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Diagnostic and Predictive Value of Presepsin (sCD14-ST) in the Time Course of Sepsis

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Purpose:

Sepsis represents a complex systemic inflammatory response to an infection. The soluble CD14 subtype (sCD14-ST) is cleaved from the monocyte/macrophage specific CD14 receptor complex after binding with lipopolysaccharides (LPS) and LPS binding protein (LPB) during systemic infections. This study evaluates the diagnostic and predictive value of this subtype sCD14-ST – the so called presepsin – during the time course of patients suffering from sepsis.

Methods:

26 patients presenting to the intensive care unit (ICU) with proven criteria of SIRS (systemic inflammatory-response syndrome), sepsis, severe sepsis and septic shock were evaluated. Septic patients were included in the study according to the criteria of the ACCP/SCCM consensus statement and were followed up to 30 days. Blood samples for measurement of presepsin were collected on day 1, 3 and 8 after the clinical onset of sepsis. Presepsin was measured by the PATHFAST® immunoassay analytical system (PROGEN Biotechnik GmbH, Germany; Mitsubishi chemical medience corporation, Japan). The study was carried out according to the principles of the declaration of Helsinki and was approved by the local ethics committee.

Results:

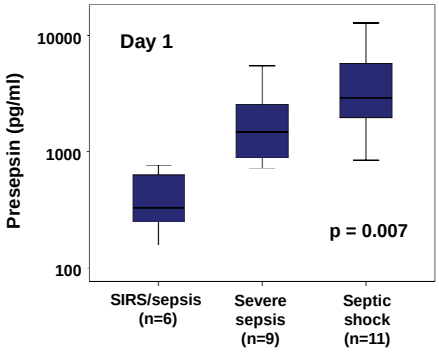
Table 1 Basline characteristics of 26 patients on the intensive care unit (ICU)

	SIRS / Sepsis (n=6)	Severe Sepsis (n=9)	Septic Shock (n=11)
Age, years (mean, range)	71 (50-81)	66 (37-75)	70 (50-87)
Gender, n (%)			
Male	2 (33)	6 (67)	8 (73)
Female	4 (66)	3 (33)	3 (27)
APACHE II, mean ± SEM	18 ± 4	15 ± 3	20 ± 2
Site of infection, n (%)			
Lung	4 (67)	6 (67)	8 (73)
Urinary tract	1 (17)	1 (11)	-
Abdominal	-	1 (11)	1 (9)
Central nervous system	1 (17)	-	-
Skin	-	1(11)	2 (18)
Germ spectrum, n (%)			
Gram-stain positive	2 (33)	3 (33)	6 (55)
Gram-stein negative	2 (33)	4 (44)	5 (46)
Fungi	-	3 (33)	2 (18)
Viral	1 (2)	-	1 (9)
Laboratory values, mean ± SEM			
White blood cells (10^9/L)	15.0 ± 4.1	19.6 ± 4.5	17.4 ± 3.3
Platelets(10^9/L)	236 ± 135	237 ± 228	162 ± 459
Hemoglobin , g/dl	13.8 ± 1.1	10.4 ± 0.4	10.7 ± 0.5
Hematocrit, %	38.6 ± 1.9	31.9 ± 1.3	32.4 ± 1.7
C - reactive proteine, mg/l	120 ± 38	177 ± 39	232 ± 38
Creatinine, mg/dl	0.9 ± 0.1	2.2 ± 0.6	2,8 ± 0.6
Albumin, g/l	25.9 ± 1.6	22.6 ± 2.7	17.8 ± 0.8
Sodium, mmol/l	132 ± 5.1	137 ± 1.2	142 ± 1.9
Bilirubin, mg/dl	0.8 ± 0.2	0.7 ± 0.1	1.7 ± 0.3
30 days outcome			
Non-survivor	2 (33)	1 (11)	5 (45)
Survivor	4 (67)	8 (89)	6 (55)

Table 2 Correlations of presepsin levels and baseline laboratory and clinical parameters of all septic patients (n=26)

