

Mismatch between mRNA cardiac expression of BNP and CNP in pacing-induced heart failure

S. Del Ry¹, M. Cabiati², V. Lionetti², C. Caselli¹, T. Prescimone¹, M. Emdin³, F.A. Recchia², D. Giannessi¹.

¹Siena University - Pisa - Italy, ²Scuola Superiore Sant'Anna - Pisa - Italy, ³Fondazione G Monasterio - Pisa - Italy

Purpose: It has been recently demonstrated in an animal model of heart failure (HF) that the high-frequency pacing of the left ventricle (LV) free wall causes a dyssynchronous pattern of contraction that leads to progressive cardiac failure with pronounced differences in regional contractility.

Aim of this study was to evaluate the possible variation of brain natriuretic peptide (BNP) and C-type natriuretic peptide (CNP) mRNA expression in the anterior/anterior lateral region (pacing site, PS) compared with the infero-septal region (opposite site, OS) to individualize the possible association between the contraction patterns and the expression of these biomarkers.

Methods: Cardiac tissue was collected from male adult minipigs without (controls, n=6) and with pacing-induced HF (n=8) from PS, and from the tissue remote from the pacing-site. mRNA expression of BNP and CNP was evaluated by semiquantitative polymerase chain reaction (PCR) by using GAPDH as housing gene.

Results: A significant difference in mRNA expression of BNP in PS was observed between HF animals and controls (BNP/GAPDH: 0.65 ± 0.11 vs. 0.35 ± 0.04 , $p=0.02$) whereas in OS BNP levels resulted similar to those of controls (BNP/GAPDH: 0.36 ± 0.05). mRNA expression of CNP was higher in HF with respect to controls both in PS and in OS, although not significantly (CNP/GAPDH: controls 0.089 ± 0.036 , PS 0.29 ± 0.23 , OS 0.54 ± 0.16). These findings are in tune with the increase of CNP tissue concentrations (controls $=0.69 \pm 0.13$; PS $=1.56 \pm 0.19$; OS $=1.70 \pm 0.42$ pg/mg protein; $p=0.039$ controls vs.OS). The higher levels of BNP mRNA expression in PS are in agreement with a reduction of contractile function in this region while the higher CNP mRNA expression in OS could suggest the presence of a major endothelial dysfunction in the remote region.

Conclusions: In clinical conditions the endothelial dysfunction precedes the overt HF, so, although further investigations are necessary, these results suggest that CNP could be a early marker of HF. In this context, CNP could be a marker more relevant than BNP in early recognizing patients with HF.