PRESEPSIN MEASUREMENT FOR DIAGNOSIS OF INFECTION IN SURGICAL PATIENTS

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Aim. To determine whether presepsin can be useful for diagnosis of infection in surgical patients

Subjects and methods. The study was conducted at Sklifosovsky Research Institute for Emergency Medicine from October 2012 to March 2014. The investigation enrolled 92 adult patients with different pathological conditions. Presepsin levels were estimated in a comparison study with other sepsis markers (C-reactive protein, procalcitonin) and autopsy findings (in 22 non-survivors)

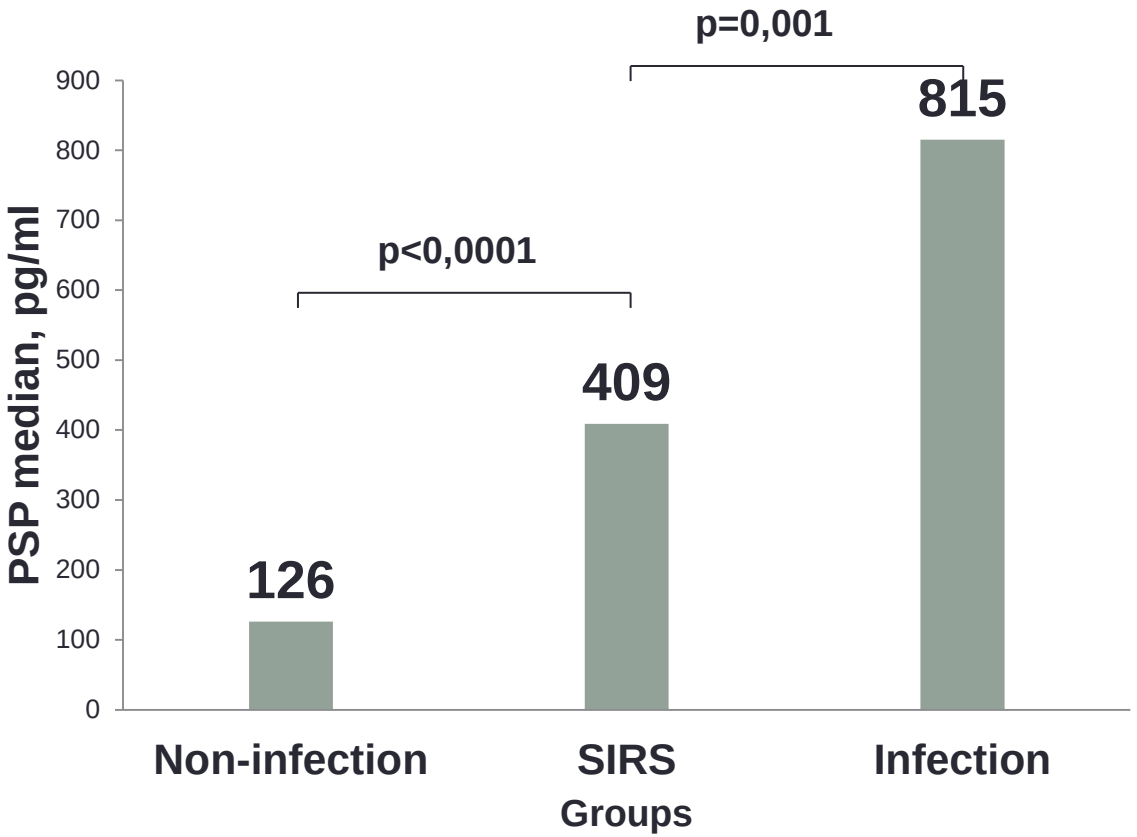
Statistical analysis

- Statistical analysis was done using GrafPad Software (Version 5.01, USA)
- Continuous data were expressed as median and quartiles (Q1-Q3), discrete data - as numbers
- Two-group comparisons were performed non-parametrically using the Mann-Whitney U test
- To compare the diagnostic value of biomarkers receiver operating characteristic (ROC) curves were constructed and the areas under the ROC-curves (AUC) were determined
- Statistical significance was defined at a p-value less than 0.05

Table 1. Demographic and clinical characteristics of the enrolled patients (n=92)

