Procalcitonin

Procalcitonin (PCT) is a 116 amino acid precursor of calcitonin. Calcitonin is exclusively produced by C-cells of the thyroid gland in response to hormonal stimuli, whereas PCT can be produced by several other cell types from a wide range of organs in response to inflammation or infection.

PCT is a good marker of bacterial infection because its level in the blood of normal subjects is very low and because viral infections cause only a minor increase in PCT concentration. Plasma PCT has a half-life of 25–30 hours. Levels typically increase within 3–6 hours of the stimulus, and higher levels are associated with poorer prognosis. Elevated values are highly suggestive of an infection, typically bacterial, with a systemic response (sepsis, or severe sepsis or septic shock). In addition, the diagnostic value of PCT is further supported by the close correlation between PCT concentration and the severity of inflammation.

PCT has been shown to be a useful tool that can aid in the diagnosis of sepsis. PCT levels can be helpful in facilitating early diagnosis thus allowing for early therapeutic interventions that have been shown to improve patient outcomes.

Anti-Human Procalcitonin Monoclonal Antibodies

Six high sensitively anti-procalcitonin monoclonal antibodies were recently developed by CUSAg. All recommended antibody pairs were evaluated in medium-scale clinical trials with serum specimens detected by VIDAS® B.R.A.H.M.S PCT kit.

Properties	Specification
Target species	Human
Host animal	Mice Balb/c
Cell line used for fusion	Sp2/0
Immunogen	Human procalcitonin
Purification method	Protein G affinity chromatography
Presentation	MAb solution in PBS (pH 7.4)
Application	CLIA and others
Catalog Number	CSB-DA131DmN①
	CSB-DA131DmN②
	CSB-DA131DmN③.
	CSB-DA131DmN④
	CSB-DA131DmN⑤
	CSB-DA131DmN⑥

Calibration Curve

All monoclonal antibodies were tested in pairs as capture and detection antibodies to filtrate the best two-site MAb pairs for the development of quantitative sandwich immunoassays. Calibration curves for the best two-site antibody pair are shown in Fig.1. Detection antibody was labeled with horse reddish peroxidase (HRP). The best selected antibody pair for quantification of human procalcitonin is (capture-detection respectively):

Mab pair A: CSB-DA131DmN③- CSB-DA131DmN②
Mab pair B: CSB-DA131DmN④- CSB-DA131DmN②
Mab pair C: CSB-DA131DmN③- CSB-DA131DmN⑤
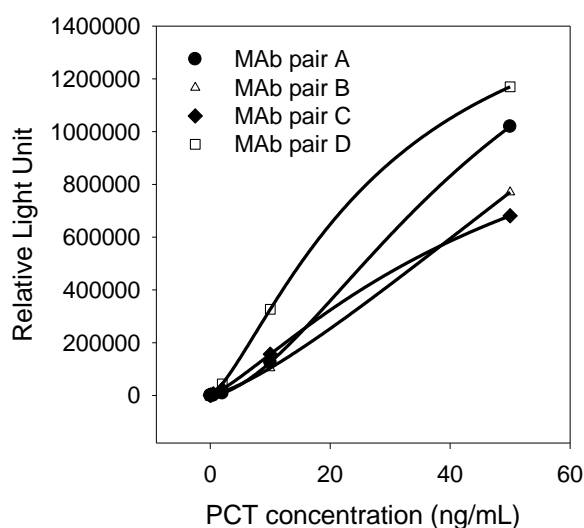Mab pair D: CSB-DA131DmN③- CSB-DA131DmN⑥

Fig.1 Calibration curve for procalcitonin in sandwich chemiluminescence immunoassay (Six calibrator concentration: 0, 0.1, 0.5, 2, 10, 50 ng/mL)

