

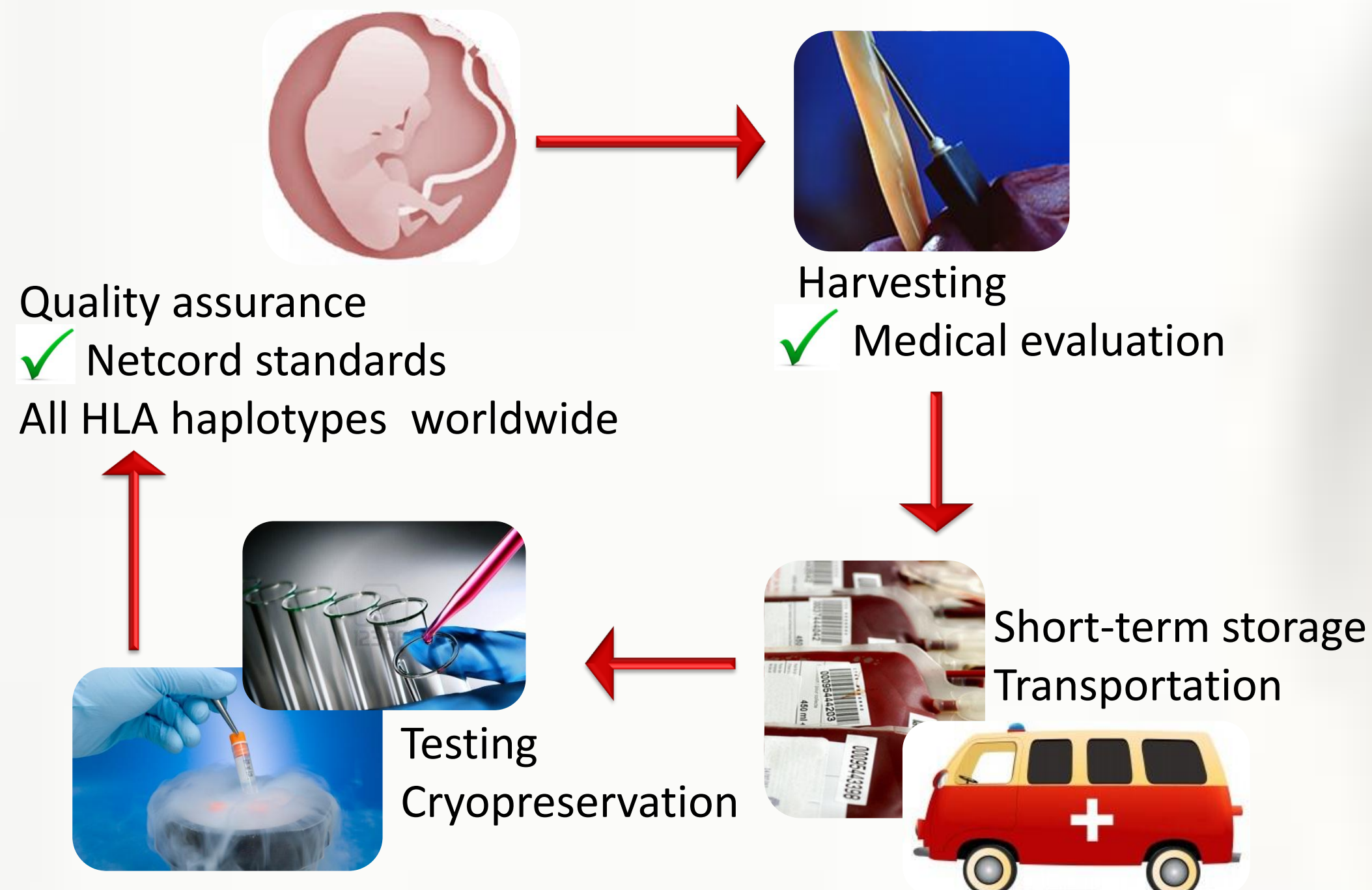
UMBILICAL CORD BLOOD TRANSPLANTS

Soldevila A. – Genetics Degree. Facultat de Biociències. Universitat Autònoma de Barcelona – Barcelona (Catalonia – Spain)

