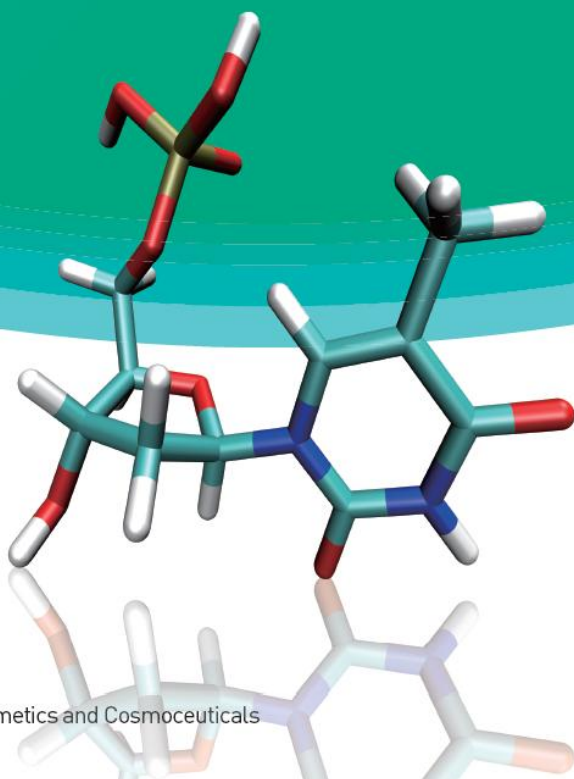


Peptides as Cosmetic Ingredient



Provides Functional Cosmetic Ingredients for High Value Cosmetics and Cosmeceuticals

<http://www.cosmo-bio.com>

<http://www.biofdnc.com>

전남 화순군 화순읍 내평리 121번지(산단길 12-55번지) 전남생물의약품연구센터 내 (주)바이오에프디앤씨 김수정 연구개발이사
Tel: 82-61-373-8381 Fax: 82-61-373-8382 e-mail: sjkim@biofdnc.com homepage: www.cosmo-bio.com

BIO-FD&C Peptides List

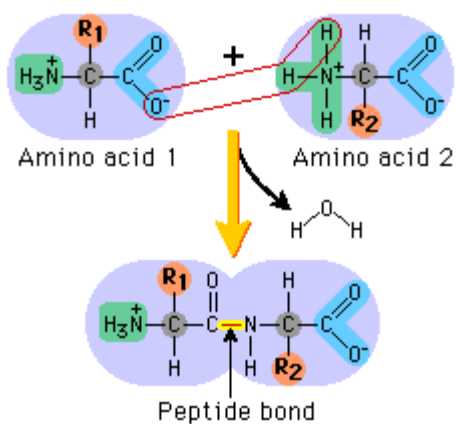
Anti-aging Peptide	Anti-wrinkle peptide	Whitening peptide	Anti-hair loss & hair growing peptide
BF-Dynorphin	Elastin essential peptide	Cyclitol	Anagen
BF-Enkephalin	Elastin anti-wrinkle peptide	ElaX-MV	Elanoren
Epiderm-X	Healix	Gallovox	Elastin scalp peptide
Heal-VB7	Keratin essential peptide	Melabet	Elastin hair peptide
Neuropeptide-1	Lipovax	Purosol	HG-Thymopentin
Neoendorphin	Prospin	Redovax	HG-Phyto-Thymopentin
Polyol	Skinup-US	Respep	Innogrowin
Rejuccell-US	Silk essential peptide	Sonitin	Keratin essential peptide
Retinovax	Sinpep	Symvastin	Keratin scalp peptide
VH-Cellup	Wrinkle-X	Whitening peptide	Phyto-thymosin beta 4

Anti-inflammatory & Anti-oxidant peptide	Anti-microbial and skin protecting peptide	Anti-acne peptide	Anti-atopic dermatitis peptide
Antiox-VH	Anti-Microbial Peptide-Aurein	Acnobet	Phyto-NEP
Qtant		Acnoheal	
Ursolin		Acnoin	
Phytopeptide-1		Hairen	
Therapep			
Vitamin peptide			

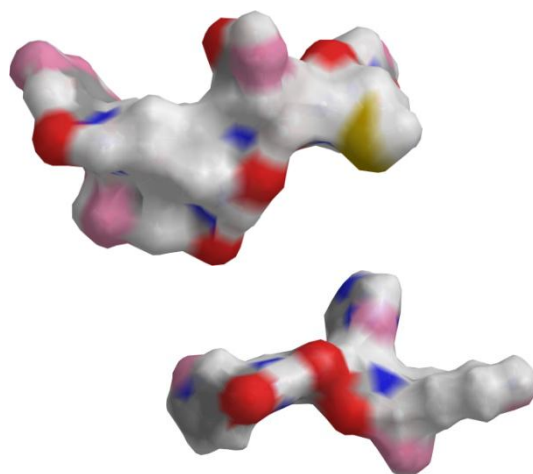


What is Peptides ?

Peptides are short polymer formed from the linking, in a defined order, of α -amino acid. The link between one amino acid residue and the next is known as an amide bond or a peptide bond.



Peptide bond



Molecular structure of BIO-FD&C biomimetic peptide

BIO-FD&C Cosmetic Biomimetic Peptides ?

