NT-Pro and BNP for the Diagnosis of Acute Heart Failure

The Natriuretic Peptides; Analytical and Clinical Considerations

Presented by Kelley Urry, M.D., MPH
Objectives:
You WILL be able to answer these Questions

• **CLINICAL COMFORT.**
  • What do I need to know about the clinical side of Heart Failure to be comfortable talking about the natriuretic peptides? A focus on the Emergency Room.

• **NATRIURETIC KNOWLEDGE.**
  • What are the natriuretic peptides? Why do they show up in Heart Failure?

• **FOCUS ON THE RIGHT THINGS.**
  • How does “cleavage” make both NT-pro and BNP equally interesting. A focus on the relationship with the heart.

• **A HEAVY HITTING RECOMMENDATION.**
  • Do the NPs currently have the highest level of evidence/recommendation for usage they can receive from the American Heart Association?

• **ADVANTAGES OF NT-PRO AND BNP.**
  • What are the differences between BNP and NT-proBNP?

• **HOW NATRIURETIC PEPTIDES HAVE BEEN SHOWN TO REDUCE COST.**
  • What exactly are the cost savings to clinicians of using the NPs.
How and How Often Does HF Happen?
How Does HF Most Often Develop?

1. Coronary Artery Disease
2. Acute Coronary Syndrome
3. Heart Failure
A Common Pathway to Developing HF

Risk Factors:
- Dyslipidemia
- Hypertension
- Diabetes
- Smoking
- Obesity

Atherosclerosis → Coronary Artery Disease → Myocardial Infarction → Remodeling → Arrhythmias → Sudden Cardiac Death

Adapted from the brochure “Biomarkers: Covering the Continuum of Cardiovascular Disease.”
Statistics of Heart Failure

- HF affects ~5.8 million Americans.
- ~670,000 people are diagnosed annually.
- ~1 in 5 with heart failure die each year.
- In 2010, the estimated cost for HF via the healthcare system was $39.2 billion.

## Causes of Heart Failure

<table>
<thead>
<tr>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart attacks/coronary artery disease (60–70%)</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Emphysema</td>
</tr>
<tr>
<td>Irregular or rapid heartbeats</td>
</tr>
<tr>
<td>Leaky/restricted valves</td>
</tr>
<tr>
<td>Congenital heart disease</td>
</tr>
<tr>
<td>Toxins (e.g., alcohol) OR chemotherapeutic drugs</td>
</tr>
<tr>
<td>Cardiomyopathy (e.g., dilated cardiomyopathy)</td>
</tr>
<tr>
<td>Thyroid disease</td>
</tr>
<tr>
<td>There are additional causes</td>
</tr>
</tbody>
</table>

Adapted from Harrison’s Principles of Internal Medicine. (2013) 18th ed.
What's the Clinician's Perspective?
Symptoms of Heart Failure

The cardinal manifestations of HF are dyspnea and fatigue. This may cause fluid retention and can lead to extreme exercise intolerance at later stages.

Some patients have exercise intolerance but little evidence of fluid retention, whereas others complain primarily of edema, dyspnea, or fatigue.

Because some patients present without “WET” signs or symptoms of volume overload, the term “heart failure” is preferred over “congestive heart failure.”

Adapted from AHA 2013 HF Guidelines Circulation. Published online June 5, 2013.
Some Tests Used for the Diagnosis of HF

- Electrocardiogram
- Chest X-Ray
- Echocardiogram
- Stress Testing
- Natriuretic Peptides

### Stages of HF: Compare the AHA and NYHA Classes

<table>
<thead>
<tr>
<th>ACCF/AHA Stages of HF</th>
<th>NYHA Functional Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> At high risk for HF but without structural heart disease or symptoms of HF</td>
<td>None</td>
</tr>
<tr>
<td><strong>B</strong> Structural heart disease but without signs or symptoms of HF</td>
<td>I No limitation of physical activity but with LV dysfunction. Ordinary physical activity does not cause symptoms of HF.</td>
</tr>
<tr>
<td><strong>C</strong> Structural heart disease with prior or current symptoms of HF</td>
<td>II Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.</td>
</tr>
<tr>
<td><strong>D</strong> Refractory HF requiring specialized interventions</td>
<td>IV Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.</td>
</tr>
</tbody>
</table>

