Synthetic Peptide Growth Factors

PeptiGrowth

PeptiGrowth Synthetic Peptide Growth Factors—
Forging the Path Forward for Cell Therapy and Regenerative Medicine

Growth factors derived from conventional sources – fetal bovine serum (FBS) and recombinant proteins – have accompanied regenerative medicine to the threshold of a new era, but in key areas they fall short of the technologies they support.

The challenge now is for accelerated research at greater cost-efficiency, and to move ahead with confidence that biological impurities, batch-to-batch variations in quality, and product instability won't imperil the accuracy of our results.

Introducing Chemically Synthesized Peptide Alternatives to Growth Factors

PeptiGrowth peptides possess similar capability for receptor activation, cell proliferation, and differentiation as conventional growth factors. Along with greater ease of use, longer shelf life, and no contamination by animal-derived components, these peptides provide uniformity in quality that can improve efficiency and data reproducibility and thus, reduce the cost of R&D, manufacturing, and quality control.

Comparison to conventional growth factors

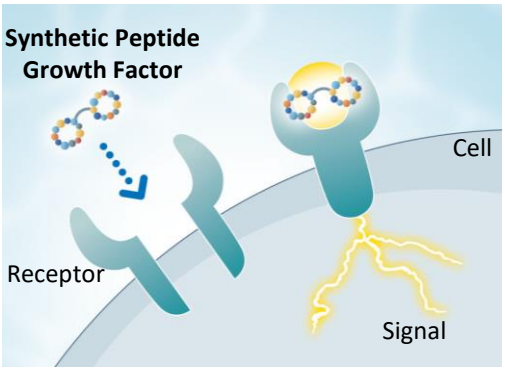
Conventional growth factors

- Unstable
- Lot-to-lot variation
- Not animal-free
- Low scalability

Synthetic peptide growth factors

- Stable
- Consistent in quality and activity
- Animal-component free
- High scalability

Receptor Diagram



Product Lineup Numerous products are being developed at the same time with the following products in the pipeline

Product Lineup

Product Code	Factor Name
PG-001	HGF alternative peptide
PG-002	TGFβ-1 inhibitor
PG-003	BDNF alternative peptide
PG-004	Noggin-like peptide
PG-005	BMP7 selective inhibitor
PG-006	BMP4 selective inhibitor
PG-007	VEGF alternative peptide
PG-008	Wnt3a alternative peptide
PG-009	Synthetic EGF
PG-010	TPO alternative peptide
PG-011	FGF2 alternative peptide
PG-012	KGF alternative peptide

Upcoming Growth Factors

Factor Name	Launch Date
PDGF-AA	2nd half 2025
IL-15	2nd half 2025

✓ All products are for research use only and are not intended for administration to humans or for diagnostic purposes.

✓ All products can be supplied as **GMP grade** upon request. Please inquire with us.

Other Development Targets

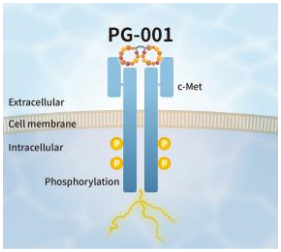
Factor Name				
Activin A	FLt3 Ligand	IGF-1	IL-21	R-spondin
BMP4	GDNF	IL-2	M-CSF	SCF
DLL 1/4	GM-CSF	IL-7	PDGF-BB	TGFβ-1

Product Information

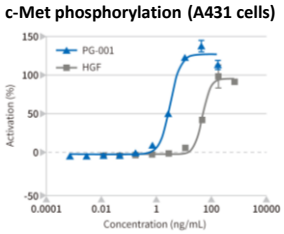
PG-001 : HGF alternative peptide (c-Met agonist)

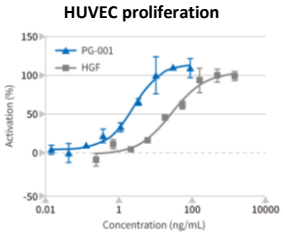
Hepatocyte growth factor (HGF) can be used for inducing hepatocyte differentiation from stem cells and proliferation of hepatocyte and myosatellite cells. PG-001 replicates the mechanism of action of HGF, inducing dimerization and signaling processes of human c-Met upon binding.