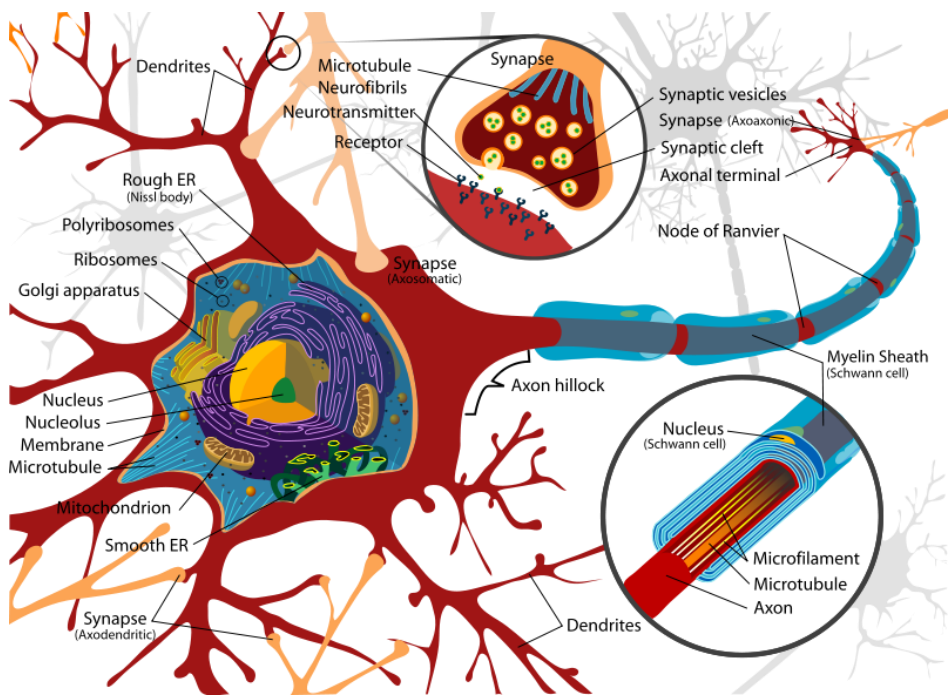
- *highly active biological materials can bind cellular receptors*
- *physically stable in cosmetic chemical conditions*
- *very small to effectively penetrate skin barrier and transdermal layers*
- *highly safe based on amino acid composition*

● General Information

Trade Name	Neuropeptide-1™
INCI Name	Octapeptide-4
Molecular Characteristics	Neuropeptide, Enkephalin conjugated with cell stimulating tripeptide (GHK)
Product Type	Pure Peptide Powder or Nanoencapsulated Solution
Cosmetic Function	Strong anti-aging and anti-wrinkle effect, Rejuvenating on aged hair tissue and follicles
Biological Function	Botox-mimetic effect, reactivation of aged skin tissue by supporting neuropeptides
Recommended Dosage	~ 15 ppm



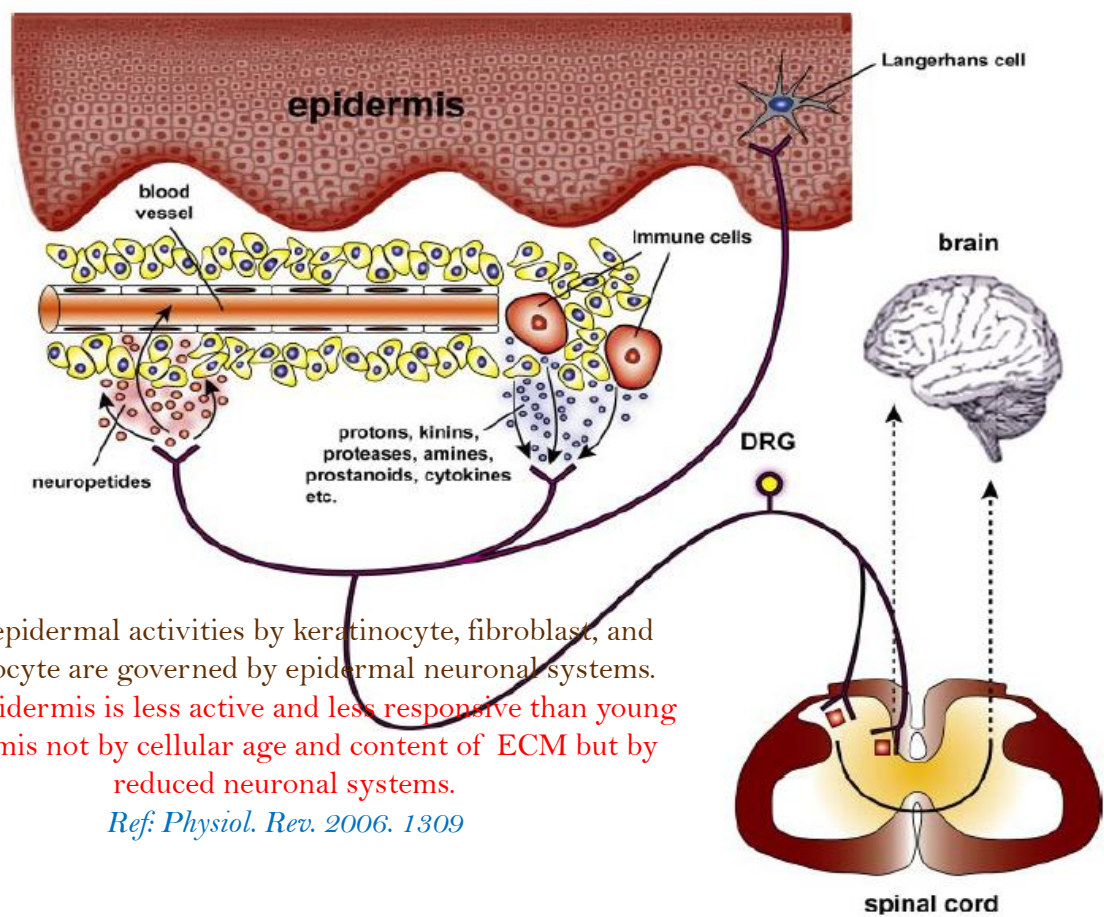
● Biological Mechanism of Neuropeptide-1



