Presepsin a new marker for critical care ? Clinical studies & outcomes

Diagnostic tools & biomarker

Presepsin mechanism

Metanalysis & review
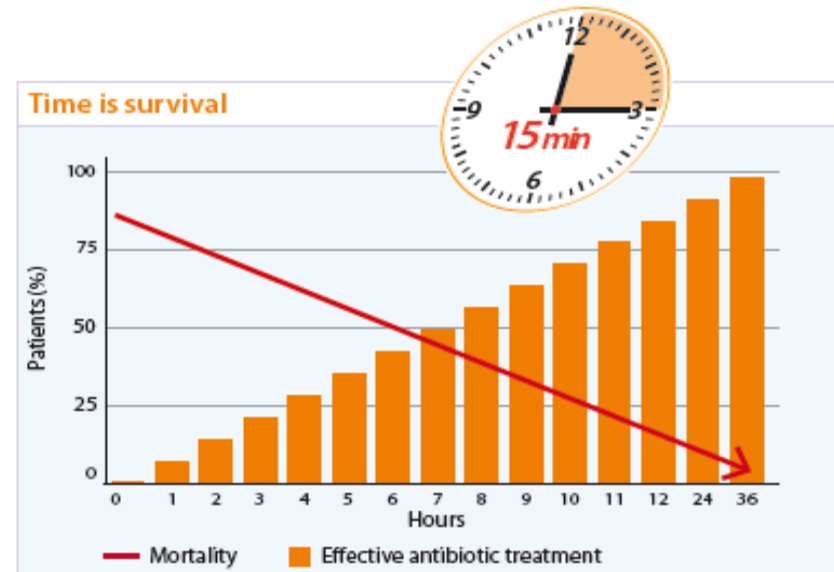
Clinical scores & performance in ER & ICU

Effect of AKI

Cut off in children

Weaning

New studies
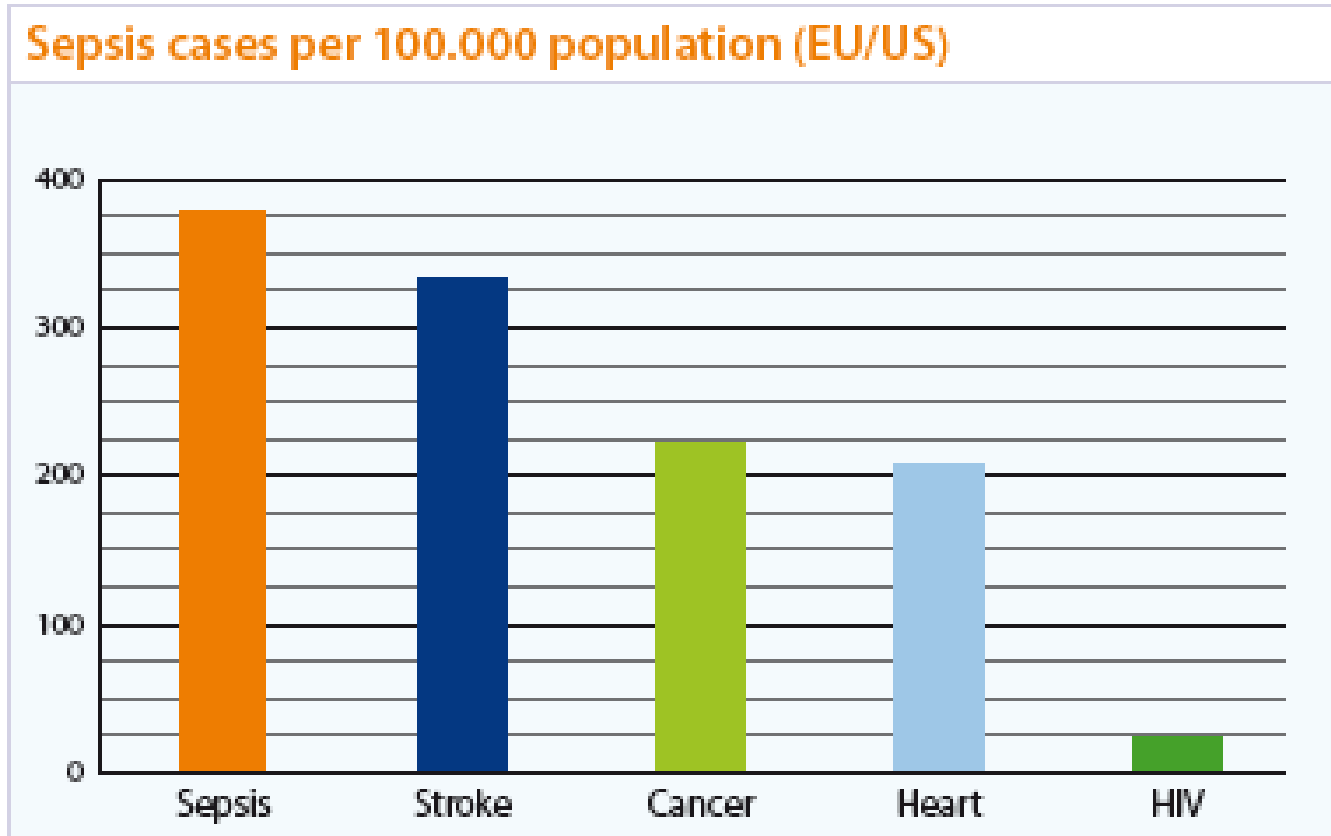

Time is survival
15 min

Modified from World Sepsis Day by lindgruen-gmbh.com

Dr. Ralf Thomae
General Manager & Representative Diagnostic Business
Mitsubishi Chemical Europe GmbH

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Frequent diseases .....

Sepsis cases per 100.000 population (EU/US)

Diagnostic tools used in sepsis diagnostics

Diagnostic tools

- **White blood cell count**

- **Germ count**

- **Blood cultures**

- **PCR (Polymerase Chain reaction)**

- **Biochemical blood marker**

e.g. Blood marker Presepsin on Pathfast

Biomarkers used in e.g. sepsis diagnostics

- Acute phase proteins

  – CRP   (C-Reactive Protein)

  – IL-6   (Interleukin-6)

  – PCT   (Procalcitonin)

- Sepsis biomarker candidates: cell marker

  ➢ PMN activation: CD64, sCD11b, TREM-1, HBP (Released from PMN granules when PMNs are exposed to bacteria.)

  ➢ Monocyte/macrophage activation: LBP, **CD14**
  (Cofactors of TLRs for recognition of endotoxines)

  ➢ New biomarker Presepsin (sCD14ST)
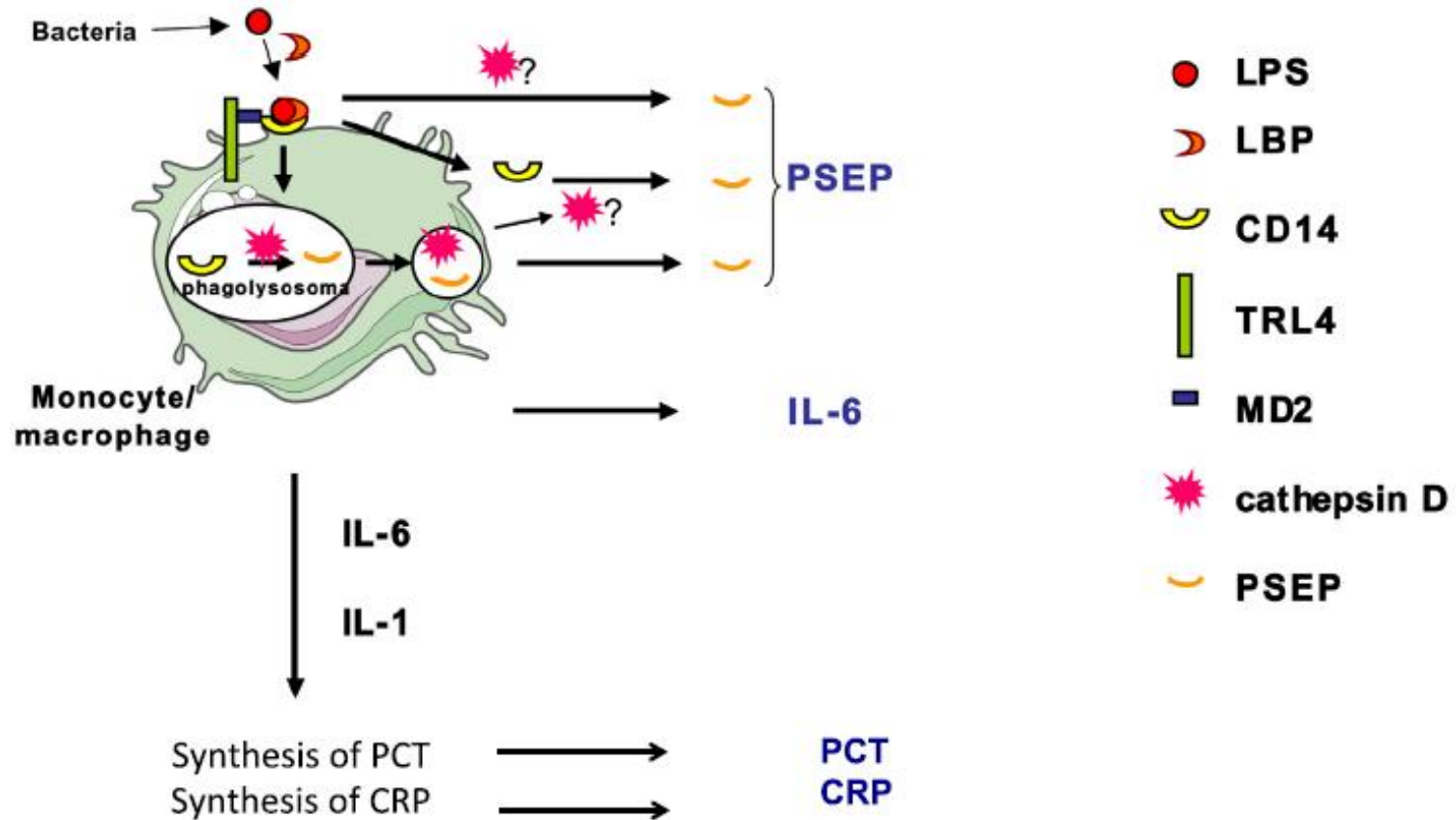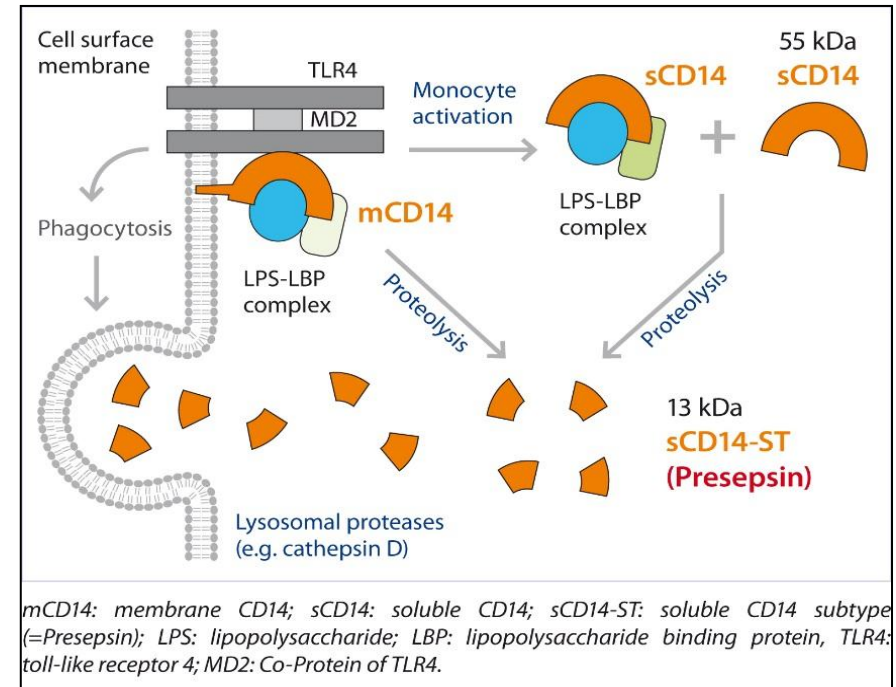
…. mechanism on cellular level……

