Teaser Memorandum

MCTT INC.

December 2007

Executive Summary

Founded in 2000, Modern Cell & Tissue Technologies(MCTT) is dedicated to research and development of various autologous cell therapy products and chitosan-based artificial dermis. Keraheal® (cultured epithelial autograft in spray type), our first commercial application, is currently in Phase III of clinical trial for burn patients and already approved by KFDA with the license for sales. MCTT, being an expert in primary cell culture and stem cell research in both embryonic and adult tissues, will continue to strive to become a world leading company in the area of cell therapy within the next ten years.

MCTT recently developed a new system or method for co-culture of stem cells and feeder cells using polymer membrane, in which stem cells and feeder cells can be cultured respectively under optimized conditions in separate spaces.

MCTT is seeking for technology transfer or out-licensing partners for its co-culture system of stem cells and feeder cells. Terms of the licensing are not set, and interested parties may further discuss the parameters should they wish to enter into an agreement.

Company Description:

- CEO: Song-Seon Jang
- Established: January, 2000
- No. of Employees:
- Capital: US$
- Location: Seoul, Korea

Bisiness Fields:

- TEMP (Tissue Engineered Medical Products) Business
- Stem Cell Therapy Business
- Skin Therapy Business
- RMS (Research Material Supplies) Business

Key Technology Highlights

□ Optimal Condition for Culturing Sem Cells & Feeder Cells

The optimal composition of culture medium of the stem cell is different from that of the feeder cell. Nonetheless, both stem cells and feeder cells should be co-cultured by using a serum-free medium because stem cells are usually induced to differentiate by serum. Thus, the feeder cells have to grow under an improper condition. In the co-culture system, the culture condition can be optimized respectively since it is divided by a polymer membrane. The culture space of stem cells is filled with a serum-free or serum-replacement medium so that it prevents stem cells from differentiation. In contrast, the culture space of feeder cells is filled with a culture medium containing serum so that it gives a most optimal environment for cells.

□ Reduced Differentiation & Increased Proliferation of Stem Cells

In the conventional culture system, a substantial number of stem cells undergo spontaneous differentiation and apoptosis. This apoptosis and spontaneous differentiation limit the expansion rate of the stem cells. In the co-culture system, a porous membrane permitted soluble factor exchange between stem cells and feeder cells. The porous membrane with a specific pore density supported maximal growth and self-renewal of stem cells, by providing: i) a much lower incidence of spontaneous differentiation than conventional culture, and ii) an increased cell production rate due to a significant decrease in apoptosis.

□ No Need to Pretreat the Feeder Cells with Cytostatic agents

In prior arts, feeder cells should be pretreated with a cytostatic agent, such as mitomycin or radiation, in order to prevent over proliferation of the feeder cells which interfere the proliferation of stem cells. Such treatment of a cytostatic agent reduced a survival period of feeder cells and may prevent the normal growth of stem cells. In the co-culture system, the culture spaces are divided by a polymer membrane to exclude feeder cells interfering stem cells. Therefore, there is no need to pretreat cytostatic agents and is possible to culture feeder cells in a high number.

Company History:

2000.01	Company established
2000.06	Approved as the Venture Business Company
2001.08	Complete GLP/GMP facilities within the Attached Research Institute
2001.09	Began the project of 2 nd stage (3 years thereafter) for National Research Laboratory
2002.04	Selected as Task for Technical Innovation from Small and Medium Business Administration
2002.12	Selected as the Project Task for Product development from the Ministry of Health & Welfare
2003.10	Passed KFDA standard and testing method on Cell Therapy (AutoCel)
2004.05	Passed KFDA Approval of Safety/Efficacy on Cell Therapy “AutoCel”
2005.06	Completed GMP for producing artificial skin
2005.09	Signed MOU for launching neuro cell therapy in China (Beijing)
2005.10	Listed 3 companies participated in paid-in capital increase (KEUNWHA PHARMA. CO., LTD., Jung Soft and S&C)
2006.5	Obtained KFDA approval for “Autocell”
2007.4	Selected as the Project Task for 21C Frontier R&D program from the Korean Ministry of Science & Technology

□ Long-term Cultivation of Stem Cells without Early Sub-Culturing

The conventional culture system reduces the cell survival of feeder cells to 5 to 7 days, since being treated with mitomycin or irradiating and cultured under the stem-cell optimized media condition. Therefore, stem cells should be sub-cultured before being confluent, even if they are first derived or have a delayed cell passage. In the co-culture system, it needs not to pretreat cytostatic agents and is possible to elongate the survival period of feeder cells. Hence, stem cells need not be sub-cultured before being confluent. Stem cells can be cultured continuously for about 2 weeks when first derived, not 5 to 7 days.

