

Cryo-treatment of the renal nerve to the clipped kidney in 2K1C Hypertensive rats: Hemodynamic and neural responses

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Radiofrequency renal denervation (DNX) is gaining increasing interest as a modality for treating resistant hypertension. The two-kidney one-clip (2K1C) hypertensive rat is a model of renovascular hypertension. In addition to activation of the renin-angiotensin system, 2K1C rats display elevated sympathetic activity. Earlier work reported that surgical renal denervation (DNX) decreases mean arterial pressure (MAP) in this model. Since radiofrequency ablation may be problematic in atherosclerotic renal artery disease, we hypothesized that cryo-treatment of the renal nerve to the clipped kidney of 2K-1C rats would decrease MAP, decrease contralateral renal sympathetic nerve activity (RSNA), and improve baroreflex sensitivity. Male Sprague-Dawley rats had sham (SC) or right renal artery clipping (2K1C) and hemodynamic monitoring by telemetry. They were pair fed a 0.4% NaCl diet. Six weeks later, 2K1C rats were stratified to moderate ($\text{MAP} \geq 140$ mmHg) or mild ($\text{MAP} < 140$ mmHg) hypertension, instrumented and underwent sham-DNX or cryo-DNX. All rats were studied in the conscious state. MAP decreased by 16 ± 5 mmHg in the 2K1C cryo-DNX moderate hypertension group ($P < 0.05$). Cryo-DNX exerted only a small depressor effect in mildly hypertensive 2K1C rats. In the moderately hypertensive 2K1C cryo-DNX rats, contralateral RSNA decreased from 12.2 ± 1.5 to 3.1 ± 3.5 $\mu\text{V.s}$ ($P < 0.05$), a value no different from SC rats 3.3 $\mu\text{V.s}$. Baroreflex sensitivity of both heart rate and RSNA increased in the cryo-DNX 2K1C rats. Renal tissue norepinephrine decreased by 73% in the DNX kidney; renal tissue Ang II was not altered. Approaches using cryo-treatment to ablate renal nerves may provide an adjunctive therapeutic modality in resistant renovascular hypertension.

Biography

Noreen F. Rossi obtained her MD at Yale University. After completing her internal medicine residency at Vanderbilt University Hospitals, she went to a renal fellowship at the University of Colorado Health Science Center. She is currently Professor of Internal Medicine and Physiology and Program Director of the Nephrology Fellowship at Wayne State University School of Medicine. She has published more than 70 papers in peer-reviewed journals and is has been continuously funded by the VA and/or NIH for more than 20 years. She is a reviewer on several journals and serves on study sections for the American Heart Association.

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