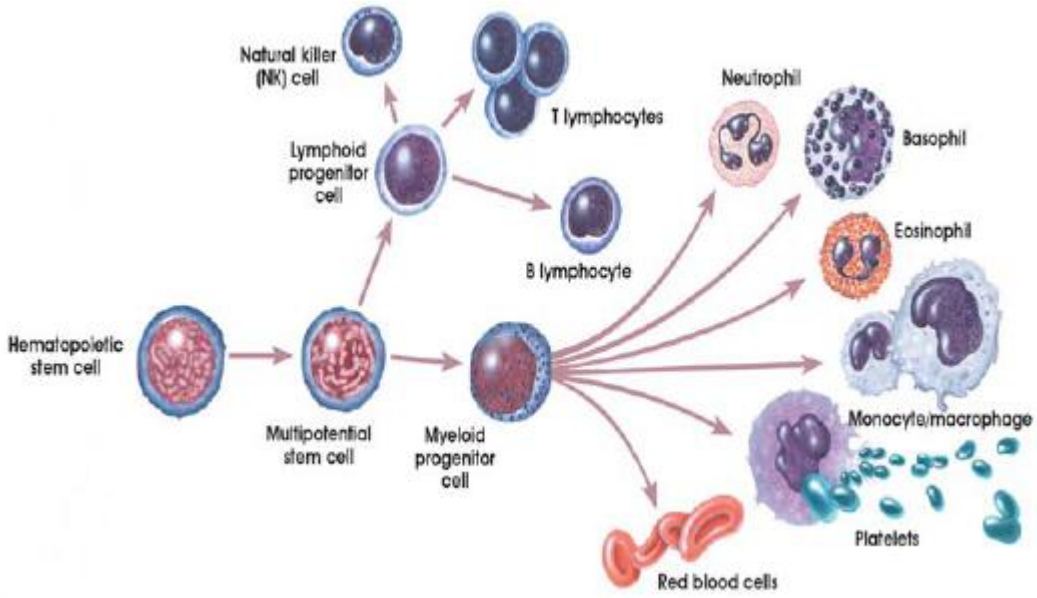
Cord Blood Stem Cell Banking

Information for Health Care Professionals

What are Stem cells?

Stem cells have the remarkable potential to develop into many different cell types in the body. Serving as a sort of repair system for the body, they can theoretically divide without limit to replenish other cells throughout life. When a stem cell divides, each new cell has the potential to either remain a stem cell or become another type of cell with a more specialized function, such as a muscle cell, a red blood cell, or a brain cell.



Source : National Institute of Health

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Umbilical cord blood is a rich source of these haematopoietic stem cells (HPCs) and, multipotent HPCs (1). In fact, cord blood has a significantly higher concentration per volume of primitive HPCs than bone marrow (2, 3), thereby making it a good source of cells for transplantation (4).

Uses for stem cells

The first successful cord blood stem cell transplant was carried out by Dr E Gluckman on a 5 year old boy with Fanconi's Anaemia, he was given a 0% chance of survival.(5) The procedure was carried out in Paris, the boy made a full recovery and he is alive and well today.

Since then, the number of transplants of HPCs derived from cord blood has increased to over 6000. Numerous reports document the feasibility and efficacy of the transplantation of cord blood stem cells for the treatment of a broad range of disorders, including haematological malignancies, solid tumours, constitutional and acquired bone marrow failure syndromes, hemoglobinopathies, congenital immune deficiencies, and inherited disorders of metabolism (6, 7, 9) (A full list of conditions, that can be treated with stem cells can be found at the end of this document.)

One major benefit of cord blood is the reduced capacity of cord blood cells to produce an alloreactive response (i.e., an immune response against the recipient). This results in markedly less frequent and less severe graft versus host disease (GVHD) (8). Cord blood stem cells are a perfect match for the baby and carry a significant probability of match in other family members, with the probability of an exact match for a sibling being 25%(16).

The Future…

Exciting developments in the research of treatments are announced almost daily in the media, announcing the potential of stem cells to treat a variety of diseases, including Multiple Sclerosis,(12) Type I Diabetes (10), Testicular Cancer(11), and to regenerate the heart following a Myocardial infarction(13). The government has already funded a lot of this research and recently announced in the 2005 Budget a £2.5 Billion investment over the next 10 years

Cord Blood stem cell Banking

Following the first successful transplant, the importance of cord blood stem cells in medical treatments became recognised among doctors and their storage for future use became a pressing need. In 1992, a doctor of biochemistry, David Harris, set the foundations for the establishment of the first private cord blood bank when he decided to preserve the cord blood stem cells of his newborn son. Since that date, it is estimated that over a million parents worldwide have chosen to store their child's cord blood in a private facility.

The first NHS cord blood bank was set up in the UK in 1996 by the National Blood Service and to date have collected and cryopreserved over 7,000 donated samples.

Altruistic Cord blood donation is still only available in 3 hospitals in the UK (15) so the opportunity to donate is very limited.

