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

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

Diagnosis

Blinded comparison of BNP concentration 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 concentration 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 fashion in parasternal long- and short-axis views and apical 2- and 4-chamber views. Experienced cardiologists (blinded to the BNP concentrations) interpreted the echocardiographic results and grouped the patients into those with normal ventricular function (ejection fraction > 50%; a regional wall-motion abnormality; or an impaired relaxation, filling). Patients whose referral was to assess valve disease or to rule out vegetation or cardioembolic stroke were excluded.

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 concentrations 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 concentration (cut points 49 to 75 pg/ml) had high sensitivity and specificity for detecting abnormal ventricular function.

Diagnostic properties of B-natriuretic peptide concentrations for detecting abnormal ventricular function*

<table>
<thead>
<tr>
<th>Cut points (pg/ml)</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (CI)</th>
<th>+LR</th>
<th>–LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>345</td>
<td>36% (30 to 42)</td>
<td>99% (96 to 100)</td>
<td>36.00</td>
<td>0.65</td>
</tr>
<tr>
<td>160</td>
<td>65% (59 to 71)</td>
<td>99% (97 to 100)</td>
<td>65.00</td>
<td>0.35</td>
</tr>
<tr>
<td>110</td>
<td>75% (69 to 80)</td>
<td>98% (94 to 99)</td>
<td>37.50</td>
<td>0.26</td>
</tr>
<tr>
<td>75</td>
<td>85% (80 to 88)</td>
<td>97% (93 to 99)</td>
<td>28.33</td>
<td>0.15</td>
</tr>
<tr>
<td>62</td>
<td>89% (84 to 92)</td>
<td>90% (85 to 94)</td>
<td>8.90</td>
<td>0.12</td>
</tr>
<tr>
<td>49</td>
<td>91% (87 to 94)</td>
<td>82% (74 to 87)</td>
<td>5.06</td>
<td>0.11</td>
</tr>
</tbody>
</table>

*Diagnostic terms defined in glossary; CIs and LRs calculated from data in article.

COMMENTARY

The study by Krishnaswamy et al 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 et al tested the use of BNP concentrations in patients referred for echocardiograms and correlated these concentrations 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 concentrations are only elevated in those with CHF to the degree shown in the study. Some evidence exists that BNP concentrations are also elevated in patients with cor pulmonale secondary to lung disease.1 Ishii et al2 examined BNP in postinfarction patients in a general practice setting and did not find the discriminatory power found in the study by Krishnaswamy et al. Second, a concern exists about the effects of medications on BNP concentrations. Angiotensin-converting enzyme inhibitors do not seem to affect BNP concentrations, but β-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 generalisability 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 manoeuvre with systolic auscultatory excursion to strengthen its utility.

REFERENCES