

Gel for Rapid Induction of Cancer Stem Cells

Rapid Production of Cancer Stem Cells Driving Tumor Recurrence to Accelerate Cancer Research.

Overview

The average cancer recurrence rate is approximately 20%. For aggressive cancers, the recurrence rate within five years can be as high as 70%. Cancer stem cells, known for their resistance to radiation and drug therapies, are considered a key cause of recurrence. Recently, drug discovery research targeting cancer stem cells has attracted significant attention. However, the extremely low abundance of these cells within tumor tissues presents a major challenge for research. Several methods have been proposed to induce cancer stem cells from cancer cells. However, all require high culture costs and long induction times, making them impractical for clinical application.

The present invention relates to a method of inducing cancer stem cells within 24 hours by culturing cancer cells on a double-network hydrogel (DN gel) without the use of drugs or genetic manipulation. Cancer stem cells induced by this method show increased expression of stem cell marker genes and exhibit tumor-forming ability even when injected in small numbers into mice.

By enabling simple and rapid production of cancer stem cells, this method is expected to accelerate the development of cancer therapies. These therapies aim to achieve fundamental cures by preventing recurrence and metastasis.

Product Application

- Scaffold material for inducing cancer stem cell
 - Development of novel therapeutics targeting cancer stem cells
 - Personalized medicine (prediction of individual patients' cancer recurrence mechanisms)

IP Data

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Cancer Stem Cells Induced by DN Gel

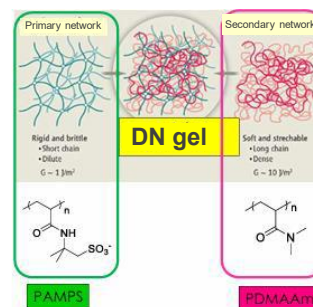


Figure 1. Structure of DN Gel

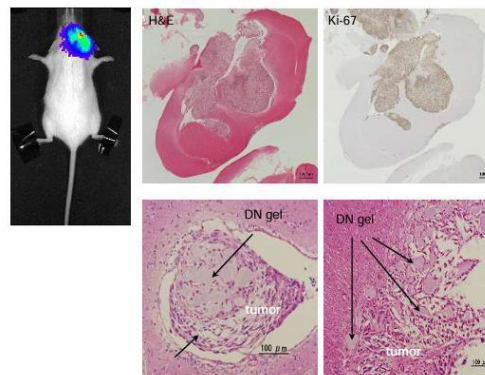


Figure 3. Tissue section of a mouse injected with cancer stem cells

Tumors formed around the DN gel

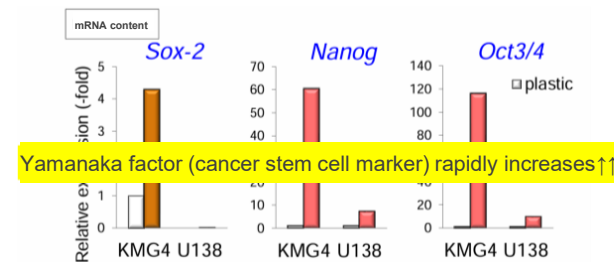


Figure 2. mRNA expression after 3 days of culture on DN gel (PS culture dish = 1)

*KMG4, U138 : Glioblastoma cell line

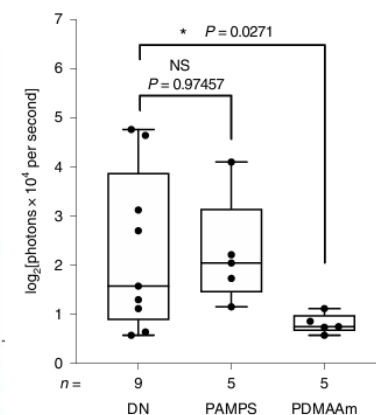


Figure 4. Comparison of tumorigenicity of cancer stem cells
 Cancer stem cells induced by DN gel exhibited high tumorigenic potential in mice.

Related Works

- [1] Suzuka, J. et al., *Nat. Biomed. Eng.* **5**, 914–925 (2021).
<https://www.nature.com/articles/s41551-021-00692-2>
- [2] "Development of rapid induction of cancer stem cells by hydrogel" announced at JST New Technology Briefing on January 18, 2022
https://www.shingi.jst.go.jp/list/list_2021/2021_shika.html

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