Fig. 1. Schematic production of presepsin. TLR: Toll-like-receptor; LPS: lipopolysaccharides; LBP: LPS-binding protein; MD2: molecular dynamic-2; PSEP: presepsin.

Presepsin : molecular secretion model

- 13 kDA fragment of CD 14 (Macrophages, monocytes, neutrophils)

- Bacterial endotoxin (LPS) induces release from membrane and proteolytic cleavage

- Rises after 2 h with a peak at about 3h after onset of the infection and a decline after 4-8 hours.*

mCD14: membrane CD14; sCD14: soluble CD14; sCD14-ST: soluble CD14 subtype (=Presepsin); LPS: lipopolysaccharide; LBP: lipopolysaccharide binding protein, TLR4: toll-like receptor 4; MD2: Co-Protein of TLR4.

	CRP	PCT	PRESEPIN
First increase after induction	>12h	6-8h	2h
Peak reached after	20- 72h	6h	3h

*Zou Q, et al. Presepsin as a novel sepsis biomarker. World J Emerg Med. 2014;5:16-9,

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Kinetic of biomarker in a patient developing sepsis

Biomarker level of a burn patient
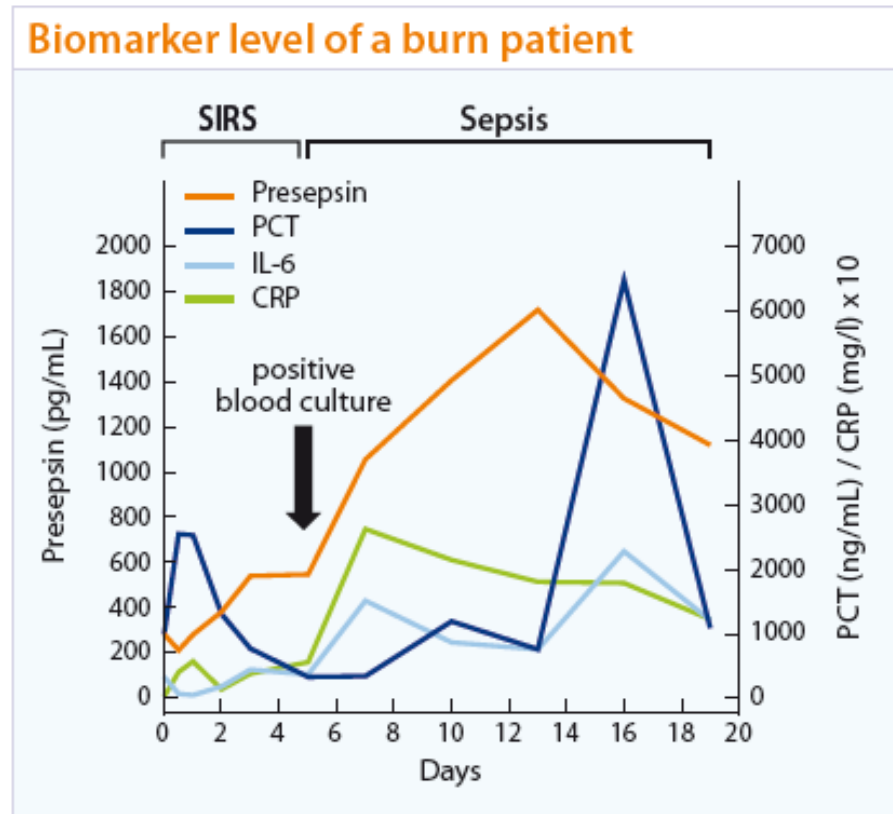
Shozushima et al, 2011 (23)

Update Presepsin in septic patients: Publications

PubMed (Nov 2016) :   **93 scientific articles**

                                         6 reviews

                                         4 meta analysis

Outcome of   **meta analysis** :

-        heterogenity in study set up (ICU,ER)
-        majority of studies performed in Asia
-        different cut off values used

high sensitivity & specificity(AUC up to 0.89) found

Accuracy of Presepsin in Sepsis Diagnosis: A Systematic Review and Meta-Analysis

Jiayuan Wu[1]*, Liren Hu[2], Gaohua Zhang[2], Fenping Wu[3], Taiping He[4]*

Table 6. The pooled AUC and 95% CI after omitting each trial in the meta-analysis (The results of sensitivity analysis).

Study	AUC	95% CI
Behnes M (2014)	0.89	0.83–0.95
Kweon OJ (2014)	0.89	0.83–0.95
Sargentini V (2014)	0.90	0.84–0.96
Su MH (2014)	0.88	0.84–0.92
Yu J (2014)	0.89	0.82–0.96
Liu B (2013)	0.89	0.81–0.97
Ulla M (2013)	0.89	0.87–0.91
Vodnik T (2013)	0.88	0.84–0.92
Shozushima T (2011)[a]	0.90	0.84–0.96
Shozushima T (2011)[b]	0.89	0.83–0.95

[a] Results of first of two trials in this article
[b] Results of second of two trials in this article
AUC: the area under the summary receiver operating characteristic curve; CI: confidence interval.

N = 10 publications

Invited critical review

Presepsin (sCD14-ST), an innate immune response marker in sepsis

Camille Chenevier-Gobeaux [a,*], Didier Borderie [a,b], Nicolas Weiss [c],
Thomas Mallet-Coste [c], Yann-Erick Claessens [c]

Review from France

Population	No.	Presepsin (pg/mL)	Author [ref.]
Healthy volunteers			
	119	Range 60–365, med 160	Manufacturer's data
	20	Mean 123 (SD 67.6)	Okamura et al. [7]
	75	Mean 21.8[a] (SD 8.45)	Yaegashi et al. [22]
	22	Mean 294.2 (SD 121.4)	Shozushima et al. [25]
	47	Mean 200 [IQR 149–275]	Claessens et al. [26]
	100	Mean 130 (25th–75th perc. 104–179)	Liu et al. [27]
	54	Med 202 [IQR 167–266]	Chenevier-Gobeaux et al. [28]
	60	Med 216 (IQR 146–350)	Behnes et al. [29]
	25	Mean 92.74 (SD 21.43)	Kweon et al. [30]
Patients without SIRS			
Total	144	Med 442 [IQR 337–562]	Chenevier-Gobeaux et al. [28]
<70 yrs	22	Med 300 [IQR 201–457]	
>70 yrs	122	Med 470 [IQR 380–601]	
Preterm neonates	26	Mean 643, med 578	Mussap et al. [31]
Preterm females	60	Med 454 (IQR 262–569.5)	Malickova et al. [32]
Patients with SIRS			
	80	Mean 81.3[a] (SD 49,5)	Yaegashi et al. [22]
	41	Mean 333.5 (SD 130.6)	Shozushima et al. [25]
	179	Mean 212 (IQR 143–300)	Liu et al. [27]
	9	Med 393 (IQR 249–745)	Behnes et al. [29]
	20	Mean 421.83 (SD 338.21)	Kweon et al. [30]
	83	Mean 2516.4 (95% CI 1360.3–3672.4)	Ulla et al. [33]
	39	Mean 503 (SD 464)	Ishikura et al. [34]
	189	Mean 606 (SD 494)	Romualdo et al. [35]
Burn	11	Med 332 (2.5–95.5 perc. 64–1523)	Cakır Madenci et al. [36]

