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Promoting Sustainable Kidney Health: The Asia-Pacific and Beyond

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Sympathetic Overactivity and Cardiovascular Morbidity in Dialysis Patients

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Cardiovascular events are the major cause of death for patients with chronic kidney disease and for those on dialysis. In addition to the traditional cardiovascular risk factors, individuals with CKD have additional contributing risk factors that contribute to poor cardiovascular outcomes. These include vascular calcification and arterial stiffness, structural cardiac disease and sympathetic neural overactivity. These all contribute to the increasing risk of cardiac arrythmias and heart failure. Sympathetic afferent and efferent innervation of the kidneys play a critical role in normal kidney physiology and become a significant contributory factor to the increased cardiovascular morbidity and mortality in CKD and end stage kidney disease. A number of both animal and clinical studies have demonstrated the importance of autonomic dysfunction in exacerbating the cardiovascular risk. The increased sympathetic overactivity with a reduction in the parasympathetic tone contributes to endothelial dysfunction, myocardial hypertrophy, increased arrhythmogenicity, and altered metabolic function (1). Central sympathetic neural activity is linked to numerous afferent inputs from arterial baroreceptors, chemoreceptors, cardiopulmonary receptors as well as renal afferent neural signals. In addition, the altered 'uraemic mileu' contributes to alterations in the central integration of the sympathetic neural response. The contribution of 'diseased kidneys' to this documented sympathetic neural overactivity has been demonstrated in both animal and human studies. Of importance is the demonstration in kidney transplant recipients with normal 'kidney function' there is still persistent sympathetic overactivity, which is abolished by bilateral nephrectomies (2). More recently, with the development of endovascular renal denervation, this offers the exciting possibility of a non-invasive surgical approach to remove the adverse sympathetic drive from the diseased kidneys to lower the cardiovascular risk in this high-risk group. 1. Hoye NA et al. Seminars in Dialysis. 2019; 32: 255 - 65. 2. Converse RL et al. N Engl J Med. 1992; 327: 1912 - 18

Keywords: Sympathetic nerve activity, Chronic kidney disease, cardiovascular events