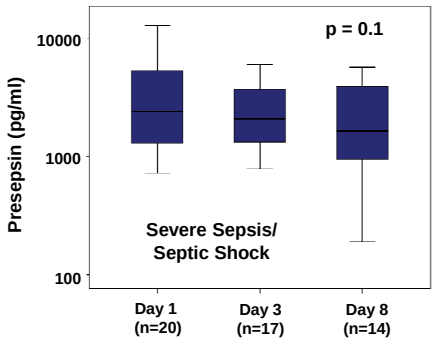
	r	p value
APACHE II score	0.25	0.3
White blood cells	0.37	0.07
C - reactive proteine	0.21	0.3
Hemoglobin	-0.60	0.001
Hematocrit	-0.59	0.002
Albumin	-0.51	0.009
Sodium	0.37	0.07
Bilirubin	0.78	0.0001

Figure 1



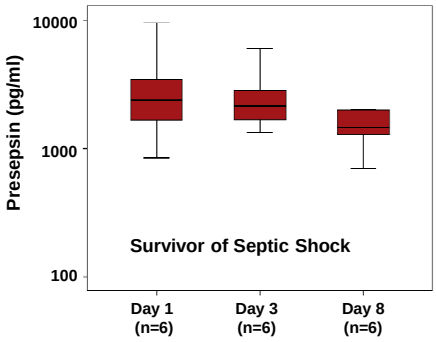
Presepsin levels were higher at day 1 in patients with septic shock (n = 11, median = 2931 pg/ml) compared to patients with severe sepsis (n = 9, median = 1475 pg/ml) and patients with SIRS/Sepsis (n = 6, median = 332 pg/ml) (test for linear trend p = 0.007) **(Figure 1)**.

Figure 2



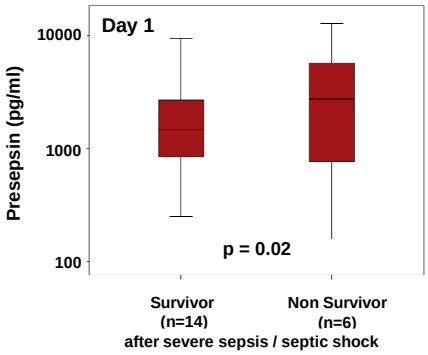
Presepsin levels of patients with severe sepsis and septic shock (n = 20) decreased from day 1 (median = 2393 pg/ml) to day 3 (median = 2120 pg/ml) by 11 % and to day 8 (median = 1563 pg/ml) by 35% during intensive care treatment (test for linear trend: p = 0.1) **(Figure 2)**.

Figure 3



In patients surviving septic shock (n=6) presepsin levels decreased from day 1 (median = 2396 pg/ml) to day 3 (median = 2120 pg/ml) by 12 % and to day 8 (median = 1359 pg/ml) by 43 % during intensive care treatment **(Figure 3)**.

Figure 4



Presepsin levels measured at day 1 were significantly higher in non-survivors of severe sepsis and septic shock (non-survivors, n = 6, median = 4215 pg/ml) compared to survivors (survivors, n= 18, median = 1311 pg/ml; p = 0.02) during the 30 days follow-up **(Figure 4)**.

The use of presepsin to differentiate severe sepsis and septic shock from SIRS/sepsis was evaluated by ROC curve analyses with an „area under the curve“ (AUC) of 0,83 (95% CI: 0.67-0.99; p=0.005), to differentiate septic shock the AUC was 0.99 (95% CI: 0.95-1.00; p=0.001) **(data not shown)**.

Conclusions:

Presepsin levels measured at the beginning of the time course of sepsis were able to differentiate patients suffering from SIRS/Sepsis, severe sepsis and septic shock. Presepsin levels decreased in patients with severe sepsis or septic shock during 8 days of intensive care treatment. Presepsin levels might predict short-term 30-day mortality in patients with severe sepsis or septic shock.

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