

Stem Cell Research and Ethics

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Science and Technology are like double-edged swords, they can develop society, benefit human beings, but they may also cause potential damage to human society. This applies also stem cell research. While the development of stem cell technology has already reached the stage of (experimental) clinic therapy, many of the ethical challenges of stem cell research remain unsettled.

Stem cells from human sources can be divided into human embryonic stem cells (hESC) and somatic stem cells, depending on their developmental stage and source. Somatic stem cells do mainly include hematopoietic stem cells and neural stem cells (usually derived from mesenchymal stem cells). From the 1950s onward, hematopoietic stem cells have been used in the context of bone marrow transplantation (BMT) for the clinical treatment of blood diseases, in particular for leukaemia. However, clinical research with neural stem cells is still in a primary stage. The main ethical issues in somatic stem cell research concern the sources and the sourcing of the used stem cells, as well as their safety in the context of clinical application.

In the past, however, most of the ethical debates on stem cell research have addressed human embryonic stem cell research. The road to human ESC research started more than 50 years ago, and was accompanied by vital discussions on the ethicality of the use of hES cells in research. The main ethics issues human ES cells include: the issues of the source of the ES cells; the moral status of human embryos; the issues of therapeutic cloning and reproductive cloning; ethical issues related to the experimental clinical use of stem cells; etc.

The sources of the human embryonic stem cells

Human embryonic stem cells can be derived from: (1) spared gamete or embryos in the blastocyst stage (blastula) that are left over after In Vitro Fertilization (IVF); (2) blastula derived from somatic cell nucleus transfer technique (SCNT), i.e. embryos derived from cloning technology; (3) blastula developed through parthenogenetic activation of voluntarily donated oocytes. Another source that is sometimes labeled as 'embryonic' stem cells, are stem cells that are derived from human fetuses, after natural or voluntarily selective abortion. In the scientific literature, however, stem cells derived from human fetuses are usually defined as 'fetal stem cells'. Because the embryo has the ability to grow into a person, but has to be destroyed in the context of research (otherwise stem cells could not be extracted), the moral status of embryos has become the central bone of contention.

The moral status of human embryos

The understanding of 'person' has both, biological and social significant. The human embryos in the research are not persons from the common understanding. However, human embryos have the developmental potential to grow into a person. Therefore, we can not manipulate human embryos randomly or abuse them. The embryo and then fetus produces the nervous system which can cause (later stage) embryos and fetuses to feel pain, especially at a later stage when some self-awareness has been developed. Existing research shows that embryos will produce sensory nerve on the 14th day. Therefore, in human stem cell research, there should be special respect and special procedures for the use of human embryos. Regulatory guidelines in most countries in the world do now specify that: human embryos that are used for research must be produced outside of the human body; human embryos that are used for research must not be older than 14 days; research must use embryos from humans and no alternative forms (such as stem cells derived from hybrid embryos; however – in some countries such as in the UK the use of hybrid embryos for research purposes is since recently allowed); human embryos cannot be treated as a commodity, i.e. are not allowed to be used in business transactions.

Informed consent

The use of spared gametes or blastula remaining after IVF, and the use of fetal cells following natural or voluntarily selective abortion has less ethical problems. The development of spared gamete and blastula into a human being depends heavily on technology. Without the use of technology, they will become inactive. Nevertheless, if they are used in stem cell research, they can be benefit to ten million people (reference?). The premise is that researchers must ensure that women do not undergo IVG for the purpose of providing embryos or ova for stem cell experiments. This also involves the problem of informed consent. Embryo providers should be fully informed about the procedures and purposes of hESC research, and the use of their embryos (or ova) must be based on voluntary agreement. In stem cell research, informed consent procedures should be highly valued, when research samples are collected.

Therapeutic cloning and reproductive cloning

Therapeutic cloning promises the in-vitro development of replacement organs and tissues for clinical treatment. There are some ethical debates related to therapeutic cloning: (1) it is still uncertain that the therapeutic effect of therapeutic cloning can be realized; (2) although the purposes of therapeutic cloning is good, to create human embryos by cloning technology, may tempt researchers to circumvent the (currently unanimous global) prohibition to clone human beings, and may thus lead to the problem of the reproductive cloning humans. Reproductive cloning creates a newborn human, that is genetically an (almost) exact duplication of an existing person. Reproductive cloning is the cloning of people; it is not cloning for treatment purpose. Human cloning may result in a series of issues problems: the cloning of humans may violate the laws of nature, and result in the use of cloned human beings as means and tool. It may, moreover, cause regression in the human species, and

result in forms of discrimination. Based on the principle of human dignity one cannot allow that human are made to a kind of product or are used as slaves. Nowadays, all the countries around the world forbid reproductive cloning.

Ethical issues related to the experimental clinical use of stem cells

The increasing translation of stem cell research, from the lab bench to the level of the clinic has given rise to additional ethical issues. The most prominent of these is exposure to health safety risks, in the context of participation in experimental clinical stem cell research and applications (Kiatpongsan and Sipp 2009). With the increase of unproven for-profit stem cell therapies in many countries, exposure to potential health safety risks has magnified. Health risks of clinical stem cell research result from a variety of causes. The most important of these causes are: (1) The ability of stem cells to migrate in the human body and to differentiate into undesirable tissue types, such as teratoma or other tumorous tissue (Prockop and Olson 2007). (2) The injection of stem cells can, potentially, result in the transmission of viruses or pollutants, which can cause secondary disease effects (Prockop and Olson 2007). (3) Risks related to surgery: since many stem cell treatments involve surgery, health risks associated with surgery (bleedings, meningitis, microbial contamination, etcetera) form an additional issue of ethical concern (Montgomery 2010; Raore et al. 2011). Another ethical issue related to clinical stem cell research is ‘therapeutic misconceptions’ (Appelbaum, Lidz and Grisso 2004). Due to the fact that many providers of experimental for-profit treatments with stem cells make overstated claims on the therapeutic benefits of the treatments they offer, patients may be lured to participate in experimental stem cell treatments on the basis of exaggerated and sometimes false hopes. Therapeutic misconceptions stand also in detrimental contrast with the principle of informed consent. The inception of exaggerated hopes in patients does fundamentally contradict with the making of autonomous and fully informed treatment decisions. A final ethical issue concerns the danger of the potential financial exploitation of patients (Hyun 2010). If it is true, that – as a result of the current stage of scientific development – many experimental treatments with stem cells do not yet have significant health benefits, how permissible is it to charge fees that are equivalent to a (systematically proven) routine clinical treatment? When and under which circumstances is it permissible to enrol patients on a fee-for-trial basis, and under which conditions should such forms of clinical experimentation occur?

In short, stem cell research should obey the following main ethical principles: the principle of the respect of human life; the principle of informed consent; the principles of de-commodification and non-exploitation; and the principle of adequate (pre)clinical testing of the safety and efficacy of new experimental therapies.

References

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