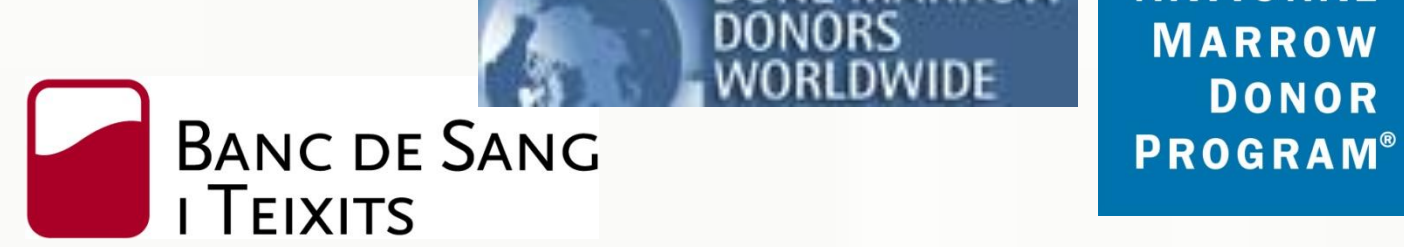
Introduction

In the last 20 years, the experience indicates that umbilical cord blood (UCB), a rich source of hematopoietic stem cells (HSC), is a valid alternative to bone marrow (BM) and peripheral blood stem cells (PBSC) transplants. It has been used successfully for patients suffering hematologic, immunologic, genetic and oncologic disorders. Several studies have shown that the number of nucleated cells (NC) is the most important factor for engraftment while some degree of HLA mismatch is acceptable. This review is focused in explain the main characteristics of UCB and in compare this source with alternatives. The differences between adult and pediatric patients will be contrasted and all the premises for donor selection will be cited. Finally, the ethical issue of having a savior sibling is reported as all the procedure that must be done to have a matching and disease-free sibling.

