Peter Saunders' letter to MPs and Peers.

Therapeutic cloning

The cloning of human embryos for research is now legal in the UK. New regulations under the 1990 Human Fertilisation and Embryology Act will allow 'therapeutic cloning' to produce stem cells for use in treating degenerative diseases.

The legislation was passed, by a 366-174 majority in the House of Commons in December, and by a 212-92 vote in the House of Lords on 22 January. Although a committee is to be set up later to look further at the issues, Parliament have effectively rubber-stamped the recommendations in the Chief Medical Officer's 'Donaldson Report' tabled last summer.The new law makes the UK the first country formally to legalise the practice.[1]

The decision followed tough opposition from a powerful alliance of pro-life campaigners and religious leaders. The European Parliament also had earlier called on the British government to shelve its plans and leaders of several other European countries had expressed disapproval.

The implementation of the new law has since been delayed through an appeal by the Prolife Alliance who believe that the Parliamentary votes are invalid because cloned embryos do not fit the definition of 'embryo' as defined in the HFE Act (ie. Produced by fertilisation). The hearing has been delayed until June (after the election), so an embargo on research will meanwhile remain.[2]

CMF General Secretary, Peter Saunders, wrote to MPs and Peers prior to the debate, urging them to vote against the measure and enclosing a copy of the latest CMF File *on Therapeutic Cloning (circulated with the January* Triple Helix*). The main substance of this letter is published below along with its appendix on adult stem cells (slightly abridged), based on research by Phil Jones of the CMF Study Group.*

KEY POINTS

The Government's decision to legalise embryonic stem cell cloning before Christmas without primary legislation or proper debate was irresponsible and unnecessary. Embryo stem cell cloning is unethical because it uses embryos as a means to an end. It is unnecessary because there is a viable ethical alternative in adult stem cell cloning, and dangerous because it creates a slippery slope to reproductive cloning.

The Donaldson Report's recommendations, now rubber-stamped, were based on an overly pessimistic belief in the capacity of adult stem cells to produce new treatments for debilitating degenerative diseases like Parkinson's and diabetes.

Medical Background

In serious degenerative diseases (such as Parkinson's, Alzheimer's and muscular dystrophy) some or all of the cells that are needed for an organ to function are lost. The dream of researchers in tissue repair is that by replacing cells that have been lost through disease, sufferers from such otherwise incurable disorders could be restored to full health. Two approaches have been proposed. The first is to use cloned human embryos, genetically identical to the patient, made by fusing the patient's DNA with an egg emptied of its own DNA. These cloned embryos would then generate stem cells of the required type, which would not be destroyed by the patient's immune system, to repair the damaged organ. But this would result in the embryos being destroyed. The alternative is to use adult stem cells from the patient themselves. (The enclosed *CMF File* explains the technology and options in simpler language)

I am opposed to embryonic stem cell cloning for three main reasons:

1.Embryonic stem cell cloning is unethical because it uses human embryos as a means to an end.

The Judaeo-Christian ethic on which UK Statute Law was originally based affirms that human life at all stages of development deserves the utmost respect. Historical medical ethical codes based on the Hippocratic Oath enshrine a similar view, recognising the power and strength of doctors. The Declaration of Geneva (1948) stipulates that doctors must 'maintain the utmost respect for human life from the time of conception'.

The Declaration of Helsinki (1975) says that in biomedical research 'the interest of science and society should never take precedence over considerations related to the well-being of the subject'.

Whilst allowing embryo research in some circumstances, The Human Fertilisation and Embryology (HFE) Act itself recognises that human embryos have special status and deserve legal protection. Furthermore, the HFE Authority has an obligation to determine that any proposal for research using embryos is necessary and desirable, and that all alternative pathways have been fully explored through prior research or work with animals. This has not been done.

2.There is a viable ethical alternative to embryonic stem cell cloning in adult stem cell technology.

