

# Moisturizers for Acne

## What are their Constituents?

**LEENA CHULAROJANAMONTRI, MD; PAPAPIT TUCHINDA, MD;  
KANOKVALAI KULTHANAN, MD; KAMOLWAN PONGPARIT, MD**

Department of Dermatology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

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### ABSTRACT

Acne is a chronic inflammatory disease of the pilosebaceous unit that affects almost all teenagers. Different treatments offer different modes of action, but aim to target acne pathology. Topical therapies, such as benzoyl peroxide, retinoids, antibiotics with alcohol-based preparations, and salicylic acid, can cause skin irritation resulting in a lack of patient adherence. Some physicians recommend patients use moisturizers as adjunctive treatment of acne, especially when either topical benzoyl peroxide or a retinoid is prescribed. Furthermore, some evidence shows that moisturizers can contribute independently to improve signs and symptoms of acne. Moisturizers contain three main properties, which are occlusive, humectant, and emollient effects. Currently, many moisturizers claim to be suitable for acne treatment. This article aims to provide a review of the active ingredients and properties of those moisturizers. Fifty-two moisturizers for acne were included for analysis. Most of the products (92%) have anti-inflammatory properties apart from occlusive, humectant, and emollient effects. Anti-acne medications, including salicylic acid, benzoyl peroxide, and retinol, were found respectively in 35, 10, and 8 percent of the moisturizer products containing anti-inflammatory properties. More than half of the products contain dimethicone and/or glycerin for its moisturizer property. Aloe vera and witch hazel are botanical anti-inflammatories that were commonly found in this study. Scientific data regarding some ingredients are discussed to provide a guide for physicians in selecting moisturizers for acne patients.

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Acne is a chronic inflammatory disease of the pilosebaceous unit that affects almost all teenagers between the ages of 15 and 17 years.<sup>1</sup> Clinical features include oily skin, noninflammatory lesions (open and closed comedones), inflammatory lesions (papules and pustules), and various degrees of scarring. Increased sebum production under androgen control, alteration of the keratinization, follicular colonization by *Propionibacterium acnes*, and inflammation are four main processes in the pathogenesis of the disease.

Different treatments of acne offer different modes of action, but aim to target the four aspects of acne pathology. Topical therapies, such as benzoyl peroxide (BP), retinoids, antibiotics with alcohol-based preparations, and salicylic acid (SA), can cause skin irritation resulting in a lack of patient adherence. Similarly, oral isotretinoin, which is the most effective medication for acne, usually causes dry skin, cheilitis, and photosensitivity.<sup>1</sup> Dryness or

skin irritation may cause barrier disruption of the stratum corneum leading to increased transepidermal water loss (TEWL) and production of inflammation.<sup>2</sup> Thus, some physicians recommend patients use moisturizers as adjunctive treatment of acne, especially when either topical BP or retinoid is prescribed.<sup>3</sup> Furthermore, some evidence shows that moisturizers can contribute independently to improve signs and symptoms of acne.<sup>1</sup>

Moisturizers contain three main properties, which are the occlusive, humectant, and emollient effects. The occlusive ingredients physically block TEWL by forming a hydrophobic film on the skin surface and within the superficial interstitium between corneocytes.<sup>4-5</sup> Occlusive agents, such as petrolatum, lanolin, mineral oil, paraffin, squalene, and silicone derivatives (dimethicone, cyclomethicone), are usually greasy.<sup>4</sup> Silicone derivatives are often used in combination with petrolatum, which make them greasy. However, silicone derivatives that have

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**ADDRESS CORRESPONDENCE TO:** Papapit Tuchinda, MD; E-mail: papapitt@gmail.com