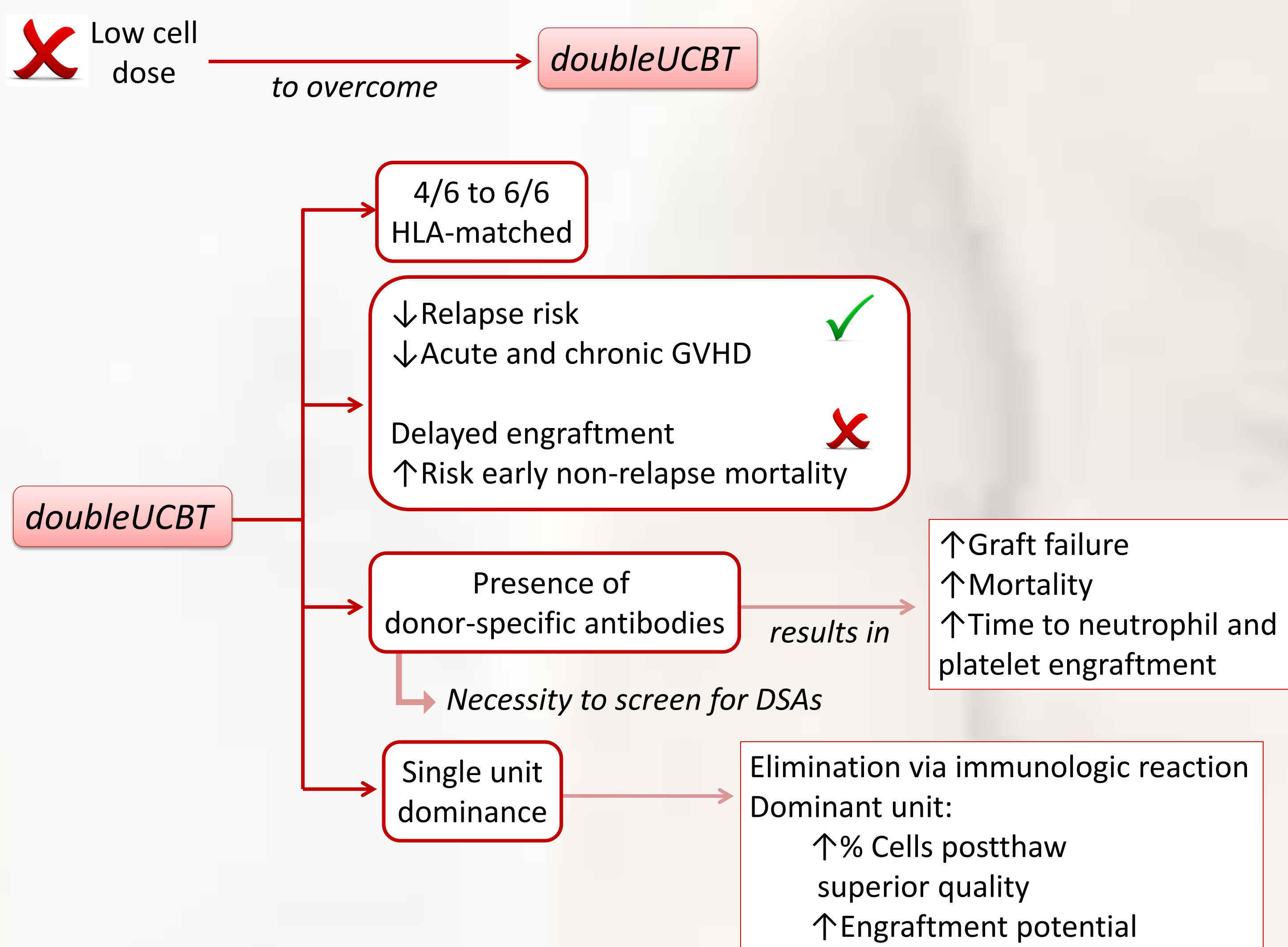
UCB banking



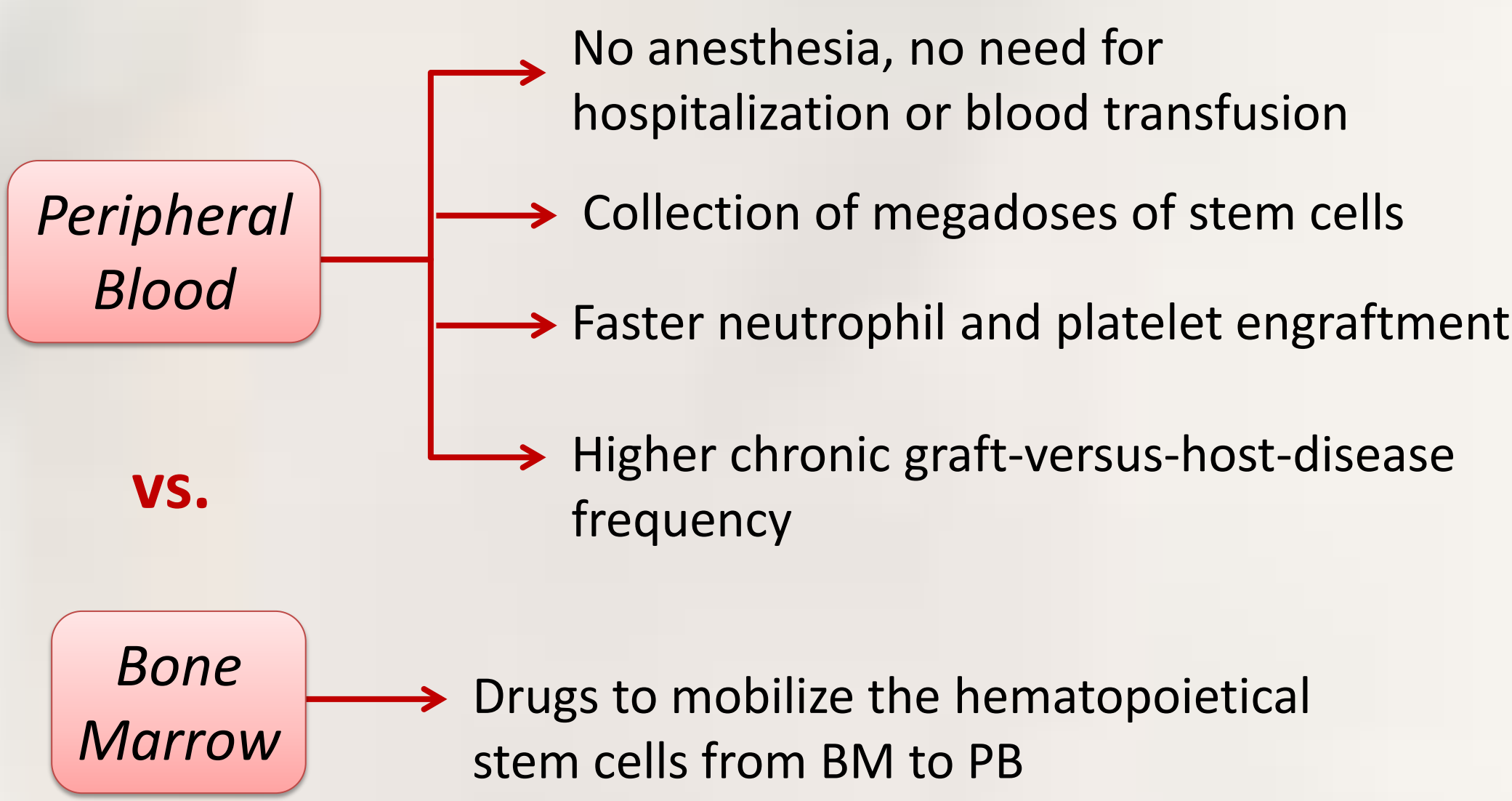
Banks and associations



Differences between adult and pediatric patients



Comparison with other sources



*No differences for relapse, acute