

The Properties of CTP (Copper Tripeptide-1)



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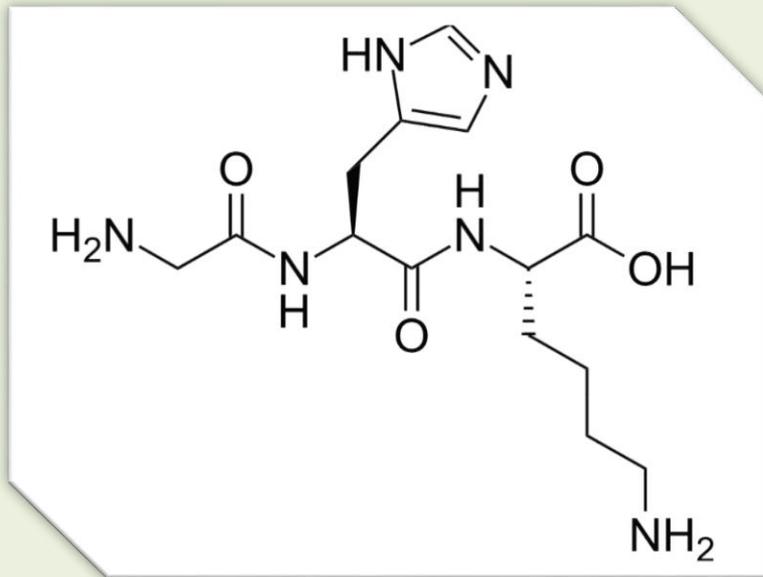
OVERVIEW

Copper peptides are naturally occurring small protein fragments that have high affinity to copper ions. In human plasma, the level of GHK-Cu is about 200ng/ml at age 20. By the age of 60, the level drops to 80ng/ml.

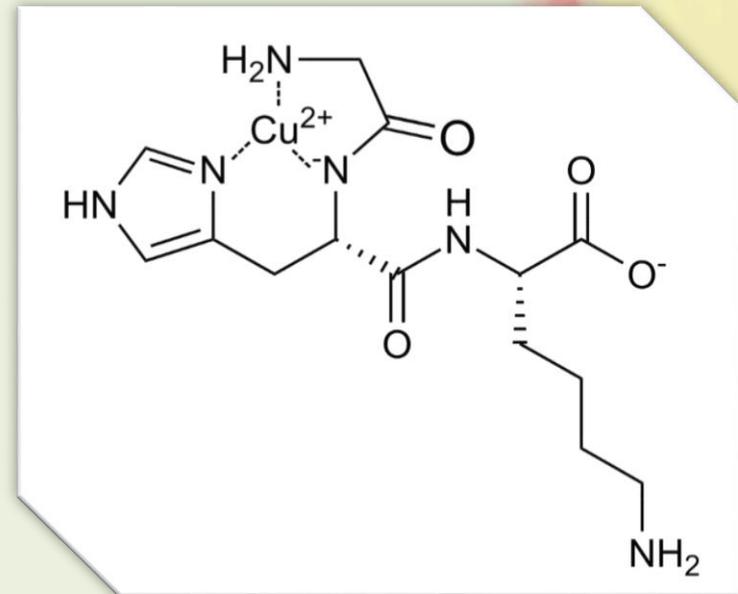
Scientific studies conducted in different research laboratories have established in humans, tripeptide GHK-Cu can promote activation of wound healing, attraction of immune cells, antioxidant and anti-inflammatory effects, stimulation of collagen and glycosaminoglycan synthesis in skin fibroblasts and promotion of blood vessels growth. Recent studies indicate its role in stem cell biology and anti-tumor defense. Synthetic GHK-Cu is used in cosmetics as a reparative and anti-aging ingredient.

THE DEFINITION OF CTP

Copper peptide, GHK-Cu is a naturally occurring copper complex of a glycy-L-histidyl-L-lysine peptide. Since it has three amino acids it is called tripeptide. The GHK-Cu tripeptide has strong affinity for copper(II) and was first isolated from human plasma. It can be found also in saliva and urine.

