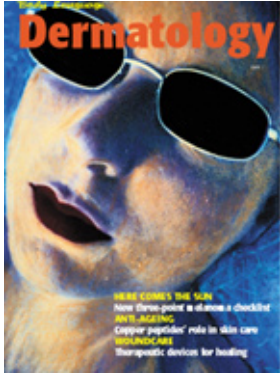


*Dr. Loren Pickart discusses how several changes in skin condition caused by human aging and photodamage can be reversed with the use of copper peptides, and provides some guidance on their safe application.*



## Reversing Skin Aging with Skin Remodeling Copper-Peptides

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pages 12-13.

**Loren Pickart PhD**

The Ancients wrote that copper was the metal of healing and of love. They may have been right on both counts. Increased nutritional copper may increase the production of estrogens and testosterone (hence "love"), since it raises levels of DHEA; it is the healing aspects that concern us here.

During human ageing, skin becomes thinner and accumulates various skin lesions and imperfections. The structural proteins are progressively damaged causing collagen and elastin lose their resiliency. The skin's water-holding proteins and sugars diminish, the dermis and epidermis thin, the microcirculation becomes disorganized, and the subcutaneous fat cells diminish in number. Decades of exposure to ultraviolet rays, irritants, allergens, and various environmental toxins further intensify these effects. The result is a wrinkled, dry, inelastic skin populated by unsightly lesions.

The good news is that certain types of copper peptides possesses biochemical ageing reversal actions and can, in a morphological sense, restore skin to a younger state. Such types of copper peptides are increasingly used in cosmetic skin and haircare products, and to improve post-treatment skin recovery after dermatological skin renewal procedures, such as, chemical peels, laser resurfacing, and dermabrasion.

By ageing reversal, I do not mean the slowing of ageing as anti-aging therapies purport to accomplish but rather the reversion of skin to a biologically younger stage.

### **GHK-Cu for Skin Renewal**

A human copper peptide complex - GHK-Cu (glycyl-l-histidyl-l-lysine:copper(II)), forms the basis for these developments. The tripeptide, GHK, which I discovered while searching for methods to reverse human ageing, is generated by proteolysis after tissue injury. Its high affinity for copper(II) allows it to obtain copper from carrier molecules such as albumin and form GHK-Cu.

When injected into skin or applied to the skin's surface, GHK-Cu activates the processes of removal of damaged scar tissue and deposition of new tissue. Francois Maquart and colleagues at Reims have presented evidence that GHK-Cu is the inducer of the second phase of healing when skin remodeling processes remove scars and tissue debris while rebuilding healthy skin. Laboratory evidence indicates that GHK-Cu concomitantly stimulates the degradation of existing collagen and synthesis of new collagen. At the molecular level, GHK-Cu aids the rebuilding of new skin by increasing angiogenesis, the production of m-RNA for collagen, elastin, proteoglycans, glycosaminoglycans and decorin, while it also stimulates the m-RNA production of, and synthesis of, certain metalloproteinases and anti-proteases that clear damaged protein and remove scars. In addition, it suppresses secretion of scar-forming TGF-beta-1 by fibroblasts. GHK-Cu acts indirectly as a chemoattractant

for cells that stimulate repair, such as macrophages and mast cells, which release protein growth factor proteins that stimulate tissue repair.

GHK-Cu also possess anti-inflammatory actions and may function in humans as a circulating non-steroidal anti-inflammatory. After episodes of tissue damage, ferric ion is released from ferritin and catalyzes damaging tissue oxidations. GHK-Cu counters this action by blocking ferritin channels, and the release of oxidizing iron ions. GHK blocks the oxidation of low density lipoproteins by loosely bound copper. Interleukin-1-beta is also released after tissue injury producing cellular damage. At hormonal levels, GHK-Cu prevents damage to pancreatic cells by interleukin-1.

