Automated Hematopoietic Progenitor Cell Analysis in Clinical Management of Peripheral Blood Stem Cell Collections

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Background: Peripheral blood stem cell (PBSC) transplantation is increasingly used to treat patients for hematologic and solid organ malignancies. Achieving successful transplantation and engraftment of stem cells requires an adequate number of CD34+ cells. However, determining the optimal time to harvest by apheresis is still challenging in clinical management. This study aims to find out the usefulness of the hematopoietic progenitor cell (HPC) count in peripheral blood to predict the CD34+ cells for collection.

Materials and Method: We conducted a retrospective analysis of patients and donors on whom PBSC collection was performed. Autologous PBSC and allogeneic PBSC collection data were included from 2019 to 2020. The CD34+ cells of the peripheral blood and processed apheresis products were evaluated by flow cytometer (FACSCanto, BD, USA). WBC, monocyte, and HPC counts were performed on both peripheral blood and apheresis products by XN-series automated analyzer, XN-20 (Sysmex, Japan). We had also compared the effect of the mobilization regimen with or without etoposide on the subsequent CD34+ cell collection.

Results: Out of a total of 224 cases of PBSC products were included in the study. In the correlation analysis, WBC was not correlated to CD34+ counts. Monocytes resulted in a low coefficient of correlation (r=0.142). HPC count correlated with CD34+ count in both peripheral blood and apheresis product (r=0.986, r=0.973, respectively). Regression analysis indicates that the correlation of peripheral HPC count and the CD34+ level of apheresis product was y=−27.0+32.9x. All the patients treated with a mobilization regimen including granul, and 47 patients used etoposide among them. However, CD34+ levels were not significantly different between patients with or without etoposide.

Conclusion: HPC count correlates with CD34+ count, which suggests HPC can be used to predict CD34+ level. Etoposide usage did not show significant increase in collected CD34+.

Keywords: Peripheral blood stem cell collection, Hematopoietic progenitor cell, Apheresis, Mobilization