N= 21 publications reviewed

- **Cut off for healthy people < 300**
- **SIRS patients range : 300-600**
- **Neonates range > 600**

- **high specificity shown**

- **combination with other biomarker & clinical scores recommended**

Presepsin clinical scores & biomarkers in ER

21st International Congress of Clinical Chemistry and Laboratory Medicine, IFCC-WorldLab – EuroMedLab, Berlin, 15 -19 May 2011

Diagnostic and prognostic value of presepsin (soluble CD14 subtype) in emergency patients with early sepsis using the new assay PATHFAST Presepsin

E. Spanuth[1], H. Ebelt[2], B. Ivandic[1] and K. Werdan[2]

[1]DIAneering – Diagnostics Engineering & Research GmbH, Heidelberg, Germany
[2]Department of Medicine III, University Clinics Halle (Saale), Martin-Luther-University Halle-Wittenberg, Germany

146 patients with sepsis in ER tested with Presepsin ad admission, 24 h, 72 h

Biomarker PCT, CRP, IL-6 measured simultaneaously and

Clinical scores (APACHE,GCS,MEDS,SOFA) evaluated for severity of disease

Tab. 2: Biomarkers and clinical scores at admission to the ER

|	Low grade sepsis N=91		Severe sepsis N=55		
	Mean	95% CI	Median	95% CI	P-value*
IL-6, pg/ml	125	80 - 213	265	113 - 790	0.0123
CRP, mg/dl	148.3	93.7 - 190.4	195.7	125.1 - 260.8	0.0315
PCT, ng/ml	1.44	0.66 - 2.24	3.05	1.74 - 8.47	0.0065
Presepsin, pg/ml	782	559 - 932	1407	989 – 1868	<0.0001
APACHE II	14	11 - 17	23	20 – 27	<0.0001
GCS	15	15 - 15	14	11.0 - 14.5	<0.0001
MEDS	8	6 - 9	11	9.5 - 14.5	<0.0001
SOFA	4	3 - 5	6	5 – 8	0.0005

Presepsin clinical scores & prognosis in ER

Tab. 3: Presepsin decision thresholds
based on presepsin determination at admission to the emergency department in patients with low grade sepsis (n=85), severe sepsis (N=40), septic shock (n=15), and 30-day death (n=23)

Risk stratification	Very low	Low	Moderate	High	Very high
Presepsin (ng/L)	< 200	200-300	300-500	500-1000	≥ 1000
Low grade sepsis, n (%)	3 (3.5)	9 (10.6)	18 (21.1)	29 (34.1)	26 (30.6)
Severe sepsis ,n (%)	0	0	5 (12.5)	11 (27.5)	24 (60.0)
Septic shock, n (%)	0	0	0	4 (26.7)	11 (73.3)
30-day death, n (%)	0	0	0	5 (21.7)	18 (78.3)

Tab. 5: Improved risk prediction by combining clinical scores and presepsin
c-statistic and Net Reclassification Index (NRI)

	AUC alone	AUC with presepsin	NRI
APACHE II	0.815	0.905	54.38%
GCS	0.763	0.931	76.91%
MEDS	0.819	0.936	62.67%
SOFA	0.747	0.917	55.75%
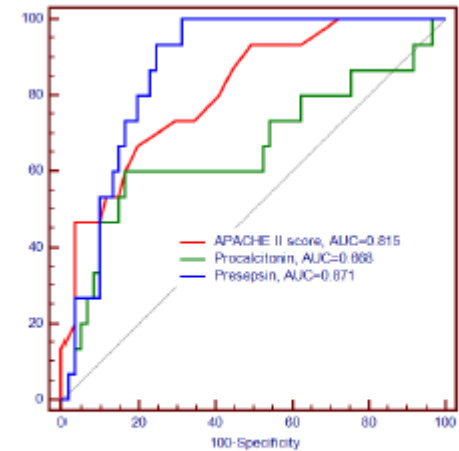
Fig. 2: ROC curves of presepsin, PCT and APACHE II score for predicting 30-day mortality

APACHE II : **A**cute **P**hysiology **A**ge and **C**hronic **H**ealth **E**valuation
GCS   :   **G**lasgow **C**oma **S**core
MEDS :   **M**ortality in **E**mergency **D**epartment **S**epsis
SOFA :   **S**equential **O**rgan **F**ailure **A**ssessment

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21st International Congress of Clinical Chemistry and Laboratory Medicine, IFCC-WorldLab – EuroMedLab, Berlin, 15 -19 May 2011

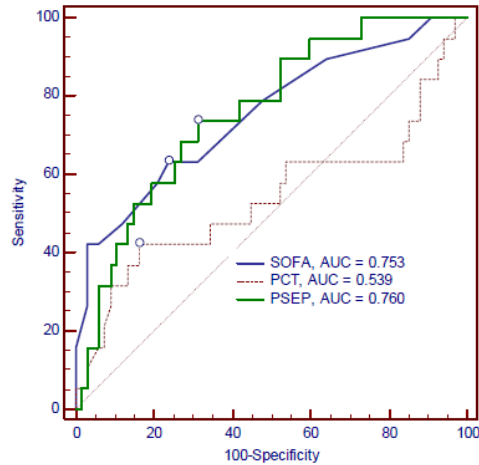# Presepsin and new qSOFA score in ER

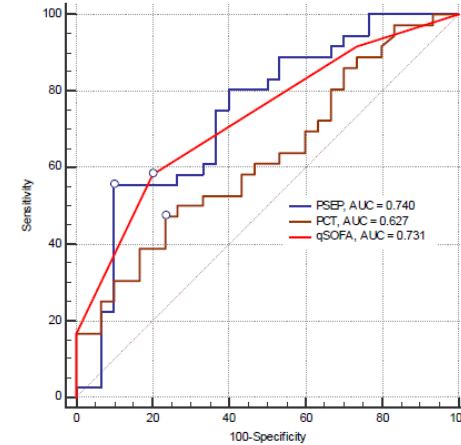Fig. 4: ROC curves for discrimination between survivors and non-survivors

Fig. 4: ROC curves of PSEP, PCT and qSOFA for discrimination between uncomplicated sepsis and severe sepsis/septic shock
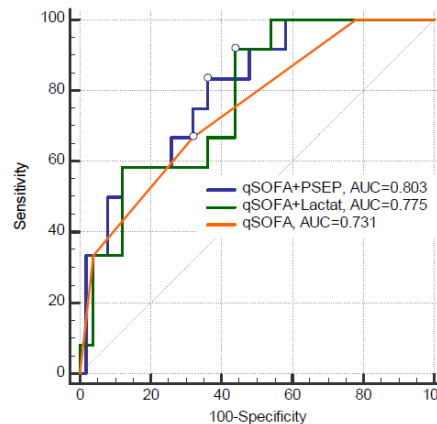

Fig. 6: Combination of qSOFA with PSEP or lactate for mortality prediction

qSOFA + Presepsin = AUC 0.803

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Presepsin vs PCT at monitoring & outcome in ER

Disease monitoring. All patients received antimicrobial therapy. In patients without occurrence of MAEs within 30 days after admission (N=104) the both marker levels decreased from baseline to 72 hours in the majority of the patients. In the patient group who experienced MAEs (N=36), both markers showed an increasing tendency. This effect was more pronounced for presepsin (Fig. 2).
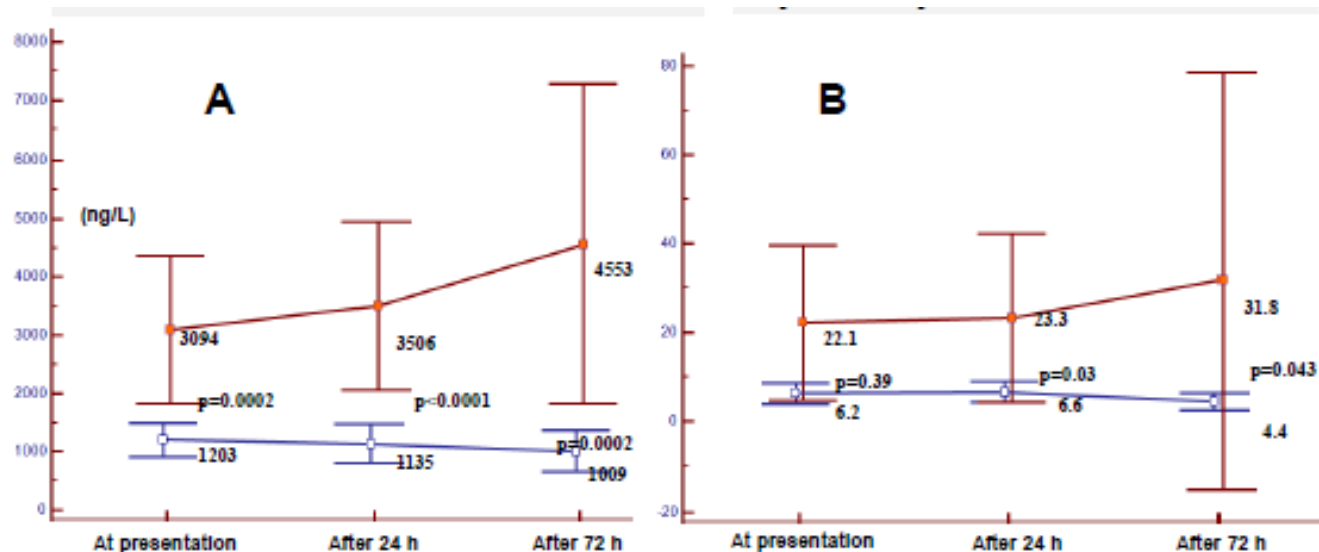

