

# Correlation of B-Natriuretic Peptide and Norepinephrine with Resting Hemodynamics Obtained by Impedance Cardiography (ICG) in Heart Failure Patients

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## Background

Neurohormone levels are elevated in heart failure, and previous studies have shown significant correlations between levels and invasive hemodynamics.

To determine if levels correlate with hemodynamics obtained by impedance cardiography (ICG), we studied 38 consecutive outpatients with chronic heart failure (mean age  $71 \pm 17$  yrs, 69.2% male, 64.1% ischemic cardiomyopathy, 64.1% functional class 3, left ventricular ejection fraction  $26 \pm 12\%$ , systolic blood pressure  $123 \pm 24$  mmHg, and diastolic blood pressure  $66 \pm 16$  mmHg). After each patient rested supine for 20 minutes, we performed ICG measurements, and drew blood for neurohormones.

## Conclusions

BNP correlated well with SV and TFC as measured by ICG. The correlation with TFC is expected, since BNP has been shown to correlate with wedge pressure.

If BNP testing is not readily available, of all the measurements that can be obtained by ICG TFC appears to be most closely correlated with BNP, and might be a suitable method for determining severity of heart failure and/or the presence of acute decompensation. Only the resting SV correlated with plasma norepinephrine.

## Results

Table 1. Correlation of neurohormones with ICG hemodynamics

Variable	Mean	Range	Correlation with Norepi	p value	Correlation with BNP	p value
HR (bpm)	$72.5 \pm 16.1$	48 - 120	0.191	NS	0.089	NS
CI (l/min/m <sup>2</sup> )	$2.78 \pm 0.60$	2.00 - 5.00	0.086	NS	-0.046	NS
SV (ml)	$77.9 \pm 20.8$	44 - 128	-0.347	0.038	0.290	$\leq 0.05$
SVR (dynes)	$1277 \pm 499$	684 - 2563	0.079	NS	0.043	NS
TFC (L)	$29.06 \pm 5.79$	17.2 - 49.3	0.162	NS	0.453	$\leq 0.01$
LVSWI	$3.04 \pm 0.86$	1.40 - 6.40	0.004	NS	-0.237	NS

HR = heart rate, BPM = beats per minute, CI = cardiac index, SV = stroke volume, SVR = systemic vascular resistance, TFC = thoracic fluid content, LVSWI = left ventricular stroke work index, Norepi = norepinephrine, BNP = b-natriuretic peptide

Note: original abstract referred to ICG (impedance cardiography) as TEB (thoracic bioimpedance).