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Infection

AFIAS PCT Plus

INTENDED USE

AFIAS PCT Plus is a fluorescence Immunoassay (FIA) for the quantitative determination of Procalcitonin (PCT) in human whole blood / serum / plasma. It is useful as an aid in management and monitoring of bacterial infection and sepsis.

For *in vitro* diagnostic use only.

INTRODUCTION

Identifying sepsis is a daily challenge in intensive care unit of every hospital. Early assessment of sepsis is vital for determination of the appropriate treatment since various therapeutic strategies are known to improve survival of patients with sepsis.

In healthy people, the concentration of plasma PCT is below 0.1 ng/mL. The level of PCT rises rapidly after a bacterial infection with systemic consequences. It can also be elevated by other situation such as major surgery, severe burns, or in neonates. However, it returns to baseline rapidly. Viral infections, bacterial colonization, localized infections, allergic disorders, autoimmune diseases, and transplant rejection do not usually induce a significant PCT response (values <0.5 ng/mL). Therefore, by evaluating PCT concentrations, the physicians are able to engage in the risk assessment for progression to severe sepsis and septic shock.

PRINCIPLE

The test uses a sandwich immunodetection method; Dried antibodies in the detector tube, once diluted with the diluent, bind with antigens in the sample to form antigen-antibody complexes. These complexes then migrate through the nitrocellulose matrix and are captured by another sets of immobilized antibodies on the test line.

The more antigens in the sample, the more antigen-antibody complexes, which leads to a stronger fluorescence signal. This signal then is interpreted by the reader to display the PCT concentration in the sample.

COMPONENTS

AFIAS PCT Plus consists of a cartridge, a pipette tip, an ID chip, an Instruction for use and C-tip.

- Each cartridge is packaged in an aluminum pouch, has three components; a cartridge part, detector part and diluent part.
- The cartridge part contains a test strip, the membrane which has Streptavidin at the test line, with chicken IgY at the control line.
- The detector part contains anti human PCT-fluorescence conjugate, anti human PCT-biotin conjugate, anti chicken IgY-fluorescence conjugate, bovine serum albumin (BSA) as a stabilizer and sodium azide as a preservative in phosphate buffered saline (PBS).
- The diluent part contains bovine serum albumin (BSA), detergent, sodium chloride and sodium azide as a preservative in phosphate buffered saline (PBS).
- C-tip (Capillary tip) is a useful tool for point of care testing which requires a small volume of capillary blood from fingertip, heel site (in infants) or ear-lobe.

WARNINGS AND PRECAUTIONS

- For in vitro diagnostic use only.
- Carefully follow the instructions and procedures described in this 'Instruction for use'.
- Use only fresh samples and avoid direct sunlight.
- Lot numbers of all the test components (cartridge and ID chip) should agree.
- Do not interchange test components between different lots or use test components after the expiration date, either of which might yield misleading of test result(s).
- The cartridge should remain sealed in its aluminum pouch until use. Do not use the cartridge if that is damaged or already opened.
- Frozen sample should be thawed only once. For shipping, samples must be packed in accordance with applicable local ordinance. A Sample with severe hemolytic and hyperlipidemia cannot be used and should be recollected.
- Just before use, allow the cartridge, the detector and the sample reach the room temperature by leaving them in the room for approximately 30 minutes at the least.
- **AFIAS PCT Plus** as well as the instrument for AFIAS tests should be used away from vibration and/or magnetic field. During normal usage, it can be noted that the instrument for AFIAS tests may produce minor vibration.
- Used pipette tips, C-tips and cartridges should be handled carefully and disposed by an appropriate method in accordance with relevant local regulations.
- An exposure to larger quantities of sodium azide may cause certain health issues like convulsions, low blood pressure and heart rate, loss of consciousness, lung injury and respiratory failure.
- **AFIAS PCT Plus** will provide accurate and reliable results subject to the following conditions.
  - **AFIAS PCT Plus** should be used only in conjunction with the instrument for AFIAS tests.
  - Any anticoagulants other than **EDTA, heparin, sodium citrate** should be avoided.
- **C-tip should be used when the following conditions are met.**
  - C-tip provided with the kit is recommended to obtain correct test result.
  - Capillary blood should be immediately tested after collection.
  - Do not leave C-Tip after collection of blood, test immediately.
  - Do not perform a test with C-tip on General Mode. It might cause an erroneous result.
  - Excess capillary blood around the C-tip should be wiped off.
  - In order to avoid cross-contamination, please do not re-use C-tip for multiple samples.
  - AFIAS cartridge should be inserted and positioned in the cartridge holder prior to the blood sample collection.

