

dermatologist

Regional Atlas of **CONTACT DERMATITIS**

Edited by:
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Chapter 1: Introduction to Contact Dermatitis

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Contact dermatitis is a common skin condition frequently seen by physicians. It affects approximately 20% of people in the United States. It is responsible for 70 to 80% of all reported occupational skin diseases and it is a frequent chief complaint of clinic visits.¹ There are two main types of contact dermatitis: irritant contact dermatitis and allergic contact dermatitis. Irritant contact dermatitis (ICD) is far more frequent than allergic contact dermatitis (ACD). While the clinical appearance may be similar, allergic contact dermatitis differs from irritant dermatitis in many ways (**Table 1.1**).

Table 1.1: Allergic versus Irritant Contact Dermatitis

	Allergic Contact Dermatitis	Irritant Contact Dermatitis
Definition	an acquired inflammatory response to an allergen that occurs only in individuals who have been sensitized to the allergen on prior exposure(s)	nonspecific immune reaction of the skin to a substance that results in a skin eruption in any individual if a high concentration of the substance is used
Molecular Mechanism	Cell mediated hypersensitivity through Langerhans Cells and CD4+ T cells after contact with a specific allergen (delayed Type IV hypersensitivity reaction)	Skin barrier disruption and cellular damage of the keratinocyte membrane from contact with an irritant activates the innate immune system
Time between exposure and cutaneous manifestation	Hours to days	Within minutes to several hours
Body Location	Scalp is uncommon	Hands and face are common
Symptoms	Itching	Pain and burning
Factors that alter severity of reaction	Concentration or allergen and length of exposure Atopic are less likely to have ACD	Dry skin and thicker skin reacts less severely Atopic patients react more severely due to reduce barrier function
Common allergens/irritants	Top 10 allergens from patch test results ² : nickel sulfate, balsam of Peru (<i>Myroxylon pereiare</i>), fragrance mix, quaternium-15, neomycin sulfate, bacitracin, formaldehyde, cobalt chloride, methylidibromoglutaronitrile, and p-phenylenediamine	Top irritants ^{3,4} : low humidity, heat, water, detergents, solvents, oils, heat and sweating, dust and fibers, acids and alkalis
Testing	Patch test Photopatch Test Provocative use test	None

The list of allergens that cause ACD continues to grow. There are over 3,500 environmental contact allergens reported in the literature.⁵ Exposure to a particular allergen can occur for years before developing a delayed hypersensitivity immune response. After sensitization occurs, subsequent exposure to the allergen will result in ACD even if used in small concentrations.⁶ While the list of contact allergens continues to grow, the North American Contact Dermatitis Group (NACGD) reported the top ten allergens from patch testing in 2006 which included: nickel sulfate, balsam of Peru (*Myroxylon pereiare*), fragrance mix, quaternium-15, neomycin sulfate, bacitracin, formaldehyde, cobalt chloride, methylidibromoglutaronitrile, and p-phenylenediamine.² Poison ivy (urushiol) is another common allergen but is not including in the results by the NACGD. Topical medications are a common cause of contact dermatitis including antibiotics (58%), corticosteroids (30%), and anesthetics (6%). This generates a conundrum when selecting treatments for contact dermatitis as upwards of 30% of individuals tested have a contact allergy to topical corticosteroids.⁷ Many of the products that are used on a daily basis contain one or more potential allergens (**Table 1.2**).

Table 1.2: Products containing common allergens

Products	Allergen
Metals	Nickel, Cobalt, Sodium gold thiosulfate, Potassium dichromate
Fragrance	Balsam of Peru (Myroxylon Pereirae), Ylang-ylang oil, Jasmine Fragrance mix I (cinnamic aldehyde, Cinnamyl alcohol, Hydroxycitronellal, Isoeugenol, Eugenol, Oak moss absolute, -Amyl cinnamic aldehyde, Geraniol) Fragrance mix II (Lyrall®, citral, Farnesol, Citronellol, Hexyl cinnamic aldehyde, Coumarin)
Rubber accelerators and Latex	Carba mix, Mercaptobenzothiazole (MBT), Thiuram mix, Mercapto mix, Black rubber mix, Mixed dialkyl thioureas
Leather	Tanning solutions: Potassium dichromate Leather gloves and watch bands: P-tert-butylphenol formaldehyde resin
Adhesives	Colophony, Ethylenediamine dihydrochloride, Epoxy resin, P-tert-butylphenol formaldehyde resin, Ethylacrylate, Methyl methacrylate
Nails	Nail polish: Tosylamide formaldehyde resin Artificial nail glue: Ethyl Acrylate, Methyl methacrylate
Hair	Shampoos: Quaternium-15, Methylidibromoglutaronitrile/Phenoxyethanol, Cocamidopropylbetaine/Amidoamine, Imidazolidinyl urea, Cocamide DEA Permanent wave solutions: Glyceryl thioglycolate Hair Dyes: p-Phenylenediamine (PPD), Cobalt
Clothing and Textiles	Dyes: disperse blue 106 and 124 (increased amounts found in dark clothing) Permanent press clothing (used most often to provide wrinkle resistance in cotton, rayon, or cotton polyester blends and not often used in wool, nylon, or silk fabrics): Ethylenurea melamine-formaldehyde Footwear: Mercaptobenzothiazole (MBT), Potassium dichromate, and Colophony
Cosmetics and Personal Care Products	Propylene glycol, Phenylenediamine, Lanolin alcohol, Amidoamine, Benzophenone, Chloroxylenol, Alpha tocopherol, Glyceryl thioglycolate, Cocamidopropyl betaine, Cocamide DEA, Balsam of Peru (Myroxylon Pereirae), Imidazolidinyl urea, Ylang-ylang oil, Paraben mix, Methylidibromoglutaronitrile/Phenoxyethanol, Iodopropynyl butylcarbamate, 2-Bromo-2-nitropropane-1,3-diol (Bronopol®)
Preservatives	Formaldehyde Releasing Preservatives: Quaternium-15, Formaldehyde, Diazolidinyl urea, Imidazolidinyl urea, DMDM hydantoin ethylenurea melamine-formaldehyde, 2-bromo-2-nitropropane-1,3 diol, Dimethylol Dihydroxyethyleneurea Other Preservatives: methylchloroisothiazolinone, paraben mix, methylidibromo glutaronitril, thimerosal, methylidibromo glutaronitrile/phenoxyethanol, iodopropynyl butylcarbamate, tosylamide formaldehyde resin, phenoxyethanol, benzalkonium chloride, gluteral
Sunscreen	Photocontact: Benzophenone-3/oxybenzone, cinnamic aldehyde
Topical medications	Antibiotics: Neomycin sulfate, Bacitracin Corticosteroids: Tixocortol-21-pivalate (Class A), Budesonide (Class B), and Hydrocortisone-17 butyrate (Class D) Anesthetics, including medications for hemorrhoids, teething, cold sores, canker sores: Lidocaine, Benzocaine Antihistamines: Ethylenediamine dihydrochloride Ophtalmic drops and Vaccines: Thimerosal (preservative) Antabuse: Thiuram mix Vehicles and Emulsifiers: Colophony, Lanolin, Propylene glycol, Sorbitan sesquioleate
Temporary Tattoos	p-Phenylenediamine (PPD)
Emollients	Lanolin (wool alcohol), Methylchloroisothiazolinone/Methylisothiazolinone (MCI/MI) in Eucerin

Adapted from ref 2 and 7

While ACD is a specific reaction to an allergen that occurs only in sensitized individuals ICD can occur in anyone exposed to an irritant at a high concentration or for a significant length of time. There are many substances that can disrupt the skin's barrier and activate the innate immune response. Occupational dermatitis, which is in large part caused by irritant dermatitis, costs up to \$ 1 billion annually from medical bills, medications, worker's compensation, and lost work hours.⁸ Irritant dermatitis is more common in women than men. ICD is also much more common in certain locations, such as the hands and face, as these areas are frequently exposed to irritants. Some of the most commonly implicated irritants include: low humidity, heat, metals, paper, tools, fibers/fabrics, plastics, dust, woods, rubber, jewelry, seasonal environment, fiberglass and hearing aids.⁴ In many cases the mechanism, such as friction and drying, are just as important in causing ICD as the physical irritant.

Our goal is to provide a regional approach to contact dermatitis with the hope of making this vast subject area more approachable and clinically useful. We will use this systematic approach to discuss some of the most common allergens and irritants in a given location as well as providing guidance in diagnosis and treatment options including topical medications and patch testing (**Table 1.3**).

Table 1.3: T.R.U.E TEST allergens		
Panel 1.1	Panel 2.1	Panel 3.1
Nickel	p-tert-Butylphenol formaldehyde	Diazolidinyl urea
Wool alcohols	Epoxy resin	Quinoline mix
Neomycin sulfate	Carba mix	Tixocortol-21-pivalate
Postassium dichromate	Black rubber mix	Gold sodium thiosulfate
Caine mix	CI+Me-Isothiazolinone	Imidazolidinyl urea
Fragrance mix	Quaternium-15	Budesonide
Colophony	Mercaptobenzothiazole	Hydrocortizone-17-butyrate
Paraben mix	p-phenylenediamine	Mercaptobenzothiazole
Negative control	Formaldehyde	Bacitracin
Balsam of Peru	Mercapto Mix	Parthenolide
Ethylenediamine dihydrochloride	Thimerosal	Disperse blue 106
Cobalt dichloride	Thiuram mix	2-Bromo-2-nitropropane-1,3-diol (Bronopol)

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Chapter 2: Scalp

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Although the scalp is commonly exposed to many articles and products containing known allergens, isolated scalp dermatitis due to contact dermatitis is relatively uncommon. This appears to be primarily a topographical property innate to the scalp. The thicker scalp skin, with abundant pilosebaceous units and a relative absence of rhytids or crevices, is the ideal barrier against contact dermatitis. In contrast, the eyelids are on the other end of the spectrum, with very thin skin and many folds that retain substances, increasing time exposure and resulting in more severe reactions. For these reasons, contact dermatitis is unlikely to be at the top of the differential diagnosis for isolated scalp dermatitis. Even in cases where an aggressive allergen is present, the scalp is often not affected or only minimally affected, despite significant involvement of the face, ears and/or neck.¹ It is often more useful to talk about “scalp-applied” irritants and allergens rather than isolated scalp contact dermatitis.

