What are the Most Common Chemical Sensitizers at Home and in the Workplace?

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March 2, 2014
10:45 AM-12:00 PM
Disclosure

• Research and Educational Grants
  – Baxter
  – Genentech
  – Merck

• Speaker’s Bureau
  – Baxter
Objectives

1. Develop skills in clinical history and patch testing in suspected allergic contact dermatitis
2. Identify the most frequent contact sensitizers encountered at home and in the workplace
3. Discuss the relationship between metal hypersensitivity and prosthetic joint failure
<table>
<thead>
<tr>
<th>Year</th>
<th>Allergen</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>Methylisothiazolinone</td>
<td>Castaneda-Tardana. Dermatitis 2013, Vol 24, No 1</td>
</tr>
<tr>
<td>2012</td>
<td>Acrylates</td>
<td>Sasseville D. Dermatitis 2012, Vol. 23, No 1</td>
</tr>
<tr>
<td>2011</td>
<td>Dimethyl Fumarate</td>
<td>Bruze M, Zimerson E. Dermatitis 2011, Vol 22, No 1</td>
</tr>
<tr>
<td>2010</td>
<td>Neomycin</td>
<td>Sasseville D. Dermatitis 2010, Vol. 21, No 1</td>
</tr>
<tr>
<td>2007</td>
<td>Fragrance</td>
<td>Storrs F. Dermatitis 2007 Vol. 28, No. 1</td>
</tr>
<tr>
<td>2006</td>
<td>P-Phenylenediamine</td>
<td>DeLeo V. Dermatitis 2006 Vol. 17, No. 2</td>
</tr>
<tr>
<td>2005</td>
<td>Corticosteroids</td>
<td>Isaksson BM. Dermatitis 2005 Vo. 16, No. 1</td>
</tr>
<tr>
<td>2004</td>
<td>Cocoamidopropyl Betaine</td>
<td>Fowler J. Dermatitis 2004 Vol 15, No.1</td>
</tr>
<tr>
<td>2003</td>
<td>Bacitracin</td>
<td>Sood A, Taylor J. Dermatitis 2003 Vol 14, No. 1</td>
</tr>
<tr>
<td>2002</td>
<td>Thimerosal</td>
<td>Belsito D. Dermatitis 2002 Vol.13, No.1</td>
</tr>
<tr>
<td>2001</td>
<td>Gold</td>
<td>Fowler J Dermatitis 2001 Vol.12, No.1</td>
</tr>
<tr>
<td>2000</td>
<td>Disperse Blue Dyes</td>
<td>Storrs F Dermatitis 2000 Vol. 11, No. 1</td>
</tr>
</tbody>
</table>
Most Common Sensitizers at Home

SUMMARY STATEMENT:
If an eruption worsens, rather than improves, after the topical application of certain medications, or fails to respond to TCS, patch testing should be performed to the suspected product and/or ingredients known to be contact sensitizers.

• Medications
• Cosmetics
Summary Statement: CD commonly develops after exposure to topical medications, including:

- Corticosteroid
- Lanolin
- Para-aminobenzoic acid (in sunscreens)
- Neomycin sulfate
- Bacitracin
- Caine mix (benzocaine, tetracaine, dibucaine)
  - Anti-itch preparations
  - Patients sensitive to benzocaine can use lidocaine & carbocaine
- Thimerosal
  - Preservative of topical medication, cosmetics, vaccines, contact lens sol
- Iodochlorhydroxyquin
- (Quinolone Mix)
Neomycin
Contact Allergen of 2010

- Second most common allergen in NA
- Cross react with paromomycin, butirosin, framycetin, tobramycin, kanamycin, gentamicin
- Concomitant sensitizations: bacitracin
- Risk: stasis dermatitis, leg ulcers, anogenital dermatitis & otitis externa
- Committee on Infectious Diseases of the AAP no longer considers contact hypersensitivity to neomycin a contraindication to vaccination
Corticosteroids
Contact Allergen of 2005

