

PRODUCT

Novel method to culture patient-derived immortalized epithelial stem cells in 2D cell culture plates.

INDICATIONS

Ulcerative Colitis (UC),
Inflammatory Bowel Disease (IBD)

VALUE PROPOSITION

- Derivation of immortalized 2D stem cells that exhibit pathophysiological features and characteristics of primary 3D stem cell lines.
- 2D stem cell lines required less maintenance and were easier to grow through multiple passages (~25 passages).

DEVELOPMENT STAGE

Available for Licensing

PUBLICATIONS

Manuscript in preparation.

CONTACT INFORMATION

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Method to Grow Patient-Derived Immortalized Epithelial Stem Cell Lines in a 2D Culture System

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OPPORTUNITY

Inflammatory bowel disease, particularly in the form of Ulcerative Colitis (UC), is emerging as a growing area of research for the development of novel therapeutics and patient-based assays. There is an unmet need for cell-culture based models that can be used to replicate IBD pathophysiology and be used to facilitate drug discovery screens *in vitro*. Currently, 3D culture models are used to maintain UC patient-derived lines which are resource-intensive and at best, offer challenging platforms for further genetic manipulation. Moreover, 3D culture systems are at risk of the cells differentiating. These factors place rigid limitations on current research efforts in this field, thus impeding the discovery and development of therapies for these intestinal diseases. Therefore, there is an unmet need to develop novel cell-culture systems that can allow for easy culture of UC patient-derived cell lines while still maintaining their pathophysiology.

SOLUTION

Researchers at Cleveland Clinic have developed a novel method for growing patient-derived immortalized epithelial stem cells in normal cell culture plates (2D). Cell lines cultured using the current methodology exhibit similar features to the primary cells. Cell lines derived from the current methodology are easy to grow and propagate versus conventional 3D culture methods.

Advantages and applications of current culture methodology:

- Method to generate, propagate and passage UC patient-derived immortalized stem cell lines while maintaining control/disease state pathophysiology.
- Cell lines can be differentiated and propagated for more than 25 passages.
- Can culture large quantities of cells quickly and efficiently.
- Helps reduce cell culture and maintenance costs. For example, the culture method does not require the use of Matrigel.
- Culture methodology without Matrigel allows for easy genetic manipulation that includes transfection or transduction – which is a major limitation of primary 3D intestinal stem cell culture.
- Cell lines maintain differentiation ability with the current system allowing them to differentiate to spheroids.
- Cell lines can be transfected with HCMV viruses thereby exhibiting a model for IBD patients with colectomy.
- Immortalized 2D cultured cell lines can be used to develop gut-on-a-chip assays.

In conclusion, by eliminating the experimental barriers to efficient patient-derived stem cell culture and propagation, the current technology allows for the discovery of novel therapeutics for these inflammatory diseases and apply the current technology to other disease indications within this domain.

**Data available upon request.*