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Editorial

The Cardiorenal Syndrome: Basis and Common Ground for a Multidisciplinary Patient-Oriented Therapy

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Disorders of the heart and kidneys – the cardiorenal syndrome (CRS) and its five subtypes

CRS, general definition A complex pathophysiologic disorder of the heart and kidneys where acute or chronic dysfunction in one organ may induce acute or chronic dysfunction in the other organ
CRS type I *(acute CRS)* Abrupt worsening of cardiac function (e.g. acute cardiogenic shock or acute decompensation of chronic heart failure) leading to kidney injury
CRS type II *(chronic CRS)* Chronic abnormalities in cardiac function (e.g. chronic heart failure) causing progressive chronic kidney disease
CRS type III *(acute renocardiac syndrome)* Abrupt worsening of renal function (e.g. acute kidney failure or glomerulonephritis) causing acute cardiac disorder (e.g. heart failure, arrhythmia, or pulmonary edema)
CRS type IV *(chronic renocardiac syndrome)* Chronic kidney disease (e.g. chronic glomerular disease) contributing to decreased cardiac function, cardiac hypertrophy and/or increased risk of adverse cardiovascular events
CRS type V *(secondary CRS)* Systemic condition (e.g. diabetes mellitus or sepsis) causing both cardiac and renal dysfunction

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Ronco: Editorial

Patients admitted to hospital(s) may present with various degrees of heart and kidney dysfunction. Primary disorders of one of these two organs often result in secondary dysfunction or injury to the other. Such pathophysiological interactions represent the pathophysiological basis for a clinical entity often referred to as the cardiorenal syndrome (CRS) [1]. Although generally defined as a condition characterized by the initiation and/or progression of renal insufficiency secondary to heart failure, the term CRS is also used to describe the negative effects of reduced renal function on the heart (renocardiac syndrome).

The absence of a clear definition and the complexity of heart-kidney interactions contributed in the past to a lack of clarity with regard to diagnosis and management. The most recent definition of CRS includes a variety of conditions, either acute or chronic, where the primary failing organ can be either the heart or the kidney. The CRS comprises disorders of the heart and kidneys where acute or chronic dysfunction in one organ may induce acute or chronic dysfunction in the other. The current definition has been classified into five subtypes whose etymology reflects the primary and secondary pathology, the time frame, and simultaneous cardiac and renal dysfunction secondary to systemic disease [2].

Such advances in the definition and classification of CRS allow a characterization of complex organ cross talk, and specific prevention strategies, and therapeutic interventions to attenuate end-organ injury have been proposed. A major problem with previous terminology was that it did not allow to identify the pathophysiological interactions occurring in the different types of combined heart/kidney disorders. A large number of direct and indirect effects of each organ dysfunction can initiate and perpetuate the combined disorder of both organs through a complex interplay of neurohumoral feedback mechanisms. For this reason, a subdivision into different subtypes seems to provide a more concise and logically correct approach to this condition.

During a consensus conference held in Venice in 2008, under the auspices of the Acute Dialysis Quality Initiative (ADQI), several experts in the fields of internal medicine, cardiology, cardiac surgery, nephrology and intensive care convened to debate the topic in a well-established process for consensus and to formulate a classification of CRS. The fruitful results of this conference include not only the definition of a classification system, which represents a great achievement in itself, but also the initiation of a multidisciplinary collaboration towards new diagnostic, preventive and therapeutic strategies for patients suffering from combined disorders of the heart and the kidney. Such a multidisciplinary approach requires a structured education of young physicians who should advance in their careers with an open mind and pursue an attitude that is patient oriented rather than organ oriented. The advent of the journal *CardioRenal Medicine* may represent the basis for this innovative trend and for a new era in the management of patients with the cardiorenal syndrome.

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