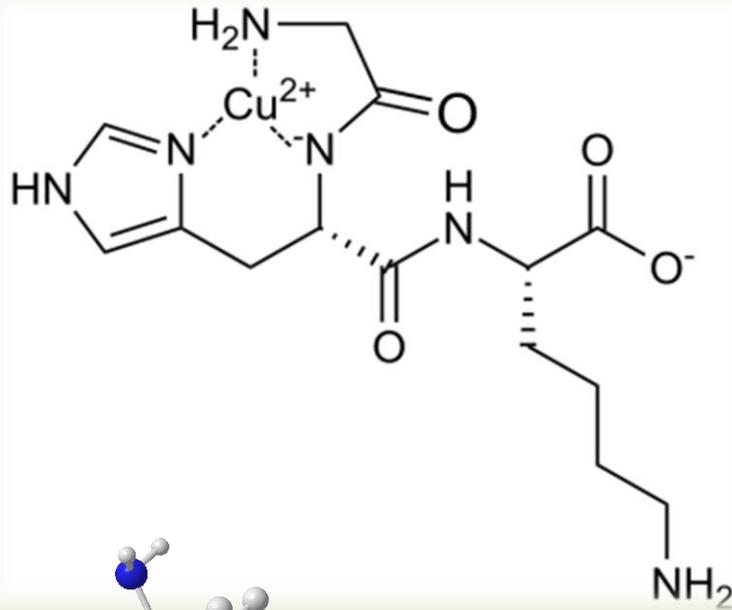


TRIPEPTIDE



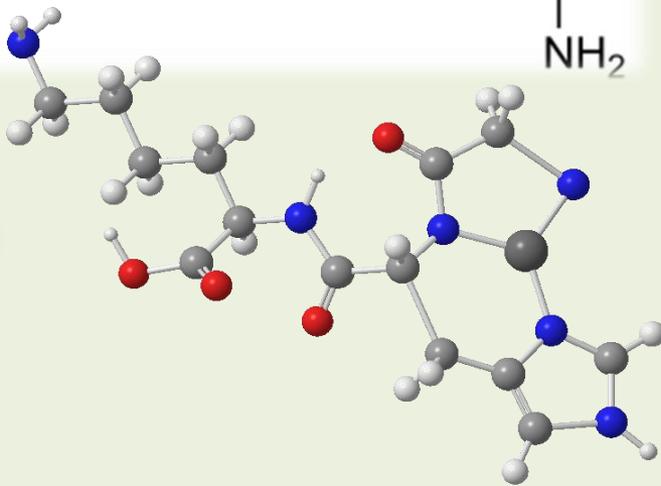
COPPER COMPLEX
COPPER TRIPEPTIDE-1

THE CHARACTERISTICS OF CTP

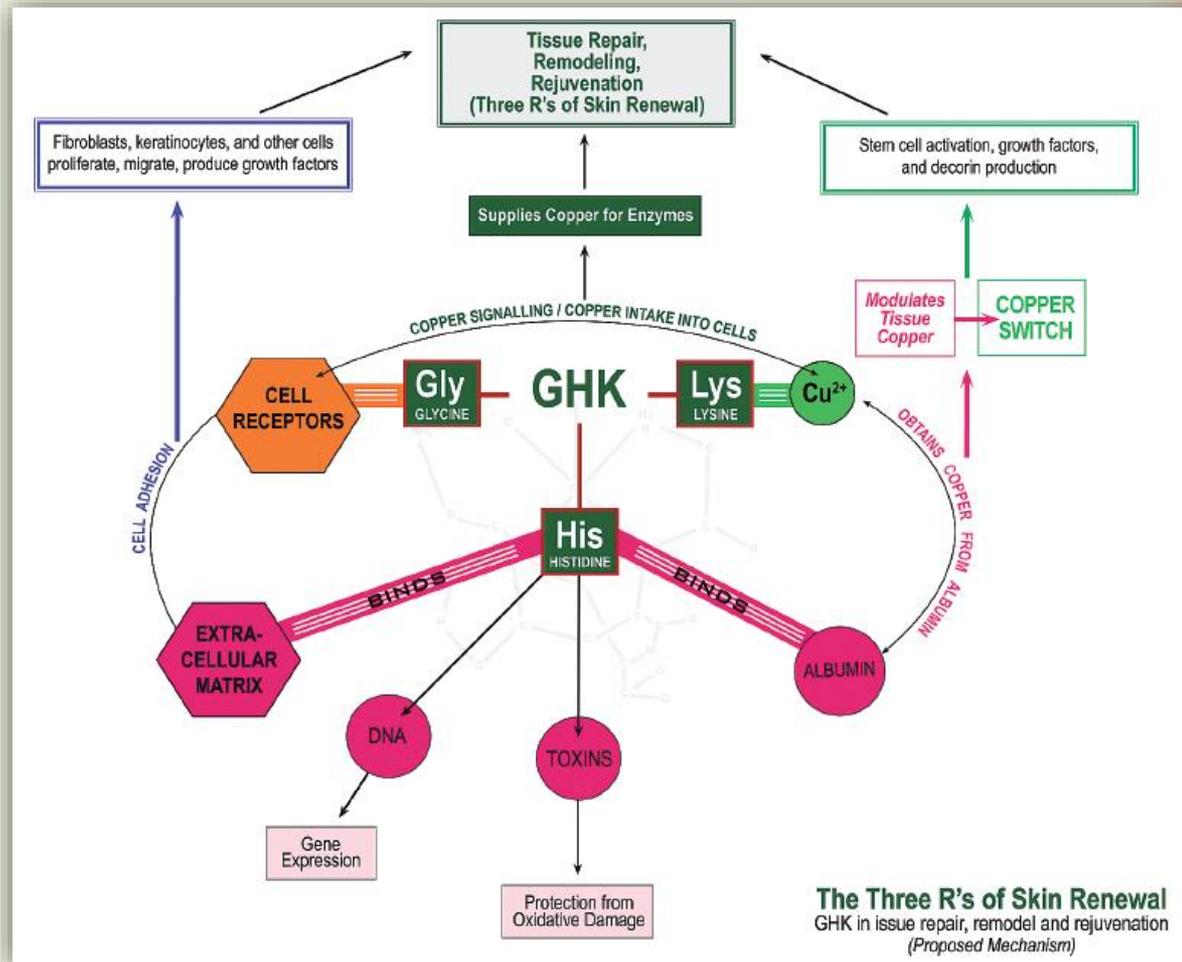


INCI Name
Other Name
Cas No
Purity (%)

Copper Tripeptide-1
GHK-Cu
89030-95-5
95% (min)



