

# Synthetic Peptide Growth Factors

# PeptiGrowth

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

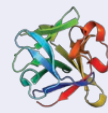
Growth factors derived from conventional sources — fetal bovine serum (FBS) and recombinant proteins — have accompanied medicine to the threshold of a new era, but in key areas they fall short of the technologies they support.

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 the same capacities for receptor activation, cell proliferation and differentiation as conventional growth factors. But with greater ease of use, longer shelf life and noncontamination by animal-derived components, they 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

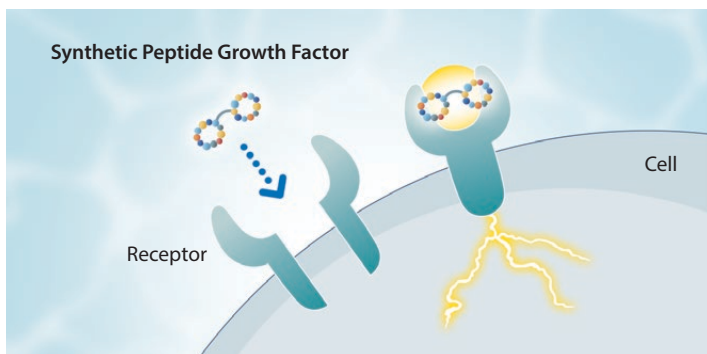
- Unstable
- Lot-to-lot variation
- Not animal-free
- Low scalability
- Expensive



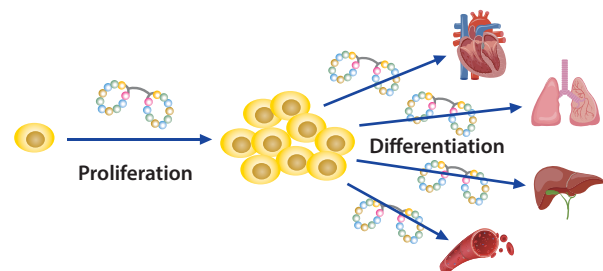
Growth factor alternative peptides

- Stable
- Consistent quality
- Animal-free
- High scalability
- Reasonable Price

### Receptor Diagram



### Leading the world with our technology and ideas



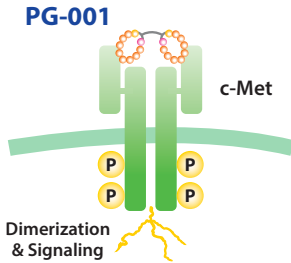
### Who we are...

PeptiGrowth is a joint venture between Japan's PeptiDream, with its proprietary Peptide Discovery Platform System (PDPS), and Mitsubishi Corporation, known for its global network reach in healthcare product manufacture and distribution. Together they've made available the first synthetic growth factor compounds for cell culture media featuring no animal components, unparalleled purity, consistency and stability, at a cost that makes them the rational choice.

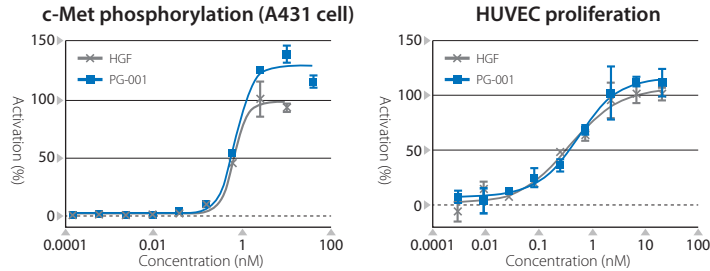
**PG-001: HGF alternative peptide (c-Met agonist)**

Hepatocyte growth factor (HGF) stimulates cell growth and plays a crucial role in epithelial morphogenesis, affecting multiple cell types. It is used in inducing hepatocyte differentiation from stem cells and promoting myoblast differentiation via myosatellite cells. PG-001 mimics the mechanism of action of HGF, inducing dimerization and signaling processes of c-Met upon binding.

**Mode of action**



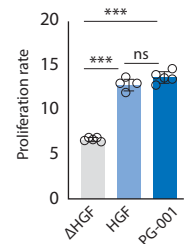
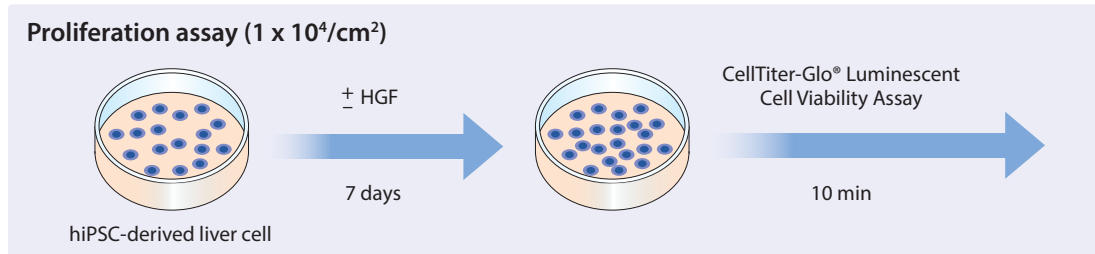
**Activity evaluation data**



