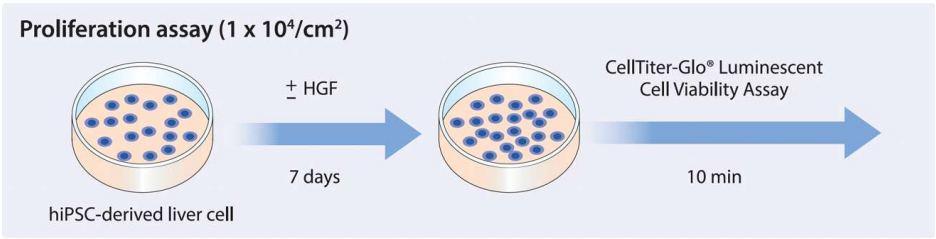
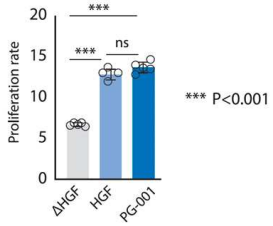
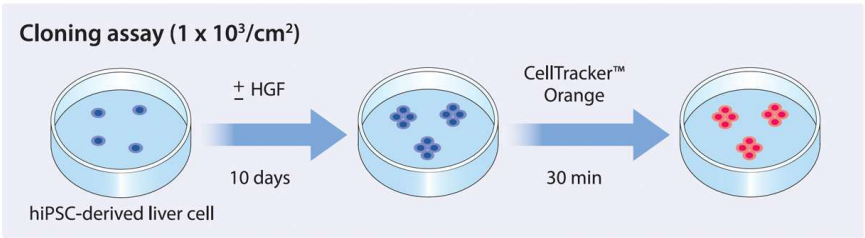
Application Notes of Synthetic Peptide Growth Factors

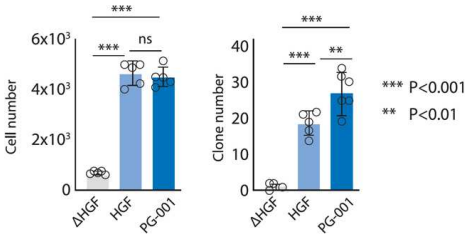
PG-001 : Proliferation and cloning assay of iPSC-derived liver cells





Proliferation of human liver cells was enhanced by the supplementation of PG-001 (0.25 nM), comparable to recombinant HGF addition (0.25 nM).





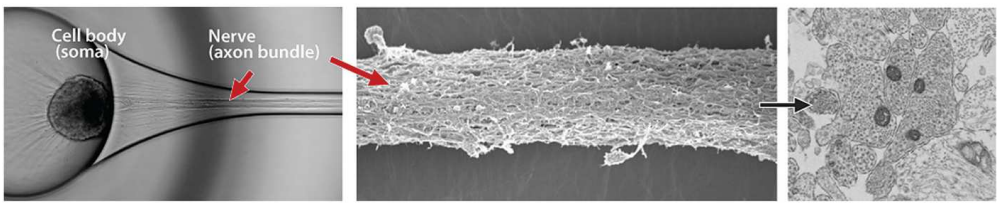
Efficiency of colony formation by the supplementation of PG-001 was observed to be similar to that achieved by recombinant HGF addition (both for 0.25 nM).

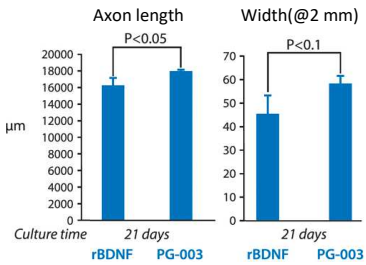
Provided by Prof. H. Taniguchi, Institute of Medical Science, The University of Tokyo.

PG-003 : Growth of iPSC-derived neural axon bundles from Nerve Organoid™

Nerve Organoid™

Jiksak Bioenginering Inc.'s patented Nerve Organoid™ consists of 3D nerve tissue in a unique microfluidics device. The 3D nerve tissue is derived from human iPS nerve cells. It closely resembles an in vivo nerve with a cell body and axons that self-organize into bundles as they extend through the device's microchannel.



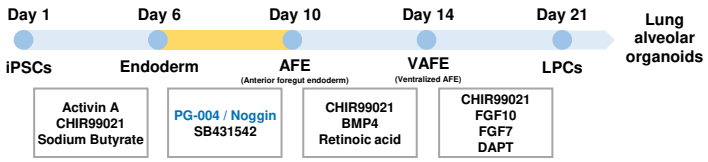


Provided by Jiksak Bioengineering Inc.

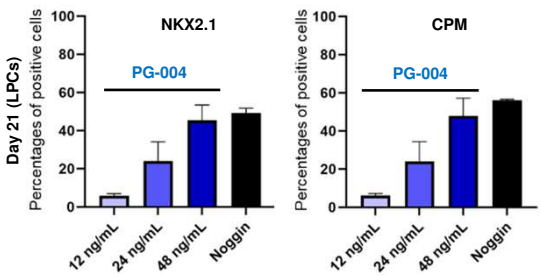
- ✓ The length of the neural axon bundle from the cell body (soma) to the end and the width of the neural axon bundle were measured at 2 mm from the soma.
- ✓ The axon bundles generated by PG-003 were **longer and thicker** than the ones generated by rBDNF.

