

ORIGINAL ARTICLE

Results of patch testing in 10 patients with peristomal dermatitis

Megan N. Landis, MD,^a James H. Keeling, MD,^a James A. Yiannias, MD,^c Donna M. Richardson, RN,^b
Diane L. Nordberg Linehan, RN,^a and Mark D. P. Davis, MD^b
Jacksonville, Florida; Rochester, Minnesota; and Scottsdale, Arizona

Background: Peristomal dermatitis is a common problem in patients with ostomies that is a source of considerable morbidity. Irritant contact dermatitis is most common, but allergic contact dermatitis can also occur. Because of the lack of published reports on patch testing for this indication, we undertook a retrospective study of patch testing results in patients with suspected peristomal allergic contact dermatitis.

Objective: We sought to describe our patch testing experience with patients referred with peristomal dermatitis.

Methods: This was a retrospective review of medical records of patients with ostomies and peristomal dermatitis who underwent patch testing in the Mayo Clinic Departments of Dermatology in Jacksonville, FL; Rochester, MN; and Scottsdale, AZ, during a 10-year period (2000-2010).

Results: Ten patients with peristomal dermatitis were referred for patch testing (6 in Minnesota, 2 in Florida, and 2 in Arizona). Patients were patch tested to the materials used in their stoma devices, to the standard series, and in some cases to supplemental series. All 10 had at least one allergic patch test reaction, most commonly to stoma paste (3 of 10 patients).

Limitations: Retrospective nature of study via chart review is a limitation.

Conclusion: Patch testing is a useful tool for identification of allergens in patients with peristomal dermatitis. (J Am Acad Dermatol 10.1016/j.jaad.2011.07.009.)

Key words: allergens; allergic contact; dermatitis; ostomy; patch tests; surgical stomas.

Intestinal stomas are increasingly used to treat patients with debilitating conditions such as Crohn's disease. About 100,000 ostomy surgeries are completed annually, adding to the more than 1 million persons in North America who already have intestinal stomas.¹ Although ostomies can be disease curing, and even life saving at times, they are not without complications. The most common complication is peristomal dermatitis,² which affects more

than one third of patients with colostomy and more than two thirds of patients with ileostomy.³

Of the various types of peristomal dermatitis, irritant contact dermatitis occurs most commonly. Allergic contact dermatitis (ACD) can also occur because of potential allergens in such items as the stoma appliance or materials, topical medications, adhesives, and skin cleansers. Although patch testing is the optimum tool for identifying potential allergens, there are few reports on the patch testing of such patients. We therefore decided to review our institutional experience of patch testing for peristomal dermatitis.

METHODS

Patients

After approval by the Mayo Clinic Institutional Review Board, we searched the institutional electronic patch test database of patient records to identify patients with ostomies who underwent patch testing at any of our 3 departments of

From the Departments of Dermatology at Mayo Clinic in Jacksonville, ^a Rochester, ^b and Scottsdale.^c

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Reprint requests: Mark D. P. Davis, MD, Department of Dermatology, Mayo Clinic, 200 First St SW, Rochester, MN 55905. E-mail: davis.mark2@mayo.edu.

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dermatology (Scottsdale, AZ; Jacksonville, FL; or Rochester, MN) between January 2000 and April 2010. Numerous patients with ostomies had undergone informal patch testing by our nurses treating stoma by means of a use test; however, these patients were not included in this series. Denial of research authorization from patients who did undergo patch testing constituted the main criterion for exclusion from analysis.

