

CDB Research Leads to New ES Cell Culture Method

October 7, 2004 – Japanese pharmaceutical maker Dai Nippon Seiyaku announced the release of a new serum and feeder-free embryonic stem (ES) cell culture system based on technologies developed and patented by the RIKEN Center for Developmental Biology (CDB) Laboratory for Pluripotent Cell Studies (Hitoshi Niwa, Team Leader).

The ability to sustain and grow cells outside of a living body, through a technique called cell culture, was an important stride forward in twentieth century biology, enabling scientists to study and manipulate the cellular activity and properties of colonies of cells maintained in vitro. Cell culture has been of particular importance to the understanding of stem cell biology, as research into culturing showed that lines of these “master” cells, unlike differentiated cell lines, can be maintained indefinitely. This in vitro immortality, known as “self-renewal” is in fact a hallmark of stem cells and one of their principal attractions as potential sources of cells for use in regenerative medical therapy.

A number of types of culture media have been formulated to provide the necessary nutrients and environmental conditions to the cells being maintained. Embryonic stem cell culture has traditionally made use of serum from the blood of fetal cows as a source of nutrients along with a bed of fibroblast cells taken from mouse embryos, which provides the environment required to maintain the ES cells in an undifferentiated state. Although this combination of conditions makes it possible to grow and maintain ES cells, the means by which they achieve this remains incompletely understood at the molecular level. The use of bovine serum and feeder cells from embryonic mice is of particular concern when the potential clinical applications of ES cells are considered, as the risk of contamination by animal-borne viruses or other infectious agents rules out the use in human patients of cells bred using feeder cells or media from non-human sources.

Rising to this challenge, the Niwa team developed a serum- and feeder-free system that makes it possible for researchers to culture ES cells under fully characterized experimental conditions. This technology was then commercialized in collaboration with the Japanese unit of the international research venture, Stem Cell Sciences K. K., located in the Kobe Biomedical Industry Project research park. Dai Nippon acquired the license to the technology and began marketing it for use in mouse ES culture under the name Culticell in July 2004. The availability of a medium that is free of uncharacterized ingredients and independent of feeder cells marks an important step towards the realization of the promise of ES cells in clinical medicine, while the development of a commercial product based on work by a CDB laboratory highlights the potential of the translational research paradigm bridging basic and applied science.