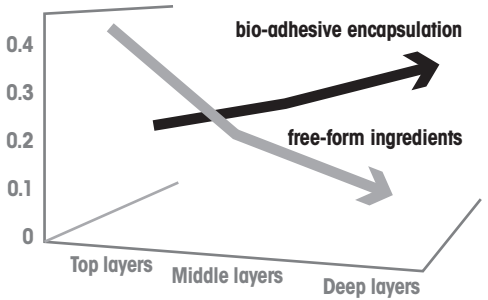
High-performance Revita.COR® deploys bio-adhesive microspheres for optimal hair-growth benefit

BIO-ADHESIVE TECHNOLOGY

Revita.COR delivers state-of-the-science hair-regrowth technology, building on the legendary success of Revita shampoo. This conditioner establishes new benchmarks for the comprehensive synthesis of hair-growth compounds and for their effective delivery.

Unlike common conditioners, high-performance Revita.COR contains numerous powerful ingredients known to stimulate hair growth. Equally remarkable: These active ingredients come encapsulated within hydrophobic, bio-adhesive, cationically charged microspheres, less than a micron in diameter, for maximum hair-growth benefit even while you swim or sweat.

This next-generation delivery system adheres to the scalp tenaciously, keeping active ingredients attached and working long after the hair has been rinsed — 12 hours or more. The system's tiny particle size, from 0.1 to 1.0 µm, penetrates the hair, skin, and follicles deeper than any other delivery vehicle.



A clinical study of penetration confirmed that more than twice as much of the ingredient encapsulated in bio-adhesive, cationically charged microspheres reached the deeper layers of skin, where it could perform.

The solid state of the microspheres helps not only to repel water but also to increase stability and prolong product life. It allows ingredients to be released slowly over time. It protects the active compounds within the spheres and reduces their reaction with environmental factors.

Revita.COR possesses these properties because its bio-adhesive, positively charged microspheres cling to the abundant proteinaceous material that makes up hair and scalp.

In a clinical trial, human hair was treated with a shampoo containing either a 1% free-form compound or a 1% bio-adhesive, cationically charged, encapsulated version of the same compound. Then the hair samples were analyzed by gas chromatography, mass spectrometry, measurement of fragrance in the headspace, and subjective evaluation by a panel of olfactory experts.

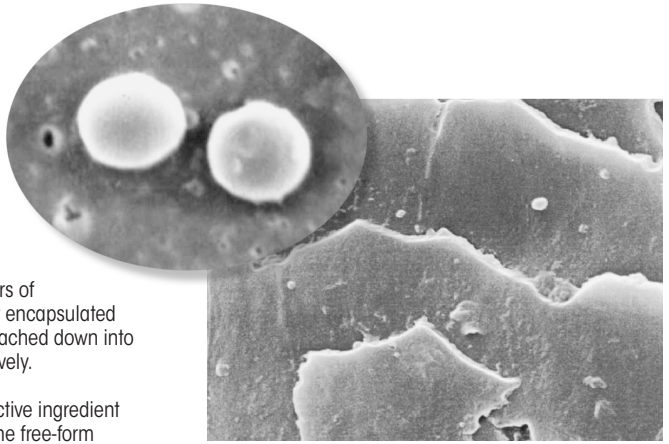
At 24 hours, the encapsulated ingredient was 10 times stronger than the free-form ingredient. It also persisted longer.

In another clinical trial, comparing a 6% lotion employing free-form ingredients to a 6% lotion with encapsulation, skin-penetration depth

was determined using a skin-extraction technique and chromatographic analysis. One inner forearm was used to test a control sample, and the opposite arm was used to test the encapsulated sample, of which 0.25 grams was applied to a 15.5 cm^2 zone and left on for one minute. Both arms were rinsed and dried. Then 1.5 ml of ethanol was placed on the skin for 30 seconds, its fraction was collected, and the entire procedure was repeated three times.

Penetration analysis confirmed that twice as much of the free-form ingredient stayed behind on the superficial layers of the skin, while more than twice as much of the ingredient encapsulated in the bio-adhesive, cationically charged microspheres reached down into the lower layers of the skin, where it could perform effectively.

Release-kinetics analysis also showed that more of the active ingredient persisted after two, four, and six hours, whereas more of the free-form ingredient had dissipated.



Bio-adhesive microspheres in Revita.COR as seen through a scanning-electron microscope, at 10,000x magnification (left) and on the surface of a hair.

ACTIVE COMPOUNDS

The ultra-premium compounds deployed in Revita.COR, each evaluated and proven in clinical trials, are designed specifically for the scalp, providing significant benefits against follicular dysfunction and in favor of scalp vitality.

Unique among conditioners, Revita.COR contains a powerful, locally acting inhibitor of 5α-dihydrotestosterone, the hormone that triggers male pattern baldness. The property is just one of many in this powerful formula for hair-growth stimulation, working through multiple mechanisms of action to improve the health and structure of hair.

Revita.COR is ideal as a standalone product or in combination with other hair regrowth therapies.

HOW HAIR GROWS

Hair plays an important role in the protective barrier function of skin and scalp, keeping microbes out and bodily fluids in, healing scratches and wounds, and resisting environmental attack from sun and chemicals. Individual hairs grow in and fall out through a continuous cycle. Normally, a hair follicle cycles at least a dozen times in a person's life.

