

The Skin Moisturizer Debate: Oil or Oil-Free?

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Dermatologists frequently are queried by patients regarding moisturizer selection. The fact that no single moisturizer meets the needs of all patients is clearly illustrated by the tremendous variety of products available for purchase through a variety of vendors, including drug stores, mass merchandisers, cosmetic counters, spas, boutiques, and Internet sales. Indeed, the skin moisturizer market is confusing for patients and physicians alike. One of the more common areas of controversy is whether patients should select an oil-free or an oil-containing moisturizer. Some manufacturers of skin moisturizers advertise that their products are entirely oil-free. Does this confer some benefit? Patients with acne state that if they use anything that contains oil, it causes them to break out. Does the oil contained in some moisturizers cause acne? Other patients state that they never use anything with petrolatum because it is not a natural substance. Is there any truth to any of these ideas from a medical standpoint? Or, are patients and physicians falling prey to the power of advertising and the promise of beauty?

The main ingredient used in oil-containing formulations is petrolatum and the main ingredient in oil-free formulations is dimethicone. These 2 ingredients will be discussed as prototypes in the oil vs oil-free moisturizer debate.

The Case for Oil

The most important oil used in dermatology is petrolatum. It is an age old chemical originally manufactured and patented in its refined form by Robert A. Chesebrough in 1872. He called his new discovery "Vaseline," a name and product that are still in

existence today. Chesebrough originally recommended the use of petrolatum as a chemical to treat leather; however, its value was soon recognized as a remedy for skin ailments. Petrolatum first appeared in the US Pharmacopoeia in 1880.

Petrolatum is a semisolid mixture of hydrocarbons that are obtained through the dewaxing of heavy mineral oils. Pure cosmetic-grade petrolatum is odorless and tasteless. It does not bind proteins or undergo chemical alteration in the skin, which accounts for the fact that is not allergenic and it is not a cutaneous irritant. In fact, petrolatum is used as the negative control for patch testing by many dermatologists and can be found as a carrier for many of the ingredients on the dermatologist's standard patch test tray.

Petrolatum also is noncomedogenic. Because it is a mixture of hydrocarbons, it can easily contain impurities if not well manufactured. Poor quality petrolatum may indeed contain tar impurities and tar is known to be comedogenic; however, cosmetic-grade petrolatum is devoid of tar impurities and does not cause comedone formation. Perhaps some of the confusion regarding the comedogenicity of petrolatum is due to the comedogenic nature of the tar impurities.

No cosmetic ingredient can come close to petrolatum in its ability to reduce transepidermal water loss by up to 99%, thus creating an environment conducive for skin healing. Petrolatum also can intercalate into the intercellular spaces of corneocytes that temporarily mimics the intercellular lipids and reduces itching and skin roughness. Petrolatum has not been duplicated synthetically, and natural petrolatum is found in about 75% of the skin care products and cosmetics marketed today.

The Case for Oil-Free

All oil-free skin care products and cosmetics must have an oily substance to allow the formulation to function as intended on the skin. The most common substance used in oil-free formulations is silicone oil. Silicone was developed in the 1930s when Franklin, Hyde, and McGragor discovered a method of extracting pure

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silica from raw quartzite and converting it to dimethyl silicone. There are currently over 4200 silicone-based products used in industries ranging from medicine to transportation to paper manufacture to food production to skin care.

Silicone originates from silica, which is found in sand, quartz, and granite. It derives its properties from the alternating silica and oxygen bonds that are known as siloxane bonds, which are exceedingly strong. These strong bonds account for the tremendous thermal and oxidizing stability of silicone. Silicone is resistant to decomposition caused by UV radiation, acids, alkalis, ozone, and electrical discharges. The silicone used in topical preparations is an odorless, colorless, nontoxic, oily liquid. To date, there are no reports of toxicity from use of topical silicone-based products.

The most common silicone used in skin care products and cosmetics is dimethicone. Dimethicone is a clear liquid that is insoluble in water and can be used in place of petrolatum and mineral oil in formulations. Dimethicone is found in all oil-free moisturizers and facial foundations. It is hypoallergenic, noncomedogenic, and nonacnegenic. This is the reason why it is popular among persons with sensitive skin and acne.

Oil vs Oil-Free

The data has been presented for both oil formulations that contain petrolatum and oil-free formulations that contain dimethicone. Which formulations are better? Both ingredients are hypoallergenic, noncomedogenic, and nonacnegenic. The answer is that they are both good and will provide superior functioning, but the best formulation for a given patient depends on the skin needs of the individual.

Oil-based formulations are superior to use for individuals with dry skin. Petrolatum reduces trans-epidermal water loss much better than dimethicone. Petrolatum also is longer-lived on the skin surface and can temporarily replace the intercellular lipids. Oil-free dimethicone products cannot function in this manner. However, petrolatum products create a warm heavy feeling on the skin surface and can be greasy. Dimethicone is less occlusive than petrolatum and is termed an astringent emollient because it can decrease the stickiness of petrolatum-based formulations. Dimethicone is excellent at making the skin surface smooth and shiny without leaving behind an objectionable film.

Oil-free formulations with dimethicone perform superiorly in individuals with oily skin. The dimethicone can mix with sebum on the surface of the skin to make the face feel less oily. Dimethicone also is excellent at smoothing the dry skin associated with acne medications while not making the skin feel greasy. This too is an important characteristic for products intended for individuals with oily skin. Dimethicone does not create an optimal environment for skin healing, but oily skin does not necessarily demonstrate barrier damage.

The oil vs oil-free debate should be considered separately from marketing jargon. Both types of formulations have a place in dermatology. In general, oil-based formulations are preferred where skin barrier defects exist while oil-free formulations are better when sebum production is abundant. The dermatologist should consider both formulations valuable and select the optimal moisturizer formulation based on individual patient skin types. ■