## **Development of Products**

In 1985, I started a company called ProCyte to develop products based on GHK-Cu. We found that GHK-Cu creams to the human skin increased the thickness of the epidermis and dermis, increased skin elasticity, reduced wrinkles, resulting in a removal of skin imperfections such as blotchiness and sun damage marks, while producing a significant increase in subcutaneous fat cells. Recent, more extensive and statistically significant, human studies solidified these observations. GHK-Cu in creams is more effective in stimulating new collagen development than vitamin C or retinoic acid (Abulghani, Shirin, Morales-Tapia, Sherr, Solodkina, Robertson, Gottlieb). In eight weeks, a GHK-Cu-containing liquid foundation improved epidermal thickness, increased skin elasticity, and improved skin appearance (Abba, Finkley, Stephens).

GHK-Cu creams reduced visible signs of photodamage and increased skin density in eight weeks on facial skin (Leyden, Grove, Barkovic, Appa). A placebo controlled study (71 females, 12 weeks), reported that GHK-Cu containing face creams reduced wrinkles and fine lines while increasing skin elasticity, density and skin thickness (Leyden, Stephens, Finkey, Barkovic). A second placebo controlled study (41 females, 12 weeks) by these physicians found that a GHK-Cu containing eye cream reduced wrinkles and fine lines and improved eye appearance.

In 1994, I started Skin Biology to develop a improved second generation of skin regenerative copper peptides with enhanced potency, breakdown resistance, a longer duration of action and high adherence to skin. We found a fraction of peptide fragments from soy protein that possessed the desired qualities when chelated to copper (II). Such soy peptides have a very low antigenicity and long history of safe use in cosmetic products. In humans, Howard Maibach and colleagues at San Francisco tested these new copper peptides in four small, placebo-controlled human studies. They found that creams made from these new copper complexes produced significantly faster skin healing and reduced redness and inflammation after mild skin injuries induced by tape stripping, acetone burns (removal of skin lipids), 24-hour detergent irritation, and nickel allergy inflammation.

## **Scarless Healing**

This new technology opened an approach to scarless or 'nearly-scarless' healing of surgical incisions. GHK-Cu can markedly reduce scarring after surgery if injected (an aqueous solution of 1 mg/ml) down the incision line. However, the second generation copper peptides are superior for this use. In veterinary studies, the application of these creams immediately after surgery produced rapid and scarless healing in dogs after spaying operations and in young horses after leg-straightening operations. This permitted the dogs to be returned to their owners in four days instead of the usual five, while the foals were returned in five days instead of seven. For such uses, wounds should be left open to air or only lightly covered with gauze. Wet bandages nullify the positive effect.

These second generation copper peptides function well to improve the recovery of skin after procedures such deep peels, laser resurfacing, and dermabrasion. If the skin is treated with copper peptides within two hours after the procedure, post-treatment redness and inflammation is avoided without the use of corticosteroids. Skin

rebuilding is hastened while scars and infections are greatly lessened. A water based product that we developed, called CP Serum, works especially well. This is often followed by either emu oil or squalane which act as moisturizers and as penetrating agents that push more copper peptide into the skin.