GVHD, transplant-related mortality or survival rates

UCB Pros and Cons

PROS

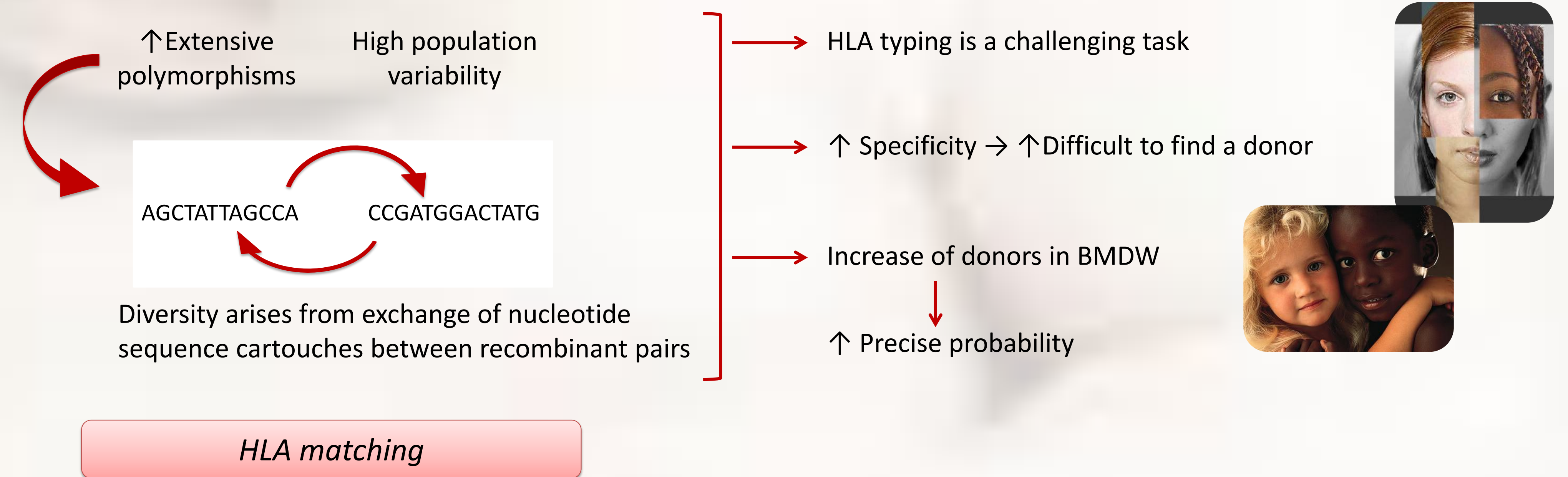
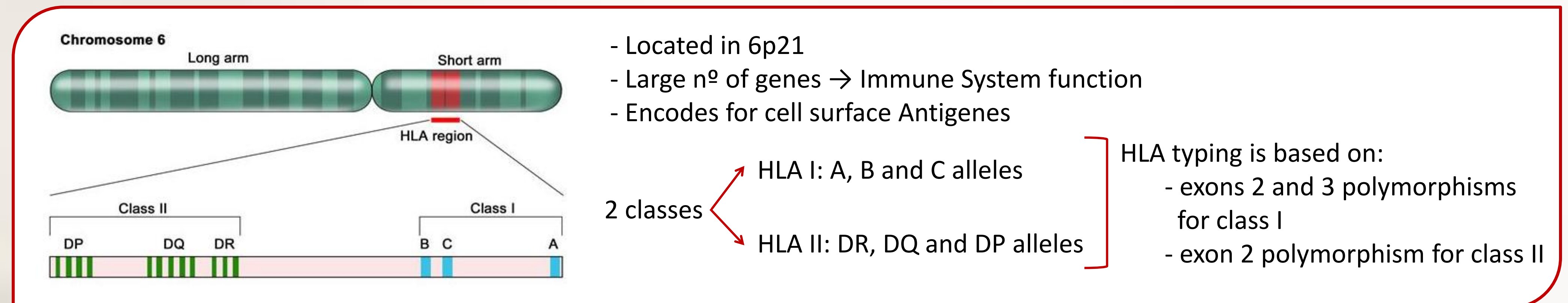
- **Immediate availability:** UCB banks → important source of rare HLA haplotypes
- HSCT can be performed with 3-4/6 match → **99% of all patients can find acceptable UCB units.**
- **Favorable alloreactivity:** Low grade II-IV of acute and chronic GVHD frequencies.
- UCBT is advantageous for children requiring urgent transplantation.

