Research Article

Novel Anti-Aging Technologies and Products

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ABSTRACT

Skin aging is influenced by many factors including ultraviolet radiation, excess alcohol consumption, tobacco abuse, and environmental pollution. Age-related skin changes are the result of genetically programmed changes (intrinsic factors) and environmental wear-and-tear on the skin (extrinsic factors). This article also provides information about wrinkles development and the approaches to stimulate collagen formation. This article provides overview on different anti-aging technologies like Intense Pulsed Light System, Liposomal Encapsulation Technology, Nanosomes, Intelligent Nanoparticles Drop Anti-aging Cargo, etc. This article also provides overview on different ant aging products of Salvona and Olay.

Keywords: Skin Aging, Intrinsic Factors, Extrinsic Factors, wrinkles, Technologies, Products.

NOVEL ANTI-AGING TECHNOLOGIES AND PRODUCTS

INTRODUCTION

The aging of our skin can be divided into two broad processes: Chronological aging and Photo aging. Chronological aging represents the structural, functional, and metabolic changes in the skin [1, 2]. Symptoms of chronological aging include dry and thin skin, fine wrinkles, abnormal blood vessels and age spots[3]. Photo aging involves damage to collagen and elastin fibers in the skin[4-7].

Wrinkles development

A wrinkle is caused by reduction of collagen [8]. Collagen is a major body protein. It plays important role in forming support structure of the skin [7, 8]. The spatial arrangement of the collagen network also depends on the presence of supporting macromolecules known as proteoglycans and glycoaminoglycans (GAGs). It is a much better support structure than GAGs. GAGs are water saturated gel in which water soluble molecules, hormones, peptides, and ions circulate. During the aging process, the reduced amount of collagen is gradually replaced by the weaker GAGs[8]. This reduction in the quantity of collagen and replacement with alternative but weaker macromolecules results in skin that is less thin and less elastic.

Approaches to Stimulate the Collagen Formation

1. Stimulate the central hormonal system to increase Growth Hormone secretion which is the master hormone that will in turn promote fibroblast to produce more collagen throughout the body[8-10]. (Fibroblasts are mesanchymatous cells within the dermatological meshwork. And they have a role in epithelial differentiation, leading to collagen formation.)
2. Stimulate selected parts of the body, such as the face or neck, to produce more collagen through exposing the area topically to certain nutrients called secretagogues.

The mission of any successful anti-aging skin regimen must address, in addition to increased collagen synthesis, ways to limit the amount of oxidative damage caused by environmental pollutions and the sun's ultraviolet rays on the skin[11,12]. Therefore certain efforts are been carried out to reduce free radical damage by using antioxidants.

Antioxidants can be administered by two ways

1. **Oral intake**

   Oral intake of basic anti-aging vitamins should include-
   - 500-3,000mg of Vitamin C
   - 300-800IU of Vitamin E
   - 5,000- 15,000IU of Beta Carotene
   - 100-200mcg of Selenium
   - 500-1,000mg of Magnesium

2. **Topical application**

   The following are the key ingredients with antioxidant properties that should be topically applied in conjugation with a good water-based moisturizer to nourish the skin from the outside in and to prevent oxidative damage[12].
   - Superoxide Dismutase (SOD)
   - Squalene
   - Retinoid (Vitamin A derivatives)[13-16]

- Dipalmitoylhydroproline
- Vitamin C
- Tocopherol (Vitamin E)

Different Facial Plastic Surgery like BOTOX®, Chemical peel, Fraxel® Laser Procedure, Facelift-Rhytidectomy, etc are used for anti-aging treatment purpose[17-19]. But there are certain disadvantages of these surgeries like temporary bruising, eyelid drooping, heart disease from phenol peel, uneven skin tone and pigment changes, etc. Therefore certain newer anti-aging technologies have been introduced.

These are

1. Enhanced skin structure through innovative anti-aging treatment with Intense Pulsed Light (DepiLight IPL).
2. Liposomal Encapsulation Technology.
3. Nanosomes – Intelligent Nanoparticles Drop Anti-Aging Cargo.