Mode of action



Activity evaluation data





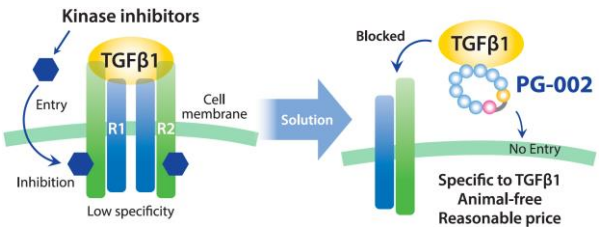
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 4825.39 (acetate)
Product size :
- 5 μg/vial
- 50 μg/vial
- 500 μg/vial

PG-002 : TGFβ-1 inhibitor

Small kinase inhibitors are commonly used to inhibit the signaling of TGFβ-1, aiming to achieve cell differentiation. However, due to their lack of specificity, they can perturb other signaling pathways, leading to cytotoxicity. PG-002 specifically inhibits TGFβ-1 signaling under extracellular conditions, making it a suitable alternative to small kinase inhibitors.

Mode of action



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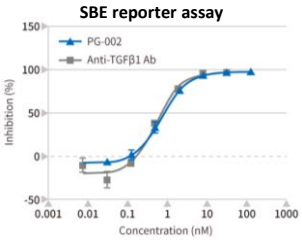


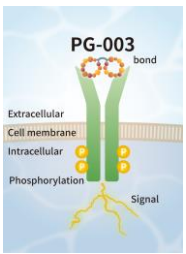
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 2587.90 (acetate)
Product size :
- 10 μg/vial
- 100 μg/vial

PG-003 : BDNF alternative peptide (TrkB agonist)

Brain-derived neurotrophic factor (BDNF) binds to the TrkB receptor, regulating neuronal growth, survival, and synaptic function. PG-003 exhibits agonistic activity against the TrkB receptor by specifically binding to and inducing its dimerization and promoting cell signaling pathways.

Mode of action



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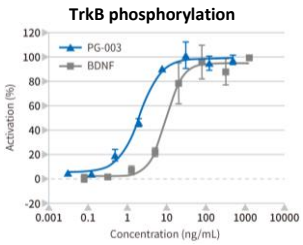
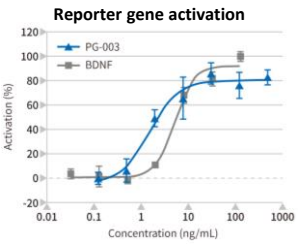




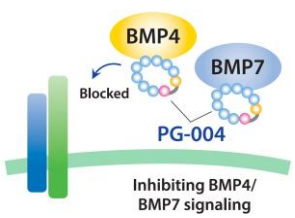
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 5151.66 (acetate)
Product size :
- 10 μg/vial
- 100 μg/vial
- 1 mg/vial

PG-004 : Noggin-like peptide (BMP4,7 inhibitor)

Noggin is commonly used in the culture of organoids derived from intestinal, pancreatic, lung, and tumor tissues, as well as for the neural and endoderm differentiation of stem cells. PG-004 inhibits the BMP4 and BMP7 families in the same manner as Noggin, exhibiting antagonist activity against them.

Mode of action



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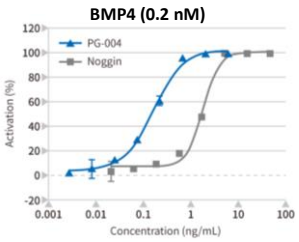
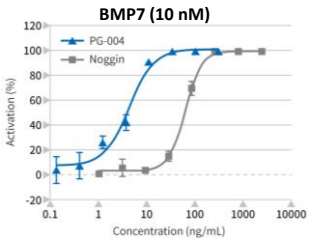




Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 2920.15 (acetate)
Product size :
- 5 μg/vial
- 50 μg/vial
- 500 μg/vial

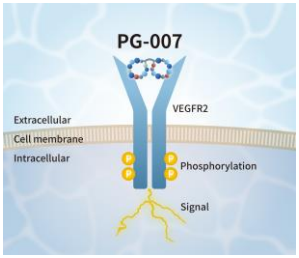
Related products

PG-005: BMP7 selective inhibitor
PG-006: BMP4 selective inhibitor

PG-007 : VEGF alternative peptide (VEGFR2 agonist)

Vascular endothelial growth factor (VEGF) has the ability to promote the proliferation of endothelial cells, and it is also a key differentiation factor for endothelial cells as well as hematopoietic stem cells. PG-007 has been confirmed to possess phosphorylation capability on VEGFR2, similar to VEGF, as well as the ability to promote the proliferation of iPSC-derived endothelial cells and the differentiation of iPSCs into endothelial cells.

