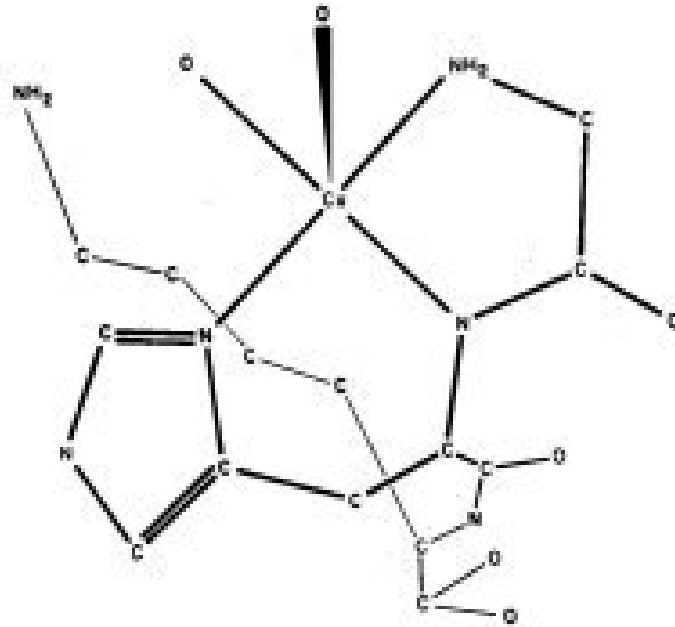


Copper Tripeptide - 1:(INCI Name)

