

REPORT

Skin Care Pioneer

Few people remember Benjamin S. Frank, M.D., the articulate physician who made numerous television appearances in the 1970s extolling the virtues of dietary supplements.

Dr. Frank's controversial books introduced much of what is now accepted about the role of nutrition in preventing disease. Dr. Frank was prescribing high-potency supplements to his patients more than 30 years ago. These same supplements are routinely used by tens of millions of Americans today to protect against degenerative disease. When looking at current clinical findings about nutrition and health, one can easily see how far ahead of his time Benjamin Frank was.

Dr. Frank proposed that aging was partially a result of decreased energy production in the cell's mitochondria. He felt that in the presence of reduced mitochondrial function, cells become defective and lack the energy needed to effectively repair DNA. Scientific studies published as recently as this year validate Dr. Frank's theory about cell energy depletion and aging.

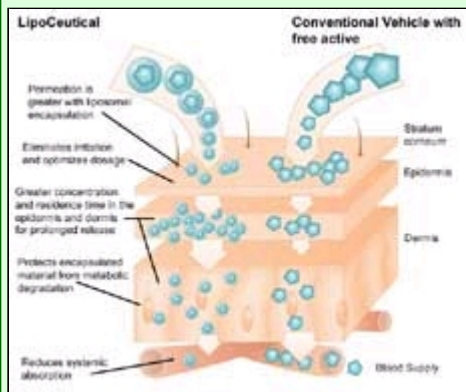
One of Dr. Frank's most famous hypothesis was that the topical application of RNA improved cell energy metabolism and therefore the health and appearance of the skin.

A lot has been discovered about skin aging since Dr. Frank began experimenting with RNA-based face creams at his New York City medical office. This article describes the latest version of Dr. Frank's ever evolving RNA-based skin cream.



LipoCeuticals vs. "Free Actives"

Your topical products benefit by utilizing liposomes when compared to "free actives" incorporated into conventional vehicles (ointments, creams, gels and lotions).



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Scientific studies demonstrate that it is now possible to apply topical preparations to one's skin and achieve noticeable anti-aging effects. The cosmetic industry has been racing to develop therapeutic skin care treatments that can clinically demonstrate results. Today's savvy consumers demand products with enhanced efficacy that will live up to their expectations.

In response, cosmetic companies have increased the percentages of active ingredients with the goal of replicating the anti-aging effects revealed in the newly published studies. The problem of increasing the level of active ingredients is that the wrong layers of the skin can be overly saturated resulting in irritation and reduced efficacy.

The first step in resolving this problem is to encase the active ingredients so that they can be absorbed through the top layer into the lower layers of the skin where they are most active. The second obstacle to overcome is designing a delayed release system so that the active ingredients can be released over an extended amount of time. After all, most people are only going to apply a face cream once a day. Skin cells, on the other hand, require the continuous presence of active ingredients to optimally protect against ultraviolet and environmentally induced damage.

"Liposome" technology was developed many years ago to facilitate delivery of active ingredients past the top layer of the skin. The consistency of liposome delivery through the skin has been limited by a number of technical factors.

An enhanced process of liposome delivery was developed two years ago and has been awarded worldwide patents. This technology delivers active ingredients to the specific layers of the skin, increasing the

concentration of those actives in the dermis, and then providing a prolonged time-release action throughout the entire day.

Until recently, this delivery system was available only to the pharmaceutical industry. This technology of delivering active ingredients to targeted areas of the skin is called QuSome®, and is now available in skin care products.

The opportunity is thus created to deliver proven anti-aging ingredients to the layers of the skin where they are most needed to guard against ultraviolet radiation, environment toxins, and the normal processes of skin senescence.

Controlled delivery of RNA into the skin

In the 1970s, Dr. Benjamin Frank did not have access to conventional liposome, let alone the enhanced QuSome® technology that enables precise delivery of active ingredients to the lower layers of the skin. Despite the lack of controlled delivery, Dr. Frank's highly concentrated RNA cream showed significant efficacy in improving many of the noticeable effects of skin aging.

Dr. Frank's molecular hypothesis for the efficacy of RNA was its ability to increase cellular energy levels so as to facilitate the movement of young cells to the surface where they could replace unsightly senescent cells. Dr. Frank also believed that the metabolic deficiencies characteristic of aging skin cells precluded them from performing youthful repair functions. The nucleic acid RNA, he postulated, seemed to restore this repair mechanism.

Despite being limited by a primitive delivery system, Dr. Frank's RNA cream demonstrated pronounced anti-aging effects in his patients. A double-blind clinical trial in 1970 of Dr. Frank's RNA cream showed that it caused a visible lifting and tightening of the skin, with wrinkles appearing to be less visible in just three-weeks. Despite these impressive early findings, RNA was largely ignored, perhaps because there was not a significant commercial market for "anti-aging" creams in that era.

With today's QuSomes® delivery technology, RNA and other active ingredients can be precisely delivered to the lower layers of skin to continuously promote critical cellular metabolic processes.