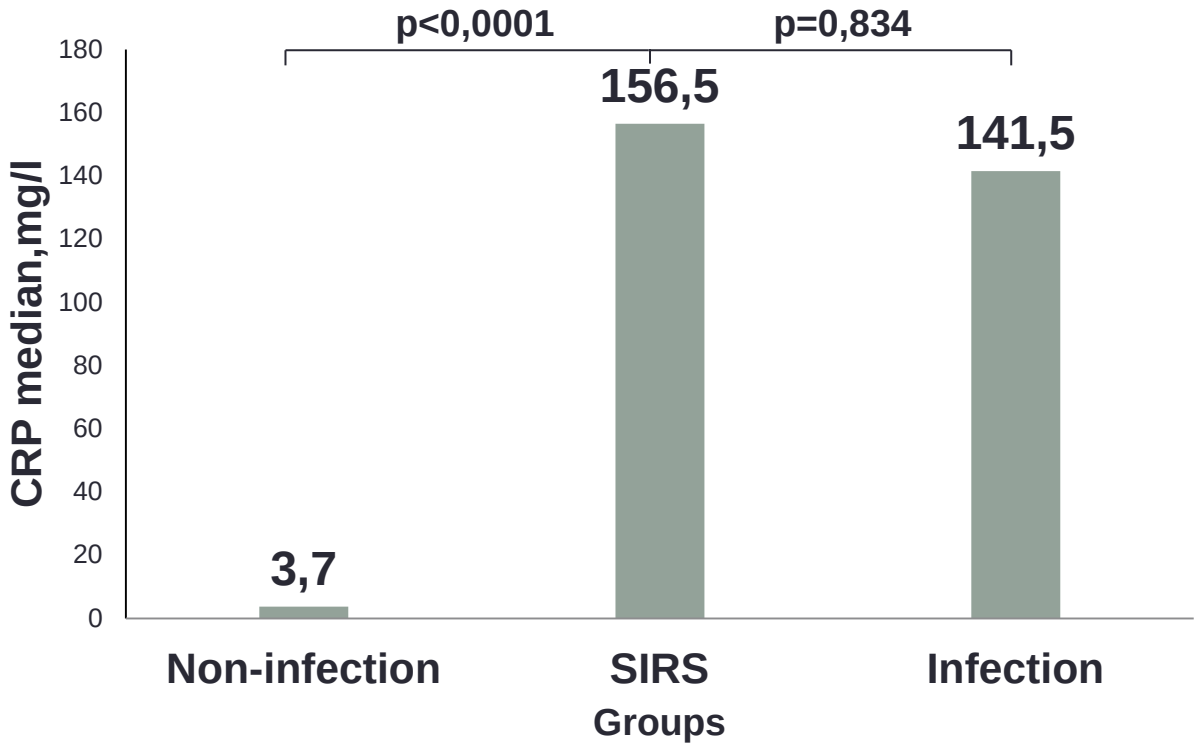
Group / Characteristics	Non-infection n=17	SIRS n=18	Infection n=57
Male/female ratio Age, yrs, median (range)	16/1 62 (49-82)	9/9 41 (20-57)	31/26 38 (17-78)
Diagnosis, no.	Unstable angina pectoris – 17	Multiple trauma-7 Pancreatitis - 4 Burns - 3 Gunshot wound - 1 Gastric ulcer perforation - 1 Apendicitis - 1 Esophageal perforation – 1	Post-operative infectious complications (pneumonia, surgical site infection, abscess, phlegmon etc.)
Blood samples were collected	Before surgery	On day 1-2 after admission	At clinical manifestations of infectious events
Mortality, no.	0	5	28

Figure 1. Median levels of presepsin (PSP) in the Non-infection, SIRS and Infection groups