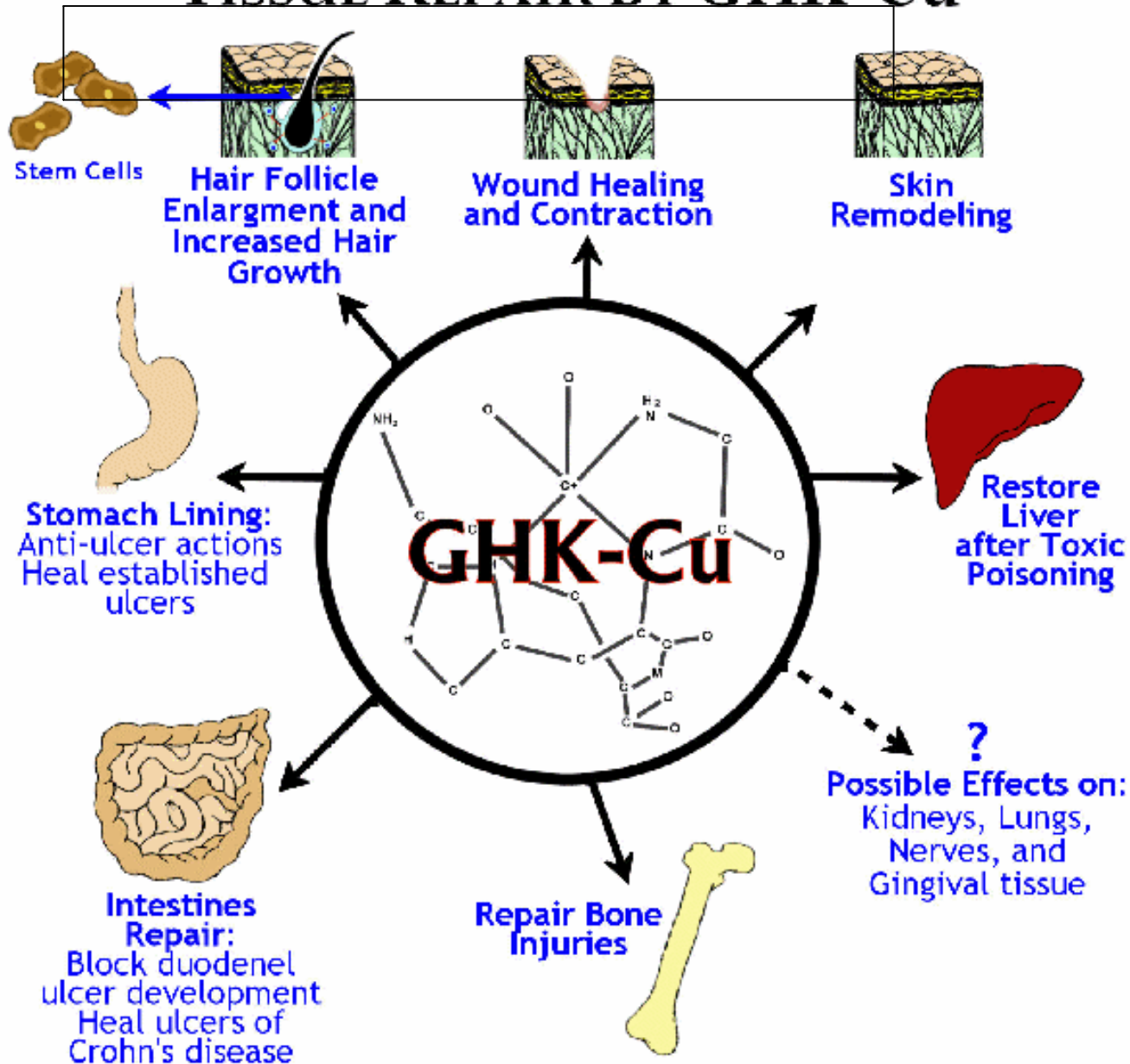


GHK - Cu:(glycyl - L - histidyl - L - lysine - Cu²⁺)

Copper Tripeptide - 1?

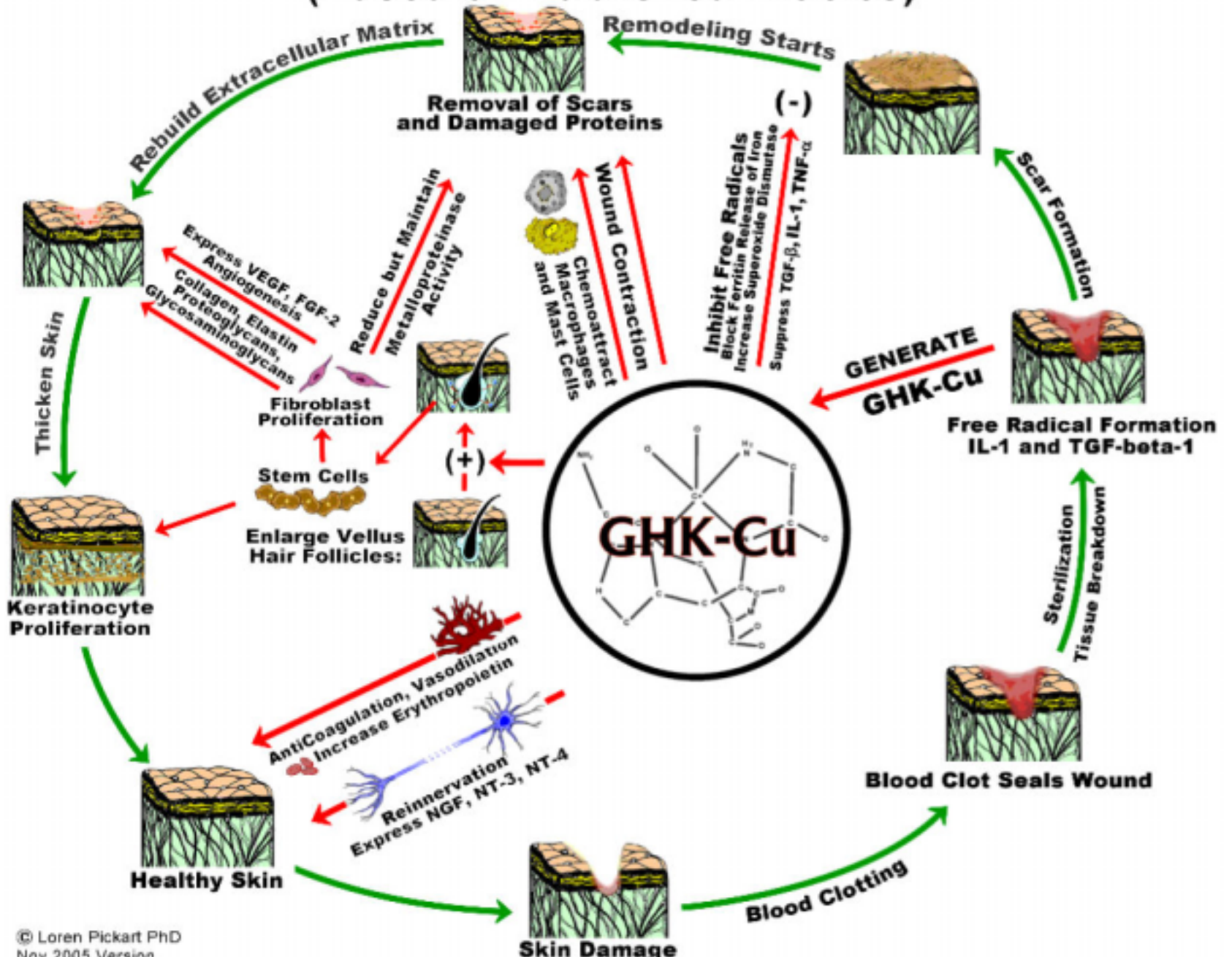
- [Tissue Remodeling Copper Peptides Induce Regeneration of Diverse Organs](#)
[Biochemical Actions of GHK-Cu](#)
[SRCPs \(Skin Remodeling Copper Peptides\)](#)
[Cosmetic Skin Renewal and Aging Reversal](#)
[Stimulation of Hair Growth](#)
[GHK, Copper, Regeneration, & Stem Cells](#)
[Wound Healing](#)
[Skin and Hair Transplantation](#)
[Liver Regeneration](#)
[Bone Healing](#)
[GHK, Copper, Regeneration, and Stem Cells](#)
[Anti-Oxidant and Anti-Inflammatory Actions](#)
[Intestinal and Stomach Healing](#)
[SRCP Biochemistry Related to Tissue Regeneration](#)
[Stimulation of Fingernail Growth](#)
[Improving Suntanning and Reducing Skin Peeling](#)
[Background of SRCPs](#)
[GHK-Cu - Function in Human Body](#)
[The Need for Improved Skin Regenerative Copper Peptides](#)
[Growth Inhibitory Analogs of the GHK copper binding region](#)
[General References on Chemistry and Biology of GHK](#)
[The Aging Reversal Experiments and GHK](#)