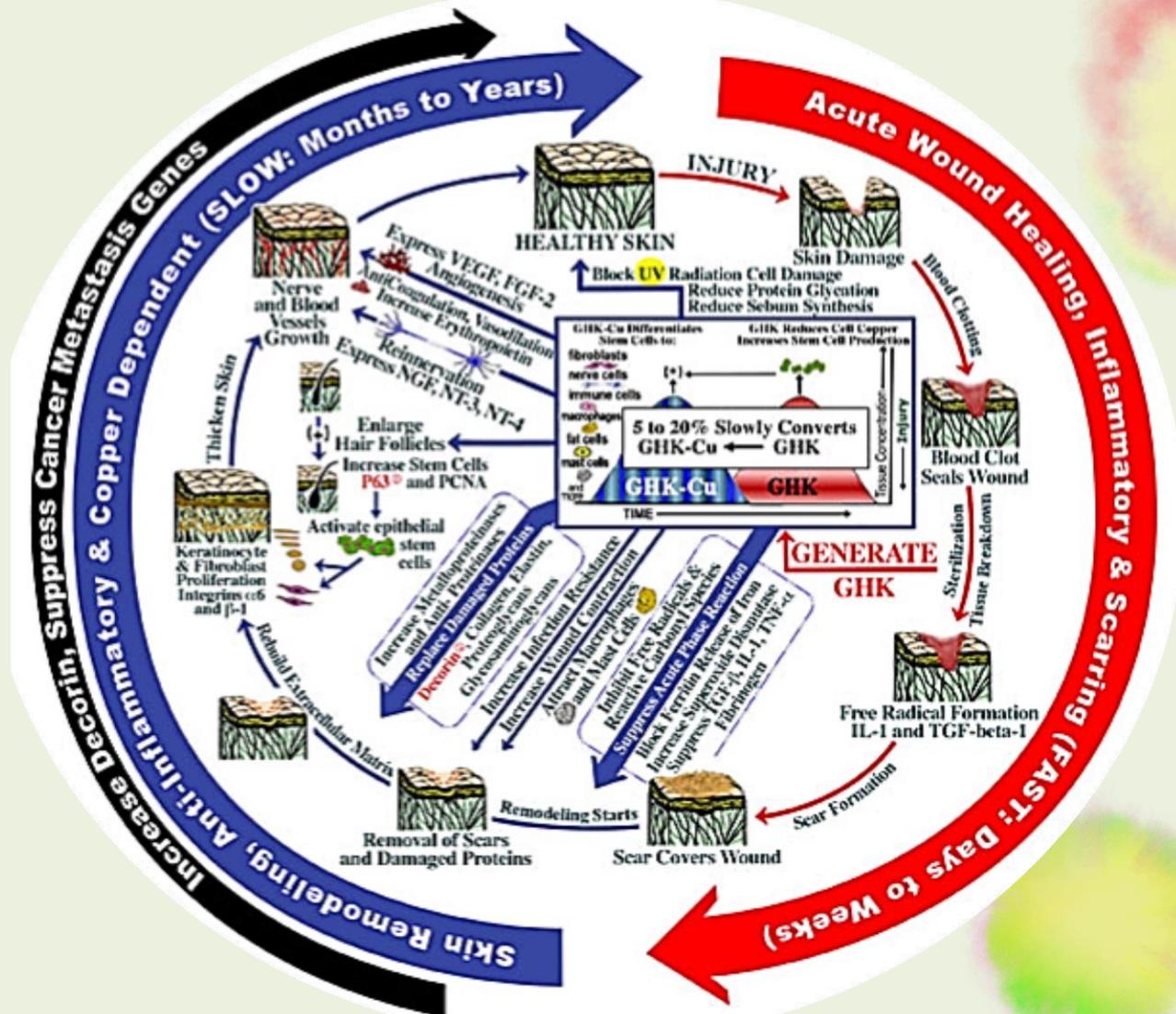
PROPOSED MECHANISM OF ACTION OF GHK-Cu¹



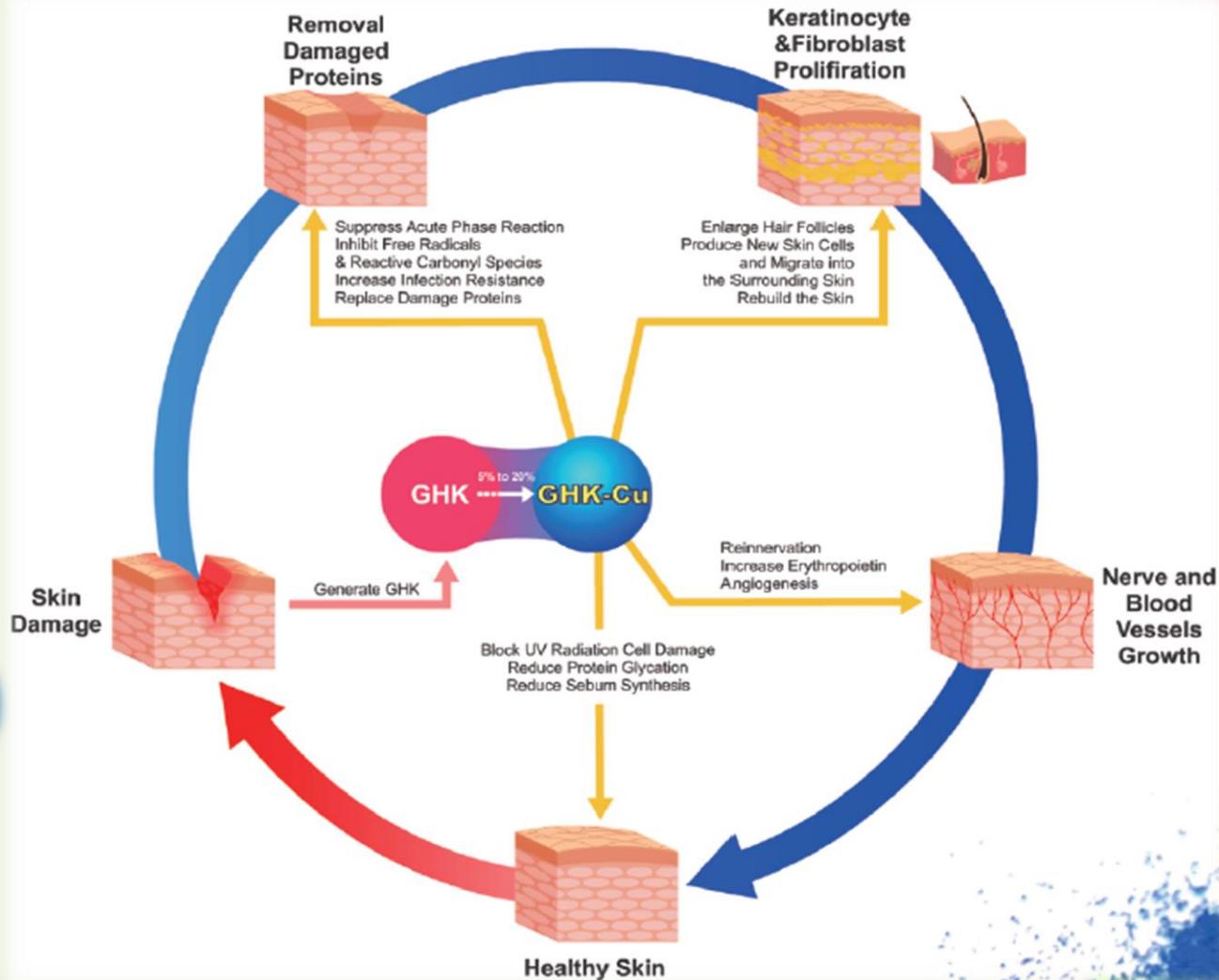
THE EFFECT OF COPPER TRIPEPTIDE-1

1. Calm irritated and reddened skin
2. Tighten loose skin and improve elasticity
3. Tighten the protective skin barrier proteins
4. Improve skin firmness
5. Reduce fine lines
6. Reduce the depth of deep wrinkles
7. Improve skin clarity and "glow"
8. Reduce spots, photodamage, and hyperpigmentation
9. Smooth rough skin
10. Improve overall appearance
11. Improve hair transplant success
12. Improve hair growth and thickness
13. Restore liver after toxic poisoning
14. Block stomach ulcer development
15. Heal intestinal ulcers
16. Accelerate wound healing
17. Act as powerful anti-inflammatories on skin
18. Cause the differentiation of stem cells needed for tissue repair

