

Sources of human embryonic stem cells and ethics

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This is an overview of ethical issues discussed specifically regarding human embryonic stem cell research before the derivation of human iPS cells. The use of human embryonic stem cells in research has raised a number of ethical controversies. The extent of these controversies is partly dependent on the source of embryonic stem cells (1). There are three main sources of human embryonic stem cells:

1. Already existing embryonic stem cell lines;
2. Embryos that are left unused after *in vitro* fertilization procedures (the so-called “spare” embryos);
3. Embryos created by means of somatic cell nuclear transfer technique (the same technique that was used when Dolly was created) for the purpose of conducting research.

Deriving embryonic stem cells from already existing embryonic stem cell lines is a less controversial practice than deriving them from “spare” embryos left from *in vitro* fertilization procedures. Stem cells derived from embryos created for research by somatic cell nuclear transfer technique raise major ethical objections from certain parts of society, arguing from religious and other moral perspectives (1).

However, many of those who oppose embryonic stem cell research generally agree that the first source of embryonic stem cells (already created embryonic stem cell lines) is an acceptable one. They base this opinion on the argument that stem cell lines have already been created and it is impossible to save the lives of former embryos from which they were created, even if harvesting of embryos itself may have been a morally wrong action. Therefore, they allow using these lines on the condition that further creation of embryonic stem cell lines should not be encouraged (2). The other two sources of embryos raise serious ethical questions, namely, whether using “spare” human embryos for research means a lack of respect for the embryos and whether using embryos created for research purposes is morally worse than using existing “spare” embryos for research. The application of the technique of the somatic cell nuclear transfer raises a question on what ethical problems relate to creating human embryos by means of this technique. There is no unanimous position among the scientists, ethicists and politicians on these ethical issues.

Does using “spare” human embryos for research mean a lack of respect for the embryos?

Below are some of the arguments that have been expressed regarding this question:

Arguments: There are a couple of reasons why using spare embryos for research would mean treating them without respect.

- If stem cell therapies became routine treatments, human embryos would become a source of therapeutic materials, and using them as merely means to achieve the ends may decrease the respect for human life (3). There is also a danger that such devaluation of human embryos at the very beginning of their life would encourage a policy of sacrificing the vulnerable for the benefit of others (4, 5). This is the so-called “slippery slope” argument, meaning that if we accept a certain action, such acceptance takes us to further toleration of other presently unacceptable actions. For example, an instrumental use of embryos may increase the social toleration of the loss of life, which may make it easier for society to accede to currently more controversial practices involving the ending of life. In its turn, that could ultimately put at risk persons with disabilities (4, 5). If we consider a human pre-implantation embryo as a human being, utilitarian arguments stressing the benefit of embryonic stem cell research cannot justify an unethical act and transform it into ethical one (6). Even if we regard research on

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embryos as not wrong, it may still open the way to a “slippery slope” of dehumanizing practices, such as embryo farms, cloned babies, the use of fetuses for spare parts, and the commodification of human life (7).

- According to some moral philosophers, there is a moral difference between acts and omissions, between actively killing something, and passively failing to intervene to stop its destruction from other causes (when one could have intervened). Even though the outcome is the same in each case, it can be argued that it is worse to actively bring about the destruction oneself (4).

Counter-arguments: There are several reasons why using spare embryos for research would not mean that human embryos are treated without respect:

- There is no reason to believe that destruction of embryos will undermine the respect for human life in society. The destruction of embryos in connection with *in vitro* fertilization treatment as well as abortion have been practiced for some time, and no special change in the way we view the value of human life has been observed. Destruction of spare embryos during *in vitro* fertilization (in the cases when they are neither implanted nor donated to other couples) could thus be considered more problematic than the destruction of spare embryos resulting from *in vitro* fertilization to produce stem cells for research with therapeutic aims (8).
- If we consider that it is immoral to sacrifice embryos for the sake of curing or treating devastating diseases, we should also consider that it is immoral to sacrifice them for the sake of treating infertility. To regard an embryo as a mere thing, open to any desired use, does not respect its significance as potential human life. It remains a question whether embryos can be used for all the purposes or only for certain. For example, few would favor the destruction or use of embryos for the purpose of developing a new line of cosmetics (7). Currently the accepted position is that human embryos should be used only for research purposes with therapeutic aims to tackle serious human diseases.
- Whether the spare embryos are donated for research or left to perish after being defrosted, they are actively destroyed anyway – either after they have served as the subjects of research or after the time limit for keeping them in the freezer has expired. If the result of the embryo research can help to cure so far incurable diseases, the interest of those who are suffering from these diseases should be considered (9, 10) and spare embryos should better be used for research than wasted after their freezing time has expired.

Is using embryos created for research purposes morally worse than using existing “spare” embryos for research?

