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Letter to the Editor

ANP and BNP in atrial fibrillation before and after cardioversion – and their relationship to cardiac volume and function

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Abstract

The role of atrial (ANP) and B-type (BNP) natriuretic peptide in atrial fibrillation (AF) is not clear. Our aim was to describe ANP and BNP in AF, and their changes following cardioversion in persistent AF. Furthermore, we wanted to assess the association between ANP and BNP and cardiac volume and function evaluated by magnetic resonance imaging. ANP and BNP decreased significantly following cardioversion. After 180 days of sinus rhythm, ANP and BNP were still significantly elevated. Same results were seen in patients with lone AF. Left and right atrial volumes correlated positively with ANP and BNP. Changes in left atrial volume were predictive of changes in ANP and BNP following cardioversion.

AF may cause enduringly elevated ANP and BNP and atrial volume seems to be an important determinant of ANP and BNP in AF.

Keywords: Atrial fibrillation; Natriuretic peptides; Cardiac volume; Cardioversion; Magnetic resonance imaging

Increased levels of atrial (ANP) and B-type (BNP) natriuretic peptide are both independent predictors of morbidity and mortality in a variety of cardiovascular conditions. ANP and BNP are elevated in atrial fibrillation (AF); however, the exact reason remains unclear. Decreasing levels of ANP following cardioversion of persistent AF have been found in several studies; however only a few studies have reported changes to plasma BNP following cardioversion. Most previous studies have only evaluated changes immediately after cardioversion, but long-term effects on the natriuretic peptides following cardioversion are unknown [1,2].

The aims were to report on the plasma levels of ANP and BNP in patients with permanent and persistent AF, and to describe their changes following cardioversion in persistent AF. Furthermore, we wanted to describe the relationship between atrial and ventricular volumes and ejection fractions (EF) evaluated by magnetic resonance imaging (MRI) and plasma ANP and BNP in patients with AF.

The population and MRI technique has previously been described [3,4]. Sixty consecutive patients with persistent AF were evaluated before cardioversion and 1, 30 and 180 days after cardioversion, if still in sinus rhythm.

ANP was measured by a radioimmunoassay of plasma extracted by means of C18 Sep-Pak cartridges. BNP was measured by an automated two-site sandwich immunoassay technique using chemiluminescent technology (Bayer, ADVIA Centaur).

Results of ANP and BNP measurements are presented in Table 1. ANP and BNP decreased significantly following cardioversion; however, after 180 days of sinus rhythm, ANP and BNP were still significantly higher than in the healthy volunteers. In the subgroup with lone AF the same results were seen.

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Table 1
ANP and BNP

	Permanent	Persistent Baseline	Persistent Day 1	Persistent Day 30	Persistent Day 180	Healthy volunteers
All						
Number	19	60	49	27	21	19
ANP	215.4±105 *	197.0±77.2 *	160.3±91.8	138.5±55.9	110±38.5 *, **	46.9±15.5
BNP	138.3±102 *	165.8±107 *	95.2±91.0	101.7±81.7	72.1±49.6 *, **	18.3±10.6
Lone AF						
Number	9 (47%)	25 (42%)	22 (45%)	11 (41%)	9 (43%)	
ANP	191.3±91.7 *	188.6±72.0 *	127.8±61.0	124.1±48.0	94.0±26.2 *, **	
BNP	174.7±118.6 *	134.6±83.8 *	74.4±68.8	85.8±46.5	56.3±25.4 *, **	

Values are mean±1 S.D.
ANP: plasma atrial natriuretic peptide (pg/ml). BNP: plasma B-type natriuretic peptide (pg/ml).
Values at days 1 and 30 have not been tested against values at baseline or healthy volunteers.
* Statistically significant difference compared to healthy volunteers ($p<0.0001$).
** Statistically significant difference within cardioversion series ($p<0.0001$).

