

# **Procalcitonin FS\***

# Order Information

Cat. No. Kit size

1 7318 99 10 930 R1 2 x 18 mL + R2 2 x 6 mL

# Intended Use

Reagent for quantitative in vitro determination of procalcitonin (PCT) in serum or plasma on photometric systems.

# Summary

Sepsis is a life-threatening organ dysfunction caused by a dysregulated host immune response to infection. It is a global health concern and a leading cause of death worldwide, affecting an estimate of 48.9 million people each year. [1-3]

Early diagnosis and treatment of sepsis still remains a big challenge in the intensive care units. PCT, the thyroid precursor of calcitonin, is a 116 amino acid polypeptide with a molecular weight of approximately 13 kDa. Under physiological conditions PCT is exclusively synthesized by thyroid C cells and undergoes successive cleavages into three fragments, N-terminus, calcitonin and katacalcin. [3-8]

PCT serum levels in healthy individuals are very low (< 0.05 ng/mL). In response to microbial systemic infections and sepsis, PCT is ubiquitously expressed in multiple tissues via stimulation by inflammatory cytokines or bacterial endotoxins and may increase up to 1000 ng/mL. [5-8]

# Method

Particle enhanced immunoturbidimetric test.

Determination of procalcitonin concentration by photometric measurement of antigen antibody reaction between antibodies against human procalcitonin bound to polystyrene particles and procalcitonin present in the sample.

## Reagents

#### **Components and Concentrations**

R1:	TRIS	pH 6.5	0.1 mol/L
R2:	TRIS	pH 9.0	0.1 mol/L
	Polyclonal antibodies (goat) against human PCT covalently		
	bound to polystyrene	e particles.	

#### Storage and Reagent Stability

The reagents are stable up to the end of the indicated month of expiry, if stored at  $2 - 8^{\circ}$ C and contamination is avoided. Do not freeze the reagents and protect them from light.

## Warnings and Precautions

- 1. The reagents contain sodium azide (0.9 g/L) as preservative. Do not swallow! Avoid contact with skin and mucous membranes.
- 2. Reagent 2 contains animal material. Handle the product as potentially infectious according to universal precautions and good laboratory practice.
- 3. In very rare cases, samples of patients with gammopathy might give falsified results [9].
- 4. Please refer to the safety data sheets 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.
- 5. For professional use only.

#### Waste Management

Refer to local legal requirements.

# **Reagent Preparation**

The reagent is ready to use.

## **Materials Required**

General laboratory equipment

#### Specimen

Serum or heparin plasma

Stability [10, 11]:		
24 hours	at	20 – 25°C
5 days	at	2 – 8°C
14 days	at	–20°C

Only freeze once. Discard contaminated specimens.

#### Assay Procedure

Applications for automated systems are available on request.

#### Basic parameter for cobas c 501

•		
Wavelength	660 nm	
Temperature	37°C	
Measurement	2 point end	
Sample/calibrator	10 µL	
Reagent 1	120 µL	
Reagent 2	40 µL	
Addition Reagent 2	Cycle 35 (~300 s)	
Absorbance 1	Cycle 41 (~350 s)	
Absorbance 2	Cycle 70 (~600 s)	
Calibration	RCM	

**Note:** For adapted procedures, calculate volumes of sample, calibrator and reagents appropriately and keep exactly to timing.

#### Calculation

The PCT concentration of unknown samples is derived from the calibration curve using an appropriate mathematical model such as RCM or spline. The calibration curve is obtained with six calibrators at different levels, including a matrix-based zero-value. Stability of calibration: 4 weeks

Stability of calibration. 4 weeks

# **Calibrators and Controls**

DiaSys TruCal PCT is recommended for calibration. TruCal PCT values have been made traceable in a method comparison of Procalcitonin FS versus a commercially available test on Roche cobas e 411. Use DiaSys TruLab PCT for internal quality control. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat. No.		Kit size
TruCal PCT	1 7310 99 10 082	6	x 1mL
TruLab PCT Level 1	5 9970 99 10 046	3	x 1mL
TruLab PCT Level 2	5 9980 99 10 046	3	x 1mL



# **Performance Characteristics**

#### Data evaluated on cobas c 501

Exemplary data mentioned below may slightly differ in case of deviating measurement conditions.

