
Síndrome Cardiorrenal

**Apresentado pelo Residente Igor Denizarde Bacelar Marques
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STATE-OF-THE-ART PAPER

Cardiorenal Syndrome

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Vicenza, Italy; Helsinki, Finland; London, Ontario, Canada; and Melbourne, Australia

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The term cardiorenal syndrome (CRS) increasingly has been used without a consistent or well-accepted definition. To include the vast array of interrelated derangements, and to stress the bidirectional nature of heart-kidney interactions, we present a new classification of the CRS with 5 subtypes that reflect the pathophysiology, the time-frame, and the nature of concomitant cardiac and renal dysfunction. CRS can be generally defined as a pathophysiologic disorder of the heart and kidneys whereby acute or chronic dysfunction of 1 organ may induce acute or chronic dysfunction of the other. Type 1 CRS reflects an abrupt worsening of cardiac function (e.g., acute cardiogenic shock or decompensated congestive heart failure) leading to acute kidney injury. Type 2 CRS comprises chronic abnormalities in cardiac function (e.g., chronic congestive heart failure) causing progressive chronic kidney disease. Type 3 CRS consists of an abrupt worsening of renal function (e.g., acute kidney ischemia or glomerulonephritis) causing acute cardiac dysfunction (e.g., heart failure, arrhythmia, ischemia). Type 4 CRS describes a state of chronic kidney disease (e.g., chronic glomerular disease) contributing to decreased cardiac function, cardiac hypertrophy, and/or increased risk of adverse cardiovascular events. Type 5 CRS reflects a systemic condition (e.g., sepsis) causing both cardiac and renal dysfunction. Biomarkers can contribute to an early diagnosis of CRS and to a timely therapeutic intervention. The use of this classification can help physicians characterize groups of patients, provides the rationale for specific management strategies, and allows the design of future clinical trials with more accurate selection and stratification of the population under investigation. (J Am Coll Cardiol 2008;52:1527-39) © 2008 by the American College of Cardiology Foundation

Definição

- “Desordem fisiopatológica do coração e dos rins, em que disfunções agudas ou crônicas de um órgão podem levar a repercussões agudas ou crônicas no outro.”
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Classificação

- Tipo 1: Síndrome cardiorenal aguda
 - Tipo 2: Síndrome cardiorenal crônica
 - Tipo 3: Síndrome renocárdica aguda
 - Tipo 4: Síndrome renocárdica crônica
 - Tipo 5: Síndrome cardiorenal secundária
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Síndrome Cardiorenal Aguda

- Em pacientes submetidos à ACTP ou cirurgia cardíaca, até mesmo um pequeno aumento da SCr ($>0,3\text{mg/dL}$) está associado com maior tempo de internação e maior mortalidade.

Lasnigg A, Schmid ER, Hiesmayr M, et al. Impact of minimal increases in serum creatinine on outcome in patients after cardiothoracic surgery: do we have to revise current definitions of acute renal failure? *Crit Care Med* 2008;36:1129–37.

Roghi A, Savonitto S, Cavallini C, et al. Impact of acute renal failure following percutaneous coronary intervention on long-term mortality. *J Cardiovasc Med* 2008;9:375–81.

Síndrome Cardiorenal Aguda

- O aumento da SCr não é apenas um marcador de gravidade da doença, mas demonstra a ação da disfunção renal aguda em acelerar o dano CV através da ativação de vias neuro-hormonais, imunológicas e inflamatórias.

Tokuyama H, Kelly DJ, Zhang Y, Gow RM, Gilbert RE. Macrophage infiltration and cellular proliferation in the non-ischemic kidney and heart following prolonged unilateral renal ischemia. *Nephron Physiol* 2007;106:54–62.