LIMITATIONS OF THE TEST SYSTEM

- The test may yield false positive result(s) due to the cross-reactions and/or non-specific adhesion of certain sample components to the capture/detector antibodies.
- The test may yield false negative result. The non-responsiveness of the antigen to the antibodies is most common where the epitope is masked by some unknown components, so as not to be detected or captured by the antibodies. The instability or degradation of the antigen with time and/or temperature may cause the false negative as it makes antigen unrecognizable by the antibodies.
- Other factors may interfere with the test and cause erroneous results, such as technical/procedural errors, degradation of the test components/reagents or presence of interfering substances in the test samples.
- Any clinical diagnosis based on the test result must be supported by a comprehensive judgment of the concerned physician including clinical symptoms and other relevant test results.

STORAGE AND STABILITY

- The cartridge is stable for 20 months (while sealed in the original aluminum pouch) if stored at 2-8 °C.
- After the cartridge pouch is opened, the test should be performed immediately.

MATERIALS SUPPLIED

REF SMFP-32

Components of **AFIAS PCT Plus**

- Cartridge Box Contains
  - Cartridge 24
  - Pipette Tip (Zipper bag) 24
  - C-Tip (Zipper bag, 30 µL) 24
  - ID Chip 1
  - Instruction For Use 1

MATERIALS REQUIRED BUT SUPPLIED ON DEMAND

Following items can be purchased separately from **AFIAS PCT Plus**.
Please contact our sales division for more information.

- **AFIAS-1** REF FPRR019
- **AFIAS-6** REF FPRR020
- **Boditech PCT Control** REF CFPO-97
- **Boditech PCT Calibrator** REF CFPO-109

SAMPLE COLLECTION AND PROCESSING

The sample type for **AFIAS PCT Plus** is human whole blood / serum / plasma.

- It is recommended to test the sample within 24 hours after collection.
- Take precautions on the collected sample because it's reported the concentration is rapidly changed when the sample for PCT test is kept at room temperature or refrigerated.
- The serum or plasma should be separated from the clot by centrifugation within 3 hours after the collection of whole blood. If longer storage is required, e.g. if the test could not be performed within 24 hours, serum or plasma should be immediately frozen below -20 °C. The freezing storage of sample up to 3 months does not affect the quality of results.
- However, the whole blood sample should not be kept in a freezer in any case.
- Once the sample was frozen, it should be thawed one time and only for test, because repeated freezing and thawing can result in the changed test values.
- Collection of capillary blood sample using C-tip
  (1) Clean the area with a pre-injection swab.
  (2) Pierce with a sterile lancet.
  (3) Wipe away first drop of blood.
  (4) Gently massage the surrounding area towards a C-tip for a second drop.
  (5) Hold a C-tip horizontally and touch the tip of C-tip to the blood drop.
  (6) Capillary action will automatically draw the blood sample to C-tip and stop
  (7) Wipe off any excess blood around the tip.
  (8) Double-check if capillary blood is fully filled in the C-tip and AFIAS reader is ready for a test on the 'C-tip mode'.

TEST SETUP

- Check the components of the **AFIAS PCT Plus** as described below: Cartridge, pipette tip, C-tip, ID chip and instruction for use.
- Keep the sealed cartridge (if stored in refrigerator) at room temperature for at least 30 minutes just prior to the test. Place the cartridge on a clean, dust-free and flat surface.

- Turn on the instrument for AFIAS tests.
- Empty the tip box.
- Insert the ID chip into the "ID chip port".
- Please refer to the instrument for AFIAS tests 'Operation Manual' for complete information and operating instructions.

TEST PROCEDURE

▶ General Method (with pipette tip)

1) Select "General Mode" in the instrument for AFIAS tests.
2) Take 100 µL of sample with a pipette and dispense it into the sample well on the cartridge.
3) Insert the cartridge into the cartridge holder
4) Insert a tip into the tip hole of the cartridge.
5) Tap the 'START' icon on the screen.
6) The test result will be displayed on the screen after 12 minutes.

▶ C-tip Method (with C-tip)

1) Select "C-tip Mode" in the instrument for AFIAS tests.
2) Insert the cartridge into the cartridge holder.
3) Take 30 µL of whole blood with a C-tip (Please refer to the sample collection.)
4) Insert the whole blood-filled C-tip into the tip hole of the cartridge.
5) Tap the 'START' icon on the screen.
6) The test result will be displayed on the screen after 12 minutes.

※ Note: Refer to the instrument for AFIAS tests Operation Manual to select sample type.

INTERPRETATION OF TEST RESULT

- The instrument for AFIAS tests calculate the test result automatically and displays PCT concentration of the test sample in terms of ng/mL.
- The cut-off (reference value) : 0.5 ng/mL
  - **AFIAS PCT Plus** test should be considered as a screening tool only. In case of a positive result (above 0.5 ng/mL), consult a physician to discuss the test result. The physician may decide further course of action.
  - Test result of > 2 ng/mL may reflect severe sepsis.