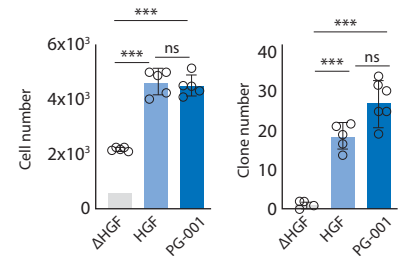
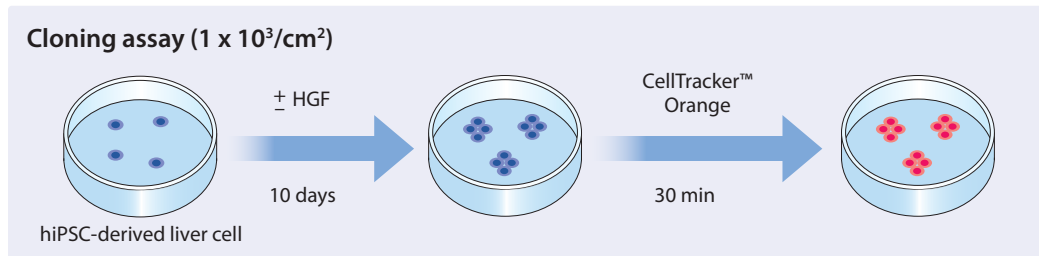
**Properties**

- Formulation:** Lyophilized
- Storage condition:** -20°C
- MW:** 4825.39 (acetate)
- Product Size:**
  - 2 µg (eq. 32 µg of rHGF)
  - 5 µg (eq. 80 µg of rHGF)
  - 15 µg (eq. 240 µg of rHGF)

**Activity evaluation data**



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



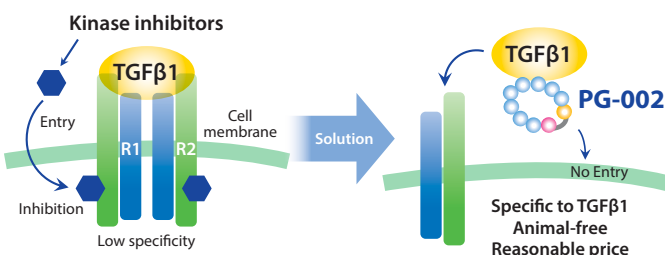
Efficiency of colony formation by the supplementation of PG-001 was observed to be similar to that achieved by recombinant HGF addition (both for 0.25nM).

\*These data provided by prof. H. Taniguchi, Institute of Medical Science, University of Tokyo.

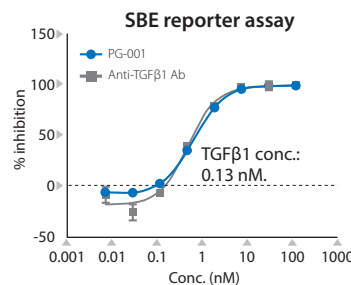
**PG-002 TGFβ1 inhibitor peptide**

Signal inhibition of TGFβ1 is often used for stem cell reprogramming and hPSC differentiation. Small kinase inhibitors are commonly used but they lack specificity and can perturb other signaling pathways, causing cytotoxicity. PG-002 specifically inhibits TGFβ1 signaling at extracellular conditions, making it a suitable replacement for small kinase inhibitors.

**Mode of action**



**Activity evaluation data**



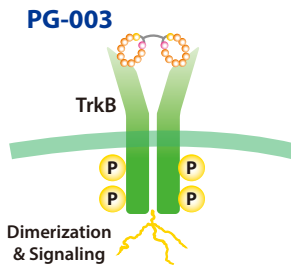
**Properties**

- Formulation:** Lyophilized
- Storage condition:** -20°C
- MW:** 2587.90 (acetate)
- Product Size:**
  - 10 µg, 100 µg

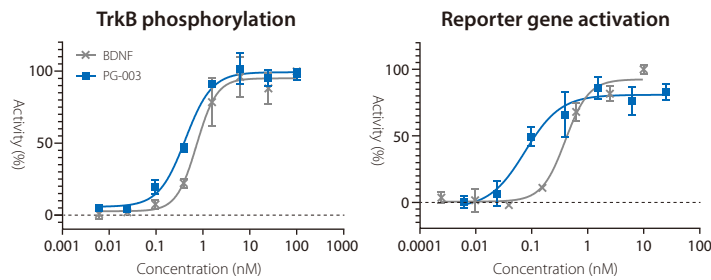
## PG-003: BDNF alternative peptide (TrkB agonist)

Brain-derived neurotrophic factor (BDNF) is a brain-derived protein that binds to TrkB receptor, regulating neuronal growth, survival, and synaptic hyperfunction. PG-003 binds to TrkB receptor, inducing signaling events comparable to BDNF.