ACCF = American College of Cardiology Foundation; AHA = American Heart Association; NYHA = New York Heart Association

AHA 2013 HF Guidelines Circulation. Published online June 5, 2013.
NYHA Stages

Normal
No symptoms
Normal exercise
Normal LV function

NYHA I
Asymptomatic LV Dysfunction
No symptoms
No problem exercising
Abnormal LV function

NYHA II
Compensated CHF
Slight symptoms w/ exercise
Abnormal LV function

NYHA III
 Decompensated CHF
Symptoms w/ exercise
Abnormal LV function

NYHA IV
Refractory CHF
Symptoms at rest
Not controlled with treatment

Source: Am Heart Association, June 1999 Presentation (www.amhrt.org)
So, How Best to Think of Heart Failure?

Patients often have a progressively poor quality of life with a shortened life expectancy. In other words, the heart is simply not able to pump enough blood to meet the demands of the body. Patients often have a progressively poor quality of life with a shortened life expectancy.

HF is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood.

QUESTION FOR YOU!

How does the body deal with this backup of blood?
SECRETING NATRIURETIC PEPTIDE INTO THE BLOOD!

Unloading sodium (Na) into the urine from the blood gets rid of that extra water/fluid that’s not being pumped by the left ventricle well!

Because, simply, water follows sodium
Cardiovascular and Renal Actions of BNP

- ↑ Diuresis
- ↑ Natriuresis
- Inhibition of RAAS
- Systemic Vasodilatation
- ↓ Arterial and Venous Pressure

Adapted from De Lemos et al. Lancet 2003;362:316-22
Cardiovascular and Renal Actions of BNP

NT-Pro

Not Biologically Active
Why Are BNP and NT-proBNP Used Interchangeably?
BNP and NT-proBNP in the Blood Come from an Intracellular Precursor

ProBNP molecule cleaved to BNP and NT-proBNP.
Dilation of the left ventricle increases cardiac pre-proBNP gene expression.

The amount of pre-proBNP released into the circulation is directly proportional to the extent of heart-wall stretch.

Thus, natriuretic peptide levels are an accurate reflection of the severity of heart failure, particularly in those with depressed EF w/o kidney problems.
NYHA Stages

- **Normal**
  - No symptoms
  - Normal exercise
  - Normal LV function

- **NYHA I**
  - **Asymptomatic LV Dysfunction**
  - No symptoms
  - No problem exercising
  - Abnormal LV function

- **NYHA II**
  - **Compensated CHF**
  - Slight symptoms with exercise
  - Abnormal LV function

- **NYHA III**
  - ** Decompensated CHF**
  - Symptoms with exercise
  - Abnormal LV function

- **NYHA IV**
  - **Refractory CHF**
  - Symptoms at rest
  - Not controlled with treatment

Source: Am Heart Association, June 1999 Presentation (www.amheart.org)
Correlation with NYHA Classification


Median Concentration (pg/mL)

NYHA Class

BNP | NT-proBNP

I | II | III | IV

0 | 1500 | 1000 | 500 | 0

Clinical Support Slides for Using BNP:

Data on Why They're Useful and Strongly Recommended by the AHA
Before the Era of Natriuretic Peptides


Added Value of Natriuretic Peptides in the Emergency Department

Clinical Evaluation + BNP

Clinical Indecision Reduced
74%

Clinical Evaluation

Clinical Evaluation + BNP

Adapted from Maisel AS.  NEJM 2002; 347: 161-7
Early-stage Patients in Particular Can Go Underdiagnosed!

>50% of HF patients do not know that they have HF!

