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# Anti-Aging Skin Products

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**Bottom Line at the Top: Moisturize, accept the damage that has been done, try to not make it worse, and save your money on the creams.**

Skin creams and cleansers are sort of witches' brews, with a dab of this and a pinch of that blended into a water and fat emulsion, intended to magically erase wrinkles and undo years of skin damage. Since the myriad products may contain any of dozens of common and hundreds of specialized ingredients, I can't possibly address the each and every one in one article. So I'll limit myself to discussing general concepts about anti-aging skin products and describe the science available for four anti-aging ingredients – ceramide, hyaluronic acid, niacinamide and resveratrol.

Companies capitalizing on societal gerascophobia (fear of aging) whip up new products faster than scientists can prove or disprove their effectiveness and safety. The Food and Drug Administration (FDA), which has the task of assuring that our food and drugs are safe and effective, try to look out for us, but it's not their job to test products. It's their job to assess which claims of products' benefits require proof and to demand and evaluate that proof when they do.

Medications require verification of efficacy and safety prior to their hitting the market. Normally we and the FDA don't consider cosmetics to be drugs, and those which merely moisturize or cover-up wrinkles are not. However, a statement that a product is intended to affect the structure or function of the body, as with wrinkle eradication, skin damage repair or increased collagen production, is a medicinal claim requiring proof, The FDA must evaluate that proof and agree that the product does what it says it will do and the potential benefit outweighs any risk.

Skin care companies, like three-year-olds, push the boundaries of what they can get away with rather than go through the long and expensive process of proving a medical claim. The FDA is left to chase after them. In a flurry of activity over the last 2 years, the FDA has sent letters warning about unproven medical claims to Skin Authority, L'Oreal, StriVectin, Avon, Bioque, Lancome, Set-N-Me-Free Aloe Vera Co and Athletes.com, just to name a few. The letters demand that the companies stop making the claims, provide convincing documentation that a product is safe and effectively performs as claimed, or take the product off the market.

Since their products with their unproven claims remain on the market, it's clear that letters don't achieve enforcement. That's a whole other hurdle that takes time, personnel and money. With Congress having cut the FDA's budget since 2011, it's hard to imagine that constrained resources would be diverted away from food and pharmaceutical safety to skin creams.

Anti-aging creams contain herbs, nutrients, biologics or even stem cells, most of which have not been proven to impact skin aging or damage. Proprietary product ingredients with names like Matrixyl3000, Gravitite-CF lifting complex, Collaxyl and Dermaxyl may sound impressive but fail to give a clue to their contents. They could be ground up banana slugs or Jello, for all we know. Anyone who buys the product and believes the claims puts blind trust in a magical formula and suspends rational skepticism of manufacturers' honesty.

An ingredient list orders a skin product's components by weight, with the first ingredient being the major component and the last ingredient usually just a smidgeon. The first ingredient of every cream and lotion I've seen is water, often called 'purified water' or 'aqua' to make it sound better than the sewage effluent their competitor uses.

The next umpteen ingredients are oils, fatty acids and other organic salts, di- and tri-glycerides, alcohols, glycerol, gums and waxes that with water create a creamy emulsion. At the end of the list are various preservatives, including parabens, phosphates and EDTA.

Sprinkled throughout the list are the 'active' ingredients, like ceramides, hyaluronic acid, green tea, resveratrol, glycolic acid, vitamins, herbs, yeast, food extracts, urea, lanolin, sugars, nutrients we normally make like betaine,

rare minerals and 'biologics'. Biologics are extracts or products derived from microorganisms or human or animal tissue. They might be a pure chemical entity (like penicillin) or just mushed up animal tissue.

There is no guarantee that an independent third-party tester verified that listed ingredients are actually in the product, the company didn't sneak unlisted agents into it, or there aren't retained toxic impurities.

There's also the question of special ingredients' toxicity. Product promotion showing amazingly different before and after pictures often result from ingredients which induce low-grade inflammation. An inflamed area swells with fluid accumulation, like allergic hives and the skin over the swelling becomes more smooth. Two of these products are Retin-A, which contains tretinoin, and Nerium, which contains an extract of the poisonous plant oleander. Both can cause skin irritation. If mild, the skin swells slightly, fills out wrinkles and you don't feel any irritation. In more sensitive people, the skin might develop a significant rash.

**Special Ingredients**: According to Albert M. Kligman MD, inventor of the acne medication Retin-A, it is important to have affirmative answers to 3 questions before we can accept that any ingredient might actually do what the manufacturer says it does. First, can the ingredient actually penetrate the top barrier layer of skin in sufficient concentrations to have an effect? Second, does the ingredient have a specific biochemical effect on skin components? And third, are there published, peer-reviewed, double-blind, placebo-controlled, statistically significant trials that substantiate the claims?

Concerning question #1, there is considerable debate about the effectiveness of topical creams except as moisturizers. The barrier layer of skin does what it says – it keeps things out. Highly charged or large molecules from herbs, food and biologics, like proteins, large peptides, long polysaccharides and nucleic acids cannot penetrate intact skin, e.g. skin without cuts, rash or damage.

Cream ingredients that can't penetrate skin cells may travel down the hair follicle and into pores to gain access to skin's growth areas. They must do so in clinically relevant amounts and then be able to diffuse to target cells in the dermis.