• Affects 0.5%-5.8% of suspected of ACD
• Increased risk/suspect:
  – Chronic venous leg ulcers/ stasis derm
  – Contact dermatitis
  – When dermatitis fails to respond to CS
  – When dermatitis worsens with treatment
• PT complicated by anti-inflammatory nature
  – Read also at 7-10 days (~ 30% would be missed)
  – PT to CS, patient’s product, vehicle and preservatives in preparations
• Tixocortol, Budesonide, Hydrocortizone-17-butyrate in TT
STRUCTURAL GROUPS OF CORTICOSTEROIDS
Cross reactivity based on 2 immune recognition sites-C 6/9 & C16/17 substitutions

Class A (Hydrocortisone & Tixocortol pivalate: has C17 or C21 short chain ester)
  Hydrocortisone, -acetate, Tixocortol, Prednisone, Prednisolone, -acetate, Cloprednol, Cortisone, -acetate, Fludrocortisone, Methylprednisolone-acetate

Class B (Acetonides: has C16 C17 cis-ketal or –diol additions)
  Triamcinolone acetonide, -alcohol, Budesonide, Desonide, Fluocinonide, Fluocinolone acetonide, Amcinonide, Halcinonide

Class C (non-esterified Betamethasone; C16 methyl group)
  Betamethasone sodium phosphate, Dexamethasone, Dexamethasone sodium phosphate, Fluocortolone

Class D1 (C16 methyl group & halogenated B ring)
  Clobetasone 17-butyrate, -17-propionate  Betamethasone-valerate, -dipropionate, Aclometasone dipropionate, Fluocortone caproate, -pivalate, mometasone furoate

Class D2 (labile esters w/o C16 methyl nor B ring halogen substitution)
  Hydrocortisone 17-butyrate, -17-valerate, -17-aceponate, -17-buteprate, methylprednisolone aceponate

Lanolin (Wool wax alcohols)

- Base of many topical medications (TCS), moisturizer, creams, cosmetics
- Complex mixture therefore test actual lanolin used
- Lanolin Paradox: sensitivity low in normal skin, moderate in atopic, high in stasis eczema & ulcers
SUMMARY STATEMENT: When evaluating ACD from cosmetics and personal care products which contain considerable numbers of chemical ingredients, consider that the most common causes are due to a few important chemical classes including fragrances, preservatives, excipients, nickel and sun blocks.

<table>
<thead>
<tr>
<th>Top 10 (+) reactions to NACG Allergens</th>
<th>NACD 2009-10</th>
<th>TT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel Sulfate (Metal)</td>
<td>15.5</td>
<td>x</td>
</tr>
<tr>
<td>Neomycin (Antibiotic)</td>
<td>8.7</td>
<td>x</td>
</tr>
<tr>
<td>Fragrance Mix I (Fragrance)</td>
<td>8.5</td>
<td>x</td>
</tr>
<tr>
<td>Bacitracin (Antibiotic)</td>
<td>8.3</td>
<td>x</td>
</tr>
<tr>
<td>Balsam of Peru (Fragrance)</td>
<td>7.2</td>
<td>x</td>
</tr>
<tr>
<td>Cobalt Chloride (Metal)</td>
<td>6.2</td>
<td>x</td>
</tr>
<tr>
<td>Quarternium 15 (Preservative)</td>
<td>5.8</td>
<td>x</td>
</tr>
<tr>
<td>Formaldehyde (Preservative)</td>
<td>5.8</td>
<td>x</td>
</tr>
<tr>
<td>PPD</td>
<td>5.5</td>
<td>x</td>
</tr>
<tr>
<td>Fragrance Mix II (Fragrance)</td>
<td>4.7</td>
<td></td>
</tr>
</tbody>
</table>

### Fragrance

<table>
<thead>
<tr>
<th>Fragrance Mix I</th>
<th>Balsam of Peru</th>
<th>Fragrance Mix II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cinnamic alcohol 1%</td>
<td>Cinnamic acid</td>
<td>Coumarin 2.5%</td>
</tr>
<tr>
<td>Cinnamic aldehyde 1%</td>
<td>Benzoyl Cinnamate</td>
<td>Hydroxyisohexyl 3-cyclohexene carboxaldehyde (Lyral) 2.5%</td>
</tr>
<tr>
<td>α-Amyl cinnamaldehyde 1%</td>
<td>Benzoyl Benzoate</td>
<td>Citronellol 0.5%</td>
</tr>
<tr>
<td>Hydroxycitronellal 1%</td>
<td>Benzoic acid</td>
<td>Farnesol 2.5%</td>
</tr>
<tr>
<td>Geraniol 1%</td>
<td>Vanillin</td>
<td>Citral 1.0%</td>
</tr>
<tr>
<td>Isoeugenol 1%</td>
<td>Nerodilol</td>
<td>α Hexyl cinnamic aldehyde 5.0%</td>
</tr>
<tr>
<td>Eugenol 1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oak moss 1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other fragrance sensitizers: Lyral, jasmine, lavender, sandalwood, tea tree oil, ylang ylang oil, lemongrass oil, jasmine, Narcissus