Although the chances of using stem cells are still comparatively low, it has become more likely over the past few years. In 1997 the probability of autologous usage was estimated

to be 1 in 2700. A study in 2004 estimated it to be 1 in 400 during a lifetime. (17) If allogeneic use within the family is considered then the probability is almost doubled. Many factors affect the parents' decision to bank their child's cord blood; the more common reasons are listed below.

1. There is a family history of one or more of the diseases that use stem cells as a treatment.
2. The parents are from a mixed race background. Research has shown that finding a match for this group is very difficult.
3. Parents see cord blood stem cells as a valuable resource for the future. They have a real belief in the research findings published to date and think that these potential applications may be of benefit to the baby or other biological family members in the future

The procedure

Parents who choose to collect and save their babies cord blood will approach their midwife and ask for help and guidance.

You will already be familiar with taking cord blood samples following birth. The cord blood is taken using Aseptic Technique to prevent contamination of the sample.

All necessary equipment for the collection is included in the kit that the parents will bring with them to the delivery room.

There are two methods that can be used:

1. Immediately after the Cord is clamped and cut with the placenta still in utero
2. After delivery of the placenta.

Both yield the comparable volumes of cord blood stem cells. It is up to your clinical judgement when you choose to collect the cord blood. (14)

Future Health accreditation by the Department of Health

Future Health is the ONLY private Stem Cell Bank to be accredited by the UK Department of Health (0083/00/00/0-04). This means that everything, from the collection methodology, through to our laboratory processes and storage facilities have been rigorously inspected and fully approved. Furthermore it is subject to constant monitoring and further inspections in the future. The NHS guidelines state that only cord blood stem cells that have been processed and cryopreserved by a DoH accredited tissue bank can be used in the UK. We DO NOT engage in any research activities, and families retain full ownership and control of their stem cells.

Further information training and advice

We at Future Health are committed to providing up to date, information and advice for all Midwives. We are happy to provide, free of charge, any training on the stem cell banking or the collection procedure that you require, either individually or as a group workshop. This can be used to contribute to your PREP requirements and a certificate can be provided if needed.

Conditions that benefit from stem cell treatment

Stem Cell Disorders
Aplastic Anaemia
Fanconi Anaemia
Paroxysmal Nocturnal Haemoglobinuria (PNH)

Acute Luekaemias
Acute Lymphomblastic Leukaemia
Acute Myloid Leukaemia
Acute Biphenotypic Leukaemia
Acute undifferentiated Leukaemia

Chronic Leukaemias
Chronic myeloid Leukaemia
Chronic Lyphoblastic Leukaemia
Juvenile myelomonocytic leukaemia
Juvenile myeloid leukaemia
Myeloproliferative Disorders
Acute myelofibrosis
Agnogenic myeloid metaplasia (myelofibrosis)
Polycythaemia Vera
Essential thrombocythaemia

Myelodisplastic syndromes
Refractory anaemia (RA)
Refractory Anaemia with Ringed Sideroblasts (RARS)
Refractory anaemia with excess blasts (RAEB)
Refractory anaemia with excess blasts in transformation (RAEB-T)
Chronic Myelomonocytic leukaemia (CMML)

Lymphoproliferative Disorders
Non-Hodgkin's Lymphoma
Hodgkin's disease
Prolymphocytic Leukaemia

Inherited Diseases
Beta Thalassaemia
Pure Red cell Aplasia
Sickle Cell Disease

Liposomal Storage Diseases
Mucopholysaccaridoses (MPS)
Hurler's syndrome (MPS-IH)
Scheie Syndrome (MPS-IS)
Hunter's Syndrome (MPS-II)
Sanfilippo Syndrome (MPS-III)
Morquio Syndrome (MPS–IV)
Maroteaux-Lamy syndrome
Sly Syndrome Beta Glucuronidase Deficiency
Adrenoleukodystrophy
Mucolipidosis-II (I cell disease)
Krabbe Disease
Gaucher's Disease
Niemann-Pick Disease
Wolman Disease
Metachromatic Leukodystrophy

Histiocytic Disorders
Familial Erythrophagocytic Lymphohistiocytosis
Histiocytosis-x
Hemophagocytosis

Phagocyte Disorders
Chediak-Higashi Syndrome
Chronic Granulomatous Deficiency
Neutrophil Actin Deficiency
Reticular Dysgenesis

Congenital Immune system disorders
Bare Lymphocyte Syndrome
Omenn's Syndrome
Severe Combined Immunodeficiency (SCID)
SCID with Adenosine deaminase deficiency
Absence of T &B cells SCID
Absence off T Cells normal B cells SCID
Common Variable Immunodeficiency
Wiskott - Aldrich syndrome
X linked Lymphoproliferative Disorder

Inherited Platelet Disorders

Amegakaryocytosis/Congenital Thrombocytopaenia

Plasma Cell Disorders
Multiple Myeloma
Plasma Cell Leukaemia
Waldenstrom's Macroglobulinaemia

Other inherited disorders
Lesch-Nyhan Syndrome
Cartilage-Hair Hypoplasia
Glanzmann Thrombasthenia
Osteopetrosis

Other Malignancies
Ewing Sarcoma
Neuroblastoma
Renal Cell Carcinoma

Source: www.parentsguidecordblood.com

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