- **Class I**: Asymptomatic (25%)
- **Class II**: Symptoms during heavy effort (36%)
- **Class III**: Symptoms during mild effort (29%)
- **Class IV**: Symptomatic at rest (10%)

### AHA Recommendations: Benefit Classes and Levels of Evidence

#### Classification of Recommendation (COR)

<table>
<thead>
<tr>
<th>Class</th>
<th>Benefit vs Harm</th>
<th>Should/Reasonable/May be Considered to be Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>Benefit &gt;&gt;&gt; Harm</td>
<td>Should be Performed</td>
</tr>
<tr>
<td>Class IIa</td>
<td>Benefit &gt;&gt; Harm</td>
<td>Reasonable to be Performed</td>
</tr>
<tr>
<td>Class IIb</td>
<td>Benefit ≥ Harm</td>
<td>May be Considered to be Performed</td>
</tr>
<tr>
<td>Class III</td>
<td>No Benefit</td>
<td>Harm</td>
</tr>
</tbody>
</table>

#### Level of Evidence (LOE)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level A</td>
<td>Multiple populations evaluated. Data derived from multiple randomized clinical trials or meta-analysis</td>
</tr>
<tr>
<td>Level B</td>
<td>Limited populations evaluated. Data derived from a single randomized trial or non-randomized studies</td>
</tr>
<tr>
<td>Level C</td>
<td>Very limited populations evaluated. Only consensus opinion of experts, case studies, or standard of care</td>
</tr>
</tbody>
</table>

AHA 2013 HF Guidelines Circulation. Published online June 5, 2013.
### AHA Recommendations in Hospitalized

#### Class I (Should be Performed)
Measurement of BNP or NT-proBNP is useful to support clinical judgment for the **diagnosis of acutely decompensated HF**, especially in the setting of uncertainty for the diagnosis.

Measurement of BNP or NT-proBNP and/or cardiac troponin is useful for establishing **prognosis or disease severity** in **acutely decompensated HF**.

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I (Should be Performed) Measurement of BNP or NT-proBNP is useful to support clinical judgment for the <strong>diagnosis of acutely decompensated HF</strong>, especially in the setting of uncertainty for the diagnosis.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Measurement of BNP or NT-proBNP and/or cardiac troponin is useful for establishing <strong>prognosis or disease severity</strong> in <strong>acutely decompensated HF</strong>.</td>
<td>I</td>
<td>A</td>
</tr>
</tbody>
</table>

#### Class IIb (May be Considered to be Performed)
The usefulness of BNP- or NT-proBNP-guided therapy for acutely decompensated HF is not well established.

Measurement of other clinically available tests such as biomarkers of myocardial injury or fibrosis may be considered for additive risk stratification in patients with acutely decompensated HF.

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class IIb (May be Considered to be Performed) The usefulness of BNP- or NT-proBNP-guided therapy for acutely decompensated HF is not well established.</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>Measurement of other clinically available tests such as biomarkers of myocardial injury or fibrosis may be considered for additive risk stratification in patients with acutely decompensated HF.</td>
<td>IIb</td>
<td>A</td>
</tr>
</tbody>
</table>

**COR = Classification of Recommendation; LOE = Level of Evidence**

Adapted with permission from AHA 2013 HF Guidelines Circulation. Published online June 5, 2013.
### Biomarker: Ambulatory Outpatients

<table>
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<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class I (Should be Performed)</strong>&lt;br&gt;In ambulatory patients with dyspnea, measurement of BNP or NT-proBNP is useful to support clinical decision making regarding the diagnosis of HF, especially in the setting of clinical uncertainty.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Measurement of BNP or NT-proBNP is useful for establishing prognosis or disease severity in chronic HF.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td><strong>Class IIa (Reasonable to be Performed)</strong>&lt;br&gt;BNP- or NT-proBNP-guided HF therapy can be useful to achieve optimal dosing of guideline-directed medical therapy (GDMT) in select clinically euvolemic patients followed in a well-structured HF disease management program.</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td><strong>Class IIb (May be Considered to be Performed)</strong>&lt;br&gt;The usefulness of serial measurement of BNP or NT-proBNP to reduce hospitalization or mortality in patients with HF is not well established.</td>
<td>IIb</td>
<td>B</td>
</tr>
</tbody>
</table>