Intense pulsed light technology

It is a specific technology to remove unwanted hair and to modify the skin structure with a high energy light source. It uses the complete spectrum of a xenon light source which is then reduced to the required and effective wave range with the help of filters[20]. IPL stimulates the collagen and elastin synthesis of the skin. The result is that wrinkles are smoothed out and the elasticity of the skin is improved. The IPL system DepiLight Alpha has a wave spectrum of 500 - 950 nm while the energy density is 2.6 - 21 J/cm^2.

Liposomal encapsulation technology (let)

It is the newest delivery method used to transfer drugs that act as healing promoters to the definite body organs.

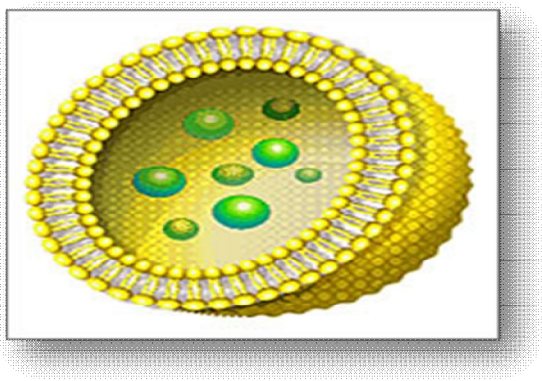


Fig: 1: Active ingredient are encapsulated in the liposomes

Liposomes are sub-microscopic bubbles made of a class of substances called phospholipids. When phospholipid layers are placed in certain solutions and under certain conditions, liposomal bubbles automatically form. These tiny bubbles are filled with the host solution and now protect the enclosed substance from exposure to degrading substances in the surrounding environment. This is particularly important for anti-oxidant nutrients like Vitamin C. Phospholipids are also impervious to digestive juices which make liposomes ideal for transporting acid - and enzyme - reactive substances through the digestive tract. In addition, the submicroscopic size of nutrient–filled liposomes is so small that they easily pass through the intestinal barrier without requiring help from an active transport system or from osmotic pressure in the gut. Hence, virtually the entire nutrient is carried straight to the cells that need it.

The disadvantage with conventional large, liposomes (Typically 1 micron in size) is that they have a limited ability to penetrate narrow blood vessels or into the skin to a significant degree (shown in fig 2). Consequently, some of the materials that are entrapped in the inner layers of these liposomes may in certain conditions be virtually un-releasable.

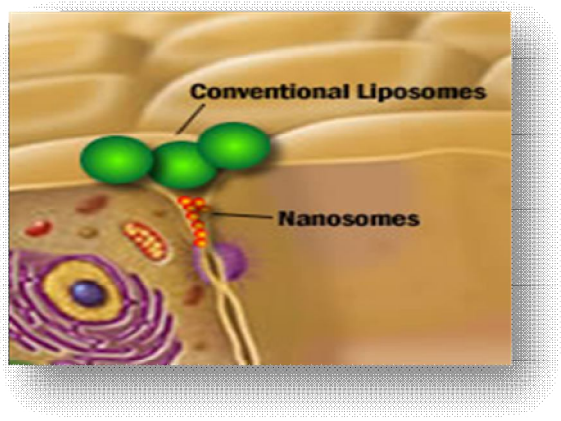


Fig: 2: Nanosomes

Because of this disadvantages of liposomes, Nanosomes are been introduced.

Nanosomes

Nanosomes are very small, single or double bilayered liposomes that are so small that they are measured in the Nanometer range, and are approximately 800 times smaller (Typically 50 Nanometers in size) than the diameter of the human hair. Nanosomes can be up to twenty times smaller than liposomes, dependant on type. Nanosomes are composed of much higher quality phospholipid ingredients than the commercial lecithin that larger liposomes are created from, some with higher percentages of phosphatidylcholine (PC), one of the essential components of cell membranes. Lecithin is commonly used source for liposomes typically contain only 10-

20% phosphotidylcholine. Higher grades used to create nanosomes may contain upto 40% phosphotidylcholine. Because the higher grade materials that make up the Nanosomes are believed to possess more mammalian molecular characteristics than conventional liposomes, they possess greater non-antigenic properties and are more biodegradable.