TISSUE REPAIR BY GHK-Cu



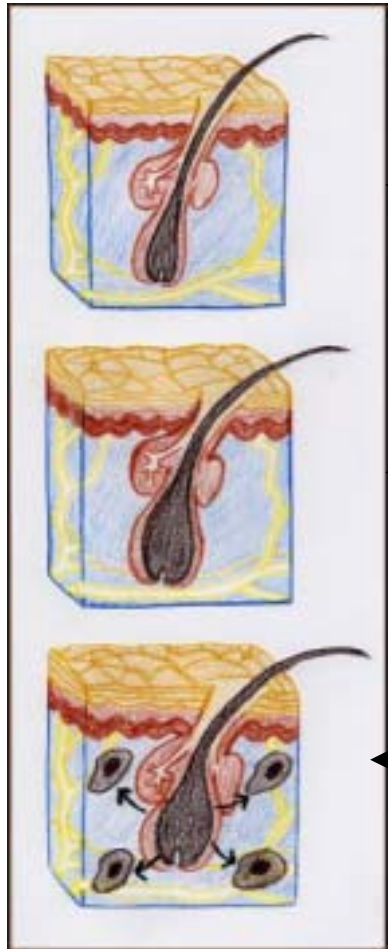
Proposed Actions of GHK-Cu on Skin

(Based on Published Articles)



Skin Remodeling Starts with Hair Follicles.

Skin remodeling starts with the hair follicles. The body's signal for remodeling first activate the systems that break down damaged proteins and remove damaged skin lesion. Various proteins (proteolytic enzymes) start braking down scars and damaged tissue . Then the signals enlarge the hair follicles in the skin area to be rebuilt. New skin cells arise from the hair follicle and migrate into the surrounding skin area



← Hair follicle before remodeling signal.

← The remodeling signal increases the size of the hair follicles.

