

## Science and bioethics at a crossroads

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By Martin Clynes

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*This is a very exciting time for biotechnology, the science of using living organisms and their products to make useful products and to cure human diseases. In the past few years, all the genes that make up the human DNA have been sequenced (ie completely described chemically). There is great hope that we will, as a result, discover many new gene products that can act as targets in the body for new pharmaceuticals to help cure disease.*

Diseases that involve long-term damage or loss of function in a particular organ, however, represent a special problem -- diabetes, Parkinson's, Alzheimer's, and spinal injuries are examples. They can often be helped, but not cured, by drug treatment. It seems that we may need some sort of transplant or tissue repair strategies to cure these diseases -- hence the current interest in stem cells.

Most organs in the body contain immature precursor cells which are not involved in the primary functions of that organ, but which perform a very special service. When the tissue is damaged, or when the differentiated cells reach the end of their normal lifespan and die, these immature cells can start to divide and produce new cells to replace the lost ones -- these cells are called stem cells.

If we could stimulate these stem cells to grow, we might be able to repair lost or damaged tissues; but stem cells are often in short supply in the tissues we want to repair. So, another possibility is to take stem cells from a plentiful source (eg bone marrow), and persuade them to change into, say, nerve cells -- not an easy task, but this sort of work on adult stem cells is the subject of active research and looks quite promising. For example, in mice stem cells from liver and spleen have been transformed into insulin-producing cells -- still a long way from curing diabetes, but it provides a glimmer of hope and indicates that it is worth continuing on this road.

More recently, attention has also turned to embryonic stem cells. The cells of the early embryo give rise to all the organs in the body and so look like an exciting prospect for research on how animals develop, and perhaps eventually as a means of producing tissues and organs for transplantation. Animal embryonic stem cells had been used by researchers for quite a few years; then, about five years ago, researchers in the USA developed the first long-term human embryonic stem cell lines. Unfortunately, deriving such cells involves destruction of human embryos, and even though the researchers and the company involved had assembled a bioethics committee which approved the work, many scientists and others had serious reservations.

Nevertheless, sections of the scientific press seemed to suspend their critical faculties in their enthusiasm for what human embryonic stem cells might achieve, and this enthusiasm continues in the absence of much concrete evidence (why spoil a good story with facts). The myth of their potential efficacy has gathered momentum, and, unfortunately, unrealistic hopes have been given to patient advocacy groups; hence the current pressure within the European Union to fund embryonic stem cell research.

### **Cloning human embryos**

Another related technology should be mentioned here -- cloning. Cloning essentially involves taking a mature egg, removing its nucleus (which contains almost all the DNA,

the genetic material which gives each species and each individual its specific characteristics); then taking the nucleus from a mature cell in an adult, and putting it into the egg. In appropriate conditions, this egg, if placed in the womb, can develop into a mature animal -- as was achieved in the case of the celebrity sheep Dolly. In fact, this has now been achieved for sheep, cow, mouse, pig, goat, cat, rabbit and horse. So far attempts have failed for rat, rhesus monkey and dog. Successful production in culture of early human embryos by this method was reported early in 2004, but only females could be produced, and the researchers did not allow these human lives to continue.

Production of human children as a result of nuclear transfer cloning could probably be achieved, but most scientists, and most governments agree that, at least at our current stage of knowledge, human reproductive cloning (that is, cloning with the intention of producing a baby) should not be undertaken. First of all, it is a dangerous and unpredictable process -- in animals, success rate is in the range 1%-4%. There may be problems with birth defects, premature aging and sudden death (such problems may relate to epigenetic defects - incorrect chemical modification of DNA or of DNA-binding proteins). The psychological problems for a cloned child are difficult to predict and the potential for abuse of such technology is substantial.

Another type of cloning, however, is legal in some countries - the UK, for example, and in the USA in private industry; this is called therapeutic cloning. It means essentially making a clone of yourself: putting a nucleus from one of your cells into an enucleated egg, growing the embryo to a certain stage and freezing it for later use, or using it to derive stem cells which will be your (almost) perfect tissue match for transplants. Essentially, it means bringing your almost (almost, for any scientific perfectionists, because the egg will donate some mitochondrial DNA) identical twin into existence as a source of "spare parts", should you need them. Strangely -- possibly because of the soothing effect of the word "therapeutic" -- this sort of cloning seems more widely acceptable. Stem cell research in general is not controversial -- human embryonic stem cell research and so-called therapeutic cloning technology (I say so-called because it has not yet cured anyone) are controversial, because they depend inherently on destroying human embryos.

### **Will there be "miracle cures"?**

Many of those who support human embryonic stem-cell research do so for the best of motives: to see new cures emerging for currently incurable diseases, which is something that we all want. We cannot, however, look to cure sick people by terminating other lives. The potential of this technology has been greatly oversold. Few serious scientists with knowledge of the field really expect that human embryonic stem cell research will bring cures for human disease in the near future. Perhaps it will some day, but even for that, the evidence is fragmentary and there are significant safety issues, which receive little media attention.