□ Safe & Reduced Contamination

In prior arts, stem cells are inevitably mixed with feeder cells when being sub-cultured, because 2 kinds of cells are cultivated on the same culture plate. In case of clinical applications, mouse feeder cells are so problematic to contaminate human stem cells. Besides, stem cells may not be safe due to the remaining mitomycin treated to feeder cells. In the co-culture system, stem cells are separated from feeder cells through a polymer membrane so that pure human stem cells can be obtained while excluding animal cells. In addition, the stem cells even for therapeutic use can be obtained without any contaminant since not pretreated by a cytostatic agent such as mitomycin or radiation. Therefore, the method for co-culturing stem cells by using a membrane of the present invention can be widely used for clinical applications.

Technology Overview

□ Co-culture System using a Porous Membrane

The present technology relates to a method for co-culture of stem cells using feeder cells, more particularly to a method for culturing stem cells by using a membrane having a number of pores to separate stem cells from feeder cells. The present technology provides an optimal condition for culturing stem cells, in which 2 kinds of cells can be cultivated independently in separate spaces while permeating essential substances selectively. Any kind of non-toxic polymers can be used as a material of the porous membrane. Preferably, the polymer material can be selected from a group comprising polyester, polycarbonate and polytetrafluoroethylene(PTFE). In addition, the polymer material is comprised of synthetic polymers alone or coated with gelatin, collagen or the like.

□ Maintenance of Undifferentiation of Stem Cells

In co-cultures using a semi-permeable membrane, the degree of undifferentiation varied according to material attaching stem cells. The stem cells cultured on a polyester membrane multiplied actively and covered the surface within 5 days erasing the border of colonies. In a size, stem cells had a high ratio of nuclei and cytoplasm and were crowded, which is a characteristic specific for immature cells. In the control group cultured on a polystyrene plate, embryonic stem cells were inoculated on feeder cells so that extra-cellular substrates secreted from the feeder cells may be stored between stem cells and poly-stylene surface. The expression of Nanog RNA transcripts as an undifferentiation marker of embryonic stem cell was examined by performing a real-time reverse transcription polymerase chain reaction. As a result, stem cells on polyester have expressed the highest level of Nanog RNA transcript. Also, both stem cells on polycarbonate and polytetrafluoroethylene coated with collagen have expressed the transcripts in higher levels than those on polystylene and the control group. FIG. 1 depicts the surface expressions of Tral-60 an undifferentiation marker according to culture conditions by performing a FACS analysis. Table 1 illustrates Tral-60 cell surface expression(%) measured in FIG. 1. As a consequence, it is observed that the undifferentiation marker of a polyester membrane case is most highly expressed on the cell surface. Therefore, it is confirmed that the cell culture on the polyester membrane is most suitable not to induce differentiation.

Figure 1: FACS of Tral-60

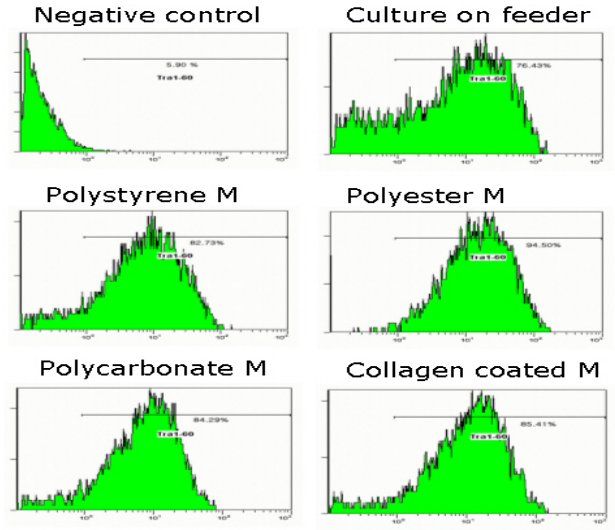


Table 1: Surface expression of Tral-60

Material	Tra1-60 cell surface expression (%)
Negative control Only 2° Ab	5.90 %
Culture on Feeder	76.43 %
Culture on polystyrene	82.73 %
Culture on polyEster membrane	94.50 %
Culture on polycarbonate membrane	78.87 %
Culture on collagen coated membrane	84.29 %