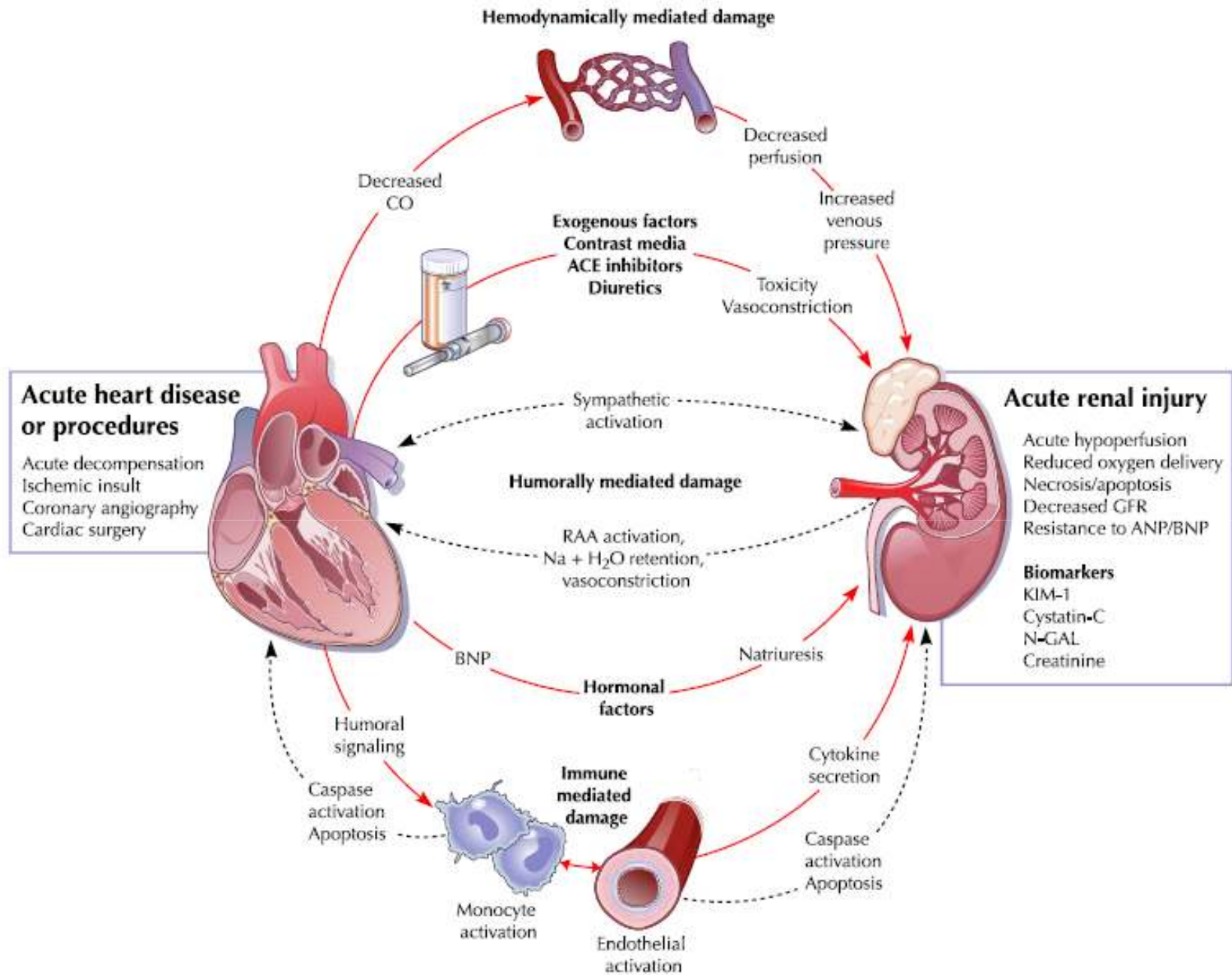


Figure 1 CRS Type 1

Table 1**Protein Biomarkers for the Early Detection of Acute Kidney Injury**

Biomarker	Associated Injury
Cystatin C	Proximal tubule injury
KIM-1	Ischemia and nephrotoxins
NGAL (lipocalin)	Ischemia and nephrotoxins
NHE3	Ischemia, pre-renal, post-renal AKI
Cytokines (IL-6, IL-8, IL-18)	Toxic, delayed graft function
Actin-actin depolymerizing F	Ischemia and delayed graft function
α -GST	Proximal T injury, acute rejection
π -GST	Distal tubule injury, acute rejection
L-FABP	Ischemia and nephrotoxins
Netrin-1	Ischemia and nephrotoxins, sepsis
Keratin-derived chemokine	Ischemia and delayed graft function

GST = glutathione S-transferase; IL = interleukin; KIM = kidney injury molecule; L-FABP = L-type fatty acid binding protein; NGAL = neutrophil gelatinase-associated lipocalin; NHE = sodium-hydrogen exchanger.

Síndrome Cardiorenal Crônica

- A prevalência de disfunção renal em pacientes com ICC é de aproximadamente 25%.

Hillege HL, Nitsch D, Pfeffer MA, et al. Renal function as a predictor of outcome in a broad spectrum of patients with heart failure. *Circulation* 2006;113:671–8.