Interpretation of patch test results

We used standardized patch testing methods, as delineated by the North American Contact Dermatitis Group⁴ and as reported previously.^{5,6} Patients were excluded from patch testing if they had applied topical corticosteroids to patch test sites or had taken immunosuppressive drugs (including oral corticosteroids); they also were excluded if they had medical conditions that might compromise evaluation of skin responsiveness. Patch testing equipment consisted of Finn Chambers (SmartPractice, Phoenix, AZ [formerly Epitest Ltd Oy, Tuusula, Finland]) on Scanpor tape (Norgesplaster AS, Vennesla, Norway). Each patient had patches applied to the upper aspect of the back that were left in place for 48 hours. Allergens were obtained from Chemotechnique Diagnostics (Vellinge, Sweden) or were compounded at the Mayo Clinic pharmacy. Patch test reactions were evaluated at 48 to 72 hours after application and then again at 96 to 168 hours. A nurse or a physician trained in patch testing performed the final patch test reading. A physician interpreted the results and assessed their relevancy. Patients were encouraged to return for a visit with the physician who ordered the patch test after the completion of patch testing for further assessment of the results.

Patch test reactions were categorized as: (1) negative, (2) macular erythema or weak reaction (non-vesicular erythema, infiltration, or possible papules), (3) strong (edematous or vesicular), or (4) extreme (spreading, bullous, or ulcerative). An interpretation of the patch test reactions as relevant or irrelevant was based on a known history of contact with a substance containing the allergen or a known history of circumstances involving likely contact with substances containing the allergen. The relevancy of each reaction was identified as one of the following:

irritant (coded as “I”); allergic but not relevant (no exposure to products containing the allergen; coded as “N”); allergic but questionably relevant (recent exposure to products likely containing the allergen; coded as “Q”); allergic but formerly relevant (prior exposure to products likely containing the allergen; coded as “P”); and allergic and relevant (use test or

patch test with product containing allergen was positive or ingredient was verified in patient’s product and the use of that product was verified; coded as “R”). At the last reading, positive allergic patch test results were defined as: (1) weak reaction, (2) strong reaction, (3) extreme reaction, or (4) a macular erythema reaction if results were relevant after the exclusion of irritant reactions.

Materials

Patients were patch tested to the standard series of allergens and to other series on the basis of their clinical presentation and clinical history, including occupation, hobbies, and social history, as determined by the physician who performed the testing (Table I). The additional series included the plastics and glues series, the cosmetic series, the corticosteroid series, and the cosmetic and fragrance series. Patients also were tested to their respective ostomy devices and supplies, as outlined in Table I and as illustrated by Figs 1 to 3.

When testing to ostomy devices and supplies was conducted, a small piece of the material was placed on an area of uninvolved skin, which was then covered with tape (Scanpor tape [Norgesplaster AS] in Florida; paper tape secured with Cover-Roll stretch tape [Beiersdorf AG, Hamburg, Germany] in Minnesota and Arizona) or a Tegaderm Film dressing (3M Health Care, St Paul, MN), depending on skin tolerance to these products. The materials were left in place for 48 hours. Reactions were evaluated at 48 to 72 hours and then again at 96 to 168 hours after application of the materials.

Statistical analysis

Patient data were entered into a clinical database. The application used a client server written in Uniface (Compuware Corp, Detroit, MI), and the database was Sybase (Sybase Inc, Dublin, CA).

CAPSULE SUMMARY

- Peristomal dermatitis is a common problem in patients with ostomies that is a source of considerable morbidity; irritant contact dermatitis is most common, but allergic contact dermatitis can also occur.
- Stoma adhesive paste was the most commonly identified allergen in a series of 10 patients.
- Patch testing in such patients should use both a large standard series and the patient’s own ostomy device and supplies.

Table I. Characteristics of 10 patients with ostomies and allergic contact dermatitis

Patient No.	Age, y	Sex	Type of stoma	Allergens tested	Relevant allergens	Follow-up, mo	Dermatitis resolved with allergen avoidance
1	49	M	Colostomy	• Standard series • Plastics and glues series • Test samples sent by stomal company: ◦ Pectin ◦ Polyisobutylene ◦ Sodium carboxymethyl cellulose ◦ Styrene/isoprene/styrene block copolymer ◦ Petrolatum ◦ Irganox antioxidant in petrolatum* ◦ Aliphatic hydrocarbon resin	• Thimerosal • Benzoyl peroxide • Fragrance mix • Hexachlorophene	108	Yes
2	65	M	Ileostomy	• Standard series • Tape[†] • Durahesive skin barrier[†] • Stomahesive paste[†]	• Durahesive skin barrier[†] • Stomahesive paste[†]	3	Yes
3	74	M	Colostomy	• Standard series • Sween Micro-guard powder (antifungal)[‡] • Paste[‡] • Stoma care natural aloe-based skin care wipes[§] • Hollister 8610 outer appliance tape • Hollister 8610 stoma adhesive	• Bacitracin 20% ointment	54	Yes