Product Category	Allergen	Pattern
Headband, bathing cap, hairnet, hats	Leather or Rubber	Linear rash across forehead Encircles head May involve ears
Wigs	Adhesives	Encircles head
Bobby pins, hair pins	Nickel	Discrete Corresponds with shape of offending agent
Wash-out products including shampoos and conditioners	Quaternium-15, Methylidibromoglutaronitrile, Phenoxyethanol	Rinse-off pattern Patchy distribution
Hair Dyes	p-Phenylenediamine (PPD)	Acute edematous dermatitis
Permanent wave solutions	Glyceryl thioglycolate	Acute edematous dermatitis
Shampoo	Coccamidopropyl betaine	Chronic dermatitis with episodic flairs

Presentation

Potential allergens involved in scalp dermatitis have been reviewed. Patients with documented scalp dermatitis who underwent patch testing showed that hair dyes, hair-cleansing products and medicaments combined for nearly 2/3 of the positive patch test reactions.² Unfortunately, the study was not designed to assess the relevance of these positive patch tests. Looking at the pattern of dermatitis is helpful when trying to determine which allergen is involved (**Table 2.1**).

Figure 2.1: Contact Dermatitis due to head accessories.

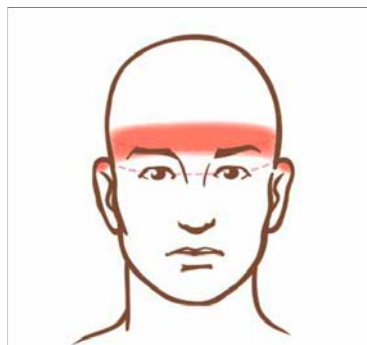
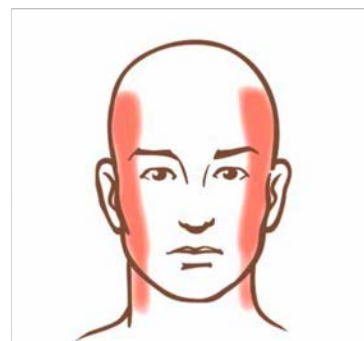


Figure 2.2: Rinse-off pattern due to shampoo, conditioner and other rinse-off products.



Regional consideration of the scalp in contact dermatitis requires the clinician to ask two important questions:

First, “Is there a primary dermatitis involving the scalp?” As with any anatomical region, geometric areas of dermatitis are nearly pathognomonic for contact dermatitis. On the scalp, this may take the form of jewelry, such as nickel hairpins, clasps or other decorative items. Curling irons and straighteners may also be a source of allergen exposure. These products most often cause problems in nickel-sensitive patients.³ Bands

of dermatitis that span the forehead, encircle the head and/or affect the helices of the ears is suggestive of head accessories with leather or rubber parts, such as in hat bands or hat linings (**Figure 2.1**).⁴ With such distribution, exposure to adhesive tapes used to fix wigs to the scalp should also be considered.⁵

Secondly, “Is there a primary dermatitis suggestive of a scalp applied allergen?” Allergic reactions to hair products are not largely restricted to the scalp and often involve the face, eyelids, ears and neck; a high degree of suspicion is critical to the diagnosis. The rinse-off or drip pattern sign is a clinically useful clue to suggest a scalp-applied allergen (**Figure 2.2**). This appears as a well-demarcated and relatively linear streaking dermatitis involving the pre-auricular face and lateral neck. In patients with classic rinse-off pattern of dermatitis, personal hair care products should be considered.² The most important potential allergens in shampoos and conditioners are fragrances, cocamidopropyl betaine (CAPB) and preservatives including Quaternium-15.⁶ CAPB is of particular interest and is contained in many shampoos, including those marketed as “no tears” products. Two somewhat unique patterns have been observed with CAPB sensitivity: chronic scalp pruritus and flaking, and a chronic dermatitis with episodic flares.²

Hair dye is a scalp-applied allergen that needs to be considered. In one study, hair dye was the most common cause of scalp dermatitis.² Paraphenylenediamine (PPD) is a frequently used oxidative colorant. In 2006 and 2007, it was reported that PPD contact allergy had increased significantly in the general population and, in 2006, PPD was named Contact Allergen of the Year by the American Contact Dermatitis Society.⁷ In PPD-sensitive patients, there is often a robust acute dermatitis involving the face, eyelids and neck with only minimal scalp involvement (**Figure 2.3**).

Figure 2.3: Acute dermatitis from PPD containing hair dye.



An emerging allergen frequently applied to the scalp is *Melaleuca alternifolia*, commonly known as tea tree oil. Recent popularity is due, in part, to reports showing efficacy in the treatment of seborrheic dermatitis.⁸ As with any potential contact allergen, melaleuca sensitization and irritation is increased when exposure to inflamed and damaged skin occurs. Clinicians should consider this allergen in patients with recalcitrant, worsening or flaring seborrheic dermatitis or seborrheic dermatitis. In this setting, asking the patient about the use of “natural” or over-the-counter remedies may lead to the discovery of melaleuca exposure.

Minoxidil may be the most frequent cause of scalp dermatitis medicamentosa.¹ Although irritant contact dermatitis is the most frequent reported outcome of topical use of minoxidil, there are reports of allergic contact dermatitis on the scalp. A pustular eruption of the scalp has also been reported.^{9,10}

Recommendations

Management of suspected contact dermatitis of the scalp should include patch testing. However, an empiric trial of hypoallergenic products can be performed. **Table 2.2** highlights some useful scalp products that are minimally or hypoallergenic.

Table 2.2: Minimally or Hypoallergenic Scalp Products	
<i>Product</i>	<i>Allergen</i>
Loprox Shampoo	None
Clobex Shampoo	Cocamidopropyl betaine
DHS Tar Shampoo (Fragrance Free)	None
Free and Clear Shampoo	None
RID Lice Removal Shampoo	Fragrance
California Baby Supersensitive Shampoo and Bodywash	Parabens
Neutrogena T/Sal Shampoo	Cocamidopropyl betaine

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Chapter 3: Face

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Introduction

The face is widely exposed to the surrounding environment and is also a region that comes into frequent contact with the hands. As a result, contact dermatitis presenting on the face may be from a causative agent that had direct, indirect or airborne contact. The face is also the most common site of photocontact dermatitis.¹ Therefore, the face is a highly complex region and can be difficult to assess. Paying close attention to characteristic patterns may provide clues to identifying the specific allergen or irritant.

Presentation

Facial contact dermatitis has a fairly well defined group of frequent offending allergens. Using a regional approach helps simplify this list into three main categories: scalp dermatitis, aerosolized allergens, and directly applied facial allergens/irritants (**Table 3.1**).

The term aerosolized contact allergens (aeroallergen) should not be restricted to things like animal dander, dust mites and pollens, which more frequently drive Type I hypersensitivity reactions. Aeroallergens also include fragrances (**Figure 3.1 and 3.2**), plant allergens and things that become temporarily aerosolized during the repair or manufacturing process.

Aeroallergens have been classically reported to present as facial dermatitis with a distinct cut off along the shirt collar. Aeroallergens are also sometimes contributors to a phototoxic or photoallergic reaction. Sparing under the chin or behind the ears is a clue to photo-exacerbation. Patients with aeroallergen-driven facial dermatitis frequently have an underlying atopy. The "headlight sign," which refers to the presence of facial dermatitis that dramatically spares the nose, may be useful clinically to suggest such patients (**Figure 3.3**).² It has been reported in patients with atopic dermatitis and neurodermatitis.

Table 3.1: Facial Dermatitis - Useful product/allergens and patterns	
Scalp-applied allergens (refer Chapter 2 for complete list)	
Shampoos, conditioners, hair dye	Periphery of the face (pre-auricular, submental, and mandibular region), rinse off pattern
Aeroallergens	
fragrance, plant allergens, aerosols, animal dander, dust mites, pollen	Facial dermatitis, Cutoff at shirt collar
Face-applied allergens	
Cosmetic products (makeup)	Bilateral, Centralized (forehead, cheeks, chin), Patchy/diffuse
Wash-out products (soaps)	Periphery of the face (pre-auricular, submental, and mandibular region), patchy
Leave-in products (lotions, sunscreens)	Bilateral, diffuse distribution
Cell phone (nickel or chromate)	Mid-to-lower cheek of lateral face, unilateral, bilateral if simultaneous use of two cell phones.
Eyewear (eyeglasses, sunglasses)	Bilateral, symmetrical, linear rash, corresponds to shape of eyewear, below eyes on upper cheeks
Scuba diver face masks	Bilateral, symmetrical, corresponds to shape of mask
Rubber cosmetic sponge	Patchy distribution, asymmetrical

Figure 3.1 and 3.2: dermatitis due to fragrance (aeroallergen)



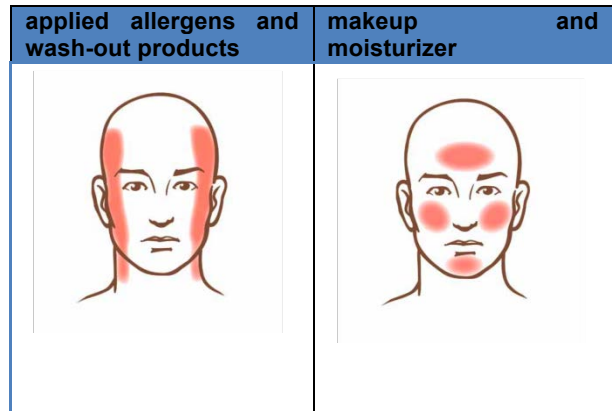
Figure 3.3: Headlight sign- facial dermatitis that spares the nose



Figure 3.4: Rinse-off pattern due to scalp-

Figure 3.5: Contact dermatitis due to

In a study performed by the North American Contact Dermatitis group, females more frequently presented with facial contact dermatitis secondary to cosmetic-associated allergens.³ Common sources among both females and males include moisturizers, sunscreens, hair products and fragrances.^{1,3} In general, cosmetic-related dermatitis favors a bilateral facial distribution. It is often patchy and diffuse. Predilection for the periphery of the face involving the pre-auricular, submental and mandibular region should direct consideration toward scalp-applied allergens, like shampoos, conditioners and hair dyes, as well as wash-off products like facial cleansers (**Figure 3.4**). This sign was introduced in the first paper of this series and is known as a rinse-off pattern. A predominantly central facial distribution (forehead, cheeks and chin) suggests makeup, moisturizers or jewelry (**Figure 3.5**).