### Removal of Skin Lesions

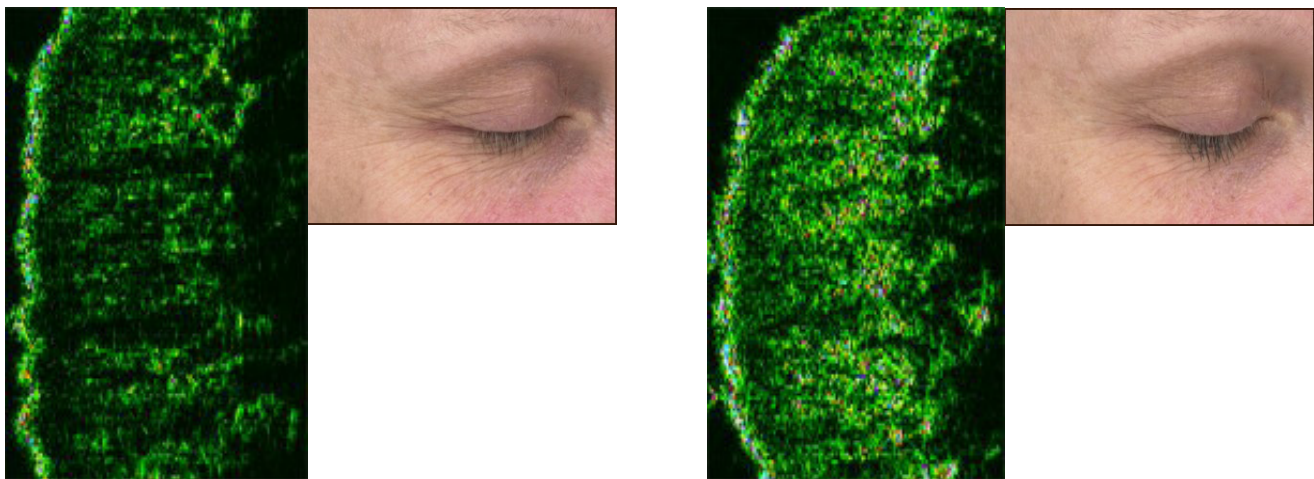
These new copper peptides work well for the removal of skin lesions. It appears that most skin imperfections (hypertrophic scars, pitted scars, skin tags, moles, actinic keratosis) can be removed or greatly reduced, by repeated daily use of hydroxy acids to loosen and dissolve the lesions followed by strong copper peptides to aid skin regeneration. Hydroxy acids such as 2% salicylic acid (pH=3.2) or 14% glycolic acid (pH=3.9) are effective with copper peptides but obtaining a cosmetically satisfying result may require several month of applications. The use of stronger hydroxy acids, followed by the application of copper peptides, greatly speeds the removal of lesions and scars, but can be very irritating if not expertly applied. For example, to remove moles, 70% glycolic acid is applied for 6 minutes, washed off, then the strong copper peptides are applied to the moles. Two to three days of this procedure often removes moles permanently.

### Safety of Copper Peptides

Repeated testing of regenerative copper peptides has failed to find any toxicity problem. Extremely small amounts penetrate the skin and no rise in blood copper has ever been found in animals or humans treated with copper peptides. In nutritional studies of copper, increased supplementation has been reported to increase DHEA levels, raise brain enkephalins, reduce carcinogenesis and cancer growth, reduce protein glycation and deleterious peroxidation of fats, reduce brain developmental defects in offspring, and increase anti-oxidant defenses by activation of superoxide dismutase.

Any product should be carefully tested for its effect on skin repair. Not all copper peptides complexes are skin regenerative; some inhibit skin repair. The only products with solid, credible evidence of efficacy are those from ProCyte, Neutrogena, and the newer copper peptides from Skin Biology.

Figures: The application of copper-peptide complexes to the skin's surface produces a tighter skin barrier and increases the density of collagen and elastin. Left photos: an ultrasound scan and photo of skin of a 59-year-old woman before treatment. Right photos: the skin after one month of treatment with a copper-peptide cream. The white-yellow colours are the ultrasonic reflection from skin regions that are more dense because of closer cellular binding and increased collagen and elastin. This effect is opposite to the usual thinning and loosening of skin during aging.



Extended references to the above *may be found at*  
[www.skinbiology.com/copperpeptideregeneration.html](http://www.skinbiology.com/copperpeptideregeneration.html) and [www.skinbiology.com/copperhealth.html](http://www.skinbiology.com/copperhealth.html).

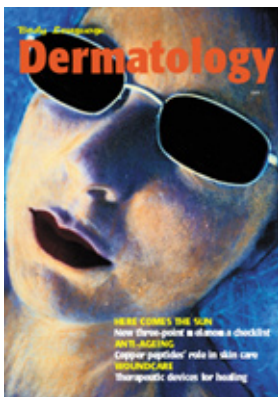
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##### ABSORB ALL THE TENSION

Dr Renato P Calabria has created Laserclosure to minimise facelift scarring. To alleviate pressure, he uses a CO2 laser to de-epithelialise excess skin.

##### ABDOMINO PLASTY

Abdominoplasty procedures combined with liposuction can result in the flat scaphoid abdomen that patients desire, writes Dr Robert F Jackson. The exact techniques depend on the abdominal deformity. For the lower abdomen, Dr Jackson has developed a template for resection of the lower abdominal skin.