Benjamin Frank's ill-fated death

Benjamin Frank suffered from a particularly lethal form of juvenile (Type I) diabetes. He was born with the disorder and spent his entire life fighting off multiple diabetic complications. During his medical school years, Dr. Frank developed neuropathy to the extent that it interfered with his ability to walk. He also developed kidney impairment in his early 20s. Juvenile diabetics with this type of severe disease were not expected to live past age 30. Yet at the age of 58, Dr. Frank was in relatively good health.

He knew, however, that his diabetic condition would prematurely end his life by occluding his arterial system. Dr. Frank took a chance that aggressive intravenous chelation therapy offered in the Bahamas might extend his productive life span. His associate, Carmen Fusco, begged him not to undergo this therapy because he already suffered impaired kidney function (a common diabetic complication).

Despite these concerns, Dr. Frank made a fateful trip to The Bahamas for aggressive intravenous chelation therapy. As a result of his pre-existing kidney impairment, the mineral overload induced by the chelation therapy caused kidney failure. There were no dialysis facilities in the Bahamas available to prevent him from falling into a state of acute uremic poisoning. Dr. Frank was put on to an air ambulance to receive emergency dialysis in Miami, but he died on Dec. 14, 1979 in mid-air flight from the effects of acute kidney shutdown.

Had Dr. Frank been able to access chelation therapy in the United States, dialysis would probably have saved him long enough for his kidney function to return.

It is known today that those with impaired kidney function should not undergo chelation therapy, but chelation was in its infancy stages back then, and the appropriate precautions were not fully understood.

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Picking up the pieces

Dr. Frank did not live long enough to carry through his pioneering research. The only person left to pick up the pieces and carry Dr. Frank's research forward was his assistant Carmen Fusco, a former instructor of pharmacology at Cornell University. Carmen spent many years refining the RNA cream, adding new ingredients, new delivery vehicles and experimenting on patients she saw as a nutritional consultant.

By 1983, Carmen had put together an RNA-based cream with additional ingredients such as the natural moisturizer NaPCA. The results with her patients were impressive enough for The Life Extension Foundation to offer the cream to members. This RNA cream was named Rejuvenex®, and it became an immediate success, with Foundation members re-ordering it on a regular basis. The 1983 introduction of Rejuvenex® was the first time this RNA-based cream had ever been made available outside the tightly controlled clinical setting.

Unlike commercial cosmetic companies that almost never change their formulations, Carmen Fusco continued experimenting with Rejuvenex®, adding new skin protecting ingredients when they became available, and testing them on her patients. The result was that Rejuvenex® became a formula that was continually being upgraded to reflect innovative anti-aging research findings.

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The first cream to provide alpha hydroxy fruit acid

One way of encouraging new younger cells to form in the lower levels of the epidermis is to clear the way by removing dead obstructive cells and bacteria that dull the surface of the upper layer of the skin.

In the late 1980s, the media reported on the age-reversal properties of glycolic acid, an alpha-hydroxy fruit acid that functioned to slough dead skin cells off the surface so that more youthful appearing fresh cells would be visible. The effects of the topical application of these fruit acids was the disappearance of fine lines and wrinkles and a fresher looking tone to the skin.

Several years before this announcement, Carmen Fusco had added an alpha hydroxy fruit acid (lactic acid) to the formula. Rejuvenex® was thus the first anti-aging cream in history to incorporate an alpha hydroxy fruit acid as an active ingredient.

The research findings about the value of fruit acids helped validate the concept of applying a topical agent to reverse the signs of skin aging.

The cell renewal effect of vitamin A

The damage inflicted by solar radiation was at one time thought to be irreversible. Then a drug company developed a vitamin A analog called Retin-A that demonstrated a partial reversal of photoaging. A well-financed public relations campaign caused the media to focus exclusively on the cell renewal effects of Retin-A, rather than on natural forms of topical vitamin A that could be obtained without a prescription.

Carmen Fusco had previously included a potent dose of retinyl palmitate in Rejuvenex® for the purpose of working with RNA to stimulate epidermal growth factor (EGF), that in turn signals fibroblasts to induce young cells to replace old cells on the surface of the skin.

Retin-A caused significant irritation in many people, and avoidance of sunlight was mandatory for those using it. Despite these side effects, Retin-A became a popular drug prescribed by dermatologists to patients who wanted to improve the appearance of their face.

Later studies indicated that natural vitamin A (retinyl palmitate) had some of the cell renewal properties that were once attributed

solely to retinoic acid drugs.

Guarding against solar radiation

Few dermatologists in the past realized that even casual daily exposure to sunlight resulted in severe cumulative damage to skin cells. This was evident by looking at portions of the skin that are never exposed to the sun and comparing them to parts of the body (such as the face) that receive daily sun exposure.

Carman Fusco recognized this problem early on, and incorporated agents to block ultraviolet rays into the very first Rejuvenex® formula. Cosmetic companies were slow to catch on to the need to obstruct the damaging effects of solar radiation, and there are still face creams that claim anti-aging effects, but provide no UV protection.