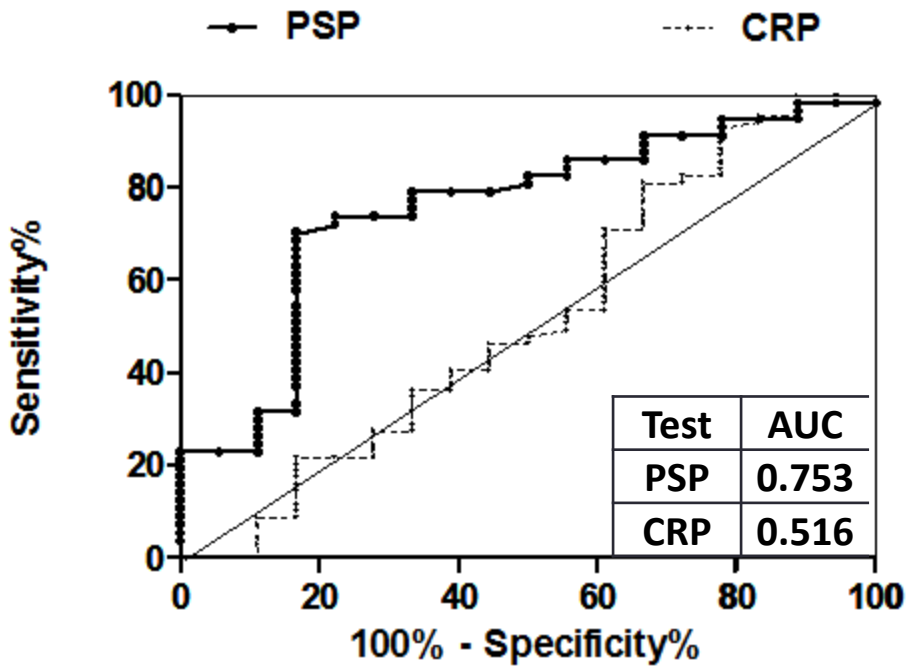
Groups	Number of patients	Median	Q1-Q3	Min	Max
Non-infection	17	126	105-185	70,6	259
SIRS	18	409	235-540	213	3189
Infection	57	815	492-2900	116	20000

Figure 2. Median levels of C-reactive protein (CRP) in the Non-infection, SIRS and Infection groups



Groups	Number of patients	Median	Q1-Q3	Min	Max
Non-infection	17	3,7	2,4-6,7	0,69	259
SIRS	18	156,5	68,6-227,3	2,14	536
Infection	57	141,5	93,1-213	18,5	306

Figure 3. ROC curves for presepsin (PSP) and C-reactive protein (CRP) in the SIRS and Infection groups



At the cut-off value of 539 pg/ml PSP demonstrated the clinical usefulness for differentiation between inflammation and infection (sensitivity=74% and specificity=78%)

Figure 4. Flow chart of deceased patients included in the study

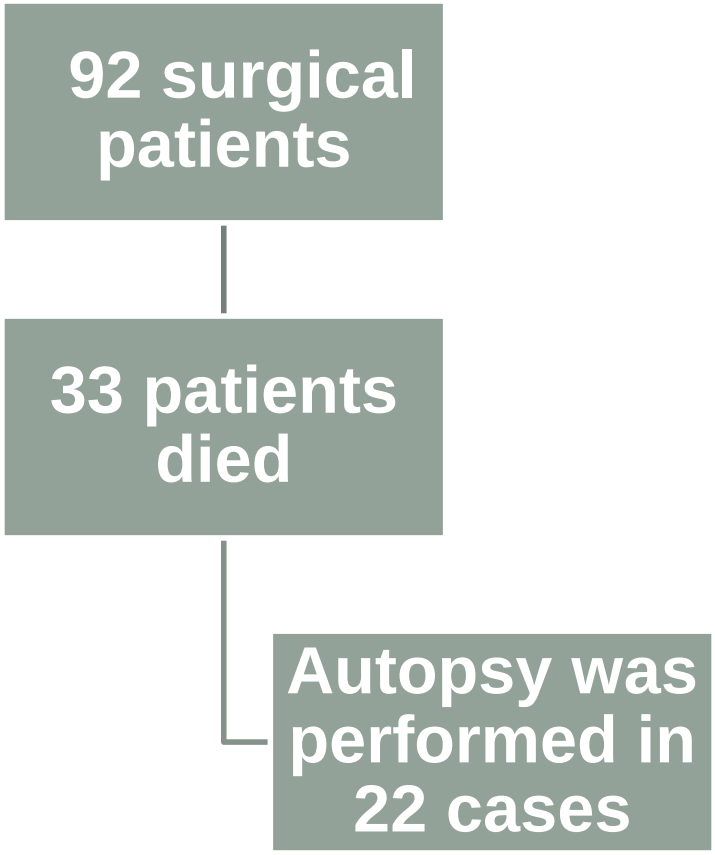


Table 2. Demographic and clinical characteristics of 22 non-survivors

Characteristics \ Group	Purulent intoxication	Others
Patients, no.	13	9
Male/female ratio	7/6	7/2
Age, yrs, median (range)	38 (20-78)	44 (26-61)
Length of hospital stay, days, median (range)	21 (1-107)	7 (3-40)