**TABLE 1. Active ingredients in moisturizers for acne**

ACTIVE INGREDIENTS	PROPERTIES				
	OCCCLUSIVES	HUMECTANTS	EMOLLEINTS	ANTI-INFLAMMATORY	OIL-REDUCING
1. Almond oil			√		
2. Aloe vera ( <i>Aloe barbadensis</i> )				√	
3. Arachidyl alcohol			√		
4. Beeswax	√			√	
5. Benzoyl peroxide				√	
6. Betaine		√			
7. Bisabolol				√	
8. Butylene glycol		√			
9. Caprylic/capric triglyceride	√				
10. Cetearyl alcohol			√		
11. Cetyl alcohol	√				
12. Chamomile ( <i>Matricaria recutita</i> )				√	
13. Cholesterol			√		
14. Cocoa butter	√				
15. Coconut oil				√	
16. Cetearyl isononanoate		√			
17. Cucumber extract				√	
18. Cyclomethicone	√		√		
19. Cyclopentasiloxane			√		
20. Decyl oleate			√		
21. Dimethicone	√		√		
22. Ethylhexylpalmitate			√		
23. Fatty acids			√		
24. Glycerin (glycerol)		√			
25. Glyceryl stearate	√		√		
26. Glycyrrhetic acid				√	
27. Grape seed oil	√				
28. Green tea extract				√	
29. Honey		√			
30. Hyaluronic acid		√			
31. Hypericum perforatum (St. John's wort)				√	
32. Jojoba oil		√			
33. Isohexadecane			√		
34. Isopropyl myristate			√		
35. Lactic acid		√			
36. Lanolin (wool alcohol)	√		√		
37. Lecithin	√				
38. Licochalcone A				√	√

**TABLE 2. Moisturizers without anti-inflammatory properties**

ACTIVE INGREDIENTS	PRODUCTS			
	1	2	3	4
<b>MOISTURIZER EFFECT</b>				
Cetyl alcohol	√			
Glycerin (glycerol)			√	
Isopropyl myristate				√
Joboba oil		√		
Mineral oil ( <i>Paraffinum liquidum</i> )	√			
Paraffin				√
Propylene glycol	√			
Squalane		√		
Stearic acid	√	√		
Vitamin E				√
Products				
1. Cures by Avance Anti-Acne Moisturizer (Avance); 2. Carley's Midnight Moisturizer for Acne Prone Skin (Carley's Clear and Smooth); 3. Boots Expert Anti-Blemish Night Moisturizer (Boots); 4. Germany Nakabel Anti Acne and Blotches Cream Naturals Horse Milk Extract (Nakabel)				

not been combined with other ingredients are not greasy. The second property of moisturizers is humectant, which attracts water from the dermis to epidermis. Examples of humectants are glycerin (glycerol), sodium lactate, ammonium lactate, hyaluronic acid, sorbitol, urea, and alpha hydroxyl acids.<sup>1,4</sup> The other property of moisturizers is emollient, which smooths skin by filling space between skin flakes with a droplet of oil.<sup>1</sup> Emollients include a vast array of compounds ranging from esters to long chain alcohols, such as isopropyl isostearate, castor oil, propylene glycol, octyl stearate, and dimethicone.<sup>1</sup> One ingredient of moisturizers can have more than one property, such as dimethicone, which has both occlusive and emollient properties. Other ingredients including topical medications for acne and botanical anti-inflammatory substances are sometimes added to moisturizers for acne.

Currently, many moisturizers that are available either over the counter or online claim that they are suitable for acne treatment. The current study was designed to investigate the active ingredients and properties of those moisturizers.

**MATERIAL AND METHODS**

The authors used the key words “moisturizers” and “acne” to search for moisturizers that are available online. Only moisturizers that claimed they are suitable for acne, blemishes, and pimples were selected to identify their ingredients and properties. The same inclusion criteria were used for moisturizers that are available over the counter. Each moisturizer with its corresponding ingredients was entered into a Microsoft Excel (Seattle,

Washington) spreadsheet and then evaluated for their ingredients and properties.

**RESULTS**

Fifty-two products were included for analysis. Table 1 demonstrates the active ingredients and their properties that the authors were able to identify in the products. Some ingredients also have an oil-reducing property, which may be suitable for oily skin. Ninety-two percent (48/52) of the products have anti-inflammatory properties apart from occlusive, humectant, and emollient effects. Table 2 demonstrates a list of the products and their ingredients that do not contain anti-inflammatory properties. Anti-acne medications, including SA, BP, and retinol were found, respectively, in 35 percent (17/48), 10 percent (5/48), and 8 percent (4/48) of the moisturizer products containing anti-inflammatory effects (Tables 3 and 4). Twenty-two of 48 products (46%) contained other anti-inflammatory substances without anti-acne medications (Table 5). More than one-half of all products contain dimethicone and/or glycerin for their moisturizing properties. Aloe vera and witch hazel, botanical anti-inflammatories, were commonly found in the products as well.