CONS

- The **cell dose** is a clearly **limitation** of this source.
 - ↑ Risk of graft failure
 - Contributes to a lower neutrophil and platelet engraftment ratios
- **Single one-time availability:** transplant strategies must be designed around a single use of a small cell product.
- Immune reconstitution is delayed because of the immaturity of the newborn immune system.

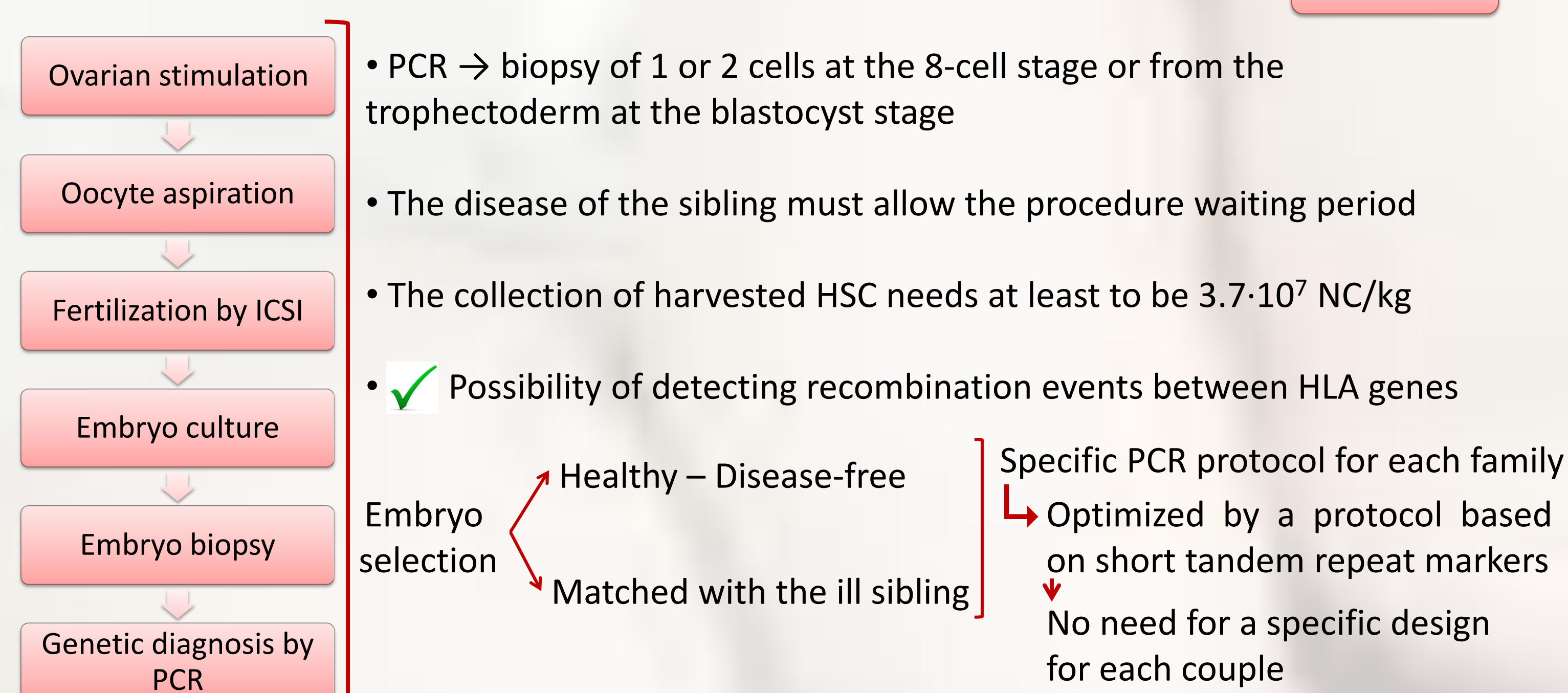
Donor selection

Human Leukocyte Antigen Complex



HLA matching

Savior siblings



Benefits and risks of all implicated parts and ethical issues

<p>Savior sibling → ethical issue: his/her welfare.</p> <ul style="list-style-type: none"> ✓ Gift of life and saving his /her ill sibling life ✓ The parents make so much effort → the kid will be loved ✓ No important physical risks associated with harvesting HSC ✗ Emotional endangerment because of the motivation for its conception ✗ Emotional stress if the transplant fails 	<p>Ill sibling</p> <ul style="list-style-type: none"> ✓ A savior sibling is the best option <ul style="list-style-type: none"> - ↓ post-transplant complications ✗ Psychosocial and moral burden because they receive a gift that is inherently unreciprocal ✗ Possibility of deterioration of the relationship between siblings 	<p>The mother</p> <ul style="list-style-type: none"> ✓ Chance to save their ill child life and to bring a new life ✗ Physical risks of any pregnancy ✗ Emotional stress <p>Potential fate of unused embryos → embryo in discussion about abortion and rights of human life</p> <p>- Kantian Dictum</p>
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High resolution HLA matching: - improves transplant outcomes - increases patient survival