Each cycle consists of an anagen growth phase, which may last for several years, a catagen transitional phase, which lasts for two or three weeks, and a telogen resting phase, which lasts for approximately three months. Mean hair-growth rate is 0.3–0.4 mm per day.

In the case of androgenic alopecia, the anagen phase shortens, and telogen phase lengthens. So at any given time, fewer follicles are growing and more are resting. This condition accounts for the reduced density of strands, often called hair thinning, that characterizes most aging scalps.

It is theorized that the chemical signaling required to stimulate anagen becomes increasingly difficult to achieve. For this reason, Revita.COR conditioner is formulated with several of the active compounds that participate in follicle signaling.

A hair consists of a bulb and a shaft, anchored deep in the dermis.
The shaft grows up through the epidermis and protrudes from the surface.
A healthy follicle can produce a shaft several feet long.

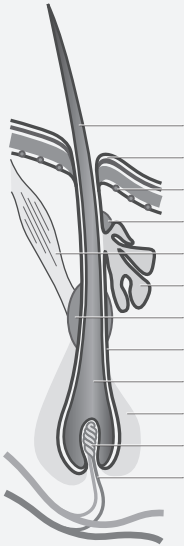
Each follicle is divided into three parts:

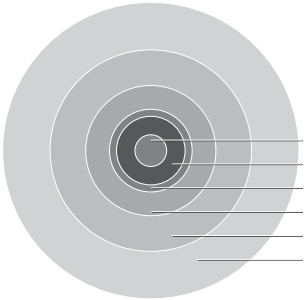
1) the infundibulum, which is an invagination of the epidermal surface,

2) the isthmus, where the sebaceous gland and arrector pili muscle attach to the follicle, and

3) the inferior segment, which manufactures the strand.

Growth happens in the proliferative hair-matrix cells of the hair bulb, in the inferior segment. Slow-cycling, multipotent stem cells reside in a bulge near the insertion point of the arrector pili muscle.





Cross section of a hair and follicle:

medulla
cortex
cuticle
internal sheath
external sheath
dermal sheath

Early in each hair cycle, the new follicle becomes encapsulated in a highly proliferative matrix of cells. Stem cells from a permanent bulge, amid what will become the new follicle, then migrate downward from their reservoir and proliferate to form a new hair bulb, whence the new hair shaft will grow, and an inner root sheath, which will act as a channel to guide the growing shaft up to and out from the surface.

During the catagen phase of the cycle, normally a few years later, the inferior portion of the follicle will disintegrate, called apoptosis. The blood supply that nourished it, called the dermal papilla, will migrate up toward the bulge, which remains in place as a permanent reservoir of stem cells.

What remains of the follicle enters the resting phase of the cycle, called telogen, and waits for chemical signals to begin the process all over again.

Male hormones regulate this activity. The hormone testosterone, produced in the testes, migrates through the blood system into the dermal papilla cells. Here the enzyme 5α-reductase catalyzes the conversion of testosterone into 5α-dihydrotestosterone, which exerts powerful effects on the follicle, suppressing cell division and hair growth, especially in male pattern baldness.

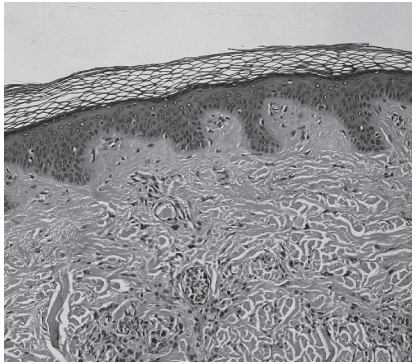
How each compound in Revita.COR conditioner affects hair and scalp

STEM CELLS

Unlike any other conditioner, Revita.COR is formulated to stimulate human hair follicle development and growth by incorporating cutting-edge plant-based stem cells.

Role of stem cells. In the scalp, epithelial stem cells differentiate into hair follicles, sebaceous glands, or interfollicular epidermis. Each lineage maintains its own reservoir of stem cells for normal tissue homeostasis and renewal. In response to disease or injury, some stem cells mobilize to repair tissues whose resident stem cells have been damaged or removed, responding to signals to migrate and proliferate in new locations. Follicles display a robust regenerative capacity that normally maintains hair growth throughout our lifetimes. Understanding how stem cells repair wounds is important to understanding how they regrow hair.

At the site of each hair is a bulge of cells that divide less frequently than other epithelial cells. They are activated at the start of each growth cycle to generate a new follicle. In one laboratory experiment, stem cells from a single bulge were removed from a hairy mouse



Stained slide of normal epidermis and dermis, with a benign intradermal nevus

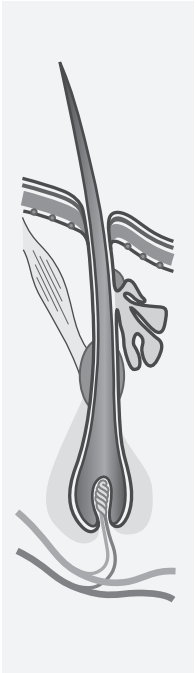
and grafted onto a hairless mouse, and they generated new follicles that cycled normally. In another study, when confronted with stem cells from the wing of a chick, epidermis from its leg actually produced feathers.