**DISCUSSION**

Topical therapies, including SA, BP, retinoids, and antibiotics are effective in managing acne, but are associated with local adverse effects, such as irritation and dryness. A concomitant use of moisturizers can enhance efficacy, alleviate dryness, and improve skin comfort. The study by Laquieze et al<sup>6</sup> showed that using moisturizers

**TABLE 3. Moisturizers containing salicylic acid**

ACTIVE INGREDIENTS	PRODUCTS																
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
<b>MOISTURIZER EFFECT</b>																	
Arachidyl alcohol	√																
Butylene glycol			√		√		√		√			√					
Caprylic/capric triglyceride			√		√	√											
Cetearyl alcohol	√		√		√			√	√	√	√						
Cetyl alcohol				√				√	√		√		√				
Cyclopentasiloxane				√									√				
Dimethicone	√		√	√	√	√			√	√		√	√		√	√	√
Ethylhexylpalmitate									√								
Glycerin (glycerol)		√		√	√			√		√	√	√				√	√
Glyceryl stearate				√		√		√	√		√		√		√		
Isohexadecane					√											√	
Lactic acid						√											
Lecithin	√	√															
Mineral oil ( <i>Paraffinum liquidum</i> )															√		
Propylene glycol				√			√	√	√			√	√	√			
Safflower oil						√											
Sodium pyrrolidone carboxylic acid (PCA)							√										
Sorbital						√											
Squalane			√														
Stearic acid		√		√							√		√				
Stearyl alcohol				√									√				
Sunflower seed oil ( <i>Helianthus annuus</i> )	√																
Vitamin E			√			√	√		√		√				√		

Table 3 continued on next page

provided a significant improvement in skin dryness and comfort to the patients who were treated with oral or topical isotretinoin. From the study described herein, the authors found that SA was the most common anti-acne medication added in the moisturizers for acne. SA has comedolytic effects by breaking down follicular plugs because of its lipophilic nature and anti-inflammatory capability by affecting arachidonic acid cascade.<sup>7-10</sup>

However, SA is likely to cause local skin peeling when used at concentrations of 2% or more.<sup>11</sup> Thus, moisturizing properties in the products can relieve the irritation effect of SA. O’Goshi et al<sup>12</sup> demonstrated an increase in skin hydration of the skin of swine after applying 10% SA in petrolatum once daily for five days. The continuous effect was also detected over two weeks after cessation of application.<sup>12</sup>

**TABLE 3 continued. Moisturizers containing salicylic acid**

ACTIVE INGREDIENTS	PRODUCTS																
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
<b>ANTI-INFLAMMATORY</b>																	
Aloe vera ( <i>Aloe barbadensis</i> )				√	√		√				√						
Chamomile ( <i>Matricaria recutita</i> )				√			√										
Cucumber extract							√										
Licochalcone A							√										√
<b>SALICYLIC ACID</b>	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Tea tree oil ( <i>Melaleuca alternifolia</i> )	√														√		
Vitis vinifera (grape seed extract)							√										
Witch hazel ( <i>Hamamelis virginiana</i> )		√			√		√	√			√			√			
Zinc gluconate					√			√								√	