Continued

Table I. Cont'd

Patient No.	Age, y	Sex	Type of stoma	Allergens tested	Relevant allergens	Follow-up, mo	Dermatitis resolved with allergen avoidance
4	73	F	Urostomy	• Standard series • Nystop (nystatin topical powder)[¶] • Stomahesive paste[†] • Stomahesive protective powder[†] • Natura Durahesive (beige part)[†] • Kendall Alginate hydrocolloid dressing • Econazole nitrate cream 1% • Cutivate (fluticasone propionate ointment 0.005%)[#] • Zinc oxide 25% paste • Natura Durahesive (tape part)[†]	• Stomahesive paste[†]	4	Yes
5	52	M	Ileostomy	• Standard series • Cosmetics • Plastics and glues • Rubber series • Stomahesive paste[†] • Hypafix tape^{**} • Skin-Prep protective wipe^{**} • White plastic bag (back of ostomy bag) • Flesh-colored plastic (ostomy bag) • Natura Durahesive wafer[†] • Natura Durahesive plastic ring[†] • New Image wafer	• Diphenyl-4-phenylenediamine • Cyclohexyl-N-phenyl-4-phenylenediamine • Isopropyl-N-phenyl-4-phenylenediamine • Methyldibromoglutaronitrile/ phenoxyethanol • Diphenylguanidine • Ethylenediamine • Potassium dichromate	8	Yes

6	71	F	Colostomy	• Standard • Preservative • Plastics and glues series • Rubber series • DuoDERM[†] • FlexWear skin barrier	• Benzoic acid • Hexylresorcinol	7	Yes
7	63	M	Ileostomy	• Standard series • Cosmetic series • Plastics and glues series • Rubber series • Wood chips • Stomahesive paste[†] • Fluocinonide gel • Stomahesive protective powder[†] • Skin prep protective wipe • Micropore tape^{††} • Stoma appliance	• Stomahesive paste[†]	63	Yes
8	39	M	Urostomy	• Standard series • Plastics and glues series • Steroid series • Stoma bag (clear plastic) • Stoma bag (white plastic side) • Eakin cohesive seal[†] • Durahesive skin barrier[†]	• Benzoyl peroxide (unknown significance)	67	NA (no known exposure, resolved with empiric topical corticosteroids)

Continued

Table I. Cont'd

Patient No.	Age, y	Sex	Type of stoma	Allergens tested	Relevant allergens	Follow-up, mo	Dermatitis resolved with allergen avoidance
9	86	M	Urostomy	• Standard series • Nystatin-triamcinolone cream • Triamcinolone 0.05% cream • Nystatin powder • Appliance ring • Appliance tape • Eakin cohesive seal[†] • New Image skin barrier (No. 15903) • Micropore tape^{††} • Stomahesive paste[†] • Strip paste[‡] • Medical adhesive • Stomahesive powder[†] • Cavilon No-Sting barrier film^{††} • Skin barrier[†] • Tape[†] • Hollister 8733 skin barrier • Hollister 8733 tape	• Neomycin sulfate • Bacitracin • Fragrance mix (unknown significance)	95	NA (no known exposure, resolved with empiric topical corticosteroids)
10	63	F	Ileostomy	• Standard series • Plastics and glues series • Rubber series and steroid series • Stoma wafer	• Ethyl cyanoacrylate	10	No (possible persistent exposure)

Sources of allergens have been specified as much as possible, but in some cases general product descriptions were only information available.