Human epidermal cells have also shown this remarkable plasticity, this feature of "stemness," an ability already exploited to treat burn patients. To understand the special properties of human epidermal stem cells, researchers have identified about 150 genes expressed preferentially in bulge cells, relative to basal cells.

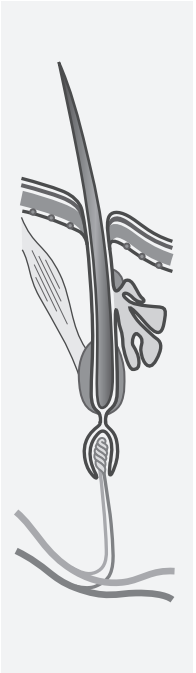
The signaling pathways, growth factors, and other mechanisms of regulation are only now beginning to reveal themselves. They appear to include Wnt signaling, bone-morphogenetic-protein signaling, transforming-growth-factor-β signaling, and notch signaling.

Hair-growth cycle. The scalp and its appendages — hair follicles and sebaceous glands — provide protective barriers that keep microbes out and bodily fluids in. They resist environmental assaults and wounds by continuous self renewal.

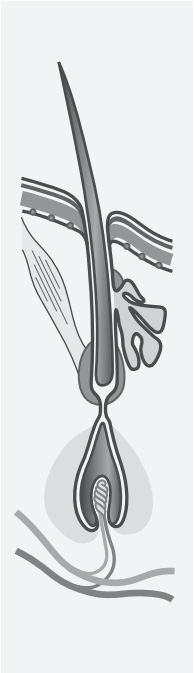
Stem cells serve to create this new epidermal tissue. They proliferate within the stratum basale, also called the stratum germinativum, which is the basal layer of epithelial cells that divide continually to replace the keratin-rich cells of the stratum corneum as they migrate toward the surface and slough away.



A hair follicle has three parts: 1) the infundibulum, located at the surface, 2) the isthmus, where the sebaceous gland, arrector pili, and bulge of stem cells attach, and 3) the inferior segment, which manufactures the hair strand.



During the catagen transitional phase, the inferior portion of the hair follicle disintegrates, and the dermal papilla migrates up toward the stationary bulge of stem cells. What remains of the follicle enters telogen resting phase.



Early in the next anagen growth phase, stem cells from the bulge migrate down into a rich matrix of cells and proliferate to form the bulb of a new hair follicle. As the new hair grows, it will push out any remaining old strand.

Epidermis is remarkable in its ability to generate appendages. On the scalp, the primary appendages are the pilosebaceous units, containing follicles to manufacture hair and sebaceous glands to lubricate the cutaneous surface. Morphogenesis begins with a downward incursion of the epidermis into the underlying dermis to form a placode — a platelike thickening of embryonic ectoderm — in a process dependant on cues from neighboring cells. Underlying dermal cells condense to form a papilla, which is the vascular process that nourishes the root. As the follicle develops, it becomes encapsulated in a rich matrix of cells. Then a bulb of stem cells, located roughly midway down the follicular process, proliferate to form an inner root sheath, which will act as a channel to guide the growing hair shaft.

A period of hair growth, called anagen phase, normally lasts a few years. The following phase, called catagen, lasts a few weeks and involves the apoptosis and disappearance of the lower two thirds of the follicle. The dermal papilla migrates up toward the bulge, and the remains of the follicle enter a resting phase, called telogen, and wait for chemical signals to begin the cycle all over again.

Except for follicles affected by androgenic alopecia (male pattern baldness) or other disease, a single follicular process cycles many times throughout a person's life. The cyclic nature of degeneration and regeneration from the bulge led to the discovery that stem cells were concentrated there. Even without alopecia, anagen phase shortens, and telogen phase lengthens, accounting for the thinning hair usually found on aging scalps. Perhaps the chemical signaling required to stimulate anagen becomes increasingly difficult to achieve.

Stem cells in Revita.COR. Our new understanding of follicular stem cells means exciting new developments in biotechnical formulas for hair regrowth, such as Revita.COR conditioner. We know that embryonic stem cells can develop into any tissue, that normal skin has reserves of such cells to regenerate itself after wounding, and that stem cells from one animal can develop into follicles in another animal.

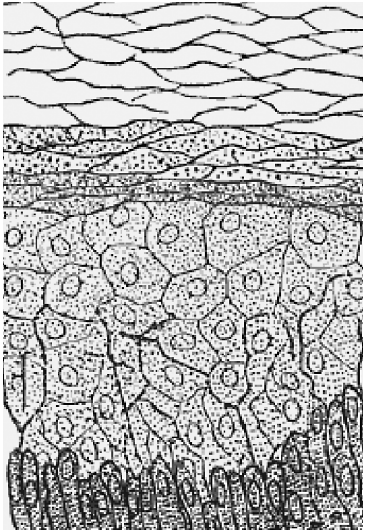
New applications for bulge stem cells would be to treat hair follicle disorders. Cultured basal epidermal keratinocytes already treat burn patients. However, human stem cells are difficult to access, and their use is fraught with ethical dilemmas.

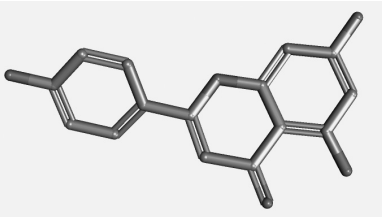
Revita.COR overcomes these ethical hurdles by employing plant-based stem cells, which exhibit many of the same properties and much of the same plasticity as human cells. A revolutionary botanical agent derived from plant stem cells is now showing evidence of protecting and stimulating human epidermal stem cells and preventing many of the signs of scalp aging.