Figure 5. Clinical characteristics of 22 non-survivors

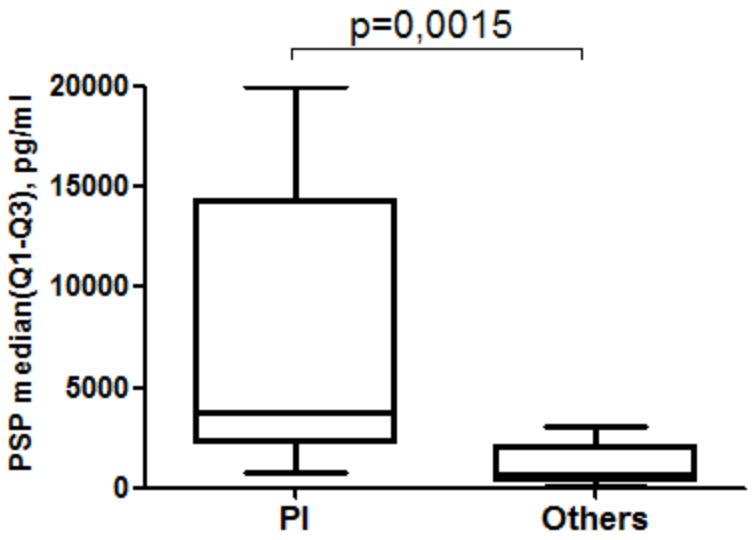
Purulent intoxication (who died from severe infectious complications, n=13)

- 4 – Infected pancreonecrosis
- 4 – Bacterial pneumonia
- 3 – Phlegmons, necrotizing fasciitis
- 2 – Septicopyemia
- 2 – Abscesses
- 1 – Bacterial endocarditis
- 1 – Large bowel obstruction. Bacterial shock

Others (who died from other causes, n=9)

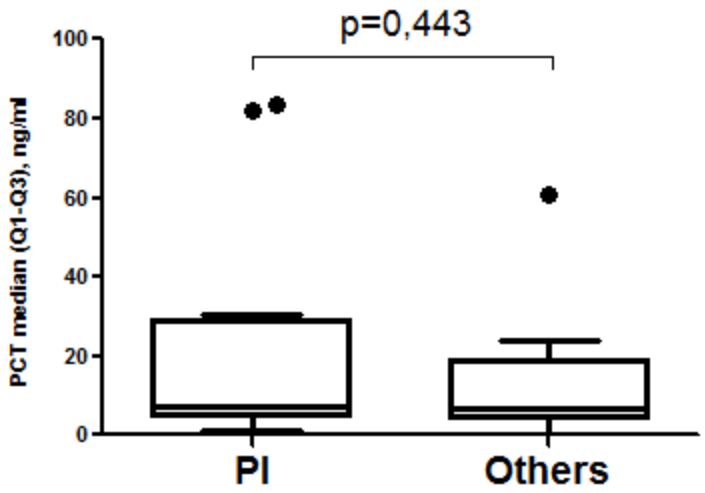
- 2 – Burn toxemia
- 2 – Acute respiratory and heart failure (Pulmonary Langerhans cell histiocytosis; pneumocystis pneumonia)
- 1 – Hemorrhagic shock (Multiple penetrating thoracoabdominal stab wound)
- 1 - Cancer intoxication
- 1 – Acute heart failure (Gastric ulcer perforation)
- 1- Acute brain edema (Aneurism rupture)
- 1- Total pancreonecrosis during enzymatic toxemia stage

Figure 6 . Presepsin (PSP) levels in patients died from purulent intoxication (PI) and other causes (Others)



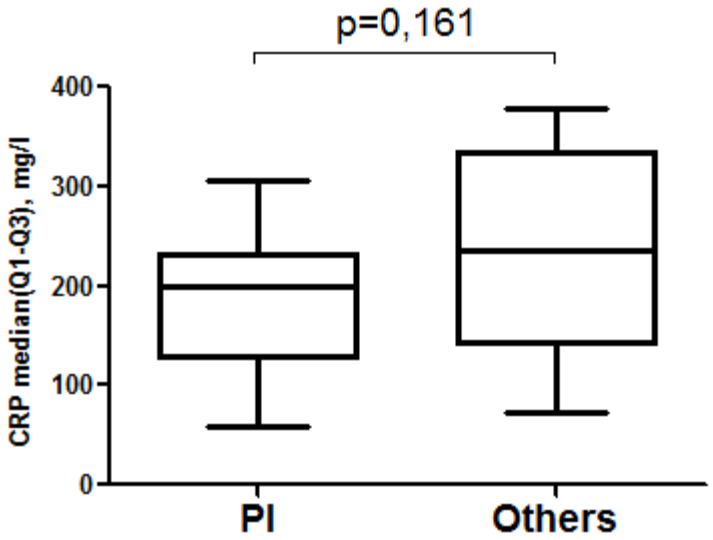
Group	Number of patients	Median	Q1-Q3	Min	Max
PI	13	3766	2234-14301	737	20000
Others	9	689	344,5-2026	113	3051