Clinical Comparison

70 clinical blood samples were separately tested using four MAb pairs on the CUSAg CLIA platform and compared to a diagnostic kit from bioMerieux. Data from this study were analyzed using the Passing-Bablok regression method and are summarized in the following table and scatter plot. Results reveal good agreement between CUSAg immunoassay and comparison assay.
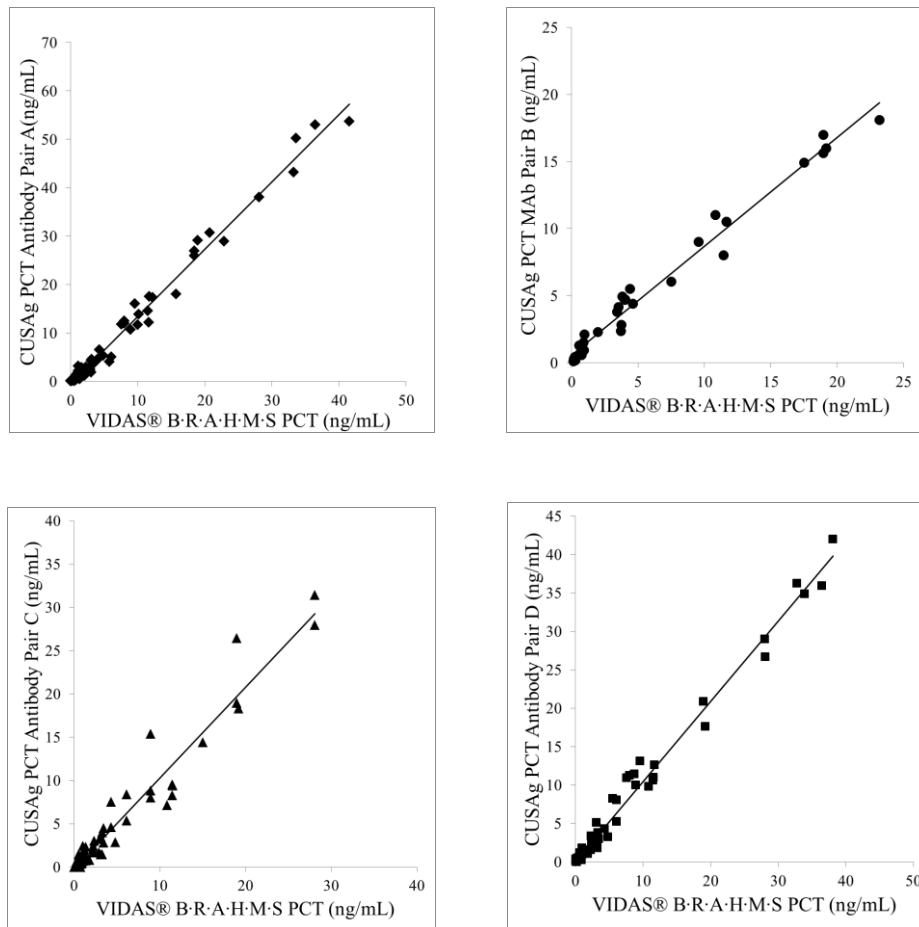
Fig.2 Clinical comparison of CUSAg PCT immunoassays and VIDAS® B.R.A.H.M.S PCT assay

PCT protein

A certain amount of excellent PCT protein (Cat: CSB-DP131D) is also offered by CUSAg. It could be used as calibrator in immunoassay.

Reference

Meisner M, Tschaikowsky K, Palmaers T, Schmidt J (1999). "Comparison of Procalcitonin (PCT) and C-reactive Protein (CRP) Plasma Concentrations at Different SOFA Scores During the Course of Sepsis and MODS". Critical Care. 3 (1): 45–50.

Balci C, Sungurtekin H, Gürses E, Sungurtekin U, Kaptanoğlu B (February2003). "Usefulness of Procalcitonin for Diagnosis of Sepsis in the Intensive Care Unit". Critical Care. 7 (1): 85–90.

Brunkhorst FM, Al-Nawas B, Krummenauer F, Forycki ZF, Shah PM (2002)."Procalcitonin, C-reactive Protein and APACHE II Score for Risk Evaluationin Patients with Severe Pneumonia". Clinical Microbiology and Infection. 8 (2): 93–100.