ACTIONS OF COPPER TRIPEPTIDE-1



SIMPLE OVERVIEW OF THE ACTION OF COPPER TRIPEPTIDE-1



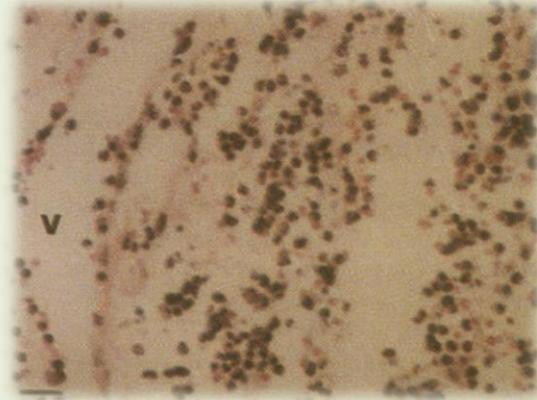
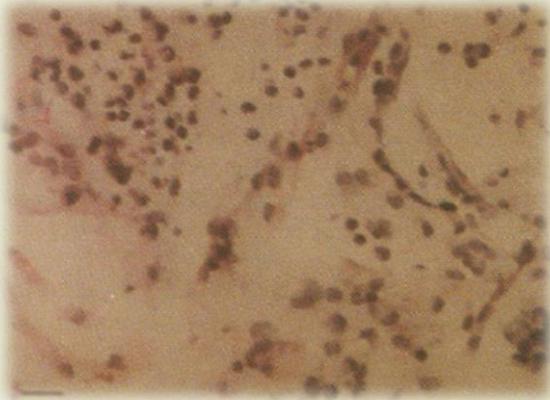
COMPARISON THE FUNCTION OF CTP WITH RETINOID AND VITAMIN C

Skin Effect	Copper peptide	Retinoid	Vitamin C
Reducing wrinkle	Yes	Yes	Minor improvements
Skin Color Tone	Very good tone	Often reddish, leathery appearance	Fair tone
New Collagen	Yes Significant in 70% of users in 30days	Yes Significant in 40% of users in 30days	Yes Significant in 50% of users in 30days
New Elastin	Yes	Yes	Minor improvement
Increase water— holding proteoglycans and glycosaminoglycans	Yes	Yes	No
Repair skin barrier	Yes	No Actually degrades skin barrier	No

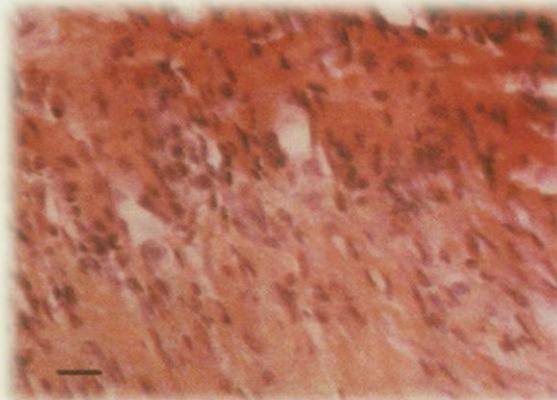
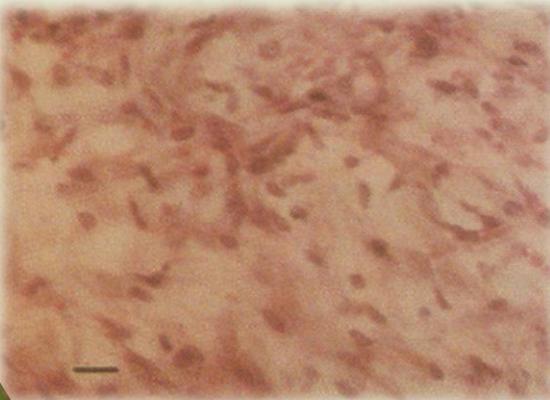
COMPARISON THE FUNCTION OF CTP WITH RETINOID AND VITAMIN C