Figure 7. Procalcitonin (PCT) levels in patients died from purulent intoxication (PI) and other causes (Others)



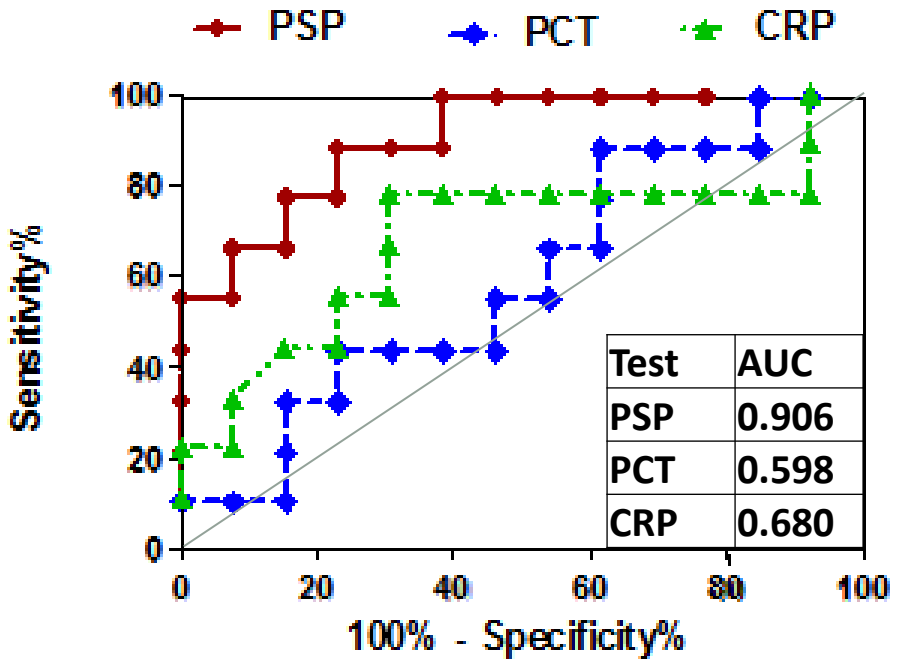
Group	Number of patients	Median	Q1-Q3	Min	Max
PI	13	7,27	4,92-29,21	1,05	83,54
Others	9	6,84	4,19-18,87	0,13	60,57

Figure 8. C-reactive protein (CRP) levels in patients died from purulent intoxication (PI) and other causes (Others)



