to testing.
5. The freeze-thawing cycles should be no more than 2 times.
6.Prior to testing, mix the specimen by gentle inversion several times.

[Test Method]
Before performing any tests, read the Instruction for Use of this kit and the applicable instrument thoroughly. Before use, restore the temperature of the reagents and blood specimens to 10℃~30℃.

CAUTIONS:
1. This test is only for *in vitro diagnosis*.
2. This test is only for laboratory professional use.
3. Do not use expired products.
4. The device is suitable for dedicated instrument only.
5. If there are droplets on the wall or top of the tube, please centrifuge before use.
6. When using whole blood, if the run effect is poor due to factors such as hemolysis or viscous blood, individual negative specimens may be slightly positive. Therefore, it is recommended serum/plasma specimens be used if the condition permits.
7. Very few of the specimens containing high concentrations of heterophilic antibodies or rheumatoid factor can lead to false positive results. Therefore, other clinical symptoms need to be considered when judging the results.
8. The test temperature is 15~30 ℃, and the humidity is preferably 40 ~ 60%.
9. Wear protective clothing, gloves and eye protection when testing.
10. Discard after first use. The test card cannot be used more than once. The blue lines on the test card are used to distinguish whether the test card has been used, and the unused ones have blue lines, while the used ones have no blue lines.
11. If the test card is unqualified, the C line (Quality control area) will be abnormal and the applied analyzer will display invalid results.
12. Specimens that have been hemolyzed cannot be used.
13. Proper specimen collection, storage and transport are critical to the performance of this test.
14. Do not touch the reaction area of test strip.
15. Do not use the product if the pouch is punctured or not well sealed.
16. This product is not used for near patient test or self-testing.
17. The test result should be interpreted by the physician along with clinical findings and other laboratory test results.
18. There are desiccants in the product and please do not eat.
19. The components in different batches of kits are not interchangeable.
20. Dispose of used specimens, tests and other wastes in accordance with local laws and regulations.
21. Free copy of instructions for use can be provided if the purchaser request.
22. If any serious incident that has occurred in relation to the device, the user shall report it to the manufacturer and the competent authority of the Member State in which the user and/or the patient is established.
23. The e-IFU of the product is available on the website: https://en.lepumedical.com/e-ifu/.
24. The summary of safety and performance for the device is available on the website of Eudamed: https://ec.europa.eu/tools/eudamed.
25. Poor run effect may occur while using whole blood sample. If hemolysis or viscous occur, the test strip will be reddish or yellowish. In this situation, the test result is unreliable and may lead to a false positive result. Please redo the test for this situation.

CONTROLS:

External quality control
Run controls each run. Before the test, the applied analyzer should perform quality control. Using the control materials to perform the test, if the applied analyzer displays the normal quality control, then the user can continue to test the specimens; if the applied analyzer displays abnormal quality control, then the user needs to check the operation of the analyzer and contact after-sales engineer to guide the use of the analyzer.

Internal quality control
A procedural control is included in the test. A fluorescent line appearing in the control region (C) is considered an internal procedural control. It confirms sufficient specimen volume, adequate membrane wicking and correct procedural technique. If the C line is abnormal, the analyzer will display invalid results.

WORKING CALIBRATION:
For the card type applicable with LEPU Quant -Fluo 800 Fluorescent Immunochromatography Analyzer: the calibration information is provided in the product QR code that has entered the calibration equation. The components in different batches of kits are not interchangeable. Use the code scanning gun to read the calibration information of this batch of products and check the product name and batch number.
For the card type applicable with LEPU Fluo-1800 Fluorescent Immunochromatography Analyzer: the calibration information is provided in the product information chip. The components in different batches of kits are not interchangeable. Insert the kit into the corresponding kit bin, the analyzer will identify the chip information, check the product name and batch number.

PROCEDURE:
Before the test, the user should read the applied instrument instruction manual and be familiar with the operating procedures.