**COR = Classification of Recommendation; LOE = Level of Evidence**

Adapted with permission from AHA 2013 HF Guidelines Circulation. Published online June 5, 2013.
Advantages and Disadvantages

Though they are both clinically useful: BNP and NT-pro-BNP have advantages and disadvantages.
Know the Differences between the NPs

While both assays provide accurate, clinically relevant information that can aid clinicians in the diagnosis of heart failure, there are differences between the two molecules that should be considered.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>NT-proBNP</th>
<th>BNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>8.5 kd</td>
<td>3.5 kd</td>
</tr>
<tr>
<td>Physiologically Active</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Half Life</td>
<td>~120 min</td>
<td>20 min</td>
</tr>
<tr>
<td>Clearance Mechanisms</td>
<td>Renal Clearance</td>
<td>Receptor Mediated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enzymatic Degradation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Renal Clearance</td>
</tr>
<tr>
<td>Approved Cutoffs</td>
<td>Age &lt; 75 yrs: ≤ 125 pg/mL</td>
<td>&lt; 100 pg/mL</td>
</tr>
<tr>
<td></td>
<td>Age ≥ 75 yrs: ≤ 450 pg/mL</td>
<td></td>
</tr>
</tbody>
</table>
## Know the Differences: Analytical Considerations Anticoagulants and Sample Stability

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>BNP</th>
<th>NT-proBNP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half-life</td>
<td>20 min</td>
<td>90 min</td>
</tr>
<tr>
<td>Room Temp. Stability</td>
<td>24 h</td>
<td>72 h</td>
</tr>
<tr>
<td>Stability @ 2–8°C</td>
<td>24 h</td>
<td>72 h</td>
</tr>
<tr>
<td>Stability @ -20°C</td>
<td>9 months</td>
<td>12 months</td>
</tr>
<tr>
<td>Sample Type</td>
<td>EDTA</td>
<td>Heparinized</td>
</tr>
</tbody>
</table>

Adapted from Siemens IFUs: ADVIA Centaur® (BNP), Dimension®, IMMULITE®, Stratus® CS (NT-proBNP)
NT-Pro

Cardiovascular and Renal Actions of BNP

Not Biologically Active
Decision Levels
BNP Levels

- <100 pg/mL: HF ruled out
- 100 to 500 pg/mL: Gray Zone
- >500 pg/mL: HF ruled in

NT pro-BNP Levels

- <75 years: 125 pg/mL
- >75 years: 450 pg/mL

- >450 pg/mL, if <50 years: HF ruled in
- >900 pg/mL, if 50 to 75 years: HF ruled in
- >1800 pg/mL, if >75 years: HF ruled in
NT-proBNP testing for diagnosis and short-term prognosis in acute destabilized heart failure: an international pooled analysis of 1256 patients

The International Collaborative of NT-proBNP Study

James L. Januzzi, Roland van Kimmenade, John Lainchbury, Antoni Bayes-Genis, Jordi Ordonez-Llanos, Miguel Santalo-Bel, Yigal M. Pinto, and Mark Richards

**ICON: International Collaborative of NT-proBNP Literature with Alternative Rule-in Cutpoints**

Rule in or confirm heart failure:
Diagnostic cutoff is age-dependent

<table>
<thead>
<tr>
<th>Category</th>
<th>Optimal cut-point</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
<th>Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmatory ('rule in') cut-points</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50 years (n = 184)</td>
<td>450 pg/mL</td>
<td>97</td>
<td>93</td>
<td>76</td>
<td>99</td>
<td>94</td>
</tr>
<tr>
<td>50-75 years (n = 537)</td>
<td>900 pg/mL</td>
<td>90</td>
<td>82</td>
<td>83</td>
<td>88</td>
<td>85</td>
</tr>
<tr>
<td>&gt;75 years (n = 535)</td>
<td>1800 pg/mL</td>
<td>85</td>
<td>73</td>
<td>92</td>
<td>55</td>
<td>83</td>
</tr>
<tr>
<td>Rule in, overall</td>
<td>90</td>
<td>84</td>
<td>88</td>
<td>66</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

