



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

CURRENT USES AND FUTURE CHALLENGES OF CORD BLOOD STEM CELLS:

Author: Assoc. Professor K.S. VIJAYALAKSHMI M.sc(N) Community health nursing department, Sree Balaji college of Nursing, Bharath Institute of Higher Education and Research, Chromepet, Chennai.

INTRODUCTION

After a baby is born, cord blood is left in the umbilical cord and placenta. It is relatively easy to collect, with no risk to the mother or baby. It contains haematopoietic (blood) stem cells: rare cells normally found in the bone marrow.



Haematopoietic stem cells (HSCs) can make every type of cell in the blood – red cells, white cells and platelets. They are responsible for maintaining blood production throughout our lives. They have been used for many years in bone marrow transplants to treat blood diseases.

There have been several reports suggesting that cord blood may contain other types of stem cells which can produce specialised cells that do not belong to the blood, such as nerve cells. These findings are highly controversial among scientists and are not widely accepted.

CORD BLOOD TREATMENT TODAY

Cord blood is used to treat children with cancerous blood disorders such as leukaemia, or genetic blood diseases like Fanconi anaemia. The cord blood is transplanted into the patient, where the HSCs can make new, healthy blood cells to replace those damaged by the patient's disease or by a medical treatment such as chemotherapy for cancer.

In this way, cord blood offers a useful alternative to bone marrow transplants for some patients. It is easier to collect than bone marrow and can be stored frozen until it is needed. It also seems to be less likely than bone marrow to cause immune rejection or complications such as Graft versus Host Disease. This means that cord blood does not need to be as perfectly matched to the patient as bone marrow (though some matching is still necessary).

However, cord blood transplants also have limitations. Treatment of adults with cord blood typically requires two units of cord blood to treat one adult. Clinical trials using "double cord blood transplantation" for adults have demonstrated outcomes similar to use of other sources of HSCs, such as bone marrow or mobilized peripheral blood. Current studies are being done to expand a single cord blood unit for use in adults. Cord blood can also only be used to treat blood diseases. No therapies for non-blood-related diseases have yet been developed using HSCs from either cord blood or adult bone marrow.

CURRENT RESEARCH ON BLOOD DISEASES

A major limitation of cord blood transplantation is that the blood obtained from a single umbilical cord does not contain as many haematopoietic stem cells as a bone marrow donation. Scientists believe this is the main reason that treating adult patients with cord blood is so difficult: adults are larger and need more HSCs than children.

A transplant body in the early days after transplantation. This serious complication has been partially overcome by transplanting blood from two umbilical cords into larger children and adults. Results of clinical trials into double cord blood transplants (in place of bone marrow transplants) have shown the technique to be very successful. Some researchers have also tried to increase the total number of HSCs obtained from each umbilical cord by collecting additional blood from the placenta.

Much research is focused on trying to increase the number of HSCs that can be obtained from one cord blood sample by growing and multiplying the cells in the laboratory. This is known as "ex vivo expansion". Several preliminary clinical trials using this technique are underway. The results so far are mixed: some results suggest that ex vivo expansion reduces the time taken for new blood cells to appear in the body after transplantation; however, adult patients still appear to need blood from two umbilical cords. More research is needed to understand whether there is a real benefit for patients, and this approach has yet to be approved for routine clinical use.

CURRENT RESEARCH ON OTHER DISEASES

Several research teams have reported studies in animals suggesting that cord blood can repair tissues other than blood, in diseases ranging from heart attacks to strokes. These findings are controversial: scientists often cannot reproduce such results and it is not clear HOW cord blood may be having such effects. When beneficial effects are observed they may be very slight and not significant enough to be useful for developing treatments. If there are positive effects, they might be explained not by cord blood cells making nerve or heart cells, but by the cells in the cord blood releasing substances that help the body repair damage.

Current research aims to answer these questions in order to establish whether safe and effective treatments for non-blood diseases could be developed in the future using cord blood. An early clinical trial investigating cord blood treatment of childhood type 1 diabetes was unsuccessful. Other very early stage clinical trials are now exploring the use of cord blood transplants to treat children with brain disorders such as cerebral palsy or traumatic brain injury. However, such trials have not yet shown any positive effects and most scientists believe much more laboratory research is needed to understand how cord blood cells behave and whether they may be useful in these kinds of treatments

FUTURE CHALLENGES

Experts believe that umbilical cord blood is an important source of blood stem cells and expect that its full potential for treatment of blood disorders is yet to be revealed. Other types of stem cell such as induced pluripotent stem cells may prove to be better suited to treating non-blood-related diseases, but this question can only be answered by further research.

REFERENCE

[EuroStemCell fact sheet on blood stem cells \(HSCs\)](#)

[The European Group for Blood and Marrow Transplantation](#)

[UK National Health Service cord blood bank](#)

[Umbilical Cord Blood Banking](#) - an opinion paper by the Royal College of Obstetricians and Gynaecologists' Scientific Advisory Committee (published June 2006)