Mode of action



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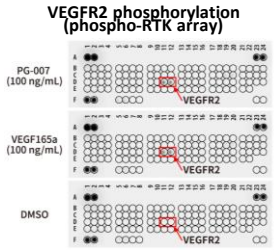
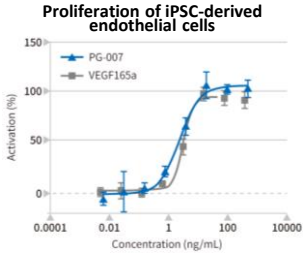




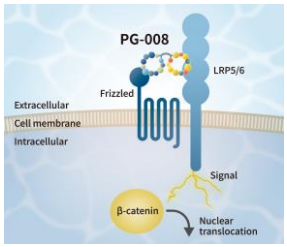
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 4785.32
Product size :
- 5 μg/vial
- 50 μg/vial
- 500 μg/vial

PG-008 : Wnt3a alternative peptide (β-catenin pathway agonist)

Wnt3a binds to Frizzled and LRP5/6 receptors to induce the β-catenin pathway of Wnt signaling. It is used in the differentiation of stem cells as well as the maintenance of organoids. PG-008 exhibits agonistic activity in the β-catenin pathway of Wnt signaling in the same manner as Wnt3a, exhibiting even superior activity compared to recombinant Wnt3a.

Mode of action



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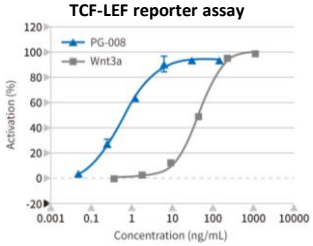
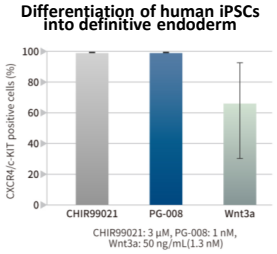




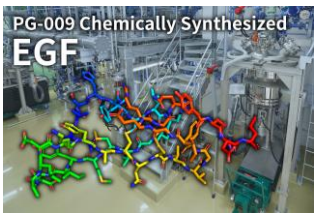
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 5099.63 (acetate)
Product size :
- 10 μg/vial
- 100 μg/vial
- 1 mg/vial

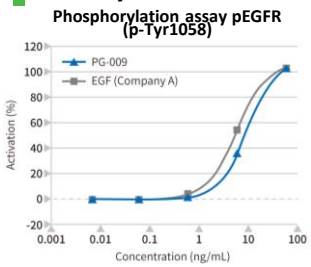
PG-009 : Synthetic EGF

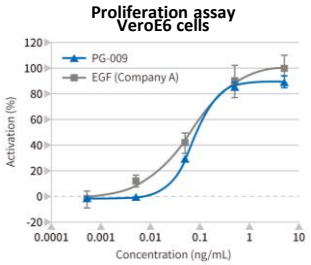
PG-009 is full-length Epidermal Growth Factor (EGF) (human) synthesized through complete chemical synthesis. In comparison to recombinant EGF produced using microorganisms or cells, it shows no quality variations between batches, is devoid of animal-derived raw materials, and is compatible with GMP production.

Product concept



Activity evaluation data





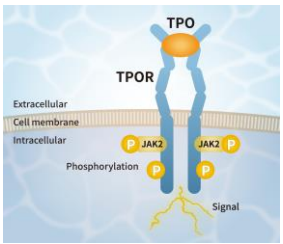
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 6215.9
Product size :
- 100 μg/vial
- 1 mg/vial

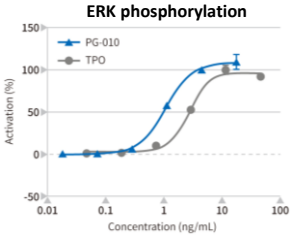
PG-010 : TPO alternative peptide (TPOR agonist)

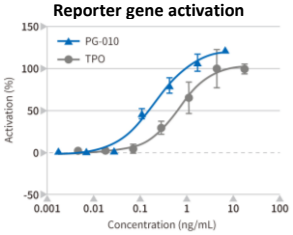
Thrombopoietin (TPO) stimulates the proliferation and maturation of megakaryocytes and is commonly used for the differentiation of iPSCs into hematopoietic stem cells. PG-010 binds to TPOR and exhibits agonistic activity equivalent to recombinant TPO.