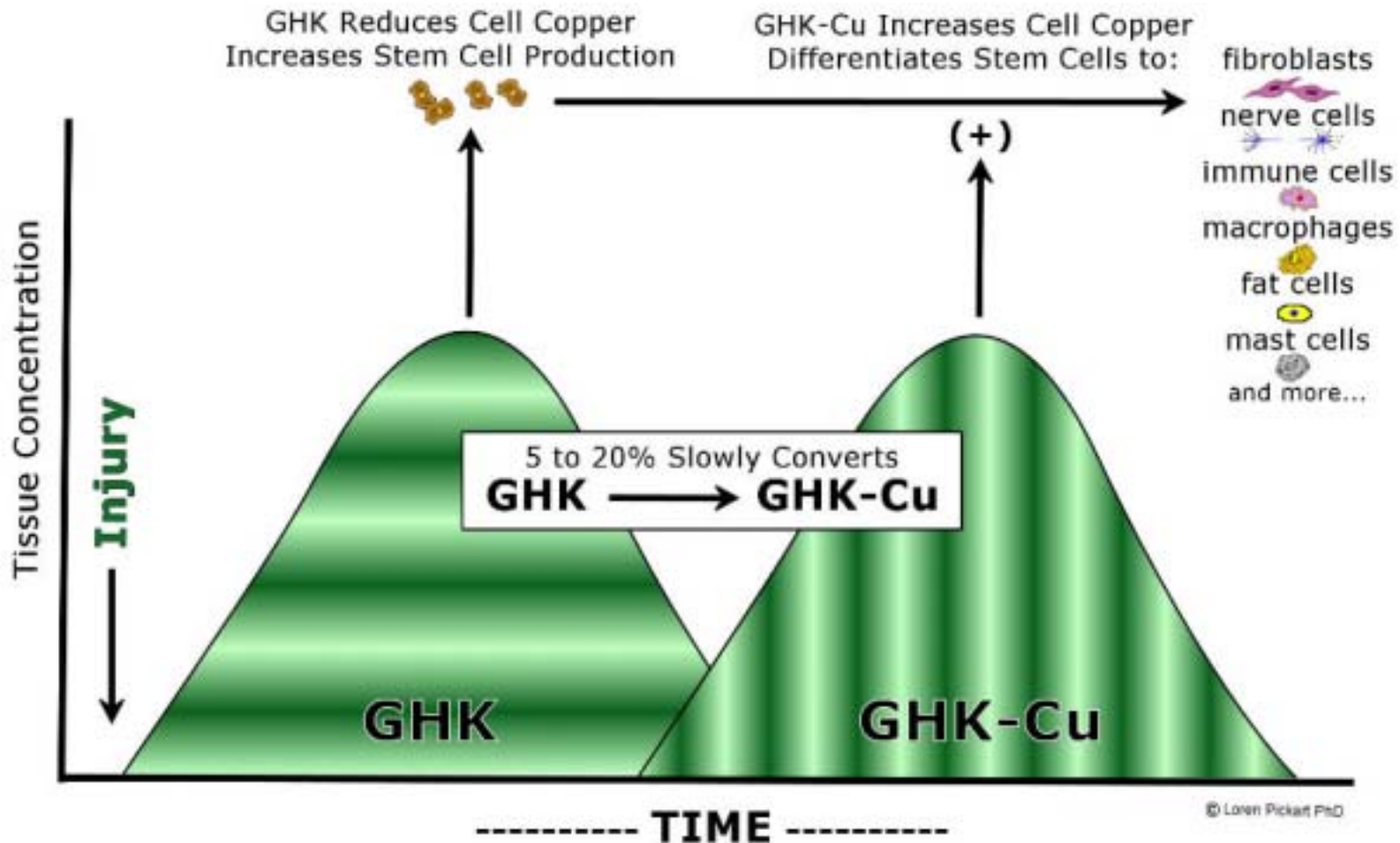
← The enlarged hair follicle begins to produce new skin cells that migrate into the surrounding skin and rebuild the skin.

