Left Ventricular Hypertrophy Induces an Increase in N-Terminal Pro-Brain Natriuretic Peptide Levels in Subjects With and Without Hypertension: A Population Study

Miguel Rivero, Fernando García de Burgos, Francisco Sogorb, Vicente Miro, Vicente Betomeu, Antonio Salvador, Rafael Paya, Juan Cisca, Quiterio Graau, Alejandro Jirón, Vicente Cimiente, Jose Luis Boco, Jose Luis Diago, Anceli Flutis, Luis Maimar, Vicente Moso, Alberto Moreno, Alicia Monier, Juan Moreno, Juana Reina, Kerdar Roldán, Ricardo Gomez, Grupo Dishunton VI, Hospital La Fe, Valencia, Spain

Background: Plasma N-terminal pro-brain natriuretic peptide (NT-proBNP) may be useful in the diagnosis of heart failure. Recently it has been published that hypertension (HT) must be taken into account when using NT-proBNP, but left ventricular hypertrophy (LVH) and hemodynamic abnormalities in patients with normal blood pressure (BP) may lead to increased NT-proBNP levels in patients with hypertension, a knowledge that is still not well understood.

Methods: We studied 216 subjects (110 females, 46 males, ages 60.0 ± 7.8 years) obtained from a random sample of 432 people from the Valencian Community, Spain, who in a previous questionnaire had declared to have some degree of dyspnea. These 432 subjects were referred to their local hospital (10 hospitals were involved in the study) where blood samples were taken, an echo-Coppper study was performed, a specific questionnaire was completed which included the question asked if they had previously been diagnosed with HT. Blood samples were all measured immediately at the same hospital. Of the 432 subjects, we got a positive answer from 215, and 49 have lower LVH (LV mass index >125 g/m²) NT-proBNP levels were in pmol/ml in control and normal individuals.

Results: For the whole LVH population NT-proBNP was 20 ± 12, LV mass index 17 ± 5, Vp 53 ± 19, and ejection fraction (EF) 63 ± 5. When we compared NT-proBNP (1972 ± 2071) in subjects with normal diastolic BP (D > 95 mmHg) we found that of the hypertensive group (HT > 120 mmHg), systolic blood pressure 114 ± 20, diastolic blood pressure 87 ± 1, LV mass index 173 ± 77, Vp 19 ± 18, EF 50 ± 10 with NT-proBNP (2050 ± 2200) in subjects with diastolic hypertension (D = 28, age 70 ± 5, systolic blood pressure 160 ± 24, diastolic blood pressure 90 ± 10, LV mass index 123 ± 27, Vp 36 ± 20, EF 63 ± 0.1). The differences were significant. This should be confirmed in new studies for its potential importance when using NT-proBNP for diagnostic and prognostic purposes.

Conclusion: This population study shows that NT-proBNP is elevated in patients with LVH or without HT. In HT the presence of HT does not influence the peptide levels significantly. This should be confirmed in new studies for its potential importance when using NT-proBNP for diagnostic and prognostic purposes.

The 894T Allele of the Endothelial Nitric Oxide Synthase Gene Is Related to Left Ventricular Mass in African Americans With High-Normal Blood Pressure

Robert L. Aull-Buela, Alexander Guarise, Deborah Lynn, Adlaihoff Oduwole, Cheryl Pack, Jan Morgan, Prasilla Ichigo-Pemur, Nounding Li, Elizabeth Ollii, Morehouse School of Medicine, Atlanta, GA

Background: The 894T allele of a single base exchange polymorphism (G894T) in exon 7 of the endothelial nitric oxide synthase (eNOS) gene has been recently associated with hypertension (HTN) in some but not all studies. Because high-normal blood pressure (BP) confers an increased risk for the development of HTN and other cardiovascular disorders, including left ventricular hypertrophy (LVH), we tested the hypothesis that the allele variation (894T) in the eNOS gene would directly correlate with alterations in LV mass (LVM) in individuals with high-normal BP.

Methods: Genotype distribution or allele frequencies of G894T were compared between 15 African Americans with high-normal BP (systolic BP of 130 to 138 and/or diastolic BP of 85 to 89 mmHg) and 44 counterparts with normal BP (<130/85 mmHg). Echocardiographic LVM was calculated (University formula) and indexed to body surface area to obtain the LV mass index (LVMi). G894T allele frequencies were compared in men and women.

Results: Among individuals with high-normal BP, homozygous carriers of the 894T allele (TT) had higher LVM than heterozygous GT and individuals without 894T allele (i.e., GG). (2050 ± 17 vs. 70 ± 25 and 91 ± 18 g/m², respectively, P < 0.001). In contrast, no such difference was observed in individuals with normal BP as TT carriers compared with GT and GG (84 ± 12 vs. 78 ± 4 and 83 ± 24 g/m², respectively, P = NS). This relationship which was observed between eNOS-894T allele and LVM in individuals with high-normal BP, but not in those with normal BP, was also observed in analysis of variance (ANOVA) model after adjusting for age, gender, body mass index and smoking. Conclusion: These findings suggest a relationship between the 894T allele and LVM in African Americans with high-normal blood pressure.