Natriuretic Peptide Work Up of ED Patient

Patient Presenting to the ED w/ acute dyspnea

Assess patient

<table>
<thead>
<tr>
<th>BNP</th>
<th>NT-proBNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100 pg/mL</td>
<td>&lt; 300 pg/mL</td>
</tr>
<tr>
<td>100-500 pg/mL</td>
<td>300-450 pg/mL</td>
</tr>
<tr>
<td>&gt; 500 pg/mL</td>
<td>&gt; 450 pg/mL</td>
</tr>
<tr>
<td>≥ 900 pg/mL</td>
<td>≥ 1800 pg/mL</td>
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</tbody>
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<table>
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<tr>
<th>AGE</th>
</tr>
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<tbody>
<tr>
<td>&lt;50 yrs</td>
</tr>
<tr>
<td>50-75 yrs</td>
</tr>
<tr>
<td>&gt;75 yrs</td>
</tr>
</tbody>
</table>

Acute CHF unlikely
Rule-Out

Acute CHF less likely
Investigate Further

Acute CHF likely
Rule-In

Cost Savings from Using NPs
Review of Objectives

• **CLINICAL COMFORT.**
  • What do I need to know about the clinical side of Heart Failure to be comfortable talking about the natriuretic peptides? A focus on the Emergency Room.

• **NATRIURETIC KNOWLEDGE.**
  • What are the natriuretic peptides? Why do they show up in Heart Failure?

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• **ADVANTAGES OF NT-PRO AND BNP.**
  • What are the differences between BNP and NT-proBNP?

• **HOW NATRIURETIC PEPTIDES HAVE BEEN SHOWN TO REDUCE READMISSIONS AND COST.**
  • What exactly are the cost savings to clinicians of using the NPs.
Nancy Gunther-Orsatti
U.S. Marketing Manager
Siemens Healthcare Diagnostics
N-Terminal Pro–B-Type Natriuretic Peptide Testing Improves the Management of Patients with Suspected Acute Heart Failure

Background—The diagnostic utility of N-terminal pro-B-type natriuretic peptide (NT-proBNP) in heart failure has been documented. However, most of the data were derived from countries with high healthcare resource use, and randomized evidence for utility of NT-proBNP was lacking.

Methods and Results—We tested the hypothesis that NT-proBNP testing improves the management of patients presenting with dyspnea to emergency departments in Canada by prospectively comparing the clinical and economic impact of a randomized management strategy either guided by NT-proBNP results or without knowledge of NT-proBNP concentrations. Five hundred patients presenting with dyspnea to 7 emergency departments were studied. The median NT-proBNP level among the 230 subjects with a final diagnosis of heart failure was 3697 compared with 212 pg/mL in those without heart failure (P<0.00001). Knowledge of NT-proBNP results reduced the duration of ED visit by 21% (6.3 to 5.6 hours; P=0.031), the number of patients rehospitalized over 60 days by 35% (51 to 33; P=0.046), and direct medical costs of all ED visits, hospitalizations, and subsequent outpatient services (US $6129 to US $5180 per patient; P=0.023) over 60 days from enrollment. Adding NT-proBNP to clinical judgment enhanced the accuracy of a diagnosis; the area under the receiver-operating characteristic curve increased from 0.83 to 0.90 (P<0.00001).

Conclusions—In a universal health coverage system mandating judicious use of healthcare resources, inclusion of NT-proBNP testing improves the management of patients presenting to emergency departments with dyspnea through improved diagnosis, cost savings, and improvement in selected outcomes. (Circulation. 2007;115:3103-3110.)

Key Words: costs and cost analysis ■ healthcare economics and organizations ■ heart failure ■ natriuretic peptides

To Lab and Hospital Management: Why Use NPs?