A unilateral rash with patchy distribution along the mid- to lower-cheek of the lateral face is suggestive of a nickel or chromate allergy from cell phones^{4,5} (**Figures 3.6 and 3.7**). An individual with symmetrical contact dermatitis due to simultaneous use of two cell phones was recently reported.⁷

Figure 3.6 and 3.7: Nickel or Chromate allergy in cellphones



Other potential nickel sources should be considered, such as eyewear. A bilateral rash on the upper cheek where the lower rims of eyewear potentially make contact with the skin is suggestive of an allergy to worn-out metal in eyewear^{1,6} (**Figures 3.8 and 3.9**).

Figure 3.8 and 3.9: Contact dermatitis due to nickel in eyewear.



Rubber is another common cause of contact dermatitis and rubber-induced rashes often present according to the shape of the offending object. Scuba diver face masks and swimming goggles produce a bilateral, symmetrical pattern that follows the outline of the product.¹ Rubber cosmetic sponges will cause a patchy distribution with an asymmetrical pattern, but may vary depending on the patient.¹

Recommendations

Patients with a known allergy to commonly used topical medicaments for acne, rosacea, seborrhea, psoriasis or actinic keratoses can be particularly challenging to treat. Having a high level of suspicion for irritant or allergic contact dermatitis from topical medications and good understanding of the best agents to use in these patients is important in the proper management of these patients (**Table 3.2**).

Table 3.2: Minimally or Hypoallergenic Prescription Topical Agents

Acne		Psoriasis	
Medication	Allergen(s)	Medication	Allergen(s)
Acanya gel	PG	Dovonex Cream	Diazolidinyl Urea
Atralin gel	Parabens, BHT	Taclonex Ointment	None
Benzaclin gel	None	Vectical	None
Differin Gel (0.1%, 0.3%)	PG Parabens	Seborrhea	
Differin cream	Parabens	Medication	Allergen(s)
Duac gel	None	Promiseb	Propyl Gallate
Retin-A Micro gel (0.1%, 0.04%)	PG, BHT	Tersifoam	Parabens, PG
Tazorac gel	BHA, BHT	Xolegel	BHT, PG
Tazorac Cream	None	Actinic Keratoses	
Rosacea		Medication	Allergen(s)
Medication	Allergen(s)	Solaraze Gel	None
Finacea Gel	PG	Zyclara	Parabens
Metrogel	Parabens, PG	Efudex	PG, Parabens

PG = propylene glycol; BHT = butylated hydroxytoluene; BHA = butylated hydroxyanisole

As discussed previously, there is also a large number of patients that are allergic to topical corticosteroids; therefore it is prudent for the dermatologist and non-dermatologist alike to be aware of this common problem and be able to prescribe an alternative agent (**Table 3.3**).

Table 3.3: Topical Products Recommended for Empiric Use in Settings of Suspected Allergy to Topical Steroids
<p>A. Nonallergenic active ingredient, nonallergenic vehicle</p> <ul style="list-style-type: none"> - Topicort Ointment (desoximetasone 0.25% ointment, Taro Pharmaceuticals) - Topicort Gel (desoximetasone 0.5% gel, Taro Pharmaceuticals) - Protopic Ointment (tacrolimus 0.1%, 0.03% ointment, Astellas Pharma)
<p>B. Nonallergenic vehicle, potentially allergenic active ingredient</p> <p>a. Ointments</p> <ul style="list-style-type: none"> • Locoid Ointment (hydrocortisone butyrate 0.1% ointment, Ferndale Labs) • Generic triamcinolone 0.1% ointment • Generic desonide 0.05% ointment <p>b. Liquids</p> <ul style="list-style-type: none"> • Locoid Lotion (hydrocortisone butyrate 0.1% lotion, Ferndale Labs) • Beta-Val Lotion (betamethasone valerate 0.1% lotion, Teva Pharmaceuticals) • Embeline Lotion (clobetasol propionate 0.05% lotion, Coria Labs) • Cormax Lotion (clobetasol propionate 0.05% lotion, Watson Labs) • Generic clobetasol 0.05% lotion • Generic betamethasone dipropionate 0.05% lotion
<p>C. Nonallergenic steroid, potentially allergenic vehicle</p> <ul style="list-style-type: none"> • Cloderm Cream (clocortolone 0.1% cream, Coria Labs); contains parabens

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Chapter 4: Eyelids

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The eyelids are one of the most sensitive regions of the body, making them very susceptible to contact dermatitis. This may be explained by two major theories. The skin of the eyelids is quite thin (0.55 mm) compared to other sites on the face (2.0 mm); this suggests the eyelids would be more susceptible to damage and irritation.^{1,2} The other theory focuses on the sphincter function of the orbicularis oculi. The accordion-like movement of the upper eyelid during blinking may lead to potential allergens becoming trapped and retained between the folded skin when the eye is open.³ This would result in prolonged exposure. Regardless, the eyelids are more susceptible to both irritant and allergic contact dermatitis.

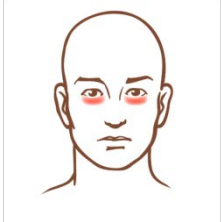
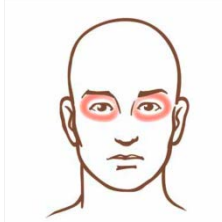

Presentation

Similar to the face, the eyelid region can be more easily approached by considering categories of allergen exposure. The five major categories are scalp-applied allergens, aeroallergens, directly contacted allergens, ectopic allergens and inadvertent allergens. The first two categories have been previously covered in the scalp and face series. We will consider the latter three further.

Directly applied allergens include anything directly applied or exposed to the eyelid. This list is nearly endless and includes a myriad of cosmetics, cleansers and ophthalmic medicaments. The most common allergens in this category are fragrances, preservatives and nickel.^{4,5} Nickel can be found as an ingredient or contaminate in personal care products such as make-up, but it is also found frequently in applicators.⁶ These applicators may also be a source of rubber or black dye (paraphenylenediamine) exposure.

A predominance of the lower eyelids with a “run-off or drip” pattern should raise suspicion of ophthalmic solutions (**Figure 4.1**).³ Ophthalmic medications may contain potentially irritating and sensitizing preservatives such as benzalkonium chloride, thimerosal merthiolate, chlorobutanol, chlorohexidine or phenylmercuric.² Topical medicaments such as antibiotics and steroids should also be considered.

Finally, this category also includes things like swim goggles, binocular or telescope eye pieces, eye patches, etc (**Figure 4.2**). These objects often cause a characteristic dermatitis that mimics their use. The image below shows unilateral eyelid dermatitis in a medical technician student who used a monocular microscope with a rubber eyepiece (**Figure 4.3**).

Figure 4.1: Lower eyelid dermatitis due to ophthalmic medicaments.	Figure 4.2: Annular dermatitis due to goggles, binoculars or other eye pieces.	Figure 4.3: Unilateral eyelid dermatitis as seen on a medical technician student using a monocular microscope with a rubber eye piece.
		

The category of “ectopic allergens” is an interesting one. The term is most often used when talking about eyelid dermatitis in relationship to gold.⁷ It refers to the allergen source being removed or at an ectopic site from the dermatitis. Typically this is a gold ring on the finger. The situation is somewhat perplexing in that patients frequently do not have a reaction on the finger. The explanation for this seems to be that gold is released from the allergen source in the presence of sweat and abrasive particles like titanium dioxide, a frequent ingredient in cosmetics.⁷ Data

from the North American Contact Dermatitis Group (NACDG) published in *Dermatitis* looked at isolated eyelid contact dermatitis and found that gold was the most frequently encountered allergen producing a positive patch test.⁴ The “inadvertent allergens” are an easily forgotten but important cause of eyelid dermatitis. The eyelids are frequently rubbed and touched which leads to transfer of substances from the hands. In this manner, they eyelids may be exposed to a multitude of potential allergens. This type of allergen spread often appears as an isolated, asymmetric upper eyelid dermatitis. Some common sources include hand sanitizer, hand soap, hand moisturizer and nail polish.^{2,3} The thicker skin of the hands is often spared.

Recommendations

When allergic contact dermatitis of the eyelid is suspected, empiric use of minimally or hypoallergenic scalp-applied products, cleansers, cosmetics and topical medications and products may be helpful.

