

Sorbitan Sesquioleate: An Emerging Contact Allergen

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Sorbitol-based emulsifiers such as sorbitan sesquioleate (SSO) are commonly used in topical corticosteroids, topical antibiotics, topical antifungals, moisturizing creams and lotions, and topical retinoids. Contact dermatitis from sorbitol derivatives appears to be increasingly prevalent. Patch-testing with SSO can be useful in the work-up of patients with presumptive cosmetic allergic contact dermatitis. Those sensitized to SSO can be counseled to avoid sorbitol-containing products, especially topical corticosteroids. Herein we discuss case reports of SSO allergy and a recent case series of 12 of 112 dermatitis patients (10.7%) patch-tested during a 6-month period who showed contact allergy to SSO. We provide a list of key corticosteroids and products that can contain SSO, sorbitol, or sorbitol derivatives.

SORBITAN SESQUIOLEATE (SSO) is an emulsifier formed from derivatives of oleic acid (a monosaturated fatty acid) and sorbitol (a sugar alcohol). SSO is used in some cosmetics and in a wide range of topical corticosteroid ointments. Potential cross-reactors of SSO, as listed in the Contact Allergen Replacement Database, include sorbitan monooleate, sorbitan monostearate, polysorbate, and sorbitol. SSO and other sorbitol derivatives may also be used in antifungals, antibiotics, acne treatments, and moisturizers.¹⁻³ In addition, SSO is an emulsifier in some allergens used for patch testing. Fragrance mix I (FM I), ethyleneurea/melamine formaldehyde (EU/MF), and the individual components of FM I all contain SSO.⁴⁻⁶ At Tufts Medical Center, we test with SSO 20% in petrolatum routinely in our cosmetic and vehicle series. Clinically important and prevalent contact allergy to SSO appears to be a recent and emerging phenomenon.¹⁻³

Currently, the North American Contact Dermatitis Group (NACDG) does not test for SSO sensitization in dermatitis patients.⁷ SSO did not appear to be an

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important contact allergen in previous studies. Large studies conducted one to three decades ago that evaluated sensitization to various emulsifiers, including SSO, found that SSO was not an important allergen at that time.^{4,5,8,9} However, evidence has suggested that SSO sensitization is on the rise. A small case series recently described contact allergy to SSO caused by an SSO-containing wound dressing.¹⁰ SSO allergy stemming from topical corticosteroid preparations as well as other product formulations has also been reported.^{2,11} We recently described 12 (10.7%) of 112 patients patch-tested during a 6-month period who had contact allergy to SSO.³ All of these patients were using products emulsified with SSO, sorbitol, or sorbitol derivatives. We found these emulsifiers in topical antifungals (ciclopirox cream), topical antibiotics (metronidazole and clindamycin cream), moisturizing creams and lotions (Vanicream Skin Cream and Vanicream Lite Lotion, Pharmaceutical Specialties, Inc., Rochester, MN), and toothpaste (Crest Toothpaste, Procter & Gamble, Cincinnati, OH). Of note, 75% of the individuals in our study were using topical corticosteroids (typically oint-

Table 1. Sorbitan Sesquioleate and Topical Corticosteroids

Steroid Group	Steroid Name	Potency
D	Clobetasol propionate ointment	Super
	Halobetasol propionate ointment	Super
	Betamethasone dipropionate ointment	Super
	Fluticasone propionate ointment	High
C	Desoximetasone ointment	High
B	Fluocinonide ointment	High
A	Hydrocortisone acetate ointment	Low

Adapted from Asarch A, Scheinman PL.³

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ments) that contained SSO or sorbitol derivatives. We followed-up approximately 70% of patients in this study, and 89% showed improvement with the avoidance of proven contact allergens, including sorbitan derivatives, that had been delineated by patch testing. Additionally, we followed-up 78% of individuals who were initially using topical corticosteroids emulsified with sorbitol derivatives. All of these patients improved with a change of topical corticosteroids and the use of cosmetics containing no other proven contact allergens.³

Table 1, adapted from a previous report, lists and groups some topical corticosteroids that contain SSO. Steroids from any of the groups, as well as those of multiple potency levels, can contain SSO.³ Whereas SSO appears to be largely confined to ointments, sorbitol derivatives can be found in numerous topical vehicle types. Coloe and Zirwas recently found that 47 of 166 topical corticosteroid preparations contain SSO or a potential SSO cross-reactor.¹ The application of these emulsifiers to inflamed skin likely contributes to sensitization.

