

## Prospects of Stem Cell Research in Taiwan

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The research on human stem cells is a fledgling enterprise in Taiwan. Both government-sponsored research institutes and universities alike are eager to have a foothold in this important biotechnology area in the 21<sup>st</sup> century. However, the regulation of human embryonic stem cell research needs to catch up with the pace of research scientists. The guideline for human embryonic stem cell research published in 2002 specified that

1. The derivation of embryonic stem cells is limited to sources from (a) fetal tissues obtained through miscarriage, (b) fetal tissues obtained through legal abortion, and (c) embryos that are destined to be discarded in the *in vitro* fertilization clinics and are created within 14 days of fertilization;
2. Therapeutic cloning, also known as somatic cell nuclear transfer (SCNT), will require further elaboration before the future guideline pertaining to this area is issued;
3. No fees are allowed for the procurement of embryos and informed consent from the donors should be obtained;
4. No reproductive cloning is allowed;
5. Clinical research using embryonic stem cells will need to be approved by the respective Institutional Review Board.

Currently, several institutes, including Industrial Technology Research Institute, Academia Sinica, National Taiwan University and the National Health Research Institutes are undertaking the effort of establishing human embryonic stem cell lines with different degrees of progress. It is worth noting that researchers at the National Health Research Institutes have established a technique to isolate stem cells from human term placenta. This may represent an alternative source of pluripotent stem cells. The researchers in the National Health Research Institutes continue to characterize the pluripotency of these placenta-derived stem cells both *in vitro* and *in vivo*. Moreover, the National Health Research Institutes has licensed a technique in isolation and enrichment of neural stem cells from The Ohio State University. The ongoing development of this proprietary research platform in the National Health Research Institutes will provide sufficient supply of human neural stem cells for stem cell-based therapies in neural degenerative diseases such as Alzheimer's disease and Parkinson's disease as well as for damaged neural tissues such as stroke and spinal cord injury.

Tissue rejections are often encountered in allogenic transplantation. One solution is to obtain autologous stem cells through SCNT. It is a challenging yet crucial technology for allowing the embryonic stem cells to be used in future stem cell-based therapy and tissue regenerative therapy. Hence, we will invest a significant amount of effort in SCNT research. This requires a priori the establishment of proper regulation for carrying out SCNT. The National Health Research Institutes and Department of Health are formulating the regulation. Another area of emphasis is to devise optimal supporting materials for culturing embryonic stem cells. This task is pursued by investigators in the Institute of Stem Cell and Tissue Engineering in National Chung-Hsing University, funded by the National Health Research Institutes. Investigators in several institutes are also exploring the techniques of using feeder-layer free culture medium. It is anticipated that

a concerted effort of the several teams in Taiwan will allow expeditious advance of human embryonic stem cell research from laboratory benches to hospital beds in the near future.