Fig. 2: Course of presepsin (A) and PCT (B) during microbial therapy in patients with worse outcome (red line, N=36) and favourable outcome (blue line, N=104) (mean values, error bars: 95% CI)

MITSUBISHI CHEMICAL EUROPE

PATHFAST®

SEVEN-DAY PROFILE PUBLICATION

Data from Italy

Albumin Italian Outcome Sepsis (ALBIOS) trial in ICU

Serge Masson
Pietro Caironi
Caterina Fanizza
Ralf Thomae
Roberto Bernasconi
Andrea Noto
Roberto Oggioni
Giovanni Stefano Pasetti
Marilena Romero
Gianni Tognoni
Roberto Latini
Luciano Gattinoni

Circulating presepsin (soluble CD14 subtype) as a marker of host response in patients with severe sepsis or septic shock: data from the multicenter, randomized ALBIOS trial

997 patients enrolled in the ALBIOS biomarkers sub study in 40 Italian ICUs

3 blood samplings at days 1, 2, 7 after ICU admission for Presepsin testing

Evaluation of new biomarkers Presepsin for:

risk stratification , prognosis, monitoring of antibiotic therapy

Reference : Masson S, et al. Intensive Care Med 41:12-20, 2015

Albumin Italian Outcome Sepsis (ALBIOS) trial in ICU

Comparison of Presepsin and PCT for mortality prediction in ICU

	AUC (95% CI)	Optimal cutoff	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	LR +	LR −
ICU survival								
Presepsin								
Day 1	0.69 (0.58 to 0.79)	1631	66.7	74.0	71	70	2.56	0.45
Day 2	0.70 (0.59 to 0.87)	1718	69.4	73.5	72	71	2.62	0.42
Day 7	0.74 (0.64 to 0.84)	1606	72.0	70.0	71	71	2.40	0.40
Procalcitonin								
Day 1	0.56 (0.44 to 0.68)	14.27	60.4	58.0	58	60	1.44	0.68
Day 2	0.55 (0.44 to 0.67)	8.88	60.4	55.1	57	59	1.35	0.72
Day 7	0.64 (0.54 to 0.75)	1.51	56.0	74.0	68	63	2.15	0.59
SOFA score								
Day 1	0.69 (0.59 to 0.80)	9	65.3	68.8	68	66	2.09	0.50
Day 2	0.67 (0.56 to 0.78)	8	73.9	54.2	61	68	1.61	0.48
Day 7	0.75 (0.65 to 0.85)	7	59.6	83.0	78	67	3.50	0.49

Masson S, Latini R, Spanuth E, Thomae R, et al. Crit Care 2014;18:R6

Albumin Italian Outcome Sepsis (ALBIOS) trial in ICU

Comparison of Presepsin and PCT for mortality prediction in ICU

Presepsin

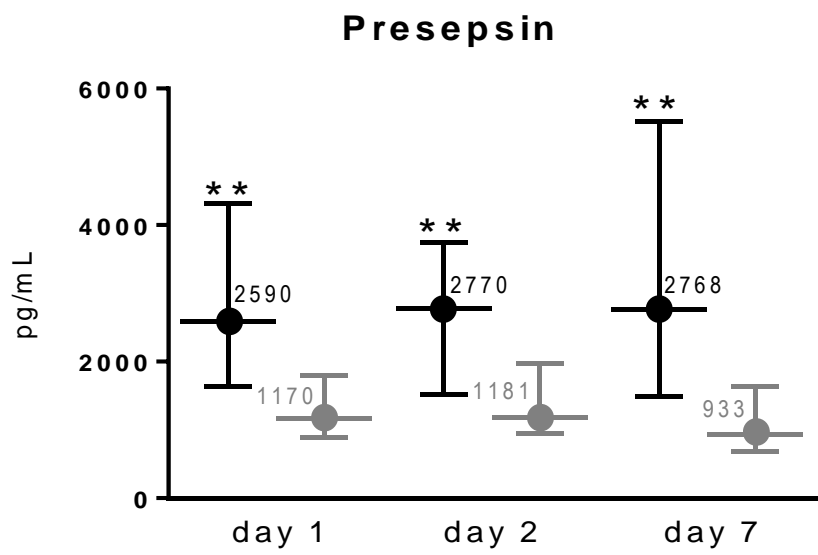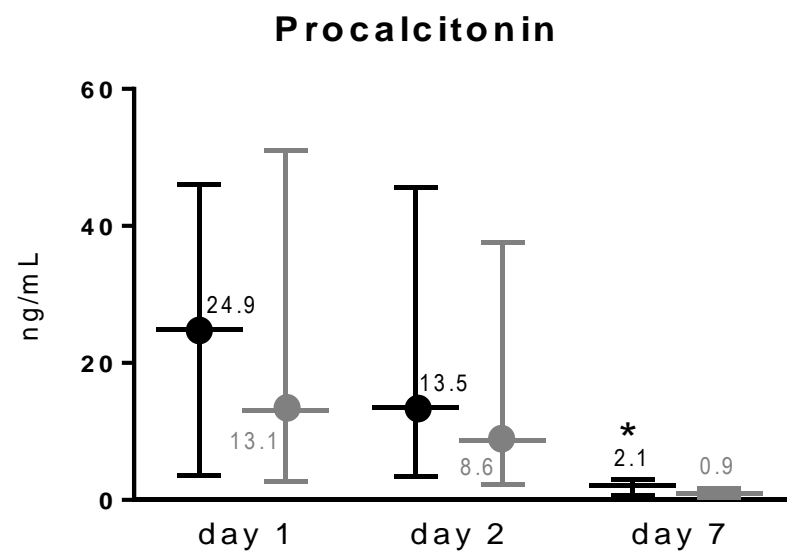Two-way ANOVA
Survival: p=0.004
Time: p=0.46
Interaction: p=0.04

Procalcitonin

Two-way ANOVA
Survival: p=0.31
Time: p<0.0001
Interaction: p=0.18

Masson S, Latini R, Spanuth E, Thomae R, et al. Crit Care 2014;18:R6
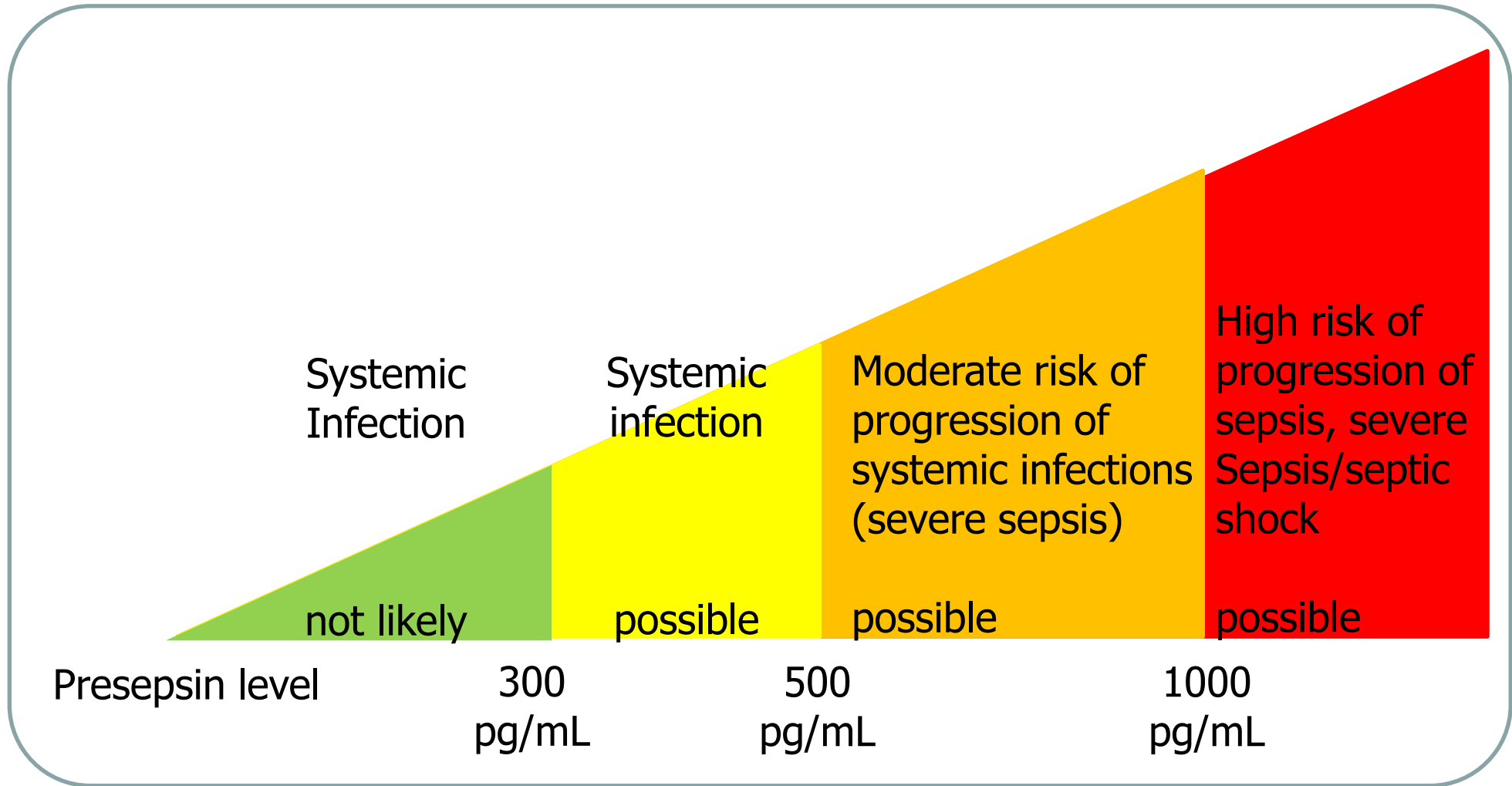
Albumin Italian Outcome Sepsis (ALBIOS) trial