Quenching free radicals

The skin is on the front line of exposure to damaging free radicals. Not only do skin cells have to directly contend with environmental pollutants and UV radiation, but they also suffer from the same oxidative stress as other cells in the aging body. The skin is very vascular, but it is also the outermost organ to receive nutrients. Therefore, it has a relatively limited blood supply, meaning that it does not benefit from orally ingested antioxidants as much as cells in other parts of the body.

Benjamin Frank was a proponent of Denham Harman's free radical theory of aging, and was one of the first physicians to routinely prescribe antioxidant supplements to his patients. Based on research indicating that topically applied antioxidants could protect and improve the appearance of skin, Carmen Fusco incorporated vitamins C and E into early versions of Rejuvenex®. As enhanced delivery systems became available, it became possible to penetrate these antioxidants deeper into the skin. With the new QuSome® delivery vehicle, it is now possible to deliver the optimal forms of vitamins C and E to the lower layers of the skin and delay their release so that the skin can obtain ongoing protection against damaging free radicals.

Vitamin C, however, does more than quench skin-damaging free radicals! It is also required for collagen synthesis, which declines markedly in aging skin. As humans age, they suffer diminished microcapillary circulation within the skin, thereby depriving skin cells of the supply of vitamin C it needs for youthful collagen synthesis. The topical application of vitamin C in a skin-penetrating medium can enhance the availability of vitamin C for collagen production.

Vitamin C regenerates vitamin E in the skin. An antioxidant like vitamin E can only suppress a limited number of free radicals before it runs out of electrons to donate. Vitamin C regenerates vitamin E and enables vitamin E to provide sustained antioxidant protection in the skin's elastin fibers.

Vitamin C also plays a vital role in skin repair. When skin is injured, its vitamin C content is used up rapidly in the scavenging of free radicals, and in synthesizing collagen to speed healing.

Dehydration accelerates skin aging

As we grow older, the outer layer of the skin (the stratum corneum) changes from the smooth, vibrant appearance of youth into the rough, dry, wrinkled appearance of old age. Loss of moisture is one reason why skin loses its elasticity and becomes dry, dull and wrinkled.

There are many moisturizers sold on the market, but unless they contain a proven humectant (an agent that attracts and holds water), they fail to protect against age-related water loss. Moisturizers without humectants are really skin sealers that only temporarily help to prevent the evaporation of the skin's own moisture. They usually contain mineral oil, lanolin and an emulsifier. The failure of these oil-based moisturizers is demonstrated by the dry appearance of skin as soon as the oil is washed off.

One of the natural humectants in young skin is NaPCA (the sodium salt of pyrrolidone carboxylic acid). NaPCA functions to naturally draw moisture and holds it in place within the skin. Aged skin is depleted of NaPCA and other humectants needed to retain water.

One of the problems with Dr. Frank's original RNA cream was that it induced a drying effect on the skin. Patients were told to alternate application of the RNA cream with a commercial moisturizer to reduce the drying effect. When Carmen Fusco added



NaPCA to Rejuvenex® in 1983, the drying problem went away and patients no longer had to use a moisturizer with the RNA-based Rejuvenex®.

By 1986, an even more potent moisturizer was developed at the University of Missouri by Drs. Stig Friberg and David W. Osborne. This discovery was called Ceraphyl® NGA (glyceridacid) and was the first substance that worked in the cell membrane to keep skin cells plump with moisture like young cells even when moisture levels were low.

The availability of Ceraphyl® NGA was announced at the April 1986 Life Extension Breakthrough Conference in Anaheim, California. Its inclusion in Rejuvenex® resulted in even more pronounced moistening effects.

Unparalleled track record

Over the past 33-years, a lot of creams with purported anti-aging properties have come and gone. The facial cream called Rejuvenex®, on the other hand, has been continually upgraded as new findings appear in the scientific literature. With the advent of the QuSome® delivery system, it is now possible to concentrate alpha lipoic acid, DMAE, RNA, vitamins A, C, E, natural moisturizing factors and other active agents into the deeper layers of the skin.

By encasing the active ingredients using QuSome® technology, Rejuvenex® is now able to provide more alpha hydroxy acid to the skin's surface to slough off older unsightly cells, while simultaneously nourishing and protecting living cells in the dermis and lower epidermis.

Based on newly published findings, there now exists a scientific basis to apply nutrients to the surface of one's skin to help counteract the consequences of aging.

Benjamin Frank would have been proud to see the controversial concepts he long ago espoused on national TV being validated in prestigious journals today. In Dr. Frank's era, he was forced to debate conventional doctors who adamantly insisted that the type of food you ate had nothing to do with your future health prospects.

Carmen Fusco is an Assoc. Professor, maintains a clinical nutritional practice and participates in cancer research as part of an American Health Foundation group. She continues to see many of Dr. Frank's original patients; many who have reached advanced ages in good states of health.

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