<http://en.wikipedia.org/wiki/neuron>

Neurons are highly specialized for the processing and transmission of cellular signals. The axon terminal contains synapses, specialized structures where neurotransmitter chemicals (such as *neuropeptides*) are released to communicate with target neurons.

Neurons and Neuropeptides



Most epidermal activities by keratinocyte, fibroblast, and melanocyte are governed by epidermal neuronal systems. Aged epidermis is less active and less responsive than young epidermis not by cellular age and content of ECM but by reduced neuronal systems.

Ref: Physiol. Rev. 2006. 1309

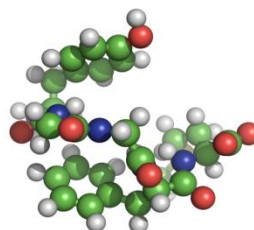
Most Qualified Biomimetic Peptide for 20 Years

Name	Amino Acid Sequence	INCI Name	Function
Copper Tripeptide	GHK	Octapeptide-4	For Skin & Hair
Palmitoyl Pentapeptide	KTTKS	Decapeptide-7	For Skin and Anti-aging
Actyl Hexapeptide	EEMQRR	Oligopeptide-39	Botox biomimetic peptide

R&D Background of Neuropeptide-1,2, & 3

Enkephalin (YGGFM), (YGGFL)

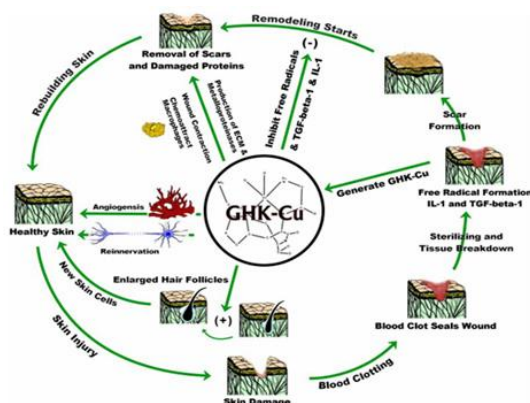
The structure of enkephalin (->)



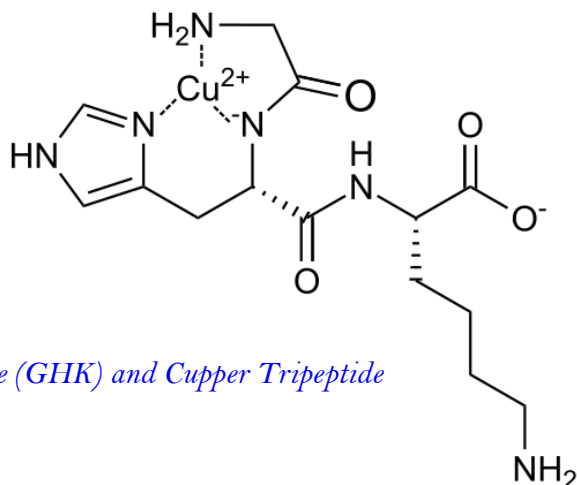
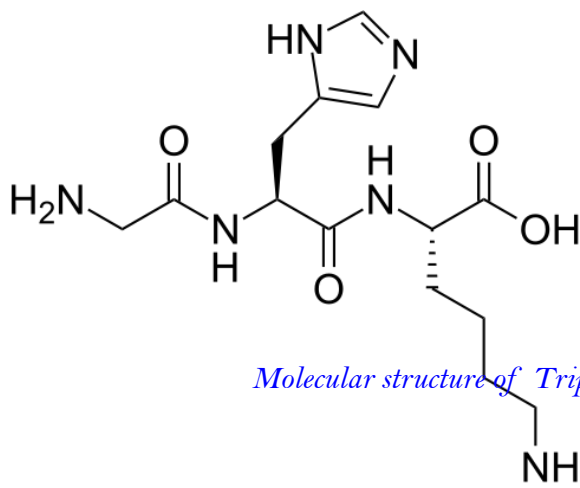
Neuropeptide-1 (YGGFL GHK)

Neuropeptide + *GHK (from Cu²⁺ Tripeptide)*

What is Cu²⁺-Tripeptide (GHK) & GHK ?

