

Understanding stem cell science

WITH PETER HOLLANDS, Ph.D.



We've gotten many requests to know more about cord blood banking. So, back by popular demand, here is Dr. Hollands' column from earlier this year which explores the subject in depth. Peter Hollands Ph.D. (Cantab), C.Sci., FIBMS has worked in stem cell technology for 30 years.

Stem cell banking: Fact, folly or fiction?

Hardly a day goes by without a new revelation in stem cell technology. When I first worked in this field nearly 30 years ago, there was little interest in stem cells beyond that of the highly specialized experts working on bone marrow transplantation. Today, we hear about stem cells obtained from cord blood, the placenta, embryos, the fat collected during liposuction and even baby teeth!

All sorts of claims are made about the current and future clinical applications of these cells—some based on fact and others on wishful thinking. Typically, the contributions of politicians, the media and, perhaps worst of all, self-interested celebrities to the stem cell debate just further confuse the issue. Whatever the present and future applications of stem cell technology may be, it is becoming increasingly obvious that stem cell technology is big business, particularly in the field of private stem cell banking.

Banking that makes sense

Private banking for umbilical cord blood stem cells began in the U.S. and is now an international, multimillion-dollar industry. Cord blood stem cells do have tried and tested applications in the treatment of hematological malignancy, with over 10,000 transplants to date for the treatment of 45 different blood disorders. Cord blood stem cells have also been shown to have the capacity to repair other tissues. Cord blood is therefore a very good source of stem cells, and private banking for family use is arguably a useful and cost-effective procedure. The future of cord blood stem cells in the emerging field of regenerative medicine is particularly promising. The drawback with private banking is, first of all, the cost—which is highest in the U.S.—and also the fact that private banking reduces the supply available from public banks, where it is potentially most useful.

Public banks store cord blood and offer it for transplant to anyone in need, and this is by far the most clinically effective way to collect and store cord blood stem cells. Nevertheless, public cord blood banks need large investments to set up and run such a service.

'Biological insurance'

The success of the private cord blood banking industry has stimulated the growth of other private cell banking industries, including those that

store stem cells taken from the placenta and baby teeth. The problem with these services is that, at present, there are no known clinical applications for these cells. Clients are therefore currently paying for a service that has no immediate practical use. The companies involved will, of course, argue that their services have great potential (which they may) and they provide “biological insurance” for the future. I do not believe in the “biological insurance” concept, which is the product of marketing executives rather than scientists and clinicians.

Some people even undergo a peripheral (circulating) blood stem cell harvest, involving a drug regime followed by connecting the patient to a machine that collects the peripheral blood stem cells, which are then frozen. These cells do have clear, current clinical uses, but the objection here is the questionable process of collection from healthy individuals when collection at the time of illness, if required, is tried and tested technology.

The very latest development in the private stem cell storage industry is a U.S. company offering the storage of embryonic stem cells. This service is offered to people who have excess frozen human embryos stored in infertility clinics. Such embryos are thawed;

then embryonic stem cells are extracted and frozen again for possible later use by the clients. Besides being morally objectionable in and of itself, embryonic stem cell banking has several practical drawbacks, especially these:

- Embryonic stem cells have no current clinical applications. There are no plans at all for clinical trials involving embryonic stem cells.
- There are still many technical problems to be resolved in embryonic stem cell research, not least of which are cell stability and tumor formation by embryonic stem cells.
- Current adult and cord blood stem cell technology is providing current therapy and clinical trials in regenerative medicine.

Stem cell banking is clearly a field in which potential clients must ask the banks—and themselves—very careful questions. *Caveat emptor!*

Dr. Peter Hollands is a senior lecturer in biomedical science at the University of Westminster in London.

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