



**CORRELATION STUDY OF CD34⁺ STEM CELL COUNT AND ENGRAFTMENT
PERIOD IN ALLOGENEIC TRANSPLANT PATIENTS IN UKMMC**

By

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ABSTRACT

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Hematopoietic progenitor stem cells obtained from the peripheral blood have been increasingly used primarily to treat patient with several malignant hematopoietic disorder. The success of the allogeneic transplantation is significantly dependent on the total CD34⁺ stem cell count which will determine the rate of the hematopoietic recovery and engraftment. This study was aimed to correlate the different doses of CD34⁺ stem cell with the period of engraftment. We compared 2 groups of patients based on the total CD34⁺ stem cell count infused with several parameters for engraftment. Group A consisted of 9 patients who were infused with $< 5 \times 10^6$ cells/kg CD34⁺ stem cell and Group B had consisted of 53 patients infused with $\geq 5 \times 10^6$ cells/kg CD34⁺ stem cell. The number of days taken to reach the neutrophil count $\geq 0.5 \times 10^9/L$, platelet count of $\geq 50 \times 10^{11}/L$ and successful complete chimerism were documented. In total 62 patients with hematopoietic malignancies were assessed by comparing low versus high doses of CD34⁺ stem cell. The number of CD34⁺ stem cell count correlated with the rate of engraftment. Infusion of more than 5×10^6 cells/kg patients body weight of CD34⁺ stem cells was significantly associated with faster neutrophil engraftment ($p= 0.002$). However, other parameters such as platelet engraftment ($p= 0.149$) and complete chimerism period ($p= 0.021$) were not significantly influenced by the CD34⁺ stem cell count. Generally this study has shown that infusion of $\geq 5 \times 10^6$ cells/kg CD34⁺ stem cell seems to shorten the time to hematopoietic engraftment.

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Hematopoietic progenitor stem cells that are obtained from the peripheral blood have become increasingly used over the last 15 years as the source of hematopoietic stem cells for transplantation. It has been widely used primarily to treat patients with different types of malignant hematologic disorders such as aplastic anemia, leukemia, lymphoma, myelodysplastic syndrome and others. Stem cell transplants is a well establish treatment to replace the stem cells after bone marrow have been destroyed by the disease, chemotherapy and radiation (Radical, 1990).

One of the major complications of allogeneic stem cell transplant is graft-versus-host disease (GVHD) that can be serious or fatal. In GVHD, the donated stem cells view the recipient's body as foreign, and these donated cells will attack the body. Several factors are important in the development of GVHD. However, the most important factor is the donor/recipient human leukocyte antigen (HLA) match. There are differences in the HLA between the donor and the recipient. These differences can cause donor cells to recognize the recipient's cell as foreign, and this will lead to an immune response against the recipient's tissues and organs (Bittencourt *et al.*, 2002; Morariu., 2001; Singal *et al.*, 2000). Therefore, for every transplant case the best matched HLA donor will be selected to prevent or minimized the risk of GVHD and thus promote engraftment.

Engraftment is an important milestone in allogeneic stem cell transplant recovery. Rapid engraftment will result in less mortality and morbidity and also reduces the use of resources such as transfusions of blood and blood products. Engraftment is the process of transplanted stem cells starting to grow and develop. It means your bone marrow function and immune system—which were weakened or destroyed by conditioning—are beginning to recover. Signs of