

SODIUM ACCUMULATION IN THE MYOCARDIUM OF HYPERTENSIVE RATS

Giacomo Rossitto¹, Silvia Lacchini¹, Adam Harvey¹, Mark Petrie¹, Rhian Touyz¹, Christian Delles¹

¹Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, United Kingdom

Introduction: Salt is associated with progression of hypertensive heart disease through left ventricular hypertrophy and diastolic dysfunction. Recently, Na⁺ was shown to accumulate in peripheral tissues with advancing age and resistant hypertension; glycosaminoglycans (GAG) were identified as the putative binding site. This study was set out to investigate if a similar accumulation occurs in the heart.

Methods: Heart samples from hypertensive young and old rats (spontaneously hypertensive rat and stroke prone [SHRSP]; 20 and 52 weeks old, respectively) and normotensive age-matched controls (Wistar-Kyoto [WKY] rats; n=6-10 per group) were used for: (i) chemical analysis of tissue Na⁺ content by flame photometry; (ii) gravimetric measurement of water content, as the difference between wet weight (WW) and dry weight (DW); (iii) histologic quantification of GAG content by alcian blue staining (A.B., pH 2.5) of mid-myocardial tissue (A.B. positive area, %).

Results: Myocardial Na⁺ content was increased in SHRSP old rats compared to SHRSP young and age-matched WKY (220±22 vs 169±11 and 164±11 mol/gDW, respectively). It was paralleled by an increase in tissue water (76.7±0.9 vs 74.4±1.0 and 73.5±1.5 %WW, respectively), but Na⁺ accumulation was overall hypertonic relative to the controls (67.5±5.3 vs 58.2±5.7, p<0.01, and 59.3±5.0 mmol/l, p=0.01, respectively). Myocardial GAG increased with aging, but was higher in both SHRSP young and old rats (3.02% and 0.17%) compared to WKY (0.37% and 0.05%).

Conclusion: Tissue Na⁺ accumulates in the heart of aged hypertensive animals and is at least in part independent of water. GAG content increases with aging, but to a higher extent in hypertensive animals, and could represent a binding site for myocardial sodium accumulation.

Disclosure: None declared..