Skin Effect	Copper peptide	Retinoid	Vitamin C
Improve capillary circulation	Yes	Yes	No
Activate Metalloproteinases to remove damaged proteins	Yes	No	No
Causes irritation	No	Yes Strong irritant	No
Anti-inflammatory	Yes	No	No
Anti-oxidant	Yes Activates superoxide dismutase in skin	No	Yes Vitamin C acts as anti-oxidant
Used for clinical skin repair?	Yes For wound healing and dermatological skin repair	Yes For skin renewal and anti-acne	No Effects are too minor

EFFECT OF INJECTION FOR GHK-Cu INTO THE WOUND CHAMBER



3 Days after injection
of GHK-Cu



14 Days after injection
of GHK-Cu



EFFECT OF INJECTION FOR GHK-Cu INTO THE WOUND CHAMBER

At days 3

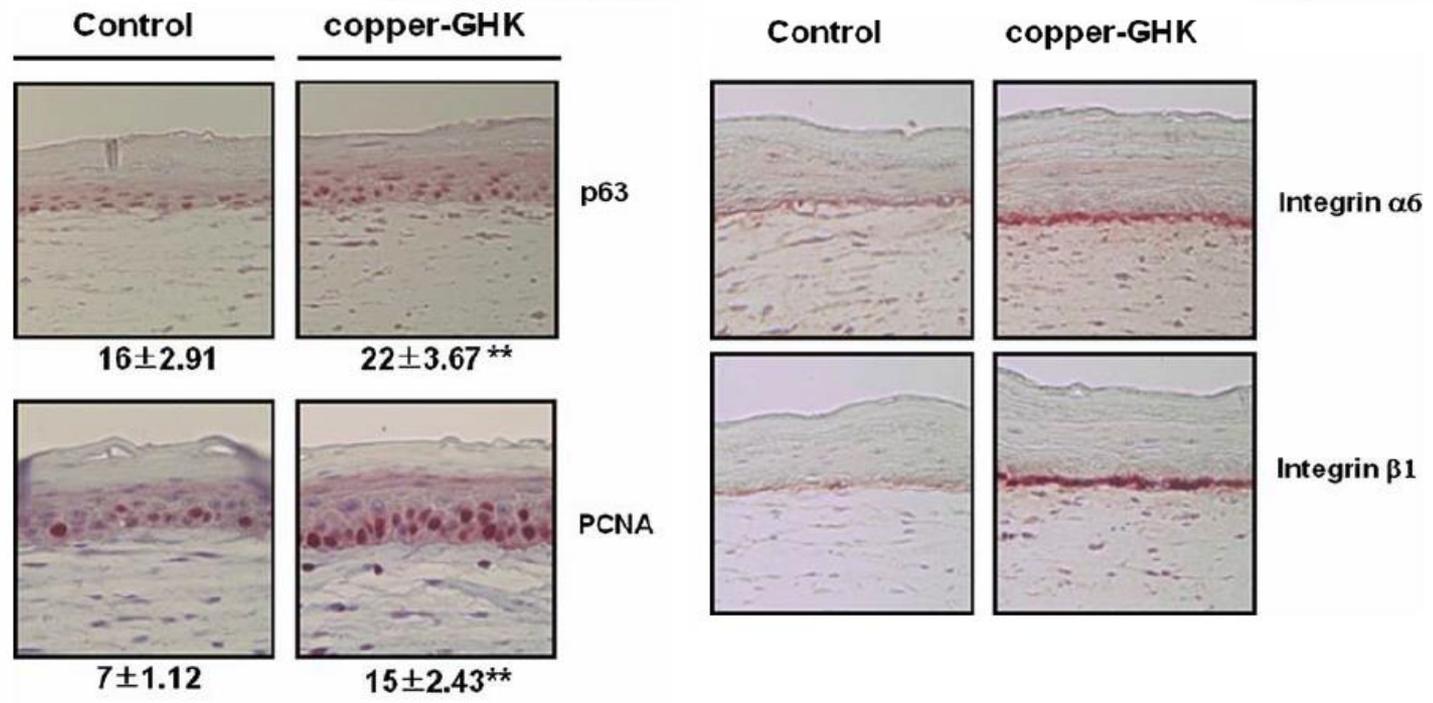
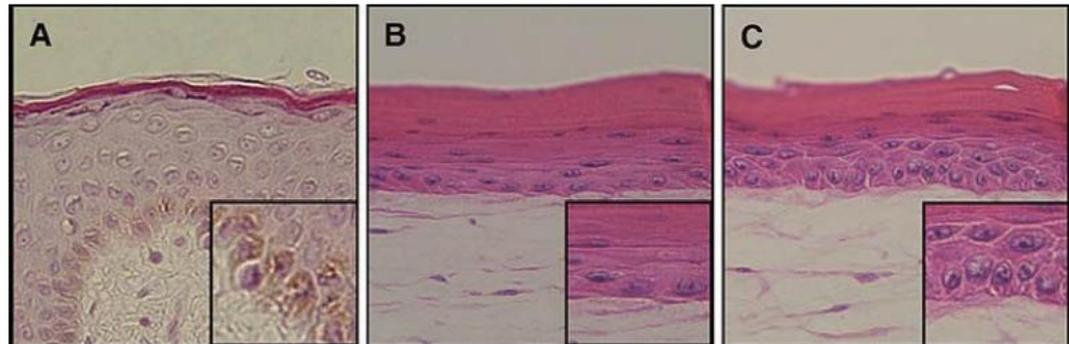
More inflammatory cells (polymorphonuclear cells and macrophages) were present in the treated chambers (B) than in the controls (A) and some neovascularization (v) was already visible.