Mode of action



Activity evaluation data





Properties

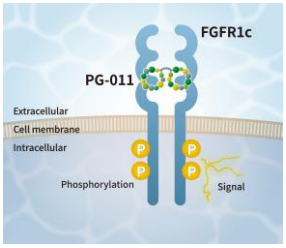
Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 7148.02 (acetate)
Product size :
- 10 μg/vial
- 100 μg/vial
- 1 mg/vial

Product Information continued from previous page

PG-011 : FGF2 alternative peptide (FGFR1c agonist)

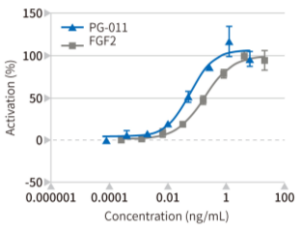
Fibroblast Growth Factor 2 (FGF2/basic FGF) binds to FGFR1c and activates intracellular signaling. It is essential for maintaining the undifferentiated state of iPSCs in culture. PG-011 exhibits agonistic activity similar to FGF2, demonstrating equivalent efficacy to recombinant FGF2. Unlike recombinant FGF2, known for its instability, PG-011 is highly stable. Its activity remains even after 4 days at 37℃ in culture media.

Mode of action

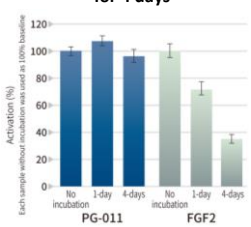


Activity evaluation data

Proliferation of human MSCs



Stability at 37℃ in medium for 4 days



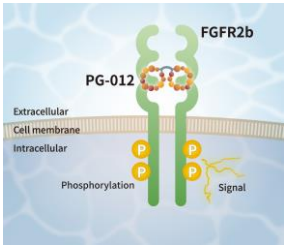
Properties

Formulation : Lyophilized
Storage condition : ≦-20℃
Purity : ≧95%
MW : 5127.81 (acetate)
Product size :
- 10 μg/vial
- 100 μg/vial
- 1 mg/vial
- 10 mg/vial

PG-012 : KGF alternative peptide (FGFR2b agonist)

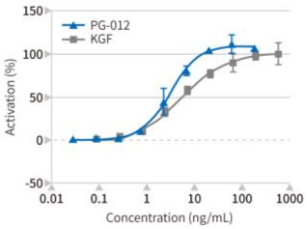
Keratinocyte Growth Factor (KGF/FGF7) binds to FGFR2b and activates intracellular signaling. It is essential for differentiation and proliferation of epidermal cells and cells derived from the endoderm, such as alveolar epithelial cells, islet cells, and hepatocytes, from pluripotent stem cells. PG-012 exhibits agonistic activity similar to KGF, demonstrating equivalent efficacy to recombinant KGF.