Not all patients will be allergic to every product identified as producing allergic reactions.

F, Female; M, male; NA, not available.

*BASF, Florham Park, NJ (formerly Mount Olive, NJ).

[†]ConvaTec Inc, Skillman, NJ (formerly part of Squibb, Princeton, NJ then Bristol-Myers Squibb, Princeton, NJ).

[‡]Coloplast Corp, Minneapolis, MN.

[§]Torbot, Cranston, RI.

^{||}Hollister Inc, Libertyville, IL.

[¶]Paddock Laboratories Inc, Minneapolis, MN.

[#]GlaxoSmithKline PLC, Brentford, United Kingdom.

^{**}Smith & Nephew, London, United Kingdom.

^{††}3M Health Care, St Paul, MN.

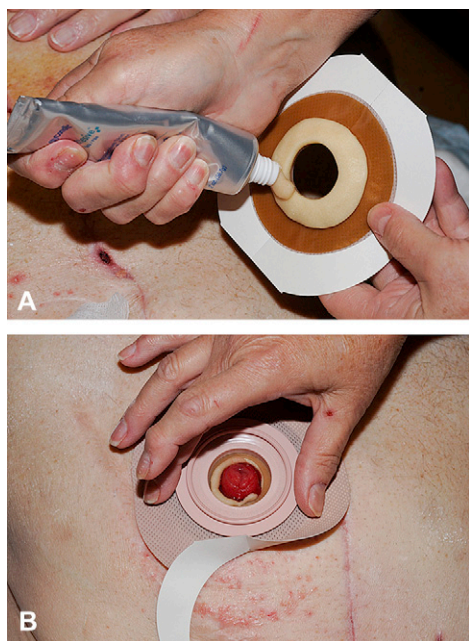


Fig 1. Application of stoma device. Application of stoma adhesive to ostomy device (**A**) and attachment of device to skin around stoma (**B**).

RESULTS

We identified 10 patients with peristomal dermatitis who underwent patch testing. Fig 4 shows an illustrative example of peristomal ACD. Table I lists the 10 patients and the allergens to which each patient reacted. Allergic reactions occurred most commonly to stoma paste, with 3 patients reacting to Stomahesive paste (ConvaTec Inc, Skillman, NJ). Further testing to the individual components of the different types of paste was not performed.

All 10 patients reacted to at least one allergen. All 10 patients had follow-up contact in person at the clinic or by telephone with a clinician from the dermatology department or another department (eg, from a nurse treating wound ostomy continence or from colorectal surgery or urology). The overall mean duration of follow-up was 41.9 months (Table I).

Seven patients with relevant positive reactions improved with avoidance. Three of these 7 patients had reactions only to their appliances or to their ostomy supplies (ie, Durahesive skin Barrier [patient 2] and Stomahesive paste [patients 2, 4, and 7] [ConvaTec Inc]). The other 4 in the group of 7 patients reacted to allergens from the standard series (patients 1, 3, 5, and 6) or the supplemental series (plastics and glues series [patient 1]) used in patch testing. One of these patients (patient 5) also reacted to the rubber series used in patch testing (Table I).

Two patients had positive reactions of unknown significance to benzoyl peroxide (patient 8) and to

neomycin sulfate, bacitracin, and fragrance mix (patient 9) that improved with empiric topical corticosteroid treatment. Patient 10 had a positive reaction of unknown significance to ethyl cyanoacrylate that did not improve. The allergen may have been present in the patient's device adhesive, thus causing a persistent reaction secondary to persistent exposure. ConvaTec Inc, the manufacturer of the patient's stoma device, was contacted to determine whether ethyl cyanoacrylate was present in the device but would not provide that information.

We also searched the medical literature to identify previously reported cases of ACD in patients with ostomies,^{3,7-24} and the results are summarized in Table II.