### Mode of action



### Activity evaluation data



### Properties

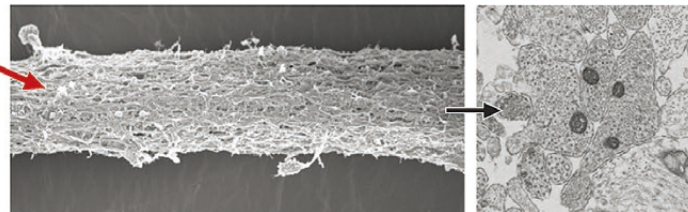
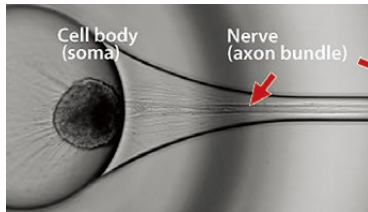
**Formulation:** Lyophilized  
**Storage condition:** -20°C  
**MW:** 5151.66 (acetate)  
**Product Size:**  
 •10 µg (eq. 25 ug of rBDNF)

## Application data for PG-003: Growth of iPS cell-derived neural axon bundles from Nerve Organoid

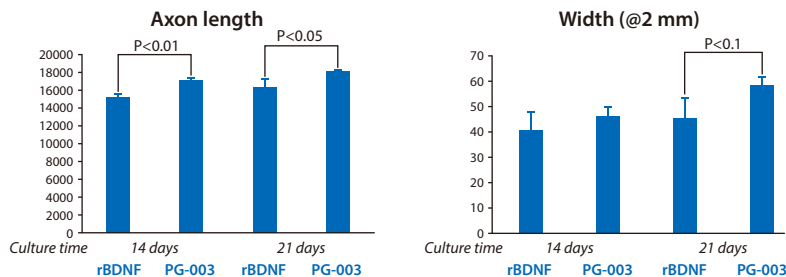
Activity of PG-003 was compared with rBDNF by evaluating the growth promotion of neural axons using Nerve Organoid, a proprietary system of Jiksak Bioengineering.

## Nerve Organoid™

Our 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.



**Jiksak Bioengineering Inc.**  
**Business:** Development, manufacture, and sales of 3D cell tissue and culture devices; Drug discovery services using human-derived cells

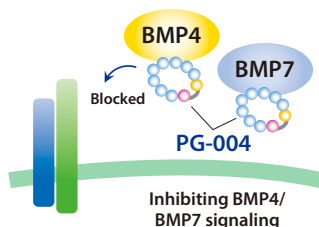


- ✓ The length of neural axon bundle from the spheroid to the end and the width of the neural axon bundle were measured at 2 mm from the cell aggregate (spheroid)
- ✓ Axon bundles generated by **PG-003** were **longer and thicker** than the ones generated by rBDNF

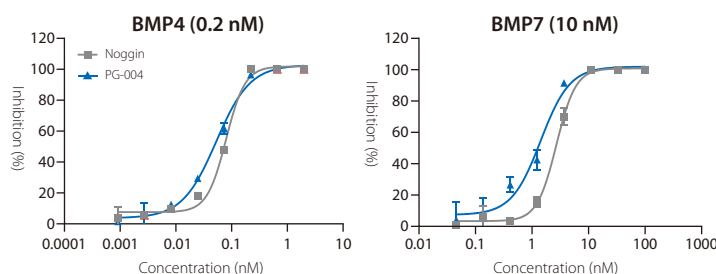
## PG-004: Noggin-like peptide (BMP4/7 inhibitor)

Noggin is a bone morphogenetic protein (BMP) family antagonist that supports growth of organoids derived from epithelial tissues, iPSCs and ESC differentiation. It is commonly used in the culture of organoids from intestinal, pancreatic, lung, and tumor-derived tissues, as well as for stem cell differentiation into neural and microglial lineages. PG-004 inhibits BMP 4/7 families in the same manner as Noggin.

### Mode of action



### Activity evaluation data



### Properties

**Formulation:** Lyophilized  
**Storage condition:** -20°C  
**MW:** 2920.15 (acetate)  
**Product Size:**  
 •5 µg (eq. 40 ug of rNoggin)

### Related products

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

# List of pipelines

Numerous products are being developed at the same time, with the following products in pipelines.

