Title: Human Stem Cells

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References: TA 44 / 2003: final report "Menschliche Stammzellen", 337 pages, in German, and TA 44A / 2003: "Cells that are causing a political stir", summary of the TA-SWISS study "Human Stem Cells", 13 pages, in German, French and English.

Results: The fascination that surrounds stem cells and the expectations of future treatments is based on the fact that these cells produce all of the two hundred or so different cell types that occur in the human body. Stem cells differ from "ordinary" specialised cells, each of which has quite specific functions, because of two important characteristics: embryonic and adult stem cells can reproduce over a long period by repeated cell division, *and* they have the ability to develop into one or more cell types.

Through new concepts, it might be possible with human stem cells to realise first-time or improved treatments for serious disorders such as Parkinson's disease, which today cannot be treated, or only inadequately treated. The first concept is based on the reproduction of human stem cells in the laboratory and redeveloping them selectively for suitable cell grafts, to be transplanted into the body of the sick person, where they take over the functions of cells and tissues that are no longer working properly. In the second approach, human stem cells would be transplanted into the patient. The differentiation of the required cells takes place only in the body of the person being treated, controlled by signals from the tissue into which the cells have been transplanted. Under the third concept, the stem cells would be used to grow tissues, which could then be transplanted ("tissue engineering"). The fourth approach allows for new types of drug based on discoveries about the reproduction and differentiation of stem cells. These drugs would work on the patient's own tissue-specific stem cells in such a way that impaired cell and tissue functions in the patient's body would be regenerated. The first three treatment concepts referred to above appear essentially to be applicable to both embryonic and adult stem cells; the fourth makes use exclusively of adult stem cells.

At present, no clinical application of human embryonic stem cells is available. Research on these cells is still in its infancy. Up to now, there have been established cell treatments only in a few areas, such as blood cancer and skin burns, and these use adult stem cells. But public debate about stem cell research is focused on human embryonic stem cells because of the ethical questions related to the use of embryos as a source of these cells.

From an ethical point of view, the goal of stem cell research, to help and to heal, is not just a tenable one, but also a desirable one. But even considering these lofty objectives, an embryo is a very valuable commodity, and there is a great deal at stake. It is more than a question of a potentially beneficial "exploitation" of human life at its very earliest stage of development that is doomed to die anyway. Embryos just a few days old are also potential living beings, even if they are stored deep frozen in reproductive medicine clinics. They have been created with the intention of fulfilling dreams of having children by couples who are unable to conceive naturally. Occasionally such embryos become "superfluous". Is it ethically acceptable to use these embryos, contrary to their original purpose, for the harvesting of stem cells, even if doing so means "consuming" them? The report analyses in-depth the arguments in the discussion concerning the moral status of the embryo.

The Swiss federal constitution and the Swiss law on reproductive medicine leave open the question of whether "superfluous" embryos from IVF may be used for research. To close this legal loophole, a draft "Federal law on research on superfluous embryos and embryonic stem cells" will be discussed in both chambers of the Swiss Parliament in 2003. Under this bill, embryo research and the harvesting of embryonic stem cells would also be permitted in Switzerland. However, research may only be carried out on "superfluous" embryos from IVF or on stem cells harvested from "superfluous" embryos. The stem cells may be sourced both internally and from other countries. The ban on the production of embryos for purely research purposes is to remain in the future, as is the import of embryos and therapeutic cloning.

In the view of the authors of the study, the regulations proposed in the bill on handling embryos are pragmatic. They set out criteria for the utilisation of "superfluous" embryos that are anyway doomed to die. Nevertheless, it would be highly desirable to broaden the discussion and thereby to keep an eye on research on all types of stem cells, as well as other cytotherapy options. The many hurdles that have still to be overcome to establish cell treatments based on human embryonic stem cells seem to suggest that the time is not yet right to argue for the harvesting of such cells on a broad front. Moreover, it should be borne in mind that research on embryonic stem cells could also indirectly affect the ways and means in which other areas of biomedicine deal with human embryos. It is generally agreed that ethical and moral considerations should be given greater significance in embryo research than "purely" scientific and economic interests. But there are differing views on how binding regulations on embryo research should be worded, every one of which may well be justified in itself. The challenge for politicians and for society is to find a broadly acceptable solution in this sensitive area.

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23.4.2003