DISCUSSION

Herein, we report on a series of 10 patients with peristomal ACD and the allergens to which they reacted when patch tested. Peristomal dermatitis is a common cutaneous complication in patients with stomas,³ and it is the reason for one third of the medical appointments that patients with stomas make with the nurses treating stomas.²⁵ Irritant contact dermatitis is the most common form of peristomal dermatitis, and it can be caused by fecal material or urine leaking from inappropriately sized or placed ostomy equipment.²⁶ ACD should be considered in the differential diagnosis when there are persistent eczematous eruptions at sites localized to the point of contact with the peristomal device or associated with ostomy-related medications and adhesives. Patch testing can identify causative allergens and lead to a definitive diagnosis.

The nurses treating wound ostomy continence, who are accustomed to identifying and treating peristomal skin problems, generally see patients with stoma devices on a regular basis and develop rapport with them. At our institution, nurses treating wound ostomy continence who see patients with ostomies and stoma-related skin problems typically perform a use test to determine possible causes of ACD related to the stoma device and supplies. Most of these patients may never be seen in the department of dermatology and thus are not described here. Our findings indicate that when peristomal dermatitis fails to improve with careful skin care and ACD is suspected, such patients should be referred to a dermatologist for traditional patch testing, the preferred technique for diagnosing ACD, to a standard series and to samples of the patient's own device and supplies. ACD in patients with ostomies is probably more common than has been reported, but patients seldom undergo traditional patch testing.



Fig 2. Common stoma products. Device seal (top left, Eakin cohesive seal [packaging at top right], ConvaTec Inc, Skillman, NJ) that can be molded into different shapes is used to prevent leakage around stoma. Various types of wipes are used to prepare skin for adhesive and to remove adhesive (far left, top to bottom: No-Sting Skin-Prep [Smith & Nephew, London, United Kingdom]; AllKare adhesive remover wipe [ConvaTec Inc]; and AllKare protective barrier wipe [ConvaTec Inc]). Antifungal powder (bottle in far left of middle row: Mitrazol powder [Healthpoint Ltd, Fort Worth, TX]) and protective barrier powder (second bottle from left in middle row: Stomahesive protective powder [ConvaTec Inc]) is often applied to excoriated or weeping skin. Some adhesives are silicone aerosols (second from right in middle row: Medical Adhesive 7730 [Hollister Inc, Libertyville, IL]) applied to device, whereas others are hydrocolloid-based skin barriers (far right in middle row: Stomahesive paste [ConvaTec Inc]) used as filler substance for uneven skin surfaces to increase ostomy device wear time while protecting skin. Adhesive paste can be applied either directly to skin or to barrier wafer that is then attached to skin. Bottom of image: barrier strips can be cut and shaped to improve fit of skin barrier (Adapt barrier strips, Hollister Inc).

Additional patch testing to the individual components of stoma devices or supplies is necessary to identify specific allergens. These components must be obtained from the manufacturers, who may or may not be willing to supply them. Previous reports of ACD to Stomahesive paste (ConvaTec Inc) identified the causative allergen as Gantrez (polymethylvinylether), which is a polymer component in adhesives.^{15,20,23,24} One other case of ACD caused by Stomahesive paste (ConvaTec Inc) was negative to Gantrez, but the causative allergen remained unknown because the manufacturer refused to supply other components for additional testing.²² Our 10 patients did not undergo further testing to individual materials in their stoma device and supplies. Future studies with further analysis of commercially available products that elicit positive reactions, such as stoma paste, are warranted. On

the basis of our findings and those of previous studies, we suggest that one strategy for patients found to react to stoma paste would be to include avoidance of the previously identified allergen Gantrez.

This small series not only highlights the benefits of patch testing patients with ostomies for suspected ACD but also demonstrates the importance of follow-up for assessment of compliance, education, and review of new exposures. Peristomal skin problems cause considerable distress for affected patients but, as our findings illustrate, peristomal ACD improves with identification and avoidance of causative allergens. We therefore recommend patch testing of patients with ostomies and suspected ACD.