- Mesmo pequenas diminuições no RFG aumentam significativamente o risco de mortalidade e são consideradas marcadores de severidade da lesão vascular

Bhatia RS, Tu JV, Lee DS, et al. Outcome of heart failure with preserved ejection fraction in a population-based study. *N Engl J Med* 2006;355:260–9.

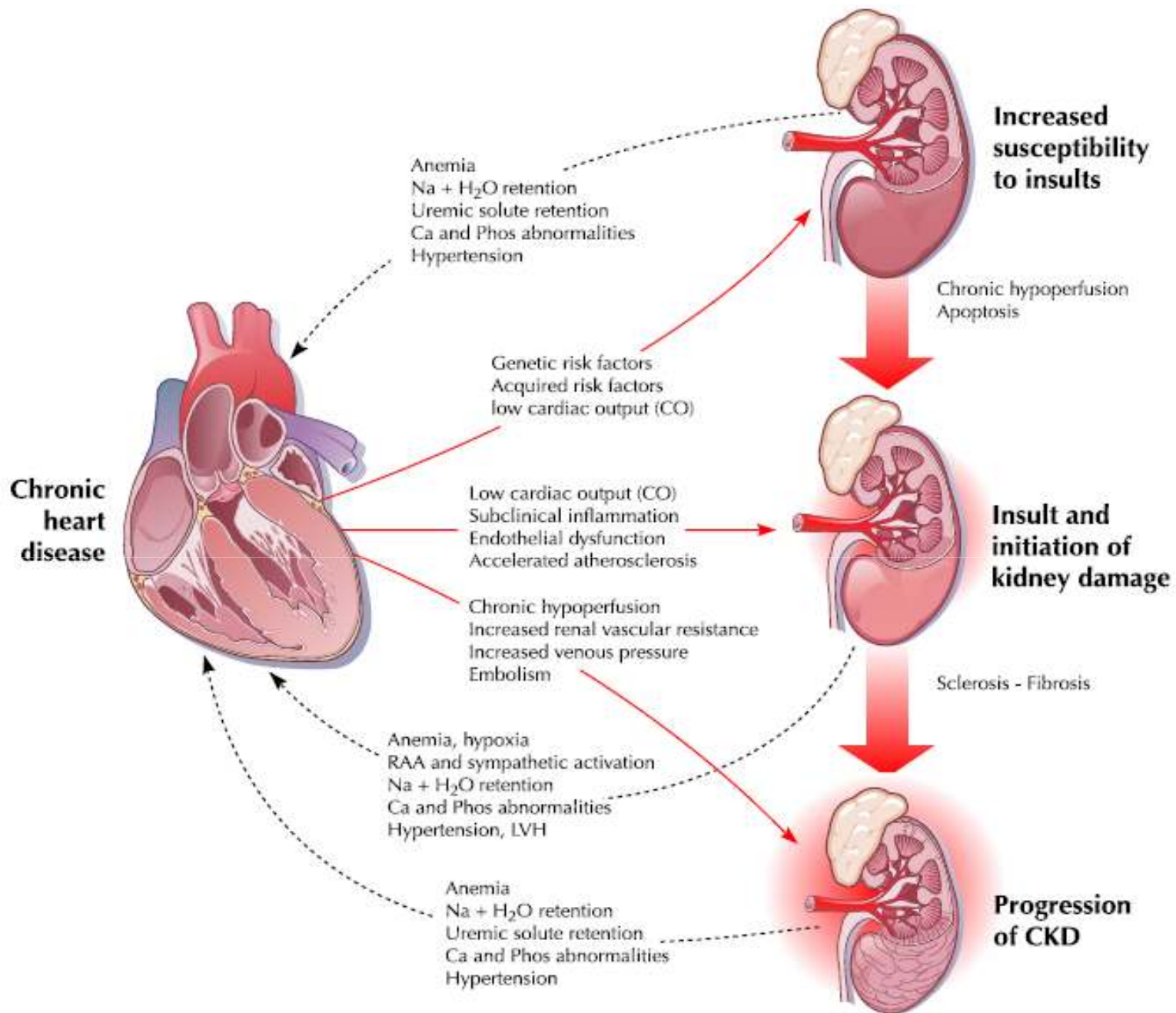


Figure 2 CRS Type 2

Síndrome Renocárdica Aguda

- Disfunção renal aguda tem sido reportada em aproximadamente 9% dos pacientes internados e em mais de 35% daqueles em UTI.

