



The Impact Factors on Cord Blood Yield



Seyed HM^{1*} and Mona Ahmadipناه²

¹Department of Haematology, Tehran University of Medical Sciences, Iran

²Royan Stem Cell Technology Institute, Cord Blood Bank, Iran

*Corresponding author: Seyed Hadi Mousavi, Department of Haematology, School of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran

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Abstract

Umbilical Cord Blood (UCB) as an alternative source of hematopoietic stem cell transplantation in hematological and non-hematological disorders. The achievement of transplantation is greatly connected to the level of TNC and CD34+ cells. The assessment of ideal situations can decline the amount of sample rejection due to low cell count and increases the quality of cord blood units (CBUs) in the blood bank and the reaching to the better engraftment. In this study, we reviewed some factors that are in our control and could impact on cord blood quality and quantity.

Introduction

Umbilical cord blood (UCB) is an effective source of Hematopoietic Stem Cells Transplantation (HSCTs) in some hematological and non-hematological disorders [1]. One of the main issues that effect on transplantation outcome is Cord Blood (CB) cell count, furthermore to Human Leukocyte Antigen (HLA) similarity and CD34+ cell count [2,3]. Despite all the benefits it has such as without risk for donors, as soon as possible availability, a lower limitation at HLA similarity and lower GVHD than another source, the uses of this source is limited because of the low numbers of cells in one unit [4]. The numbers of total Nucleated Cells (TNC) and CD34+ cells are worthy markers of CB quality since they have been informed to be associated with engraftment [5]. Consequently, by considering the maternal and infant factors and also controlling the affective issues, such as mode of collection, time and temperature of collection, transport and processing, freeze and thaw techniques, can raise the CB yield.

There are no doubt some factors such as maternal age and weight, gestational period, cord length, placenta weight, number of previous live births, mode of delivery, maternal smoking, race, maternal diseases, fetal distress, fetal distress and baby's sex can impact on cord blood yield but control of these issues are out of hand and we cannot interfere with them [6]. Due to the high cost of cord blood storage and the direct relationship between the numbers of cells in a cord blood unit with the result of transplantation, umbilical cord blood banks seek to improve the quality and quantity of their center in order to provide the best service. Therefore, by controlling some of the factors mentioned above, we can achieve this.

Phlebotomy Training

The most important factor in cord blood collection is the training of staffs because having well-trained staffs can collect a high volume of blood with the best quality [7].

Mode of collection

There are two major techniques for CB collecting: in-uterus and ex-uterus collection. Each method has some advantages and disadvantages. In overall, in-uterus CB collection yielded a meaningfully superior volume, TNC, CD34+ cells and CFU than exutero [8,9].

Type and amount of anticoagulant

There are not many studies in this regard, but given that the umbilical cord blood sample is processed within a maximum of 48 hours after sampling, there is no particular problem in the sample if the anticoagulant ratio is met. Usually used citrate phosphate dextrose-adenine 1(CPD-A1) amount of 35ml in a 250cc bag [10,11].

Time and temperature

According to studies and or experience transportation and stored in CB before processing must be at room temperature and processing initiate as soon as possible until 48h after sampling. In this time and temperature, CBUs have higher quality and quantity [10].

Processing technique

If the process done by the device, we have higher cell count and quality than manually [12].

Frizzing technique

Di-Methyl Sulf-Oxide (DMSO) is used by most CBBs for frizzing. But the important point about this is the concentration of DMSO, that up to a final concentration of 10% have a lower toxicity and higher functionality [13].

Conclusion

Since CBB requires critical financial investment and organizational attempt, banking proficiency should be optimized. CBBs requisite develop plans to increase the TNC content of stored units. Have a CBB with suitable samples can assistance to high probably to transplantation of patients undergo blood diseases and other disorders can management with this source. Sometimes the only method to treat is CB transplant, thus should not lose the chance for having high-quality samples.

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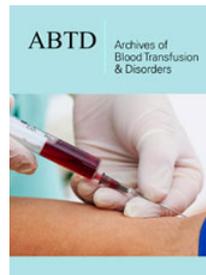
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