Cellular Therapy and Transplantation (CTT), Vol. 2, No. 5, 2009
doi: 10.3205/ctt-2009-No5-abstract27

Abstract accepted for "Joint EBMT Pediatric Working Party – 3rd Raisa Gorbacheva Memorial Meeting on Hematopoietic Stem Cell Transplantation", Saint Petersburg, Russia, September 17–20, 2009

Importance of CFU-GM number for prediction of hematological reconstitution after low CD34$^+$ cell dose autotransplantation in children

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Abstract

Objective: The insufficiency of CD34$^+$ cell numbers at the time of peripheral blood stem cell (PBSC) collection is frequently observed in children after multiple blocks of chemotherapy.

Aim: To detect the additional parameter of transplant quality for the prediction of successful hematological reconstitution after auto-PBSC transplantation with low doses of CD34$^+$ cells in graft.

Methods: Forty-one children with malignances—who had received CD34$^+$cells/kg <2x10^6—were included in our study evaluating the correlations between CD34$^+$cell/kg and CFU-GM/kg at different dose levels ≥2x10^5/kg and <2x10^5/kg and the time of hematopoietic recovery. A Mann-Whitney U test and multivariate correlation method were used to evaluate the importance of each graft parameter for the prediction of engraftment.

Results: There was no correlation between CD34$^+$ cell dose and the time of engraftment in these pts. A high level of correlation was detected between the number of CFU-GM/kg infused and the time of neutrophil (r=-0.67, p<0.05), platelet (r=-0.3, p<0.05), and/or first reticulocyte ›2‰ (r=-0.66, p<0.05) reconstitution. Infusion of CFU-GM/kg ≥2x10^5/kg (n=26) resulted in rapid short-term neutrophil >0.5x10^9/l and platelet >20x10^9/l recovery (10 days (5–13) and 22 days (8–57), respectively) compared with CFU–GM/kg <2x10^5/kg (n=15) (13 days (11–21) and 25 days (10–95), respectively) (p<0.05).

Long-term hematopoietic recovery platelet counts >50x10^9/l were 31 days (range: 9–81) in CFU-GM/kg ≥2x10^5/kg infusion.

We conclude that the number of CFU-GM/kg was the most important parameter for predicting the auto-PBSC with CD34$^+$ cell dose <2x10^6/kg engraftment. The minimal recommended number of CFU-GM is 2x10^5/kg for the efficacy of hematopoietic recovery after auto-PBSCT.

Keywords: autotransplantation, CFU-GM, insufficiency of CD34+ cells, engraftment