Xenobiotic-Free Culture System To Expand Human Limbal Stem Cells

Tech ID: 27459 / UC Case 2017-431-0

SUMMARY

UCLA researchers in the Departments of Opthalmology have developed a xenobiotic-free manufacturing process to produce transplantable human limbal stem cells for use in treating limbal stem cell deficiency.

BACKGROUND

Limbal stem cell deficiency (LSCD) is a disorder characterized by the loss or dysfunctionality of limbal stem cells (LSCs) and its subsequent ability to regenerate the corneal epithelial surface. LSCD is characterized by persistent epithelial defects, conjunctivalization, neovascularization, scarring, and inflammation, all of which lead to corneal opacity, pain, photophobia, and ultimately blindness. Corneal transplantation is ineffective to treat severe to total LSCD because functional LSCs are not transplanted. The highest success rate of treating LSCD was achieved using single isolated LSCs cultured on 3T3 mouse fibroblasts feeder cells in a culture medium that contained fetal bovine serum (FBS). However, the presence of animal components in such xenobiotic culture systems poses a risk of transmitting animal diseases to human recipients after transplantation. There is a need for an effective and complete xenobiotic free culture system for culturing LSCs that minimizes the risk of cross-contamination and toxic effects when the LSCs are transplanted to the patient.

INNOVATION

Researchers at UCLA developed a xenobiotic-free manufacturing process to produce transplantable human limbal stem cells for use in treating limbal stem cell deficiency. This method does not require the use of toxic compounds such as cholera toxin (to promote LSC proliferation) or DMSO (to enhance membrane permeability). The researchers have defined an optimal media and growth protocol for these cells.

APPLICATIONS

Transplant of LSCs in patients with limbal stem cell deficiency

ADVANTAGES

- Does not contain xenobiotics: Eliminates risk of transmitting animal disease to recipient
- Does not use cholera toxin or DMSO (to enhance membrane permeability)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20200123497	04/23/2020	2017-431
European Patent Office	Published Application	3554487	10/23/2019	2017-431

RELATED MATERIALS

- Mei, Hua, et al. "A three-dimensional culture method to expand limbal stem/progenitor cells". Tissue Engineering Part C: Methods 20.5 (2013): 393-400.
- Nakatsu, Martin, et al. "Human limbal mesenchymal cells support the growth of human corneal epithelial stem/progenitor cells". Investigative Ophthalmology & Visual Science, 55.10 (2014): 6953-6959.
- GONZALEZ, SHEYLA, et al. "Comparison of Different Limbal Epithelial Stem Cell Isolation Methods to Improve the Epithelial Sheet Quality for Transplantation." Investigative Ophthalmology & Visual Science 54.15 (2013): 989-989.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Limbal stem cells, cell culture, culture medium, xenobiotic-free, transplant, therapy, limbal stem cell deficiency, LSCD, cornea, opacity, blindness

CATEGORIZED AS

- **Medical**
  - Disease: Ophthalmology and Optometry
  - Research Tools
  - Stem Cell
- **Research Tools**
  - Reagents

RELATED CASES

2017-431-0

▶ GONZALEZ, SHEYLA, et al. "Human Bone Marrow-Derived Mesenchymal Stem Cells Support the Growth of Limbal Epithelial Progenitor/Stem Cells". Investigative Ophthalmology & Visual Science 55.13 (2014): 522-522.

▶ GONZALEZ, SHEYLA, et al. "A 3D culture system enhances the ability of human bone marrow stromal cells to support the growth of limbal stem/progenitor cells". Stem Cell Research 16.2 (2016): 358-364.

▶ GONZALEZ, SHEYLA, et al. "Comparative study of xenobiotic-free media for the cultivation of human limbal epithelial stem/progenitor cells". Tissue Engineering Part C: Methods, ahead of print.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ Stem Cell-Derived Exosomes for the Treatment of Corneal Scarring

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