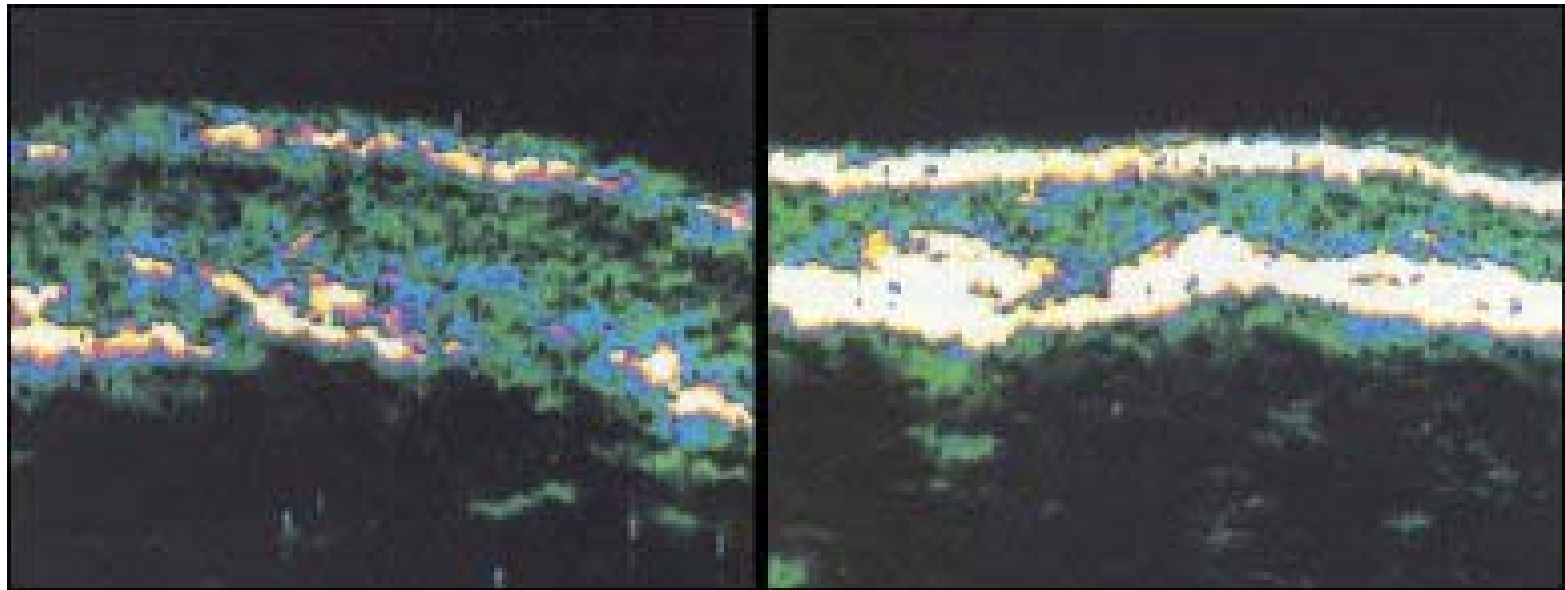
Publications on SRCPs and Hair Growth

Study	Result	Reference
Use of GHK-Cu analogs for hair follicle enlargement and stimulation of hair growth	Methods for the design and testing of copper-peptide complexes with hair growth properties are described. A wide variety of GHK-Cu analogs were described that increase hair follicle size and increase hair growth in mice and rats.	US Patent 5,120,831 New metal peptide complexes and derivatives used for stimulating growth of hair in warm-blooded animals, especially humans. Pickart US Patent 5,177,061 Compositions for stimulating hair growth containing cupric complexes of peptide derivatives including. glycy-l-histidyl-l-lysine n-octyl ester. Pickart US Patent 5,214,032 New glycy-l-histidyl-lysyl copper compounds used in stimulating hair growth. Pickart US 5,550,183 Metal-peptide compositions and methods for stimulating hair growth. Pickart
Stimulation of hair growth in mice	GHK analogs with hydrophobic residues were tested and found to stimulate hair growth in rats.	The hair follicle stimulating properties of peptide copper complexes. Results in C3H mice. Fors, Pickart and Uno Ann N Y Acad Sci 1991 26;642:468-9
Stimulation of hair growth in mice and rats	The details of hair stimulation by copper peptides was studied by 1) phototrichogram, 2) folliculogram (micro morphometric analysis), and 3) the rate of DNA synthesis in the follicular cells. The effects were essentially a stimulation of the follicular cell proliferation, resulting in an enlargement of the anagen follicles from vellus to terminal type (therapy) or a maintenance of the piebald terminal follicles (prevention). A SRCP (PC1020) had the effect of follicular enlargement on the back skin of fuzzy rats, covering the vellus follicles.	Chemical agents and peptides affect hair growth. Uno and Kurata (University of Wisconsin, Madison, USA) J Invest Dermatol 1993 101(1 Suppl):143S-147S
Minimizing hair loss after cancer chemotherapy	Rats were pretreated with SRCPs then exposed to chemotherapeutic drugs. This reduced hair loss. If the rats were first given chemotherapeutic drugs, the treated with SRCPs later, the SRCPs speeded hair regrowth.	Hairloss protection by peptide-copper complex in animal models of chemotherapy-induced alopecia. Awa and Nogimori Journal Of Dermatological Science, Vol: 10, 1995, 99-104
Human hair growth	Stimulation of hair growth in humans with GHK-Cu analogs	Phototrichogram Analysis of Hair Follicle Stimulation: A pilot clinical study with a peptide-copper complex. Patt, Duncan and Kalis (University of Reims, France) Dermatological Research Techniques, (CRC Press), pp-217-226, 1996
Hair growth in rats	Stimulation of hair growth in rats	Quantitative Assessment of Peptide-Copper Complex Induced Hair Follicle Stimulation Using the Fuzzy Rat, Uno, Packard, Patt (University of Wisconsin) Dermatological Research Techniques, (CRC Press), pp-227-239, 1996
Hair growth in rats	Stimulation of hair growth in rats with GHK-Cu analogs	Evaluation of Telogen Hair Follicle Stimulation Using an In Vivo Model: Results with Peptide Copper Complexes. Timpe, Dumwiddie, Patt (Procyte Corp.) Dermatological Research Techniques, (CRC Press), pp-241-254, 1996
Human study of hair growth with GHK-Cu analog	Compared GHK-CU analog in Tricomin with 2% minoxidil. Tricomin 2.5% increased hair count by 97 non-vellus hairs while 2% minoxidil increased count by 73 non-vellus hair after 3 months (non-vellus hair count)	Procyte Corp. press release 1997
Breakdown resistant, long acting copper-peptides used for stimulation of hair growth	Tested copper complexed with protein peptones for hair growth effects in mice. Copper-peptide mixture produced more hair growth in mice than GHK-Cu analogs	Pickart US Patent 5,554,375 Tissue protective and regenerative compositions.
Review	Skin remodeling and hair growth	Pickart L, Effect of copper peptides on hair growth and condition, Body Language Dermatology 2004, Number 7, pages 20-22
Review	Skin remodeling and hair growth	Pickart L, Skin remodeling copper peptides for improving hair growth, Cosmetics & Medicine (Russia) 2004, Number 3, pages 14-29

