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IAP Statement Calling for a Ban on Human Reproductive Cloning

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National academies of science from all parts of the world are united in supporting a worldwide ban on the reproductive cloning of human beings, and in calling for cloning to obtain embryonic stem cells for both research and therapeutic purposes to be excluded from this ban.

Reproductive cloning

Cloning is currently the subject of intense global debate. Some countries have already banned the reproductive cloning of humans. We urge all other countries to introduce and support appropriate regulations to ensure that reproductive cloning is subject to a universal ban.

Human reproductive cloning by somatic cell[1] nuclear transfer (see 'What is cloning?') raises many issues – ethical, social, economic and scientific. It is through scientific research that the prospect of human reproductive cloning has come to be an issue of public policy. Scientists therefore have a special responsibility in the associated public debate.

What is cloning?

Cloning of an organism commonly involves a technique called somatic cell nuclear transfer, where the nucleus of an egg cell (containing its genetic material) is removed and replaced with the nucleus of a somatic cell taken from the body of an adult. If the reconstructed egg cell is then stimulated successfully to divide, it may develop to the pre-implantation blastocyst stage. In reproductive cloning, the cloned blastocyst is then implanted in the uterus of a female and allowed to continue its development until birth. However, in cloning for research or therapeutic purposes, instead of being implanted in the uterus the cloned blastocyst is converted into a tissue culture to make a stem cell line for research or clinical applications.

Scientific research on reproductive cloning in other mammals shows that there is a markedly higher than normal incidence of fetal disorders and loss throughout pregnancy, and of malformation and death among newborns. There is no reason to suppose that the outcome would be different in humans. There would thus be a serious threat to the health of the cloned individual, not just at birth but potentially at all stages of life – without obvious compensating benefit to the individual bearing this threat. Moreover, death of a fetus late in pregnancy could pose a serious threat to the health of the woman carrying it. Even on a purely scientific basis, therefore, it would be quite irresponsible for anyone

1 Somatic cells are all types of cell other than egg or sperm cells or their precursors.

to attempt human reproductive cloning given our current level of scientific knowledge.

It is not beyond the bounds of possibility that scientific knowledge could advance to the point where reproductive cloning by somatic cell nuclear transfer might be accomplished without undue risk. Such a situation would not of itself warrant the lifting of a ban on the practice, which would still face strong ethical, social and economic objections.

We therefore call on all countries worldwide to ban the reproductive cloning of human beings.

Cloning for research and therapeutic purposes

Similarly to reproductive cloning, cloning for research or therapeutic purposes involves generating a human blastocyst[2] via somatic cell nuclear transfer. However, the crucial difference is that the cloned blastocyst is never implanted into the uterus. Instead, cells isolated from the blastocyst are used to make stem cell lines for further study and clinical applications.

Research studies using such nuclear transfer techniques could be important for improving our basic knowledge of, for example, how the cell nucleus can be re-programmed to switch on the set of genes that characterises a particular specialised cell, or for understanding the genetic basis for human diseases, or for enhancing our understanding of re-programming faulty human genes. A more long-term goal would be to learn how to re-programme somatic cells into stem cells (see 'What are stem cells?') and thus provide a way of obtaining stem cells, genetically compatible with the patient, without any need for the use of eggs and embryos. It is, of course, only justified to carry out this research using human eggs where animal studies fail to provide a suitable alternative.

What are stem cells?

Stem cells are cells that can replicate themselves and also generate specialised cells as they multiply. Stem cells could be used to generate replacement cells and tissues to treat many diseases and conditions including Parkinson's disease, leukaemia, stroke, diabetes, spinal cord injury and skin conditions, including burns. Damaged organs or tissues would be colonised with sufficient normal cells, derived from stem cells, to restore their physiology or accelerate repair, or organs replaced by providing stem cells with an appropriate scaffold for their reconstruction.

Stem cells occur at all stages of development from embryo to adult but their versatility and abundance gradually decrease with age. While embryonic stem cells may be able to produce any of the 200 different types of specialised cells that make up the human body, adult stem cells appear to be capable of producing only one or a limited number of types of cell. Recently some have argued that adult stem cells have proved sufficiently versatile and therefore there is no need to derive stem cells from very early human embryos. We believe the scientific findings that have been reported so far do not support this conclusion. Therefore research on both adult and embryonic stem cells is vital for a proper evaluation of the prospects of stem cell therapy for the treatment of serious disease and injury.

Nuclear transfer techniques also offer the prospect of therapeutic applications for patients requiring cell, tissue or organ transplants, by producing embryonic stem cells that are genetically compatible with the recipient and thus circumventing the problem of rejection. However, aside from the scientific challenges, there are problems with the cost of customised treatments and obtaining a supply of unfertilized human eggs. At present, as cloning is an inefficient process, it is likely many eggs would be required to make a single embryonic stem cell line. It remains to be established if cloning for therapeutic purposes will be viable clinically. Research into additional strategies to overcome immune rejection is therefore strongly to be encouraged and such research may require the use of human embryonic stem cells derived from early human embryos.

Cloning for research and therapeutic purposes therefore has considerable potential from a scientific perspective, and should be excluded from the ban on human cloning. Both policies should be reviewed periodically in the light of scientific and social developments.

2 Approximately 5-6 days after a human egg is fertilised, it is known as a blastocyst and consists of about 100 cells, the majority of which are already specialised to form the placenta. Most countries that allow in vitro fertilisation (IVF) treatment allow the use of embryos up to day 14 after fertilisation.

List of IAP Member Academies which endorsed the statement:

African Academy of Sciences
The Caribbean Academy of Sciences
Latin American Academy of Sciences
Third World Academy of Sciences
The Academy of Sciences of Albania
National Academy of Exact, Physical and Natural Sciences, Argentina
Australian Academy of Science
Bangladesh Academy of Sciences
National Academy of Sciences of Belarus
National Academy of Sciences of Bolivia
Brazilian Academy of Sciences
Bulgarian Academy of Sciences
Cameroon Academy of Sciences
Chinese Academy of Sciences
Academia Sinica, China Taiwan
Croatian Academy of Arts and Sciences
Cuban Academy of Sciences
Academy of Sciences of the Czech Republic
Royal Danish Academy of Science and Letters
Academia de Ciencias de la República Dominicana
Academy of Scientific Research and Technology, Egypt
Estonian Academy of Sciences
The Delegation of the Finnish Academies of Science and Letters
Académie des Sciences, France
Georgian Academy of Sciences
Academy of Athens, Greece
Hungarian Academy of Sciences
Indian National Science Academy
Indonesian Academy of Sciences
Israel Academy of Sciences and Humanities
Science Council of Japan
Royal Scientific Society of Jordan
Kenya National Academy of Sciences
National Academy of Sciences of the Kyrgyz Republic
Latvian Academy of Sciences
Lithuanian Academy of Sciences
Macedonian Academy of Sciences and Arts
Academía Mexicana de Ciencias

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