LEPU Quant-Fluo 800 Fluorescence Immunochromatography Analyzer (applicable with card type test card):

1. Operate the fluorescent immunochromatography analyzer according to the Instruction for Use.
2. Use the barcode scanner to read the standard curve information of this batch of product. Please check the product name and lot number.
3. Take out the test card from the originally packed reagent bag and use it as soon as possible within 1 hour, especially in highly humid environments.
4. Place the test card on a clean horizontal platform.
5. Pipette 75 µL of the specimen, add the specimen to the sample buffer solution and mix well for 60 seconds.
6. Pipette 100 µL (about 3 drops) of the above solution into the test card well and start timing.
7. 15 minutes later, read the results by a fluorescent immunoassay analyzer; 20 minutes later, the results are invalid.

LEPU Fluo-1800 Fluorescence Immunochromatography Analyzer (applicable with cassette type test card):

1. Operate the LEPU Fluo-1800 Fluorescence Immunochromatography Analyzer as per its instruction for use and select the “Device Quality Control” interface for operations of quality control.
2. Take the kit from the originally package for the items to be tested and use it as soon as possible within 48 hours.
3. Insert the kit into the corresponding kit compartment.
4. Put the tip bit, the mixing plate, the diluent bottle and the tip bit box at their corresponding positions.
5. Insert the test sample into the sample holder and push the sample holder into the slot.
6. The instrument displays the “sample test” interface. If you select the position sample, you can set the test type, sample information, etc.
7. Click “Test” to automatically enter the test mode, and read the test result after testing.

8. 15 minutes later, read the results by a fluorescent immunoassay analyzer; 20 minutes later, the results are invalid.

CALCULATION:

The analyzer will automatically calculate the analyte concentration in each sample. The units of measurement is ng/mL.

REFERENCE RANGE:

The normal reference range of PCT is <0.5 ng/mL.

Using Leccurate® PCT Detection Kit to detect 153 samples of healthy people, the obtained normal reference value is 0.50 ng/mL.

It is suggested that the laboratory set up its own reference value range.

INTERPRETATION OF RESULTS:

PCT < 0.5ng/ml indicates the low risk of sepsis.

PCT< 2.0ng/ml indicates moderate risk of sepsis; PCT > 2ng/ml indicates high risk of sepsis.

The test results must be combined with other clinical and laboratory data for comprehensive judgment.

[Metrological traceability]

The product can be traceable to Elecsys BRAHMS PCT of Roche Diagnostics (Shanghai) Co., Ltd. Firstly, the Elecsys BRAHMS PCT is used to assign values to the working calibrators covering the whole linear range of the calibration curve for Leccurate® PCT Detection Kit, then the working calibrators are calibrated by the permanent measurement program and adjust the calibration curve that meets the requirements of the analyzer. Each batch of kit must be calibrated before leaving the factory.

[Limitations of Test Method]

1. This product cannot be used as the sole criterion for judgment, and can only be used as a reference for doctors' comprehensive judgment;
2. In case of suspected sepsis, it is recommended to take samples at different time points for a range of tests. If the result obtained through this test result is consistent with the symptom and the results obtained by other methods, it can be considered as sepsis. If the result is inconsistent with them, please test again after 2 hours. If the result is still negative, and the sampling time is 4 hours after the onset of the disease, then the clinical information can be comprehensively considered to exclude sepsis;
3. This product belongs to the immunochromatographic test card and has the inherent limitations of immunochromatography.
4. This product is only used for in vitro assay of procalcitonin in the specimen.
5. The test results are for clinical reference, a confirmed diagnosis should only be made after all clinical and laboratory findings have been evaluated.

[Analytical performance]

1. Accuracy of measurement

1.1 Trueness

The sample recovery should be in the range of 85% to 115%.

1.2 Precision (repeatability and reproducibility)

Repeatability:

Use specific concentration samples (0.5 ng/mL and 10 ng/mL) to verify the repeatability and precision through the 20*2*2 model. The result is listed below. The CV of the test results are all less than 15%. The results obtained are as follows.