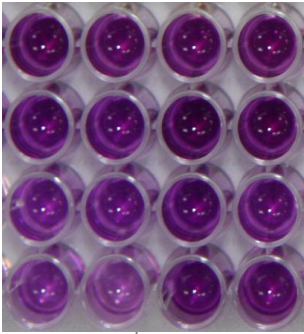


Ref) Cu-GHK as the Activator of Remodeling, Cosmetics & Medicine (Russia) April 2004

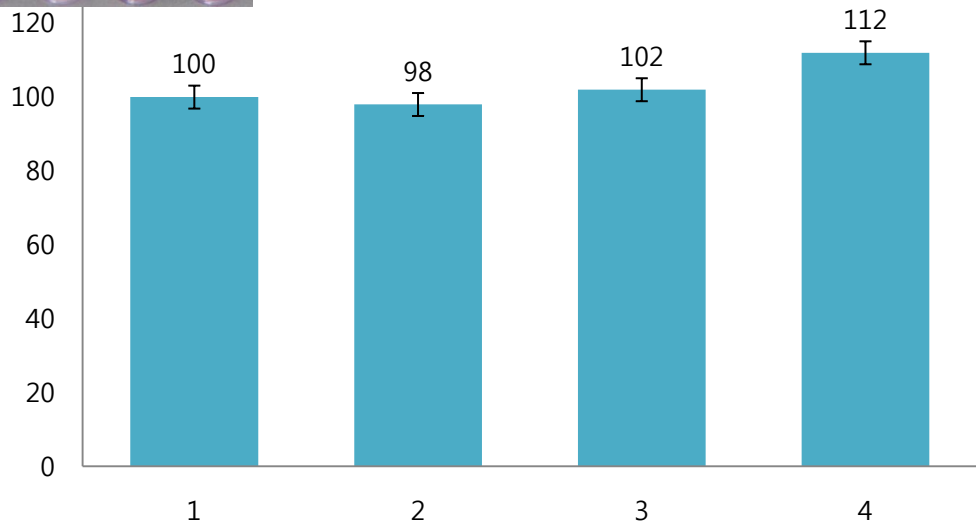


Molecular structure of Tripeptide (GHK) and Copper Tripeptide

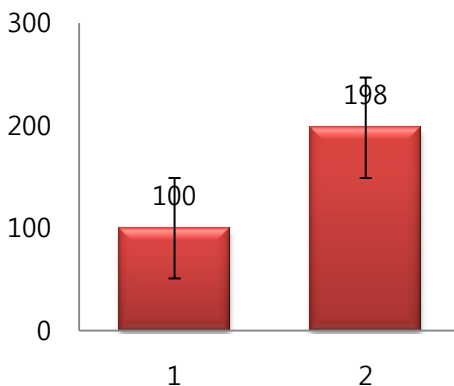
● Experimental Data



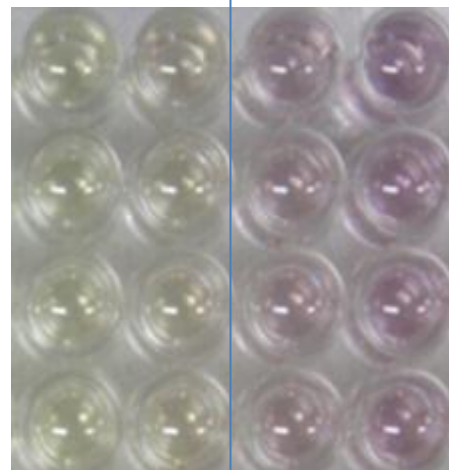
Neuropeptide-1 is highly safe to
epidermal keratinocyte and
fibroblast up to **1,000ppm**!



25 ppm of Neuropeptide-1
significantly increased collagen
content per fibroblast cell for 48
hrs.