Some of the processes to create Nanosomes include the use of high pressure supercritical fluids or subjecting large, multiple-layer liposomes to ultrasonic energy. These processes are complex, lengthy, and extremely delicate. Consequently, the cost to produce nanosomes is higher than conventional liposomes.

Advantages of nanosomes

Since Nanosomes made with various phospholipid types can contain, encapsulate, and mobilize both water soluble materials as well as oil soluble materials, not only can they deliver a wide variety of encapsulated ingredients to cells, but in the cases of higher grades of materials, also deliver phosphatidylcholine (PC), to help feed the cells own building block. Nanosomes can more easily penetrate into the skin by topical application, with their active ingredients entrapped inside them more efficiently transported and delivered to desired target cells.

Intelligent nanoparticles drop anti-aging cargo

In this technique the intelligent nanoparticles selectively open and release drugs which target aging cells. Intracellular controlled release of molecules within senescent cells was achieved using mesoporous silica nanoparticles (MSNs). These MSNs are capped with a galacto–oligosaccharide (GOS) to contain the cargo molecules (magenta spheres; as shown in scheme)[21]. The GOS is a substrate of the senescent biomarker, senescence–associated β-galactosidase (SA–β-gal), and releases the cargo upon entry into SA-β-gal expressing cells.

The scientists tested the new nanodevice in cell cultures derived of patients with accelerated aging syndrome dyskeratosis congenita. These cell cultures are characterized by a high concentration of senescent cells, due to high levels of beta-galactosidase activity– an enzyme which is associated with senescence. The researchers designed nanoparticles that open when the enzyme is detected release their contents in order to eliminate senescent cells, prevent deterioration or even reactivate for their rejuvenation.

Anti-aging products

Salvona products

- SalSphere™ Resveratrol
- Multisal™ Technology
- HydroSal™ Lift
- SalSphere™ Anti-aging Lifting

Olay products

- Regenerist micro-sculpting cream
- Pro-X age repair lotion with sunscreen broad spectrum SPF 30
- Pro-X anti-aging starter protocol
- Regenerist wrinkle revolution complex

Salvona Products

SalSphere™ Resveratrol

It is an advanced, sub-micron delivery system for natural polyphenols. It delivers potent antioxidants into the deeper layers of the skin. The polyphenol family of antioxidants is beneficial for scar reduction, reduction of the harm from UV irradiation, and anti-aging[22]. SalSphere™ Resveratrol is used to overcome the following issues associated with the utilization of free Resveratrol in topical applications:

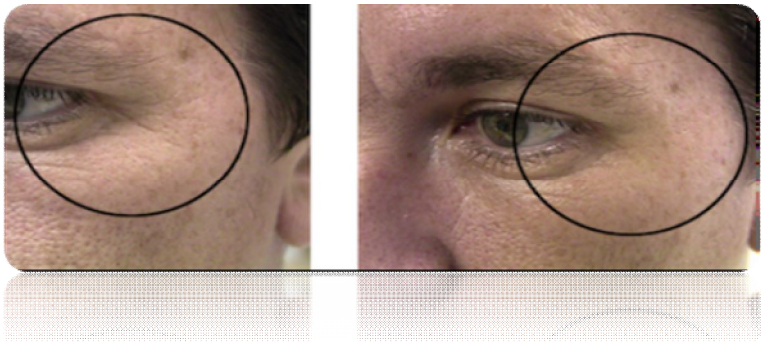
1. Stabilize, protect from premature oxidation and discoloration.
2. Allow the polyphenols to penetrate into the skin.
3. Provide a long lasting benefit.

HydroSal™ Lift

It is a Polymeric system comprised of a blend of extracts [Portulaca, Ginseng and Centella Extract]. It is designed to fill in and contract the skin immediately reducing the appearance of fine lines and wrinkles. It can be incorporated in lotions, gels, creams, and sprays.

