Changes in Left Ventricular Structure and Function Predict the Onset of Hypertension in Adult Normotensives With a Family History of Hypertensive Disease: A Seven-Year Follow-Up Study

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Background: Alterations in left ventricular (LV) structure and function have been previously observed in normotensive offspring of hypertensive (HT) families but their significance is still unclear.

Methods: To verify if these alterations have predictive value for the onset of HT disease, 205 normotensive adults (mean age 43±10 yrs) with family history of HT, were examined echocardiographically (2D, M mode, Doppler) at baseline and then repeatedly at 12 months intervals, during a follow-up period of 7.1 yrs (range 4.7-7.5 yrs). Results: During this period, 57 subjects (28%) became hypertensive (H group). These subjects had higher values for the baseline LV mass index (LVMi)(97±25 g/m2 vs 61±21 g/m2; p<0.01), lower LV ejection fraction adjusted to body surface area (1.1±0.4 vs 1.4±0.4; p<0.01), and lower LV longitudinal fractional shortening (0.16±0.03 vs 0.19±0.03; p=0.038) compared to those who did not develop HT (N group). The subjects in the H group had also higher initial systolic blood pressure (SBP)(124±12 mmHg vs 117±11 mmHg; p=0.01) and a higher number of 1st degree relatives with HT (2.9±0.3 vs 1.5±0.4; p=0.04). There was no significant difference in baseline LVEF, LV circumferential fractional shortening, LV end diastolic diameter and left atrial size between H and N subjects at baseline.

SBP at the end of the follow-up was predicted independently by the initial SBP (β=0.315; p<0.01), age (β=0.01, p=0.042) and LVMi (β=0.185; p<0.01). During the follow-up period, the subjects who subsequently developed HT, experienced a significant increase in LVMi (from 97±25 g/m² to 104±26 g/m²; p<0.03), and decrease in systolic diameter (from 53±4 mm to 53±5 mm; p<0.01). The paired differences for all these parameters were significantly higher in the H group compared to the N group. H subjects also had higher variations in LV-E/A between the echo exams in the follow-up period when compared to the N group (mean 39% vs 19%; p<0.01).

Conclusions: Increased LV mass and alterations in LV diastolic and systolic longitudinal function predict the onset of HT in normotensives with family history of HT. Increased variability in LV diastolic function seem to appear during the period of developing HT.

N-Terminal Pro-Brain Natriuretic Peptide Predicts Cardiovascular Events in Hypertension: A LIFE Substudy

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Background: N-Terminal pro brain natriuretic peptide (NT-proBNP) is a strong cardiovascular risk factor in patients with chronic heart failure as well as in the general population. We wanted to investigate whether high NT-proBNP could predict the composite endpoint (CEP) of cardiovascular death, non-fatal stroke or non-fatal myocardial infarction in patients with hypertension and left ventricular hypertrophy as well. Methods: After two weeks of placebo treatment and yearly for 4.5 years clinical, laboratory, and echocardiographic values were assessed in 184 hypertensive patients from the LIFE Echo substudy, aged 55-60 (mean 61.7±7 years, with echocardiographic LV hypertrophy. NT-proBNP was measured by immunosay (Elecsys proBNP) at baseline and after one year of treatment. Results: CEP occurred in 20 patients. Baseline NT-proBNP (pg/mL) above the mean value of 185 pg/mL was associated with higher incidence of CEP (18.7% vs 9.7%, p=0.05). Known cardiovascular disease (n=60) defined as diabetes (n=20), or history of either ischemic heart disease (n=26), cerebrovascular disease (n=19), peripheral vascular disease (n=5) or chronic heart failure (n=2), was also associated with higher incidence of CEP (24.8% vs 8.9%, p=0.01). NT-proBNP above the median value was not associated with higher incidence of CEP in this high-risk group (24.3% vs 21.7%, NS), but was in the remaining 124 "low-risk" hypertensive patients (14.8% vs 4.3%, p=0.01). In Cox regression analysis controlling for treatment assignment NT-proBNP (P=0.05) predicted CEP slightly more strongly than prior cardiovascular disease (P=0.05) and current smoking (P=0.06). Systolic blood pressure, gender and body mass index did not enter the model. NT-proBNP levels after one year of treatment also tended to predict the CEPs that occurred subsequently (18.6% vs 9.2%, P=0.07).

Conclusion: NT-proBNP is a strong cardiovascular risk factor in patients with hypertension and LV hypertrophy, especially in the group without diabetes or clinically overt cardiovascular disease. Furthermore, our data suggest the possible use of NT-proBNP - even measured during treatment - as a practical tool for risk stratification in hypertension.