

**LETTER**

# Concomitant assessment of PSP and NT-proCNP as predictive markers of sepsis in severe trauma patients under mechanical ventilation

Aurélie Gouel-Chéron<sup>\*1,2</sup>, Maryline Dupin<sup>3</sup>, Marine Chantepedrix<sup>3</sup>, Isabelle Chaillol<sup>4</sup>, Fabienne Venet<sup>2,5</sup>, Alexandre Pachot<sup>3</sup>, Guillaume Monneret<sup>2,5</sup>, Bernard Floccard<sup>1</sup> and Bernard Allaouchiche<sup>1,2</sup>

In intensive care units (ICUs), a great deal of research is devoted to finding new biomarkers to help physicians in the prediction of outcome. The pancreatic stone protein/regenerating protein (PSP) [1,2] and the amino terminal pro-C-type-natriuretic-peptide (NT-proCNP) [3] were assessed as markers of sepsis in patients with moderate trauma and as prognostic markers of mortality for PSP [4]. The objective of this study was to analyze separately the roles of these two biomarkers in the prediction of sepsis in patients with severe trauma.

This retrospective observational study was conducted over the course of 24 months in a trauma ICU at a university hospital. Trauma patients who were under mechanical ventilation, had an Injury Severity Score of at least 25, and were at least 18 years old were included. Clinical exclusion criteria were aspiration pneumonia or gut perforation during trauma, immunosuppressive therapy, and death in the first 48 hours. Our institutional ethics committee ('Comité de Protection des Personnes') waived the need for signed consent as samples were obtained on residual blood after routine follow-up. They recommended delivering oral information about the study to the patient or their family.

Blood samples were collected at 8 a.m. on the first two days after injury. Every patient who had a frozen plasma sample available was retrospectively included. Plasma levels of PSP and NT-proCNP were measured by using the enzyme-linked immunosorbent assay (ELISA) technique.

Sixty-one patients were included, and 36% developed pneumonia (median delay of 4 days). At days 1 to 2, neither PSP nor NT-proCNP concentrations were significantly different between sepsis and non-sepsis groups

(Figure 1), even after stratification of clinical data (transfusion, neurological trauma). The area under the receiver operating characteristic curve (AUC) was not significantly different from 0.5 for PSP and NT-proCNP (0.54 ( $P = 0.34$ ) and 0.61 ( $P = 0.12$ ), respectively), although the power for a target AUC of 0.8 was 0.97. There was a weak correlation between PSP at days 1 to 2 and SOFA (Sepsis-related Organ Failure Assessment) score at days 1 to 2 (Spearman test,  $r = 0.34$ ,  $P = 0.04$ ).

Although the diagnosis criteria of sepsis, the mean delay of infection, and the incidence of sepsis might be slightly different, these results are different from those previously published [1,3].

The major limitations are that the study was conducted at only one center and only 61 patients participated. However, the homogenous severity of our patients has to be noticed.

Many studies are devoted to finding new biomarkers to predict sepsis in the ICU. In this pilot study, neither PSP nor NT-proCNP could help in the prediction of sepsis in patients with severe trauma. Our study illustrates the complexity of validating biomarkers for sepsis prediction in an independent cohort of patients. Validation cohorts should be designed in multicenter studies to confirm every result, whether positive or negative.

#### Abbreviations

AUC, area under the receiver operating characteristic curve; ICU, intensive care unit; NT-proCNP, amino terminal pro-C-type natriuretic peptide; PSP, pancreatic stone protein/regenerating protein.

#### Competing interests

The authors declare that they have no competing interests.

#### Acknowledgments

The authors would like to thank Anne Portier and Catherine Jouvène-Faure for technical assistance. This work was supported by funds from the Hospices Civils de Lyon. This project is part of Advanced Diagnostics for New Therapeutic Approaches, a program dedicated to personalized medicine, coordinated by Mérieux Alliance (Lyon, France).