There is now good evidence, growing all the time, that adult stem cells may be a simpler alternative to using embryonic stem cells without the practical and ethical problems inherent in the cloning of human embryos. Very recent research (see below), has demonstrated that adult stem cells have much more flexibility to replace damaged cells than was previously thought. Much of this recent research post-dates

the Donaldson Report, which recommended the use of embryonic stem cells and was accepted by the government last summer.

3. Therapeutic cloning will lead inevitably to reproductive cloning.

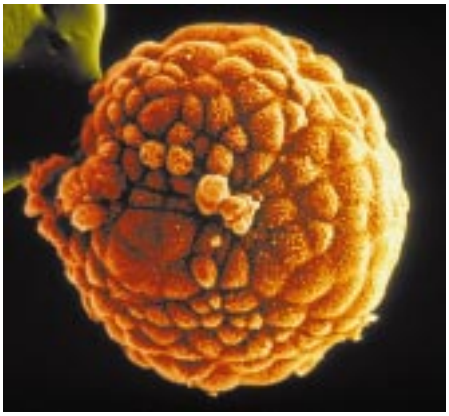
Once cloned embryos have been produced, theoretically all that is necessary for reproductive cloning to take place is for them to be implanted in a womb. This process is technically straightforward and would be impossible to police. Therapeutic cloning of embryos therefore constitutes a very slippery slope to reproductive cloning.

The case for the use of Adult stem cells in Tissue Repair

Adult stem cells are cells that replace cells lost from a tissue throughout life. A single blood stem cell can replace the entire blood system in an animal whose bone marrow has been destroyed.[3] Until very recently the accepted dogma was that in adults stem cells were programmed to generate cells of a single tissue type. For example, blood stem cells[4] could generate blood cells, but not brain or muscle cells. Only embryonic stem cells were thought to have the ability to produce different tissue types. It is now clear that this is not the case.[5]

In papers in *Science* published in December 2000, two research groups (from Stanford University and the US National Institute of Neurological Disorders and Stroke) showed that blood stem cells could generate nerve cells in the brain, when transplanted into mice. [6,7] The blood cells, which had been genetically engineered to fluoresce green, did not need to be injected into the brains of the animals, but migrated into the brain after intravenous injection. The authors of both papers stressed that these observations offered the hope of brain repair from adult blood stem cells.

Similar research reported in 1999 demonstrated the potential of blood stem cells to repair damaged muscle in muscular dystrophy.[8] Mice with a similar disorder to human muscular dystrophy were treated with a bone marrow transplant. The donor blood stem cells were found to have generated muscle cells, repairing the muscle defect in the recipient of the transplant. In November 2000 Canadian researchers at the McGill University Health Centre showed that adult blood stem cells could be used to build up damaged heart muscle; again in research involving rats.



Scanning electron micrograph of a five day old human embyro on the tip of a pin.
Photo: Yorgos Nikas, Wellcome Photo Library

'RATHER THAN AMENDING THE HFE ACT PREMATURELY, PARLIAMENT SHOULD HAVE ADOPTED THE MORE CAUTIOUS AND HUMANE APPROACH OF ENCOURAGING ADULT STEM CELL RESEARCH'

Both embryonic and adult stem cell technologies share some of the same potential pitfalls. In a genetic disease like muscular dystrophy, all the cells in the patient carry the same abnormal gene, and adult stem cells from the patient would need to be genetically modified. Extensive research to achieve successful modification of blood stem cells is ongoing - with some encouraging results.[9] The adult stem cell approach has major advantages. There is very extensive clinical experience with obtaining, purifying and transplanting adult blood stem cells, for example in the treatment of leukaemia, and there are none of the technical problems of developing the new technologies of human embryonic stem cell culture and cloning.

In reality, tissue repair by either route will require extensive further research. But given the remarkable properties of adult stem cells and the experience we already have in their clinical use, it would seem both ethical and scientific arguments favour the allocation of resources to this approach over embryonic stem cell cloning. Rather than amending the HFE Act prematurely, Parliament should adopt this more cautious and humane approach.

Peter Saunders
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References

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