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Chapter 5: Mouth, Lips and Perioral Region

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The oral region of the face is unique, with three different epithelial zones: the cutaneous lips, the vermillion and the mucosa of the oral cavity. The skin of the cutaneous vermillion is similar to the rest of the face. There are typical features such as sebaceous glands, sweat glands and hair follicles. However, the vermillion is non-keratinized. Specifically, areas in this region are considered “non-keratinizing” and therefore lack the typical stratum corneum barrier, including the labial mucosa and wet surface of the vermillion, ventral tongue, floor of mouth, soft palate and buccal mucosa. The mucosa of the oral cavity contains saliva with buffering and solvent action. Susceptibility to allergens and irritants varies among these regions. Many irritants and allergens have classic patterns that can be helpful with making the diagnosis (**Table 5.1**).

Table 5.1: Useful Patterns of Dermatitis	
Product/allergen or irritant	Patterns
Oral Cavity	
<u>Dental crowns, fillings/amalgams, dentures, dental braces</u> made most commonly from mercury, nickel, gold, and cobalt (allergens)	<ul style="list-style-type: none"> Buccal mucosa and lateral tongue Lichenoid
<u>Oral hygiene products</u> Sodium lauryl sulfate (irritant) in toothpastes and mouthwash Flavoring including cinnamon and mint (irritant)	<ul style="list-style-type: none"> Can be seen on the lips as well as oral mucosa Patchy distribution Toothpaste may show asymmetric involvement of corners of mouth
Lips	
<u>Cosmetics</u> Peppermint oil in lipbalm (allergen)	<ul style="list-style-type: none"> Seen on the upper and lower lips Diffuse distribution
<u>Musical instrument held outward from the lips</u> Recorder or trumpet	<ul style="list-style-type: none"> Seen on the upper and lower lip Corresponds with shape of offending product
<u>Musical Instrument held to the side or with a reed</u> flute saxophone or clarinet	<ul style="list-style-type: none"> Lower lip Corresponds with shape of offending product
<u>Habitual oral placement of objects</u> Pencil, pen, or necklace containing nickel (allergen) or repetitive trauma (irritant)	<ul style="list-style-type: none"> Seen on the upper and/or lower lips Corresponds with shape of offending product
Perioral Region	
Lip lick dermatitis	<ul style="list-style-type: none"> Circumferential irritant dermatitis
Toothpaste	<ul style="list-style-type: none"> See above

Oral Cavity

The signs and symptoms of contact dermatitis in the oral cavity are less well defined than that seen with other regions covered in this series. The classic symptomatology of itching and scaling is often absent. Instead, the non-keratinized oral mucosa seems to show a different set of reaction patterns in response to contactants. Lichenoid reactions are a particularly important pattern seen involving the oral mucosa. While oral lichen planus is the prototypical example of this pattern, extrinsic agents like drugs and contactants should not be overlooked as a potential etiology.¹ Clinically, there may be white reticular patches, erythema or erosions. The lesions may be asymptomatic or associated with intense burning. The differential diagnosis is broad and often requires a myriad of techniques to finally arrive at the correct diagnosis. A biopsy is typically warranted and helps to rule out things like connective tissue disease and immunobullous disease. Eosinophils seen on histology are helpful in pointing the diagnosis away from lichen planus and favoring an extrinsic driving force such as a drug or contactant.

Historical clues are also extremely helpful in this setting. Recent exposure to dental materials, metals or plastic sources should be considered significant and patch testing initiated. This is particularly important in localized lichenoid dermatitis in close proximity to the suspected oral implant or prosthesis. Areas that should be considered most suggestive for oral contact lichenoid reactions are the lateral tongue and buccal mucosa. These are the areas in closest proximity to amalgams (fillings) and most prosthetic devices.¹ Metals used in dentistry are most often mercury, nickel, gold, cobalt, palladium

and chromium. Sources of exposure to these metals include dentures, braces, crowns and fillings (amalgams). Through history and physical exam looking for foreign materials is important; and if present patch testing and removal of offending agent can be of great benefit. Other causes of oral lichenoid contact dermatitis include flavorings (with

cinnamon being the classic example) and dental adhesives (acrylates).² Allergy to acrylates from dental prostheses may also cause tingling or jaw pain.³

One other consideration with regard to contact dermatitis affecting the oral cavity is the so-called “burning mouth syndrome” (BMS). While this disorder is likely a localized dysesthesia with both psychological and neurophysiological components, it may be prudent for some patients to undergo patch testing to help exclude contact dermatitis. It has been suggested that patients with a fluctuating course of BMS may represent a subset of patients in which allergic contact dermatitis is relevant. Unfortunately, only a few patch test studies assessing BMS have been done and show mixed results.^{4,5}

Oral hygiene products may cause allergic contact dermatitis in either the mucosa of the oral cavity or on the lips.⁶⁻
⁸ Therefore, rashes that involve both the oral cavity and the lips are very suggestive of an allergy to chemicals in mouthwashes, toothpastes, dental floss and chewing gum. A common offending irritant in these products is sodium lauryl sulfat. In toddlers with skin eruptions in the mucosa of the oral cavity or on the lips, exposure to rubber in pacifiers should also be considered.^{9,10} The oral mucosa is frequently exposed to food. Food additives and flavorings may cause mucosal inflammation.

Lips

The lips are often exposed to cosmetic products. In a recent patch test study published by the North American Contact Dermatitis Group, isolated lip dermatitis was determined to be allergic in 38.3% of patients most commonly to Fragrance mix, Balsam of peru (*Myroxilon pereirae*), and nickel. The most common allergen source was components of cosmetics.^{3,11,12} Patch testing is an important step in patients with lip dermatitis. Allergic contact cheilitis may be the result of allergy to chemicals in lip balms, lipsticks, lip glosses and sunscreens.^{12,13} The anatomy of lipstick is surprisingly complex. There are dyes, flavoring agents, sunscreens and preservatives in addition to the vehicle.¹¹ A common historic allergen in lip products is castor oil, which is used as a solvent for pigments. Lanolin, another common component in lip products, is used as an emollient and has induced an allergic response in individuals.¹² Cases of postoperative patients reacting to Aquaphor Healing Ointment were shown to react specifically with lanolin alcohol.¹⁴ Benzophenone, found in many lip products and sunscreens, has also been found to be a common allergen.¹² Both allergic contact and allergic photocontact dermatitis may be seen.¹⁵ Patients may sometimes decide to use “natural” products, under the impression the products are free of irritants or allergens. This is a popular misconception, as such products may be contaminated with allergens, including bee’s wax and associated propolis (also known as bee glue) as well as peppermint.¹⁶ Assessment for natural product lines such as Burt’s Bees will help the detection of unsuspecting allergens. As many as one-third of patients with allergic contact dermatitis also had an irritant component contributing to their disease according to the study by the North American Contact Dermatitis Group.¹⁷ Exposure to metal lipstick casings or the habitual sucking of metallic objects (pen or pencil) can also be the cause of isolated allergic contact cheilitis to nickel. In these patients, there is often a more focal plaque of chronic dermatitis, which represents the contacted site. Similarly, a focal plaque of chronic dermatitis on the mid-lower lip may be seen in a musician who plays a wind instrument. The allergen may be the mouth piece itself or the wooden reed.^{12,18} There can also be an irritant component to their contact dermatitis from the repetitive trauma to a localized area.

More unique or exotic contactants should also be considered when focal plaques of dermatitis on the lips are present. Things like musical instruments, pipes and even blowguns need to be considered (**Figure 5.1 and 5.1**).¹⁹ Anything that contacts the lips needs to be considered, including a significant other or spouse. The transfer of a contactants inadvertently from one person to another (usually a significant other or spouse) has been referred to as consort contact dermatitis. The prototypical vignette is a wife with allergic contact cheilitis to her husband’s aftershave.²⁰

Figure 5.1: Contact with metal containing objects such as musical instruments can cause allergic contact dermatitis to the metals or irritant contact dermatitis from the repetitive trauma



Figure 5.2: Resulting contact dermatitis from a flute

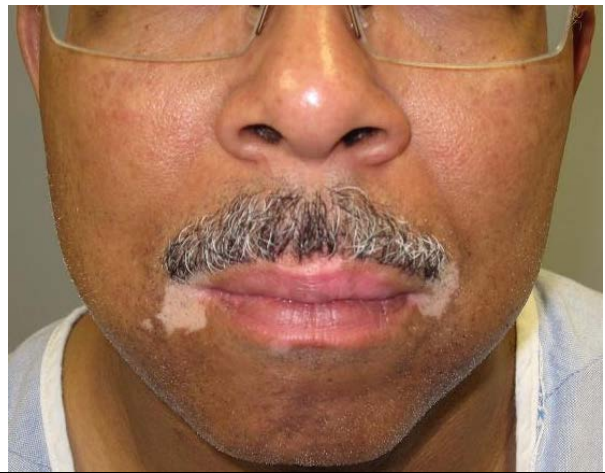


Perioral Region

“Lip licker dermatitis” is an irritant dermatitis that involves the perioral skin.²¹⁻²³ Clinically, there is usually a hyperpigmented circumferential symmetric plaque that is red and scaly. A pacifier can trap saliva and create an identical picture in younger children.

While dental products (mouthwash, toothpaste, dental floss or chewing gum) and medicaments (neomycin, bacitracin, budesonide, tetracaine) were among the third most common allergen sources for isolated allergic contact cheilitis, spillover to the perioral skin can also be seen. This is particularly seen in the case of toothpaste-driven allergic contact dermatitis. Both the foaming action of the toothpaste and the movement of the brush contribute to the spread of the toothpaste contactants. Clinically, this can be seen as contact dermatitis at the angles of the mouth. Another helpful clue is that the angles are affected in an asymmetric fashion with the side on which the toothbrush is held showing more involvement. This is typically the right side in right-handed individuals (**Figure 5.3**).

Figure 5.3: Residual periorificial leukoderma related to contact dermatitis from toothpaste with whitening. This patient demonstrates the classic pattern of accentuation at oral commissures which is asymmetric favoring side which patient holds tooth brush.



