

Dynamic Changes in NT-proBNP Levels in Unrelated Donors during Hematopoietic Stem Cells Mobilization

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Abstract : Background. Over the last few decades, the Center for International Blood and Marrow Transplant Research (CIBMTR) and the World Marrow Donor Association (WMDA) have been actively working to ensure the safety of the hematopoietic stem cell (HSC) donation process. Registration of adverse events that may occur during the donation period and establishing a relationship between donation and side effects are included in the WMDA international standards. The level of blood serum N-terminal pro-brain natriuretic peptide (NT-proBNP) is an early marker of myocardial stress. Due to the high analytical sensitivity and specificity, laboratory assessment of NT-proBNP makes it possible to objectively diagnose myocardial dysfunction. It is well known that the main stimulus for proBNP synthesis and secretion from atrial and ventricular cardiac myocytes is myocyte stretch and increase of myocardial extensibility and pressure in the heart chambers. Aim. The aim of the study was to assess the dynamic changes in the levels of blood serum N-terminal pro-brain natriuretic peptide of unrelated donors at various stages of hematopoietic stem cell mobilization. Materials. We have examined 133 unrelated donors, including 92 men and 41 women, that have been included into the study. The NT-proBNP levels were measured before the start of mobilization, then on the day of apheresis, and after the donation of allogeneic HSC. The relationship between NT-proBNP levels and body mass index (BMI), ferritin, hemoglobin, and white blood cells (WBC) levels was assessed on the day of apheresis. The median age of donors was 34 years. Mobilization of HSCs was managed with filgrastim administration at a dose of 10 µg/kg daily for 4-5 days. The first leukocytapheresis was performed on day 4 from the start of filgrastim administration. Quantitative values of the blood serum NT-proBNP level are presented as a median (Me), first and third quartiles (Q1-Q3). Comparative analysis was carried out using the t-test and correlation analysis as well by Spearman method. Results. The baseline blood serum NT-proBNP levels in all 133 donors were within the reference values (<125 pg/ml) and equaled 21,6 (10,0; 43,3) pg/ml. At the same time, the level of NT-proBNP in women was significantly higher than that of men. On the day of the HSC apheresis, a significant increase of blood serum NT-proBNP levels was detected and equald 131,2 (72,6; 165,3) pg/ml ($p < 0,001$), with higher rates in female donors. A statistically significant weak inverse correlation was established between the level of NT-proBNP and the BMI of donors ($-0.18, p = 0,03$), as well as the level of hemoglobin ($-0.33, p < 0,001$), and ferritin levels ($-0.19, p = 0,03$). No relationship has been established between the magnitude of WBC levels achieved as a result of the mobilization of HSC on the day of leukocytapheresis. A day after the apheresis, the blood serum NT-proBNP levels still exceeded the reference values, but there was a decreasing tendency. Conclusion. An increase of the blood serum NT-proBNP level in unrelated donors during the mobilization of HSC was established. Future studies should clarify the reason for this phenomenon, as well as its effects on donors' long-term health.

Keywords : unrelated donors, mobilization, hematopoietic stem cells, N-terminal pro-brain natriuretic peptide

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