Mode of action

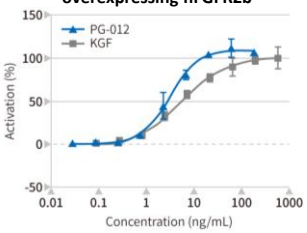


Activity evaluation data

ERK phosphorylation



Proliferation of BaF3 cells overexpressing hFGFR2b



Properties

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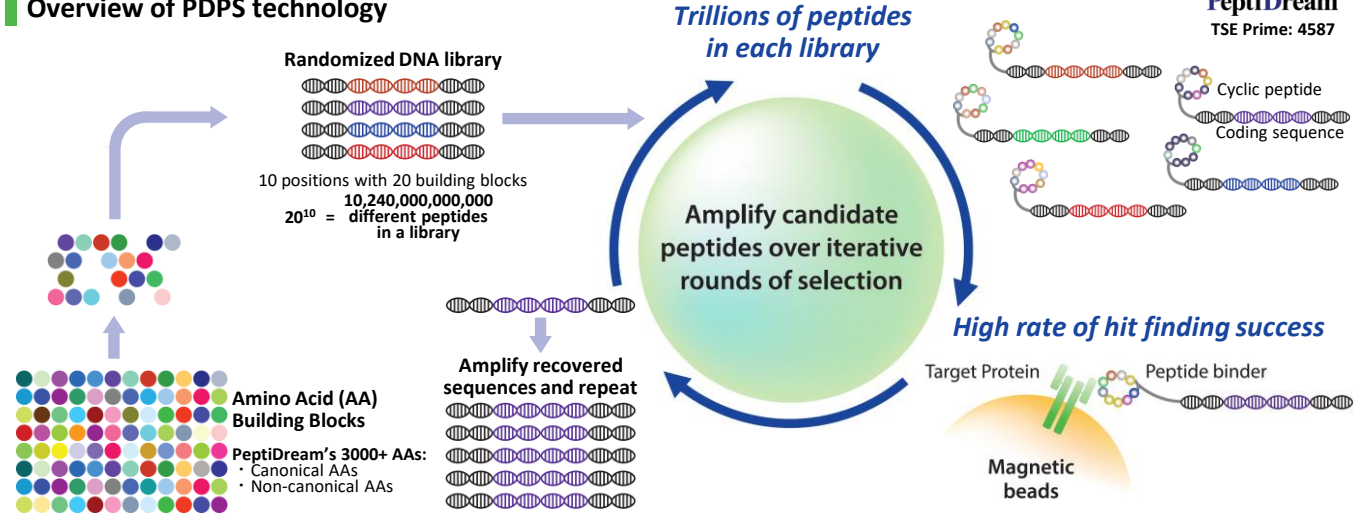
Storage condition : ≦-20℃
Purity : ≧95%
MW : 6018.40 (acetate)
Product size :
- 10 μg/vial
- 100 μg/vial
- 1 mg/vial

Peptide Discovery Platform System (PDPS)

PeptiDream employs its proprietary PDPS technology, enabling the production of highly diverse non-standard libraries containing trillions of peptides, and efficiently identifying highly potent and selective macrocyclic peptide candidates. PeptiGrowth is leveraging this PDPS to obtain peptides that can specifically bind to target molecules, typically receptors or growth factors, and use them as synthetic peptide growth factors.

PeptiDream
TSE Prime: 4587

Overview of PDPS technology



✓ **We offer co-development of synthetic peptide growth factors to any growth factors and cytokines not on the development list.**

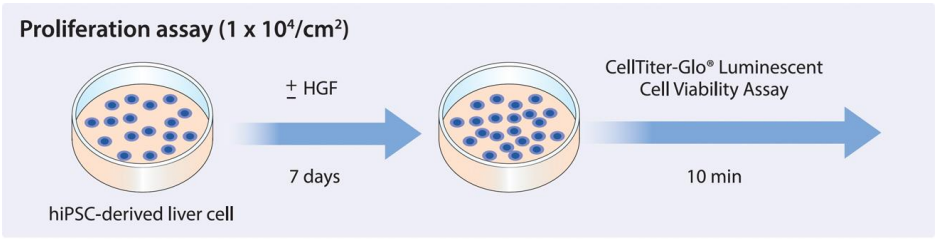
PeptiGrowth
PeptiGrowth.com/en

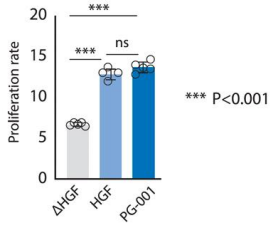
abacus dx

Abacus dx
www.abacusdx.com
Tel: 1800 222 287 (AUS)
0800 222 170 (NZ)
Email: info@abacusdx.com

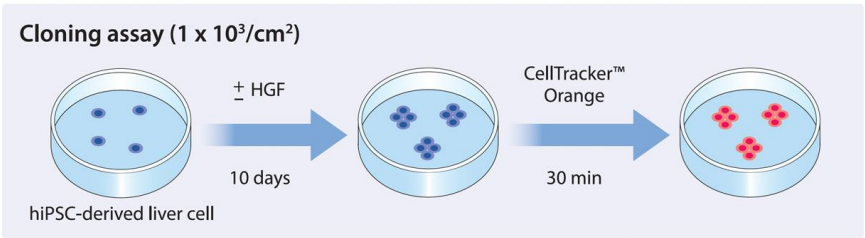
Application Notes of Synthetic Peptide Growth Factors