GHK, Copper, Regeneration, and Stem Cells

GHK, Stem Cells, and Differentiation





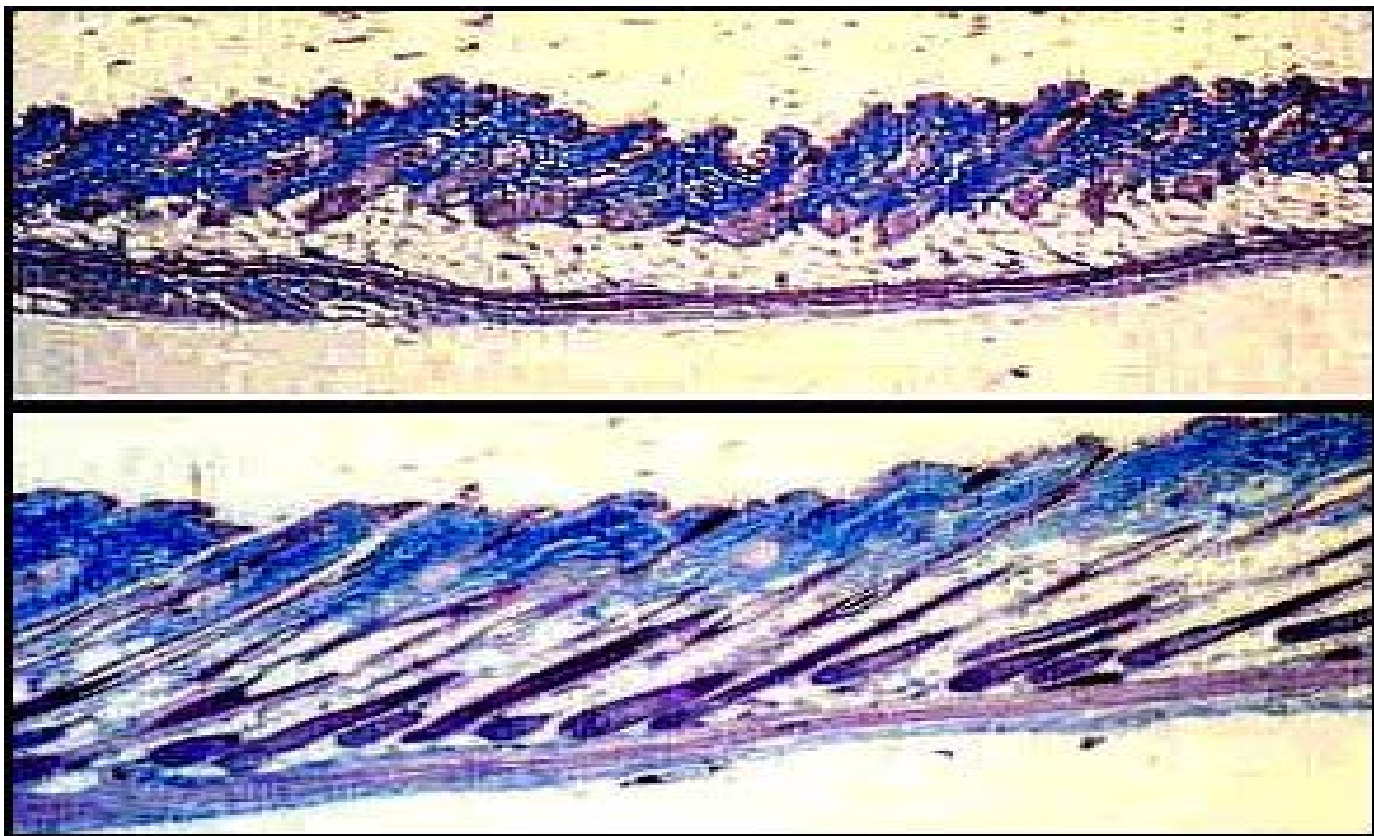
SRCPs (Skin Remodeling Copper Peptides) help stimulate new capillary formation (angiogenesis), increasing the biosynthesis of collagen, elastin and the water-holding proteoglycans and glycosaminoglycans