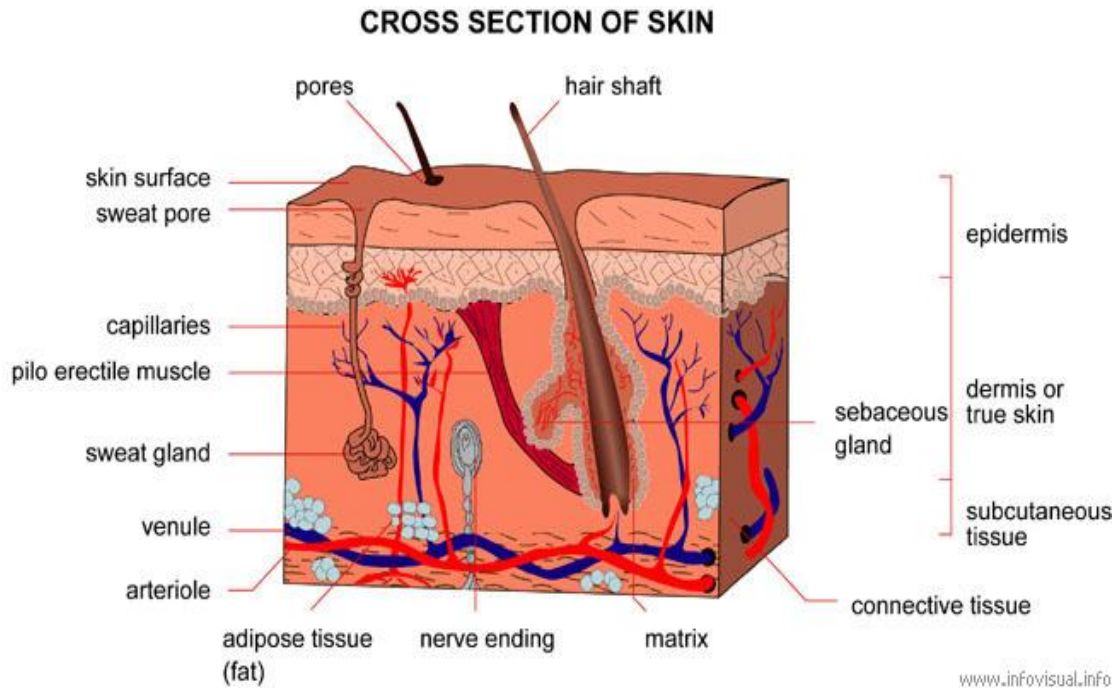


Water control

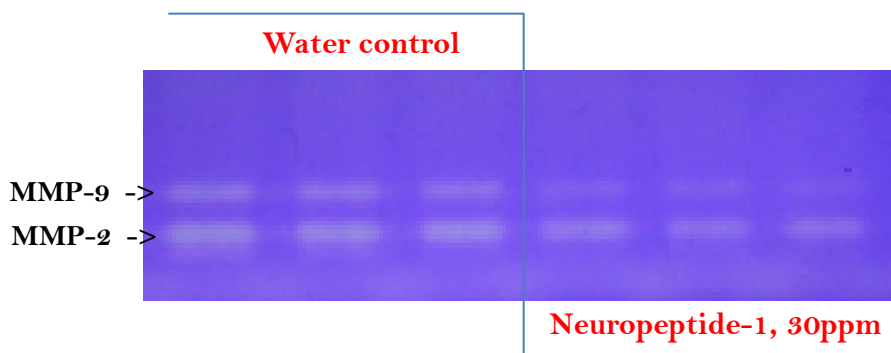


Neuropeptide-1, 25ppm

● Experimental Data



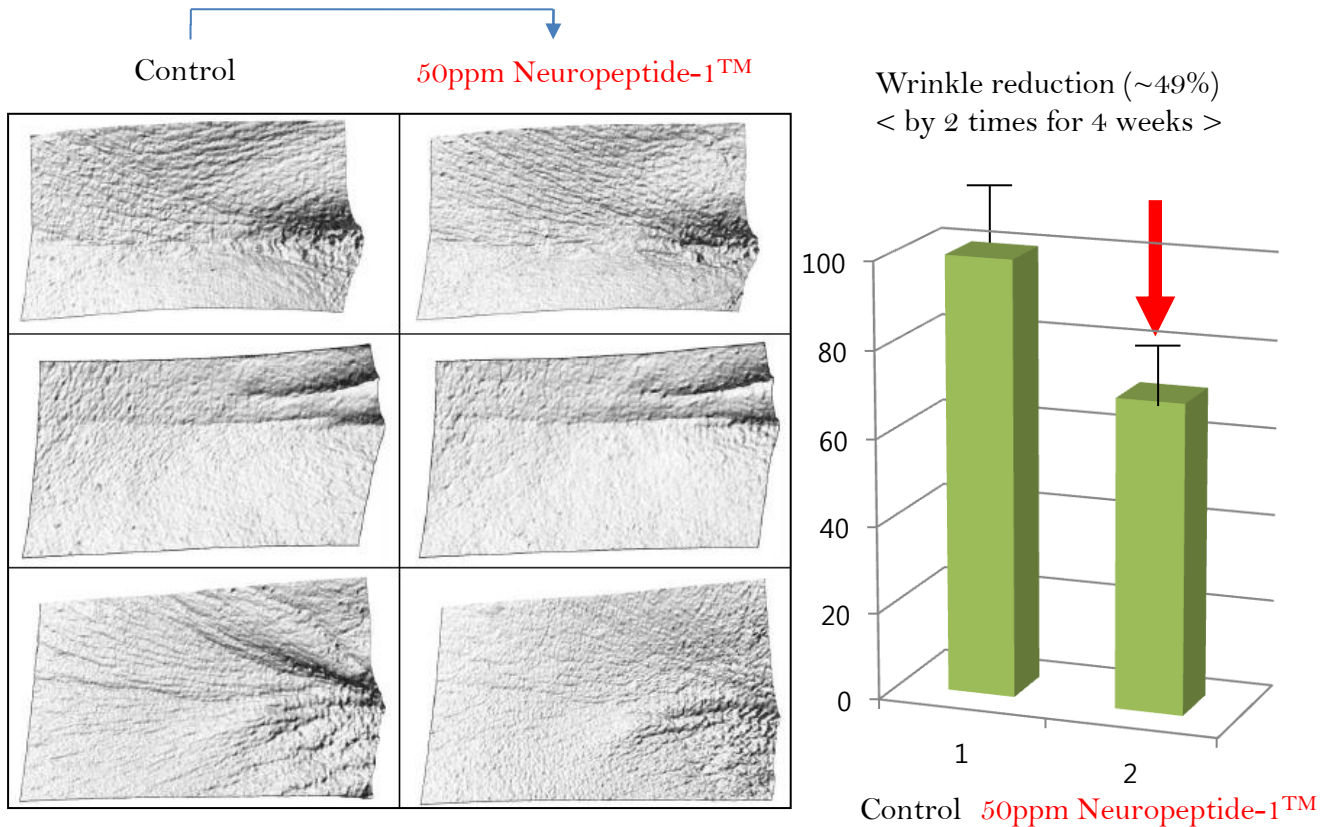
- MMP : Matrix metalloproteinase
 - Extracellular matrix degrading enzymes
 - discovered by Gross and Lapiere at 1962
 - **critical component of tissue growth and morphogenesis**