Extending the vigor of human epidermal stem cells is now the cutting edge of biotechnical research into hair regrowth. Current in-vitro experimentation demonstrates that active phyto-compounds can stimulate the growth of human mesenchymal stem cells and help to protect them from ultraviolet-radiation attack.

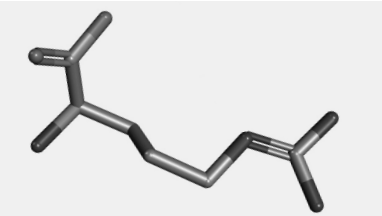
In experiments conducted on hair follicles, plant-based stem-cell extracts rejuvenate follicular cells and delay their senescence.

Hair growth benefits. So Revita.COR conditioner offers unprecedented new potential to prolong the health of the human scalp and the productivity of its hair follicles, thus delaying baldness and minimizing its adverse effects, by applying plant-based stem cells.





Three-dimensional models of apigenin (above) and arginine



Multiple clinical studies suggest that apigenin, known to possess antioxidant, anti-inflammatory, and anti-tumor properties, can stimulate hair growth.

Androgen-inducible transforming growth factor β (TGF-β1), found in dermal papilla cells, gives the signal for hair follicles to terminate the anagen growth phase and move into the catagen transitional phase. In one study, human epidermal keratinocytes treated with apigenin showed decreased levels of TGF-β1 expression, thus increased proliferation of both the papilla cells and the keratinocytes.

In a study using murine hair-follicle organ culture, apigenin stimulated the elongation of hair follicles, a process necessary for the anagen phase of hair growth.

As a flavone, apigenin exerts anti-inflammatory activities. In a murine study of the compound's anti-allergic effects in vivo, researchers experimented with dietary apigenin to treat atopic dermatitis, a chronic inflammatory disorder characterized by eczematous skin lesions. The treatment alleviated development of skin lesions significantly.

Known to possess chemopreventive activities against skin tumors induced by ultraviolet radiation such as sunshine, a study using human keratinocyte cell lines found that apigenin inhibited the COX-2 protein, whose over-expression plays an important role in carcinogenesis.

ARGININE

Arginine helps to form nitric oxide to feed and regulate hair follicle activity. Revita.COR conditioner incorporates arginine because the amino acid is a metabolic precursor of nitric oxide, an important signaling molecule, vasodilator, and mediator of cutaneous cell function.

Chemical pathways for nitric oxide exist within each hair cell. Increasing the volume of intracellular nitric oxide has been shown to increase the size and section of the follicle. In one method of action, nitric oxide increases blood flow to hungry hair follicles by relaxing vessels and causing dilation, helping hair to receive proper nutrition. Through another method of action, it functions as an important mediator in various physiological and pathophysiological processes of the cutaneous system, such as regulating blood flow, melanogenesis, wound healing, and hyperproliferative skin diseases.

Exciting research focuses on the role of nitric oxide in the human hair follicle and in hair cycling. A 2003 Berlin study demonstrated that human papilla cells produced the substance. Researchers believe it to be a signaling molecule in those cells, and basal- and androgen-mediated nitric oxide production to be involved in regulation of hair follicle activity. Nitric oxide, a poisonous gas synthesized by the oxidation of nitrogen or ammonia, exists throughout the atmosphere and within the bodies of all mammals. To optimize nitric oxide within hair follicles — without the potential hazards of the gas itself — the precursor chemical arginine is used a safe alternative.

The semi-essential amino acid also plays an important role in cell division, wound healing, and immune function. Creatine formation requires the chemical to stimulate protein synthesis. It helps to prevent wasting in people with critical illnesses. Symptoms of deficiency include hair loss, skin rash, and poor wound healing.

In Revita.COR conditioner, the creative addition of arginine means improved blood flow and nutrition to follicles, as well as better overall regulation of follicle activity, so they can grow hair fibers of greater diameter.

BIOTINYL TRIPEPTIDE-1

Biotinyl tripeptide-1 is a scalp-conditioning agent that stimulates metabolism in skin cells and opposes follicle aging to help prevent hair loss. It enhances production of the binding elements that hold cells together and facilitate the communications otherwise blocked by dihydrotestosterone. It increases cutaneous blood flow, thus restoring nourishment to miniaturizing follicles.

A tripeptide-1 is a protein-derivative molecule containing three amino acid residues: glycerine, histidine, and lysine. Biotinyl tripeptide-1 boosts the synthesis of laminin-5, a glycoprotein and component of connective tissue. It also boosts collagen IV, a fibrous protein, the chief constituent of fibrils, and the organic substance of bones. These activities are especially important at the junction of the dermis and epidermis, an area where cells are highly engaged in the reproductive process and where dihydrotestosterone can do great damage.

In a four-month clinical study with 35 male volunteers suffering from alopecia, 18 applied a hair lotion containing biotinyl tripeptide-1, and 17 applied a placebo. After treatment, the ratio of hairs in anagen growth phase versus telogen resting phase increased for 67 percent of the volunteers, and it increased by up to 46 percent. The root sheath was thicker to ensure optimum anchoring.