At days 14

Large areas of well-organized fibrosis with elongated fibroblasts were seen in the GHK-Cu-injected chambers (D), whereas the control ones (C) were characterized by a cellular accumulation

EFFECT OF GHK-Cu (LSE)

Fig. 3 Histology of normal skin (a) and LSE (b LSE without copper-GHK, c LSE with copper-GHK). Following H&E staining, the shapes of basal cells were compared by microscopic examination. The basal layer keratinocytes appeared to be more cuboidal in the copper-GHK treated models ($\times 200$, insert box $\times 400$)



EFFECT OF GHK-Cu (WESTERN BLOT ANALYSES)

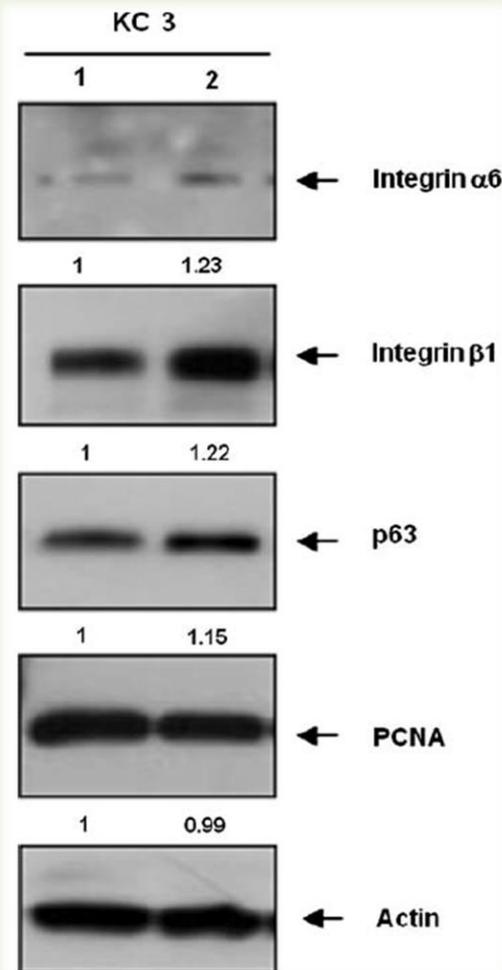
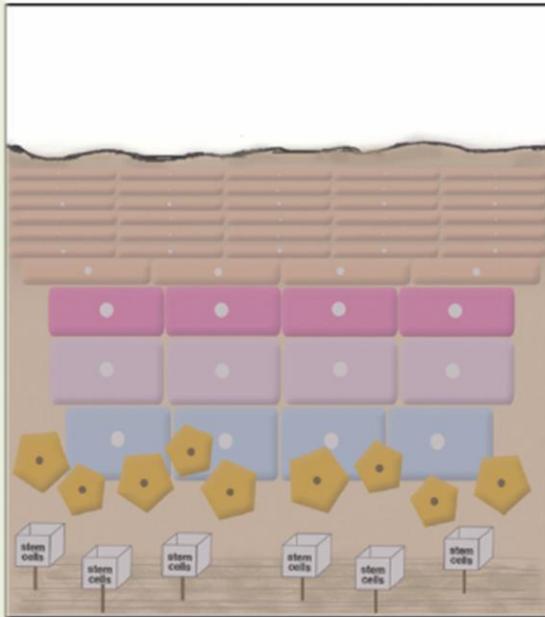


Fig 5 Cultured keratinocytes were treated with or without 1 μ M copper-GHK for 3 days. The cells were then lysed and Western blot analyses were conducted on the lysate as described in the “[Materials and methods](#)”. The results shown are representative of experiments that were conducted in triplicate

ANTI-AGING EFFECT OF GHK-Cu

Aged Epidermis:

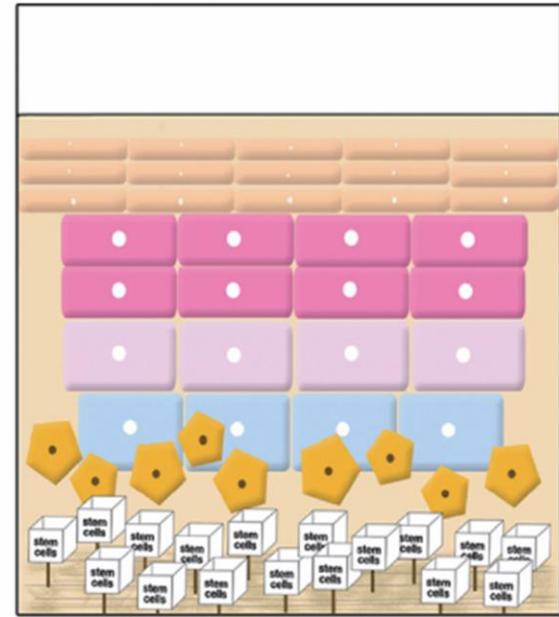


Basement Membrane

GHK-Cu
ADDED



Increased Skin Renewal & Repair:



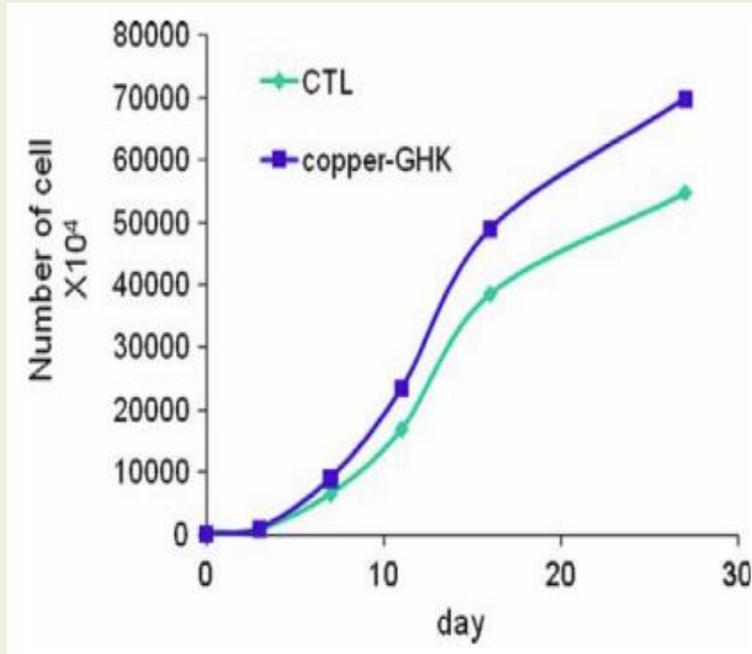
Transient Cells
Integrins connect stem cells to basement membrane

