SCIENTIFIC AND ETHICAL ASPECTS OF HUMAN CLONING

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Preface

I have been a member of the Australian Academy of Science's sub-committee dealing with this issue, and am in full agreement with all its published statements.

I have had extensive discussions with several Officers and Fellows of the Royal Society in relation to their discussion document "Wither cloning?", and I am in general agreement with its conclusions also. I have also discussed the subject at length on numerous occasions with Dr Ian Wilmut, who produced "Dolly" the sheep.

I have lectured extensively since 1997 on human cloning to scientific audiences in Britain, the United States and Australia, and to numerous undergraduate and lay audiences in Australia, and feedback from these audiences has certainly influenced my opinions.

Scientific Issues

In general, I support the distinction between Human Reproductive Cloning - creating a fetus or adult from a somatic cell nucleus, and Human Therapeutic Cloning - creating cells, eg. embryonic stem cells, from a somatic cell nucleus, which does **not** involve the production of a fetus. I agree with a growing consensus of scientific opinion around the world (Gurdon and Colman, Nature 402, 743-749 1999; New Scientist Editorial 165, 3, Jan 29 2000) that we should not intentionally embark on Human Reproductive Cloning as defined above, but that the potential of Therapeutic Cloning for the treatment of hitherto incurable conditions like AIDS, Parkinson's Disease, Alzheimer's Disease, or Diabetes is enormous.

In our current state of scientific understanding, human embryonic stem cells can be recovered from the inner cell mass of a fertilised egg on about day 5-6 after fertilisation. The fertilised egg is destroyed in the process. The embryonic stem cells can then be propagated in tissue culture. They are deemed to be pluripotent - capable of forming a wide variety of different cell types, but not totipotent, as embryonic stem cells have already lost the ability to form a placenta. Hence there is no fear of Reproductive Cloning from embryonic stem cells.

The exciting prospect of the future is to take this research one step further and produce cloned embryonic stem cells, so that an individual could donate one of his or her own somatic cell nuclei for transfer into an enucleated, unfertilised egg. This would then be cultured, the inner cell mass removed, and the person's own embryonic stem cells grown in culture and differentiated into the required replacement cell line. Being self-generated, they would not be rejected as foreign tissue by the body's immune defence system.

Mouse embryonic stem cells have been available for 18 years, but as yet relatively little work has been done to characterise which inductor substances are required to make these cells differentiate into ectoderm, mesoderm, or endoderm. Nobody has yet produced cloned mouse embryonic stem cells. Human embryonic stem cells

were first described late in 1998, and as yet nobody has reported producing cloned human embryonic stem cells.

If Therapeutic Cloning is to be transformed from a dream into a reality, an enormous amount of basic research will be necessary to establish the safety and efficacy of the technique. But the potential rewards would be enormous, comparable to the discovery of antibiotics. By cloning our own cells to create replacement cell lines, we would be fulfilling the age-old Biblical injunction of "Physician, heal thyself" (St Luke IV, 23).

Ethical Aspects

A utilitarian ethicist would surely be persuaded that the enormous potential for doing good by therapeutic cloning far outweighs the harm done by the destruction of a few early human embryos. After all, abortion of such embryos in the case of unwanted pregnancies is perfectly legal in all states of Australia.

We do not seem to have developed what might be called "Haploid ethics". We are not concerned with the fate of the millions of live spermatozoa men void in their urine each day. We are not concerned with the fate of the unfertilised egg after ovulation in a normal menstrual cycle. Hence it is difficult to imagine that there could be much ethical or moral objection to removing the nucleus from an unfertilised egg as a prelude to cloning.

The Catholic Church seems to be the only one of the world's great religions to have defined rather precisely the moment when a new human life begins. In Donum Vitae (1987) we are told that life begins at fertilisation, "when the nuclei of the two gametes have fused". In the official Latin version, published a year later (1988), this was changed to "fusione duorum gametum". But, in cloning, only **one** gamete is used, and even then it is an enucleated egg. Thus, according to either version of Donum Vitae, cloned individuals that have not been created by fertilisation pose a real problem as to when their "life" begins.

I use this example to point out the futility of trying to bring God in as the final arbiter of ethical debate. It emphasises the point made so eloquently by Richard Holloway, Bishop of Edinburgh (Godless Morality: Keeping Religion out of Ethics, 1999, pgs 19-20):

> "This is why the use of God in moral debate is so problematic as to be almost worthless. We can debate with one another as to whether this or that alleged claim genuinely emanated from God, but who can honestly adjudicate in such an Olympian dispute? That is why it is better to leave God out of the moral debate and find good human reasons for supporting the system or approach we advocate, without having recourse to divinely clinching arguments".

I rest my case.

R. V. Short