Table 2. Some Products Containing Sorbitan Sesquioleate, Sorbitol, or Sorbitol Derivatives

<i>Product Type</i>	<i>Product</i>	<i>SSO, Sorbitol, or Sorbitol Derivative</i>
Topical antifungals	Ketoconazole cream	Sorbitan monostearate, polysorbate
	Ciclopirox cream	Sorbitan monostearate, polysorbate
Topical antibiotics	Clindamycin cream	Sorbitan monostearate, polysorbate
	Metronidazole cream	Sorbitol
Creams and lotions	Vanicream Skin Cream*	Sorbitol
	Vanicream Lite Lotion*	Sorbitol
	Cutemol Emollient Skin Cream [†]	Sorbitan sesquioleate
Topical retinoids	Tazorac Cream [‡]	Sorbitan monooleate
Lipstick	Almay Hydracolor Lipstick [§]	Sorbitan sesquioleate
Oral hygiene products	Crest Toothpaste	Sorbitol
	Arm and Hammer Toothpaste [¶]	Sorbitol
	Aquafresh Toothpaste [#]	Sorbitol
	Colgate Toothpaste**	Sorbitol
Foods	Apples	Sorbitol
	Cherries	Sorbitol
	Berries	Sorbitol
	Plums	Sorbitol
	Pears	Sorbitol
	Seaweed	Sorbitol
	Sucrose-free cakes and cookies	Sorbitol
Oral liquid medications ¹³	Tylenol Maximum Strength Liquid ^{††}	Sorbitol
	Mylanta Liquid ^{‡‡}	Sorbitol
	Furosemide Solution ^{§§}	Sorbitol
	Zantac Syrup [#]	Sorbitol
Pediatric products ²	Desitin Diaper Rash Ointment	Sorbitan sesquioleate
	Baby Magic Creamy Baby Oil ^{¶¶}	Sorbitan sesquioleate

SSO = sorbitan sesquioleate.

*Pharmaceutical Specialties, Inc., Rochester, MN.

[†]Summers Laboratories Inc, Collegeville, PA.

[§]Revlon Inc, Oxford, NC.

^{||}Procter & Gamble, Cincinnati, OH.

[¶]Church & Dwight Co., Inc., Princeton, NJ.

[#]GlaxoSmithKline, Middlesex, United Kingdom.

**Colgate-Palmolive Company, New York, NY.

[‡]Allergan, Inc., Irvine, CA.

^{††}McNEIL-PPC, Inc, Fort Washington, PA.

^{‡‡}Johnson & Johnson - Merck Consumer Pharmaceuticals Co, Fort Washington, PA.

^{§§}Boehringer Ingelheim Roxane, Inc, Columbus, OH.

^{||||}Pfizer Inc., New York, NY.

^{¶¶}Playtex Products, Streetsboro, OH.

Table 2 lists some additional preparations and consumer products that may contain SSO, sorbitol, or sorbitol derivatives. Topical medicaments and cosmetics both can contain these emulsifiers. Antibiotic and antifungal creams, acne treatments, skin creams and lotions, and lipsticks can contain sorbitol derivatives. Sorbitol or its derivatives can also be found in many toothpastes and mouthwashes. In our previous study, a patient with lip dermatitis was using toothpaste that contained sorbitol; SSO reactivity was shown on patch testing, and the patch-test results were felt to be clinically relevant for the presenting symptoms.³ Sorbitol, a sugar alcohol, can also be found in certain foods and oral medications. Apples, cherries, berries, plums, pears, seaweed, and certain sucrose-free cakes and cookies can contain this chemical (see Table 2).¹² Numerous oral liquid medications can also contain sorbitol.¹³ Thus, patients could possibly develop systemic contact dermatitis from ingesting foods or medications high in sorbitol content. Pereira and colleagues suspected that systemic contact dermatitis in an SSO-allergic patient was being caused by foods.⁶ Adcock and Gray found that 90% of oral sorbitol was absorbed after ingestion.¹⁴ However, the threshold level of ingested sorbitol needed to elicit systemic contact dermatitis in a sorbitan-allergic patient is currently unknown.