Multicenter, open-label trial, 1818 patients with severe sepsis admitted to 100 intensive care units (ICUs)

Incidence of new organ failure based on increasing Presepsin levels
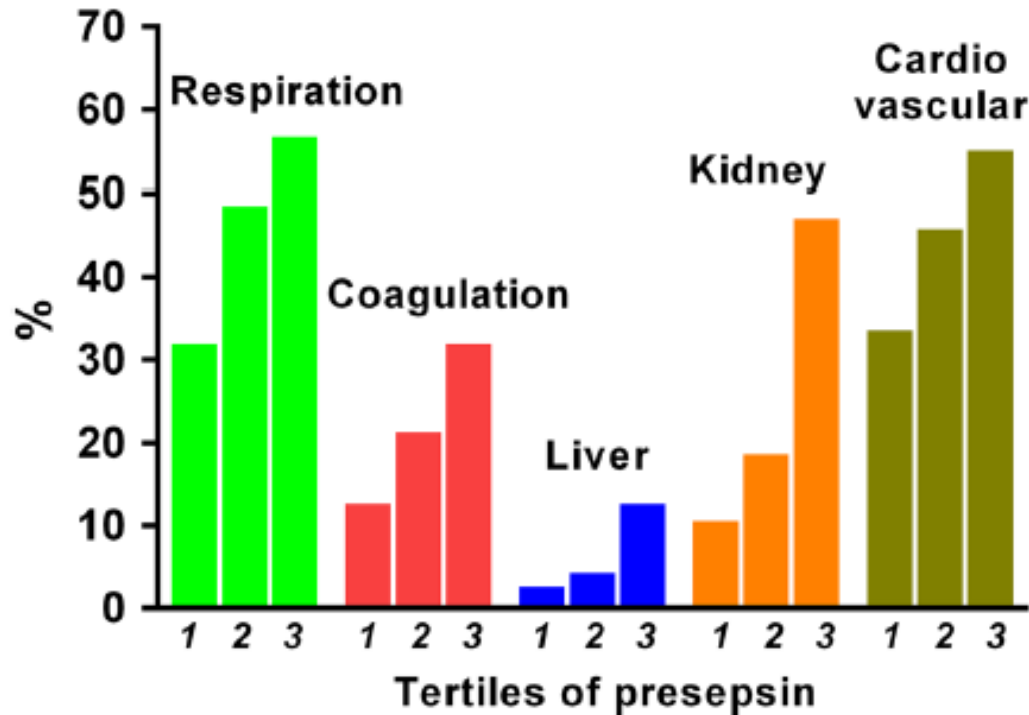
Fig. 1 Baseline presepsin concentration according to the incidence of new organ failures, defined as a change in each component during the study period to 3 or 4 from a value of 0, 1, or 2 at baseline. Number of patients with new organ-specific failures: respiration (238, 45.3 % of those without organ-specific failure at baseline), coagulation (186, 21.6 %), liver (57, 6.4 %), kidney (157, 21.8 %), cardiovascular (173, 44.1 %). Number of patients without prevalent organ failure by organ and by presepsin tertiles (all; tertile 1, tertile 2, tertile 3): respiration (525; 185, 167, 173), coagulation (862; 301, 291, 270), liver (896; 308, 303, 285), kidney (715; 294, 253, 168), cardiovascular (392; 163, 120, 109). $p < 0.0001$ across all categories by Chi square test, except for cardiovascular ($p = 0.006$)

Reference : Masson S, et al. Intensive Care Med 41:12-20, 2015

PATHFAST®

International threshold values for Presepsin

Systemic Infection

Systemic infection

Moderate risk of progression of systemic infections (severe sepsis)

High risk of progression of sepsis, severe Sepsis/septic shock

not likely

possible

possible

possible

Presepsin level

300 pg/mL

500 pg/mL

1000 pg/mL

RESEARCH　　　　　　　　　　　　　　　　　　**Open Access**

CrossMark
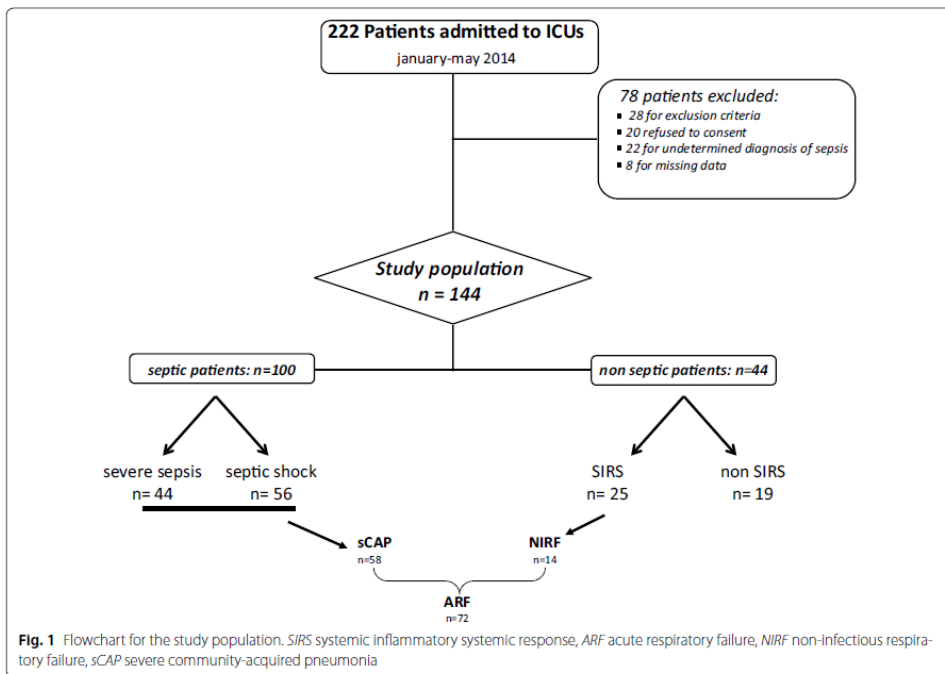
Diagnostic and prognostic value of soluble CD14 subtype (Presepsin) for sepsis and community-acquired pneumonia in ICU patients

Kada Klouche[1,2]*, Jean Paul Cristol[2,3], Julie Devin[3], Vincent Gilles[1], Nils Kuster[3], Romaric Larcher[1], Laurent Amigues[1], Philippe Corne[1], Olivier Jonquet[1] and Anne Marie Dupuy[3]

Fig. 1 Flowchart for the study population. *SIRS* systemic inflammatory systemic response, *ARF* acute respiratory failure, *NIRF* non-infectious respiratory failure, *sCAP* severe community-acquired pneumonia

Table 2 Causes of infection in the 100 septic patients

Causes of infection	n 100
Pneumonia	58
Intra-abdominal infection	11
Meningitidis	8
Urinary infection	6
Isolated bacteremia	5
Others	6
Unknown	6