p63 p63 p63 p63 p63

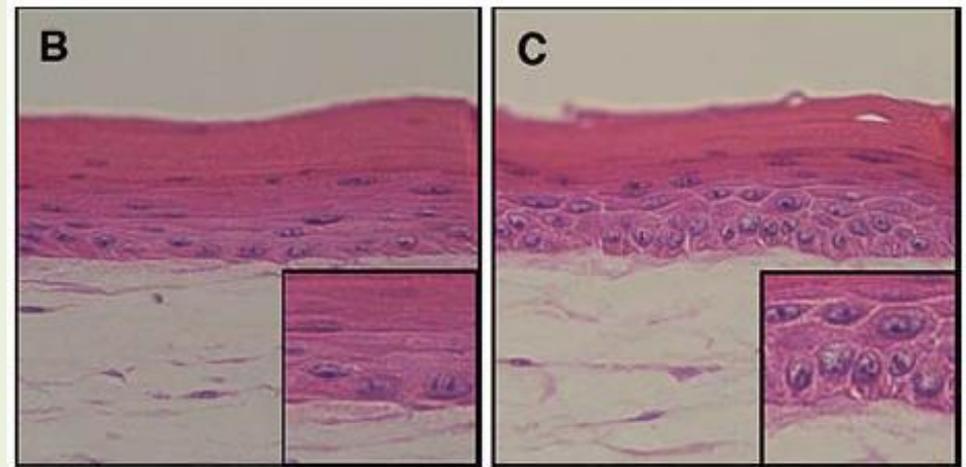
GHK-Cu Effects on Skin Stem Cells

Integrins and p63 increase Stemness revived stem cells

EFFECT OF GHK-Cu ON KERATINOCYTES



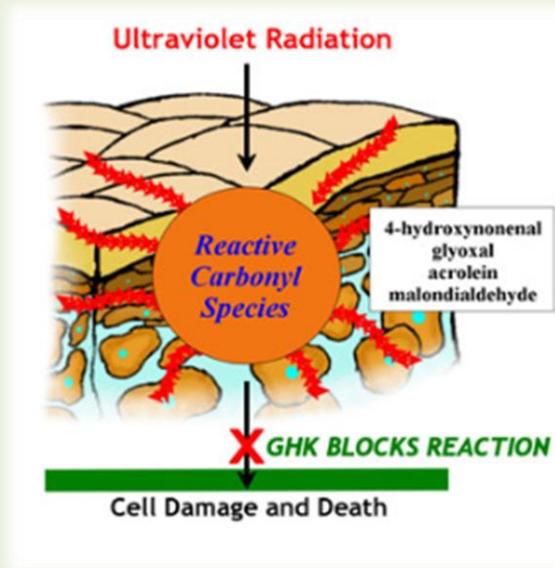
The long-term effect of Copper-GHK on the proliferation of Keratinocytes

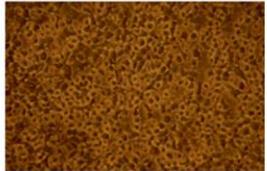
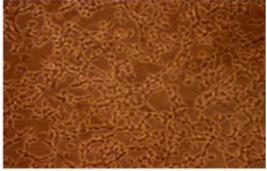


LSE with or without GHK-Cu

IMPROVING SUNTANNING AND REDUCING UV DAMAGE TO SKIN CELLS

GHK blocks lethal ultraviolet radiation damage to cultured skin keratinocytes by binding and inactivating reactive carbonyl species such as 4-hydroxynoneal, acrolein, malondialdehyde and glyoxal.



CONTROL	
UVB radiation + HNE (4-Hydroxynoneal) Cell Death	
GHK + UVB + HNE (4-Hydroxynoneal) Cells Protected	

GHK increasing the efficiency of melanin formation and reducing post-tanning peeling damage. Decreasing the time in sunlight and post-tanning peeling would reduce overall ultraviolet exposure.

COSMETICS ADVANTAGE OF CTP

- Skin matrix remodeling
- Penetrate stratum corneum membranes
- Anti-inflammatory and Antioxidant action
- Improves wound healing
- Increases hair follicle size
- Stimulation of hair growth
- Restores function in damaged cells

COSMETICS ADVANTAGE OF CTP

 **Stem Cells**
• Increase growth factor secretion


Skin Remodeling (Humans)
Six placebo controlled studies on 270+ subjects
• Increases keratinocyte proliferation
• Improves appearance, firmness elasticity, and skin thickness
• Improves wrinkles, mottled hyperpigmentation & photodamage
• Increases skin collagen
• Tightens protective skin barrier proteins
• Improves skin clarity


Wound Healing
— Heals:
• Rats, mice, pigs, rabbits, humans, dogs and Guinea pigs
— Heals:
• Surgical wounds
• Burn wounds
• Ischemic wounds
• Wound chambers
• Punch biopsy
• Dog paws
• Skin transplants
— Accelerates:
• Increased re-epithelialization, wound closure, wound strength, granulation tissue, collagen, elastin, proteoglycans, glycosaminoglycans, decorin, and subcutaneous fat cells



Tissue Remodeling Copper peptides
Induce Regeneration of Diverse Organs

CTP IN MARKET

Skin renewal

Neutrogena Visibly Firm Night Cream®
Neutrogena Visibly Firm Eye Cream®
Blue Copper Firming Elasticity Repair®
Climate Extreme Body Repair with Copper Peptide®
Blue Razor Aftershave®
Neova®Eye Therapy
Neova®Night Therapy Cream®
Neova®Body Therapy Lotion®
Neova®Cuticle Therapy
Neova®Cleansing Bar
Neova®Body Scruband BioPeptide-CL®