Fragrance mix I & Balsam of Peru (in TT) pick up 60-70% of all ACD to fragrances at best
Fragrance Mix Patch Test

- Low specificity
  - Mild Irritant, caution with weak (+) reactions
- Increased probability of a relevant FM patch-test
  - Increased strength of test reaction
  - Repeated (+) reaction on retest
  - (+) to one of its ingredients

FDA Voluntary Cosmetic Registration Program Database

• ~ one in six stay-on cosmetics & one in four rinse-off products contain a formaldehyde releaser
  – frequency
    • Imidazolidinyl urea : 7%
    • DMDM hydantoin : 5.4%
    • Diazolidinyl urea : 4.5%
    • quaternium-15: 1.4%

de Groot, White et al. 2010
de Groot, Flyvholm et al. 2009
## Cosmetic Preservatives

<table>
<thead>
<tr>
<th>Formaldehyde</th>
<th>(+) PT*</th>
<th>Non Formaldehyde</th>
<th>(+) PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formaldehyde</td>
<td>5.8 %</td>
<td>Iodopropynylbutylcarbamate</td>
<td>4.3 %</td>
</tr>
<tr>
<td>Quarternium 15</td>
<td>5.8%</td>
<td>Methyldibromoglutaronitrile</td>
<td>3.8 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Euxyl K 400)</td>
<td></td>
</tr>
<tr>
<td>Diazolidinyl urea (Germall II)</td>
<td>2.2 %</td>
<td>MCI/MI</td>
<td>2.5 %</td>
</tr>
<tr>
<td>Imidazolidinyl urea (Germall)</td>
<td>2.2 %</td>
<td>Parabens</td>
<td>0.8 %</td>
</tr>
<tr>
<td>Bromonitropropane (Bronopol)</td>
<td>1.0 %</td>
<td>Chloroxylenol</td>
<td>0.5 %</td>
</tr>
<tr>
<td>DMDM Hydantoin (Glydant)</td>
<td>1.0 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paraben, quarternium-15 & formaldehyde preservatives are frequently combined & cosensitize **

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* % Prevalence PT reaction based on NACDG 2009-2010


Formaldehyde

Most common potential source of exposure

• Cosmetics
  – Rarely on ingredient label, direct use forbidden in some countries
  – Contain formaldehyde releasers

• Permanent press textiles
  – Increase strength, prevent shrinking, resist wrinkling (permanent press) of cellulose and rayon fibers

Formaldehyde Resins

• Dermatitis pattern in areas where clothing fit tightly
  • Posterior neck, upper back, lateral thorax, anterior & posterior axillary folds (spares axillary vault), waistband (spares undergarment areas), flexor
• Importance of pressure, friction, heat, perspiration
Treatment for Formaldehyde Resin Allergic Contact Dermatitis

• Use 100% silk, polyester, acrylic, nylon
  – Linen & denim if soft & wrinkle easily
• Avoid “easy care,” “permanent press,” or “wrinkle free”
• Some also recommend avoidance of formaldehyde-releasing preservatives in personal products*
• AVOID FORMALDEHYDE RESINS AT ALL TIMES. Occasional exposure to “Dress clothes” on weekends is enough to maintain dermatitis

Methylisothiazolinone
Contact Allergen of 2013

• Preservative in cosmetics and toiletries
  US FDA Voluntary Cosmetic Ingredient Registration Program:
  MI (singly or MCI/MI) was used in 1125 cosmetic products in the US in 2007
  – 24% (n = 275) were shampoos
  – 18% (n = 206) were conditioners
  – 10% (n = 117) were baby soaps and detergents