Uchino S, Bellomo R, Goldsmith D, Bates S, Ronco C. An assessment of the RIFLE criteria for acute renal failure in hospitalized patients. *Crit Care Med* 2006;34:1913-7.

Bagshaw SM, George C, Dinu I, Bellomo R. A multi-centre evaluation of the RIFLE criteria for early acute kidney injury in critically ill patients. *Nephrol Dial Transplant* 2008;23:1203-10.

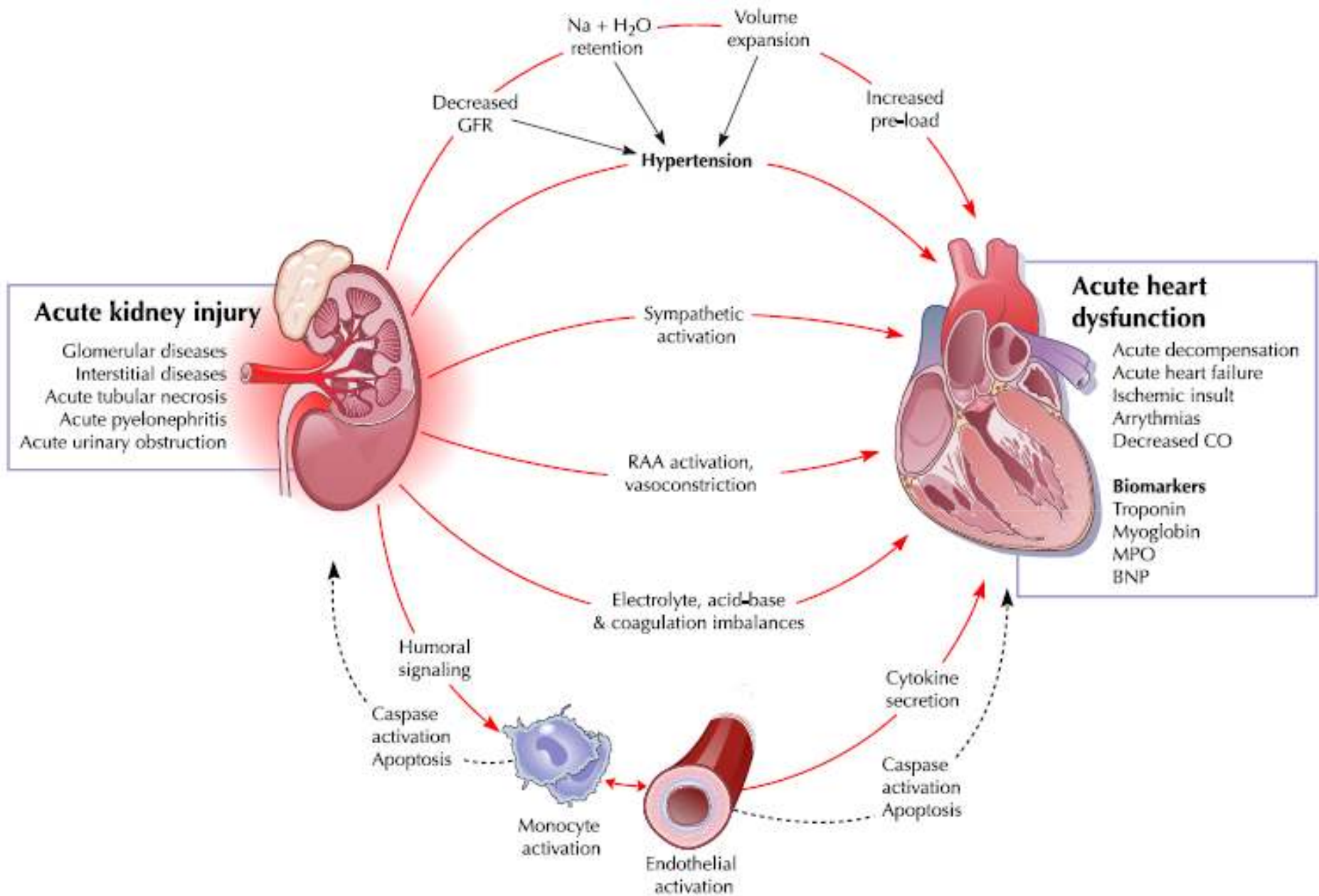


Figure 3 CRS Type 3

Síndrome Renocárdica Crônica

- Mais de 50% das mortes de pacientes com DRC estágio 5 são atribuídas a eventos CV.
- Pacientes com DRC tem um risco de morte cardíaca 10-20x maior quando comparados com controles do mesmo gênero e idade sem DRC.

