Cord blood banking

Cord blood banking: what are the real issues?

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More impetus needs to be placed on cord blood donation

In July, the Royal College of Obstetricians and Gynaecologists (RCOG) released a report on the uses and the potential perils of umbilical cord blood collection.¹ This report has had the positive effect of drawing attention to what has hitherto been an under addressed topic of medical research and ethics. However, the focus and recommendations of the report say little about one important aspect of cord blood usage—research. Such an omission, although understandable from an organisation primarily concerned with maternal and neonatal health, may nevertheless have implications for the broader applicability of the report's recommendations, outside the immediate arena of patient care.

The RCOG report deals with various aspects of cord blood collection and use—the harvesting procedure itself; cord blood transplantation treatment, either as an autologous cell transplant or as a donation for community use; and whether cord blood banking for personal use should be permitted or encouraged as a privately funded commercial enterprise. It also makes note of some of the legal and ethical issues surrounding cord blood and tissue banking more generally, concerns that will be of increasing importance as more biobanks are established worldwide. A large part of the report deals with concerns on neonatal and maternal safety and whether cord blood collection may pose a risk. These concerns may be valid and certainly, the health of mothers and children should not be compromised. The guidance provided by this report in relation to the collection procedure will undoubtedly assist maternity health professionals in this area.

The main relevance of the RCOG recommendations in a policy context, however, concerns the utility of directed collection and storage for low-risk families and the means by which this is funded. Currently, the publicly funded National Health Service (NHS) Cord Blood Bank is available to store non-directed cord blood donations, which are then made available to treat unrelated recipients. Cord blood

collection for directed donations is also supported by the NHS system for families with a genetic disorder treatable by cord blood transplantation, in the hope that the cells may be used to treat an affected sibling. Part of the impetus behind the RCOG inquiry, however, has been the appearance in recent years of commercial cord blood banks, which offer personal storage of cord blood to families with no known genetic risk of disease. This is intended for possible directed use in the event that a child of such a family spontaneously develops a medical condition that might be treated using cord blood.

The findings of the RCOG report led them to conclude that directed cord blood donation in low-risk families is at present likely to be of little use, and that the probability of using a directed donation is sufficiently low to fail to justify the procedure's expense. Although they support public funding for non-directed donation as a community health resource and for directed donation where indicated by genetic risk factors, their view is that directed donation in the case of families who are not at risk is of dubious utility and should not be funded. The practice of commercial cord blood banking for directed storage is therefore not recommended, although (as opposed to policy in some countries) they advise that it should be permitted as a matter of choice.

The fundamental limitation of these recommendations is that they are based on a consideration of cord blood solely as a treatment in itself—as a haematopoietic cell transplant that is good for a single use, such as a heart or a kidney donation. But cord blood has the potential to be much more than that.

The therapeutic properties of umbilical cord blood derive from the fact that it contains stem cells that are capable of haematopoietic reconstitution. These have been shown to facilitate greater immune tolerance than “adult” stem cell transplants, resulting in better engraftment and reduced incidence of immune rejection; and like all stem cells, they can also in theory propagate

themselves and expand indefinitely. Therefore, rather than being a one-shot treatment for a single patient, the stem cells in umbilical cord blood could potentially be applied to treat large numbers of patients.^{2,3}

Using cord blood in this way would deal with many of the current issues of cord blood transplantation. The efficacy of treatment, which is at present sub-optimal owing to the low cell dose in a single cord blood unit, could be increased with an expanded population of stem cells for transplantation. Moreover, if collection and banking of cord blood could provide treatments for others as well as the donor, the obvious communal benefit of this practice would render the current arguments about whether cord blood collection should be publicly or privately funded much less important. Indeed, as a donation could be for both directed and non-directed use, it would combine elements of both personal benefit and altruism and would probably encourage more families to donate, increasing the availability of compatible treatments for all. The RCOG report makes bare mention of the possibility of “efforts to expand the progenitor pool” of cord blood stem cells, but this would seem to be one of the crucial areas in which cord blood research and treatment could progress.

Furthermore, cord blood might provide treatments not only on a much larger scale but also across a broader scope of diseases than that for which it is currently used. Presently, cord blood transplants are only used to treat haematopoietic disease. Recent research, however, has shown that cord blood stem cells are not restricted to the haematopoietic lineage, but are also capable of developing into nerve or muscle cells.^{4,5} Preclinical experiments have shown encouraging results using cord blood stem cells in tissue repair⁶ and in treatment of neurological diseases.⁷ According to some studies, certain types of stem cells found in cord blood may even possess some of the pluripotential capacities of embryonic stem cells,⁸ which would make their application virtually limitless. As the RCOG report states, future non-haematopoietic use of cord blood stem cells may be “still speculative”, but the scientific literature provides clear evidence that with sufficient effort and resources devoted to research, cord blood may prove to be one of the most important tools in the specialty of stem cell therapy.

Outside the immediate clinical context, therefore, the issues associated with cord blood banking are far broader than those suggested by the RCOG in this report. Overall, the RCOG paper is

of value in that it provides some guidance in this topical area to health professionals working in the perinatal field. From a more general perspective, however, we should not be misled into believing that the issues on which it focuses are all encompassing, or even the most important issues in relation to the practice of cord blood storage.

For medical science and for the benefit of the public, the question should not be whether cord blood collection is recommended for directed use, or whether it is performed on NHS funds or by a private biobanking company. Instead, we should be asking what else might be achieved using cord blood stem cell treatments, beyond the realms of current clinical practice, and how we can best strive to attain these goals. In particular, we should ask why we choose to merely passively permit cord blood banking and discourage the hope on which personal cord blood banks are founded: that cord blood

may one day provide treatments for a whole range of illnesses and injuries that our children may have. Surely in light of the promise and potential already shown by this field, we should actively be funding research into cord blood stem cells and encouraging all parents in suitable circumstances to donate their cord blood for research and treatment, thus supporting the work that might lead to alleviating disease and suffering for many more patients.

J Med Ethics 2006;**32**:621–622.
doi: 10.1136/jme.2006.018994

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Received 31 August 2006

Revised 31 August 2006

Accepted 31 August 2006

Competing interests: None.

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