The determination of which allergens to use should include consideration of the patient's stoma device and supplies, including any topically applied

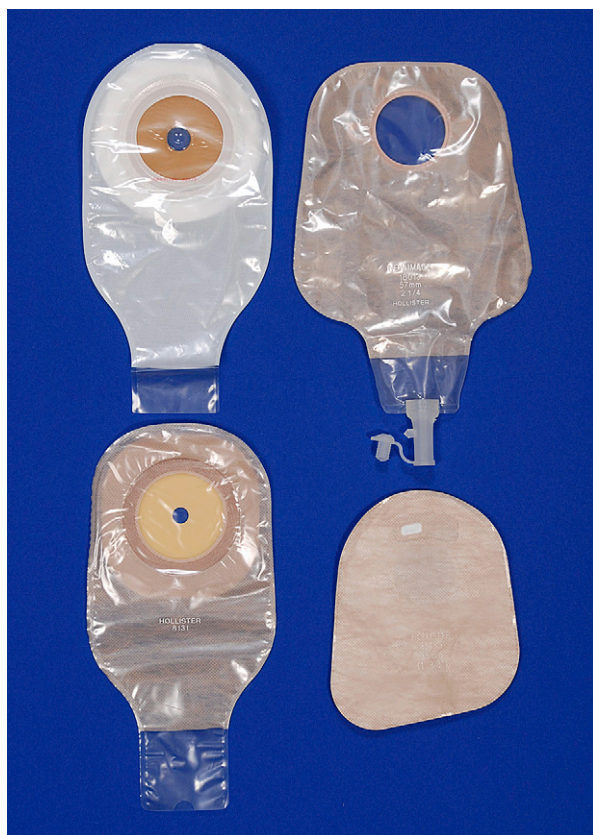


Fig 3. Ostomy pouching systems. Ostomy pouches are available in 1-piece systems (left) that combine barrier and pouch into single unit or in 2-piece systems (right).

medicaments or other products, in addition to an extensive standard series and any other clinically indicated supplemental series. The Mayo Clinic standard series contains more than 70 allergens. If only a small, limited number of allergens is used to patch test such patients, potential positive allergens can be missed. Multiple patients in our series benefited from being tested to a large series of standard allergens, including patient 1, who reacted to thimerosal, fragrance mix, benzoyl peroxide, and hexachlorophene; patient 5, who reacted to several allergens (including phenylenediamine, diphenylguanidine, ethylenediamine, and potassium dichromate); and patient 3, who reacted to bacitracin. All 3 of these patients improved after avoiding the respective allergens.

In a recent review by Agarwal and Ehrlich,²⁷ the authors recommended allergens to consider for the patch testing of patients with ostomies. This list included a standard tray, plastics and glues series, cosmetics, and fragrances. Important personal products were recommended as well, including the patient's stoma bag and ring seal, adhesive removers, cleaners, anesthetics, deodorants, and any other



Fig 4. Peristomal allergic contact dermatitis. Erythema and induration surround stoma, with crusted erosions at site of skin contact with allergen, which in this case was stoma paste.

topical products, several of which are shown in Figs 1 and 2. Our findings support these recommendations, as these allergens were commonly found in our series of patients.

In summary, ACD should be considered in patients with peristomal dermatitis that does not improve with careful skin care. Common offenders include stoma paste and topical medicaments. Standard patch testing should be used to determine the causative allergens so that they can be avoided.

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Table II. Documented reports of allergic contact dermatitis in patients with ostomies

