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## Topical Growth Factors Help Reverse Photodamage

Many times breakthrough technology emerges from an innocuous source. One such example is tissue nutrient solution (TNS), which originated from commercial collagen production. When creating collagen *in vitro*, human fibroblasts are placed in a nutrient rich medium. A shock to this system is executed with the intention of triggering fibroblast production of growth factors that naturally stimulate collagen production – which is where TNS was first discovered. SkinMedica, Inc. (Carlsbad, Calif.), has harnessed this physiologically balanced solution into a new skincare product providing natural restoration and revitalization.

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# Clinical Studies Show TNS Essential Serum Repairs Damaged and Aging Skin

By Kevin A. Wilson, Contributing Editor

Clinically proven to stimulate the repair of photodamaged and aging skin, TNS Essential Serum, is a topical cosmeceutical from SkinMedica featuring two distinct formulations in combination to nourish skin and improve the appearance of fine lines and wrinkles, age spots, skin tone and texture. TNS Essential Serum is delivered using a dual pump mechanism which mixes the formulations at the time of use to maximize efficacy and stability.

TNS Essential Serum's two components are TNS Recovery Complex, a physiologically balanced, but highly concentrated mixture of naturally-secreted growth factors and cytokines; and APS Corrective Complex, a potent formulation of seven antioxidants, matrix-building peptides and amino acids, skin brighteners, soothing agents and other essential nutrients. "I consider this product to be the gold standard in topical facial rejuvenation," said Hema Sundaram, M.D., F.A.A.D., director of Dermatology, Cosmetic and Laser Surgery Clinics in Rockville, Md. and Fairfax, Va. "In just one combination formula we have the essential ingredients to successfully stimulate the skin to reverse the effects of aging, predominately by encouraging collagen formation."



**Hema Sundaram, M.D., F.A.A.D.**  
Director  
Dermatology, Cosmetic and Laser  
Surgery Clinics  
Rockville, MD and Fairfax, VA

According to William Philip Werschler, M.D., F.A.A.D., F.A.A.C.S., assistant clinical professor of medicine/dermatology at the University of Washington School of Medicine (Seattle, Wash.), TNS is rich with a range of more than 110 known growth factors naturally



**William Philip Werschler, M.D., F.A.A.D., F.A.A.C.S.**  
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created by fibroblasts *in vitro*, just as if in response to injury *in vivo*. "Being naturally created by fibroblasts, the resulting material is very safe and will not cause unnatural growth. Physiologically balanced growth factors (PBGF) are harvested, purified and processed, then put into the product at a high concentration to stimulate the production of normal, healthy skin. This is a unique, powerful and relevant biotechnology, despite having been around eight or nine years," he said.

Dr. Sundaram added: "Another key aspect of the PBGF in TNS Essential Serum is that the growth factors are generated by growing fibroblasts in a three-dimensional matrix, which is unique and as close to real skin as possible."

"We constantly generate these compounds naturally at a low level," Dr. Werschler continued. "The main advantage behind the topical application of PBGF is that as we age, our ability to produce growth factors – regularly or in response to aging and environmental insult – is inhibited. We don't notice it until later in life, when we find we don't heal very fast. A toddler skins his knee or elbow and it seems to heal in a week; a senior does the same and he's still bandaging it a month later. Growth factors are produced locally and act locally; therefore, topical application of PBGF supplements our diminishing capacity to generate these compounds ourselves, delivering them right where they're needed to reverse the signs of aging."

**"I consider this product to be the gold standard in topical facial rejuvenation. In just one combination formula we have the essential ingredients to successfully stimulate the skin to reverse the effects of aging."**



40 year old patient with coarse wrinkles before Tx



40 year old patient one month after use of TNS Essential Serum  
Photos courtesy of Atkin et al., *J Cosmet Laser Ther*, 2010; 12:14-20.

**"The aim is to further enhance rejuvenation by jumpstarting the production of new collagen."**



49 year old patient with fine periorcular wrinkles before Tx



49 year old patient two months after use of TNS Essential Serum  
Photos courtesy of Atkin et al., *J Cosmet Laser Ther.* 2010; 12:14-20.

APS Corrective Complex, the other half of the TNS Essential Serum combination, features a variety of powerful but distinct antioxidants with complementary properties. "The main purpose of antioxidants is to combat damage from free radicals, or reactive oxygen species (ROS) – the highly unstable compounds that are largely responsible for the aging process in skin," Dr. Sundaram noted. The harmful effects of ROS reveal themselves visually in terms of obviously reduced skin quality, as well as physiologically, as they cause DNA damage which promotes imperfect repair or reproduction of skin cells.

Individually, the antioxidants found in the APS Corrective complex (including ergothioneine, green tea extract, blackberry leaf extract, *saccharomyces* ferment filtrate, coenzyme Q-10, tocopheryl acetate and tetrahexyldecyl ascorbate), fight ROS in different ways, according to Dr. Sundaram. However, the specific selection of water- and lipid-soluble antioxidants in APS Corrective Complex also enhances efficacy in how they work together. "Water soluble compounds can penetrate between skin cells," Dr. Sundaram elaborated, "and lipid soluble compounds can potentially enter through the cell membrane. Any one of these antioxidants has certain beneficial effects but there is potential for a synergistic effect when they are used in combination."