Example - Healing of Diabetic Skin Ulcers

Persons with diabetes often have slow and inadequate skin repair. The skin complications of diabetes lead to skin that is dry, tends to crack, and is slow to heal.



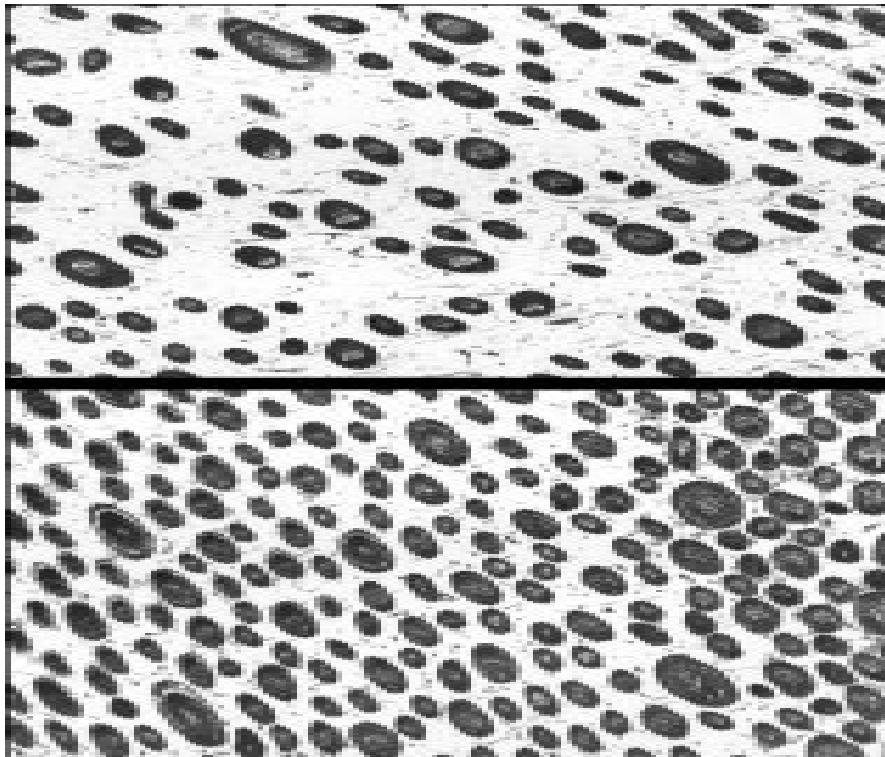
SRCP (Skin Remodeling Copper Peptides) creams often produce a rapid improvement in skin health and help prevent the development of cracks and fissures in the skin which may turn into skin ulcers. Rapid healing of broken and cracked skin, before an infection sets in, is very important.