Recommendations

When allergic contact dermatitis of the oral cavity, lip and perioral region is suspected, empiric use of minimally allergenic or hypoallergenic products is recommended. Dermatitis in this area is frequently caused by an allergen so patch testing can be helpful in determining irritant versus allergic etiologies.¹⁷ Plain petroleum jelly may be used as a lip moisturizer. This is particularly helpful in the case of irritant dermatitis in lip lickers. Individuals should use only plain petroleum jelly and avoid formulations that may have other ingredients. Products such as Vaseline Advanced Formula Lip Therapy will have product labels stating “Active Ingredient: White petrolatum (100%)” portraying pure petrolatum jelly, but such products actually have inactive ingredients such as flavor and fragrance. Tom’s of Maine Children’s Fluoride-Free Silly Strawberry Toothpaste is a nice, hypoallergenic toothpaste to keep in mind for empiric use in cases of suspected toothpaste allergy to cinnamon. For irritant dermatitis of the mouth from sodium lauryl sulfate (SLS) using SLS free toothpastes such as Sensodyne ProNamel Mint Essence Toothpaste, Bert’s Bees Natural Toothpaste, and JASON natural cosmetics toothpaste. For patients who react to acrylates in dentures, prolonged boiling of the dentures has been reported to polymerize residual acrylate monomers, thereby decreasing the allergenicity.

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Chapter 6: Neck

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Presentation

The neck should be considered among the sites prone to contact dermatitis. Like the eyelids, the thin skin of the neck contributes to the sensitive nature of the region, making it vulnerable to a number of contact allergens. It is often a co-reactor with the face, and the same approach presented in Chapter 3 can be employed when considering the neck. There are three primary categories that should be considered: scalp-applied contact allergens with run-off to the neck, aeroallergens and directly applied contact allergens.

Scalp-applied allergens are outlined in Chapter 2. It is important to remember that the preauricular face, submandibular chin and lateral neck constitute what is known as the rinse-off pattern, suggesting a scalp-applied allergen that is rinsed off, like shampoo.

Aeroallergens were discussed in detail in Chapter 3. The neck is typically exposed to the same airborne contactants. In the setting of an aeroallergen-driven dermatitis, the neck may offer the greatest clue – a sharply demarcated cutoff at the shirt collar. Another classic clue found on the neck is what some refer to as the “atomizer sign.”^{1,2} This is when there is a focal dermatitis located on the anterior neck in the Adam’s apple region (**Figure 6.1**). It is evidence of a focal application of an aerosolized contactant – typically a spray of perfume or cologne. Presence of the atomizer sign is a diagnostic pearl for fragrance-based allergic contact dermatitis.

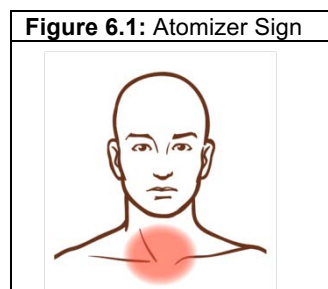


Table 6.1: Useful Patterns for Neck Dermatitis	
Product/allergen or irritant	Patterns
Aeroallergens	
Fragrance (cologne, perfume) Balasm of peru, Fragrance mix 1 and 2	<ul style="list-style-type: none"> ⌈ Anterior region ⌈ “Atomizer sign” ⌈ Patchy distribution
Photoallergen/UV driven	
Sunscreens Benzophenones	<ul style="list-style-type: none"> ⌈ Facial and neck dermatitis ⌈ Sparing under chin and behind ears
Indirectly contacted allergens	
Nail Polish Tosylamide formaldehyde resin	<ul style="list-style-type: none"> ⌈ Asymmetric
Directly contacted allergens	
Jewelry/neck pieces Nickel	<ul style="list-style-type: none"> ⌈ Crescentic pattern ⌈ Anterior neck ⌈ Corresponds with shape of offending product
Dress shirt/coat collar Dyes including disperse blue 106 and 124 (increased amounts found in dark clothing) or permanent press clothing containing Ethyleneurea/melamine, Formaldehyde resin	<ul style="list-style-type: none"> ⌈ Encircles the neck ⌈ Corresponds with shape of offending product
Zippers Nickel	<ul style="list-style-type: none"> ⌈ Patchy distribution ⌈ Anterior or posterior neck ⌈ Corresponds with shape of offending product
Necklace clasp Nickel	<ul style="list-style-type: none"> ⌈ Posterior neck ⌈ Corresponds with shape of offending product
Violin/viola exotic woods, metal components, rubber or varnishes	<ul style="list-style-type: none"> ⌈ Left side of the anterior neck (just below the angle of the jaw) ⌈ Patchy distribution ⌈ Unilateral distribution ⌈ “Fiddler’s neck”

Directly applied allergens to the neck can be subdivided into two basic types of contactants: personal care products, including cosmetics and sunscreen, and personal articles like jewelry and clothing.

A recent article reviewed the results of patch testing to personal care products. Preservatives were the most common allergen to cause a positive patch test result, followed by fragrances.² Sunscreens are a unique subset of personal care products that deserve particular consideration. Allergy to the active ingredient in sunscreens appears to be very low (less than 1% of the general population).^{3,4} However, sunscreens are involved in a unique niche in the world of

contact dermatitis –photoallergic contact dermatitis. While the overall proportion of patients with sunscreen allergy is low, when considering referrals for photopatch testing, sunscreens are the number one photoallergen found to react.⁴ Benzophenones are the major class of photoallergenic sunscreens. The primary clue on exam that suggests photoallergic reaction to sunscreens is the photodistribution pattern. Photodermatitis may be mistaken for aeroallergen-driven dermatitis. A helpful differentiating feature is that the region under the chin and behind the earlobes is typically spared in a photoallergic process.⁵

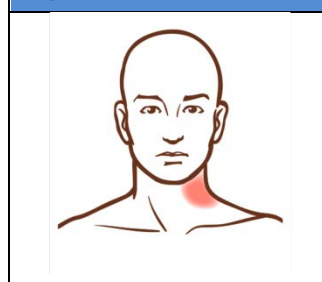
Nail polish can be considered under the category of personal care products and cosmetics. According to a study on allergic contact dermatitis, the face and neck were the most commonly affected sites from nail polish exposure.^{4,6-7}

Personal articles include a wide array of items. An allergy to metal in jewelry such as necklaces (**Figures 6.2 and 6.3**) or the neck pieces of stethoscopes may appear as crescentic rashes on the anterior neck.^{2,6,7} Wooden necklaces made from exotic woods may also produce an allergic reaction. A more linear band of dermatitis encircling the neck can be a clue that a patient is reacting to the collar of a dress shirt or coat. This may be an irritant reaction if the textile is coarse, such as wool, in a patient with an underlying atopic diathesis. The reaction may also be allergic in nature. The allergen may be primary to the article of clothing, such as textile resins and dyes, or it may be a retained allergen. Retained allergens are most often found in articles that are not frequently washed such as coats, hats and shoes. These allergens represent an allergen that has become embedded and retained within the article of clothing. A final pattern is that of posterior neck dermatitis. This pattern may indicate a reaction to dress labels or necklace clasps.^{7,8}

Figure 6.2 and 6.3: Individual with necklace containing common contact allergen nickel resulting in allergic contact dermatitis in a necklace distribution



Figure 6.4: Fiddler's neck



Musical instruments can also be considered under personal articles known to cause contact dermatitis affecting the neck. A rash on the left side of the anterior neck (just below the angle of the jaw) in an individual who plays the violin or viola is very suggestive of an allergy to something in the string instrument. This has led to the term “fiddler’s neck” being used to describe such presentations (**Figure 6.4**). These affected individuals often have an allergy to the exotic woods, metal components or varnishes on the chin rest.^{7,9,10}

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Chapter 7: Hands

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Introduction

The hands are a common site for dermatitis. This area remains a diagnostically complex region due to the multifactorial nature of hand dermatitis. Both endogenous and exogenous factors play a role in hand dermatitis.¹ The exact prevalence is difficult to determine because many cases may go unreported. With 20-35% of all dermatitides involving the hands, it is estimated that 2-10% of the general population is affected by hand dermatitis.^{2,3}

Contact dermatitis has been reported to be the most common type of dermatitis involving the hands. Several studies have highlighted that hand dermatitis is common amongst people in occupations involving wet work or exposure to soaps/cleansers. The profession traditionally considered "high risk" for women is hairdressing or healthcare worker; and for men manufacturing or construction.³

Presentation

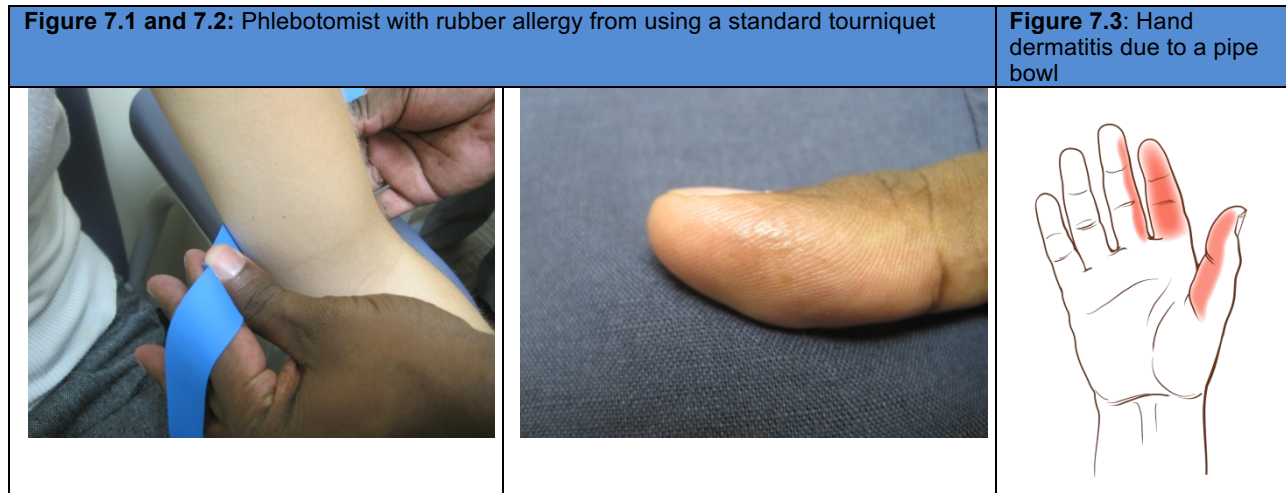
Developing a differential for potential contactants in hand dermatitis can be challenging. A helpful starting point may be to question the possibility of occupationally related causes of hand dermatitis. Risk factors include the use of gloves and chemical exposure. Wet work is also a very important risk factor for hand dermatitis. Exposing the hands to a wet environment daily can lead to maceration of the stratum corneum and impairment of the protective barrier.⁴ In these cases, the hands become more susceptible to irritants and potential allergens. According to a cross-sectional analysis by the NACDG, occupational hand dermatitis is frequently related to gloves, bacitracin,³ preservatives, metals, and fragrance.³