Reference	Type of stoma	Age, y	Sex	No. of patients	Allergens tested	Relevant allergens
Stevenson ⁷ (1975)	Ileostomy (3 patients), ileal conduits (3 patients), thoracostomy (1 patient)	NA	NA	7	NA	• Lanolin • Rubber • Strapping
Dauids et al ⁸ (1978)	Patient A: Caregiver for ureterostomy (in patient's daughter) Patient B: Colostomy	Patient A: 37 Patient B: 69	Patient A: F Patient B: M	2	Patient A: • A standard series (unspecified) (20 allergens) • Tincture of benzoin (adhesive) • DOR ostomy deodorant (1% in acetone)* • 12 Ingredients of DOR ostomy deodorant* Patient B: • Stomahesive[†] • Balsam of Peru • DOR deodorant*	Patient A: • DOR deodorant (3-plus reaction)* • DOR ostomy deodorant (reported as component 7; mostly citronella oil)* • Tincture of benzoin (1-plus reaction) Patient B: • DOR deodorant* • Balsam of Peru
Camarasa and Alomar ⁹ (1980)	Colostomy	40	F	1	• ICDRG standard series • Karaya ring adhesive[‡]	• Karaya seal ring[‡]
Mann et al ¹⁰ (1983)	Urostomy	41	F	1	• Standard series (unspecified) • Karaya paste[‡] • Current and previous urostomy devices and supplies	• Epoxy resin • Urostomy pouch plastic (system 2)[§]
van Ketel ¹¹ et al (1983)	Urostomy	47	F	1	• ICDRG standard series • Plastics and glues series • Ileostomy bag	• Epoxy resin • Ileostomy bag[§]
Fregert et al ¹² (1984)	Urostomy	77	F	1	• ICDRG standard series • Ileostomy pouch and supplies	• Epoxy resin • Ileostomy pouch[§]
Beck et al ¹³ (1985)	NA	NA	NA	6	• Standard series (unspecified) • Ostomy bag and supplies	• Epoxy resin (6 patients) • Ostomy bag (5 patients)
O'Brien ¹⁴ (1986)	Ileostomy	50	F	1	• A modified European standard series, unspecified • Karaya gum powder[‡] • Chiron double-sided plaster • Stomahesive plastic flange[†] • Plastic colostomy bag[‡] • Zinc cream containing lanolin • Plastic colostomy bag containing epoxy resin[§]	• Plastic colostomy bag containing epoxy resin[§] • Zinc cream • Mercurochrome • Formaldehyde • Quaternium 15 • Wool alcohols (acetylated lanolin alcohol) • Epoxy resin

Heskel ¹⁵ (1987)	Colostomy	48	F	1	• NACDG standard series • Perfume screening trays • Stoma supplies • 7 Components of Stomahesive paste[†]	• Stomahesive paste[†] • Gantrez[†] (stabilizer in Stomahesive paste)[†] • Balsam of Peru • Cinnamic aldehyde • Geraniol • Benzyl alcohol • Isoeugenol
van Hecke and Vossaert ¹⁶ (1988)	Colostomy	57	M	1	• Patient's ostomy device components (system 2)[§] and other ostomy supplies • European standard series • Plastics and glues series	• Plastic ostomy bag • 2-benzotriazol (or Tinuvin P [component of plastic ostomy bag][#])
de Pablo et al ¹⁷ (1992)	Colostomy	74	M	1	• GEIDC standard series • Plastics and glues series** • Rubber seal of colostomy bag	• DDM • Rubber seal of colostomy bag (Colodress[†])
Parslew et al ¹⁸ (1996)	Ileostomy	48	F	1	NA	• Polyisobutylene (component of adhesive ring of stoma bag) • Adhesive ring of stoma bag (Salts Simplicity^{††}) • Benzoyl peroxide • Colophony
Lazarov and Trattner ¹⁹ (1998)	Patient A: Colostomy Patient B: Urostomy	Patient A: 58 Patient B: 57	Patient A: F Patient B: F	2	Patients A and B: • Standard series (not specified) • Respective ostomy adhesive rings • Plastic bag • Adhesive paste • Protective barrier • AllKare adhesive remover wipe[†] Patient B only: • d-limonene • Coconut diethanolamide	Patient A: • AllKare adhesive remover wipe[†] Patient B: • AllKare adhesive remover wipe[†] • d-limonene (component of adhesive remover wipe) • Nickel
Lyon et al ³ (2000)	NA	NA	NA	4	• Patch and use testing to unspecified allergens	• Fragranced stoma bag deodorizer (1 patient) • Positive use test to unspecified stoma device and/or supplies (3 patients)