CAFFEINE

Active caffeine helps to regulate the effects of testosterone. Male pattern baldness is known to occur in individuals with sensitivity to testosterone, causing damage to hair follicles that leads to baldness. Caffeine, a xanthine alkaloid, acts as a central-nervous-system stimulant in humans, warding off drowsiness and restoring alertness.

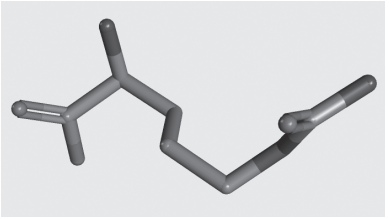
A university study in Germany used hair samples from the scalps of young men in the first stages of hormone-related hair loss.
The study tested hair organ cultures with four compounds: 1) a nutrient-based solution, 2) a testosterone solution, 3) a caffeine solution, and 4) a mixture of caffeine and testosterone.

Solutions like Revita.COR conditioner that contain a caffeine nutrient helped to stave off hair loss and encourage hair growth, while those that relied on testosterone alone led to increased hair loss. The results demonstrated that by using caffeine, average growth was increased by 46 percent, and the life cycle of hair was extended by 37 percent, compared to controls.

CITRULLINE

Revita.COR is fortified with citrulline, a crystalline amino acid formed in the conversion of ornithine to arginine and found in the inner root sheath and medulla of hair follicles. Citrullinemia, a disorder of amino-acid metabolism accompanied by excess citrulline in the blood and urine, is often associated with skin changes like atrophy of the epidermis, thin and short collagen bundles, and dystrophic elastic fibers, perhaps due to under-nutrition of hair follicles.

With a diagnosis of reduced citrulline, researchers have noted changes such as sparse and brittle blond strands and the presence of transverse opaque bands. Amino-acid analysis has shown that relaxers used to straighten African hair often damage the strands, suggesting increased fragility, leaving them shorter than expected. A decrease in citrulline was found in all relaxed hair studied. Relaxers are associated with reduced citrulline and have been associated with inflammation.



Three-dimensional model of citrulline

Ginseng root, long used in Chinese traditional medicine, helps to prolong the lives of hair follicles

GINSENG

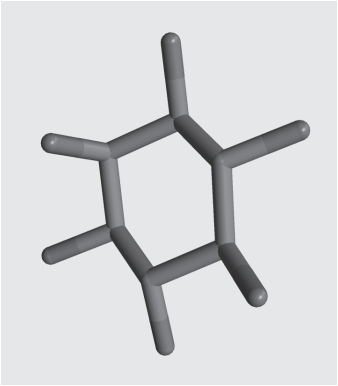
Modern scientific evidence indicates that roots of the genus *Panax,* commonly called ginseng, prolong hair-follicle life, exert antioxidant effects, boost the immune system, and provide many other benefits.

Several plant extracts have been investigated for their ability to influence apoptosis, the genetically determined process of cellular self destruction. In multiple published studies of murine hair follicles, ginseng prevented apoptosis. It also aided formation of medullary cells in hair follicles, even after application of gamma radiation.

Modulating the apoptotic process is of great interest to researchers, both for stimulating cell death, such as in treatments to oppose cancer cells, and for inhibiting cell death, such as in treatments to promote hair follicle growth. Phytochemicals from ginseng are likely to prove therapeutic in numerous applications.

A hydrolyzed ginseng-saponin quaternary has been developed as a conditioning agent for the next generation of hair-care products. Its structure includes a hydrophobic group from the aglycon of ginseng saponin, which is biologically active and considered its most important therapeutic component.

Properties of surface tension, conductivity, critical micelle concentration, absorption into hair, tensile strength, and moisture retention have been studied extensively and demonstrated scientifically.



Three-dimensional model of inositol

Inositol is a sweet, crystalline, stereoisomeric, cyclic alcohol.

Researchers have reported that diets lacking inositol produce baldness in laboratory animals, but when the vitamin is restored, the hair grows back. Males seem to be affected most. Physicians have reported similar findings with human patients. Inositol is known to strengthen hair by helping it to retain moisture.

Inositol has the same chemical formula as glucose, the chief source of energy for living organisms. It helps cells to manufacture membranes and respond to messages from their environments. Its phospholipids perform this important role in signal transduction by relaying outside messages to cell nuclei.

A nonessential member of the vitamin-B complex that the body needs in small amounts, inositol or its phosphates and associated lipids are found naturally in bran cereals, brown rice, nuts, beans, and fruits.

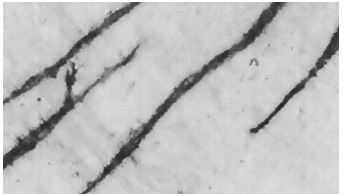
LUPINE

The lupine, especially the white lupine native to the Mediterranean, is a plant rich in peptides, trace elements, and vitamins. Lupine extract has been proven in clinical trials to stimulate hair follicles and revitalize hair growth. It performs on three fronts of the hair cycle: enzymatic, metabolic, and vascular.

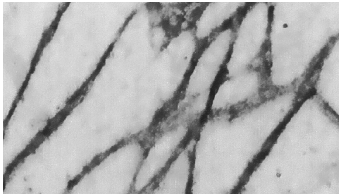
Enzymatically, lupine extract restores hormonal balance by inhibiting 5α-reductase, an enzyme implicated in androgenetic alopecia. Tested on normal human fibroblasts, the extract inhibits conversion of testosterone into the 5α-dihydrotestosterone that causes dwindling hair diameter, a process called miniaturization.