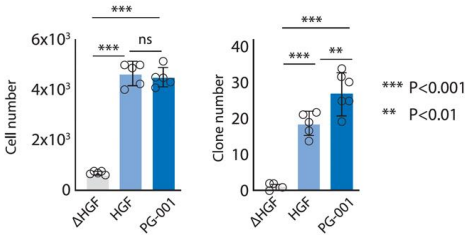
PG-001 : Proliferation and cloning assay of iPSC-derived liver cells





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





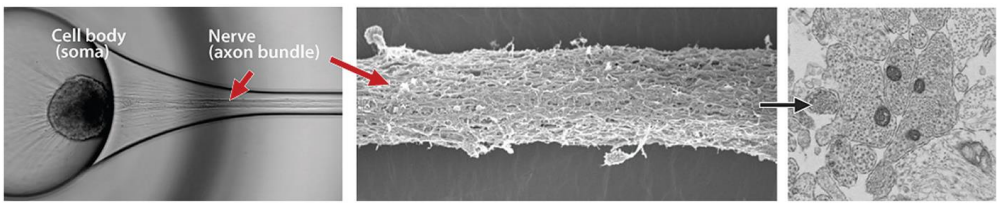
Efficiency of colony formation by the supplementation of PG-001 was observed to be similar to that achieved by recombinant HGF addition (both for 0.25 nM).

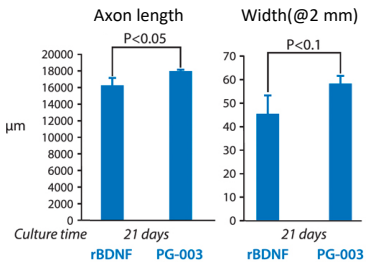
Provided by Prof. H. Taniguchi, Institute of Medical Science, The University of Tokyo.

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.



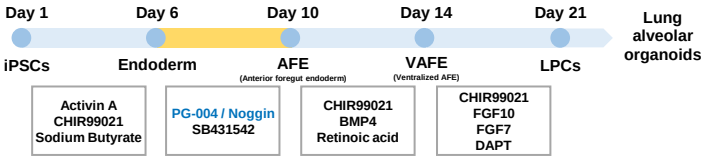


Provided by Jiksak Bioengineering Inc.

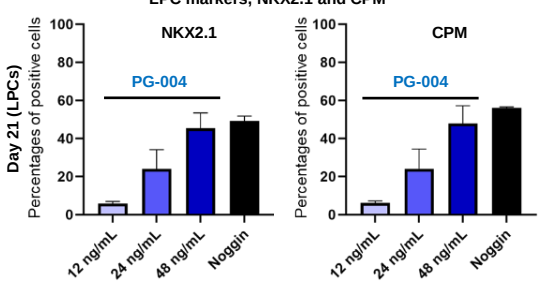
- ✓ The length of the neural axon bundle from the cell body (soma) to the end and the width of the neural axon bundle were measured at 2 mm from the soma.
- ✓ The axon bundles generated by PG-003 were **longer and thicker** than the ones generated by rBDNF.

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

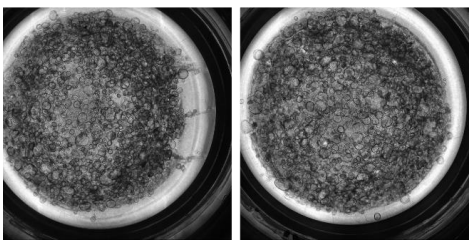
The induction of lung progenitor cells (LPCs) from hiPSCs and the formation of lung alveolar organoids using LPCs were demonstrated with PG-004. The concentration of Noggin was set at 100 ng/mL as a reference, while the concentration of PG-004 was varied within the range of 12-48 ng/mL.



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)

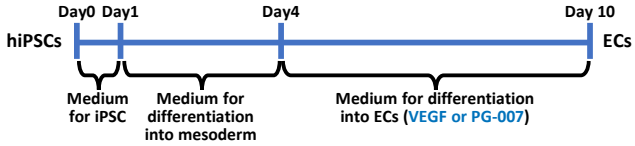
- ✓ PG-004 (48 ng/mL) yielded a comparable differentiation efficiency to LPCs to that of Noggin (100 ng/mL).
- ✓ Lung alveolar organoids generated using PG-004 were found to be identical to those induced using Noggin.

