

Topically— Oils and the Skin

Emollients, humectants, and occlusive agents are terms closely associated with skin care. **Emollient**, from the Latin *emollire*, means “to soften.” This is a term that can be applied to all oils, as they improve the feel and appearance of the skin by overcoming dryness and protecting against water loss. An emollient creates a light barrier on the skin surface.

Humectant, from the Latin *humectus*, moist, or from *humere*, to be moist. A humectant is a substance that draws water to itself. Glycerin, the back bone or the “palm” of the triglyceride, is a humectant drawing water to itself from the environment. Glycerin can also draw moisture from lower layers of skin to the surface, and under adverse conditions dry it out. Newer humectants are made from honey, while others are manufactured synthetically. Propylene glycol is a synthetic humectant.

Occlusive agents, from “occlude,” or in Latin, *occlusus*, create a physical barrier on the skin to keep moisture in the skin layers and prevent it from

escaping. The long-chain saturated fatty acids like stearic and palmitic acids, and the waxes, are occlusive agents. Petroleum jelly is a synthetic occlusive agent.

The Skin Is an Organ

As the largest organ of the body, the skin is made up of three general layers: the epidermis, the dermis, and the subcutaneous layer. Each layer performs a myriad of functions maintaining and protecting the body as a whole and producing necessary compounds like vitamin D.

The outermost layer, the epidermis, is in turn made up of five layers, the outermost of which is called the **stratum corneum**, meaning *horned layer* in Latin. Once thought of as inert, a protective but inactive film, the stratum corneum is now recognized as biologically and chemically active. It performs two vital functions, **barrier function** (*protection*) and **passage function** (*movement*). Both are important tasks for the body as a whole. The degree to which these processes are healthy and perform normally determines the overall health of the skin.

The primary function of the stratum corneum is protection, preventing elements of the environment such as liquids, gases, objects, and unfriendly organisms from penetrating the skin. Internal functions are protected and the body held together as a unit; thus the *barrier function* is one of protecting our bodily integrity. The stratum corneum also functions as a permeable membrane, allowing a two-way *passage* into and out of the body. The passage function moves moisture in the form of perspiration, along with toxins and waste, out of the skin layers. From the outside in, skin absorbs moisture, oxygen, light, and nutrients, including fatty acids, moving them inwards to the body. Light passing into the lower skin layers also makes vitamin D, which is one of the passage function's especially vital roles.

Cerimides, a mix of lipids and skin cells with waxes, cholesterol, and free

fatty acids, form the outermost layer, the stratum corneum. These lipids fill the space between *corneocytes*, cells no longer living, to protect the underlying tissues against dehydration, chemicals, infection, and mechanical wear and tear. Fatty acids produced in the skin layers and those obtained in natural oils play a large part in maintaining skin health. Lipids in the skin are vital to preserving moisture in cell membranes. They maintain suppleness and tone by preventing water from escaping, while also protecting skin cells from environmental stresses.

| Stratum corneum lipids & corneocytes | |
|--------------------------------------|-----------|
| Cerimides, waxes | 50% |
| Cholesterol | 25% |
| Free fatty acids | 10% |
| Corneocytes | remainder |

The way these lipids are combined and organized determines the health of the stratum corneum and the skin as a whole. When functioning properly, a protective and permeable membrane performs multiple operations. When impaired, the function of the outermost layers fails, and skin conditions like eczema and dermatitis result. When compromised by allergens and pathogens, the skin barrier becomes inflamed, irritated, red, and skin diseases can result. Maintaining the stratum corneum is central to skin health.

Collagen, another vitally important part of the skin structure, is a protein complex of amino acids that represents nearly a third of the proteins in the body. Found in tendons, ligaments, bone, and skin, collagen is tough and strong, and makes up the connective tissue and protein cement that holds the body tissues together. Collagen functions in the skin to keep the tissues supple, firm, and elastic, and its loss leads to wrinkling and sagging tissues. Anti-aging treatments emphasize collagen support and replenishment for this reason.

Fatty Acids, Sebum, and the Skin

Fatty acids are ubiquitous in nature. Found in all living forms, plant and animal alike, they enable life processes to unfold throughout the life span of the organism. With plant oils and skin producing and sharing many of the same fatty acids, there is great compatibility. A proper balance of oils helps protect and repair tissues, but deficiencies of essential fatty acids can result in a variety of skin conditions and problems.

Skin produces its own fatty acids, making up 90% of the sebaceous lipids on the skin surface. Called **sebum** and produced in the sebaceous glands, these lipids are necessary for keeping the skin and hair supple and pliable. Attached to hair follicles, sebaceous glands produce the fatty acids that maintain the integrity and health of the skin. Of particular importance in addition to maintaining suppleness, sebum acts as the skin's innate immune system and operates as an immune organ. Able to produce antimicrobial compounds and perform pro- and anti-inflammatory functions, it controls wound healing and transports vitamins and antioxidants to the skin's inner and surface layers.