In addition to herbs and biologics, skin cream companies often choose a variety of natural foodstuffs to put in their creams. The list is long. Essential fatty acids, phospholipids, soy flavonoids, curcumin, green tea extract, vitamins A, C and E and grape seed oil all sound healthy enough that you might want them on your skin. There is limited data that they are as healthy in a cream as they are in your diet.

**Ceramides** and sphingomyelin are integral lipid components of skin. The name 'lipid' refers to any structure containing fatty acids or their derivatives, including oils, waxes and steroids. They are soluble in organic solvents like nail polish remover, but not in water. Cholesterol, cooking oil and ear wax are also lipids.

More than ten different ceramides make up about 20% of skin's lipid complexes. They contribute significantly to skin's appearance and are essential to its barrier function. Ceramide skin content declines with age. Stark proof that ceramides are essential to normal skin structure is evident in people with a genetically defective capacity to make ceramides, causing a type of ichthyosis. Ichthyosis is a life-long condition of generalized ugly scaling, mild redness and defective ability to keep skin's water in and bacteria out.

We get ceramides in our diet from wheat, dairy, eggs and soybeans. Our bodies also make ceramides from scratch: UV radiation and other inflammatory stresses induces the conversion of sphingomyelin to ceramide.

There are few well-done studies of ceramide-containing skin creams. Only one study I could find shows even some benefit, which was to help skin retain water. Though ceramide is a significant contributor to the outer barrier layer of skin, there is no data that ceramide from a cream will be taken up and incorporated into that layer.

In addition to bolstering barrier function, ceramides also trigger cell death. Scientists think this is a good thing if the killed cells are aged, damaged or cancerous. The fact that the body makes ceramide in response to injury, UV radiation or inflammation suggests that it is a natural way to clean up the mess after any damage. The body also turns off making ceramide when there is no toxic insult or if there are plenty of the body's homegrown anti-oxidants.

Since the body seems to regulate ceramide levels in response to need, we don't know what would happen if we were to succeed in artificially augmenting ceramide levels. Would it trigger the death of normal cells?

**Niacinamide**, a form of vitamin B3, penetrates into human skin in amounts that could have medicinal effects. Reliable research documents that niacinamide

increases anti-oxidant capacity of skin, reduces blotchiness and yellowing, and to some extent smooths wrinkles and softens skin. It boosts ceramide synthesis in connective tissue and promotes a healthy outer layer of skin cells. Both of these effects may make skin stronger and a better barrier, possibly explaining fewer wrinkles and softer skin.

All of these effects were seen with emulsions containing niacinamide concentrations of 2 - 5% by weight. That's not an insignificant amount, but there seem to be no side effects as long as nicotinic acid is not part of the mixture. It also seems that niacinamide is good for skin whether or not the person is niacin deficient.

**Hyaluronic acid** is a long complex chain of sugar made by the human body that is part of the matrix surrounding cells. The highest concentrations are in fluids of the eyes and joints. It is a component of skin that contributes to retaining water.

People take oral hyaluronic acid supplements for arthritis, but it is too large a molecule to be absorbed intact from the gut into the body. There is no good data that show that oral hyaluronic acid fixes any health problem. On the other hand, it is FDA approved for various eye surgeries and for orthopedists to inject it into joints to bolster damaged cartilage. Injected into the skin, it makes a safe, effective filler to puff out lips and wrinkles.

Some people apply it to skin to heal wounds, burns and skin ulcers, but there is no evidence that it helps. It might keep them from drying out, but it has no special healing effect and the breakdown products might increase inflammation.

There is a paucity of proof that hyaluronic acid in a cream does much for skin. Because it swells when added to water and then holds onto that water, it might help as a skin moisturizer. It is too large to permeate skin's barrier layer, so it's unlikely that it would fill out wrinkles the way that injected hyaluronic acid does. There is no evidence to support claims that it prevents or reverses changes associated with aging, tobacco use or sun exposure.

Large, intact hyaluronic acid is anti-inflammatory. In contrast, inflammation and injury lead to its break down into smaller pieces that stimulate the immune system and contribute to inflammation. For this reason, it wouldn't be a good thing to use on eczema or inflammatory skin rashes.

**Resveratrol**, the phytochemical in red wine that purportedly prevents heart disease and cancer, is an anti-oxidant. It has low toxicity and no significant reported side effects.

The bulk of research about resveratrol's effect on skin relates to preventing sun damage and skin cancer. When used in test tubes, taken internally by mice or applied to animals' skin, it reduces UV radiation-induced skin damage and bolsters the body's mechanisms of preventing cancer. These are all preventive effects.

However, I found no data that it reverses sun damage or wrinkles caused by natural aging. It takes a special formulation to enable it to stably mix in a cream or lotion, and that formulation plus its large size make it nearly impossible to pass into skin. If skin can't absorb it, it's unlikely to be able to effect any repair. Based on current information, it basically works as a sun block.

Some special ingredients in a skin cream show promise for at least partially preventing irritant or UV radiation-induced skin damage. We lack sufficient research to prove or disprove much of what is claimed about rejuvenating skin creams. It seems that very few ingredients deserve claims that they repair damage or reverse the appearance of aging.

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