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TABLE III. Propylene glycol-free topical corticosteroids

	0	G	C	L	S
Amcinonide					
Cyclocort			X	X	
Betamethasone dipropionate					
Alphatrex	X		X	X	
Diprosone	X			X	
Maxivate	X		X		
Betamethasone valerate					
Betatrex	X		X	X	
Desowen	X				
Tridesilon	X		X		
Valisone	X			X	
Desonide					
Desowen	X				
Tridesilon	X		X		
Desoximetasone					
Topicort		X	X		
Topicort LP			X		
Diflorasone diacetate					
Florone	X				
MaxifIor	X				
Fluocinolone acetonide					
Synalar	X				
Flurandrenolide					
Cordran	X			X	
Halcinonide					
Halog	X				X
Hydrocortisone					
Hytone	X				
Lacticare HC				X	
Nutracort				X	
Hydrocortisone acetate					
Pramosone	X			X	
Hydrocortisone butyrate					
Locoid	X		X		
Triamcinolone acetonide					
Aristocort	X				
Aristocort A			X		
Kenalog	X				

0. ointment; G. gel; C. cream; L. lotion; S. solution

CUTANEOUS REACTIONS TO PROPYLENE GLYCOL

The potential for irritant reactions and sensitization to propylene glycol has been recognized since 1952, when Warshaw and Henmann noted reactions in patients in whom propylene glycol was used as a solvent for patch test allergens. Since then, authors have reported numerous cases of contact dermatitis from propylene glycol in a wide variety of topical preparations.

Substances that have been associated with patch test-proved propylene glycol reactions are listed in Table I. Each preparation contains a unique concentration of propylene glycol, ranging from approximately 2% to 60%.

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Table IL Propylene glycol patch test studies

Author(s)	Propylene glycol concentration %	No. of persons tested	No. of Positive reactions %	Investigator's interpretation of reaction
Warshaw and Herrmann[23]	100	366	138 (15.7)	Irritant
Huriez et al.[36]	38	183	23 (12.5)	Allergic
Braun[37]	10	78	3 (4)	Allergic
Fisher et al.[21]	10	100	2 (2)	Allergic
Hannuksela et al.[38]	100	1556	194 (12.5)	"True allergy'
	32	42*	20	in 4 cases;
	10	42'	12	remainder irritant
	3.2	42*	9	
Hannuksela et a1[39]	2	880	2 (0.2)	Allergic
Nater et a1[40]	100	98	11 (11.2)	Irritant
Blondeel et al.[9]	10	330	13 (3.9)	**
Angelini and Meneghini[41]	20	400	6 (1.5)	Allergic
Romaguera et a1[42]	5/10	1450	15 (1)	**
Andersen and Storrs[43]	100	84	12 (14.3)	5 cases allergic 7 cases irritant
Angelini et al.[44]	5	3364	27 (0.8)	Allergic
Hannuksela and Salo[45]	30	86	19 (22)	**
	10	86	7 (8)	
	1	86	5 (5.8)	
Willis et al.[46]	100	35	14 (40)	Irritant
	50	16	0 (0)	
Kinnunen and Hannuksela[47]	30	823	31 (3.8')	* *

*Selected from subjects reacting to 100% propylene glycol.
**Investigators did not state whether reactions were judged irritant or allergic.

DERMATOLOGIC USES

Propylene glycol as a therapeutic agent

Propylene glycol possesses several properties that have been tested in therapeutic trials. Studies have demonstrated that certain concentrations of propylene glycol can denature protein and induce keratolysis. [13]

Propylene glycol as a vehicle

Propylene glycol is an ideal vehicular component for many topical preparations. It is a superior solubilizer, spreader, and emollient[21] and has often been used as a replacement for glycerin in dermatologic and cosmetic preparations[8] The low cost of propylene glycol provides an additional advantage.[22]

Within the past decade there has been increased use of propylene glycol in topical corticosteroid formulations. We found propylene glycol in varying concentrations in approximately 55% of the topical steroids currently available." Propylene glycol can be found in similar percentage[6] of topical antibacterials, antifungals, benzoyl peroxide preparations and emollients.[11] The concentration of propylene glycol in each therapeutic formulation is variable, the final percentage is determined according to optimal stratum corneum penetration and drug release. Small changes in the concentration of propylene glycol can adversely affect drug absorption.[1,5]

Given this widespread presence of propylene glycol, many persons are exposed to the substance. The potential for adverse skin reactions is therefore significant.