Below are some of the arguments that have been expressed regarding this question:

Arguments: There is a moral difference between *different intentions*, although the final result is the same. In the case of “spare” embryos, the initial reason for creating them was to use them for fertility treatment and thus to give them the chance of becoming human beings. Therefore, research on “spare” embryos left over from fertility treatment is morally more acceptable, according to some writers, than research on embryos created specifically for research purposes, knowing that they will have to be destroyed in the course of conducting research (11).

Counter-arguments: In both cases the destruction of the embryos, either “spare” or created for research, is inevitable, since there is an international consensus that embryos used for research must not be inserted in the womb of a woman. We must also take into consideration that in fact there is nothing unnatural about creation of “spare” embryos, at least in the case of *in vitro* fertilization treatments, since “spare” embryos are produced in almost every natural pregnancy as well. Most of these spare embryos have to die enabling a sibling embryo to come to birth. The loss of embryos is

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an inevitable consequence of many pregnancies. The production of spare embryos, created only to perish, is not unique to assisted reproduction techniques. Therefore, in normal *in vitro* fertilization as in normal sexual reproduction, the creation and “sacrifice” of embryos in pursuit of a live child is accepted as natural and necessary (12). If it is normal to create “spare” embryos for *in vitro* fertilization purposes, knowing that they are created to perish, it should be normal to create embryos for research purposes. If one produces embryos for research purposes, one has a better chance that they will match the needs of future patients, since stem cell lines created from embryos produced by means of therapeutic cloning would be immunologically compatible to patients (2).

What are the ethical problems related to “therapeutic cloning”?

Somatic cell nuclear transfer or, in other words, cloning is the technique used when Dolly was created. It involves transferring the adult nucleus from a somatic cell into an egg without a nucleus. The term “therapeutic cloning” refers to the procedure of deriving an embryonic stem cell line from an embryo created by means of this technique, using the nucleus from the patient’s somatic cell. The term “therapeutic cloning” is somewhat misleading, since the procedure itself is therapeutic neither for the created embryo nor for the patient – it is the application of the derived stem cells for treatment that can be therapeutic. Concern has also been expressed that this not yet completely tested technique is too early labeled as “therapeutic” and that such “misnomer” distracts attention from significant practical and ethical implications of its use and raises unrealistic expectations (13). Besides the difficulties with the terminology, there is also no consensus regarding the ethical aspects of the so-called “therapeutic cloning”. Below are some of the arguments that have been expressed regarding this question:

Arguments: There are several reasons why therapeutic cloning should be pursued:

- Embryo experimentation (including therapeutic cloning) is not sufficiently wrong to outweigh the benefits of embryo research. Although clinical benefits are still in the future, they could be numerous. For example, in the area of transplantation, somatic cell nuclear transfer would avoid many of the problems associated with heterologous transplantation (14, 15).
- Even if destruction of human embryos as a result of conducting research is viewed as “killing”, it can be argued that the moral obligation not to kill, although very strong, is not one that can never be overridden. There may be some circumstances where very great harms can be avoided by actively ending someone’s life. For example, assassinating Hitler might have saved millions of Jewish people. A parallel has been drawn that similarly, sacrificing human embryos for research might lead to finding cure for millions of suffering patients (4).
- Therapeutic cloning could also be beneficial since embryonic stem cell lines could be created from embryos containing the nucleus of somatic cells of patients suffering from very rare genetic diseases or even common diseases but with a complex genetic or environmental basis. Such stem cell lines would be beneficial for researchers since otherwise it may be difficult to get enough of such tissues for biochemical and physiological analysis, as such cases are rare. Once such stem cell lines have been created, they could be studied by many researchers.

Counter-arguments: Ethical arguments against therapeutic cloning have also been expressed:

- If cloned human embryos were created, it would be easier for someone misguided to go to the next step and allow them to be implanted, or for someone rich enough to seek a clandestine “off-shore” treatment of infertility by means of reproductive cloning (10). Allowing research on embryos created by somatic cell nuclear transfer could become a step towards human reproductive cloning and its acceptance by society (3, 5). If all the technical problems in the first steps of cell nuclear replacement techniques were solved successfully then it would

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possibly become both easier and more tempting (because certain risks have been reduced) to try to use nuclear replacement techniques for reproductive cloning (16). However, as the worldwide prohibition of certain technologically possible experiments with human beings shows, legislation is able to restrict the use of certain technologies worldwide (such as non-somatic gene therapy). Legislation already prohibits reproductive cloning in numerous countries of the world, but it is important to outlaw human reproductive cloning worldwide (10).