**Products**

5. Aveeno Clear Complexion Daily Moisturizer (Johnson and Johnson); 6. Burt's Bees Natural Acne Solutions Daily Moisturizing Lotion (Burt's Bees); 7. Philosophy Clear Days Ahead Oil-Free Salicylic Acid Acne Treatment and Moisturizer (Philosophy); 8. Neutrogena Oil-Free Anti-Acne Moisturizer (Johnson and Johnson); 9. Yves Rocher Pure System Soins Stop Imperfections Stop Blemish Lotion (Yves Rocher); 10. Pevonia SpaTeen Blemished Skin Moisturizer (Pevonia); 11. Acne Treatment Exfoliating & Rejuvenating Acne Treatment Gel/Non-Greasy Moisturizer; (DermaCosmec); 12. ANSR Day – acne protective moisturizer (Oregon Aesthetic Technologies, Inc.); 13. Hope in a Bottle | oil-free moisturizer and acne treatment | Philosophy (Philosophy); 14. Clean & Clear Oil-Free Dual Action Moisturizer (Johnson and Johnson); 15. Aubrey Organics – clarifying therapy moisturizer-acne treatment for acne-prone skin; (Aubrey Organics); 16. Clean & Clear Acne Control Moisturizer (Johnson and Johnson); 17. Clean & Clear Essentials Moisturizer Oil-Free Anti Acne Cream won't clog pores (Johnson and Johnson); 18. Dr. Somchai Face & Body Anti Acne Lotion prevent breakouts oiliness (SS Manufacturing Co., Ltd.); 19. Clear-n-Smooth Anti-Blemish Cream (Hawknad Manufacturing Industries, Inc.); 20. L'Oreal Men Expert Pure & Matte Acno Striker Moisturizer (L'Oreal); 21. Vichy Normaderm Tri-activ Anti-Imperfection Hydrating Care (Vichy Laboratories)

Similarly, BP and retinols are regarded as irritative agents. BP has greater activity than topical (iso)retinoin against inflammatory lesions while retinoids work well for comedolytic effects and decrease sebum excretion.<sup>1</sup> Although the concentration of BP used for acne is limited by local skin irritation, there were no significant differences in frequency and severity of irritation between the use of 5% and 2.5% BP.<sup>13</sup> The study by Matsunaga et al showed that the adjunctive use of a moisturizer (Cetaphil®, Galderma Laboratories, L.P.) improved local tolerance of adapalene gel.<sup>6</sup>

Dimethicone and glycerin were the most common ingredients found in the products. Dimethicone and cyclomethicone are silicone derivatives and usually used in oil-free facial moisturizers.<sup>4</sup> The term “oil-free” implies that this substance does not contain either mineral oil or

vegetable oil.<sup>4</sup> Dimethicone reduces TEWL without a greasy feel and contains both occlusive and emollient properties. It is suitable for acne and sensitive patients as it is noncomedogenic and hypoallergenic. Cyclomethicone is a thicker silicone that has similar properties as dimethicone. The authors found that other ingredients, such as petrolatum, lanolin, and mineral oil, were occasionally added in the 52 products analyzed, as they have some drawbacks for acne-prone skin. The use of lanolin is limited by odor, expense, and the fact that it is a common cause of allergic contact dermatitis.<sup>4,14</sup> Mineral oil is a lightweight inexpensive oil that is odorless and tasteless. One of the main concerns for its use is that it is comedogenic. However, there are different grades of mineral oil, including industrial grade and cosmetic grade. Some experts believe that cosmetic grade mineral oil is

**TABLE 4. Moisturizers containing benzoyl peroxide or retinol**

ACTIVE INGREDIENTS	PRODUCTS									
	22	23	24	25	26	27	28	29	30	
<b>MOISTURIZER EFFECT</b>										
Betaine							√			
Butylene glycol	√						√			
Caprylic/capric triglyceride							√			
Cetearyl alcohol										√
Cetyl alcohol					√		√			√
Cholesterol	√									
Cyclopentasiloxane	√									
Dimethicone	√				√		√	√	√	
Ethylhexylpalmitate							√			
Glycerin (glycerol)	√			√	√	√	√	√	√	√
Glyceryl stearate					√					
Grape seed oil									√	
Honey				√						
Hyaluronic acid					√					
Isohexadecane	√									
Jojoba oil							√		√	
Lactic acid		√								
Myristyl ether propionate									√	
Olive oil									√	
Panthenol										√
Propylene glycol										
Sodium hyaluronate	√			√			√			
Sodium pyrrolidone carboxylic acid (PCA)							√			
Sorbital							√			
Sugars	√									
Sunflower seed oil ( <i>Helianthus annuus</i> )	√									
Vitamin E	√	√			√	√	√	√	√	√
Zinc oxide		√								
<b>ANTI-INFLAMMATORY</b>										
Aloe vera ( <i>Aloe barbadensis</i> )		√		√	√	√			√	
<b>BENZOYL PEROXIDE</b>	√	√	√	√	√					
Bisabolol	√		√							
Chamomile ( <i>Matricaria recutita</i> )					√					
Green tea extract				√	√					
Marigold ( <i>Calendula officinalis</i> )					√					
Niacinamide/nicotinamide/vitamin B3		√								
<b>RETINOL</b>							√	√	√	√
Tea tree oil ( <i>Melaleuca alternifolia</i> )				√						
Vitis vinifera (Grape seed extract)									√	
Witch hazel ( <i>Hamamelis virginiana</i> )				√						

