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Skin Food I: Dietary Supplements

THE USE OF NUTRITIONAL AND HERBAL products by North Americans has never been higher. Long gone are the days when a select few vitamins and minerals were the only choices in the drugstore. Today, Americans spend more than 25 billion dollars annually on dietary supplements, and at last count, there were more than 29,000 different commercially available supplements. North Americans generally use dietary supplements for three main reasons—to enhance dietary quality, as a preventive influence against disease, and as a "natural" way to address health problems. Among the preventive and health-promoting reasons for consuming supplements, many adults report benefits to the skin.

The sometimes murky waters of dietary supplements can be a sea of confusion for consumers. More than 40 percent of average American and Canadian adults take at least one dietary supplement on a regular basis. Researchers from the University of California, Los Angeles, found that patients in consultation for cosmetic surgery were twice as likely as the general population to be taking some sort of dietary supplement.

While many adults take supplements to improve the skin's appearance, studies indicate that consumers are unsure how and why an internal product might help the skin. We will guide you through the marketing and media

hype, pare down the need to take bags and bags of supplements, and provide a research-based appraisal to support our top supplement picks.

History of Dietary Supplements

While the dizzying array of products formulated to promote beauty from the inside may be new, and the catchy names for the concept—skingestibles or nutricosmetics—may be additions to the contemporary lexicon, the idea itself is not new. The press releases would have us believe that the folks who thought of putting vitamins in water for the promotion of beauty had done something akin to splitting the atom. In truth, the use of oral nutritional supplements to enhance beauty from the inside dates back almost to the discovery of vitamins in food.

Vitamin A supplements have been used to improve facial appearance and reduce acne for about eighty years. Supplements with B vitamins, particularly yeast (brewer's and other forms of medicinal yeast rich in B vitamins), have been touted for improving the appearance of the skin since the early 1920s. In fact, early B-vitamin skin supplements were actually individually wrapped yeast cakes to be consumed on a regular basis! Studies in the 1930s and 1940s suggested that vitamin C and some of the B vitamins may have anti-aging properties, and so-called skin vitamin formulas appeared on the market. Scientists had shown that vitamins are found in the skin in higher amounts than previously thought, particularly vitamin C and the B vitamin niacin.

A sprinkling of older studies showed that vitamin supplements could have some value in improving inflammatory skin conditions. However, with the advent of powerful drugs and topical preparations in the 1950s, the interest and enthusiasm for internal beauty supplements waned. Even where interest continued in vitamins and fats as skin-related supplements, it was almost exclusively in the topical domain. Beyond meeting the minimal recommended dietary allowance (RDA), nutritional supplements were largely a non-issue in the dermatological arsenal.

In the 1970s, there was not only disinterest in dietary supplements, but also almost complete resistance to them in the dermatological community. The prevailing notion was that health food and supplements were a waste, and that North Americans should basically eat whatever mass-market

So you thought skingestibles were new? B vitamin tablets from yeast are promoted for smooth, glowing skin in 1924.

corporations provided. One dermatologist summed up the attitude in the *American Family Physician* journal (1971): "…too many patients harbor the delusion that their health can somehow be mysteriously harmed by something in their diet."

The Comeback

Fast-forward to 2009, and we see massive changes. Results of the Healthcare Professionals Impact Study (January 2009) showed that most dermatologists

now view dietary supplements in a favorable light. Specifically, two thirds of a sample of three hundred American dermatologists recommended dietary supplements to their patients. The top reason cited for doing so was primarily for the support of healthy skin. More than 60 percent of the dermatologists reported nutritional gaps in the diet of the average patient, and their belief that dietary supplements might help address such voids. On the whole, 71 percent of dermatologists reported that a healthy diet, vitamins, and other supplements—along with exercise and healthy lifestyle choices—are of importance to healthy skin.

So what happened along the way to change attitudes from complete disdain to acceptance of supplements? Why are most dermatologists frequently asked about dietary supplements, particularly vitamins C, D, and E and fish oil? How did we go from the basic "skin vitamin" messages of the 1930s and 1940s to a nutricosmetic industry of skin-based oral supplements that is said to be valued at 3 billion dollars annually?

The comeback of internal beauty supplements occurred via a perfect storm in the early 1990s. During this time, a constellation of events renewed interest in the potential value of supplements. First came studies showing that dietary supplements, including antioxidant vitamins C and E, as well as fish oil, might help protect against damage from UV radiation. We also had *Time* magazine making vitamins the cover story on April 6, 1992, along with a tagline indicating that vitamins might halt the "ravages of aging." In addition, university-based research and corporate involvement began to reach a new degree of sophistication, and things were looking rosy for a business fueled by the first boomers, who were turning forty-six.

Still, most mainstream skin specialists dismissed studies pertaining to UV protection as only low-impact news. The general thinking was that the results might translate into useful advances in topical preparations, but they would not be a catalyst in driving the immediate sales of fish oil and multivitamins for skin health. Protecting against UV damage from the inside seemed like a long-term investment. Any revival of internal skin supplements had to be based on real results that were relatively immediate, taking place in sixty to ninety days. As part of the perfect storm, researchers from Finland would highlight the more rapid anti-aging value of oral fish

collagen supplements in 1991 and 1992, and the nutricosmetic industry was reborn.

