The rationale behind collecting umbilical cord blood

Umbilikal kordon kanı toplanmasının altında yatan gerçek

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Abstract

Umbilical cord blood (UCB) is an increasingly important and rich source of stem cells. These cells can be used for the treatment of many diseases, including cancers and immune and genetic disorders. For patients for whom no suitable related donor is available, this source of hematopoietic stem cells offers substantial advantages, notably the relative ease of procurement, the absence of risk to the donor, the small likelihood of transmitting clinically important infections, the low risk of severe graft-versus-host disease (GVHD) and the rapid availability of placental blood for transplantation centers. Even though almost 80 diseases are treatable with cord blood stem cells, 97 percent of cord blood is still disposed of after birth and lost for patients in need! To improve availability of stem cells to a broader community, efforts should be undertaken to collect cord blood and expectant parents should be properly informed of their options with regard to cord blood banking.

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Introduction

Bone marrow (BM) and peripheral blood (PB) stem cell (SC) transplantations from human leukocyte antigen (HLA)-identical sibling donors have been used for many years in the treatment of hematological malignancies, BM failure syndromes, selected hereditary immunodeficiencies and metabolic disorders. A higher probability of successful engraftment and a reduction in the risk of potentially fatal graft-versus-host disease (GVHD) is conferred with close matching. Unfortunately, there is only a 25-30% chance of identifying a full sibling donor HLA match (1, 2). An alternative to a related donor involves seeking unrelated HLA-matched adult allogeneic donors outside the family. Today more than 13 million potential unrelated volunteer adult donors are registered in the Bone Marrow Donor Worldwide registry (3). However, more than 50% of all patients are unable to find a suitable adult donor in a timely manner (4) and only 30-40% of donor searches result in unrelated donor SC transplantation (5). Non-caucasians have an overall lower chance of identifying a fully matched unrelated adult donor because of genetic heterogeneity and under-representation of non-white donors in the registries (6).

Umbilical cord blood transplantation for children and adults

Umbilical cord blood (UCB) has been evaluated by clinical investigators as an alternate source for SC transplantation in an attempt to increase the availability of suitable donors and reduce the morbidity and mortality associated with allogeneic BM- and PB-SC transplantation (7-11). Many patients who are unable to identify a BM- or PB-SC donor can now benefit from a partially or fully matched UCB due to advances in the clinical practice of cord blood transplantation. Initially, UCB-SC
transplantation using allogeneic UCB was performed in small children. However, in the meantime it has been proven that older children, adolescents, and adults can also be successfully transplanted with unrelated allogeneic UCB (12) In fact, almost 50% of the transplanted allogeneic UCB units facilitated by the National Marrow Donor Program in 2008 were for adults (13). Furthermore, recently, the first child with leukaemia was successfully treated with her own UCB (14).

Umbilical cord blood for regenerative medicine
Additionally, SC from UCB may serve as a stem cell source for future cellular therapy for tissue repair and tissue regeneration. In particular, promising results from in-vitro studies using cord blood for engineering blood vessels and heart valves (15) point in this direction (16). Furthermore, in human and animal studies, such cells seem to provide disease-ameliorating effects in conditions such as urinary stress incontinence (17), Alzheimer’s disease (18), Huntington’s disease (19), amyotrophic lateral sclerosis (20), spinal cord injury (21) diabetes (22, 23) myocardial infarction (24-27), to name just a few. The value and power of UCB-SC and the potential they possess for medical treatment and cures is creating a new paradigm for the future. There are already more than 138 clinical trials listed in the U.S under the National Institute of Health for various diseases (28).

Conclusion
It has been estimated that the lifetime probability of undergoing an autologous or allogeneic UCB-SC transplantation is almost 1:200 if only 50% of all haematopoietic diseases, which are treatable with SC, were treated with UCB-SC (not including all potential non-haematopoietic conditions) (39). Considering this perspective it seems that all expectant parents should be advised properly by their doctors with complete and up-to-date information, thus helping the parents to make a sound decision regarding whether to store the CB of their baby in a private family bank or to donate it to a public bank. The only wrong decision that actually can be made is throwing away this life saving material.

Conflict of interest
None declared

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