Tissue regeneration

lamin®group of wound products,
BioHeal®for "At-Risk" skin in persons with conditions
Graftcyte®products for hair transplantation,
Folligen®Hair growth stimulating products
Tricomin®Hair growth stimulating products,
post-surgical skin healing Complex Cu3®products for use after laser resurfacing
Protect & Restore®skin care products,
Neutrogena Visibly Firm Night Cream®skin care products,
Neutrogena Visibly Firm Eye Cream®skin care products,
Blue Copper®skin care products,
NeovaNight Repair®skin care products,
Protect & Restore SuntanningLotion®

Wound healing

laminGel Wound Dressing®
laminImpregnated Gauze Dressing®
lamin Wet Dressing (copper-saline)®
lamin-2 Hydrating Gel®
laminWound Cleanser®

Stimulation of Hair Growth

- Tricomin®Solution Follicle Therapy Spray,
- Tricomin®Revitalizing Shampoo,
- Tricomin®Restructuring Conditioner
- Tricomin®Conditioning Shampoo

Post-Surgical Skin Healingafter laser resurfacing, dermabrasion, and chemical peels

- Complex Cu3®Intensive Tissue Repair Cream
- Complex Cu3®Hydrating Gel
- Complex Cu3®Gentle Face Cleanser

CTP IN KOREAN MARKET

제품 분류	제조사	제품명
샴푸	현대약품	미녹솔C
샴푸	DK코스메틱	코미인
샴푸	한국미용메디팜	테라피션
샴푸	-	고려항칠
샴푸	-	디아스포라
샴푸	-	프로메톡
샴푸	-	조아산파낙스
크림	프로유코스메틱	쿠퍼펩타이드크림
탈모치료제	-	온헤어
수용액	DK코스메틱	코미인



THE FUNCTION OF CTP (SUMMARY)

Causes skin remodeling

- Rebuilds skin protective barrier
- Increases collagen and elastin - more than vitamin C
- Increases water-holding proteoglycans
- Rebuilds blood microcirculation
- Activates removal of damaged skin proteins and scars

Present in wounds

- The human body's natural remodeling signal

Anti-inflammatory

- Potent anti-inflammatory, activates skin's main antioxidant protein--dismutase superoxide

THE FUNCTION OF CTP (SUMMARY)

Increases hair follicle(humans) size

- Also blocks hair loss if given before chemotherapy and accelerates hair growth after chemotherapy (rats)

Hair Growth

- Copper peptide (GHK-Cu) stimulate hair growth
- The efficiency of synthetic analog of GHK-Cu was similar to that of 5% minoxidil.

CTP

INCI Name	Copper Tripeptide-1
Other Name	GHK-Cu
Cas No	89030-95-5
Purity (%)	95% (min)

CTP (1,000 ppm)

INCI Name	Water, Butylene Glycol, Copper Tripeptide-1, Phenoxyethanol, Methylparaben, Ethylparaben, Butylparaben, Propylparaben, isobutylparaben
Appearance	Transparent Blue Solution
Density at 20°C	0.990 - 1.010
Copper Tripeptide-1 Content (ppm)	950 ~ 1050
Recommended Dossage	5% (min)

FORMULATIONS

Face and Eye Care – Treatment

Product/INCI Name	% w/w
<Part A>	
Stearic acid	1.00
Cetanol	1.50
BP	0.10
Bees wax	1.0
Aracel 60	1.00
Tween 60	1.00
Aracel 165	1.50
Squalane	9.00
LP #70	4.00
Silicone oil(200F)	2.00
<Part B>	
MP	0.20
EDTA-2Na	0.02
Allantoin	0.05
TEA	0.50
1,3-BG	10.00
Glycerin	2.00
Carbopol 940	0.24
B-Glucan	1.00
D.I water	61.43
<Part C>	
CTP-1	0.10
Perfume	0.02

Methods

1. Heat Phases A to 75-80 °C
2. Combine ingredients of Part B with mixing and heat to 75-80 °C
3. Add part A to Part B with mixing and cool to 45 °C
4. Add Part C of CTP-1 and perfume at 40 to 45 °C and stir until temp.

FORMULATIONS

Conditioning Shampoo

Product/INCI Name	% w/w
<Part A>	
Deionised Water	To 100.00
Sodium Laureth Sulfate, 3 EO(70%)	14.50
Cocamidopropyl Betain	9.00
Sodium Lauroyl Sarcosinate	5.00
Isoستearamidopropyl Morpholine Lactate	5.00
Stearamidopropyl Dimethylamine Lactate	5.00
<Part B>	
Polyquaternium-10	0.20
Deionised Water	2.50
<Part C>	
CTP-1	0.05
PEG-6 Carpric/Carprylic Glycerides	1.50
PHENOVA	0.50
Perfume	qs
Total	100.00

Methods

1. Dissolve SLES in water
2. Add the rest of Part A ingredients and mix until homogeneous.
3. Combine part B ingredients and add into Part A heat to 60 °C and mix for 10min.
4. Cool to below 40 °C
5. Add Part C ingredients and mixing.
6. Adjust pH to 7.0 if necessary and viscosity as desired.

FORMULATIONS

Anti-hair loss Hair Tonic

Product/INCI Name	% w/w
<Part A>	
Deionised Water	To 100.00
Citric acid	0.26
Trisodic acid	1.20
Potassium Sorbate	0.10
<Part B>	
PHENOVA	0.50
PPG-5 Ceteth 20	2.00
<Part C>	
CTP-1	0.20
<Part D>	
Polysorbate 20	1.00
Perfume	qs
Total	100.00

Methods

1. Add part B to Part A with mix.
2. Add Part C to Part A+B and mix
3. Mix Part D and add it to Part A+B+C with Helix stirring.

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THANK YOU



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