



TECHNOLOGY

Pluripotent Stem Cell Production Method

OVERVIEW

One of the major hurdles in stem cell research is that techniques for purification and propagation can be tedious and result in low yields. Standard methods require feeder cells, matrix, and serum, which are expensive and can introduce contaminants. UMB researchers, however, have developed an alternative method to consistently and reliably purify proliferating CD34+ hematopoietic stem cells. In particular, this invention exploits the non-adherent properties of undifferentiated cells through the serial passaging of suspended cells in serum-free liquid media. The method has been effectively applied to the enrichment of a subset of CD34+ bone marrow stem cells from the femur of adult mice. The purified cell population consists of natural adult stem cells that express embryonic stem cell genes and exhibit pluripotency. For example, transplantation of purified CD34+ stem cells into adult mouse brains demonstrated stable differentiation into various mature cell types (e.g. neuronal, astroglia, and oligodendroglia). More recent data indicates these purified stem cells are capable of differentiating into a variety of specialized cell types that are either ectodermal, mesodermal or endodermal lineage. In humans, the cell culture method can be employed to generate pure populations of bone marrow stem cells from a patient for therapeutic cell replacement in the haematopoietic system, CNS, pancreatic islet, and other tissues where cell replacement is required. This method holds the potential to resolve certain stem-cell related issues such as immune rejection of transplanted cells, pathogen transfer (e.g. hepatitis, HIV) from donor to host, plus the limited availability and ethical barriers of embryonic and fetal stem cells.

APPLICATIONS

The market for stem cell technologies is expected to rise to over \$700 million in 2012, with potential to reach even higher due to investments from pharmaceutical companies and strong market demand (source: Kalorama Information). Adult stem cell technologies provide a reliable and renewable source of primary cells while avoiding the high cost and ethical issues of embryonic and fetal stem cells. Stem cell therapeutics have enormous potential to treat a wide variety of indications including Alzheimer's, spinal cord injury, stroke, burns, heart disease, diabetes, osteoarthritis, and rheumatoid arthritis. Osiris Therapeutics recently gained approval for the world's first approved stem cell drug called Prochymal, which is fast-tracked for the treatment of acute graft-vs-host disease and Crohn's disease. Such progress may spur an expansion of R&D for new stem cell therapeutics, and there's expected to be a demand for improved techniques for the production, maintenance, and purification of human pluripotent stem cells.

ADVANTAGES

A patient's own bone marrow can be used to: -generate stem cells for therapeutic cell replacement - provide a pure population of haematopoietic stem cells and clonal stem cells -avoid immune rejection, HIV, hepatitis or other pathogen transfer and other animal virus contamination from fetal bovine serum or primate feeder cells exposure

STAGE OF DEVELOPMENT

-Enriched CD34+ cells have been continuously cultured up to ten months, and can be expanded for large batch production. -Transplantation of purified stem cells into adult mouse brains demonstrated the ability of CD34+ stem cells to differentiate into various mature cell types (e.g. neuronal, astroglia, and oligodendroglia). -Transplantation into chimeric blastocysts demonstrated pluripotency through transformation into various tissues in the chimeric mouse (e.g. ectodermal neural cells, mesodermal bone & bone marrow cells, and endodermal pancreatic, liver and intestinal cells).

R&D REQUIRED

Further studies are in progress to gain additional proof of concept for specific applications of these pluripotent stem cells (e.g., neuronal replacement; insulin production, etc.).

LICENSING POTENTIAL

UM seeks partners to further develop this technology for a number of therapeutic applications.

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Additional Information

INSTITUTION

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PATENT STATUS

U.S. Patent 8,940,535, issued 1/27/2015

LICENSE STATUS

Available for licensing

CATEGORIES

- Research Tools, Antibodies, & Reagents
- Therapeutics
- Stem Cells

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EXTERNAL RESOURCES

- [Hematopoietic progenitors express myelin basic protein and ensheath axons in Shiverer brain](#)
- [Hematopoietic progenitors express embryonic stem cell and germ layer genes.](#)
- [Adult hematopoietic progenitors are multipotent in chimeric mice](#)

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