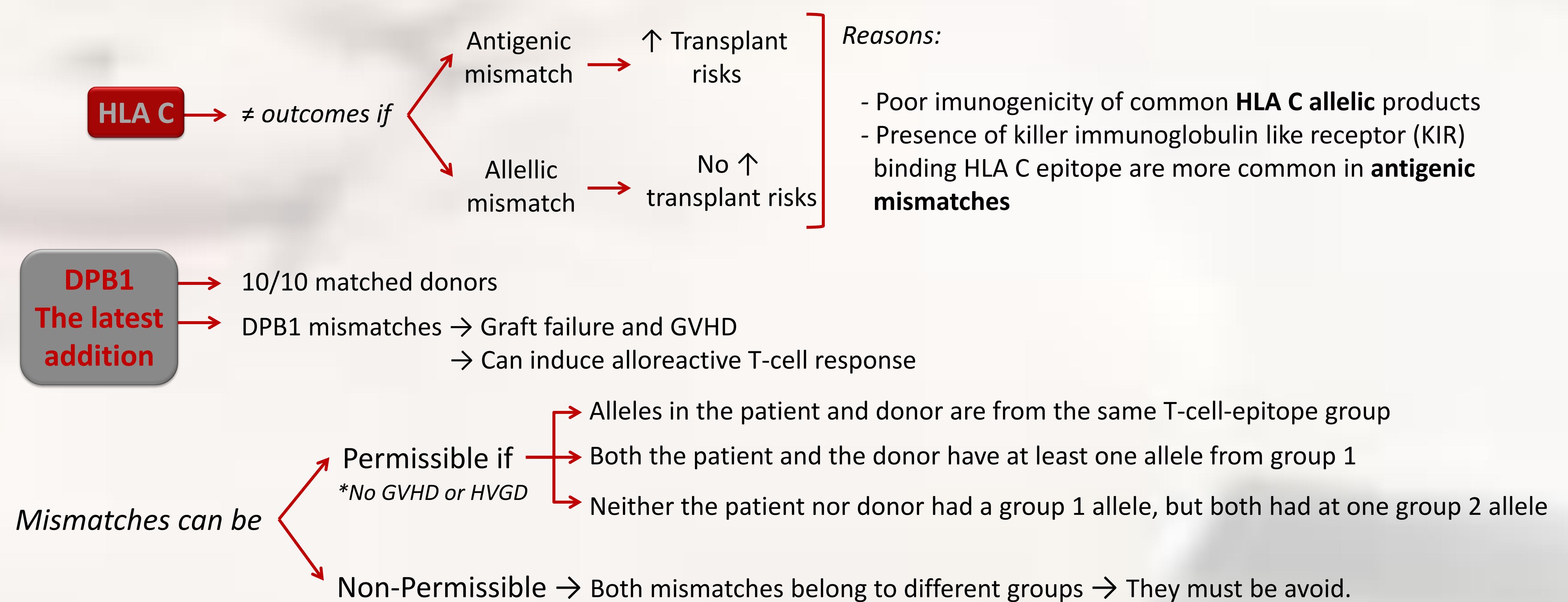
- 8/8 matched donors → HLA A, B, C and DRB1
- One-HLA class I mismatch as a 2nd choice
- Each additional mismatch → survival differences of 9%-10%

Risks associate with single locus mismatches

- HLA A, B and C: increased risk of acute GVHD
- HLA A, C and DRB1: treatment-related mortality and mortality

Most permissible

- Allelic HLA C and DRB1 mismatches are the most permissible



DPB1 The latest addition → 10/10 matched donors → DPB1 mismatches → Graft failure and GVHD → Can induce alloreactive T-cell response

Mismatches can be → Permissible if: *No GVHD or HVGD; Alleles in the patient and donor are from the same T-cell-epitope group; Both the patient and the donor have at least one allele from group 1; Neither the patient nor donor had a group 1 allele, but both had at one group 2 allele

→ Non-Permissible → Both mismatches belong to different groups → They must be avoid.

Conclusions

✓ Clearly, CBT has become an important HSC source increasingly used which presents many advantages over BM and PBST, although each case requires different monitoring and maybe not using this source.

✓ Nowadays, people try to get a wider range of use of this source like in adult cases. The number of cells is being reported as a limiting factor but the solution has been sought and a new strategy is being implemented consisting of administering two partially patched CB grafts called *doubleCBT*.

✓ Donor selection is a complicated procedure because of the high population variability of the HLA system. Every single HLA mismatch can change the transplant outcome and can contribute with the graft rejection (GVHD),

with worse overall survival and with the cited complications.

✓ One of the most important advantage is that the cells are embryonic stem cells, so they don't have the immunity system developed and this is why they have lower rates of GVHD.

✓ Regarding the second part of this review, the procedure of PGD for savior siblings is well established and it is possible to have a matching and healthy child to save another. However, this issue has ethical background and debate with important disagrees, different expert opinions and views that have to be considered. However, PGD for HLA-typing has an extra sort, have a healthy child and the chance to save his/her sibling.

References

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