**Products**

22. Clinique Acne Solutions Clearing Moisturizer Oil-Free (Clinique Laboratories); 23. Augustus BioMed All-in-One Acne Cream + Moisturizer with Vitamin E (Augustus BioMed Skin Care LLC); 24. Paula's Choice Clear Line Extra Strength Acne Fighting Treatment ~ Moisturizer Lotion (Paula's Choice); 25. Acnezine Revitol Acne Moisturizing Cream (Revitol); 26. Acnezine Revitol Moisturizing Cream (Revitol); 27. IQ Natural "Sensitive" Acne Moisturizer w/ DMAE & MSM Anti-Acne Cream (IQ Natural); 28. Murad Anti-Aging Acne Moisturizer SPF 20 Facial Treatment Products (Murad); 29. ICI Natural Skincare Anti-Acne Moisturizer (ICI Natural); 30. Neutrogena Healthy Skin Anti-Wrinkle Anti-Blemish Treatment (Johnson and Johnson)

**TABLE 5. Anti-inflammatory moisturizers without anti-acne medications**

ACTIVE INGREDIENTS	PRODUCTS																					
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
<b>MOISTURIZER EFFECT</b>																						
Almond oil	√		√																			
Beeswax	√																					
Butylene glycol					√	√	√	√	√								√				√	√
Caprylic/capric triglyceride			√				√			√							√			√		
Cetearyl alcohol					√	√	√					√										√
Cetearyl isononanoate																				√		
Cetyl alcohol			√			√				√	√		√					√				
Cocoa butter			√																			
Cyclopentasiloxane		√					√			√												
Decyl oleate													√				√			√		
Dimethicone				√		√	√	√			√		√		√					√	√	√
Fatty acids																			√			
Glycerin (glycerol)		√	√	√			√	√		√	√				√		√			√	√	
Glyceryl stearate			√			√	√			√								√				
Grape seed oil														√								
Jojoba oil					√							√										
Lactic acid									√													
Lanolin	√														√							
Lecithin		√				√																
Marigold	√																					
Octyldodecanol																		√			√	
Olive oil										√		√								√		
Panthenol				√	√	√	√						√									
Propylene glycol		√						√	√				√					√				√
Saccharide isomerate					√																	
Sodium hyaluronate		√			√	√				√												
Sodium pyrrolidone carboxylic acid (PCA)									√													
Squalane					√										√					√		
Stearic acid						√							√									
Stearyl alcohol										√												
Sugars													√							√		
Vitamin E			√	√	√											√						

Table 5 continued on next page

**TABLE 5 continued. Anti-inflammatory moisturizers without anti-acne medications**

ACTIVE INGREDIENTS	PRODUCTS																					
	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
<b>ANTI-INFLAMMATORY</b>																						
Aloe vera ( <i>Aloe barbadensis</i> )			√					√	√			√	√	√	√							
Chamomile ( <i>Matricaria recutita</i> )								√				√						√				
Cucumber extract						√	√									√						
Glycyrrhetic acid				√																		
Green tea extract									√					√								
Licochalcone A					√					√		√										√
Marigold ( <i>Calendula officinalis</i> )	√																			√		
Niacinamide/ Nicotinamide/ Vitamin B3												√									√	
Shea butter ( <i>Butyrospermum parkii</i> )			√																		√	
Tea tree oil ( <i>Melaleuca alternifolia</i> )											√							√	√	√		
Vitis vinifera (Grape seed extract)						√			√					√								
Witch hazel ( <i>Hamamelis virginiana</i> )		√										√										√
Zinc gluconate				√																		