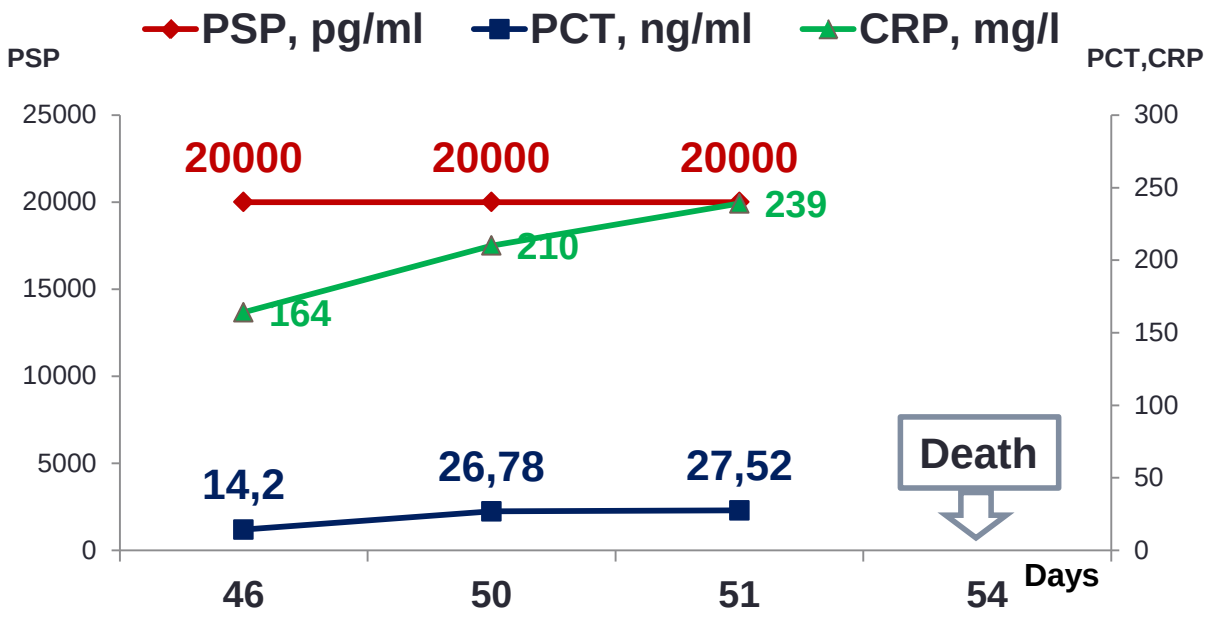
Group	Number of patients	Median	Q1-Q3	Min	Max
PI	13	199	128-231	58,2	306
Others	9	235	72-379	72	379

Figure 9. ROC-curves for presepsin (PSP), procalcitonin (PCT), C-reactive protein (CRP) in patients died from purulent intoxication (PI) and other causes (Others)



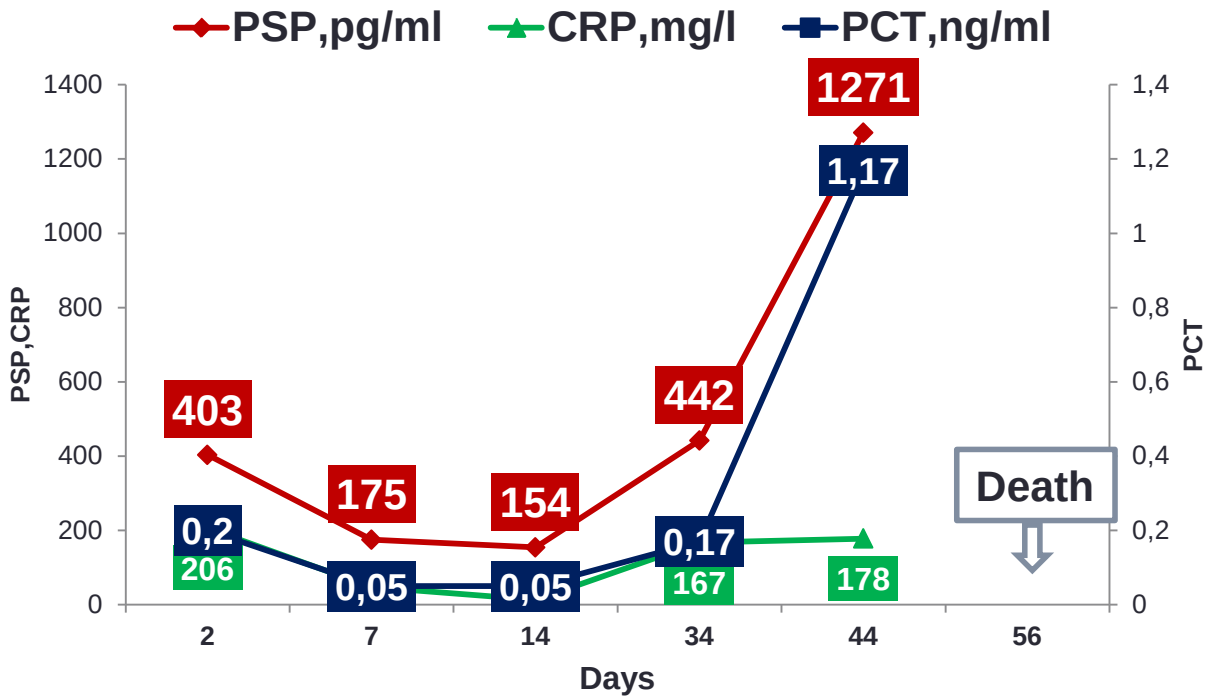
At the cut-off value of 2640 pg/ml PSP more accurately identified life-threatening purulent complications than PCT and CRP (sensitivity=89% and specificity=77%)