Fish Collagen and GAGs

Oral supplementation with marine-fish cartilage (with collagen and glycosaminoglycans, or GAGs) can significantly improve the appearance of the skin. Dermal thickness increases, and overall elasticity is significantly improved. Fish collagen, or more specifically, hydrolyzed (meaning "water-broken" or "water-digested") fish collagen is a major staple of anti-aging, internal beauty. When first discovered, the sales of oral collagen for skin took off like wildfire in Japan.

Still, it seemed implausible: how on earth could oral fish collagen and GAGs influence the skin? Isn't fish collagen degraded into individual amino acids in the digestive tract, just like any other protein? Don't enzymes in the blood break down any intact linkages of small amino-acid groups (peptides)? Such were the questions of the skeptic and naysayer.

But fish collagen works. Small peptide units, including some of those from orally ingested collagen, are absorbed intact through the intestinal passages. Some of the peptides of collagen are resistant to breakdown by enzymes in the blood. Peptides of oral collagen can act as a signal to turn on fibroblast activity and even provide antioxidant support in the skin. The true benefit of fish cartilage, though, is that it reduces fine lines and dryness, and improves skin tone, providing a more even color distribution of the skin. Once again, visible benefits are backed up by increased dermal thickness, less wrinkling, and improved elasticity.

Two different studies in 2004 showed that fish peptides can make a difference in hydration. The first, a German study from the University of Witten, showed a significant reduction in water loss from the skin after three months of supplementation. The second, a Japanese study in the *Journal of Nutritional Food* (2004), showed that oral consumption of hydrolyzed collagen for two months could improve hydration in adult women.

The latest research trend with marine-fish peptides is to combine them with antioxidants and other skin-supporting ingredients. A 2005 study showed that oral consumption of 700 milligrams of a fish peptide daily—along with 200 milligrams of alpha-lipoic acid, 180 milligrams of vitamin C, 24 milligrams of zinc, 4 milligrams of lycopene, and some B vitamins—improved skin thickness, elasticity, and self-evaluations of the visible signs of aging. Positive results were noticed after two months of use.

In a study published in the *European Journal of Clinical Nutrition* (2006), researchers from the University of Copenhagen reported the value of a fish protein extract—along with 350 milligrams of soy extract and some lycopene and white tea extract—compared to placebo. In this case, six months of use resulted in a significant reduction in forehead and eye wrinkles, as well as overall sagging and laxity of the skin. The researchers backed up the clinical and photographically judged improvements with objective ultrasound measurements showing improved dermal density, as compared with those in the placebo group. Antioxidants, it seems, can enhance the role of fish-collagen extracts in skin-care supplementation.

GLUCOSAMINE—NOT JUST FOR YOUR JOINTS

One of the most popular dietary supplements in North America, best known for its ability to reduce osteoarthritis, is glucosamine. Oral supplementation with glucosamine can reduce inflammation in the joint and provide the raw materials for repair of cartilage through the aging process. Since glucosamine can also provide the raw materials to build glycosaminoglycans (GAGs, the important dermal structural components), its potential for aging skin has not been lost on cosmetic dermatologists.

A study published in the *Journal of Cosmetic Science* (2006) highlighted the ability of a skin-friendly form of glucosamine—N-acetyl

glucosamine—to improve the appearance of aging skin. Specifically, 1,000 milligrams of oral glucosamine improved hydration of the skin, and a topical preparation of 2 percent glucosamine improved facial wrinkles, particularly those around the eyes. Look for glucosamine as an emerging star ingredient in oral and topical skin supplements.

Antioxidants

As previously discussed, oral antioxidants make it to the far reaches of the skin layers, but do they actually make a clinical difference? Is it all about future protection against the ravages of aging, or are there more immediate benefits to the appearance of the skin?

The answer is yes, there are immediate benefits, which are real-world results showing relatively fast improvements in overall texture, tone, and hydration of the skin. In fact, the result can be more glowing and well-hydrated skin within twenty-one days. In a study published in the *International Journal of Cosmetic Science* (2002), Italian researchers reported that oral ingestion of a mixture of carotenoid antioxidants (6 milligrams of lutein and 0.3 milligrams of zeaxanthin daily) could improve hydration and skin-barrier function by increasing the lipids in the outer layers of the skin.

A unique finding, it suggested that antioxidants are not just protecting collagen—but also intricately involved in fat regulation in the skin. The study underscores a theme within nutritional medicine: all things nutritional are intertwined in the body. Looking at the results from a distance, it would seem implausible that oral antioxidant supplements could influence skin-barrier lipids, but influence they do.

More recently a joint U.S. and European study published in *Skin Pharmacology and Physiology* (2007) found that 10 milligrams of lutein and 0.6 milligrams of zeaxanthin per day do indeed increase skin lipids, improve elasticity, and improve hydration in adults. The beneficial influence of these oral carotenoid antioxidants on the appearance of skin was multiplied when a topical preparation with carotenoid antioxidants was combined with the oral supplements. This would support our own stance in addressing