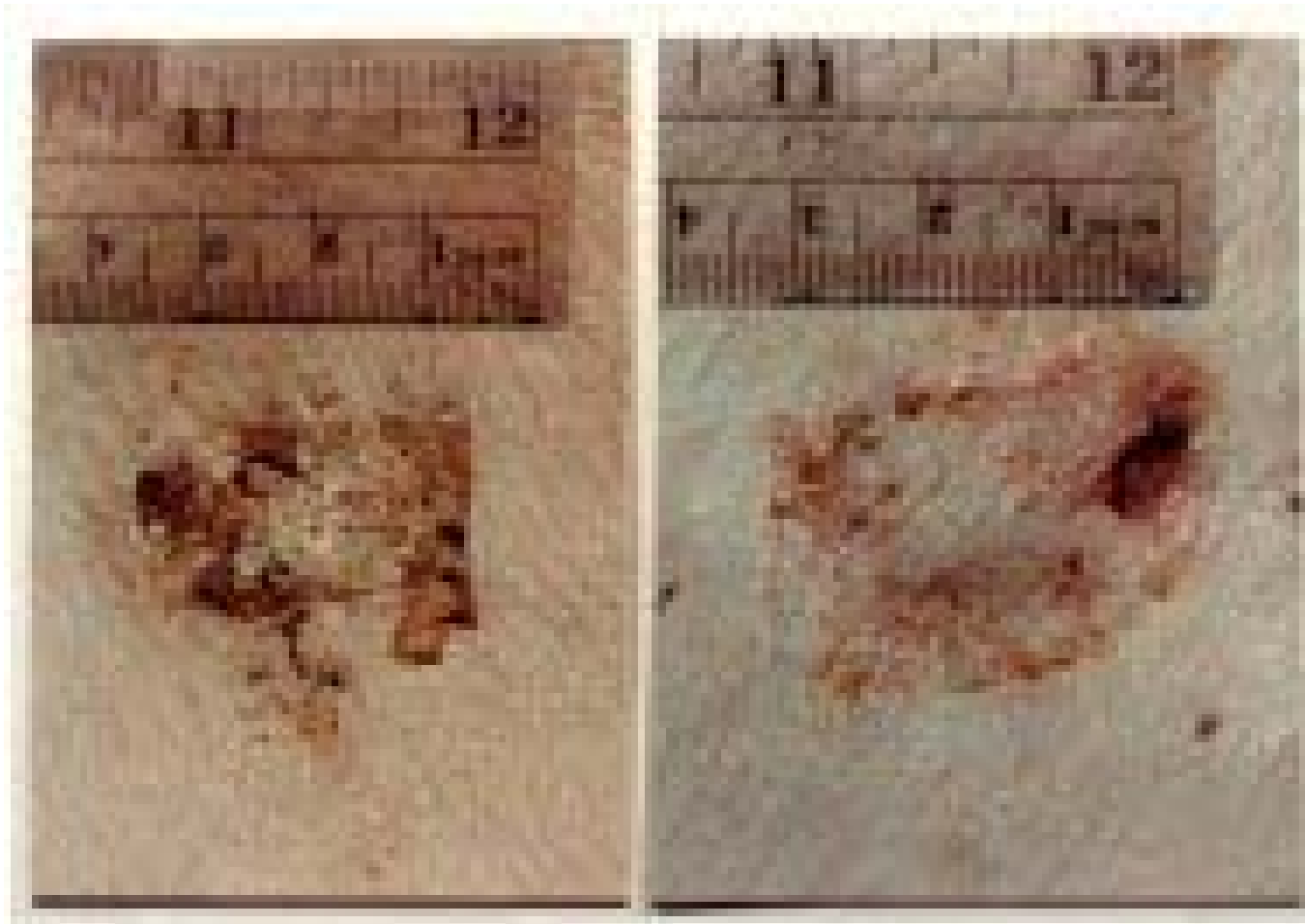


In the microscopic images to the left, the magnifications are identical. The top photo is mouse skin untreated with copper-peptides. The bottom photo is mouse skin treated with copper-peptides. Note the larger hair follicles (the elongated purple columns) in the lower photo, the increased content of subcutaneous fat in the skin (the white material in the center of the skin), and the increased thickness of the skin.

New Hair Follicle Formation?

At times, **SRCPs (Skin Remodeling Copper Peptides)** can apparently induce a proliferation of hair follicles, although this phenomena is difficult to reproduce on a consistent basis. The photograph on the top is a microscopic field of mouse hair follicles in an animal treated only with saline. The photograph on the bottom is a similar area of mouse skin treated with copper-peptides and which has a much higher density of hair follicles. Individual experiments on hair follicle multiplication are consistent, that is, the effect is actual when it occurs, but repeated results are difficult to obtain. The variability may be due to different timing in the hair growth cycle or slight changes in the type of, or formulation of, the copper-peptide preparations. Such experiments strongly suggest that, under certain circumstances, new hair follicle formation can be induced in adult animals.





Photograph: Left - Control Graft about 20% of skin graft (at center) established -this is a typical graft "take".
Right - Graft soaked in GHK-Cu in liposomes. Original graft overgrew transplant area

Cosmetic 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 Scrub and BioPeptide-CL®,**

Copper-peptide products for tissue regeneration

first arrived on the market in 1997

- **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,
- **Neova Night Repair®** skin care products,
- **Protect & Restore Suntanning Lotion®**

products for **Wound Healing**

lamin Gel Wound Dressing®,

lamin Impregnated Gauze Dressing®,

lamin Wet Dressing (copper-saline)®,

lamin-2 Hydrating Gel®,

lamin Wound Cleanser®;

Stimulation of Hair Growth

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

Post-Surgical Skin Healing after laser resurfacing,
dermabrasion, and chemical peels

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