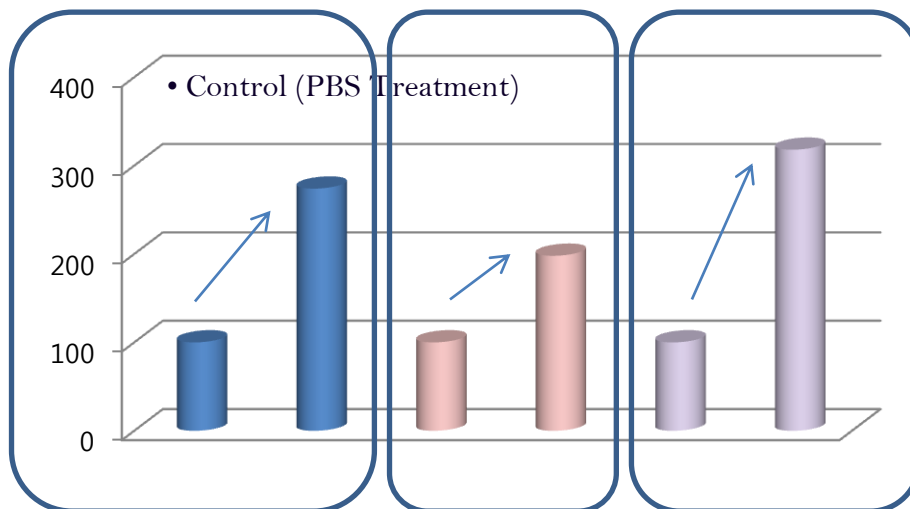
Treatment of neuropeptide-1, 30ppm for 48 hrs to fibroblast CCD986-sk significantly reduced MMP-9 expression up to **37.6%** related to anti-wrinkle effect.

● Experimental Data

Anti-Wrinkle Effect of Neuropeptide-1



Treatment 50ppm Neuropeptide-1™ significantly reduced
Intrinsic and/or extrinsic wrinkle formation on face skin of human (2 times/day, 4 weeks).
- Preliminary clinic study by BIO-FD&C -



Feeling on improvement of wrinkle reduction (274%), skin moisture (198%), and skin texture (318%)!
- Preliminary clinic study by BIO-FD&C -