High plasma ANP and BNP levels were strongly associated with large left and right atrial volumes by univariate analyses (Fig. 1). There were no statistically significant associations between ANP or BNP and atrial EF, ventricular volume or EF or left ventricular (LV) mass. By multivariate analyses variables found to be independently

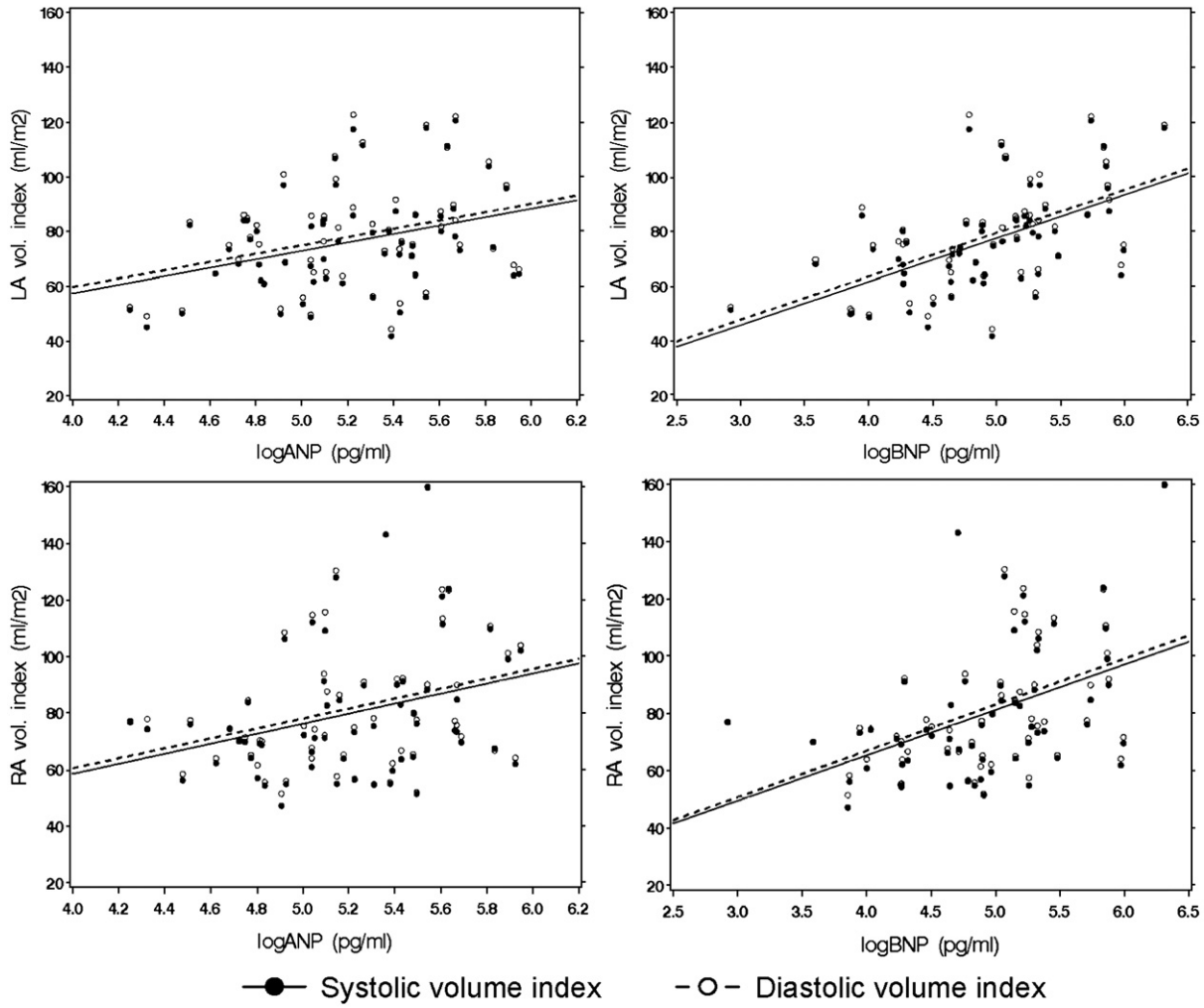

Fig. 1. Atrial volume indices versus ANP and BNP at baseline. LA: left atrial; RA: right atrial; Vol. Index: volume indexed to body surface area. ANP: plasma atrial natriuretic peptide; BNP: plasma B-type natriuretic peptide. LA vs. logANP: $p=0.008$; $R=0.35$ (systolic); $p=0.009$; $R=0.33$ (diastolic). LA vs. logBNP: $p<0.0001$; $R=0.56$ (systolic and diastolic). RA vs. logANP: $p=0.01$; $R=0.32$ (systolic and diastolic). RA vs. logBNP: $p=0.003$; $R=0.46$ (systolic); $p=0.002$; $R=0.47$ (diastolic).