



Chronic treatment with C-type natriuretic peptide impacts differently in the aorta of normotensive and hypertensive rats

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- Carolina Caniffi (1) (2) Email author (ccaniffi@ffyb.uba.ar)View author's OrcID profile (View OrcID profile)
- Flavia M. Cerniello (1) (2)
- Gonzalo Bouchet (1) (2)
- María L. Sueiro (1) (2)
- Analía Tomat (1) (2)
- Daniel González Maglio (3) (4)
- Jorge E. Toblli (5)
- Cristina Arranz (1) (2)

1. Universidad de Buenos Aires, Facultad de Farmacia y Bioquímica, Cátedra de Fisiología, , Buenos Aires, Argentina
2. CONICET - Universidad de Buenos Aires, Instituto de la Química y Metabolismo del Fármaco (IQUIMEFA), , Buenos Aires, Argentina
3. Universidad de Buenos Aires, Facultad de Farmacia y Bioquímica, Cátedra de Inmunología, , Buenos Aires, Argentina
4. CONICET - Universidad de Buenos Aires, Instituto de Estudios de la Inmunidad Humoral (IDEHU), , Buenos Aires, Argentina
5. Laboratorio de Medicina Experimental, Hospital Alemán, , Buenos Aires, Argentina

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Abstract

The aim of this study was to determine whether exogenous administration of C-type natriuretic peptide (CNP) induces functional and morphological vascular changes in spontaneously hypertensive rats (SHR) compared with normotensive rats. Male 12-week-old normotensive Wistar and SHR were administered with saline (NaCl 0.9%) or CNP (0.75 µg/h/100 g) for 14 days (subcutaneous micro-osmotic pumps). Systolic

blood pressure (SBP) was measured in awake animals and renal parameters were evaluated. After decapitation, the aorta was removed, and vascular morphology, profibrotic markers, and vascular reactivity were measured. In addition, nitric oxide (NO) system and oxidative stress were evaluated. After 14-days of treatment, CNP effectively reduced SBP in SHR without changes in renal function. CNP attenuated vascular remodeling in hypertensive rats, diminishing both profibrotic and pro-inflammatory cytokines. Also, CNP activated the vascular NO system and exerted an antioxidant effect in aortic tissue of both groups, diminishing superoxide production and thiobarbituric acid-reactive substances, and increasing glutathione content. These results show that chronic treatment with CNP attenuates the vascular damage development in a model of essential hypertension, inducing changes in fibrotic, inflammatory, oxidative, and NO pathways that could contribute to beneficial long-term effects on vascular morphology, extracellular matrix composition, and function. The knowledge of these effects of CNP could lead to improved therapeutic strategies to not only control BP but also reduce vascular damage, primarily responsible for the risk of cardiovascular events.

Keywords

Blood pressure Nitric oxide Oxidative stress Natriuretic peptides
Vascular remodeling Fibrosis

Dr. Jorge E. Toblli passed away in 2018

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Notes

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Author contribution

- Conceived of or designed study: Carolina Caniffi, Cristina Arranz
- Performed research: Carolina Caniffi, Flavia M. Cerniello, Gonzalo Bouchet, María L. Sueiro, Analía Tomat, Daniel González Maglio, Jorge E. Toblli
- Analyzed data: Carolina Caniffi, Flavia M. Cerniello, Daniel González Maglio, Jorge E. Toblli
- Contributed new methods or models: Carolina Caniffi, Analía Tomat, Jorge E. Toblli, Cristina Arranz
- Wrote the paper: Carolina Caniffi, Analía Tomat, Cristina Arranz

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

All procedures performed in studies involving animals were in accordance with the ethical standards of the institution or practice at which the studies were conducted.

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