The effects of super-flux (high performance) dialyzer on the plasma glycosylated pro-B-type natriuretic peptide (proBNP) and glycosylated N-terminal proBNP in end-stage renal disease patients on dialysis

Yasuaki Nakagawa1, Toshio Nishikimi1,4*, Naoto Minamino3, Chinatsu Yamada1, Kazuhiro Nakao1, Takeya Minami1, Yoshihiro Kuwabara1, Hideyuki Kinoshita1, Shinji Yasuno2, Kenji Ueshima2, Koichiro Kuwahara1, Kenji Kangawa3, Kazuwa Nakao1

From 6th International Conference on cGMP: Generators, Effectors and Therapeutic Implications Erfurt, Germany. 28-30 June 2013

Background
The current BNP immunoassay cross-reacts with glycosylated proBNP, and the NT-proBNP assay underestimates glycosylated NT-proBNP. In addition, the recently developed high performance dialyzer removes medium-sized molecular solutes such as β2-microglobulin. We therefore investigated the effects of high performance dialysis on measured levels of glycosylated proBNP, glycosylated NT-proBNP and other BNP-related peptides in end-stage renal disease (ESRD) patients on hemodialysis.

Method
We used our newly developed immunoassay to measure plasma total BNP, proBNP and mature BNP in 36 ESRD patients before and after hemodialysis. Plasma glycosylated NT-proBNP and nonglycosylated NT-proBNP were measured using Elecsys II after treatment with the deglycosylating enzymes neuramoinidase and O-glycosydase. We also measured plasma ANP and cGMP using radioimmunoassays.

Results
Total BNP (-38.9%), proBNP (-29.7%), mature BNP (-54%), glycosylated NT-proBNP(-45.5%), nonglycosylated NT-proBNP(-53.4%), ANP(-50.4%) and cGMP(-72.1%) were all significantly reduced after hemodialysis. The relative magnitudes of the reductions did not correlate with any indices of plasma volume, but instead appeared to be molecular weight dependent. The proBNP/total BNP and glycosylated NT-proBNP/nonglycosylated NT-proBNP ratios were increased after hemodialysis. The proBNP/total BNP ratio correlated positively with hemodialysis vintage and negatively with left atrial diameter and systolic blood pressure, whereas glycosylated/nonglycosylated NT-proBNP ratios correlated positively with parathyroid hormone levels.

Conclusion
These results suggest that plasma BNP and its related peptides measured immediately after hemodialysis may not be good indices of body fluid status in ESRD patients undergoing hemodialysis using a high performance dialyzer. ProBNP/total BNP may be influenced by hemodialysis vintage, cardiac afterload and diastolic function.

Authors' details
1Department of Medicine and Clinical Science, Kyoto Univ. Graduate School of Medicine, Japan. 4Department of EBM Research, Kyoto University Hospital, Institute for Advancement of Clinical and Translational Science, Japan. 3Research Institute National Cardiovascular Research Center, Fujii Hospital, Japan. 2Department of Cardiology, Fujii Hospital, Japan.

*Correspondence: nishikim@kuhp.kyoto-u.ac.jp
Reference
1. Nishikimi T, Okamoto H, Nakamura M, Ogawa N, Horii K, Nagata K, Nakagawa Y, Kinoshita H, Yamada C, Nakao K, Minami T, Kuwabara Y, Kuwahara K, Masuda I, Kangawa K, Minamino N, Nakao K. Direct immunochemiluminescent assay for proBNP and total BNP in human plasma proBNP and total BNP levels in normal and heart failure. PLoS One 2013, 8:e53233.

doi:10.1186/2050-6511-14-S1-P47

Cite this article as: Nakagawa et al.: The effects of super-flux (high performance) dialyzer on the plasma glycosylated pro-B-type natriuretic peptide (proBNP) and glycosylated N-terminal proBNP in end-stage renal disease patients on dialysis. BMC Pharmacology and Toxicology 2013, 14(Suppl 1):P47.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at www.biomedcentral.com/submit