Measurement of B-type Natriuretic Peptide in an emergency department using the Abbott AxSYM immunoassay

JM del Rey, E Ripoll, JL Moya *, L Manzano **
Clinical Chemistry Department, * Cardiology Department and ** Internal Medecine Department,
Hospital Ramón y Cajal, Madrid, Spain

Objective of study

Congestive heart failure (CHF) is marked by a rapid rise due to, among others, the aging population and improved survival in patients presenting other cardiovascular conditions. CHF diagnosis is routinely based on the clinical history, physical examination, ECG and chest x-ray.
B-type Natriuretic Peptide (BNP) is a cardiac hormone secreted as a response to ventricular volume expansion, pressure overload and resultant increase in wall tension.
The objective of this study is to assess the clinical utility of BNP as an additional diagnostic tool for patients with acute dyspnea.

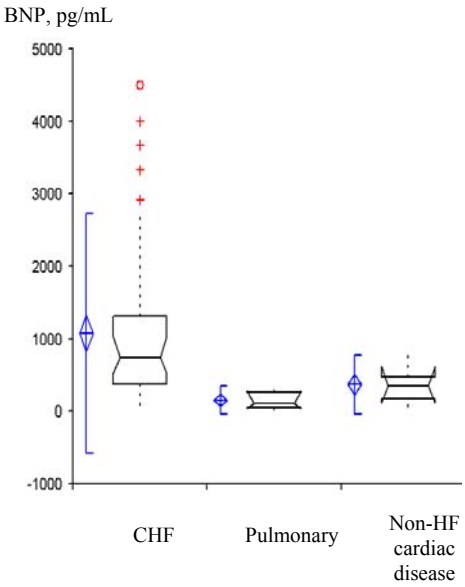
Material and Methods

A total of 86 patients (49 women and 37 men) presenting to the emergency department were screened. The overall age median was 78 years for women and 77 years for men.
The diagnosis of CHF was based on physical examination, ECG, chest x-ray and echocardiogram. Three patient categories were established depending on results these diagnostic tools:(1) dypsnea due to CHF, (2) dypsnea of pulmonary origin and (3) dypsnea due to cardiac causes but without CHF.
Blood (plasma) concentrations of BNP were determined on an AxSYM analyzer (Abbott Laboratories). Diagnostic accuracy of BNP was assessed by ROC curve analysis.

Results

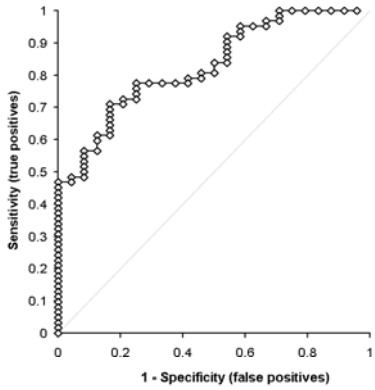
The final diagnosis was dyspnea due to congestive heart failure in 62 patients with a BNP median of 795 pg/mL (95% Interval of Confidence: 606 -1031 pg/mL), dypsnea with a pulmonary origin in 10 patients with a BNP median of 134 pg/mL (95% IC: 38 – 288 pg/mL) and dyspnea due to non-CHF cardiac causes 14 patients with a BNP median of 348 pg/mL (95% IC: 114 – 428 pg/mL). Difference between the three median values (Figure 1) were statistically significant (Kruskal-Wallis test, p<0.001).

Figure 1. BNP distribution



Area under the curve (AUC, Figure 2) for BNP in patients with dypsnea due to CHF and patients with dypsnea due to non-CHF causes was 0.829, with a standard error of 0.045 (p<0.001).

Figure 2. BNP ROC curve



Predictive positive value for 100 pg/mL, 200 pg/mL and 300 pg/mL as cut-off were, respectively, 78, 81 and 84%, while predictive negative value were 87, 64 and 52% (see Table 1).

Table 1. Diagnostic efficiency for BNP depending on cutt-off

Cut-off value	Positive predictive value	Negative predictive value
100 pg/mL	78%	87%
200 pg/mL	81%	64%
300 pg/mL	84%	52%

Conclusion

Used in conjunction with other clinical information, BNP measurement made with Abbott AxSYM BNP assay is useful in establishing or excluding heart failure in patients with acute dyspnea coming to a emergency department.
In order to discard an existing CHF, 100 pg/mL BNP cut-off would be acceptable (negative predictive value of 87%). However, if we want to be focused on specificity, 300 pg/mL BNP cut-off would be more efficient (positive predictive value 84%). The majority of patients with non CHF cardiac disease had BNP values between both cut-off.

Presented at Euromedlab,
Glasgow,
May 8-12, 2005