Relations of Ethnicity and Vascular Parameters to Left Ventricular Structure in Hypertensive Adults


Background: Men and women have well-established differences in the magnitude of ECG left ventricular hypertrophy (LVH). However, whether there are gender differences in the degree of regression of ECG LVH in response to antihypertensive therapy is unclear.

Methods: 1993 hypertensive patients (936 women and 453 men) in the LifeStyle study were randomized to losanam or atenolol with or without losamid and/or with or without diuretics. LVH (LV mass index >125 g/m² for men/women) was defined by echo-Doppler analysis using the standardized protocol. LVH was defined as LV mass index >125 g/m² for men/women.

Results: Despite clear normotensive BP values during ABPM and comparable heart rate, BP was significantly higher (P < 0.01) and increased relative wall thickness (RWT) as, 0.43. Doppler-derived stroke volume (Vp) and increased relative wall thickness (RWT) as, 0.43. Doppler-derived stroke volume (Vp) and ejection fraction (EF) were increased in black versus white patients. In black patients, systolic and diastolic BP exceeded average clinic values in both groups. Systolic and diastolic BP at echo exceeded average clinic values in both groups. In multiple linear regression analyses, both arterial stiffness and hemodynamics were independent correlates of changes in LV mass in hypertensive patients. Baseline systolic blood pressure was measured from baseline to last in-study visit.

Conclusions: Despite clear normotensive BP values during ABPM and comparable heart rate, BP was significantly higher (P < 0.01) and increased relative wall thickness (RWT) as, 0.43. Doppler-derived stroke volume (Vp) and increased relative wall thickness (RWT) as, 0.48. The findings demonstrate a strong association between black ethnicity and increased RWT and show that vascular reactivity and hemodynamics are important correlates of black-white differences in LV mass in hypertensive patients. Research specifically examining patterns of BP and vascular tone reactivity should improve understanding of ethnic disparities in hypertensive organ damage.

Gender Differences in Regression of Electrocardiographic Left Ventricular Hypertrophy in Response to Antihypertensive Therapy: The LifeStyle Study

Peter M. Okin, Richard S. Devereux, Sverker Jern, Sverre E. Kjeldsen, Steve Julius, Bernholst, for the LifeStyle Study Investigators, Weil Medical College of Cornell University, New York, NY

Background: Men and women have well-established differences in the magnitude of ECG left ventricular hypertrophy (LVH). However, whether there are gender differences in the degree of regression of ECG LVH in response to antihypertensive therapy is unclear.

Methods: 1993 hypertensive patients (936 women and 453 men) in the LifeStyle study were randomized to losamid or atenolol with or without losamid and/or with or without diuretics. LVH (LV mass index >125 g/m² for men/women) was defined by echo-Doppler analysis using the standardized protocol. LVH was defined as LV mass index >125 g/m² for men/women.

Results: Despite clear normotensive BP values during ABPM and comparable heart rate, BP was significantly higher (P < 0.01) and increased relative wall thickness (RWT) as, 0.43. Doppler-derived stroke volume (Vp) and increased relative wall thickness (RWT) as, 0.43. The findings demonstrate a strong association between black ethnicity and increased RWT and show that vascular reactivity and hemodynamics are important correlates of black-white differences in LV mass in hypertensive patients. Research specifically examining patterns of BP and vascular tone reactivity should improve understanding of ethnic disparities in hypertensive organ damage.

The Influence of Body Weight on Blood Pressure Response to Exercise in Patients With Normotensive ABPM Values

Ingram W. Francis, Joachim F. M. Mueller, Clinic Wehrwald (BfA), Todtmoos, Germany

Background: A hypertensive blood pressure (BP) response is known as a more reliable predictor for LVH and cardiovascular mortality compared to casual BP. Obese patients have an increased cardiovascular risk. One reason could be a hypertensive BP response only during exercise.

Methods: 1946 persons underwent an ABPM and a group of 1976 (1:3,7,1,20; age: 48±117±1) was identified as normotensive (daytime1<130/85mmHg, SpaceLab2007). All patients underwent standardized exercise (55-100watts, 5 min recovery period), electrocardiography and were finally arbitrarily divided into 3 groups according to their BMI (table). The results: Despite clear normotensive BP values during ABPM and comparable heart rate, the percentage of patients with a hyperensive BP response (ExBP, >250±100 mmHg at 100 watts) was significantly increased (p < 0.001) accounting for their increased BMI and was accompanied by a significantly (p < 0.01) higher LVM compared to patients with normal exercise BP (ExBP <250±100 mmHg). Conclusion: Women with a nonhypertensive BP response during exercise have a markedly greater increase in diastolic BP than women. PIs determined at echo was also higher in blacks, but cardiac index was similar, indicating an increase in vascular tone. PP/SI was instead higher in whites. In multiple linear regression analyses, both arterial stiffness and hemodynamics were independent correlates of LV mass in the entire cohort, whereas black ethnicity, PIs and PP/SI were independently associated with RWT. Upon multivariable adjustment that included clinical BP, arterial stiffness and hemodynamics, black ethnicity ceased to be independently associated with RWT, whereas white differences in LV mass in hypertensive patients. Research specifically examining patterns of BP and vascular tone reactivity should improve understanding of ethnic disparities in hypertensive organ damage.