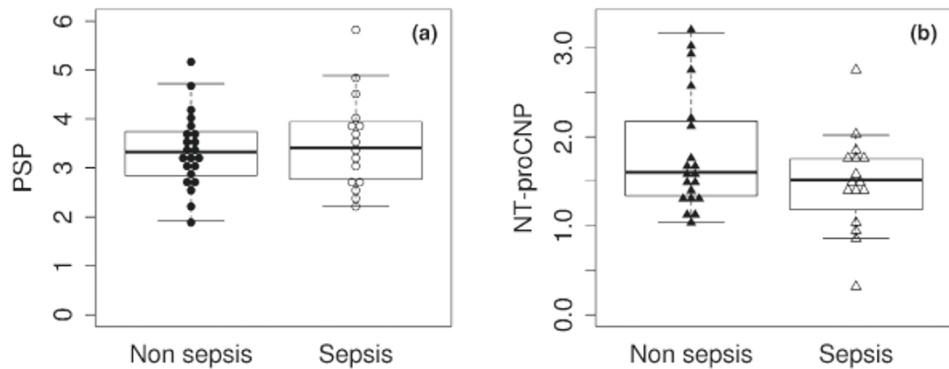
#### Author details

<sup>1</sup>Service de réanimation, Hôpital Edouard Herriot - Hospices Civils de Lyon, 5 place d'Arsonval, 69003 Lyon, France. <sup>2</sup>EA 4174, Hémostase, Inflammation et Sepsis, Hospices Civils de Lyon - Université Claude Bernard Lyon1, 7-11 Rue

\*Correspondence: aurelie.gouel@bch.aphp.fr

<sup>1</sup>Service de réanimation, Hôpital Edouard Herriot - Hospices Civils de Lyon, 5 place d'Arsonval, 69003 Lyon, France

Full list of author information is available at the end of the article



**Figure 1. Logarithm of PSP (a) and NT-proCNP (b) concentrations on days 1 and 2.** Neither PSP nor NT-proCNP doses were significantly different between groups on days 1 and 2. NT-proCNP, amino terminal pro-C-type natriuretic peptide; PSP, pancreatic stone protein/regenerating protein.

Guillaume Paradin, 69372 Lyon Cedex 08 France. <sup>3</sup>Laboratoire Commun de Recherche HCL-Biomérieux, Hôpital Édouard Herriot - Hospices Civils de Lyon, 5 place d'Arsonval, 69003 Lyon, France. <sup>4</sup>BioMérieux, Data and Knowledge Laboratory, 376 Chemin de l'Orme, 69280 Marcy-l'Étoile, France. <sup>5</sup>Laboratoire d'immunologie cellulaire, Hôpital Édouard Herriot - Hospices Civils de Lyon, 5 place d'Arsonval, 69003 Lyon, France.

Published: 23 May 2013

#### References

1. Keel M, Harter L, Reding T, Sun LK, Hersberger M, Seifert B, Bimmler D, Graf R: **Pancreatic stone protein is highly increased during posttraumatic sepsis and activates neutrophil granulocytes.** *Crit Care Med* 2009, **37**:1642-1648.
2. Llewelyn MJ, Berger M, Gregory M, Ramaiah R, Taylor AL, Curdt I, Lajaunias F, Graf R, Blincko SJ, Drage S, Cohen J: **Sepsis biomarkers in unselected**

**patients on admission to intensive or high-dependency care.** *Crit Care* 2013, **17**:R60.

3. Bahrami S, Pelinka L, Khadem A, Maitzen S, Hawa G, van Griensven M, Redl H: **Circulating NT-proCNP predicts sepsis in multiple-traumatized patients without traumatic brain injury.** *Crit Care Med* 2010, **38**:161-166.
4. Boeck L, Graf R, Eggimann P, Pargger H, Raptis DA, Smyrniotis N, Thakkar N, Siegemund M, Rakic J, Tamm M, Stolz D: **Pancreatic stone protein: a marker of organ failure and outcome in ventilator-associated pneumonia.** *Chest* 2011, **140**:925-932.

doi:10.1186/cc12702

**Cite this article as:** Gouel-Chéron A, *et al.*: Concomitant assessment of PSP and NT-proCNP as predictive markers of sepsis in severe trauma patients under mechanical ventilation. *Critical Care* 2013, **17**:434.