(Source: Company)

□ Enhancement of Growth Rate of Stem Cells

In co-cultures using a semi-permeable membrane, the growth rates of stem cells were monitored. Briefly, the growth rate of stem cells grown on a polystyrene culture plate was very different from that of stem cells cultured vice versa on a polyester membrane even under the same condition. The stem cells cultured on a polyester membrane multiplied actively and fully covered the surface within 5 days erasing the border of colonies. This result is proved to correspond to the amount of genomic DNAs. In particular, the DNA amount obtained from a polyester membrane increased by about 1.8-fold and further by about 2.7-fold than that of the control group did. Therefore, it is concluded that embryonic stem cells could expand most highly, when stem cells were cultured on a polyester membrane and feeder cells on a polystyrene plate. FIG. 2 depicts the amounts of genomic DNAs according to culture conditions that identify the growth of embryonic stem cell HSF6 (72 passages; cultured for 5 days). FIG. 3 depicts the number of cells calculated by using a DAPI staining and a trypan blue staining. The cause appeared to be reduced apoptosis of stem cells grown on a polyester membrane.

Figure 2: Amounts of genomic DNAs (absorbance)

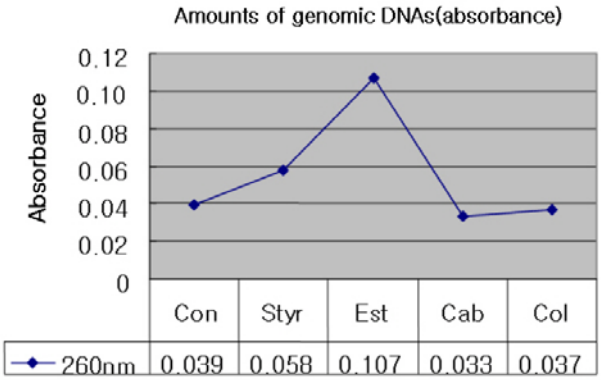
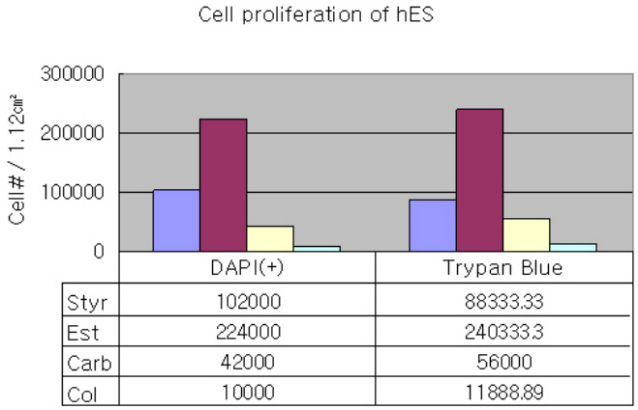


Figure 3: Cell proliferation of hES



(Source: Company)

Patent & Thesis

The company has international/oversease patents registered or filed for application with regards to the co-culture system of stem cells and feeder cells.

Reg/Appl Number	Status	Description
10-2006-0077478 (Korea)	Filed	Method for Co-culture of Stem Cells and Feeder Cells using Polymer Membrane
PCT/KR2007/002597 (PCT)	Filed	Method for Co-culture of Stem Cells and Feeder Cells using Polymer Membrane

Contact Point

KHIDI (the Korea Health Industry Development Institute) is currently receiving inquiries from interested parties in this transaction. If you are interested, please contact any of the KHIDI professionals below:

Researcher	Young-Kyun Jung	E-mail: jyktop@khidi.or.kr