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Preface

Four million people will die this year of a condition whose pathophysiology we do not understand and for which no effective treatment exists. Millions more will sustain complications and prolonged hospitalizations. Acute kidney injury (AKI) is a complex syndrome for which treatment is lacking and understanding is limited. Defined as an abrupt change in serum creatinine and/or urine output and classified according to the RIFLE (Risk, Injury, Failure, Loss and End-stage kidney disease) criteria, AKI is associated with a more than twofold increase in the risk of death in hospital – even after controlling for other conditions. When severe enough to require renal replacement therapy, AKI results in hospital mortality rates of approximately 60%. Yet, even this severe form of AKI is surprisingly common – nearly 6% of all patients admitted to the ICU.

Moreover, as many as two thirds of patients admitted to the ICU have some evidence of AKI and virtually all may be at risk of this condition. Sepsis, shock, advanced age and exposure to nephrotoxins lead the list of risk factors and many patients have more than one. As such, it is absolutely clear that in order for patients to receive optimal care, the treating physician needs a detailed working knowledge of multiple aspects of care so that appropriate multidisciplinary assistance is sought at the right time and new techniques of organ support are applied in a safe, timely and effective way. In this volume we have combined the contributions of experts in various fields to tackle some of the fundamental and complex aspects of AKI from pathophysiology to epidemiology to diagnosis and treatment; from emerging biomarkers to genetic polymorphisms. We have also included contributions which focus on the many complications of AKI and comorbid conditions encountered in patients with
AKI. From abnormalities in oxygen delivery, hemodynamics and acid-base balance to multi-organ failure, leading experts cover the fundamentals as well as the latest developments.

Because the immune response to infection is central in determining organ injury, this volume also focuses on the role of immune dysregulation in determining renal and lung injury, on the role of immune mediators in inducing dysregulation of the immune response, and on the role of genetics in determining such a response. The roles of nutritional support, metabolic management and fluid resuscitation in modulating the immune response and influencing patient outcomes are also considered. As extracorporeal therapies are being increasingly used in the care of these complex patients, we focus on important technical aspects of such therapies, including vascular access, anticoagulation, and fluid composition as well as the logistics of starting continuous renal replacement therapy programs and keeping them running. As the choice of treatment modality remains controversial, we also discuss different approaches to renal support from intermittent dialysis to continuous therapies and hybrid techniques. Finally, we conclude with a description of advanced extracorporeal techniques of organ support and discuss their role in the management of sepsis and AKI in the context of an overall strategy of multi-organ failure management.

The overall aim of this volume of the Contributions to Nephrology series is to provide the medical community involved in the care of critically ill patients with AKI with a practical and up-to-date summary of current knowledge and technology as well as a fundamental understanding of pathogenesis and likely future developments in this field. Just as importantly, this volume serves to challenge and reexamine the fundamental underlying assumptions we hold with regard to critical illness in general and AKI in particular. By reexamining age-old paradigms such as ‘pre-renal azotemia’ and looking to redefine the concepts of acute renal disease, we can expect to stumble and fall but in the end find ourselves in a new and better place. Critical care nephrology is an interdisciplinary field and it is through the continued work of basic, clinical, and translational researchers from numerous disciplines, and clinicians who will always drive the field forward, that together we will realize our ambition to improve the standard of care for patients with AKI, worldwide.

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