Provided by HiLung Inc.

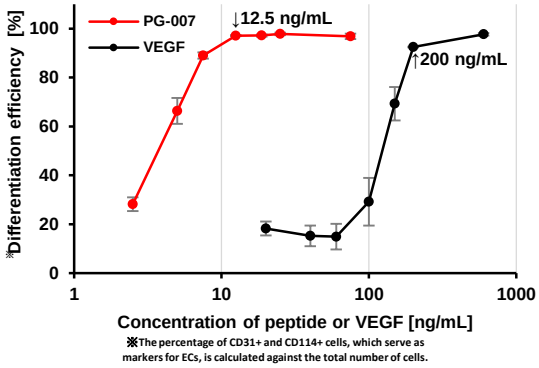
PG-007 : Differentiation of iPSCs into endothelial cells

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



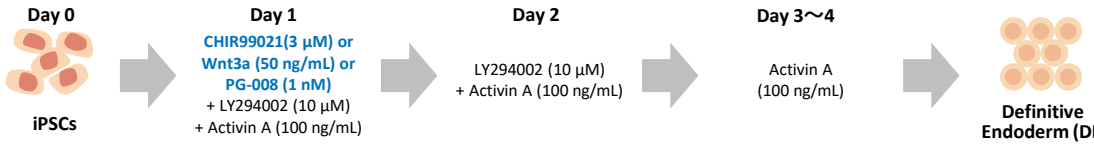
✓ PG-007 achieved the same level of differentiation efficiency of ECs from iPSCs as VEGF with a 1/16 concentration.



※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

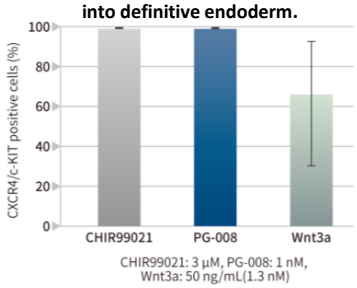
CHIR99021, a GSK3 inhibitor, is commonly used as a replacement for Wnt3a, antagonizing the β-catenin pathway of WNT signaling. We compared the differentiation efficiency in the induction of definitive endoderm (DE) from iPSCs using PG-008, recombinant Wnt3a, and CHIR99021, according to the following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



Microscopic images of cells on Day 4

CHIR99021 [3 μM] | PG-008 [1 nM] | Wnt3a [50 ng/mL : 1.3 nM]

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.

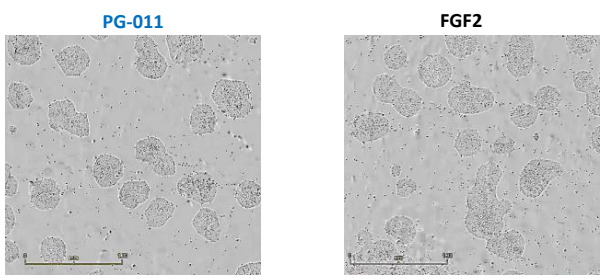
✓ Only 1 nM of PG-008 exhibited the same level of differentiation efficiency as 3 μM of CHIR99021. Moreover, PG-008 has no cytotoxicity even at 10 μM.

Provided by Dr. Nicholas Hannan at The University of Nottingham

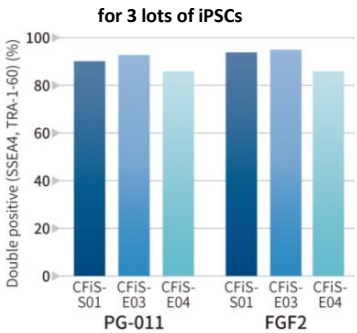
PG-011 : Undifferentiated maintenance ability of human iPSCs

The undifferentiated maintenance ability of PG-011 and FGF2 in human iPSCs was evaluated. FGF2 (100 ng/mL, ~5.9 nM) or PG-011 (5.9 nM, 30 ng/mL) was added to the culture medium. After 7 days of culturing, passaging was performed. Three passages were conducted.

Morphologies of iPSCs at P3



Undifferentiated marker measurements for 3 lots of iPSCs



✓ iPSCs cultured with PG-011 and FGF2 exhibited similar colony morphology.

✓ iPSCs cultured with PG-011 showed comparable levels of undifferentiated marker positivity on Day 7 of Passage 3 to those cultured with FGF2.

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