	Estimation of precision				Confidence interval	
	Repeat ability (SR)	Precision in Laboratory (SWL)	CV_R	CV_{WL}	Repeatability CV	Laboratory precision CV
Card type, 0.5ng/mL	0.036	0.061	7.294%	12.332%	4.61%~7.23%	8.03%~13.25%
Card type, 10ng/mL	0.218	0.542	2.115%	5.270%	1.73%~2.7%	4.33%~7.38%
Cassette type, 0.5ng/mL	0.03	0.064	5.989%	12.982%	5.08%~7.72%	10.15%~17.87%
Cassette type, 10ng/mL	0.292	0.48	2.844%	4.677%	2.34%~3.64%	3.79%~6.1%

Reproducibility:

Use specific concentration samples (0.5ng/mL and 10ng/mL) to verify reproducibility and precision through the 2 (sites)*3 The results obtained are as follows.

The reproducibility of card type:

Site	People	Day	LoT 1		LoT 2	
			0.5	10	0.5	10
Site 1	Operator 1	Average	0.51	10.06	0.5	10.19
		Standard Deviation	0.03	0.7	0.03	0.56
		CV	5.94%	6.94%	5.06%	5.52%
	Operator 2	Average	0.5	10.14	0.5	10.19
		Standard Deviation	0.02	0.73	0.02	0.61
		CV	4.52%	7.19%	4.32%	6.02%
	Operator 3	Average	0.51	10.22	0.5	10.08
		Standard Deviation	0.02	0.58	0.02	0.44
		CV	3.91%	5.71%	4.20%	4.35%
Site 2	Operator 1	Average	0.5	10.12	0.5	10.08
		Standard Deviation	0.02	0.55	0.01	0.62
		CV	3.34%	5.40%	2.85%	6.19%
	Operator 2	Average	0.5	10.19	0.5	10.04
		Standard Deviation	0.01	0.64	0.02	0.62
		CV	2.70%	6.32%	4.32%	6.19%
	Operator 3	Average	0.51	10.22	0.5	10.08
		Standard Deviation	0.02	0.58	0.02	0.44
		CV	3.91%	5.71%	4.20%	4.35%

The reproducibility of cassette type:

Site	People	Day	LoT 3		LoT 4	
			0.5	10	0.5	10
Site 1	Operator 1	Average	0.50	10.01	0.50	10.17
		Standard Deviation	0.02	0.56	0.02	0.52
		CV	3.05%	5.60%	3.85%	5.14%
	Operator 2	Average	0.50	10.07	0.50	10.12
		Standard Deviation	0.01	0.66	0.02	0.62
		CV	2.80%	6.56%	3.72%	6.17%
	Operator 3	Average	0.50	10.14	0.50	10.17
		Standard Deviation	0.01	0.50	0.02	0.57
		CV	2.56%	4.92%	3.71%	5.61%
Site 2	Operator 1	Average	0.50	9.99	0.50	10.08
		Standard Deviation	0.02	0.56	0.02	0.62
		CV	4.21%	5.63%	3.46%	6.19%
	Operator 2	Average	0.50	10.13	0.50	10.08
		Standard Deviation	0.02	0.43	0.02	0.69
		CV	3.83%	4.27%	3.96%	6.86%
	Operator 3	Average	0.50	10.18	0.50	10.26
		Standard Deviation	0.02	0.42	0.02	0.65
		CV	3.38%	4.16%	4.13%	6.34%

2. Analytical sensitivity

The analytical sensitivity of procalcitonin is 0.12ng/mL.