Forty patients had a positive blood cultures at ICU admission

Table 4 Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of PCT and Presepsin and their combinations for severe sepsis and septic shock and for pneumonia diagnoses
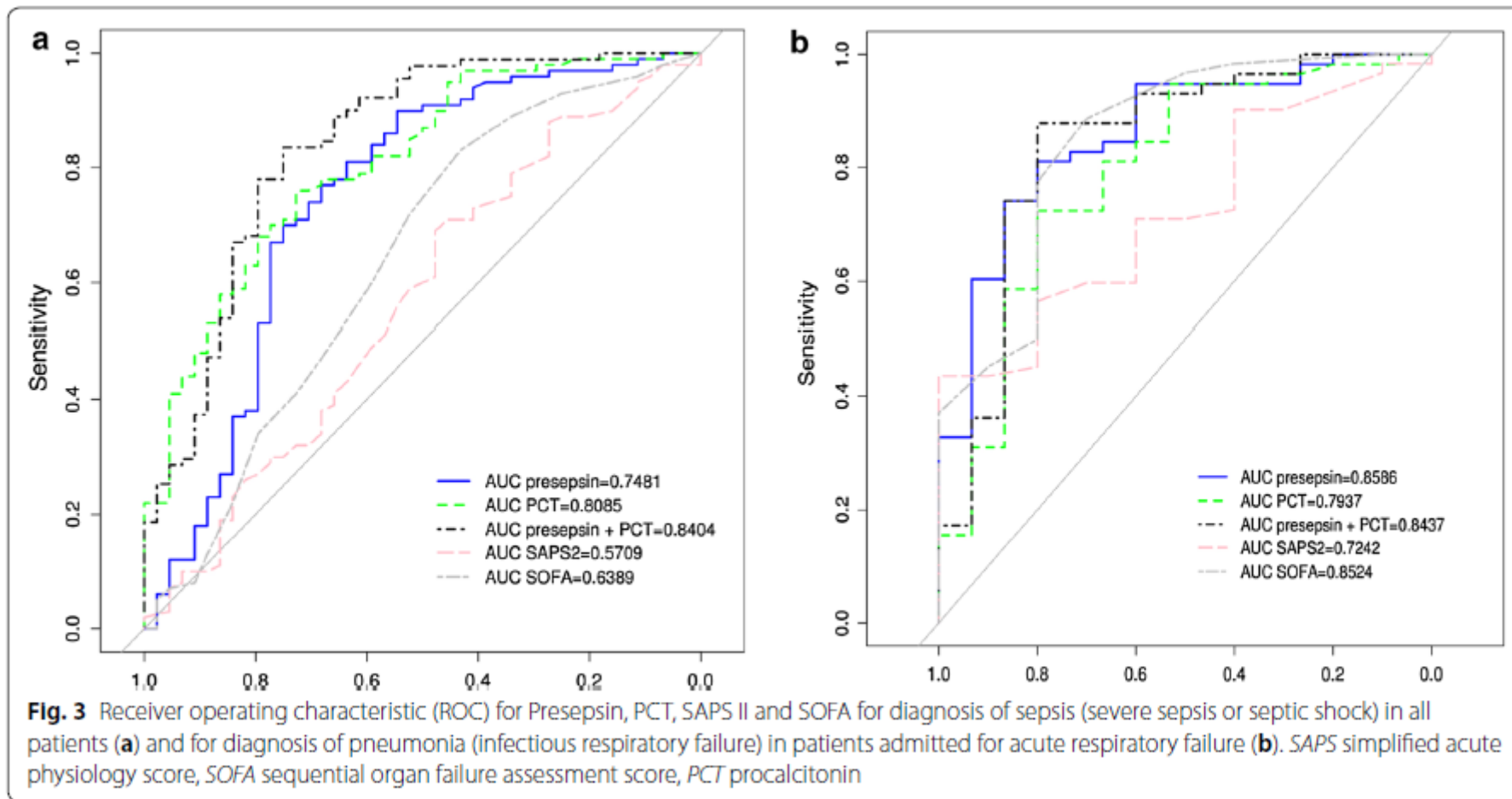
	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
SS and SSh				
PCT[a]	80	59	82	57
Presepsin[b]	90	55	82	71
PCT and Presepsin	75	68	85	55
Pneumonia				
PCT[a]	69	80	93	40
Presepsin[c]	81	80	94	52
PCT and Presepsin	62	93	97	62

SS severe sepsis, SSh septic shock, PPV positive predictive value, NPV negative predictive value

[a] Cutoff value for PCT at 0.5 ng/mL

[b] Cutoff value for Presepsin at 466 pg/mL

[c] Cutoff value for Presepsin at 588 pg/mL

Fig. 3 Receiver operating characteristic (ROC) for Presepsin, PCT, SAPS II and SOFA for diagnosis of sepsis (severe sepsis or septic shock) in all patients (**a**) and for diagnosis of pneumonia (infectious respiratory failure) in patients admitted for acute respiratory failure (**b**). *SAPS* simplified acute physiology score, *SOFA* sequential organ failure assessment score, *PCT* procalcitonin

Klouche *et al. Ann. Intensive Care (2016) 6:59*

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PLOS ONE

RESEARCH ARTICLE

Clinical Impact of Kidney Function on Presepsin Levels

Takanobu Nagata[1], Yoshinari Yasuda[1], Masahiko Ando[2], Tomoko Abe[1], Takayuki Katsuno[1], Sawako Kato[1], Naotake Tsuboi[1], Seiichi Matsuo[1], Shoichi Maruyama[1] *

1 Department of Nephrology, Nagoya University Graduate School of Medicine, Nagoya, Japan, 2 Center for Advanced Medicine and Clinical Research, Nagoya University Hospital, Nagoya, Japan

Conclusion

Presepsin levels were markedly high in patients receiving HD, similar to values seen in patients with severe sepsis or septic shock. In patients who were not receiving HD, presepsin levels increased as GFR decreased. Thus, the evaluation of presepsin levels in patients with chronic kidney disease requires further consideration, and a different cutoff value is needed for diagnosing sepsis in such patients.

Albumin Italian Outcome Sepsis (ALBIOS) trial

Clinical impact of Kidney function on Presepsin level
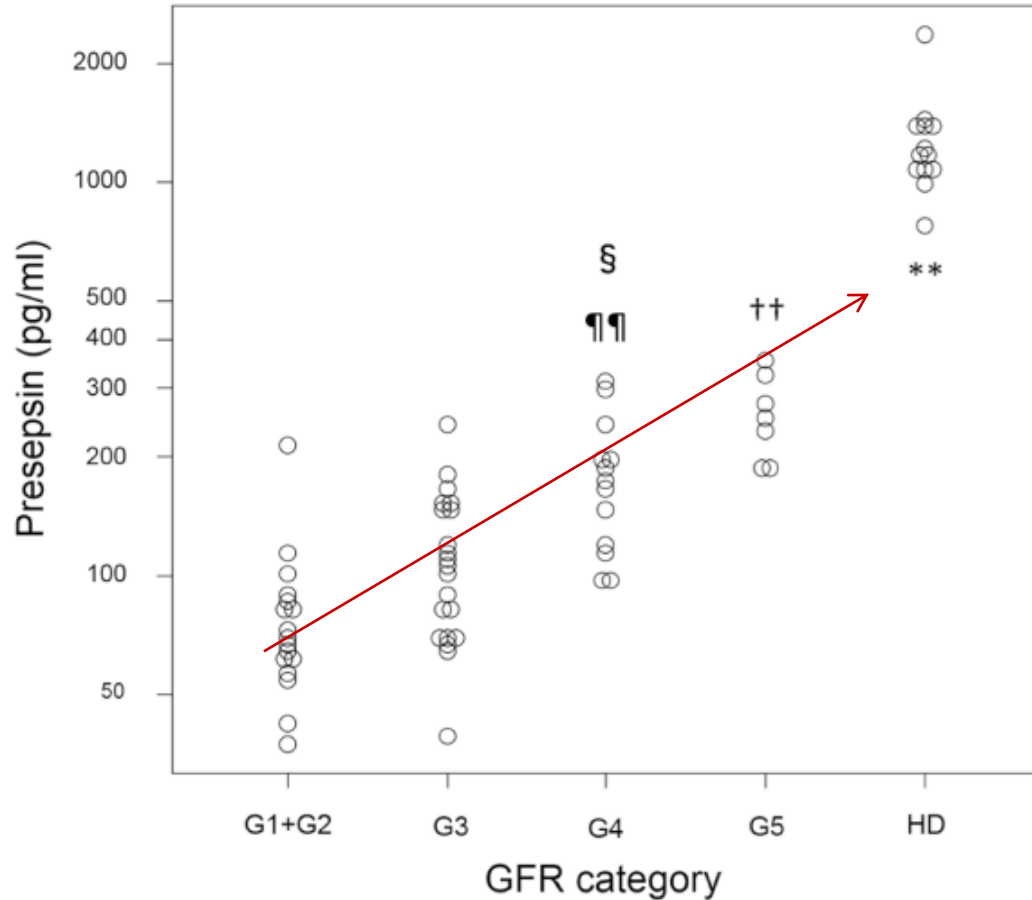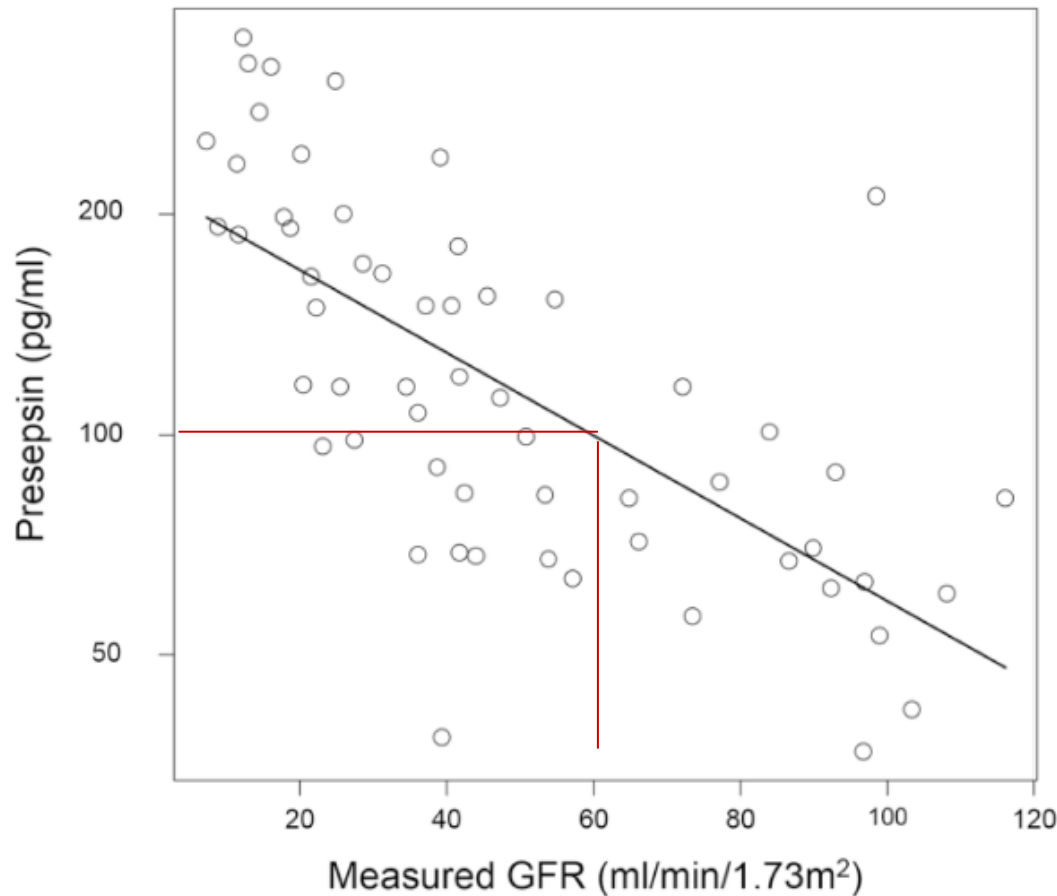
Data from Japan