Gloves are an example of occupational contact dermatitis due to personal protective equipment (PPE). Gloves are often used in fields such as healthcare, cleaning, and food preparation.³ The pattern seen with glove dermatitis is somewhat analogous to that seen with shoe dermatitis on the feet. The thinner skin of the dorsal hand and wrists tends to show a patchy dermatitis while there is relative sparing of the palmar skin. The dorsal forearm may also be involved. Chemicals used in the production of rubber compounds called "rubber accelerators" are considered to be the most common cause of allergic contact dermatitis to gloves. Among the rubber accelerators, thiurams are the most frequently implicated allergen in glove dermatitis. Carbamates, mercaptobenzothiazole, mixed dialkylthioureas, chromates, and p-phenylenediamines are other potentially relevant allergens in gloves. An allergy related to rubber components can also be found many other sources. An isolated and patterned or geometric dermatitis of the hands should initiate a Sherlock Holmes-like approach to obtaining possible contactant history. Some examples of unique rubber contactants affecting the hands include: the rubber grip on mechanical pencils and

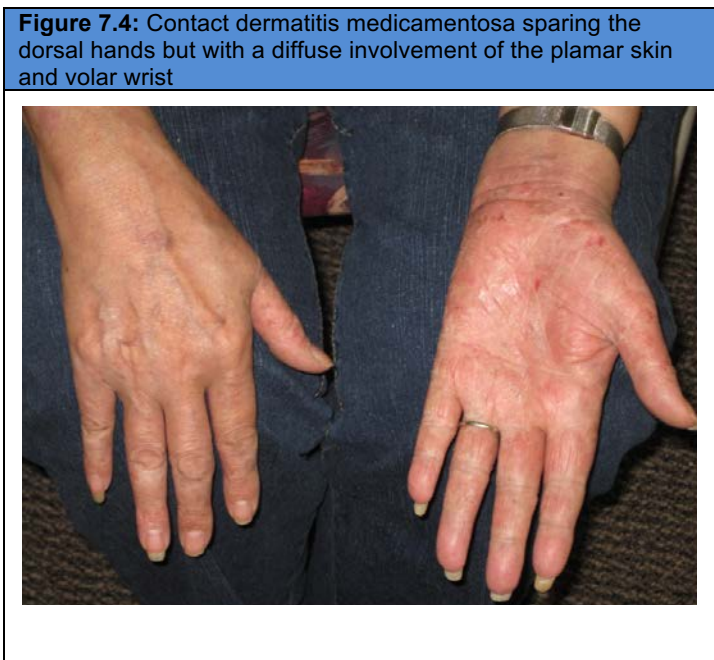
Table 7.1: Useful Patterns for Hands Dermatitis

<i>Product/allergen or irritant</i>	<i>Pattern</i>
<i>Rubber</i>	
Gloves (Latex)	<ul style="list-style-type: none"> ⌈ Patchy distribution ⌈ Favors dorsal hands and wrists
Rubber grip on mechanical pencil/pen	<ul style="list-style-type: none"> ⌈ Seen near distal phalanges ⌈ Corresponds with shape of offending product
<i>Topical Medicaments</i>	
Bacitracin, Neomycin, Sorbitan sesquioleate, sothiazolinones, lanolin, corticosteroids, and formaldehyde releasing preservatives	<ul style="list-style-type: none"> • Chonic hand dermatitis refractory to treatment or flaring with treatment
<i>Metals</i>	
Scissors, crotchet hooks	<ul style="list-style-type: none"> ⌈ Seen on fingers which hold instrument ⌈ Corresponds with shape of offending product
Keys, coins, hand-held work tools with metal parts	<ul style="list-style-type: none"> ⌈ Corresponds with shape of offending product
Escalator railing, metal bed rail	<ul style="list-style-type: none"> ⌈ Seen on palm of hand ⌈ Corresponds with shape of offending product
Handheld devices (cell phones, computer mouse, ect)	<ul style="list-style-type: none"> ⌈ Seen on palm of hand ⌈ Corresponds with shape of offending product
Ring	<ul style="list-style-type: none"> ⌈ Encircles digit ⌈ Annular pattern ⌈ Corresponds with shape of offending product
<i>Miscellaneous</i>	
Smoking pipe	<ul style="list-style-type: none"> ⌈ Palmar aspect of hand near region of proximal phalanges ⌈ Most often affects the thumb, index finger, and middle finger (digits 1-3) ⌈ Varies according to individual preference for holding the smoking pipe

pens, seen as dermatitis near the distal phalanges, chronic dermatitis of the finger tips in a phlebotomist due to rubber tourniquet use (see **Figure 7.1 and 7.2**), and involvement of the palmar aspect of hand near region of proximal phalanges in exposure to a pipe bowl (**Figure 7.3**).



Contact dermatitis medicamentosa is also important to consider in the evaluation of hand dermatitis. Many cases of hand dermatitis likely begin as xerosis or adults with atopic dermatitis manifesting as chronic hand dermatitis. This endogenous barrier disruption then sets the stage for hand dermatitis which becomes secondarily driven by allergic contact dermatitis to the agents utilized for treatment. In these cases there are more patients who demonstrate palmar (**Figure 7.4**) or diffuse involvement than seen with glove dermatitis. Both over-the-counter and prescription products need to be considered. Bacitracin is a classic example of this.³ Its use is often seen in the healthcare field and it is also widely applied by patients due to its availability without prescription. Propylene glycol is another important allergen to consider. It is found in many topical medicaments and is the most common allergen in topical corticosteroid agents. It causes both irritant and allergic contact dermatitis. Sorbitan sesquioleate, thiazolinones, lanolin, and formaldehyde releasing preservatives are other common allergens found in topical steroids.¹

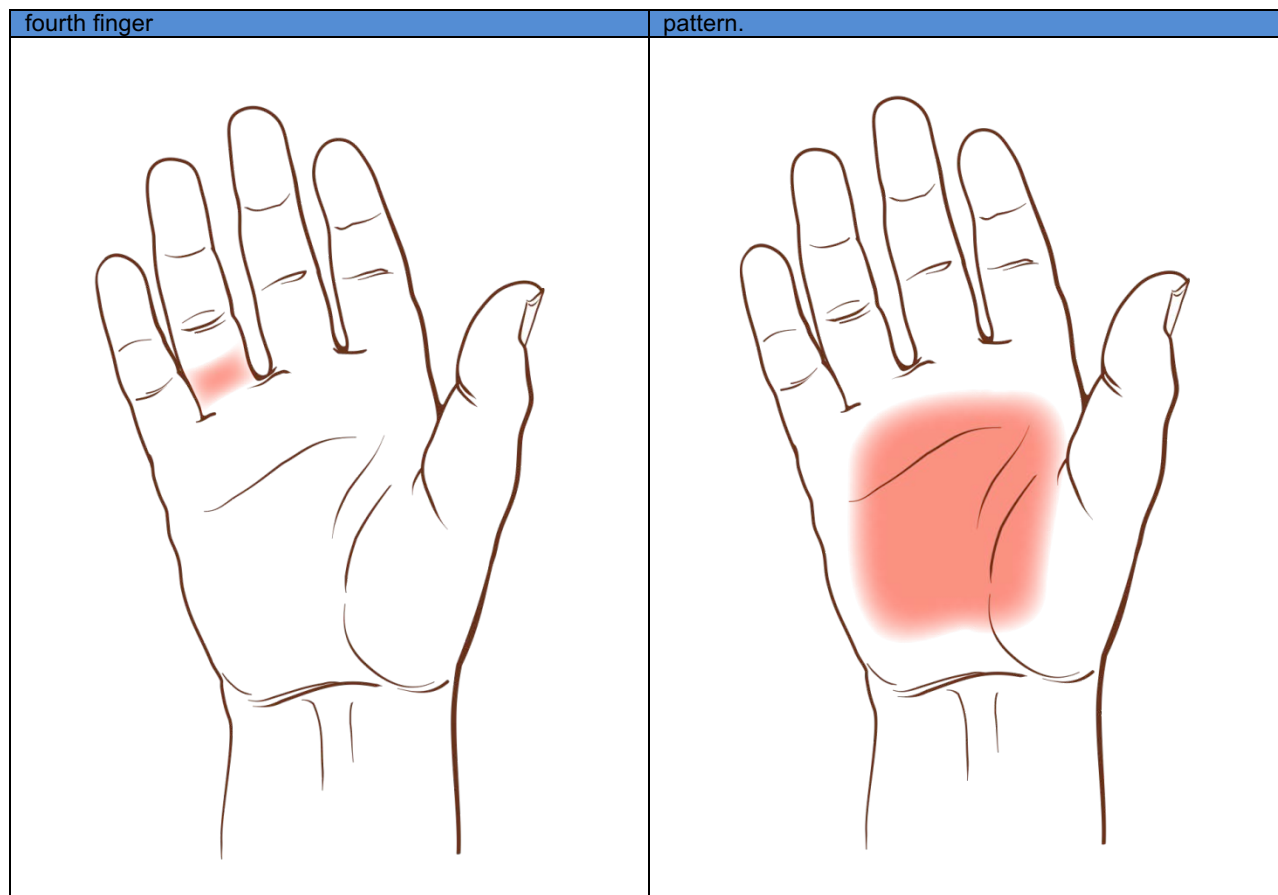


Metal is another common allergen which can affect the hands. While systemic ingestion of foods high in nickel has been associated with dyshidrosis, hand dermatitis related to metals is more often due to the handling of metal containing instruments. Certain occupations are notable for work with metal instruments. A dermatitis localized to the fingers and palm in an individual who works as a hairdresser is very suggestive of an allergy to nickel in nickel-plated scissors.⁵ Locksmiths, cashiers, and carpenters are other occupations with frequent exposure to nickel containing substances such as keys, coins, and hand-held work tools with metal parts.^{5,6}