Other avenues of research, including use of adult stem cells, appear at least equally promising, although again miracle cures are, unfortunately, not just around the corner. In this situation, it makes sense to concentrate on equally (or more) promising research directions, which do not involve embryo destruction. John Howard Yoder, the Mennonite theologian, wrote "I am less likely to look for a saving solution if I have told myself beforehand that there can be none, or have made advance provision for an easy brutal one" - a line of thought with clear applications to capital punishment, war and perhaps human embryo research.

A very inaccurate statement often repeated during the recent debate in Ireland is that if we have IVF (which certainly benefits some infertile couples and should, in my opinion, be available) we must have spare embryos that have to be either destroyed or used for research. This is just not true. Unused embryos can and should, with proper parental consent and screening of adoptive parents, be available for adoption as has been recognised in the enlightened set of guidelines issued by the Irish Medical Council early in 2004. This donation for adoption has been done successfully -- it is not just a theoretical option. The idea of parents donating embryos for research is as appalling as that of donating children for research. We have surely progressed beyond the point of considering children as property of their parents. In parallel, the technology for freezing ova is improving -- the number required for implantation can be thawed and fertilised when needed; as this technology develops further, there may be no need to bring extra embryos into existence at all.

### **The ethics of stem cell research**

The ethics of stem cell research is sometimes seen as a religious issue, but I see it primarily as a human rights issue based on an analysis of the biological facts. The only single definitive transition point, from a scientific perspective, in the formation of a new human individual person, is when the DNA from mother and father come together within the fertilised egg. Subsequent events -- implantation, formation of the primitive streak, initiation of neural function -- are parts of a continuum of events which follow the predetermined program for that individual's development already present in the fertilised egg. There is no other stage or event in development which we could pick and with any confidence say "no person existed before this point".

But why is all this so important? Well, throughout history, whenever any group has been labelled subhuman, serious abuse has followed. Our current use of language like "spare" and "supernumerary" to describe embryos may conveniently hide the reality of a real personal existence and encourage us to think of these beings as mere commodities. In the past, people were dehumanised by labels of colour, race, gender, class, caste, and religion - maybe this generation's error is characterisation by stage of development.

### **A risk for civilized standards**

Respect for each individual person is so basic to civilised society that we must, I suggest, apply the precautionary principle by defining the beginning of individual life as this point of unique biological certainty. Anything else is a guess, and if our guess is wrong, the consequences in killing human individuals is terrible. The Protestant theologian, Gilbert Meilaender, writing recently on the topic of human embryonic stem cell research, presents an interesting insight: "A person is not someone who has a certain set of capacities; a person is a someone who has a history. That story, for each of us, begins before we are conscious of it and, for many of us, may continue after we have lost consciousness. It is nonetheless our personal history even when we lack awareness of it, even when we have lost certain capacities characteristic of the species".

In fact, far from being a religious issue, I believe the destruction of individual human life inherent in generating human embryonic stem cells is perhaps even more serious from an agnostic or atheistic viewpoint. If an all-powerful God (or gods?) exists, or if there is an afterlife, or reincarnation (that more or less covers the spectrum of religious beliefs!) the individuals whose lives are prematurely ended may be looked after in

some other dimension of existence. But if we do not have such faith, then the destruction of individual human lives at this early stage is the complete termination of their existence and of any potential which they may have had -- surely the most terrible and most arrogant thing which could be inflicted on any group of our fellow humans.

## **Looking to the future**

Biotechnology, including the broad field of stem cell research, now presents really exciting potential to find cures for human diseases. But there are probably a number of different pathways to such cures. We are at a point in the history of technology when we can choose between different futures, many of which involve ethical use of biotechnology, and one -- on which human embryonic stem cell research is just the first step -- which will lead to biomedical treatments built on destroying human individuals. Irish government spokespersons have claimed that the recent EU decision on supporting human embryonic stem cell research was just about regulating this research, but it involves much more than that. It is about giving assent, support and legitimacy, at a transnational level which will have significant international influence, to a most uncivilised and barbaric field of research. We cannot stop other countries from engaging in this research, but we can and must withhold our assent. Ireland deals on a regular basis with countries which apply the death penalty and which abuse women's rights, but we would, I assume, never give support or encouragement to such objectively and unquestionably barbarous practises. Our attitude should be the same to human embryonic stem cell research...

As mentioned earlier, most of those who advocate human embryonic stem cell research and therapeutic cloning do so from a desire to expand knowledge and cure disease. There is an obligation on those of us who believe in the humanity of the early human embryo to engage such people in mutually respectful debate, not in an antagonistic way, but in an attempt to persuade them to choose other routes to the same goals.

Proper respect for the life of the individual human is not something that can change with time or cultural development; if we discard this respect, in the area of destructive human embryonic research, we will have discarded the whole basis for any kind of civilised society.

"All grown-ups were once children - although few of them remember it" ~ Antoine de Saint-Exupéry

*Martin Clynes is a professor of biotechnology at Dublin City University. This is an abridged version of an article in the Autumn issue of the Irish journal Studies.*

## **Further reading**

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