N = 71 patients

Fig 1. Dot plot of presepsin values of patients in the different GFR categories or of patients receiving HD. G1: GFR ≥ 90 ml/min/1.73m², G2: GFR = 60 to 90 ml/min/1.73m², G3: GFR = 30 to 60 ml/min/1.73m², G4: GFR = 15 to 30 ml/min/1.73m², G5: GFR ≤ 15 ml/min/1.73m², HD: hemodialysis. **P <0.01 compared to any other GFR category. ††P <0.01 compared to G3 and G2+G1. ¶¶P <0.01 compared to G1+G2. §P <0.05 compared to G3.

Albumin Italian Outcome Sepsis (ALBIOS) trial

Clinical impact of Kidney function on Presepsin level

Data from Japan

Fig 2. Correlation between the log-transformed presepsin values and measured GFR in patients not receiving hemodialysis. N = 58, Pearson's correlation coefficient = -0.687, 95% CI = -0.803 to -0.521, P <0.001.

Cut off level for kidney injury patients factor 2 higher ?

Clinical impact of Kidney function on Presepsin level

Data from Japan

Diagnostic accuracy of procalcitonin and presepsin for infectious disease

in patients with acute kidney injury
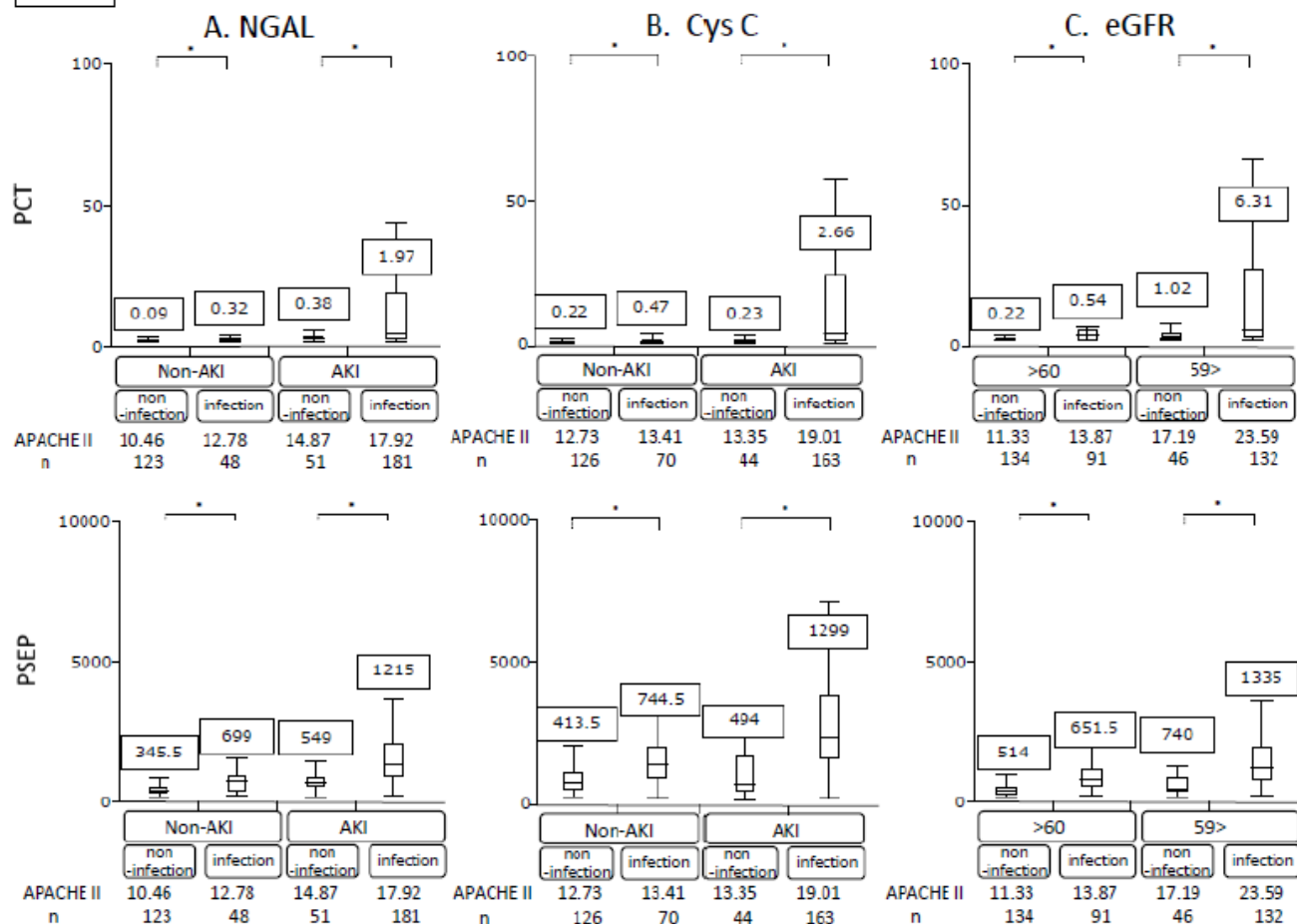
Gaku Takahashi [1,*], Shigehiro Shibata [1], Yasuo Fukui [2], Yoshikazu Okamura [3], Yoshihiro

Inoue [1]

Serial measurements PCT &Presepsin& NGAL & CysC& GFR at day 0,1,3,7

Fig. 1

Diagnostic Microbiology & Infectious Disease

91 patients

Clinical impact of Kidney function on Presepsin level

Data from Japan

Table 2 Cut-off values of PCT and PSEP for diagnosing sepsis in non-AKI and AKI patients

			AUC	Cut-off	Sensitivity	Specificity	Youden index
NGAL	Non-AKI	PCT	0.67	0.85 ng/ml	0.68	0.58	0.21
		PSEP	0.75	694 pg/m	0.69	0.81	0.45
	AKI	PCT	0.72	2.01 ng/m	0.57	0.81	0.25
		PSEP	0.83*	828 pg/m	0.81	0.71	0.45
CysC	Non-AKI	PCT	0.67	0.85 ng/m	0.42	0.83	0.47
		PSEP	0.77**	684 pg/m	0.63	0.88	0.48
	AKI	PCT	0.82	0.94 ng/m	0.69	0.79	0.30
		PSEP	0.85	891 pg/m	0.83	0.69	0.49
eGFR	Non-AKI	PCT	0.69	0.86 ng/m	0.45	0.85	0.49
		PSEP	0.79*	694 pg/m	0.66	0.87	0.50
	AKI	PCT	0.81	1.14 ng/m	0.69	0.79	0.34
		PSEP	0.84	891 pg/m	0.86	0.62	0.45

AUC, area under curve. * $p < 0.05$ vs PCT, ** $p < 0.01$ vs PCT

Preliminary cut-off data for neonatal sepsis from literature

Cut-off or reference values (mean) in pg/ml	Cases	AUC/ROC	Reference
650 ± 258	487 healthy newborns		Pugni et a.
722 ± 338	168 preterm newborns without clinical signs of sepsis		
562	21 healthy newborns	0.972	Poggi et al
	19 cases with LOS		
781	64 healthy neonates	0.97 (day 1)	AbdElaziz H.
	122 infected neonates	0.98 (day 2) 0.98 (day 3)	
643 ± 304	26 healthy preterms		Mussap et al.
556±158	18 newborns with risk factors but sepsis had been ruled out		Kwiatkowska-Gruca et al

Currently recommeded cut-off/ decision values:

Healthy neonates: < 600 pg/ml

Septic neonates: > 800 pg/ml

IFCC – EFLM EuroMedLab 2015, Paris, FR, Jun 21 – Jun 25 2015

Monitoring of Weaning from Mechanical Ventilation in Critical ILL Patients by PATHFAST Presepsin in the Intensive Care Unit

E. Spanuth[1], R. Thomae[3], E. Giannitsis[2]

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M 361

120 ICU patients, non surgical acute disease

4 x PSEP testing at intubation, before weaning, after extubation, after discharge