Integral to the optimum functioning of the skin, sebaceous glands are located over most of the body, with concentrations on the face, head, chest, and upper back. The sebum, or skin lipids, is called the "acid mantle" and can ward off bacterial infection, protecting all the layers. Fatty acids, which by nature are slightly acidic, create a surface environment inhospitable to microorganisms and bacteria. As the lipid cocktail of the stratum corneum, sebum provides a protective barrier, maintaining health and enabling the lower skin layers to function normally. Sebum is a complex mixture of triglycerides, waxes, free fatty acids, squalene, and cholesterol.

| Sebum lipids | |
|-------------------|-----|
| Triglycerides | 41% |
| Waxes, monoesters | 25% |
| Free fatty acids | 16% |
| Squalene | 12% |
| Cholesterol | 3% |

The sebum also produces a uniquely human fatty acid, sapienic acid, C16:1, named from *Homo sapiens*. Formed by enzymatic action in the skin's sebaceous glands, it is a major portion of sebum. Enzymes acting on saturated palmitic acids, C16:0, make sapienic acid, a secondary fatty acid metabolite. As an isomer of palmitoleic acid, C16:1, sapienic acid differs only in its omega classification, which is omega-10. Sapienic acid converts to sabaleic acid, C18:2, a two-carbon extension. These uniquely human fatty acids perform a number of functions, including preservation of cellular health, regulating hormones, and other physiologic processes. The skin's own lipids combined with plant oils complement each other, providing active and passive smoothing, soothing, and protective effects.

Allergens, or Everyone Is Allergic to Something

Allergens are substances that produce sensitivities in some people but are not toxic to the population as a whole. All substances, including oils, can potentially possess allergenic properties. A friend with a severe celiac condition can barely stand to look at my bottle of oat seed oil, never mind removing the lid and smelling or handling it. She had no desire to experiment on any level. Wheat germ oil could also be an allergen for a person with such a condition.

Nuts are allergens to many people and the oils can be as well. Peanut,

primarily, but also almond, hazelnut, pecan, brazil nut, and others can cause mild to serious reactions in those who are sensitive. Mangos, from the same botanical family as poison oak, are allergens for some people. In addition, allergenic properties can be present across a species. The butter from mango seeds can cause sensitivities for those with a mango allergy, as can marula and pistachio oils, which share the same botanical family. Rubber trees and shea trees share a similar botanical family, and individuals who are allergic to latex can also be sensitive to shea butter as well.

The importance of labeling all ingredients cannot be overstated. That keeps the public informed of possible complications to themselves, friends, or family members. However, people can also react to an ingredient or combination without knowing they are in fact allergic. If an allergen is known, it can be avoided with proper labeling, but sensitivities do occur where they haven't manifested in the past. Modifying recipes is not difficult and can be done by substituting similar ingredients, like a seed oil for a nut oil. No one product or combination will work for everyone, but with awareness of the problem, something can be found to work for most everyone.

Oils and Problems of Skin Health

Healthy skin depends on the integrity and balance of the stratum corneum. Skin conditions, including acne, occur when the ratios of lipids and fatty acids are out of balance. All living organisms and systems strive to maintain homeostasis, a dynamic balance within natural functions. Deficiencies of any of the essential nutrients throw off this balance and eventually manifest as disease.

Those with skin problems often have a damaged permeability layer that corresponds to low linoleic acid levels. This fatty acid makes up 14% of the ceramides, the waxes that constitute 50% of the stratum corneum, an

important component of the barrier function. Deficiencies of linoleic fatty acid lead to dry scaly skin and hair, and slow-healing wounds.

Acne, it appears, is a result of an under-supply of linoleic acid, while monounsaturated palmitoleic and the human sapienic acids are over-produced by as much as 60%. Excess sebum builds in the tissues, causing the glands and hair follicles to become clogged. With the pores blocked, the condition becomes chronic and ultimately inflamed. Scaling, dryness, and skin problems are often caused by linoleic acid deficiencies, which can be made worse by excessive intake or use of oleic and other monounsaturated fatty acids. The skin's problems are exacerbated by increased sebum production when it is least wanted or needed.

The barrier function of the skin, in particular, needs linoleic acid in sufficient quantities to maintain and repair it. In studies, linoleic acid made available to the skin in the diet and topically has restored the barrier function in as little as a month. An understandable and common reaction to help alleviate the condition of excess oil is avoidance of all oils on the skin, but it is treatment *with* oils that can return the skin to normal. Recommended treatments often banish any and all oils in an attempt to actively dry the skin of excess oils and sebum. A better approach is to provide the missing fatty acids.