Metabolically, lupine extract stimulates activity within hair follicle cells, favoring keratinization and the growth of new hair strands. During anagen growth phase, cells divide continuously to manufacture hair, pushing strands beyond the surface. Lupine extract provides peptides, zinc, and iron to stimulate the metabolic activity of hair-bulb cells and boost keratinocyte differentiation.

Vascularly, lupine extract improves development of follicular blood supply to construct new hair. In tests, it increases synthesis of vascular endothelial growth factor, making the vascular system of the hair follicle denser to facilitate better nutrient supply.



Photographic evidence of enhanced vascularization in a clinical study of 1% lupine extract (below), compared to a control



Amino acid groups known as copper peptides have two major properties: 1) as potently protective anti-inflammatory agents that limit oxidative damage after tissue injury and 2) as tissue remodeling agents that remove damaged protein and scar tissue and activate their replacement with normal tissue.

The latest development in copper peptides is a significant reduction in their size. New nano copper peptides, formulated in Revita.COR conditioner, can reach into more tissues to exert even greater efficacy.

Copper peptides are applied primarily to enhance wound healing. They also stimulate production of collagen and may enhance the action of antioxidants. Studies conducted at universities and other research institutes found that copper peptides improved hair transplant success, increased hair follicle size, stimulated hair growth, and reduced hair loss.

In one pioneering study, when scientists at the University of San Francisco Wound Center applied a synthetic copper peptide to the severe wounds of several patients, they healed 30 percent faster, and significant stimulation of follicular cells occurred. One particular tripeptide complex grew new hair in the wound area.

This discovery led them to try the same copper peptide complex on a female patient who had suffered 90 percent alopecia (hair loss). After six months, she recovered almost all of her hair. Dr. Loren Pickart, a leading authority on copper-peptide technology, analogizes the activity to a protein injection for the scalp. Subsequent tests were conducted with chemotherapy and hair-transplant patients, with great success in stimulating stronger follicles.

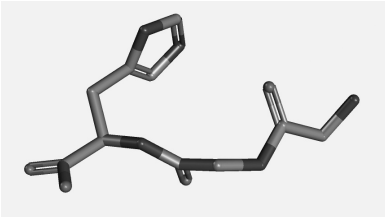
NIACINAMIDE

In living organisms, niacinamide is converted to and from niacin and is used similarly. A constituent of vitamin B3, it occurs naturally in yeasts and various other foods. In biotechnical formulations, niacinamide, also called nicotinamide, is a heterocyclic aromatic compound that functions as a conditioning agent.

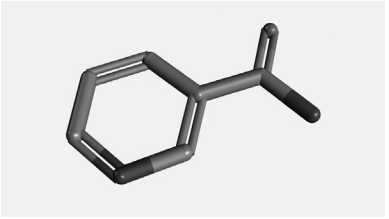
Benefits of niacinamide for the treatment of skin conditions have received greater study over the last few years, and the crystalline basic amide is now formulated into advanced products for moisturization, antiaging, and rosacea. The compound is used in better hair conditioners, hand creams, paste masks, lotions, powders, and sprays.

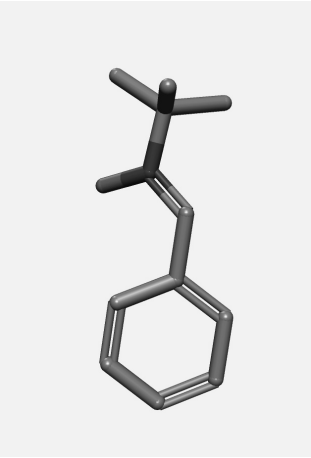
Both niacinamide and niacin are absorbed easily through skin, and dermal toxicity studies have not identified any significant adverse effects. Clinical tests of niacinamide produced no stinging sensations even at high concentration. The compound is not an irritant, sensitizer, or photosensitizer. In-vitro tests have not found significant ocular hazard.

Niacinamide and niacin are approved by the strict Japanese and European regulatory authorities for topical application. In fact, niacinamide has even been found to moderate the effects of established carcinogens.



Three-dimensional models of copper peptide (above) and niacinamide





Three-dimensional model of the common spin trap PBN

Compounds used to measure free-radical activity, spin traps are also employed to produce more stable complexes. The most commonly used spin trap, one by which others are measured, is α-phenyl-N-tert-butyl nitrone (PBN).

Studies done over 10 years have tested PBN and other spin traps. They discovered that spin traps exert powerful free-radical-quenching abilities in living systems and could treat a variety of conditions, protect against tissue damage, and complement such antioxidants as vitamins C and E.

Spin traps modulate the NF-κ-B-regulated cytokines and inducible nitric oxide synthases that are implicated in pro-inflammatory disease. One method for ameliorating specific cellular dysfunction, such as treating hair loss and stimulating hair growth, is to administer nitroso or nitrone spin traps, which work in part due to high-energy oxygen and hydroxyl free radicals. These agents inhibit the reaction of superoxide and nitric oxide to produce peroxinitrite.