SalSphere™ Anti-Aging Lifting

It gives instant reduction of Fine Lines and Long-Term Anti-Wrinkle Therapy. It contains a potent blend of active ingredients, such as the peptide Palmitoyl Tripeptide-5, alpha lipoic acid, Vitamin C, and functional botanical extracts; such as Portulaca (Purslance) Extract, Centella Extract and Ginseng Extract. It stimulates collagen synthesis[23].



A B

Fig: 3: Before (A) and after (B) pictures illustrate the effect of SalSphere™ Anti-Aging Lifting in reduction of fine lines and wrinkles. A lotion containing 10% SalSphere™ Anti-Aging Lifting was used to eliminate the signs of aging. Pictures were taken within 10 minutes of application. This technology shows immediate effect through polymer activity.

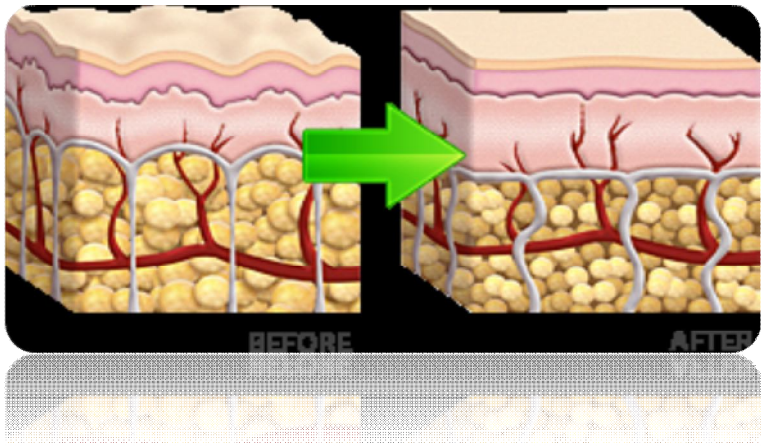


Fig: 4: Illustration of the mechanism of tightening the skin through polymer technology

It comprised of a core containing functional ingredients and a shell containing polymers, forming a thin film on the skin surface that firms the skin and produces an immediate lifting effect shown in fig 4.

MultiSal™ Technology

It involves encapsulation of Sub micron spheres within the Microspheres. It is the Multi components delivery system.

Different mechanisms to trigger the release involve

- Exposure to moisture
- Rubbing into the skin
- Change of pH

MultiSal™ Multilayer

It consists of an alpha hydroxyl acid (AHA) such as lactic acid in the outer shell that gently exfoliates the skin removing dead cells followed by the release of multiple anti-aging actives for an extended period of time to facilitate skin brightening and rejuvenation[24].

MultiSal™ Vitamin C+E

MultiSal™ Vitamin C&E (19:1) provides

- Better stability
- Enhanced penetration

Olay Products

Regenerist micro-sculpting cream

It penetrates rapidly to deliver anti-aging ingredients 10 layers deep into skin surface. It reduces the appearance of lines, boosts hydration and brightness. Skin is noticeably firmer and skin elasticity is improved.

Pro-X age repair lotion with sunscreen broad spectrum SPF 30

It helps to shield the skin from harmful UVA and UVB sun exposure and hydrates to fight the appearance of the fine lines and wrinkles.

Pro-X anti-aging starter protocol

It contains age repair lotion SPF 30, eye restoration complex and wrinkle smoothing cream.

Regenerist wrinkle revolution complex
It instantly relaxes the look of wrinkles and improves the appearance of deep eye lines in 14 days.

CONCLUSION

From the above it is clear that skin is the largest organ of the body and it is filled with the collagen and is well hydrated. It has not been subjected to free radical attacks from the environment. Resveratrol represent the first efforts to translate anti-aging interventions from the laboratory to the clinic, and more are sure to follow. Resveratrol is reported to increase life span and slow the progression of age-related diseases, and are under study for clinical applications against diseases of aging.

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