Saturated palmitic fatty acid, along with linoleic acid, can help calm the skin and return it to balance. Improved diet and essential fatty acid supplementation is also recommended to provide the necessary nourishment for regaining a healthy balance. Minimal use of monounsaturated fatty acids, including oleic acid, is recommended until the skin's health and balance is restored. Oleic acid in healthy balanced skin is beneficial, but it does not replace a deficiency of other fatty acids, especially an essential one.

Treating problem skin with combinations of fatty acids requires choosing the best oil or oils to supply the skin with what it is missing. Oils generally have

dominant, secondary, and lesser fatty acid structures. The feel and function of fatty acids on the skin varies depending on saturation, carbon chain length and mix of all the fatty acids contained in a particular oil. Fatty acid tables identify the composition of oils and can help with choosing oils appropriate for the condition.

Oils and Skin Aging

It is a fact of life that we age, and along with the rest of the body, our skin changes over time. Many billions of dollars (as well as other currencies) have been spent trying to slow the process, even attempting reversal of the inevitable. This is not healthy or realistic. Caring for the skin with natural, non-processed foods in a diet high in vegetables and quality fats, drinking lots of clean water, and avoiding synthetic chemicals in skin care products is the best anti-aging beauty treatment for the skin.

Oils used in the diet and directly on the skin can mitigate the aging process considerably. What oils are used and when is a major theme of this book. **For cooking**, saturated butter, ghee, coconut, and palm oils are preferred, as they don't break down in the presence of heat. The omega-9 oils like olive, sesame, and macadamia can be used for light cooking, warming, and for dressing salads and dipping. The omega-6 polyunsaturated oils, like grape-seed, evening primrose, and corn, will oxidize with high heat, so they should only be used for dressings, dipping and supplements. The omega-3 flax, hemp, and chia seed oils should never be heated and should be stored in the refrigerator. Use them as supplements and in cold dishes to keep the oils fresh.

A feared sign of skin aging is the appearance of dark **skin spots** on the backs of the hands, arms, and face. These spots, which are not natural freckles, come from consuming unstable oils and are a type of oxidation.

Cooking with saturated oils that are stable when heated, rather than the polyunsaturated oils, slows formation of the spots and causes existing ones to fade. Increasing consumption of plant-based antioxidants can also help mitigate unwanted oxidation. Colorful reds, oranges, greens, and yellows in foods is a sign of the presence of antioxidant compounds that protect skin and body. Oxygen, like the sun, is necessary for life, and guarding against damage is easier than correction.

Oils, Sun, and Tanning

Oils produced from trees grown in tropical areas contain a number of compounds that protect against damage from the sun's rays while allowing natural and vital vitamin D formation in the lower skin layers. Coconut oil, cocoa butter, shea butter, babassu, mango butter, and tamanu are a few of the tropical oils offering the best sun protection. The skin is provided with the raw materials necessary to protect itself against damage, while allowing light to perform the important function of making vitamin D in the skin.

A personal note on growing up in the tropics: in those far off days of the 1950s and 60s, tanning darkly was accepted. Our sunning oils were combinations of coconut oil and cocoa butter, not mineral oil or synthetic sunscreens. Now, living in the Pacific Northwest, I never use sunscreen, needing the Vitamin D that the occasional sun makes in my skin. If I lived in the southern desert, I would have to alter how I lived with the sun, avoiding the hot middle of the day and using the tropical oils for protection when outside in the sun.

The skin is a living organ, not an impermeable barrier. Synthetic chemicals in sunscreens and mineral oil can harm the skin in the presence of solar radiation. By having to overcome the effects of both the sun and incompatible and non-physiologic chemicals, the skin is overwhelmed and stressed, leading

to damaged tissues. The antioxidant compounds in tropical butters support skin cell function with natural and nourishing sun protective elements.

In the West, we have been repeatedly warned to fear the sun, but without it, life on planet earth would cease to exist. Coming to terms with how to protect against damage while enhancing the benefits we get from the sun is the best form of skin care. A food and skin care diet that relies on high quality fats and oils provides the skin tissues the compounds needed to remain in good condition throughout the span of a lifetime.

Oils and Skin Care

Oils used on the face and body should be as natural and organic as possible. Simple oils can be used to cleanse the face of makeup and dirt, by applying oil to the skin and wiping away the excess with a cloth or tissue. A hot washcloth placed over oiled, clean skin hydrates and supplies the face with phytoelements contained in the oil. The lighter oils, such as the omega-6 and omega-3 oils, make wonderful facial oils, either singly or in combination. Some oils are high in vitamin C, others in carotenes and pro-vitamin A compounds, minerals, and antioxidants. Applying them directly to the skin makes these nutrients available to skin cells. We'll discuss the types and uses of the different oils in the section on working with oils.