PBN can be administered against alopecia to stimulate hair growth. Depending on type of hair loss, daily topical application can inhibit further loss and increase rate of growth, diameter of hair, and follicular neogenesis.

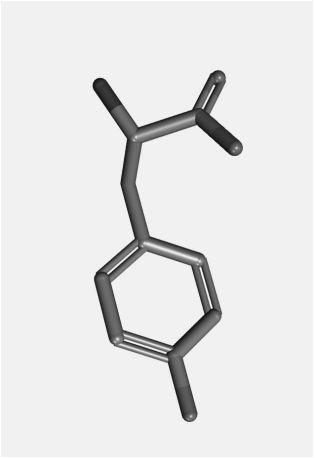
TYROSINE

Studies have found tyrosine to be helpful in conditions of stress, cold, fatigue, divorce, loss of a loved one, and sleep deprivation, with reductions in stress-hormone levels. In human trials, improvements in cognitive and physical performance have also been noted.

A crystalline phenolic alpha-amino acid obtained by the hydrolysis of proteins, tyrosine is a precursor to neurotransmitters, and it increases plasma transmitter levels, particularly dopamine and norepinephrine.

In the skin and its appendages, especially hair follicles, the epidermal-growth-factor-receptor network in which tyrosine plays a key role represents one of the most complex signaling systems found in biology. Its correct functioning is necessary for proper development and tissue homeostasis of skin, scalp, and hair. Its deregulation results in defective cellular proliferation and differentiation. Consequences include impaired wound healing and structural and functional defects in hair follicles.

The receptor tyrosine kinase also activates stem cells for differentiation and proliferation. In hair follicles, stem cells of the keratinocytic and melanocytic lineage are responsible for hair growth and color, respectively.



Three-dimensional model of a tyrosine molecule

Zinc is necessary for the proper functioning of more than 300 enzymes, and it figures in numerous biological processes. It is a cofactor for the antioxidant superoxide dismutase, and it works in a number of enzymatic reactions of carbohydrate and protein metabolism.

The immune-system activities of zinc include regulation of T lymphocytes, CD4 cells, natural killer cells, and interleukin II. It has been shown to play a role in wound healing, especially following burns and surgical incisions. Zinc may possess antiviral activity. Topical application has proven safe and effective.

An increasing number of studies have examined the efficacy of zinc in treating alopecia, showing some positive results and opening new areas for further research. Other cutaneous conditions under investigation for zinc treatment include acne vulgaris, leg ulcers, and herpes. Zinc deficiency is associated with hair loss and slow wound healing.

Revitalizing hair growth can be as simple as conditioning with Revita.COR

DIRECTIONS FOR USE

Wash hair with a high-quality shampoo. We recommend one free of sodium laureth sulfate. Then massage Revita.COR thoroughly into the scalp and leave it on for two minutes. Rinse. For optimal results, Revita.COR should be used daily.

GROWTH STRATEGIES

To optimize your hair regrowth, DS Laboratories offers a complementary shampoo, the original Revita®, plus leave-in hair-growth treatments such as Spectral.RS®, Spectral.DNC®, Spectral.DNC-L®, and new formulas under development.

Powerful hair-growth ingredients, encapsulated in bio-adhesive microspheres, adhere to the scalp tenaciously, working long and hard after hair has been rinsed.

Revita®. Revita is the most efficient hair-growth-stimulating shampoo on the market, the result of DS Laboratories' ongoing, cutting-edge research. This powerful combination of active compounds is designed to maintain scalp vitality and act against follicular dysfunction to achieve best results quickly. It contains no sodium lauryl sulfate or sodium laureth sulfate, which are cheap detergents used in many shampoos and linked to skin irritation, drying, and hair loss. Revita does contain ingredients chosen for their proven hair-growth properties: caffeine, copper peptides, spin traps, ketoconazole, rooibos, methylsulfonylmethane, procyanidins B-2 and C-1, carnitine tartrate, ornithine, taurine, cysteine, emu oil, and biotin.

Revita shampoo

Spectral.RS®. The most advanced minoxidil-free leave-in treatment, Spectral.RS delivers astonishing hair-growth results. It arrests fallout, stimulates regrowth, and increases the diameter of hair strands. Unique Nanosome technology maximizes the delivery of ingredients deep into the scalp. Spectral.RS works by addressing multiple causes of thinning hair, such as perifollicular fibrosis, stress, hormonal disturbances, vitamin deficiencies, and medications. Nanosome technology uses organic microspheres to penetrate the lowest levels of the skin and release their ingredients gradually over a 12-hour period for optimal results. Key ingredients include herbal extracts, Aminexil®, retinol, copper peptides, vitamins, and minerals. Spectral.RS is ideal to treat diffuse hair loss.

Spectral.RS minoxidil-free leave-in treatment

Spectral.DNC minoxidil-based treatment in a solution

Spectral.DNC® and Spectral.DNC-L®. These high-performance minoxidil-based formulas combine all of the latest hair-growth science into one convenient solution or lotion to regrow lost hair via multiple pathways. More than just minoxidil alone, they deliver the most aggressive, most powerful, most effective topical treatments to retain and regrow hair.