Other components of APS Corrective Complex, such as peptides, have equally important functions. "The peptides, for example, are basically fragments of the collagen molecule which, when present, are recognized by the body as signals of collagen breakdown," Dr. Sundaram continued. "The aim is to further enhance rejuvenation by jumpstarting the production of new collagen."

A number of the remaining components present in APS Corrective Complex, such

as skin brighteners, tightening agents, and hyaluronic acid filling spheres, have a more immediate but short-lived effect, which serve a greater purpose as well. "What these do is provide a more immediate 'wow' effect for the user," Dr. Sundaram explained. "The user's skin will look firmer, tighter and more radiant. Additionally, fine lines will appear to be diminished. More importantly, it promotes compliance, motivating users to apply TNS Essential Serum twice a day regularly as directed. However, the TNS, antioxidants, and peptides are largely responsible for the longer-term clinical rejuvenation effect that comes with continuous use. Clinical studies have shown that even in four weeks of regular use you'll see improvement in wrinkles, fine lines and hyperpigmentation from the actual rejuvenation of skin."

Featuring an advanced dual-pump delivery system, the components are kept separate until the moment of use. "When you have those proteins, antioxidants and other active compounds mixing together for a long period of time, they'll begin to interact, which will considerably diminish their shelf life and efficacy," Dr. Werschler stated. "The separate chambers maintain ideal environmental conditions for each product to preserve their stability, maximum potency and efficacy. It's also convenient. Between the two components you have a cosmeceutical that's unmatched and replaces a number of products a woman might keep on her shelf."

TNS Essential Serum is applied twice a day, morning and night, to freshly cleansed skin. Dr. Sundaram recommends SkinMedica Facial Cleanser. "If you're using other products they can be layered on top of TNS Essential Serum, so you'd use the serum first, then in the morning I normally recommend a broad spectrum sunscreen for added protection, with something like Tri-Retinol Complex ES

(containing three forms of vitamin A) in the evening, to further enhance the protective and rejuvenation effects."

Clinical benefits of TNS Essential Serum were demonstrated in a study of 37 women (age range 32 to 55 years, Fitzpatrick skin types I-IV with mild-to-severe periocular wrinkles) using TNS Essential Serum twice daily for three months. Clinical evaluations showed statistically significant reductions in fine facial wrinkles, coarse wrinkles and textural roughness at one month. Moreover, improvement continued with longer treatment duration.

Measurements of skin elasticity and pigmentation also showed a statistically significant improvement as early as one month after initiation of treatment. Monthly subject self-assessments suggest that the beneficial effects of TNS Essential Serum are readily apparent to users. Almost all study participants rated their overall satisfaction with the product performance as "excellent" or "good" and more than 90% desired to continue using it. Importantly, TNS Essential Serum was well tolerated with no reported adverse events. Furthermore, results of this first study were successfully reproduced in another study of 15 women (age range 27 to 62 years, Fitzpatrick skin type I with visible signs of photo-aging).

Doris J. Day, M.D., director of Day Dermatology and Aesthetics in New York, N.Y., considers TNS Essential Serum to be a must-have product in her practice. "My practice is half medical and half aesthetic," she explained. "Many of my patients have limits to what they can afford, so when I say something is a must-have product it had better be safe, effective and worth every dime. I consider it to be very cost-effective, because so many of my patients come in with bags full of products, many of which TNS Essential Serum would replace."



**Doris J. Day, M.D.**

Clinical Assistant Professor of Dermatology  
NYU Langone Medical Center  
Director  
Day Dermatology and Aesthetics  
New York, NY

Dr. Day likes to use TNS Essential Serum in conjunction with many aesthetic therapies because it's universally well tolerated. "When you're going for a better look you get the best results by attacking the problem from more than one angle: better nutrition and good skincare, in addition to fractional laser treatment or injectable neurotoxin. Using TNS Essential Serum with these can enhance the effect directly or indirectly, and may speed healing as well by bringing in so many growth factors and antioxidants."

Like her colleagues, Dr. Day isn't in the business of 'selling' her patients on a product. "What we want is something we're confident in, that we can stand behind and recommend without reservation," she said. "Physicians like me sift through the mountain of products, many of which aren't well regulated or researched, and find a number of cosmeceuticals for patients to choose from. TNS Essential Serum is among the top of the list because it's so effective and well-tolerated. It sells itself. Patients just need to use it, and they want more because it does what it's designed to do."

"Ultimately what we have with TNS Essential Serum is something we can offer patients that really works, and works well," said Dr. Sundaram. "It's not an unfulfilled promise in a jar. Every ingredient has a scientifically proven purpose. It's a testament to SkinMedica's commitment to science and to the careful, complete research they put into their products." ■



51 year old patient with hyperpigmentation before Tx



51 year old patient three months after use of TNS Essential Serum  
Photos courtesy of Atkin et al., *J Cosmet Laser Ther*, 2010; 12:14-20.



50 year old patient with uneven skin tone before Tx



50 year old patient one month after use of TNS Essential Serum  
Photos courtesy of Atkin et al., *J Cosmet Laser Ther*, 2010; 12:14-20.