PATHFAST Presepsin in Patients with SIRS and Early Sepsis in the Emergency Department

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Background: CD14 is expressed on the cell membrane of monocytes/macrophages and activates the TLR4-specific inflammatory reaction against infectious agents whereby soluble CD14 is released. During shedding from the cell surface sCD14 is split yielding the fragment sCD14-ST named presepsin. Presepsin serves as a mediator of the response to lipopolysaccharid from infectious agents. First evidence suggested that presepsin may be utilized as sepsis marker.

Objective: To examine the suitability of presepsin for diagnosis, prognosis and disease monitoring in patients suspicious of sepsis admitted to the emergency department (D).

Methods: Presepsin was determined at presentation (baseline), after 8, 24 and 72 hours in 123 individuals admitted to the ED with signs of SIRS (systemic inflammatory response syndrome) and/or infection. APACHE II score was established 24 and 72 hours after admission. 123 healthy individuals served as control group. Primary endpoint was death within 30 days. Presepsin was determined using the POC assay PATHFAST Presepsin, Mitsubishi Chemical Medience Corporation, Tokyo, Japan.

Results: Mean presepsin concentrations of the patient group at presentation and of the control group were 1945 (95% CI: 1446-2444) pg/ml and 130 (95% CI: 121-140) pg/ml, respectively (p<0.0001). Baseline presepsin as well as APACHE II score after 24 hours differed highly significant between patients with SIRS, sepsis, severe sepsis and septic shock:

	Presepsin at admission Median (IQR)	APACHE II score after 24 hours Median (IQR)
SIRS, n=9	304 (219-428)	3 (2-4)
Sepsis, n=74	544 (319-984)	11 (7-16)
Severe sepsis, n=34	1994 (1061-5331)	18 (15-21)
Septic shock, n=6	2796 (1004-5583)	24 (23-24)

24 patients died during 30 days. The 30-day mortality was 19.5% in total, ranging from 0 % to 29.5% between the 1st and the 4th quartile of presepsin concentration:

Quartile n,alive/death	1st 2/0	2nd 7/0	3rd 48/6	4th 43/18
Presepsin (pg/ml)	103-113	131-199	216-690	709-13036
Mortality (p<0.0001)	*0 %*	*0 %*	*11.1%*	*29.5%*

Presepsin and APACHE II score demonstrated a strong relationship with 30-day mortality. ROC analysis of presepsin and APACHE II score revealed AUCs of 0.705 (95% CI: 0.614-0.785) and 0.895 (95% CI: 0.827-0.943), respectively. Furthermore, non-survivors showed high presepsin values with increasing tendency during the course of the disease while in surviving patients this tendency was decreasing:

Presepsin Median (IQR), pg/ml	Baseline	8 hours	24 hours	78 hours
Survivors	590 (345-1396)	622 (367-1912)	574 (336-1610)	533 (324-1246)
Non-survivors	1763 (705-6616)	1859 (1001-5744)	1731 (809-4586)	2056 (811-5540)
p-value	0.0046	0.0005	0.0033	0.0013

Conclusion: Presepsin demonstrated a strong relationship with disease severity and outcome. Presepsin provided reliable discrimination between SIRS and sepsis as well as prognosis and early prediction of 30-day mortality already at admission. Moreover, presepsin values showed close association to the course of the disease.