Chronic dermatitis of the mid palm has been termed the “palmar grip pattern”. This distribution suggests an allergen that is grasped in the palm such as a computer mouse, cell phone, vehicle stick shift, railing, or cane.⁷ (**Figure 7.5**)

Jewelry such as rings (**Figure 7.6**) may lead to a negative image of dermatitis on the skin which is contacted.





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Chapter 8: Extremities

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Introduction

The upper and lower extremities are in frequent movement and often make contact with the surroundings. Though contact may be brief or prolonged, this allows upper and lower extremities to be susceptible to many sources of irritants and allergens.

Wrists

Linear rashes encircling the wrist are suggestive of a contactant worn around that region for an extended period of time. Jewelry is a common source and may elicit a reaction due to either metal or exotic woods.^{1,2} Individuals who wear watches may have a reaction to leather or nickel-containing straps.^{3,4} There may be occupationally-related rashes in rubber-sensitive individuals that frequently wear rubber bands around the wrist, such as post office workers.⁵ In children, exposure to nickel in identification bracelets would also be considered.⁶

Bilateral and symmetrical linear rashes that do not completely encircle the wrists in an individual who works in front of a computer for long periods of time is very suggestive of an irritation or allergic response to keyboard wrist pads and computer wrist rests.^{7,8} Exposure to black leather in workout gloves or the dye in the straps (due to the leather or dye) would also be considered.

Forearms

The forearms are often used to rest upon various surfaces which leaves the forearm susceptible to linear rashes with a patchy distribution limited to the medial junction of the volar and extensor forearm surfaces. This presentation would be suggestive of contact dermatitis from worn-out foam, rubber, metal, or Japanese lacquered wood on certain surfaces of furniture such as chairs, sofas, or desktops. Bilateral involvement of the forearms has been reported due to occupational contact dermatitis from ethylene oxide which was used to sterilize green, surgical cotton gowns.⁹

Thighs

Although the thighs are often covered by articles of clothing, rashes may occur from the items within the pockets of the clothes. A nummular, or coin-shaped, rash on the anterior thigh in individuals who keep these objects in their pant pockets is very suggestive of an allergy to certain metals (e.g., nickel) in keys and coins.^{1,11} The rashes are often unilateral but bilateral cases have been reported in individuals who use two cell phones simultaneously.¹²

A bilateral nummular rash on the posterior thighs in school-aged children is very suggestive of an allergy to metal in the bolts in certain types of seats. . Individuals who made contact between the back of their legs with the metal chair rungs had linear rashes that spanned horizontally across the posterior region of the legs. This pattern below the calves under these circumstances is very suggestive of an allergy to the metal in the chair rungs.

Individuals with chronic leg ulcers have been shown to be particularly susceptible to polysensitization to topical drugs and antiseptics used to treat their wounds and the surrounding skin.^{13, 14} In a study of 423 patients with chronic ulcers, 73% had at least one positive test patch-test. Positive tests were most frequently to Balsam of Peru, fragrance, lanolin and its derivative Amerchol L101, The duration of the ulcer influenced the patients' sensitization. Frequency of sensitization was 67.5% within 1 year and 79% within 1-10 years.¹⁴

Scattered Arms and Legs

One of the most commonly encountered presentations in the clinical setting is a skin rash that presents as a linear streak on the upper and lower extremities. In these cases, a brief history often reveals a recent camping trip or other outdoor activity. This characteristic linear pattern is typical of allergic contact dermatitis due to poison ivy or poison oak.^{15,16,17} The arms and leg can also exhibit sofa dermatitis, as explained in the anogenital chapter.

Asymmetric Arm Involvement

Photocontact dermatitis occurs when certain allergens produce an allergic reaction upon sun exposure. The left arm is more likely to experience photocontact dermatitis than the right arm although both may be involved. In North America, the left arm faces the driver's side window and this sets up the unilateral preference for photocontact dermatitis.¹⁰ Involvement on the dorsal aspects of the arm with sparing of covered regions is a clue to the diagnosis.

Table 8.1: Extremities - Useful List of Allergens and Patterns	
Product/allergen or irritant	Pattern
<i>Wrists</i>	
Jewelry (bracelets), wristwatches, identification bracelets (children), rubber bands	Encircles wrist Linear pattern Corresponds with shape of offending product
Keyboard wrist pads, computer wrist rests	Patchy or linear distribution Corresponds with shape of offending product
Workout gloves	Patchy or linear distribution Corresponds with shape of offending product
<i>Forearms</i>	
Wheelchair, Chair arms, desktops (worn-out foam, rubber, metal, or Japanese lacquered wood)	volar forearm Patchy distribution Corresponds sites contacted by offending product
<i>Left Arm</i>	
Photoallergens (sunscreens)	May see preference for left arm Dorsal upper extremity May have shirt cutoff
<i>Thighs</i>	
Coins, keys, match boxes	Seen in anterior thigh region (pants pockets) Nummular pattern (coins) Patchy distribution
Metal bolts in seats	Seen in posterior thigh region Nummular pattern Patchy distribution Corresponds with shape of offending product
Metal bar in school chairs (chair rungs)	Seen below the calves Linear or patchy Corresponds to site contacted by offending product
<i>Arms and Legs</i>	
Poison ivy, poison oak	Linear streaky pattern
Furniture (Sofa, chairs)	buttocks, back, dorsal upper thighs and arms

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Chapter 9: Feet

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Introduction

The feet are unique amongst regional contact dermatitides in that they are commonly contained in a microenvironment enclosed by footwear. Depending on the irritant or allergen, the substance can be absorbed by socks and the surrounding shoes. Wearing shoes is a common cultural practice and occurs almost daily for extended periods of time. Since shoes are not routinely washed and socks may be worn for extended periods of time, this allows for prolonged exposure to potential irritants and allergens. The combination of shoe and sock contactants plus friction and moisture creates the optimal situation for contact dermatitis to occur. Similar to the hands, see Chapter 7, dermatitis involving the thinner dorsal skin is more likely to be contacted in nature. Still, the differential diagnosis for dermatitis of the feet may remain broad.¹ The following are some helpful points to consider in the evaluation of contact dermatitis of the feet.

Presentation

Since sources of contact irritants/allergens causing contact dermatitis of the feet are often more limited, footwear and topical agents are typically at the top of the differential for contactants.²

Shoe components have been found to be common allergens in both children and adults.³ Contact dermatitis due to footwear can be symmetric or asymmetric, typically starting on the dorsal toes and gradually extending to the dorsum of the foot, sparing the interdigital folds (**Figure 9.1 and 9.2**). Typical allergens in shoe contact dermatitis include rubber accelerators, leather tanning agents, and adhesives.⁵ The most commonly reported rubber-related allergens are due to the accelerators including: mercaptobenzothiazole (MBT), thiurams and p-phenylenediamines.⁶ More recently, Crocs™ shoes, which have become very popular among physicians and other hospital staff over the past several years, were identified as a source of allergic contact dermatitis on the feet.⁷ Other major footwear-related allergens are chromates, p-tert-butylphenol formaldehyde resin (PTBFR), colophony, and paraphenylenediamine (PPD). Chromates, such as potassium dichromate, are used in the leather tanning process while PTBFR and colophony are common adhesives found in footwear (**Table 9.1**).^{3-4,8}

Important sources of contactants to consider are directly applied personal care products or medicaments. Isolated allergic contact dermatitis of the foot secondary to topical medicaments is most often from topical antibiotics, topical antifungals or topical corticosteroids.¹ While topical antibiotics are commonly the inciting allergen, in the case of topical antifungals and topical corticosteroids, the patient more often is reacting to the vehicle rather than the active ingredient itself. Expanded patch testing is helpful in determining the precise allergen.

Figure 9.1: Contact dermatitis due to new pair of shoes



Figure 9.2: Close-up view demonstrating chronic lichenified plaques of dermatitis on the bilateral dorsal feet. The interdigital spaces and plantar surfaces are spared.



Table 9.1: Foot Dermatitis - products/allergens and patterns	
Product/allergen or irritant	Pattern
<u>Rubber</u> mercaptobenzothiazole (MBT), thiurams and p-phenylenediamines	Patchy distribution
<u>Leather</u> potassium dichromate	Patchy distribution Seen on dorsum of feet Corresponds with shape of offending product
<u>Adhesives</u> p-tert-butylphenol formaldehyde resin (PTBFR), colophony,	Patchy distribution
<u>Topical Medicaments</u> antibiotics, antifungals, corticosteroids	Diffuse distribution Seen on areas of application, Typically Dorsal > Plantar Skin

Recommendations

To prevent dermatitis, it is important to: 1) address exacerbating factors such as hyperhidrosis, 2) switch patients to minimally or hypoallergenic topical medicaments (**see Table 9.2**), and 3) avoid articles that may be contaminated with topical products such as old socks and shoes.