Herzog CA. Dismal long-term survival of dialysis patients after acute myocardial infarction: can we alter the outcome? *Nephrol Dial Transplant* 2002;17:7-10.

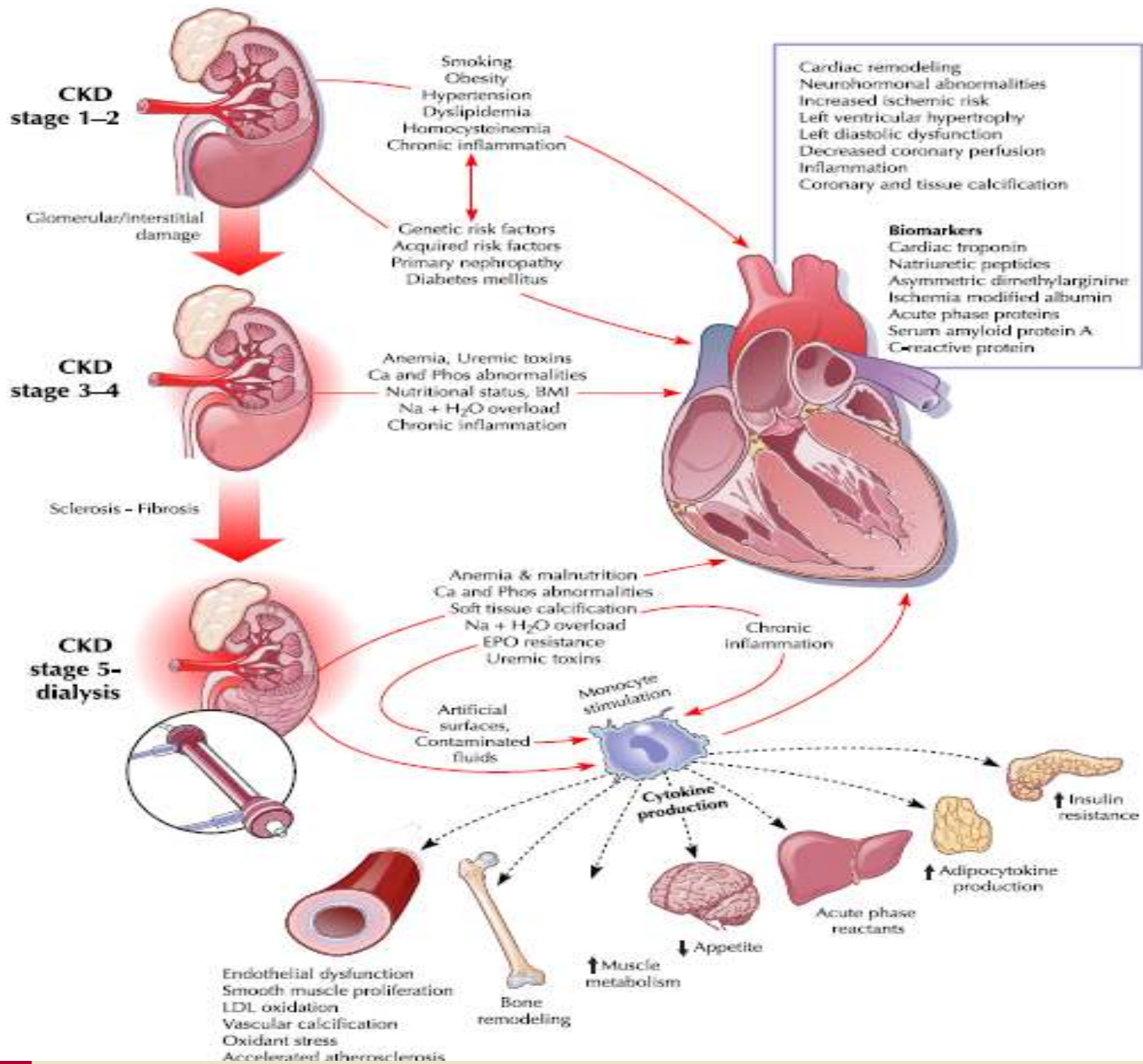


Figure 4 CRS Type 4

Síndrome Cardiorenal Secundária

- Sepsis grave representa a mais comum e séria condição que pode afetar ambos os órgãos.
- Os mecanismos responsáveis por tais alterações não são claramente compreendidos, mas podem envolver a ação de TNF e outros mediadores.

