The Use of Non-Cryopreserved and Cryopreserved Hematopoietic Stem Cells for Autotransplantation in Multiple Myeloma

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Abstract

Peripheral blood stem cells (PBSCs) autologous transplantation is the standard care for transplant-eligible patients with multiple myeloma (MM). This treatment option is somewhat limited due to the high consumption of economic resources and the access to Cryobank. The method of using non-cryopreserved stem cells has more advantages than disadvantages.

Advantages	Disadvantages
• Transplant cost reduction • Simplicity of implementation • Expansion of the number of centers offering autotransplants • Facilitated implementation of transplantation in a center that will eventually have cryopreservation capability • Prevention of dimethyl sulfoxide (DMSO) toxicity • Time saving between last induction chemotherapy and high-dose therapy	Limitation for the use of some traditional high-dose schedules as a result of the limitation of the stem-cell storage period Less flexible allocation of resources: it requires a more efficient coordination of stem-cell mobilization, apheresis, administration of the high-dose therapy and the stem-cell reinfusion

Patients or Other Participants:

78 patients with MM were included in the study. All patients got the standard immunochemotherapy programs and had remission. Patients were divided into two groups: non-CRYO (n=35) and CRYO (n=43). Cryopreservation is a standard method of storage of HSC. Native HSC are saved from +4 °C to +6 °C for 72 hours. The number of CD34+ and 7AAD- cells, colony-forming ability were made after apheresis and before transplantation.

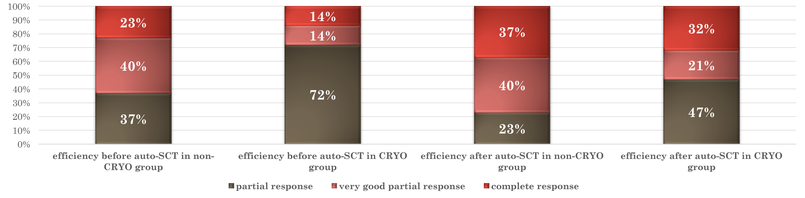
Results

There were no differences in the total number of CD34 + cells x 10^6/kg, or in the level of 7AAD– cells, or in the total CFA. However, there was a significant difference in the percentage of loss of CD34+ cells from the moment of apheresis to the moment of reinfusion. We suppose it was caused adverse effects by temperature changes in CRYO group.

Parameters	Non-CRYO	CRYO	*p*
CD34+ cells (apheresis) x10^6/kg	5.48±3.13	5.1±2.98	0.59
CD34+ cells (reinfusion) x10^6/kg	2.71±1.36	2.49±1.17	0.44
Absolute CD34+ count (apheresis) x10^9/L	2.21±1.53	1.86±1.3	0.3
Absolute CD34+ count (reinfusion) x10^9/L	**1.44±1.06**	**0.65±0.49**	**0.00005**
The loss of CD34+ cell count from the time of apheresis to the time of reinfusion, %	**34.8%±20.8**	**66.6%±23.9**	**0.002**
7-AAD– (apheresis), %	98.65±1.64	99.11±1.35	0.08
7-AAD– (reinfusion), %	93.07±4.64	90.58±7.32	0.09

Neutrophil recovery was achieved at 11th day (range 9-14) and platelets at 12th day (range 8-19) in non-CRYO group, 10th day (range 8-14) and 12th day (range 8-20) in CRYO group, respectively. HSC transplantation improved the effectiveness of treatment of MM patients in both groups, (fig. 1 and 2). The following results were obtained when evaluating 2-year progression free survival (PFS): 96% and 82% in the non-CRYO and CRYO groups, respectively (fig. 3). The identified trend requires further observation in subsequent survival assessments.

Fig. 1. Efficacy of auto-SCT in patients with MM



Parameters	Non-CRYO	CRYO	*p*
Platelet engraftment, days (range) (PLT > 25 x10^9/L)	12 (8-19)	12 (8-20)	0.71
Neutrophil engraftment, days (range) (ANC > 1,0 x10^9/L)	11 (9-14)	10 (8-14)	0.1
Platelet transfusions, doses	4 (2-8)	4 (1-8)	0.35
Red blood cell transfusions, doses	1 (0-6)	1 (0-3)	0.18

Fig. 2. MRD and PET-CT complete responses

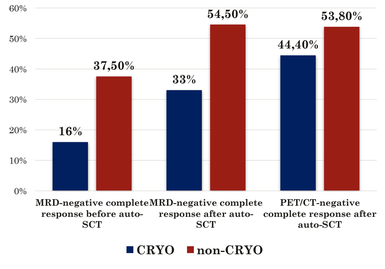
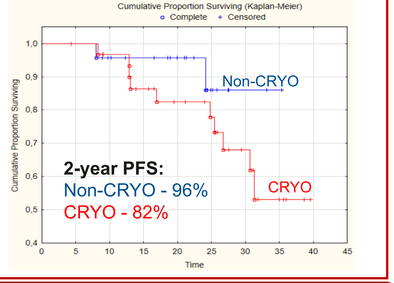


Fig. 3. PFS in CRYO and Non-CRYO groups



Conclusion

The method of storage of PBSCs without cryopreservation is equal to traditional method controlled freezing and can be used in hospitals which have no Cryobank.