IMPROVE-CHF Study

Knowledge of NT-proBNP results reduced the following:

<table>
<thead>
<tr>
<th></th>
<th>NT-proBNP Guided</th>
<th>Clinically Guided</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of ED visits</td>
<td>21% 5.6 hours</td>
<td>6.3 hours</td>
<td>0.031</td>
</tr>
<tr>
<td># of patients rehospitalized over 60 days</td>
<td>35% 33</td>
<td>51</td>
<td>0.046</td>
</tr>
<tr>
<td>Direct medical costs over 60 days of enrollment</td>
<td>15% $5180</td>
<td>$6129</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Healthcare Reform: 30-day Readmissions

- Penalty allocated for 2013, 2014, and 2015:
  - 2013: -1%
  - 2014: -2%
  - 2015: -3%

- Payment adjustment will apply for all inpatient discharges, not just the associated patient populations.

- Penalty capped at maximum levels in given fiscal year; 1% in FY 2013, 2% in FY 2014, 3% in FY 2015 onward.

- Unlike VBP, no opportunity for high performers to earn bonus payments.

Source: http://www.advisory.com/Research/Health-Care-Industry-Committee/Members/Resources/Cheat-Sheets/Readmissions
Researchers have known for some time now that natriuretic peptides can predict outcomes, according to Christopher deFilippi, MD, a cardiologist and associate professor at the University of Maryland Medical Center in Baltimore and leading cardiac biomarker investigator. deFilippi noted that as early as 2004, researchers found that variations in N-terminal pro-brain natriuretic peptide (NT-proBNP) during hospitalization and pre-discharge predicted readmission and death within 6 months (Circulation 2004;110:2168–74). "Compelling evidence has accumulated for heart failure that shows that the discharge level of natriuretic peptides—or the change between the initial and the discharge level—can be very predictive of ultimately who will be readmitted over the next 30 to 180 days," deFilippi said. "I think that, in part, this has to do with which patients have truly been compensated, despite an improvement in symptoms. Most of the hospital’s treatment for heart failure will be diuresis of some sort. However, there may be individuals who diurese, but whose cardiac condition is still poor, and natriuretic peptides could be harbinger of other comorbidities that drive readmissions in these patients."

Using natriuretic peptides to predict readmission is part of a larger effort to understand the many potential uses of these markers. In fact, deFilippi is taking part in a large, randomized, multi-center study that will examine how NT-proBNP can be useful in managing medication for HF patients. Funded by NIH, the Guiding Evidence Based Therapy Using Biomarker Intensified Treatment (GUIDE-IT) trial will investigate whether NT-proBNP can help physicians adjust HF medications better than clinical judgment alone. The trial is still recruiting participants (ClinicalTrials.gov Identifier: NCT01685840).

Harmonization with the Central Lab

Dimension® RxL Max® Integrated Chemistry System

Dimension EXL® Integrated Chemistry System

Dimension Vista® Intelligent Lab Systems

ADVIA® Chemistry Systems

ADVIA® Centaur CP System

ADVIA® Centaur XP System
Menu Breadth:
Select Assays Individually Based on Patient Need

- Cardiac-Specific Assays
  - hsTroponin I
  - CKMB
  - Myoglobin
  - Cardiophase hsCRP
  - NTproBNP
- VTE* Assessment
  - D-Dimer – with PE Exclusion Claim**
- Pregnancy Assessment
  - Quantitative ßhCG

* Venous Thromboembolism
** In conjunction with non-high Pre-Test Probability Score
NTproBNP Assay

Aids in evaluating the extent of damage in heart failure (HF) and acute coronary syndromes (ACS) and assessing the risk of future events.

Stratus® CS NTproBNP Assay

Natrecor® (Nesiritide) BNP therapeutic pharmaceutical has no significant cross-reactivity (less than 1%)

Correlation with central lab instruments

Natrecor is a registered trademark of Scios, Inc.
Source: Stratus pBNP IFU rev E
Ease of Use: Simplified Steps Ensure Consistent Results

- Accepts blood directly from collection tube
  - No sample preparation needed
  - Instrument centrifuges whole blood into plasma automatically
- Consistency between operators—simply input sample and walk away
- Automated dilution process—eliminates the need for manual dilutions
Three Simple Steps to Process a Sample

Sample → TestPak → Start → Results