They start with research-grade 5% minoxidil, the first drug approved by the US Food and Drug Administration to treat androgenic alopecia (male pattern baldness), because it is so well documented to regrow hair on the vertex of the scalp. In addition to minoxidil, Spectral.DNC and Spectral.DNC-L incorporate Aminexil®, a medication proven

to regrow hair by protecting roots and strengthening hair fibers, plus procyanidins B-2 and C-1, which are botanically derived flavanols that restore the frontal hairline as effectively as minoxidil restores the vertex, plus three more potent botanicals to inhibit the activity of 5α-reductase, the enzyme that converts testosterone into dihydrotestosterone and damages hair follicles.

These and many more ingredients are delivered via tiny Nanosomes for the deepest possible penetration and longest possible persistence. Spectral.DNC comes as a solution or spray for easy application amid thinning hair. Spectral.DNC-L comes as a lotion for easy application in more advanced cases of baldness.

Spectral.DNC-L minoxidil-based treatment in a lotion

Q: How do male hormones accelerate hair loss?
A: Testosterone migrates through the blood system into the dermal papilla cells, where the enzyme 5α-reductase catalyzes its conversion into 5α-dihydrotestosterone. That male hormone suppresses cell division and hair growth. Unique among conditioners, Revita.COR contains a powerful inhibitor of 5α-dihydrotestosterone to slow the process.

Q: How do active ingredients in Revita.COR cling to the scalp?
A: Compounds come encapsulated in hydrophobic, bio-adhesive, cationically charged microspheres, which adhere to the scalp tenaciously. This system keeps the ingredients working long and hard for maximum hair-growth effect even while sweating or swimming.

Q: How do stem cells in Revita.COR work to develop new follicles?
A: Stem cells can develop into any tissue, and normal hair follicles maintain reserves of such cells. To help regenerate damaged follicles, Revita.COR employs plant-based stem cells, which exhibit many of the same properties and much of the same plasticity as human cells, to help prevent the signs of premature scalp aging.

Q: What other compounds enhance Revita.COR?
A: Revita.COR contains numerous other compounds associated with hair growth: 1) apigenin, with antioxidant and anti-inflammatory properties, 2) arginine, a metabolic precursor of the signaling molecule nitric oxide, 3) biotinyl tripeptide-1, a scalp-conditioning agent, 4) caffeine, to regulate testosterone, 5) citrulline, an amino acid, 6) ginseng, which prolongs hair-follicle life and exerts antioxidant effects, 7) inositol, a cyclic alcohol whose deficiency is linked to baldness, 8) lupine extract, rich in peptides, trace elements, and vitamins, 9) nano copper peptides, with anti-inflammatory and tissue-remodeling effects, 10) niacinamide, a heterocyclic aromatic compound that conditions, 11) spin traps, with powerful free-radical-quenching abilities, 12) tyrosine, an amino acid that increases plasma transmitter levels, and 13) zinc, necessary for the proper functioning of more than 300 enzymes.

Q: Is Revita.COR safe?
A: Revita.COR only contains compounds that are safe for topical use. Plus, they enhance overall scalp health dramatically.

Q: Can I use hair sprays, mousses, gels, etc.?
A: Hair sprays, mousses, and gels can clog hair follicles, so are not recommended, but can be used safely in combination with Revita.COR.

Q: Can I have my hair colored or permed while using Revita.COR?
A: While no evidence suggests that coloring or perming hair leads to hair loss, it is generally not recommended. Those experiencing hair loss should avoid applying unnecessary chemicals to the scalp, but they would not interfere with Revita.COR.

Q: Can I blow dry my hair after using Revita.COR?
A: Extreme heat can damage the protein that makes up hair, leaving it fragile. Use a cool or barely warm setting if blowing hair dry.

Q: Who is a good candidate for Revita.COR?
A: Any man or woman concerned about hair loss can benefit from Revita.COR. The ideal candidate is someone in the beginning stages of loss, since it is easier to prevent baldness than to regrow hair.

Q: What results should I expect with Revita.COR?
A: Conditioning benefits appear within days. Depending on duration, severity, and source of hair loss, it would take several weeks to a few months to notice additional hair growth, since hair only grows at a rate of 0.3–0.4 mm per day.

Q: Does Revita.COR have any systemic side effects?
A: No. When used as directed, Revita.COR's active ingredients have a long, well documented record of safety. Some are used orally as well as topically.

Q: Does Revita.COR work for women?
A: Yes. Hair loss in women is surprisingly similar to that in men. Fortunately for women, estrogen protects hair follicles from many of the destructive effects of dihydrotestosterone (DHT). Hair thinning may fluctuate with levels of estrogen and DHT. Revita.COR can help protect hair follicles from DHT, resulting in thicker, fuller, healthier-looking hair.

Q: Is stress a factor in hair loss?
A: Yes, under physical or emotional stress, the immune system can produce antibodies that attack hair follicles, resulting in bald patches (diffuse loss). But stress-induced hair loss responds well to Revita.COR, which should be used as your regular conditioner to keep the scalp healthy.

Q: I am using other topical treatments. Can I use Revita.COR at the same time?
A: Yes. Revita.COR does not react with other topical treatments. You can use it safely. For best results, we recommend adding Spectral.RS® leave-in treatment for thinning hair, Spectral.DNC® for more advanced hair loss, and Spectral.DNC-L® in the most advanced stages of baldness.

Q: Do I need to use Revita.COR for a long time?
A: After achieving desired results, continue to use Revita.COR as your regular conditioner to maintain revitalized hair and healthy scalp.