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Title **Human Stem Cells**

Agency **TA-SWISS, Centre for Technology Assessment at the Swiss Science and Technology Council**

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Reference Interim report: TA 41-Z/2002: "Human Stem Cells", 224 pages, in German

The contents of the interim report are provisional in character and contribute to the discussion and current debate on stem cell topics that is being coordinated by the Science et Cité Foundation together with other institutions. The final report will appear in autumn 2002 after the completion of the TA study.

Interim Results: In mid-May 2002, the draft of the new Embryo Research Law is to be discussed in Switzerland. This draft proposes regulations concerning research on human embryonic stem cells (ES cells) and 'surplus' embryos from in-vitro fertilization (IVF). The new law answers the question: How stringently should Switzerland restrain research on human embryonic stem cells? The interim report of the Centre for Technology Assessment considers the use of adult stem cells as being much less problematic in contrast to embryonic stem cells that are particularly controversial - above all from ethical and legal points of view.

According to the authors' opinion, the central question from the ethical point of view is whether research on human ES cells should be done in Switzerland at all. If this question is answered in the affirmative, two legal possibilities exist. First, the lawmakers would be able to declare the extraction of human ES cells from 'surplus' IVF embryos as being permissible under certain specific conditions. Up to now this topic has not been regulated legally. For the purpose of artificial insemination about one thousand fertilized egg cells are stored in Swiss reproduction clinics. For various reasons, these eggs can no longer be used for their original purpose. To be usable as a source of stem cells, these fertilized egg cells would need to be cultivated further for some days. During the subsequent extraction of the ES cells, the embryo would be destroyed. "The further cultivation of the legal 'surplus' IVF embryos for research purposes is a delicate point from the legal point of view ", says Rainer J. Schweizer, a legal rights expert at the University of St. Gall. A second possibility would be to import human ES cells from other countries with more tolerant legislation. This option, however, not only raises the question of double morality, but also is considered by the authors of the TA study as being illegal - at least in cases in where the stem cells are taken from embryos specially bred for research purposes or produced by therapeutic cloning. As guaranteed biological and medical findings on human stem cells are not available at present, numerous other legal problems remain unresolved.

The regulations on stem cell research require a new verdict on the moral status of the human embryo. Whatever conclusion is reached, this will have consequences on dealing with human embryos and foeti in other areas. For example, in prenatal diagnostics, in the question of abortion, in preimplantation diagnostics, or in transplantation medicine and biomedical research in general. According to the opinion of the TA study's project manager, Baerbel Huesing from the Fraunhofer Institute in Karlsruhe, the decisions made within the framework of stem cell research can possibly pave the way for the crossing boundaries in the areas mentioned. Stem cell research is still in its infancy.

The medicinal-scientific interest in human stem cells is based particularly on the fact that these cells offer the potential for developing novel therapy concepts. In this way, previously incurable diseases might be treated successfully at some point in the future. Above all, researchers expect to find possible application areas in cell replacement therapy and tissue engineering.

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As life expectancy is increasing, the development of new therapies for degenerative illnesses (eg, Alzheimer's), cardiovascular diseases, diseases of the nervous system (eg, Parkinson's, multiple sclerosis), and cancer (eg, leukemia) is becoming increasingly important.

All market estimates available at present on the potential of the use of human stem cells assume that the market will grow explosively. According to a prognosis by a German management consultant, the worldwide market volume was 400 million USD in the year 2000. This should rise to 12.9 billion USD by 2005 and to 57.7 billion USD by 2010. Other estimates are similar in magnitude. With activities at the universities in Basle and Geneva, Switzerland is particularly active as measured by the number of scientific publications on the subject of stem cells. If one compares the scientific status of stem cell research in Switzerland with its commercial implementation up till now, one gets the impression that a "commercialization gap" exists, noted Klaus Menrad, one of the TA study's authors from the Fraunhofer Institute in Karlsruhe.

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