Table 9.2: Hypoallergenic topical antibacterials and antifungals	
Product	Vehicle Allergen
<i>Antibiotics</i>	
Mupirocin	None
<i>Antifungals</i>	
Micatin Cream	None
Desenex Liquid Spray	None
Lotramin AF Cream	None
Lotramin Powder / Powder Spray	None
Tinactin Liquid Spray / Super Absorbant Powder	None

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Chapter 10: Anogenital Region

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Introduction

The anogenital area is susceptible to contact dermatitis due to intrinsic and extrinsic properties. Similar to the eyelid region, the anogenital region is intrinsically prone to irritation and sensitization. Parallels are seen in the fact that both regions have thin epidermal barriers and show a tendency for irritant/allergen retention. The anogenital region differs from other regions in that there is also a high degree of friction, heat and moisture. These elements contribute to the frequency of several dermatoses in this region (tinea cruris, intertrigo, erythrasma, lichen simplex chronicus).¹ Contact dermatitis in the anogenital region is often secondary to patient- or physician-directed treatment of these conditions, which have lowered the irritant and sensitization threshold.

Presentation

Similar to other regions, it is important to consider both irritant and allergic contact dermatitis. Barrier creams, management of incontinence and the removal of any harsh irritants are important aspects in controlling anogenital irritant dermatitis. The remainder of this paper will focus on the allergic contact dermatitis (ACD) aspects of the anogenital region.

Data collected by the North American Contact Dermatitis Group has been reviewed with regard to patients with anogenital dermatitis who were referred for patch testing. Of the 575 patients with anogenital dermatitis who underwent patch testing, 347 had isolated anogenital disease. After patch testing, 73 patients were classified as having isolated allergic anogenital dermatitis. In this group, the most common allergens were cosmetics, medicaments and corticosteroids.²

A high index of suspicion is required for the possibility of contact dermatitis medicamentosa in the anogenital region, especially in the setting of a dermatitis that is not responding as expected to conventional therapies. In this setting, particular emphasis should be placed on searching for exposure to topical anesthetics, antibiotics, antiseptics and preservatives.¹ The rest of the chapter reviews commonly affected areas and their potential allergens (**Table 10.1**).

Table 10.1: Anogenital Dermatitis – products/allergens and patterns	
<i>Product/allergen or irritant</i>	<i>Pattern</i>
<i>Buttocks</i>	
Toilet seats Referred to as "Toilet seat dermatitis"	Seen on buttocks/proximal posterior thighs, Annular pattern, Corresponds with shape of seat.
Furniture (sofa, chair)	Buttocks, back, posterior upper thighs and arms
Diapers Referred to as "Allergic Contact Diaper Dermatitis"	Seen in diaper region ("Nappy Region"), Spares bottom of skin folds. Subset may mimic the pattern of a cowboy's gun holsters "Lucky Luke."
<i>Perianal</i>	
Moistened toilet paper ("Wet Wipes")	Perianal, Patchy distribution
<i>Vulvar</i>	
Medicaments, condoms, perfumes	Patchy distribution
<i>Penile</i>	
Medicaments	Patchy distribution
Condom	Patchy distribution along the areas covered by the condom

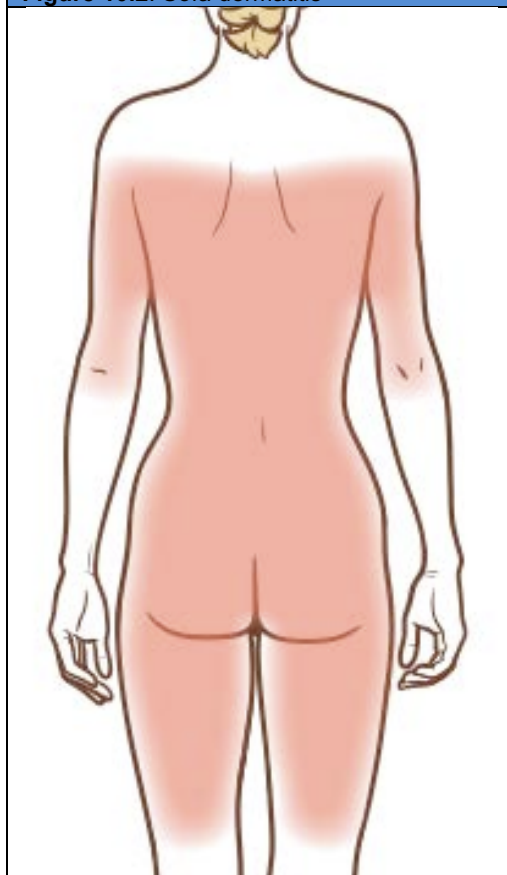
Figure 10.1: Toilet seat dermatitis



Buttocks

The distribution of the dermatitis on the buttocks can provide many clues to the etiology of the reaction. An isolated annular rash on the buttocks and posterior thighs is nearly pathognomonic for contact dermatitis to a component in toilet seats. Exposure to wooden toilet seats and associated varnish, lacquers and paints have been reported to result in ACD.³ This characteristic pattern of allergic contact dermatitis in the buttocks region is known as “toilet seat dermatitis (Figure 10.1).” Toilet seats can also retain irritants and allergens from cleansers. One case report discusses dermatitis due to formaldehyde from a toilet seat, most likely from a public restroom where aggressive cleansers are used to ensure adequate hygiene.⁴ Public restrooms and hospitals have been found to be a source of irritant exposure.

Figure 10.2: Sofa dermatitis



Sofa or chair dermatitis can involve the buttocks, but it lacks the distinct annular pattern seen with toilet seat dermatitis.⁵ If the allergen is furniture-derived, other areas that contact the furniture are typically involved, such as the posterior legs, posterior arms and back (Figure 10.2). Furniture dermatitis is notable in that an epidemic of contact dermatitis to furniture manufactured in China was recently seen. The allergen was found to be dimethyl fumarate, which was selected as the 2011 Allergen of the Year by the American Contact Dermatitis Society.⁶

Diaper dermatitis affects the area covered by the diaper and is most often irritant in nature. A secondary infection with candida should also be considered. A clue to ACD secondary to diaper components is an eczematous dermatitis that spares the skinfolds and is refractory to conventional therapies for diaper dermatitis. Allergens to consider in this setting include fragrances utilized to provide a pleasant odor to the diaper, coloring dyes, glues and rubber-related allergens. It is also important to consider wet wipes, which are often used during the diaper changing process.⁷⁻⁹ If the pattern of dermatitis favors the hips and lateral buttock, rubber accelerators such as mercaptobenzothiazole should be considered. This pattern has been referred to as the “Lucky Luke” dermatitis and is a subset of allergic contact diaper dermatitis in which the child is reacting to the elastic bands found in disposable diapers.^{10,11}

Perianal Region

With rashes involving the perianal regions, exposure to perfumed and/or colored toilet paper should be considered.¹² More recently, the use of moistened toilet paper (also commonly referred to as wet wipes) has led to an increase in the number of cases of ACD due to the presence of certain preservatives and fragrances in this consumer product.^{13,14}

Vulvar Region

The vulvar region is susceptible to the same factors as the general anogenital region. However, estrogen is integral to maintaining the strength and integrity of the vulvar barrier to potential irritants and allergens. Therefore, it is during stages of estrogen deficiency that the barrier is most compromised, thereby leading to susceptibility to both irritant and allergic contact dermatitis. As is always the general rule, the most common type of vulvar contact dermatitis is irritant in nature.¹⁵ Common causes of irritant contact dermatitis include urine, feces, sweat, topical medications, aggressive cleansing and feminine hygiene products.

Allergic contact dermatitis of the vulva needs to be considered in vulvar dermatoses refractory to treatment. Common causes of allergic contact dermatitis include topical medicaments (such as anesthetics, antibiotics, antifungals, antiseptics and corticosteroids), latex condoms and perfumes.¹⁵⁻¹⁷

Reports have also indicated that flavorings and spices may contribute to contact dermatitis in the vulvar region.¹⁴ This presentation is rare but can be seen in a patient who is reacting to allergens that are excreted in the urine and/or feces. The classic example would be a patient with sensitivity to balsam of Peru, which is a marker not only for fragrance sensitivity but also for flavorings and spices.¹⁸ Therefore, it is important to keep in mind that not only locally applied products may lead to contact dermatitis.

Penile Region

The foreskin may facilitate the retention and absorption of allergens and eventually play a role in the development in ACD. There is some evidence that circumcision may decrease the risk of inflammatory dermatoses of the anogenital area.²

Similar to other areas in the anogenital region, a study by NACDG concluded the most common allergens consisted of fragrances, preservatives, medications, vehicles and corticosteroids. There should be careful inspection for potential contactants. For example, condoms to increase sexual performance may contain benzocaine gel, which is a known potential contact allergen.

Numerous potential allergens can be found in condoms. Reports indicate ACD has resulted from latex proteins, rubber accelerators and antioxidants in condoms.¹⁹ Related personal products such as lubricants, dyes, creams and powders may also contain potential allergens. **Figure 10.3** shows a patient with erythema and scaling favoring corona of glans penis. He had been given a nystatin cream by his primary care physician, which seemed to make the dermatitis worse. The patient's patch test results were positive for both carba mix and ethylenediamine. The initial dermatitis was felt to be from carbamates in the condom; the patient was also reacting to the ethylenediamine in his nystatin.

Figure 10.3: Penile Contact Dermatitis



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