BNP and amino terminal proBNP assays did not differ for detecting congestive heart failure in the emergency department

Mueller T, Gegenhuber A, Poelz W, *et al.* Diagnostic accuracy of B type natriuretic peptide and amino terminal proBNP in the emergency diagnosis of heart failure. *Heart* 2005;**91**:606–12.

Clinical impact ratings Internal medicine ★★★★★★★ Emergency medicine ★★★★★☆☆ Cardiology ★★★★★★☆

Q In emergency department (ED) patients with dyspnoea, how do B type natriuretic peptide (BNP) concentrations compare with amino terminal proBNP (NT-proBNP) concentrations for detecting congestive heart failure (CHF)?

METHODS

Design: blinded comparison of BNP and NT-proBNP concentrations with a comfirmatory diagnosis of CHF based on the Framingham criteria after reviewing patient medical records.

Setting: a hospital in Linz, Austria.

Patients: 251 ED patients (mean age 73 y, 93% men) who had shortness of breath as the most prominent symptom. Patients with acute coronary syndromes were excluded.

Description of tests: BNP and NT-proBNT concentrations in plasma were measured by the AxSYM BNP assay (Abbott Laboratories, Abbot Park, IL, USA) and the Elecsys NT-proBNP test (Roche Diagnositics), respectively.

Diagnostic standard: blinded to BNP and NT-proBNP concentrations, 1 investigator reviewed all medical records and made a comfirmatory diagnosis of CHF based on the Framingham criteria. For the diagnosis of CHF, both of the following had to be present: Framingham CHF score with 2 major or 1 major criteria and 2 minor criteria; and evidence of systolic or diastolic dysfunction as determined by echocardiography.

Outcomes: sensitivity and specificity, positive and negative likelihood ratios, and area under the receiver operating characteristic curve for each of the assays.

MAIN RESULTS

55% of patients had dyspnoea caused by CHF. Sensitivity, specificity, and positive and negative likelihood ratios for several cutpoints for each of the assays are shown in the table. The assays did not differ for areas under the receiver operating characteristic curve.

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CONCLUSION

In emergency department patients with dyspnoea, B type natriuretic peptide (BNP) and amino terminal proBNP concentrations had similar diagnostic accuracy for detecting congestive heart failure.

Commentary

Results of the study by Meuller *et al* are in agreement with the many other studies (now >40) that show that natriuretic peptides assist in the diagnosis of CHF. The study also compared the diagnostic accuracy of 2 forms of BNP—the biologically active hormone and NT-proBNP (the inactive peptide cleaved from the prohormone after release by cardiac myocytes). This study shows that they are equivalent for diagnosing CHF, although another paper by the same authors found that BNP was more accurate in patients with left ventricular ejection fraction (LVEF) <35% and that NT-proBNP was more accurate in patients with LVEF <60%.[1]

The diagnostic accuracy of BNP was measured against a reference standard that combined Framingham criteria with echocardiographic evidence of systolic or diastolic dysfunction. It is questionable whether this is the best reference standard for CHF. It may be that BNP is a better method than current measures for identifying patients with cardiac dysfunction and for predicting prognosis.[2]

Clinicians would have most use for a test that can differentiate respiratory from cardiac causes in patients with dyspnoea. As this and other studies have shown, BNP can assist in diagnosing CHF, but clinicians should remember that respiratory diseases, such as pulmonary embolism and chronic obstructive pulmonary disease, also cause BNP levels to rise because of right ventricular strain. Current treatment also needs to be considered, because treatment with agents such as angiotensin converting enzyme inhibitors can normalise BNP levels.

Finally, no clear agreement exists on the cutpoints for BNP levels that should be used to define CHF. BNP values are higher in healthy women and in the elderly, although this may be caused in part by undetected diastolic heart failure in these populations. It is not yet clear at what values functional status declines and the risk of cardiovascular events begin to rise.

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1 Mueller T, Gegenhuber A, Poelz W, *et al. Clin Chem Lab Med* 2004;**42**:159–63.
2 Doust JA, Pietrzak E, Dobson A, *et al. BMJ* 2005;**330**:625.

Diagnostic characteristics of B type natriuretic peptide (BNP) and amino terminal proBNP (NT-proBNT) concentrations for detecting congestive heart failure in patients with dyspnoea*

Assay	Cutpoints (ng/l)	Sensitivity (95% CI)	Specificity (CI)	+LR	−LR
BNP	100†	96% (92 to 99)	61% (52 to 70)	2.46	0.07
	118	95% (90 to 98)	64% (55 to 73)	2.64	0.08
	160	90% (84 to 95)	73% (64 to 81)	3.33	0.14
	295	80% (73 to 87)	86% (78 to 92)	5.71	0.23
NT–proBNP	292	95% (90 to 98)	53% (43 to 62)	2.02	0.09
	125/450†	94% (89 to 97)	46% (37 to 56)	1.74	0.13
	476	90% (84 to 95)	65% (55 to 74)	2.57	0.15
	825	87% (80 to 92)	81% (72 to 88)	4.58	0.16

*Diagnostic terms defined in glossary; LRs calculated from data in article. †Approved cutpoint for the AxSYM BNP assay (100 ng/l) and Elecsys NT-proBNP assay (125 ng/l for patients <75 years of age and 450 ng/l for those ⩾75 years of age).