Cunningham PN, Dyanov HM, Park P, Wang J, Newell KA, Quigg RJ. Acute renal failure in endotoxemia is caused by TNF acting directly on TNF receptor-1 in kidney. *J Immunol* 2002;168:5817-23.

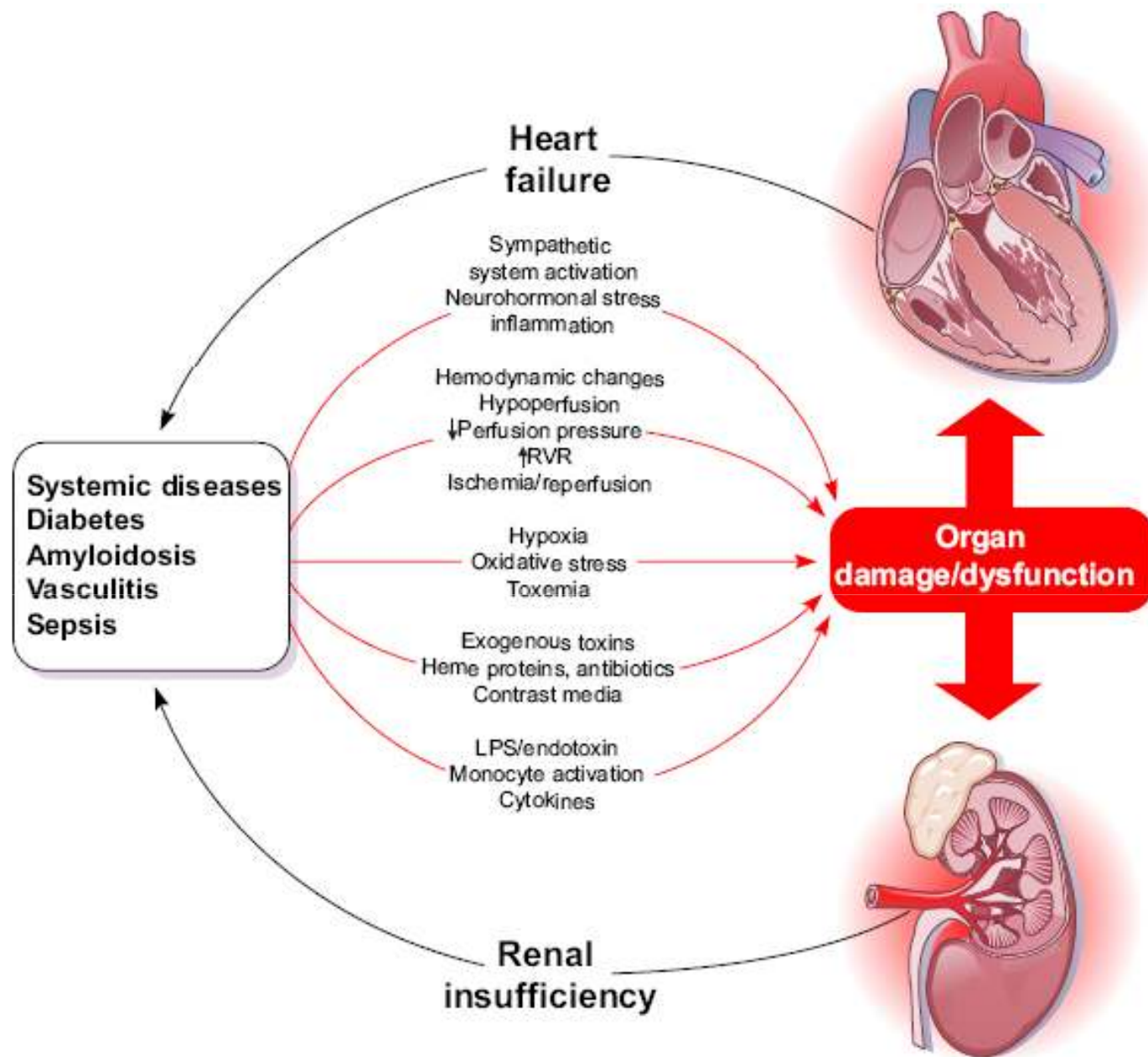


Figure 5 CRS Type 5