• Occupational sources of MI: paints, inks, glues, lacquers, varnishes, cutting oils
  – painters constitute nearly half of occupational ACD to MI alone *

• Household products with MI: dishwashing liquid, soaps, laundry detergents, stain removers, fabric softeners; all purpose, glass & wood cleansers

• Tested with methylchloroisothiazolinone (MCI/MI) mix
  – MCI/MI trade names: Kathon CG
  – Mix misses ~ 40% of allergy to MI, (low concentration of MI in mix)

SUMMARY STATEMENT 44: Suspect the diagnosis of photodermatitis to cosmetics when eczema occurs in a light-exposed distribution following the use of a skin care product or cosmetic, including sunscreens. In these cases, photopatch testing must be performed.

- Involves
  - sun-exposed areas
  - Face
  - “V” of neck
  - dorsal hands and forearms

- Spares
  - Upper eyelids
  - Upper lip
  - Submental
  - Post auricular areas
**Sunscreens**

**TABLE 2 LEVEL OF PROTECTION FROM DIFFERENT INGREDIENTS**

<table>
<thead>
<tr>
<th>Common UV absorbers</th>
<th>Type</th>
<th>Sunburn</th>
<th>UVA II</th>
<th>UVA I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octyl methoxycinnamate</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homosalate</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Padimate O</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octyl salicylate</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Phenyl-benzimidazole-5-sulfonic acid</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxybenzone “(benzophenone-3)”</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menthyl anthranilate</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octocrylene</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avobenzone</td>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nanosun™ Zinc Oxide</td>
<td>Mineral</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Level of Protection**

- None
- Moderate
- Good
- Excellent

**Chemical absorbers**
- UVB (290–320 nm)
- UVA II (321–340 nm)
- UVA I (341–400 nm)

**Physical blockers**
- Titanium Dioxide
- Zinc Oxide
What does SPF stand for?

Sun Protection Factor (Measure UVB protection)

- Range from 2-80
- UV radiation it takes to burn skin with sunscreen compared to burn bare skin. (i.e. SPF 30 take 30 x amount of UVB to cause sunburn)
  - Nothing to do with amount of time you can spend in the sun
  - Varies with every individual
- SPF 15 blocks ~95 % UVB rays
  - SPF 30 blocks ~97 %
  - SPF 50 blocks ~98%
  - SPF 100 blocks ~99%
  - None offers 100% protection
- **Bottom line:** Your daily sunscreen should be somewhere between SPF 30 and 50
Contact Dermatitis to Sunscreen

Allergic and Photo allergic

• Chemical Sun blocks: most common cause of ACD
  PABA, Benzophenone, Cinnamate
• Physical UV Blocker
  Titanium dioxide & zinc oxide: no report of CD or photo allergy
Sun Protection should include sunscreens

sun-protective clothing

PLUS cautious sun avoidance

Octinoxate  7.5%
Octocrylene  2%
Oxybenzone  3%
Zinc Oxide  6%

Titanium:  5%
Zinc Oxide:10%

Zinc Oxide:18.6%

Titanium:10%
Zinc Oxide:3%
Nickel: Contact Allergen of 2008

- 10% of population are nickel allergic
- Increasing sensitization in North America
  - New sources of nickel ACD: cell phones

Aquino MA, Mucci T, Chong, M, Davis Lorton, M, Fonacier L. Mobile Phones: Potential Sources of Nickel and Cobalt Exposure for Metal Allergic Patients. Pediatric Allergy Immunology and Pulmonology. 2013, Volume 26, Number 4,
“Does sensitization begin in infancy?”

- Nickel: most common (+) allergen in asymptomatic children
  - 12.9% of children (6-67.5 mos) were (+) to nickel

Risk factors for development of nickel allergy

- Body piercing (most important)
  - Sensitization in pierced ears (14.8%) vs. unpierced (1.8%)

- Number of piercings
  - 4% (+) PT in unpierced males
  - 11.1% with 1 piercing
  - 14.6% with multiple piercings*

Lessons from this well-documented epidemiology of nickel sensitization

Kütting et al recommend to delay ear piercing until after 10 y.o. (presumably to allow for development of immune tolerance)

Bruckner AL, Weston WL, Morelli JG. Does sensitization to contact allergens begin in infancy? Pediatrics 2000;105:e3
### TABLE 3. Body Sites of Dermatitis and Final Diagnoses