- There is a danger of *commercial pressures* driving to conduct more research on embryos and a danger of decrease of respect for the intrinsic value of human life and its *reduction to an asset for researchers*. This danger especially becomes an issue with the pressure from the scientific and medical communities to go ahead, in order not to delay therapies or to lose opportunities to other countries (10). The way we treat the beginning of human life, particularly if we commercialize them, has wider implications and affects embedded social traditions (e.g. about how we reproduce).
- There is a danger of exploitation of women. If stem cells are to be produced from embryos that are not “spare” after *in vitro* fertilization, the ova for this production must come from women (16). Therapeutic cloning would require large numbers of oocytes and this demand could result in putting *pressure on women to donate eggs*. There is a danger that in this way their acts of altruistic donation may be demeaned (4, 5). If routine stem cell-based therapy becomes available, the number of needed ova may become very large (16, 17). With a therapy based on somatic cell nuclear replacement from the intended recipient in order to ensure perfect immunological compatibility, at least one ovum would be needed for each patient. It is, therefore, unclear how this new practice of procuring ova for non-reproduction purposes would influence the status of women in society (16). There is a risk that embryonic stem cell technology and therapeutic cloning have the potential to alter the social meaning of both human conception and human mortality (17). Women may become at risk of being alienated from their reproductive labor, and their ova could become at *risk of becoming the means to achieve the aims* (4). We should also ask ourselves a question on who would be most likely to “donate” their eggs and why? Most likely, it would be poor women, quite possibly from countries with less stringent (or no) legal prohibition against such exploitation (such as developing countries). Therapeutic cloning could lead to the commercialization and exploitation of such women to provide the raw materials for the treatment of developed world diseases. In the worst case, it could even lead to a global trade in human eggs (17).

Who would benefit from stem cell-based therapies?

It is unclear whose lives would be made better by stem cell-based therapies. The patients in the poorer sections of the developed world and the vast majority of patients in the developing world would be unlikely to have access to any of this technology, even if it becomes a routine therapy. Looking at the history of pharmaceutical conglomerates withholding generic therapies in the quest for profit and dumping unsafe drugs on developing world markets there are reasons to fear that stem cell-based therapies would be accessible only to small numbers of patients (17), at least in the beginning. It has been feared that stem cell-based therapies would probably prove to be a time-consuming and very expensive method for treating disease.

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References

1. Daar AS, Bhatt A, Court E, Singer PA. Stem cell research and transplantation: science leading ethics. *Transplant Proceed* 2004; 36:2504-6.
2. Knoepffler N. Stem cell research: an ethical evaluation of policy options. *Kennedy Institute Ethics J* 2004; 14:55-74.
3. Campbell AV. Ethical issues in therapeutic cloning. Round table "Ethical aspects of human stem cells research and uses", Brussels, 26 June 2000 [cited 2005 Jan 10]. Available from: URL: http://europa.eu.int/comm/european_group_ethics/docs/dp15rev.pdf
4. Rickard M. Current issues brief No. 5, 2002-03: Key ethical issues in embryonic stem cell research. Department of the Parliamentary Library, Australia, 2002 [cited 2005 Jan 12]. Available from: URL: <http://www.aph.gov.au/library/pubs/CIB/2002-03/03cib05.pdf>
5. Nippert I. The pros and cons of human therapeutic cloning in the public debate. *J Biotechnol* 2002; 98:53-60.
6. Chu G. Embryonic stem-cell research and the moral status of embryos. *Internal Med J* 2003; 33:530-1.
7. Sandel MJ. Embryo ethics – the moral logic of stem-cell research. *New Eng J Med* 2004; 351:207-9.
8. Welin S. Ethical issues in human embryonic stem cell research. *Acta Obstetricia et Gynecologica Scandinavica* 2002; 81:377-82.
9. Pennings G, Van Steirteghem A. The subsidiarity principle in the context of embryonic stem cell research. *Human Reproduct* 2004; 19:1060-4.
10. Bruce D. Church and Society Commission of the Conference of European Churches. "Therapeutic uses of cloning and embryonic stem cells". A Discussion Document of the Bioethics Working Group of the Church and Society Commission. Conference of European Churches. Society, Religion and Technology Project, Church of Scotland, 5 September 2000 [cited 2005 Jan 10]. Available from: URL: <http://www.srtp.org.uk/clonin50.htm>
11. Muscati SA. Embryonic stem cell research and the law – a Canadian and international perspective, 2002 [cited 2005 Jan 12]. Available from: URL: http://www.innovationlaw.org/lawforum/pages/Stem_cell_paper2.doc
12. Harris J. Stem cells, sex, and procreation. *Cambridge Quarterly Healthcare Ethics* 2003; 12:353-71.
13. Shanner L. Stem cell terminology: practical, theological and ethical implications. *Health Law Rev* 2002; 11:62-6.
14. European Group on Ethics in Science and New Technologies. Group of Advisers on the Ethical Implications of Biotechnology to the European Commission. Opinion No. 15 14/11/2000 Ethical aspects of human stem cell research and use [cited 2005 May 7]. Available from: URL: http://europa.eu.int/comm/european_group_ethics/index_en.htm
15. Ben-Yehudah A, Witchel SF, Hyun SH, Chaillet JR, Schatten G. Can diabetes be cured by therapeutic cloning? *Pediatric Diabetes* 2004; 5:79-87.
16. Holm S. Going to the roots of the stem cell controversy. *Bioethics* 2002; 16:493-507.
17. Cregan K. Ethical and social issues of embryonic stem cell technology. *Intern Med J* 2005; 35:126-7.