PG-004 : Formation of lung alveolar organoids from human iPSCs

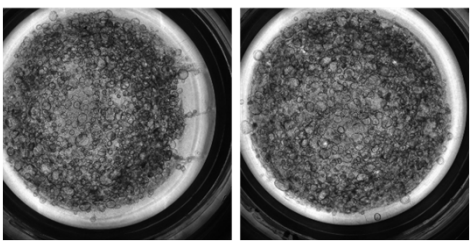
The induction of lung progenitor cells (LPCs) from hiPSCs and the formation of lung alveolar organoids using LPCs were demonstrated with PG-004. The concentration of Noggin was set at 100 ng/mL as a reference, while the concentration of PG-004 was varied within the range of 12-48 ng/mL.



Differentiation efficiency for LPCs evaluated by measuring LPC markers, NKX2.1 and CPM



Lung alveolar organoids using LPCs induced by PG-004 or Noggin



PG-004 (48 ng/mL) Noggin (100 ng/mL)

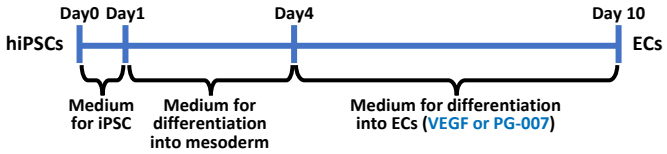
- ✓ PG-004 (48 ng/mL) yielded a comparable differentiation efficiency to LPCs to that of Noggin (100 ng/mL).
- ✓ Lung alveolar organoids generated using PG-004 were found to be identical to those induced using Noggin.

Provided by HiLung Inc.

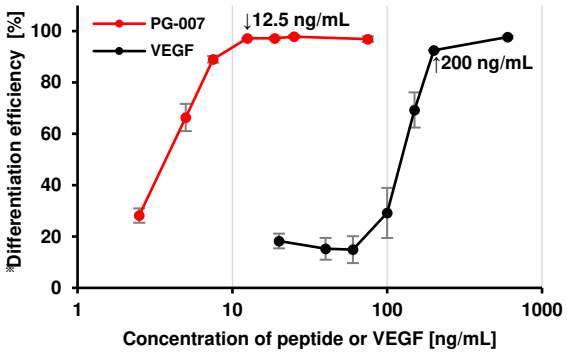
PG-007 : Differentiation of iPSCs into endothelial cells

VEGF is one of the key differentiation factors for endothelial cell (EC) differentiation from iPSCs. The differentiation efficiency of human iPSCs into ECs using either VEGF165a or PG-007 was evaluated by varying their concentrations.

Outline of experiment



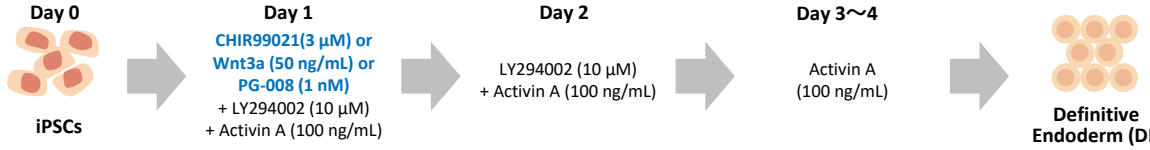
✓ PG-007 achieved the same level of differentiation efficiency of ECs from iPSCs as VEGF with a 1/16 concentration.



※The percentage of CD31+ and CD114+ cells, which serve as markers for ECs, is calculated against the total number of cells.

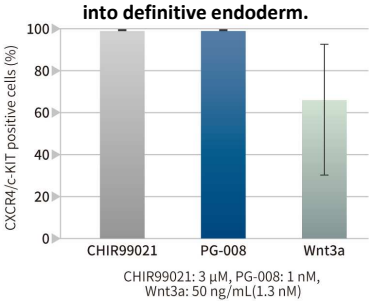
PG-008 : Differentiation of iPSCs into definitive endoderm

CHIR99021, a GSK3 inhibitor, is commonly used as a replacement for Wnt3a, antagonizing the β-catenin pathway of WNT signaling. We compared the differentiation efficiency in the induction of definitive endoderm (DE) from iPSCs using PG-008, recombinant Wnt3a, and CHIR99021, according to the following scheme.



Microscopic images of cells on Day 4

Differentiation of human iPSCs into definitive endoderm.



✓ PG-008 and CHIR99021 resulted in uniform differentiation into DE with an efficiency of >98%, while Wnt3a resulted in approximately 60% efficiency.

✓ Only 1 nM of PG-008 exhibited the same level of differentiation efficiency as 3 μM of CHIR99021. Moreover, PG-008 has no cytotoxicity even at 10 μM.

Provided by Dr. Nicholas Hannan at The University of Nottingham

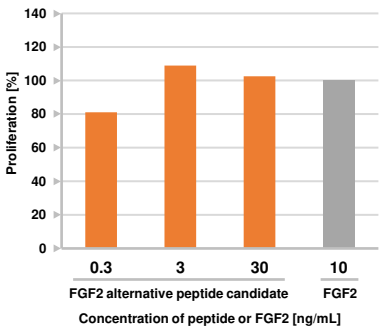
Status of development of FGF2 alternative peptide

FGF2 (fibroblast growth factor 2) is a critical component in cell culturing, finding widespread use in various applications. It plays a pivotal role in maintaining pluripotent stem cells and expanding progenitor cells, which are essential for cell-based therapies and regenerative medicine. Moreover, FGF2 is a key growth factor in the cultivated meat and seafood industries.

✓ We have succeeded in obtaining peptides that exhibit 100% Emax activity against hMSCs and bovine-derived muscle satellite cells. The FGF2 alternative peptides should be applicable in the fields of both regenerative medicine and the cultivated meat/seafood industries.

✓ We are currently evaluating the peptides with a focus on maintaining the undifferentiated state of iPSCs with the goal of launching them in summer 2024.

Human MSCs



Bovine muscle satellite cells