

Does albumin resuscitation have a role in the early prevention of sepsis-associated acute kidney injury?

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Prolonged prerenal azotemia leads to acute tubular necrosis; thus, early intervention is critical. Accordingly, many investigators are attempting to identify biomarkers that allow detection of acute kidney injury (AKI) before a rise in serum creatinine concentration occurs. A recent study (Nickolas TL *et al.* [2008] *Ann Intern Med* 148: 810–819) compared the capability of several urinary biomarkers to detect acute tubular necrosis in patients who entered the emergency department with an increase in serum creatinine level. Neutrophil gelatinase-associated lipocalin (NGAL) performed best at detecting the condition; patients with acute tubular necrosis exhibited a significantly increased urinary NGAL level, but patients with prerenal azotemia or chronic kidney disease did not. By contrast, however, fractional sodium excretion—but not urinary NGAL concentration—distinguished prerenal azotemia from chronic kidney disease. Thus, measurement of both a urinary biomarker and fractional excretion of sodium was necessary to distinguish acute tubular necrosis, prerenal azotemia and chronic kidney disease from one another. This approach will be very important for facilitating intervention in sepsis-related AKI.

Sepsis-related AKI accounts for nearly 50% of all cases of AKI in the intensive care unit. Patients with sepsis typically require resuscitation, which can be performed with solutions of saline, albumin or artificial colloid. In contrast to artificial colloid, albumin is anti-inflammatory (Meziani F *et al.* [2007] *Am J Pathol* 171: 1753–1761) and has a long half-life (2–3 weeks). In addition, although artificial colloids are less expensive than albumin, the colloids have been shown to increase the incidence of AKI (Brunkhorst FM *et al.* [2008] *N Engl J Med* 358: 125–139).

...preliminary evidence [exists] that albumin might be more beneficial than saline for fluid resuscitation in patients with severe sepsis or septic shock...

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Competing interests

RW Schrier has declared associations with the following companies/organizations: Astellas and Otsuka. See the article online for full details of the relationships. S Bansal declared no competing interests.

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The randomized Saline versus Albumin Fluid Evaluation (SAFE) study (Finfer S *et al.* [2004] *N Engl J Med* 350: 2247–2256) indicated that survival of critically ill patients does not differ according to whether saline or albumin solution is used for resuscitation. However, in a sub-analysis of patients with severe sepsis, a better survival rate was observed with albumin solution. Moreover, in a small randomized trial of hypoalbuminemic patients (serum albumin level <30 g/l), resuscitation with albumin significantly improved organ dysfunction, as assessed by the sequential organ failure assessment score, compared with saline (Dubois MJ *et al.* [2006] *Crit Care Med* 34: 2536–2540).

The hyperdynamic circulation that develops in sepsis mimics that which occurs in advanced cirrhosis. The neurohumoral axis, including the sympathetic nervous system and the renin–angiotensin–aldosterone system, are activated in both conditions. In a study of patients with cirrhosis and subacute bacterial peritonitis, administration of albumin (1.5 g/kg immediately, then 1 g/kg at day 3) plus an antibiotic (cefotaxime) significantly suppressed plasma renin activity, reduced the incidence of AKI and improved survival compared with cefotaxime alone (Sort P *et al.* [1999] *N Engl J Med* 341: 403–409).

Given the preliminary evidence that albumin might be more beneficial than saline for fluid resuscitation in patients with severe sepsis or septic shock, we feel that a prospective randomized study comparing these two solutions should be conducted in such patients to examine any differences in the occurrence of AKI and mortality. Resuscitation should be performed early and should be accompanied by measurement of a urinary biomarker (e.g. NGAL) and of fractional sodium excretion.