3. Interfering substances

Interfering substance: When bilirubin (≤20 mg/dL), hemoglobin (≤10 g/dL), triglyceride (≤150 mg/dL) will not interfere with the test results of the kit, amoxicillin (≤25mg/dL), cefaclor (≤0.6 mg/dL), ofloxacin (≤0.3 mg/dL), rheumatoid factor interference concentration (≤1200IU/mL) , HAMA (≤600ng/mL), biotin(≤ 20ng/mL), cholesterol(≤ 15mg/mL), cefotaxime(≤ 800mg/L), dobutamine(≤11mg/L), dopamine(≤120mg/L), furosemide(≤ 20mg/L), imipenem(≤ 1000mg/L), norepinephrine(≤ 2mg/L), vancomycin (≤3000mg/L) will not interfere with the kit.

Cross effect: This kit does not cross-react with the solution containing 100ng/ml of anticalcin and 35mg/ml of albumin.

4. Measuring range

The limit of blank is verified to be< 0.1 ng/mL.
The limit of detection is verified to be < 0.2 ng/mL.
The limit of quantitation is verified to be< 0.2 ng/mL.
The limit of bank, limit of detection and limit of quantitation are all tested according to the requirements of CLSI (Clinical and Laboratory Standards Institute) EP17-A2.

The limit of bank comes from the 95th percentile of the value obtained from n $\geqslant$ 60 tests of several samples without analyte in several independent test sequences. The probability that the limit of bank is lower than the concentration of sample without analyte is 95%.
The limit of detection is determined based on the blank limit and the standard deviation of the low concentration sample. The limit of detection refers to the lowest analyte concentration that can be tested (the probability of the value being higher than the limit of bank is 95%).
The quantitative detection limit refers to the concentration value corresponding to the precision CV value $\leqslant$ 20% of repeated test sample with the lowest analyte concentration.

5. Linearity
In the range of [0.5, 50] ng/mL, the linearity fits with the formula and the dose-reaction curve correlation coefficient should not be less than 0.990.

6. Range
0.2-50ng/mL (determined by the limit of detection and the linearity).
The value below the limit of detection is reported as < 0.2 ng/mL by analyzer. The value exceeding the test range is reported as > 50 ng/mL by analyzer.

7. Hook-effect
When the concentration is below 1000 ng/mL, no HOOK effect appears.

[Clinical Performance]
Use Elecsys BRAHMS PCT of Roche Diagnostics as comparison to test 153 cases, the test results are listed below.

		Elecsys BRAHMS PCT		Total
		Confirmed bacterial sepsis	Normal	
Leccurate	Positive	114	0	114
	Negative	2	37	39
Total		116	37	153
Diagnostic sensitivity		98.28% (93.93%-99.53%)		
Diagnostic specificity		100.00% (90.60%-100%)		

[Label Interpretation]

	DO NOT USE IF PACKAGE IS DAMAGED		CONSULT INSTRUCTIONS FOR USE
	DO NOT REUSE		USE-BY DATE
30°C 2°C	TEMPERATURE LIMIT		DATE OF MANUFACTURER
IVD	IN VITRO DIAGNOSTIC MEDICAL DEVICE	LOT	BATCH CODE
	KEEP AWAY FROM SUNLIGHT		KEEP DRY

EC REP	AUTHORIZED REPRESENTATIVE IN THE EUROPEAN COMMUNITY	CE 2797	CE MARK AND IDENTIFICATION OF NUMBER OF NOTIFIED BODY
	MANUFACTURER	UDI	Unique Device Identification
REF	CATALOGUE NUMBER	/	/

Beijing Lepu Medical Technology Co., Ltd.
Address:
No.37 Chaoqian Road, Changping District, Beijing, 102200, China
Tel: +86-10-56929911
Email: sales@lepu-medical.com
Website: en.lepumedical.com

EC REP Lepu Medical (Europe) Cooperatief U.A.
Abe Lenstra Boulevard 36, 8448 JB, Heerenveen,
The Netherlands
Tel: +31-515-573399 Fax: +31-515-760020

[Version No.] CE-In FL04 REV.03
[Issue Date] 05 June, 2023