Diagnosis of bacterial infection/sepsis	
[ng/mL]	state
PCT < 0.5	Local bacterial infection is possible
0.5 < PCT < 2	Infection is possible
2 < PCT < 10	Infection (sepsis) is likely, unless other cause are known
PCT > 10	Severe bacterial sepsis or septic shock

- The working range of the **AFIAS PCT Plus** is 0.02-50 ng/mL.

QUALITY CONTROL

- Quality control tests are a part of the good testing practice to confirm the expected results and validity of the assay and should be performed at regular intervals.
- The control tests should be performed immediately after opening a new test lot to ensure the test performance is not altered.
- Quality control tests should also be performed whenever there is any question concerning the validity of the test results.
- Control materials are not provided with **AFIAS PCT Plus**. For more information regarding obtaining the control materials, contact Boditech Med Inc.'s Sales Division for assistance.
  (Please refer to the instruction for use of control material.)

PERFORMANCE CHARACTERISTICS

- **Analytical sensitivity**

Limit of Blank (LoB)	0.01 ng/mL
Limit of Detection (LoD)	0.02 ng/mL
Limit of Quantification (LoQ)	0.02 ng/mL

* 0.02 - 0.1 ng/mL: CV < 20 %
* 0.1 - 50 ng/mL: CV < 10 %

- **Analytical specificity**
  - Cross-reactivity

There was no significant cross-reactivity from these materials with the **AFIAS PCT Plus** test measurements.

cross-reactivity material	Standard material conc. (ng/mL)		
	0.20	0.78	3.13
	Recovery (%)		
Pro-BNP (100 ng/mL)	100	96	101
Pro-GRP (100 ng/mL)	100	95	101
Pro-ANP (100 ng/mL)	105	100	104
Pro-END (100 ng/mL)	100	95	101
Pro-ADM (100 ng/mL)	100	94	100

  - Interference

There was no significant interference from these materials with the **AFIAS PCT Plus** test measurements.

Interference material	Standard material conc. (ng/mL)		
	0.20	0.78	3.13
	Recovery (%)		
Triglycerides (20 mg/dL)	100	100	102
Cholesterol (20 mg/dL)	100	101	102
Hemoglobin (1 mg/dL)	100	97	100
Bilirubin (20 mg/dL)	95	100	101

- **Precision**
  - Intra assay

One person tested three different lots of **AFIAS PCT Plus**, nine times at each concentration of the control standard.

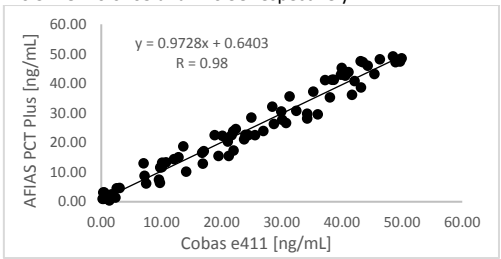
  - Inter assay

Three different persons tested three different lots of **AFIAS PCT Plus**; three times at each concentration of the control standard.

Con. (ng/mL)	Intra-assay			Inter-assay		
	Avg.	SD	CV (%)	Avg.	SD	CV (%)
0.20	0.20	3.91	0.21	3.89	0.20	3.91
0.78	0.76	4.15	0.76	4.21	0.76	4.15
3.13	3.12	2.83	3.14	3.08	3.12	2.83

- **Comparability**

PCT concentration of 171 clinical samples were independently with **AFIAS PCT Plus** and Cobas e411 (Roche Diagnostics Inc. Switzerland) as per prescribed test procedures. Test results were compared and their comparability was investigated with linear regression and coefficient of correlation (R). Linear regression and coefficient of correlation between the two tests were Y=0.9728X+0.6403 and R=0.98 respectively.



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3. Application of procalcitonin (PCT) – Q test for early detection of bacteremia and sepsis. Vetcheva-Dobrevsky et al, R. Vatcheva-Dobrevsky et al, Biotechnol. & Biotechnol. Eq. 2004, 177-184.
4. Comparison of procalcitonin (PCT) and C-reactive protein (CRP) plasma concentrations at different SOFA scores during the course of sepsis and MODS. Meisner et al, Crit Care. 1999, 3:45-50.

Note: Please refer to the table below to identify various symbols.

Σ	Sufficient for <n> tests
	Read instruction for use
	Use by Date
LOT	Batch code
REF	Catalog number
	Caution
	Manufacturer
EC REP	Authorized representative of the European Community
IVD	In vitro diagnostic medical device
	Temperature limit
	Do not reuse
CE	This product fulfills the requirements of the Directive 98/79/EC on in vitro diagnostic medical devices

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