Case 1. **A 31-year-old female patient was admitted to the institute because of recurrent viral hepatitis type C of liver graft with graft failure. Length of hospital stay was 54 days.**
Cause of death: 1. Active chronic viral hepatitis type C of liver graft with graft failure. 2. Post-catheter sepsis (septicopyemia)



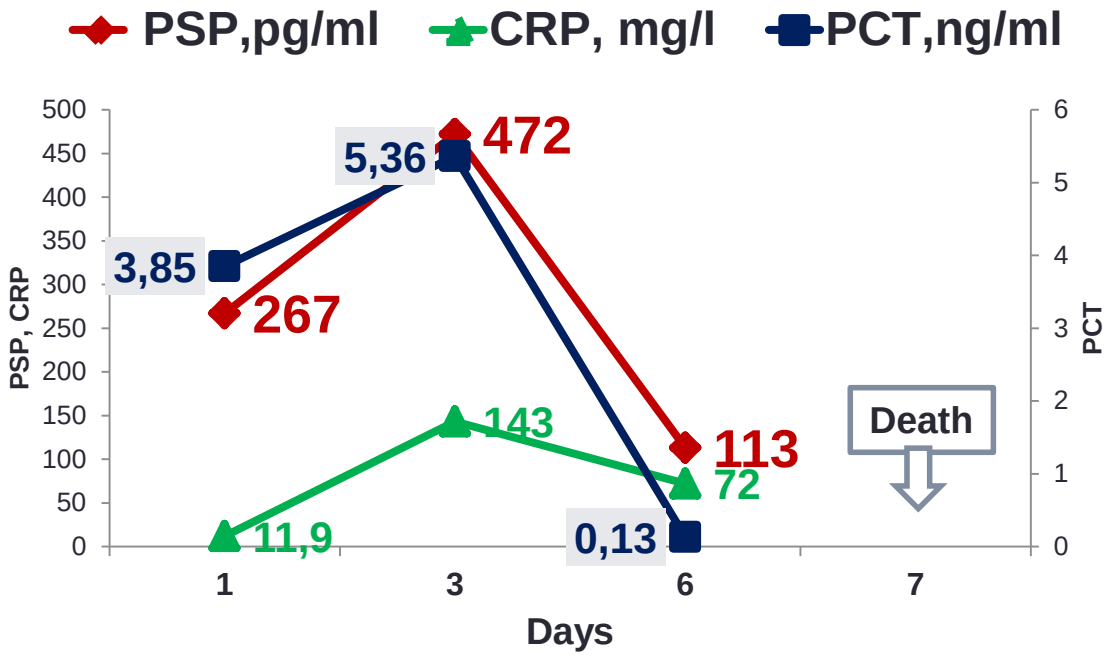
Blood culture: (+) (+) (+)
Staphylococus aureus was found in all three samples

Case 2. **A 49-year-old male patient was admitted to the institute because of severe acute pancreatitis. Length of hospitalization stay was 56 days.**
Cause of death:Total infected pancreonecrosis complicated multiple organ failure



Blood culture: **(-)**

Case 3. **A 26-year-old male patient was admitted to our institute because of multiple penetratining thoracoabdominal stab wound. Length of hospitalization stay was 6 days.**
Cause of death: Hemorrhagic shock



***Case 4*. A 44-year-old male patient was admitted to the institute due to suspected cardiac infarction. Length of hospitalization stay was 4 days**
Cause of death: HIV-infection complicated by pneumocyctis pneumonia

Day	WBC* x 10 ^{9}/l	Lymphocytes cell/ml	IEA**	PCR***	PSP, pg/ml	PCT, ng/ml	CRP, mg/l	Blood culture
1 2	7,97	200	HIV+ HCV+	EBV+ CMV+	311	7,94	304	 (-)
4	Death							

WBC* - white blood cell
IEA - immune-enzyme assay**
PCR* - polymerase chain reaction**

Conclusions

- **Presepsin may be used to discriminate between inflammation and infection in surgical patients**
- **Presepsin measurement may be employed to detect serious infections in critically ill patients**
- **Presepsin shows better diagnostic power for bacterial infection than C-reactive protein and procalcitonin**

THANK YOU FOR YOUR ATTENTION