In summary, a growing body of evidence suggests that SSO is a significant contact allergen. Testing for SSO allergy can be helpful in the treatment of patients with allergic contact dermatitis. It can allow for the initiation of appropriate topical steroid treatments without risk from potential contact sensitizers. Additionally, testing for SSO allergy is useful for avoiding false positives when testing for other allergens emulsified with SSO, such as FM I, individual FM I constituents, or EU/MF.^{3,15} SSO, sorbitol, and sorbitol derivatives are found in numerous topical product formulations. The large number of products (most notably, corticosteroids) that contain SSO provides patients with numerous possibilities of exposure to the emulsifier and consequent contact sensitization.

Recognizing this relationship will likely aid dermatologists in the treatment of their patients.

References

- Coloe J, Zirwas MJ. Allergens in corticosteroid vehicles. *Dermatitis* 2008;19:38–42.
- Castanedo-Tardan MP, Jacob SE. Allergic contact dermatitis to sorbitan sesquileate in children. *Contact Dermatitis* 2008;58:171–2.
- Asarch A, Scheinman PL. Sorbitan sesquileate, a common emulsifier in topical corticosteroids, is an important contact allergen. *Dermatitis* 2008. DOI 10.2310/6620.2008.08013.
- Frosch PJ, Pilz B, Burrows D, et al. Testing with fragrance mix. Is the addition of sorbitan sesquileate to the constituents useful? *Contact Dermatitis* 1995;32:266–72.
- Enders F, Przybilla B, Ring J. Patch testing with fragrance-mix and its constituents: discrepancies are largely due to the presence or absence of sorbitan sesquileate. *Contact Dermatitis* 1991;24:238–9.
- Pereira F, Cunha H, Dias M. Contact dermatitis due to emulsifiers. *Contact Dermatitis* 1997;36:114.
- Warshaw EM, Belsito DV, DeLeo VA, et al. North American Contact Dermatitis Group patch-test results, 2003–2004 study period. *Dermatitis*. 2008;19:129–36.
- Hannuksela M, Kousa M, Pirila V. Contact sensitivity to emulsifiers. *Contact Dermatitis* 1976;2:201–4.
- Tosti A, Guerra L, Morelli R, Bardazzi F. Prevalence and sources of sensitization to emulsifiers: a clinical study. *Contact Dermatitis* 1990;23:68–72.
- de Waard-van der Spek FB, Devillers AC, Oranje AP. Allergic contact dermatitis to sorbitan sesquileate in Adaptic wound dressing. *Contact Dermatitis* 2007;57:54–6.
- Green C, Kenicer KJ. A case of “contact allergy to corticosteroid.” *Contact Dermatitis* 1993;28:39–40.
- Gao Z, Maurousset L, Lemoine R, et al. Cloning, expression, and characterization of sorbitol transporters from developing sour cherry fruit and leaf sink tissues. *Plant Physiol* 2003;131:1566–75.
- Feldstein TJ. Carbohydrate and alcohol content of 200 oral liquid medications for use in patients receiving ketogenic diets. *Pediatrics* 1996;97:506–11.
- Adcock LH, Gray CH. The metabolism of sorbitol in the human subject. *Biochem J* 1957;65:554–60.
- Orton DI, Shaw S. Sorbitan sesquileate as an allergen. *Contact Dermatitis* 2001;44:190–1.