Continued

Table II. Cont'd

Reference	Type of stoma	Age, y	Sex	No. of patients	Allergens tested	Relevant allergens
Scalf and Fowler ²⁰ (2000)	Ileostomy	14	F	1	• NACDG standard series (50 allergens) • Stomahesive paste[†] • Individual ingredients of Stomahesive paste[†] • Other preservative and vehicle allergens	• Balsam of Peru • Propylene glycol • Stomahesive paste[†] • Gantrez[¶]
Fernandez-Redondo et al ²¹ (2001)	Urostomy	58	M	1	• GEIDC standard series • Lubrication ointment (Braum Monodose^{‡‡}) • Fragrance series • Rubber series • Samples of collecting devices and adhesives • Tetracaine • Cinchocaine • Lavender oil	• Braum Monodose ointment^{‡‡} • Caine mix • Fragrance mix • Tetracaine • Cinchocaine • Lavender oil
Gallo et al ²² (2002)	Colostomy	76	M	1	• SIDAPA standard series • Dihydroabietyl alcohol (Abitol)^{§§} • Abietic acid • Trichlorocarbonyl chloride • Stomahesive paste[†] • Appliance disk • Gantrez ES-425[¶]	• Stomahesive paste[†] • Rosin • Abitol
Martin et al ²³ (2005)	Colostomy	63	M	1	• BCDS standard series • Medicaments • Plastics and glues series • Patient's own products ◦ Dansac soft paste and its components ◦ Stomahesive paste[†]	• Dansac soft paste • Gantrez-ES[¶] (component of Dansac soft paste) • Stomahesive paste[†]

Field et al ²⁴ (2010)	Ileostomy	71	M	1	• BCDS baseline series • Plastics and glues series • Bases and preservatives series • Adhesive piece of stoma bag • Stoma wafer • Micropore surgical tape^{¶¶} • 4 Adhesives ◦ Stomahesive[†] ◦ Adapt[‡] ◦ Dansac soft paste ◦ Karaya paste[‡] • Gantrez 425[¶] • Gantrez 335[¶]	• Stomahesive paste[†] • Adapt paste[‡] • Dansac paste • Gantrez 425[¶] • Gantrez 335[¶]
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Where possible, trade names and manufacturers of products (if reported) have been given as reported and have been updated with current proprietary entities if possible; some of these may have changed in years since product was first reported as probable precipitant of allergic contact dermatitis.

BCDS, British Contact Dermatitis Society; DDM, diaminodiphenylmethane; F, Female; GEIDC, Grupo Español para la Investigación de la Dermatitis de Contacto (Spanish Group for the Study of Contact Dermatitis); ICDRG, International Contact Dermatitis Research Group; M, male; NA, not available; NACDG, North American Contact Dermatitis Group; SIDAPA, Società Italiana di Dermatologia Allergologica Professionale e Ambientale (Italian Society of Dermatology and Allergy Professionals).

*Simpla Plastics Ltd, Lincolnshire, England, United Kingdom.

[†]ConvaTec Inc, Skillman, NJ (formerly part of Squibb, Princeton, NJ, then Bristol-Myers Squibb, Princeton, NJ).

[‡]Hollister Inc, Libertyville, IL.

[§]Squibb, Princeton, NJ (now Bristol-Myers Squibb, Princeton, NJ).

^{||}Downs Surgical Ltd, London, United Kingdom.

[¶]Butyl ester of polyvinylmethylether/maleic anhydride copolymer; International Specialty Products, Wayne, NJ.

[#]Interplastic Corp, Vadnais Heights, MN.

**Chemotechnique Diagnostics, Vellinge, Sweden.

^{††}Salts Healthcare, Birmingham, United Kingdom.

^{‡‡}B. Braum Medical Ltd, Barcelona, Spain.

^{§§}Eastman Chemical Co, Kingsport, TN.

^{|||}Dansac A/S, Fredensborg, Denmark.

^{¶¶}3M Health Care, St Paul, MN.

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