1. Pickart, Ph.D. thesis, Univ. of California, San Francisco, 1973; Pickart, Thaler, *Nature New Biol.* 243, 1973, 85; Pickart, Thaler, *J. Cell Physiol.* 102, 1980, 129; Pickart, *In Vitro*, 17 (6), 1981
2. Pickart, Freedman, Loker, Peisach, Perkins, Stenkamp, Weinstein, *Nature* 288, 1980, 715; Kwa, Bor-Sheng, Rose, Weinstein, Pickart, *Peptides*, 8, 1983, 805; Freedman, Pickart, Weinstein, Mims, Peisach, *Biochemistry*, 21, 1982, 4540
3. Johnson, Pickart, Rose, *Inorg. Chem. Acta*, 67, 1982, 159; Pickart, Goodwin, Burgua, Murphy, Johnson, *Biochem. Pharmacol.*, 32, 1983, 3868; Pickart, Lovejoy, *Methods Enzymol.* 147, 1987, 314.
4. Maquart, Gillery, Monboisse, Pickart, Laurent, Borel, *Ann. N.Y. Acad. Sci.*, 580, 1990, 573; Sage, Vernon, *J. Hypertens. Suppl.* 12, 1994, S145.
5. Lau, Sarkar, *Biochem J.* 199, 1981, 649
6. Poole, Zetter, *Cancer. Res.* 43, 1983, 5857; Zetter, Rasmussen, Brown, *Lab. Invest.*, 53, 1985, 362; Raju, Alessandri, Gullino, *Cancer Res.* 44, 1984, 1579
7. Maquart, Pickart, Laurent, Gillery, Monboisse, Borel, *FEBS Lett.* 238, 1988, 343; Oddos, Jumeau-Lafond, Ries, *Amer. Acad. Derm. Abstract* P72, Feb. 2002; Wegrowski, Maquart, Borel, *Life Sci.* 51, 1992, 1049; Simeon, Wegrowski, Bontemps, Maquart, *J. Invest. Dermatol.*, 115, 2000, 962; Maquart, Bellon, Chaqour, Wegrowski, Monboisse, Chastang, Birembaut, Gillery, *J. Clin. Invest.*, 92, 1993, 2368; Simeon, Monier, Emonard, Gillery; Birembaut, Hornebeck, Maquart, *J. Invest. Dermatol.*, 112, 1999, 957; Simeon, Emonard, Hornebeck, Maquart, *Life Sci.*, 67, 2000, 2257
8. Maquart, Simeon, Pasco, Monboisse, *J. Soc. Biol.*, 193, 1999, 423; McCormack, Nowak, Koch, *Arch. Facial Plast. Surg.*, 3, 2001, 28
9. Sensenbrenner, Jaros, Moonen, Mandel, *Neurobiology*, 5, 1975, 207; Lindner, Grosse, Halle, Henklein, *Z. Mikrosk. Anat. Forsch.*, 93, 1979, 820; Garcia-Sainz, Olivares-Reyes, *Peptides*, 16, 1995, 1203
10. Levine, Patt, Koren, Joslin, 25th Ann. Meeting of Digest. Dis. W., May 1995; Miller, DeSilva, Pickart, Aust, *Adv. Exp. Med. Biol.*, 264, 1990, 79; Vinci, Caltabiano, Santoro, Rabuazzo, Buscema, Rizzarelli, Vigneri, Purrello, *Diabetologia*, 38, 1995, 39-45; Thomas, *Biochem. Biophys. Acta*, 1128, 1992, 50
11. Downey, Larrabee, Voci, Pickart, *Surg. Forum*, 1985, 573; Pickart in *Biology of Copper Complexes*, Plenum Press, 1987, 273
12. Swaim, Vaughn, Kincaid, Morrison, Murray, Woodhead, Hoffman, Wright, Kammerman, *Am. J. Vet. Res.* 57, 1996, 394
13. Ehrlich, Symposium on Collagen and Skin Repair, Reims, Sept. 12, 1991; Counts, Hill, Turner-Beatty, Grotewiel, Fosha-Thomas, Pickart, *Fed. Am. Soc. Exp. Biol.*, 6, 1992, A1636
14. Aupaix, Maquart, Salagnac, Pickart, Gillery, Borel, Kalis, *J. Invest. Derm.*, 94, 1990, 390; Fish, Katz, Hien, Briden, Johnson, Patt, *Wounds*, 3, 1991, 171.
15. Abulghani, Shirin, Morales-Tapia, Sherr, Solodkina, Robertson, Gottlieb, *J. Invest. Derm.*, 110, 1998, 686; *Amer. Acad. Derm. Meeting*, February 2002, (Appa, Barkovic, Finkey, Stephens, Abstract P66; Leyden, Grove, Barkovic, Appa, Abstract P67; Leyden, Stephens, Finkey, Barkovic, Abstract P68; Leyden, Stephens, Finkey, Barkovic, Abstract P69).
16. Uno, Kurata, *J. Invest. Dermatol.*, 101, 1993, 143S; Awa, Nogimori, *J. Dermatol. Sci.*, 10, 1995, 99.
17. ProCyte Corporation, 1997; Perez-Meza, *Int. J. Cosm. Surg.*, 6, 1998, 80.
18. Pesakova, Novotna, Adam, *Biomaterials*, 16, 1995, 911; Pohunkova, Stehlik, Vachal, Cech, Adam, *Biomaterials*, 17, 1996, 1567; Godet, Marie, *Cell. Mol. Biol. (Noisy-le-Grand)*, 41, 1995, 1081.
19. Zhai, Chang, Singh, Maibach, *Contact Dermatitis*, 40, 1999, 205; Zhai, Poblete, Maibach, *Int. J. Dermat.*, 37, 1998, 386; Zhai, Leow, Maibach, *Skin Res. Tech.*, 4, 1998, 24; Zhai, Leow, Maibach, *Clin. Exp. Derm.*, 23, 1998, 11.

Numerous Academic Articles on Cu²⁺-GHK and GHK !

Neuropeptide-1 (YGGFLGHK)

Neuropeptide-2 (YGGFLKTTKS)

Neuropeptide-3 (YGGFLEEMQRR)

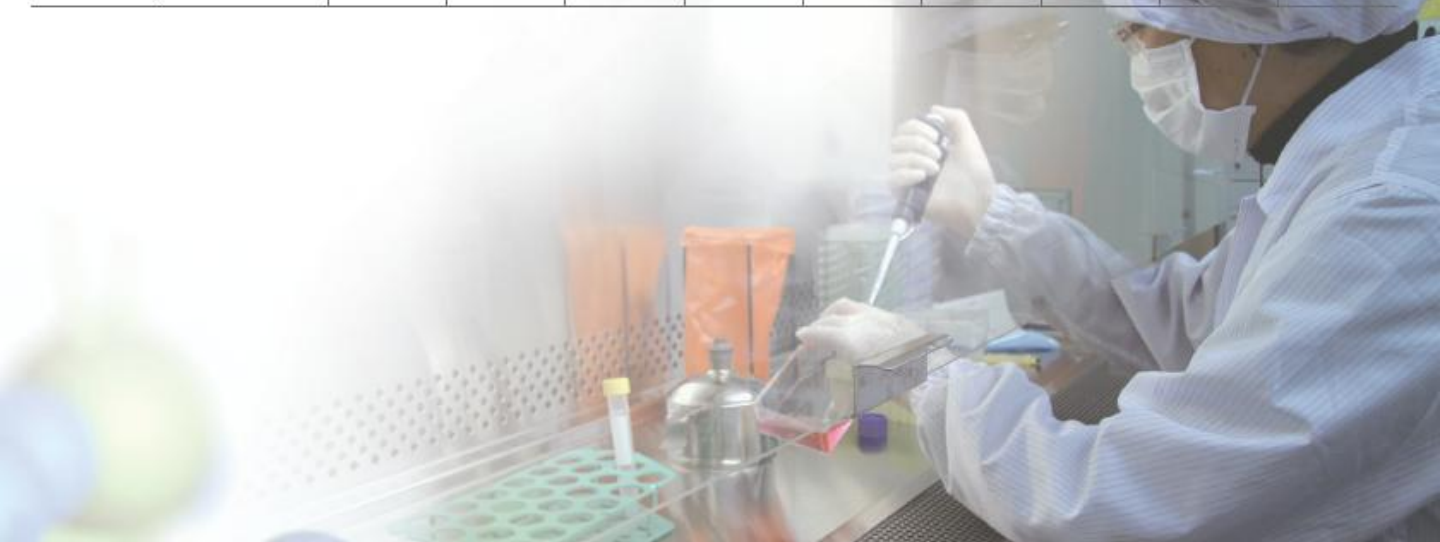
Do you need more peptide ?