**Products**

31. Weleda Baby Calendula Face Cream (Weleda); 32. Dr. Somchai Acne Prevention Moisturizer (SS Manufacturing Co., Ltd.); 33. Yes To Daily Balancing Moisturizer, Tomatoes (Yes To); 34. Cetaphil Dermacontrol Moisturizer SPF 30 (Galderma); 35. Acne.org Moisturizer with Licochalcone (Acne.org); 36. Dermalogica Active Moist Moisturizer (Dermalogica); 37. Neutrogena Acne Stress Control, 3-in-1 Hydrating Acne Treatment (Johnson and Johnson); 38. Mentholatum Acne Oil Control Moisturizer SPF15 (The Mentholatum Company); 39. End-Zit Blemish Control Moisturizer for Treatment of Acne (ABBE Laboratories); 40. Coral Actives Moisturizer for Acne Prone Skin (Ermis LABS); 41. Therapeutic Acne Moisturizer (Emerge Skin Care); 42. Blissoma Solutions Natural Skincare (Irie Star); 43. SpaGlo Vitamin B Day Cream for Acne Control (SpaGlo Beauty); 44. Acne Ceuticals Moisturizer by Raw Skin Ceuticals (RawSkinCeuticals); 45. Happy Me Skincare Natural Acne Healing Moisturizer (High Concept Events); 46. Herbal Natural Cucumber Whitening Nourishing Moisturizing & Anti-Acne Cream (Thanyporn, Thailand); 47. Organix Ever Clear: TeaTree (acne treating) Facial Products (Vogue International); 48. PAN Cosmetic Acnicare Cream Anti-Acne & Blemish Oil Control Anti-Comedone (PAN Cosmetic); 49. Anti Acne Cream for Oily Skin with Natural Antibacterial Extracts (Swissorganics); 50. Papulex Isocorrexion for Acne Prone Skin (Sinclair Pharma France); 51. Eucerin DermoPURIFYER Hydrating Day Care (Beiersdorf); 52. Oriental Princess Acne Control Moisturizing Cream (O.P. Natural products co., LTD)

noncomedogenic.<sup>4,15</sup>

Glycerin is the most effective humectant available to increase stratum corneum hydration.<sup>16</sup> If the concentration of glycerin is too high, it will create a sticky feeling on skin. Hyaluronic acid and sodium pyrrolidone carboxylic acid (PCA), which are humectants, may be used in addition to glycerin to decrease stickiness. It should be noted that

application of a humectant alone can increase TEWL. For example, glycerin (glycerol) can increase TEWL by 29 percent.<sup>4</sup> Thus, a humectant agent is usually combined with an occlusive ingredient when used as a moisturizer. The authors found that glycerin (humectant) and dimethicone (occlusive agent) were usually used in combination in the 52 products analyzed.



Metals and botanical extracts are sometimes added in the moisturizers for their anti-inflammatory properties. Ginkgo biloba, green tea, aloe vera, allantoin, and licochalcone are botanical anti-inflammatory agents that are commonly used in the current market.<sup>17</sup> Aloe vera and witch hazel, which were found commonly in this study, also have skin-soothing properties.<sup>17</sup> The anti-inflammatory effect of aloe vera results from inhibition of cyclooxygenase in the arachidonic pathway. The concentration of aloe vera should be at least 10 percent in order to have a moisturizing effect.<sup>4,17</sup> Witch hazel is commonly used as an astringent in people with oily skin. Its high tannin content obtained by steam distillation of the plant may cause astringent action. Hamamelis ointments, known as witch hazel ointments, are used as acne cosmeceuticals.<sup>4,17</sup>

Currently, there are many metals, such as zinc, copper, selenium, aluminum, and strontium, that are used in cosmeceuticals.<sup>17</sup> Well-established scientific data support the anti-inflammatory and wound healing benefits of zinc. Alkaline phosphatase requires multiple zinc ions, which are involved in adenosine monophosphate metabolism.<sup>4,17</sup> This action has a role in restraining an inflammatory response.

In conclusion, the authors aim was to investigate the ingredients and properties of moisturizers claimed to be suitable for use in acne patients. Some scientific data regarding the properties and mechanisms of action were provided to aid physicians in selecting a suitable moisturizer for their acne patients.

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