## Upcoming Growth Factors

FACTOR NAME	
EGF	TPO
bFGF	VEGF
PDGF-AA	Wnt3A

*Coming Soon in 2023 – Early 2024*

## Other Development Pipelines

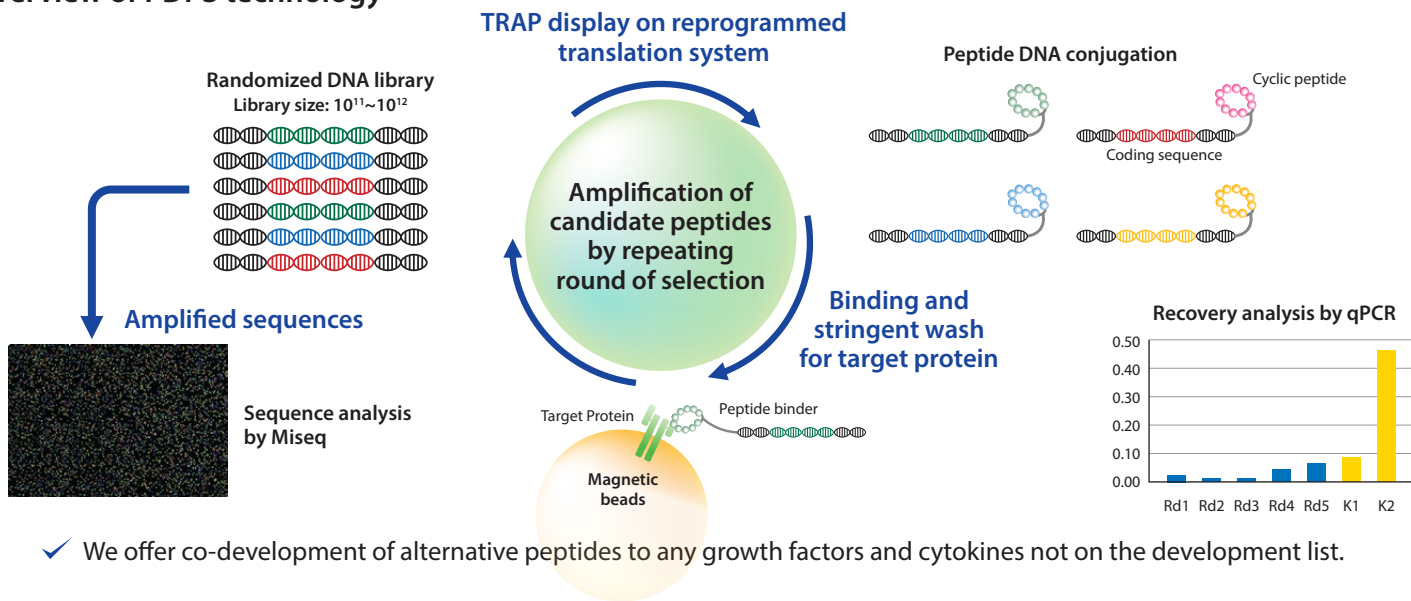
FACTOR NAME			
Activin A	Flt3 ligand	IL-11	NT-3
BMP4	IGF-1	IL-15	PDGF-BB
DKK1	IL-2	LIF	R-spondin
DLL1	IL-6	M-CSF	SCF/c-kit ligand
KGF (FGF7)	IL-7	NGF	TGFβ1

# Peptide Discovery Platform System (PDPS)

PeptiDream, a biopharmaceutical company, employs its proprietary PDPS (Peptide Discovery Platform System) Technology, a next-generation hit-finding platform, to discover and develop constrained peptides, small molecules, and peptide-drug conjugate therapeutics. PeptiGrowth is utilizing this PDPS system to obtain peptides that can specifically bind to target molecules, typically receptors or growth factors, and use them as growth factor alternative peptides.



## Overview of PDPS technology



✓ We offer co-development of alternative peptides to any growth factors and cytokines not on the development list.

## FAQs

- |           |   |  |
|-----------|---|--|
| <b>Q1</b> | <b>How stable are PG peptides in the medium?</b>                        | <b>A1:</b> All PG peptides are stable in advanced DMEM/F12 medium (w/o serum) at 37°C for at least 1 week.   |
| <b>Q2</b> | <b>Is it possible to issue an Animal Origin Free (AOF) certificate?</b> | <b>A2:</b> Yes. All PG-peptides are fully chemically synthesized and are manufactured as AOF products.   |
| <b>Q3</b> | <b>Is it possible to manufacture PG-peptides under GMP?</b>             | <b>A3:</b> It is possible for a contract manufacturing company (e.g., PeptiStar) to manage manufacturing in accordance with GMP control standards. |