Tab. 1: Presepsin values in survivors and non-survivors

Presepsin, pg/ml	Survivors, n= 82	Non-survivors, 38
Lowest value,	229	234
Highest value	5111	17698
Median (95% CI)	1096 (862 - 1269)	1609 (1115 - 1985)
IQR	714 - 1853	819 - 3196
		p=0.0454

Tab. 2: Presepsin values in sepsis and non-sepsis

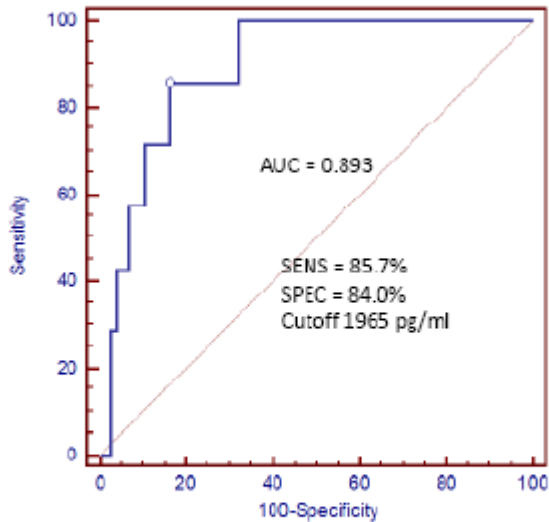| Presepsin, pg/ml	Non-sepsis, n= 104	Sepsis, n=16
Lowest value,	229	234
Highest value	5179	17698
Median (95% CI)	1099 (886 - 263)	3185 (1734 - 3904)
IQR	715 - 1705	1727 - 3905
		p=0.0004

120 ICU patients, non surgical acute disease

Fig. 1: ROC curve of presepsin for discrimination between sepsis and non sepsis at time point after intubation

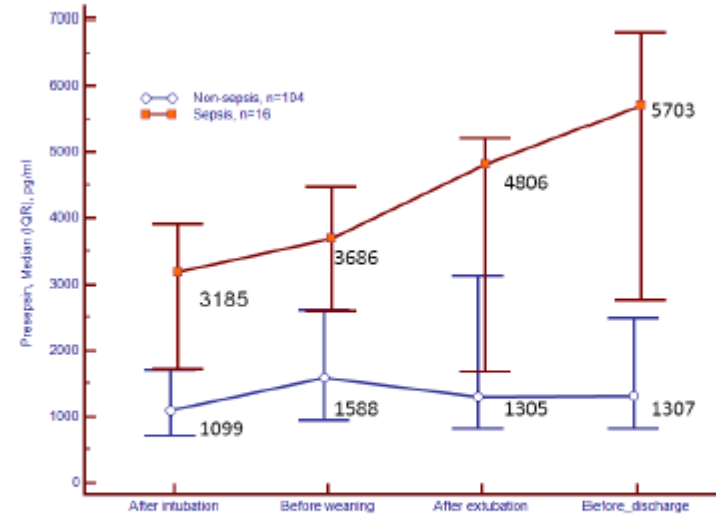ROC curve labels: Sensitivity vs 100-Specificity; AUC = 0.893; SENS = 85.7%; SPEC = 84.0%; Cutoff 1965 pg/ml

Fig. 2: Course of presepsin concentration during weaning from MV in sepsis and non-sepsis

Legend: Non-sepsis, n=104; Sepsis, n=16. Values: Sepsis: 3185, 3686, 4806, 5703; Non-sepsis: 1099, 1588, 1305, 1307. Time points: After intubation, Before weaning, After extubation, Before_discharge.

Conclusion

Weaning success is lower in patients with sepsis. We showed that development of sepsis during weaning from MV was associated with a higher mortality risk. Therefore it is important to identify those patients early. The new sepsis biomarker presepsin distingished patients who develop sepsis and those who do not during weaning with high diagnostic accuracy. The PATHFAST Presepsin assay allows the determination within 17 min from whole blood. Therefore this assay might be useful to monitor weaning from MV at the point-of-care in the ICU.

Ongoing Presepsin clinical studies

Country	Hospital site	# Patients	Expected Outcome
Germany,	Homburg	500	Risk assessment pre/post-surgery patients with abdominal surgery
Germany,	Bad Nauheim	750	Pre surgery risk assessment for TAVI patients
Romania,	Bukarest 7 hospitals	420	Diagnostic validity for prognosis of sepsis & septic shock
Russia	3 hospitals Moscov, Nizhny Novgerod	50-150	pancreatitis, cardiac surgery pediatrics ,infections pediatrics
Colombia,	10 hospitals, Bogota	500	Prospective study of PSEP in routine

PATHFAST ™: Analytes for POC use

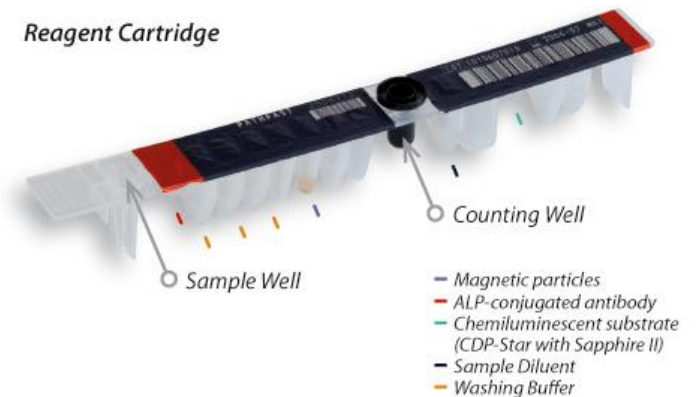## Simultaneous testing with whole blood

- **D-Dimer**
- **Trop I**
- CKMB
- Myoglobine
- **NTproBNP**
- **hsCRP**
- Presepsin

…. more assays comming

Reagent Cartridge

Counting Well

Sample Well

- Magnetic particles
- ALP-conjugated antibody
- Chemiluminescent substrate (CDP-Star with Sapphire II)
- Sample Diluent
- Washing Buffer

## Conclusion from published clinical studies

Presepsin allowed diagnostic differentiation between SIRS and sepsis as well as between sepsis severity grades, prediction of outcome and risk of mortality - already at the time of admission in ER and ICU

The simultaneous assessment of Presepsin and medical scores improved discrimination of severity degrees as well as mortality and outcome prediction

Cut off values are reproducable and published
Cut off reference values for neonates are higher than children & adults
Cut off values for kidney injury patients are higher
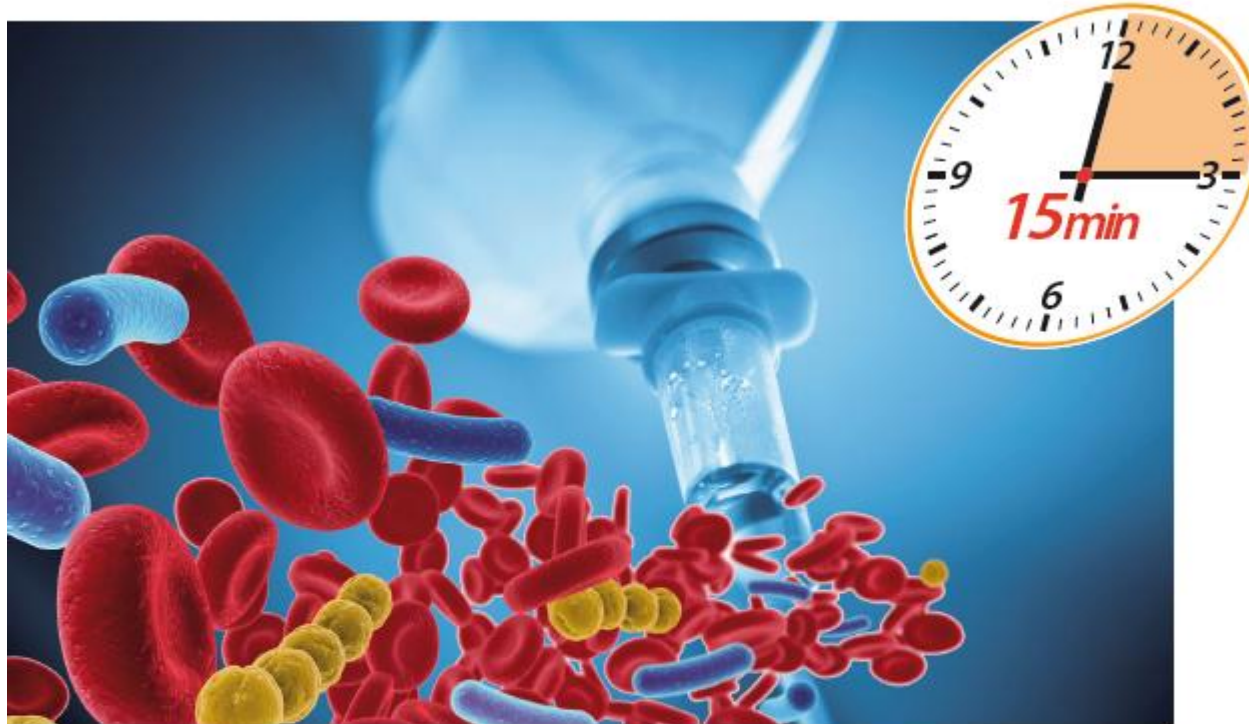
TIME IS SURVIVAL

PRESEPSIN: The Sepsis Biomarker
A short monograph