Mobilization Factors of Successful Peripheral Blood Stem Cell Collection in Healthy Unrelated Donors

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Background: Since the establishment of National Stem Cell Donor Registry, unrelated stem cell transplantation (USCT) has been increasingly used to treat patients who have no matched related donors. Peripheral blood stem cells (PBSC), mobilized by granulocyte colony-stimulating factor (G-CSF), have recently become the main source of stem cells in USCT due to their convenience and safety.

Objective: In an attempt to define factors influencing successful PBSC mobilization and collection in healthy unrelated donors, we analyzed the yields of CD34+ cells from the donors in the registry.

Methods: We retrospectively studied unrelated donors who provided G-CSF mobilized PBSC for USCT from 2009 to 2017. Successful PBSC mobilization was defined as a total number of CD34+ cells in the product ≥ 5x10⁶/kg of recipient weight. Donor characteristics, G-CSF administration, apheresis process, and other factors potentially affecting the yields of mobilized CD34+ cells were analyzed. Multivariate logistic regression analysis was used to identify independent factors influencing successful mobilization.

Results: A total of 109 consecutive unrelated donors were included in this study (61 men, 48 women). The median age of donors was 31 (range, 19-56). The median dose of G-CSF used for PBSC mobilization was 10.5µg/kg/day (range 5.9-15.6) over 4-6 days. The median white blood cell (WBC) count in peripheral blood on the 1st day of apheresis was 53.3x10⁹/L (range, 22.1-97.5). Eighty nine of 109 mobilizations (81.7%) were successful and provided adequate number of CD34+ cells for USCT. Using multivariate analysis, factors significantly (p<0.05) associated with successful PBSC mobilization were donor age and sex (young and male donor), higher G-CSF dosage, high pre-collection peripheral WBC count, and recipient weight (thin recipient).

Conclusion: The important factors of successful PBSC mobilization in healthy unrelated donors were age and sex of donor, dose of G-CSF, pre-collection of WBC level, and recipient weight. This study provides useful additional information in donor selection for adequate G-CSF mobilized PBSC in USCT.

Keywords: Peripheral blood stem cell transplantation, Hematopoietic stem cell transplantation, CD34+