

LETTER

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Continuous renal replacement therapy in critically ill patients does not affect urinary neutrophil gelatinase-associated lipocalin levels

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See related research by Schilder et al., <http://ccforum.com/content/18/2/R78>

In the present study, we assessed urinary neutrophil gelatinase-associated lipocalin (uNGAL) during 24-hour continuous renal replacement therapy (CRRT) in critically ill patients. The study was performed in accordance with the Declaration of Helsinki and was approved by the Scientific Council and the Ethics Committee of Evangelismos Hospital in Athens, Greece. Informed consent was provided by family members of the patients included in the study. Eighteen critically ill patients (13 men and five women with a mean age of 69 ± 14 years) in an interdisciplinary intensive care unit underwent continuous veno-venous hemodiafiltration (CVVHD). Three had oliguria (urine output of less than 200 mL per 12 hours). Patient characteristics at enrollment are shown in Table 1.

uNGAL was determined before CRRT onset and at 6 and 24 hours during CVVHD. uNGAL was measured by using a chemiluminescent assay with ARCHITECT technology (Abbott Diagnostics Inc., Abbott Park, IL, USA). For CVVHD, pump-driven machines - from Prisma (a brand of Gambro, Deerfield, IL, USA), Kimal (Dormagen, Germany), or Nephro-Tech (Shawnee, KS, USA) - were used with a 0.9 m² polysulfone filter. uNGAL levels did not change, whereas serum creatinine and serum cystatin C significantly decreased (Table 2). No correlation was found between uNGAL levels and the illness severity scores at inclusion.

In a study by Schilder and colleagues [1] in a previous issue of *Critical Care*, plasma NGAL (pNGAL) in critically ill patients was similarly not affected by RRT. No net removal of pNGAL was established, although absorption by the filter with concomitant production could not be

definitively excluded. Besides an insufficient clearance through the filter, other causes could be implicated for the remaining NGAL levels.

Whereas pNGAL can come from an extra-renal source (as in sepsis [2]), uNGAL may derive mostly from local synthesis in the kidney [3]. NGAL that has been synthesized in the kidney and can be detected in urine may not efficiently enter the systemic circulation to be cleared by the filter.

Table 1 Patient characteristics (n = 18)

Patient characteristic	Number (percentage) of patients unless noted otherwise
APACHE II score ^a	19.4 ± 7.5
SOFA score ^a	9.2 ± 2.9
SAPS ^a	69.5 ± 14.2
Reason for admission	
Trauma	1 (5.5%)
Post-operative	11 (61%)
Circulatory	4 (22%)
Respiratory	2 (11%)
SIRS	5 (28%)
Sepsis	4 (22%)
Septic shock	7 (39%)
RIFLE	
No	2 (11%)
Risk	5 (28%)
Injury	10 (55.5%)
Failure	1 (5.5%)
Diabetes	6 (33%)
Vasopressors	11 (61%)

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^aValues are expressed as mean ± standard deviation. APACHE II, Acute Physiology and Chronic Health Evaluation II; RIFLE, risk, injury, failure, loss, end-stage; SAPS, Simplified Acute Physiology Score; SIRS, Systemic Inflammatory Response Syndrome; SOFA, Sequential Organ Failure Assessment.

Table 2 Renal function biomarkers during continuous renal replacement therapy

	Before CRRT	At 6 hours	At 24 hours	P value
uNGAL, ng/mL	1,917 ± 1,911	1,675 ± 1,634	1,661 ± 1,633	0.23
sCr, mg/dL	2.8 ± 1.5	2.3 ± 0.9	1.9 ± 0.9	<0.0001
sCysC, mg/L	2.74 ± 0.8	1.97 ± 0.64	1.90 ± 0.8	<0.0001

CRRT, continuous renal replacement therapy; sCr, serum creatinine; sCysC, serum cystatin C; uNGAL, urinary neutrophil gelatinase-associated lipocalin.

Another possible explanation concerns the significance of NGAL function. It has been shown that NGAL has some physiological functions such as carrying out anti-microbial activity and a protective role in the kidney [4,5].

Substituting the function of the kidney with the artificial filter does not mean that the reasons leading to the increased levels of NGAL are eliminated (for example, sepsis or, specifically for the uNGAL, the kidney damage). So regardless of the possibility that the filter cleanses the factor, the production of NGAL might be purposely preserved to carry out its physiological role.

Abbreviations

CRRT: Continuous renal replacement therapy; CVHD: Continuous veno-venous hemodiafiltration; NGAL: Neutrophil gelatinase-associated lipocalin; pNGAL: Plasma neutrophil gelatinase-associated lipocalin; RRT: Renal replacement therapy; uNGAL: Urinary neutrophil gelatinase-associated lipocalin.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

IV drafted the manuscript. CP participated in the collection and analysis of the data, statistical analysis, and drafting of the manuscript. SN conceived and designed the study and revised the manuscript critically. All authors contributed substantially to the submitted work and read and approved the final manuscript.

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