RESPONSE BIOMEDICAL

RAMP® NT-proBNP

Method Comparison Study
vs. the Ortho Clinical Diagnostics VITROS® 5600

NT-proBNP and Heart Failure

Heart failure (HF) is the inability of the heart to pump well enough to the body's needs for blood and oxygen. Affecting over 40 million people worldwide, it is one of the leading causes of hospitalization, and has the highest readmission rate of any discharge diagnosis.[1]

Symptoms of HF are non-specific (e.g. shortness of breath (dyspnoea), fatigue, weight changes) making it difficult to differentiate between HF and other causes.[2] In an acute setting, diagnosis of HF is further complicated as physical examination is insensitive, electrocardiograms are inaccurate, and chest X-ray findings are unreliable.[1]

International guidelines highlight the clinical utility of using natriuretic peptides, including NT-proBNP, as biomarkers to aid in the diagnosis and exclusion of HF, establishing the prognosis and disease severity and guiding treatment.[2-4]

> In 2015, heart failure affected over 40 million people.[5]
>
> ❖
>
> 2% of all adults have heart failure; for adults 65 years and older, the rate increases to more than 10%.[2]
>
> ❖
>
> As the population ages, the incidence of heart failure is expected to increase.[6]

RAMP NT-proBNP is quantitative test that measures NT-proBNP levels in EDTA whole blood, providing lab quality results in 15 minutes, using a RAMP instrument.

Method Comparison Study

A method comparison study between the RAMP NT-proBNP test on the RAMP 200 instrument versus the Ortho Clinical Diagnostics VITROS NT-proBNP immunoassay on the VITROS 5600 instrument was conducted in June 2016 at the emergency department of Shanghai Pudong People's Hospital in Shanghai, People's Republic of China. 22 paired plasma (heparin) and whole blood (EDTA) clinical specimens from patients presenting with dyspnoea and suspected of HF were used for the evaluation; testing for both methods occurred within 3-5 hours of sample draw. Information on final diagnosis was obtained only for samples with discordant results.

Results & Discussion

Studies have shown that an age-independent cut-point of 300 ng/L can be used to exclude acute HF in dyspnoeic patients with suspected acute heart failure (HF).[7,8] Further, age-stratified cut points can be used to effectively rule out chronic HF.[9] Therefore, for the purposes of this analysis, cut-offs of 300 ng/L

and 450 ng/L were used for the RAMP and VITROS results, respectively, given the age of the patient population in this study and to account for the differences in sample types between systems.

Using these cut-offs, the RAMP NT-proBNP test showed 95% concordance versus the VITROS of 95%. Results showed that of the 22 samples, RAMP only differed with the VITROS on a single result which was negative by RAMP and Positive by the VITROS. The discrepancy was verified by looking at the ultimate diagnosis of the patient, which was documented chronic obstructive pulmonary disease (COPD) (i.e. not HF), consistent with the RAMP result.

Further data analysis was performed using the Passing and Bablok regression analysis method described in CLSI guideline EP09-A3 – *Measurement Procedure Comparison and Bias Estimation Using Patient Samples; Approved Guideline – Third Edition*. 1 sample with a result of <5 ng/L could not be included in the analysis due to the non-numerical result (Figure 1.).

Figure 1. Passing and Bablok Regression and Correlation Analyses of RAMP NT-proBNP vs. VITROS NT-proBNP
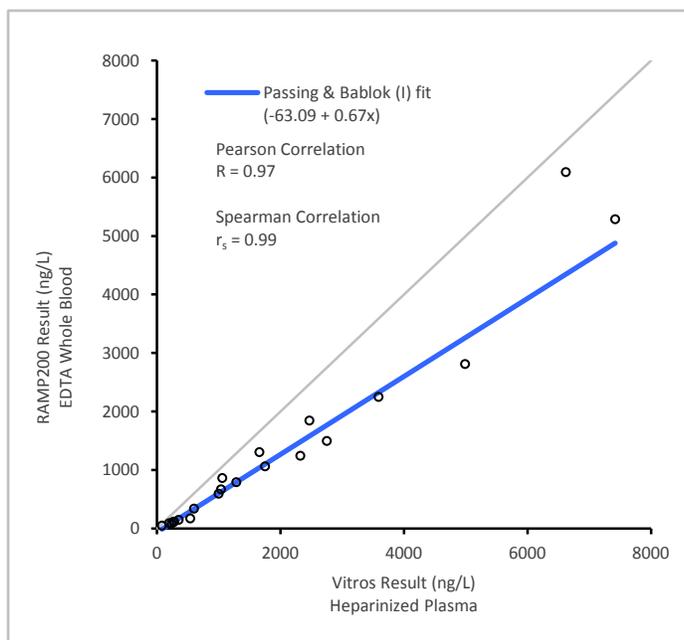
Conclusion

In this study, RAMP NT-proBNP showed excellent performance when compared to the Ortho Clinical Diagnostics VITROS 5600, a large-footprint laboratory analyzer.

Where the results were discordant between the systems, the ultimate patient diagnosis was consistent with the RAMP result, further supporting the use of a single cut-off value to rule-out of acute HF for dyspnoeic **patients.**

[1]   Peacock et al. *JACC*. 2010. **56(5)**; 343-351
[2]   Ponikowski, P., et al. *Eur Heart J.* 2016. **37(27)**: 2129-2200.
[3]   Yancy CW., et al. 2017 ACC/AHA/HFSA Focused Update of the 2013 ACCF/AHA Guideline. *Circulation*, 2017; 136:e137–e161
[4]   Christenson, RH., et al. NACB Guidelines. Biomarkers of ACS and HF. 2007
[5]   GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. *Lancet*. 2016 Oct 8; 388(10053): 1545–1602.
[6]   Metra M, Teerlink JR). "Heart failure". *Lancet*. 2017. **390 (10106)**: 1981–1995.
[7]   Januzzi, JL., et al. *Eur Heart J.* 2006. **27(3)** : 330-337.
[8]   Januzzi, JL., et al. *Am J Cardiol.* 2005. **95** : 948-954.
[9]   Gustafsson F., et al. *J Card Fail.* 2005. **11(5)** : S15-S20.

For more information about this study or RAMP Acute Care Diagnostics products, please contact Response Biomedical Corp. Technical Support.