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Letter to the Editor

NGAL, the New Marker for Acute Kidney Injury

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Dear Editor-in-Chief

The incidence of acute kidney injury (AKI), previously referred to as acute renal failure, has reached epidemic proportions worldwide, affecting about 7% of hospitalised patients (1). In the critical care setting, the prevalence of AKI requiring dialysis is about 6%, with a mortality rate exceeding 60% (1, 2). A significant increase in morbidity and mortality associated with AKI has been demonstrated in a wide variety of clinical situations, including exposure to radiocontrast dye, cardiopulmonary bypass, mechanical ventilation and sepsis (2). The early diagnosis of AKI currently depends on detection of reduced kidney function by the rise in serum creatinine concentration, which a delayed and unreliable measure in the acute is setting (2). In general, there are several non-renal factors influencing the serum creatinine concentration such as body weight, muscle mass, race, age, gender, total body volume, drugs, muscle metabolism and protein intake (3).

In the face of AKI, serum creatinine is an even poorer reflection of kidney function, because the subjects are not in steady state, and serum creatinine therefore lags far behind renal injury. Furthermore, significant chronic kidney disease can exist with minimal or no change in creatinine because of renal reserve and enhanced tubular secretion of creatinine (4).

NGAL is a novel biomarker for diagnosing acute kidney injury (AKI). The key advantage of NGAL is that it responds earlier than other renal status markers and has a proportionate response to injury (1-5).

Like many other endogenous biomarker molecules, it is not produced by just one cell type and different pathologies in different tissues can all provoke responses. Results must be interpreted with due regard to concurrent conditions in the individual patient to make the optimal use of this sensitive marker (4). Neutrophil gelatinase-associated lipocalin, or NGAL (1), belongs to the lipocalin family of proteins (5). Human NGAL consists of a single disulfide-bridged polypeptide chain of 178 amino-acid residues with a calculated molecular mass of 22 kDa (1), but glycosylation increases its apparent molecular mass to 25 kDa (1). In neutrophils and urine it occurs as monomer, with a small percentage of dimer and trimer, and it occurs as a complex with 92-kDa human neutrophil type IV collagenase, also called gelatinase B or matrix metalloproteinase-9 (MMP-9) (1,6,7).

Raised plasma levels of NGAL were strongly correlated with decreased renal function in patients with renal damage due to systemic vasculitis (2). The results for renal ischemia-reperfusion injury were subsequently confirmed and extended to nephrotoxic agents (1-3). It has been suggested that urinary NGAL levels may serve as an early marker for ischemic renal injury in children after cardiopulmonary bypass (4). Raised urinary and serum NGAL levels have also been observed in patients with established renal failure and patients with functioning renal grafts also showed urinary levels that were sufficiently raised to be readily detectable by Western blotting (1, 2). It is

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therefore apparent that a large variety of renal disorders are associated with raised plasma and urinary levels of NGAL. While plasma and urinary NGAL levels are closely correlated in acute conditions, it is to be expected that urinary NGAL levels will be particularly high after ischemic renal injury severe enough to result in acute renal failure, acute tubular necrosis or acute tubulo-interstitial nephropathy(1,5-7).

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