B type natriuretic peptide testing: where are we now?

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It is possible that plasma BNP measurement might be to heart failure what glycated haemoglobin measurement is to diabetes mellitus. Indeed, within 12–24 months, BNP testing might become a routine addition to the monitoring of patients with heart failure. In the meantime its main role is in helping to rule out heart failure in patients with new symptoms.

The plasma concentrations of B type natriuretic peptide (BNP), and the co-secreted but inactive aminoterminal proBNP, are raised in patients with heart failure. In general, the more severe the symptoms or the more severe the underlying cardiac abnormality, the higher the concentration. In principle, therefore, the measurement of plasma BNP concentrations may aid decision making in a variety of clinical settings. Assays are now straightforward, with turn around times of less than 20 minutes. As with any new technology, initial over enthusiasm has been followed by a more realistic assessment of its clinical value.1

BNP is a 32 amino acid peptide hormone secreted by the myocardiun in response to stretch or strain.2 On secretion, proBNP, the storage form of BNP, is cleaved into the inactive N terminal proBNP and the endocrinologically active BNP. The active moiety causes vasodilatation, natriuresis, and diuresis, and as such helps to counteract the vasoconstriction and fluid retention triggered by many of the neurohormones that circulate at increased concentrations in patients with heart failure. In the USA, the Food and Drug Administration has licensed human recombinant BNP (Nesiritide) as a treatment for acute heart failure.

DIAGNOSIS OF HEART FAILURE

Several studies have examined the diagnostic utility of BNP in patients with heart failure. The highest value is found in studies of patients with new symptoms (such as breathlessness or fluid retention) who often have had no treatment. The overlap between the BNP concentration in such untreated new cases and those patients with new symptoms not caused by heart failure is small. Single centre studies, both in patients presenting to the emergency room3 or to rapid access clinics,4 report areas under the receiver operating characteristic (ROC) curves of above 0.90. Multi-centre studies in similar populations report somewhat lower values, but still above 0.85.5 6 7

The greatest value for BNP testing appears to be its ability to combine a very high negative predictive value with an acceptable positive predictive value. One can select a decision cut point below which heart failure as the cause of new symptoms is very unlikely (less than 5%) and above that cut point 50–70% of patients will have heart failure confirmed on further assessment. The guidelines on heart failure from both the European Society of Cardiology,7 and the National Institute for Clinical Excellence (NICE),8 have recommended the use of BNP (or NTproBNP) testing as a “rule-out” test for patients with new symptoms.

A randomised comparison of a strategy of making NTproBNP results available to primary care physicians, in addition to the ECG, chest radiograph, and echocardiographic data, has reported a substantial increase in diagnostic accuracy for patients with new symptoms that might be caused by heart failure.9

The clinical situation is very different in patients with a “historical” diagnosis of heart failure—usually not confirmed by cardiac imaging as recommended by all recent national and international guidelines. The plasma concentration of BNP is likely to be lower in such patients, who are likely to have been treated with diuretics and angiotensin converting enzyme inhibitors. The overlap in terms of plasma BNP concentrations between abnormal and normal is greater. The diagnostic utility is therefore lower, with typical areas under the curve of between 0.5 to 0.8.10 11 BNP is not an ideal “screening” test in such patients, and echocardiography (or other imaging) should be organised along with review of the previous evidence for heart failure.

SCREENING FOR LEFT VENTRICULAR SYSTOLIC DYSFUNCTION

Several population based studies have looked at the diagnostic value of BNP in identifying asymptomatic individuals within the general population who have left ventricular systolic dysfunction. The results vary depending on the study population, with highest values (as expected) in populations with a higher pre-test probability of disease, such as the elderly, and those with previous myocardial infarction. The North Glasgow study, based in the MONICA population, reported a negative predictive value of 97.5% and a positive predictive value of 32% in those over the age of 55.7 12 13

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Abbreviations: ACS, acute coronary syndrome; BATTLE-SCARRED, BNP-assisted treatment to lessen serial cardiovascular readmissions and death; BNP, B type natriuretic peptide; MONICA, monitoring trends and determinants in cardiovascular disease; NICE, National Institute for Clinical Excellence; NTproBNP, N terminal proBNP; ROC, receiver operating characteristic; STARS, suivi du traitement dans l’insuffisance cardiaque systolique
BNP measurement can be used to identify patients at low risk for heart failure. This may have a huge impact on the request for such tests. If the value of BNP monitoring of heart failure is confirmed, adjustment of treatment compared with conventional management (p = 0.02) will be necessary. As yet, the evidence is not robust, but if the test should be used as part of a structured approach to the diagnosis of heart failure and should not stand alone—further investigation of "test positive" patients will be necessary. The other areas of use for BNP testing are, currently at least, of research interest only. Within 12–24 months, however, BNP testing may become a routine addition to the monitoring of patients with heart failure.

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