

# B-natriuretic peptide levels had high sensitivity and specificity for detecting abnormal ventricular function

Krishnaswamy P, Lubien E, Clopton P, et al. Utility of B-natriuretic peptide levels in identifying patients with left ventricular systolic or diastolic dysfunction. *Am J Med.* 2001 Sep;111:274-9.

## QUESTION

In patients referred for echocardiography, what are the diagnostic properties of B-natriuretic peptide (BNP) levels for detecting abnormal ventricular function?

## DESIGN

Blinded comparison of BNP levels with the results of echocardiography as the diagnostic standard.

## SETTING

San Diego Veteran's Healthcare System, California, USA.

## PATIENTS

400 patients (mean age 67 y, 96% men) who were referred for echocardiography to evaluate left ventricular function. Patients whose referral was to assess valve disease or to rule out vegetation or cardioembolic stroke were excluded.

## DESCRIPTION OF TEST AND DIAGNOSTIC STANDARD

The BNP level in blood samples from all patients was measured using the Triage B-type natriuretic fluorescence immunoassay (Biosite Diagnostics, La Jolla, CA, USA). All patients were scanned with 2-dimensional echocardiography using commercially available instruments that operate at 2.0 to 3.5 mHz; the scans were done in standard fash-

ion in parasternal long- and short-axis views and apical 2- and 4-chamber views. Experienced cardiologists (blinded to the BNP levels) interpreted the echocardiographic results and grouped the patients into those with normal ventricular function (ejection fraction > 50%, with no major wall-motion abnormalities and no evidence of impaired or restrictive hemodynamics) and those with abnormal ventricular function (ejection fraction < 50%; a regional wall-motion abnormality; or an impaired relaxation, restrictive, or pseudonormal pattern of left ventricular filling).

## MAIN OUTCOME MEASURES

Sensitivity, specificity, and positive and negative likelihood ratios.

## MAIN RESULTS

63% of patients had abnormal left ventricular function. Sensitivity, specificity, and positive and negative likelihood ratios for several cut points of BNP levels are shown in the Table. The area under the receiver-operating characteristic curve was 0.95 (95% CI, 0.93 to 0.97).

## CONCLUSION

In patients referred for echocardiography, B-natriuretic peptide levels (cut points 49 to 75 pg/mL) had high sensitivity and specificity for detecting abnormal ventricular function.

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### Diagnostic properties of B-natriuretic peptide levels for detecting abnormal ventricular function\*

Cut points (pg/mL)	Sensitivity (95% CI)	Specificity (CI)	+LR	-LR
345	36% (30 to 42)	99% (96 to 100)	36.00	0.65
160	65% (59 to 71)	99% (97 to 100)	65.00	0.35
110	75% (69 to 80)	98% (94 to 99)	37.50	0.26
75	85% (80 to 89)	97% (93 to 99)	28.33	0.15
62	89% (84 to 92)	90% (85 to 94)	8.90	0.12
49	91% (87 to 94)	82% (74 to 87)	5.06	0.11

\*Diagnostic terms defined in Glossary; CIs and LR's calculated from data in article.

## COMMENTARY

The study by Krishnaswamy and colleagues is the most recent in a series of studies attempting to find a clinically useful measure of left ventricular dysfunction in a world of increasing technology but diminishing access. The utility of such a test is clear: A simple, sensitive, and specific test would obviate the need for routine echocardiograms.

Krishnaswamy and colleagues tested the use of BNP levels in patients referred for echocardiograms and correlated these levels with blinded assessment of the echocardiographic results. The study results are impressive, and the table of likelihood ratios could be useful. However, a number of concerns exist that should be addressed before the BNP test can be used routinely.

First, this test was evaluated in a specific population: patients with suspected congestive heart failure (CHF). In order to validate the test, it should be applied to a wider population of patients to confirm that BNP levels are only elevated in those with CHF to the degree shown in the study. Some evidence exists that BNP levels are also elevated in patients with cor pulmonale secondary to lung disease (1). Ishii and colleagues (2) examined BNP in postinfarction patients in a general practice setting and did not find the discriminatory power found in the study by Krishnaswamy and colleagues.

Second, a concern exists about the effects of medications on BNP levels. Angiotensin-converting enzyme inhibitors do not seem to affect BNP levels, but  $\beta$ -blockers do (3). It is not clear whether this effect was seen in the Krishnaswamy study, but if such an effect existed, it could also confound the generalizability of these results. These 2 concerns need to be addressed before adopting this simple test for widespread use. Another interesting issue would be to see whether this test can be augmented by other such bedside tests as the Valsalva maneuver with systolic auscultatory excursion to strengthen its utility.

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## References

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