1st ITERA consensus meeting on the use, efficacy and applications of Umbilical Cord (UC) and Umbilical Cord Blood (UCB) Stem Cells (SC)
Kasteel Vaeshartelt
Maastricht, The Netherlands
October 14, 2008

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Aim of the consensus meeting

To define consensus statements for the following fundamental questions:

1. What is regenerative medicine and why is it so very important for the future of medical therapies?
2. Why is UCB important?
3. What is the importance of mesenchymal stem cells (MSC) from the cord tissue itself?
4. Why is it important to store stem cells from the UCB or the UC in a bank?
5. Should a child's UCSC be stored for itself and its family as well for the general public?
6. What are the current diseases that can be treated with stem cells?

Approach

In the run-up to the consensus meeting each member of the consensus panel was asked the questions in an interview. The different answers of each expert were combined and draft statements to each question were worded. The draft statements were presented to the expert panel during the consensus meeting. The statements were discussed and where necessary adapted to give rise to the final, published consensus statements. The final consensus statements were approved by the consensus panel.

Summary

- Regenerative medicine is a novel approach in medicine, aiming to repair or restore function of damaged tissue by making use of stem cells and progenitor cells
- Stem cells from umbilical cord blood or the umbilical cord tissue can be easily obtained and without any risk
- They are mostly unharmed from environmental influences or the ageing process
- Hematopoietic (blood) stem cells are standard care in many applications nowadays
- There is a substantial and rapidly increasing list of potential clinical applications of mesenchymal stem cells
- Both, the umbilical cord and umbilical cord blood stem cells are worth being stored
- Private/shared storage approaches (with potential use of privately stored stem cells on unrelated persons) might offer a good solution to fulfill the needs of individuals as well as the general public

Abbreviations: hematopoietic stem cells: HSC; mesenchymal stem cells: MSC; umbilical cord: UC; umbilical cord blood: UCB; Stem cells from UC and UCB, umbilical cord stem cells: UCSC;

Final (approved) consensus statements

1. **What is regenerative medicine and why is it so very important for the future of medical therapies?**

- A new and novel approach in medicine
- Regenerative medicine is about restoring or repairing different tissues or organs damaged by disease, age or accident
- It makes use of the body's own or other person's resources i.e. stem cells and progenitor cells
- Cellular treatments are treatments that use a natural source rather than artificial drugs or compounds
- Most therapeutic clinical applications are still experimental and in clinical trials, but the perspective is extremely bright and appealing
- Hematopoietic (blood) SC are standard care in many applications nowadays

2. **Why are stem cells from UCB or from the UC (generally UCSC) important?**

- UCSC are ethically generally accepted by the community
- UCSC are mostly uncompromised from environmental influences or the ageing process
- UCSC can be obtained harmlessly, easily and without any risk

- HSC from UCB have a much higher proliferative capacity, a better differentiation potential and a lower immunogenicity than adult cell sources

3. **What is the importance of MSC from the cord tissue itself?**

- MSC are available in much higher numbers and can be isolated much easier from UC compared to UCB
- MSC are multipotent cells with broad differentiation potential and are complementary to cord blood SC
- There's a substantial and rapidly increasing list of potential clinical applications of MSCs
- The largest indications are in regenerative medicine and tissue engineering of mesenchymal and neurological tissues
- MSC can be used for more than one clinical application as the numbers that can be collected from the cord are substantially higher
- MSC can be used for co-transplantation to support HSC transplantation aiming to improve clinical efficacy
- MSC have in addition to their original regenerative capacity the ability to modulate the immune system of the recipient
- There are no MSC based standard clinical applications as yet, but ongoing trials are very promising

4. **Why is it important to store stem cells from the UCB or the UC in a bank?**

- UCSC are worth being stored in a bank
- Birth is a one-time opportunity while disease can occur later throughout life
- UCSC are available for use as soon as they are needed
- Cryopreservation allows to store the UCSC for many years
- Cryopreserved UCSC could be used for future therapies that are still to be developed
- SC banks are subjected to strict legislation and quality control which ensures the best possible safety level
- It is an individual decision a parent needs to make

5. **Is it worth storing a child's UCSC for itself and its family as well for the general public?**

- UC is an important source of young and vital stem cells
- Private/family banking and public banking have their specific merits and are not mutually exclusive
- The autologous use of SCs has increased rapidly over the last few years, as a result the demand for private storage is increasing
- Private/shared approaches (with unrelated use of privately stored SCs) might offer a good

solution to fulfill the needs of individuals as well as the general public
- It is important to inform parents well upfront and counsel if asked to make the cells available

6. What are the current diseases that can be treated with stem cells?
- Over 70 diseases are already being successfully treated or supported with hematopoietic stem cells (HSC) and around 15 with non-hematopoietic stem cells
- Most of these are diseases for which HSC have become part of standard treatments
- The numbers will very likely increase in the coming years
- There are diseases for which stem cell treatments have been shown beneficial, but have not been adopted as standard therapy completely so far
- A list of available stem cell treatments has been published in Med Law. 2008 Mar;27(1):147-65 (see Appendix 1)

Expert panel members:

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Appendix I: Examples of diseases treatable or supportable by cord blood cells.

Oncologic Disorders	
Acute lymphoblastic leukaemia	Hemaphagocytic lymphohistiocytosis
Acute myeloid leukaemia	Hodgkin's disease
Autoimmune lymphoproliferative syndromes	Juvenile myelomonocytic leukaemia
Burkitt lymphoma	Langerhans cell histocytosis
Chronic myeloid leukemia	Myelodysplastic syndromes
Cytopenia related to monosomy	Non-hodgkin's lymphoma
Familial histocytosis	
Immune Deficiencies	
Ataxia telangectasia	Mucolipidosis type II
Cartilage-hair hypoplasia	Myelokathesis
Chronic granulomatous disease	Severe combined immunodeficiency
DiGeorge syndrome	Wiscott-Aldrich syndrome
Hypogammaglobulinemia	x-linked agammaglobulinemia
IKK gamma deficiency	x-linked immunodeficiency
Immune dysregulation polyendocrinopathy	x-linked lymphoproliferative syndrome
Haematological Disorders	
Amegarakarocytic thrombocytopenia	Pancytopenia
Autoimmune neutropenia	Red cell aplasia
Congenital dyserythropoietic anaemia	Refractory anaemia
Congenital sideroblastic anaemia	Severe aplastic anaemia
Cyclic neutropenia	Shwachman syndrome
Diamond Blackfran Anaemia	Severe neonatal thrombocytopenia
Evan's syndrome	Sickle cell disorders
Fanconi Anaemia	Severe neonatal thrombocytopenia
Glanzmann's disease	Sickle cell disorders
Hypoproliferative anaemia	Systemic mastocytosis
Juvenile dermatomyositis	Thalassemia
Juvenile xanthogranulomas	Thrombocytopenias with absent radius
Kostmann's syndrome	
Metabolic Disorders	
Adrenoleukodystrophy	Krabbe's disease
Alpha mannosidosis	Maroteau-lamy syndrome
Diabetes Mielletus, Type 1	Metachromatic leukodystrophy
Gaucher's disease (infantile)	Mucolipidosis Types II, III
Globoid cell leukodystrophy	Neimann Pick syndrome, types A and B
Gunther disease	Osteopetrosis
Hermansky-Pudlak syndrome	Sandoff syndrome
Hurler syndrome	Sanfilippo syndrome
Hurler-Scheie syndrome	Tay Sachs disease