Defined and Xeno-free Media for Feeder Free Conditions for Maintenance of Human Induced Pluripotent Cells (iPSCs) and Embryonic Stem Cells (hESCs)

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BACKGROUND

A medium formulation with the desired biological functions and that is (1) defined, (2) xeno-free with all human recombinant proteins, and (3) cost effective is crucial to the successful scale up and development of the therapeutic applications of human stem cells.

TECHNOLOGY DESCRIPTION

A xeno-free and defined media is devised for the maintenance of hESCs and iPSC in an undifferentiated state in the absence of feeder cells or feeder conditioned medium, using Matrigel^{TM} or a synthetic polymer matrix. By not using feeder cells, the medium in combination with defined coating substrate, such as Corning's synthetic matrix, can truly offer a xeno-free, and totally defined culture condition for hESC and hiPSC. Additionally, this medium was designed to be more cost attractive compared to the current ones on the market, and is the only clinical-grade media that can be used for hESC- and iPSC-based therapies. Contrary to products labeled as xeno-free currently in the market, this new medium has no trace of the animal contaminate known as sialic acid Neu5Gc (N-Glycolylneuraminic acid). Neu5Gc can be metabolically incorporated into the surface of any cultured cells. Most humans have antibodies to Neu5Gc from dietary sources such as milk and beef. The incorporation of nonhuman Neu5Gc into the cell surface of transplanted human cells will likely evoke undesirable immune responses from the host and compromise the efficacy and safety of cell based therapies. Moreover, the formulation can better buffer the variations caused by cellular metabolism, making the daily medium change unnecessary, saving on both cost and time. Finally, the serum replacement technology used in this medium was shown to increase the freeze-thaw efficiency in about 100-fold when compared to commercially available media.

APPLICATIONS

Long-term maintenance of human embryonic stem or embryonic-like stem cells used in differentiation studies, scale up for drug screening or cell-based therapies.

ADVANTAGES

- Xeno-free: can be used for hESC and iPSC based therapies since it has no trace of an animal contamination.
- iPS cells show higher number of derived clones with both X chromosomes activated. And more importantly, and contrary to all media available, our media can sustain them in long-term maintenance.
- Defined: no lot to lot variation, thus better control over experimental variation.
- Tested on H9 and several iPSC clones, isolated from different individuals and patients.
- Substantially cost savings compared to currently available equivalent media.
- No adaptation from mouse embryonic fibroblast feeder cells.

STATE OF DEVELOPMENT

Tested on several patient-derived iPSC clones and H9. Tested in different labs and by independent researchers.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,725,695	08/08/2017	2010-036

CONTACT

University of California, San Diego
Office of Innovation and Commercialization
innovation@ucsd.edu
tel: 858.534.5815.

OTHER INFORMATION

KEYWORDS

hESCs, human embryonic stem cells, microenvironments, defined culture conditions, pluripotent stem cells, embryonic-like stem cells, iPSC, feeder free

CATEGORIZED AS

- **Medical**
  - Stem Cell

RELATED CASES

2010-036-0

RELATED CASE

SD2010-299

RELATED MATERIALS

- Paulo A. Marinho, Thanathom Chailangkarn, and Alysson R. Muotria. Systematic optimization of human pluripotent stem cells media using Design of Experiments. Nature Scientific Reports 5, Article number: 9834 (2015).

University of California, San Diego
Office of Innovation and Commercialization
9500 Gilman Drive, MC 0910, ,
La Jolla,CA 92093-0910

Tel: 858.534.5815
innovation@ucsd.edu
https://innovation.ucsd.edu
Fax: 858.534.7345