Measuring range from 0.2 up to 50 ng/mL, depending on the concentration of the highest calibrator. When values exceed this range samples should be diluted 1 + 4 with NaCl solution (9 g/L) and the result multiplied by 5.					
Limit of detection**		0.2 n	g/mL		
No prozone effect up to		1000 ng/mL			
Interfering substance			Interfe ≤ 10%	rences o up to	
Ascorbic acid			150 mg/dL		
Bilirubin (conjugated)			60 mg/dL		
Bilirubin (unconjugated)			60 mg/dL		
Hemoglobin			1000 mg/dL		
Lipemia (Triglycerides)			1500	1500 mg/dL	
Rheumatoid factor			1000	IU/mL	
α-CGRP (human)			10 µ	g/mL	
<b>β-CGRP</b> (human)			10 µg/mL		
Calcitonin (human)			20 ng/mL		
Cefotaxime			180 mg/dL		
Dobutamine			22.4 µg/mL		
Dopamine			26 mg/dL		
Furosemide			4 mg/dL		
Imipenem			0.5 mg/mL		
Noradrenalin (Norepinephrine)			4 µg/mL		
Vancomycin			3 mg/mL		
For further information on interfering substances refer to Young DS [12].					
Precision					
Within run (n=20)	Sam	ple 1	Sample 2	Sample 3	
Mean [ng/mL]	0.446		1.98	9.73	
CV [%]	6.	53	4.17	3.74	
Between day (n=20)	Sam	ple 1	Sample 2	Sample 3	
Mean [ng/mL]	0.500		1.87	9.48	
CV [%]	7.34		5.00	3.56	
Method comparison (n=	=148)				
Test x	Competit		itor Procalcitonin		
Test y	Fest y DiaSys I		Procalcitonin FS		
Slope 0.919		919			
Intercept 0.041 ng			j/mL		
Coefficient of correlation 0.983					

\*\* according to CLSI document EP17-A2, Vol. 32, No. 8

## **Reference Range**

As follows [13, 14]:

Serum and plasma:

< 0.5 ng/mL Systemic infection (sepsis) is unlikely Low levels do not exclude an infection, because localized infections (without systemic signs) may be associated with such low levels.

≥ 0.5 and < 2 ng/mL	Systemic infection (sepsis) is possible.
	Patient should be closely monitored.
≥ 2 and < 10 ng/mL	Represent a high risk of severe sepsis
	and/or septic shock.
≥ 10 ng/mL	Severe sepsis or septic shock, almost exclusively due to severe bacterial
	infection

**Note:** PCT levels may be elevated independently of bacterial infection in neonates (< first 3 days of life, physiological elevation) [14-16]. Increased levels of PCT may also occur in patients with

special medical conditions eg. polytrauma, major surgery and severe burns. [6, 7, 13, 14]

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

#### Literature

- Rudd KE et al. Global, regional, and national sepsis incidence and mortality, 1990–2017: analysis for the Global Burden of Disease Study, The Lancet 2020; 395 (10219): 200-211.
- Singer M et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA 2016; 315(8): 801-810.
- Fleischmann C et al. Assessment of global incidence and mortality of hospital-treated sepsis. Current estimates and limitations. Am J Respir Crit Care Med. 2016; 193(3): 259– 272.
- Maruna P, Nedelníková K and Gürlich R. Physiology and genetics of procalcitonin. Physiol Res. 2000; 49(Suppl 1): S57–S61.
- Christ-Crain M, Müller B. Procalcitonin in bacterial infectionshype, hope, more or less?. Swiss Med Weekly. 2005; 135: 451-460.
- Becker KL et al. Procalcitonin in sepsis and systemic inflammation: a harmful biomarker and a therapeutic target. British journal of pharmacology 2010; 159(2): 253-264.
- Becker KL et al. Procalcitonin and the calcitonin gene family of peptides in inflammation, infection, and sepsis: a journey from calcitonin back to its precursors. The Journal of Clinical Endocrinology & Metabolism, 2004; 89(4): 1512-1525.
- Müller B et al. Ubiquitous expression of the calcitonin-i gene in multiple tissues in response to sepsis. J Clin Endocrinol Metab 2001; 86(1): 396-404.
- Bakker AJ, Mücke M. Gammopathy interference in clinical chemistry assays: mechanisms, detection and prevention. ClinChemLabMed 2007; 45(9): 1240-1243.
- Gruzdys V et al. Method Verification Shows a Negative Bias between 2 Procalcitonin Methods at Medical Decision Concentrations. The journal of applied laboratory medicine 2019; 4(1): 69-77.
- Meisner M. Procalcitonin-influence of temperature, storage, anticoagulation and arterial or venous asservation of blood samples on procalcitonin concentrations. Clinical Chemistry and Laboratory Medicine 1997; 35(8): 597-602.
- Young DS. Effects of Drugs on Clinical Laboratory Tests. 5th ed. Volume 1 and 2. Washington, DC: The American Association for Clinical Chemistry Press 2000.
- Harbarth S et al. Diagnostic value of procalcitonin, interleukin-6, and interleukin-8 in critically ill patients admitted with suspected sepsis. Am J Respir Crit Care Med 2001; 164: 396–402.
- 14. Meisner M. Procalcitonin Biochemie und klinische Diagnostik. 1. Auflage Bremen: UNI-MED-Verlag 2010.
- 15. Chiesa C et al. Reliability of procalcitonin concentrations for the diagnosis of sepsis in critically ill neonates. Clinical infectious diseases1998; 26(3): 664-672.
- 16. Chiesa C et al. C-reactive protein, interleukin-6, and procalcitonin in the immediate postnatal period: influence of illness severity, risk status, antenatal and perinatal complications, and infection. Clinical chemistry 2003; 49(1): 60-68.



DiaSys Diagnostic Systems GmbH Alte Strasse 9 65558 Holzheim Germany www.diasys-diagnostics.com

\* Fluid Stable