BIO-FD&C Peptides Selection Guide

Biomimetic Peptides	Anti-aging	Anti-wrinkle	Whitening	Anti-hair loss & hair growing	Anti-inflammation	Anti-oxidant	Anti-microbial	Anti-acne	Anti-atopy
BF-Dynorphin	★★★	★★		★★					
BF-Enkephalin	★★★	★★		★★					
Epiderm-X	★★★	★★	★	★	★	★★			
Heal-VB7	★★★	★★	★	★★	★	★			
Neuropeptide-1	★★★	★★		★★					
Neoendorphin	★★★	★★		★★					
Polyol	★★★	★	★★		★	★			★
Rejucell-US	★★★	★	★		★	★			
Retinovax	★★★	★★		★	★★	★			
VH-Cellup	★★★	★	★★	★★	★	★		★	
Elastin essential peptide	★★	★★★		★★					
Elastin anti-wrinkle peptide	★★	★★★		★					
Healix	★	★★★	★	★	★★	★★			
Keratin essential peptide	★★	★★★		★★					
Lipovax	★	★★★		★★	★★	★★		★	
Prospin	★★	★★★	★★		★	★			
Skinup-US	★★	★★★	★		★	★		★	★
Silk essential peptide	★★	★★★		★★					
Sinpep	★	★★★		★			★★		
Wrinkle-X	★★	★★★			★	★	★		
Cyclitol	★		★★★		★★	★★		★	★
ElaX-MV		★	★★★		★		★		
Gallowax	★		★★★		★★	★★		★	★
Melabet	★★	★	★★★		★★				
Purosol		★	★★★	★	★	★			
Redovax		★	★★★	★	★★	★★		★	
Respe	★		★★★		★★	★			
Sonitin	★	★	★★★		★	★			
Symvastin		★	★★★		★★	★★		★	★
Whitening peptide	★		★★★						

Peptides Selection Guide

Biomimetic Peptides	Anti-aging	Anti-wrinkle	Whitening	Anti-hair loss & hair growing	Anti-inflammation	Anti-oxidant	Anti-microbial	Anti-acne	Anti-atopy
Anagen	★	★	★★	★★★★					
Elanoren	★	★	★★	★★★★			★★	★	★
Elastin scalp peptide	★	★		★★★★					
Elastin hair peptide	★	★		★★★★					
HG-Thymopentin		★	★	★★★★					
HG-Phyto-Thymopentin		★	★	★★★★	★	★	★		
Innogrowin		★		★★★★	★				
Keratin essential peptide	★	★★		★★★★					
Keratin scalp peptide	★	★	★	★★★★					
Phyto-thymosin beta 4		★	★	★★★★	★	★			
Antiox-VH	★				★★★★	★★★★			
Qtant	★	★	★		★★★★	★★★★		★	
Ursolin		★★	★		★★★★	★★★★		★	
Phytopeptide-1		★★	★		★★★★	★★★★			★
Therapep		★★	★		★★★★	★★★★			★
Vitamin peptide		★★	★★		★★★★	★★★★			
Anti-Microbial Peptide-Aurein							★★★★	★★	★★
Acnobet							★★	★★★★	★
Acnoheal							★★	★★★★	★
Acnoin							★★	★★★★	★
Hairen	★	★					★★	★★★★	★★
Phyto-NEP		★★		★★★★	★★	★★		★★	★★★★



Provides Functional Cosmetic Ingredients for
High Value Cosmetics and Cosmeceuticals



BIO-FD&C

*Innovative Leader
in Cosmeceutical Ingredient*

Phytopeptides
*from BIO-FD&C revolutionizes anti-aging
and skin cell rejuvenating!*

***BIO-FD&C Co., Ltd.,
We are your innovative partner for
your most valuable cosmetics!***

Phytopeptides are the latest innovations from BIO-FD&C skin research. Phytopeptides are bio-active ingredients obtained cutting-edge technologies improving efficacy, solubility, and stability of functional peptides by conjugating with various plant-originated phytochemicals possessing high anti-oxidant and anti-inflammation activities.



BIO-FD&C
(주)바이오에프디앤씨

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