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Primary, n (%)</th>
<th>Total of Up to 3 Listed, †n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scattered/generalized</td>
<td>907 (21.1)</td>
<td>1101 (25.6)</td>
</tr>
<tr>
<td>Hand</td>
<td>866 (20.1)</td>
<td>1031 (24.9)</td>
</tr>
<tr>
<td>Face</td>
<td>667 (15.5)</td>
<td>926 (21.5)</td>
</tr>
<tr>
<td>Eyelids</td>
<td>392 (9.1)</td>
<td>466 (10.8)</td>
</tr>
<tr>
<td>Trunk</td>
<td>250 (5.8)</td>
<td>505 (11.7)</td>
</tr>
<tr>
<td>Leg</td>
<td>201 (4.7)</td>
<td>469 (10.9)</td>
</tr>
<tr>
<td>Arm</td>
<td>184 (4.3)</td>
<td>596 (13.8)</td>
</tr>
<tr>
<td>Scalp</td>
<td>150 (3.5)</td>
<td>236 (5.5)</td>
</tr>
<tr>
<td>Lips</td>
<td>138 (3.2)</td>
<td>181 (4.2)</td>
</tr>
<tr>
<td>Foot</td>
<td>110 (2.6)</td>
<td>263 (6.1)</td>
</tr>
<tr>
<td>Anal/Genital</td>
<td>106 (2.5)</td>
<td>134 (3.1)</td>
</tr>
<tr>
<td>Other</td>
<td>102 (2.4)</td>
<td>129 (3.0)</td>
</tr>
<tr>
<td>Neck</td>
<td>72 (1.7)</td>
<td>366 (8.5)</td>
</tr>
<tr>
<td>Most Exposed Areas</td>
<td>62 (1.4)</td>
<td>76 (1.8)</td>
</tr>
<tr>
<td>Ears</td>
<td>47 (1.1)</td>
<td>76 (1.8)</td>
</tr>
<tr>
<td>Eyes</td>
<td>24 (0.6)</td>
<td>36 (0.8)</td>
</tr>
<tr>
<td>Only under clothes</td>
<td>17 (0.4)</td>
<td>27 (0.6)</td>
</tr>
<tr>
<td>Nose</td>
<td>3 (0.1)</td>
<td>3 (0.1)</td>
</tr>
<tr>
<td>Erythroderma</td>
<td>2 (0.1)</td>
<td>3 (0.1)</td>
</tr>
</tbody>
</table>

*Excludes 8 with no primary site listed.
†Total of any of up to 3 sites or up to 3 diagnoses listed.
‡Excludes 23 patients with no primary final diagnosis.
### Nickel

Estimated SCD following oral nickel in nickel allergic patients

- 1% to 0.3 - 0.6 mg/d (normal diet)
- 10% to 0.55 - 0.89 mg of nickel
- ~ 50% to 2.5 mg nickel

**Approximate nickel content of foods**

- Soybean, ~ 1 cup: 895 mcg
- Figs ~5: 85 mcg
- Cocoa, 1 tbsp: 147 mcg
- Lentils 1/2 cup cooked: 61 mcg
- Cashew, ~ 18 nuts: 143 mcg
- Raspberry: 56 mcg
- Vegetables, canned 1/2 cup: 40 mcg
- Lobster 3 oz: 30 mcg
- Oat Flakes 2/3 cup: 25 mcg
- Peas Frozen, 1/2 cup: 27 mcg

### Balsam of Peru

~ half of patients with (+) PT to MP who followed a low BOP diet had their dermatitis improve

**Foods to Avoid in Balsam-Restricted Diet**

- Citrus fruits: oranges, lemons
- Flavorings: pastries, bakery goods
- Spices: cinnamon, cloves, vanilla, curry, allspice, anise, ginger
- Spicy condiments: ketchup, chili
- Perfumed or flavored tea & tobacco
- Chocolate
- Ice cream
- Cola, spiced soft drinks
- Tomatoes

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Most Common Sensitizers in the Workplace

• **Irritant Contact Dermatitis**: ~ 80% of occupational CD
  - wet work
  - solvents and alcohols
  - cutting oils, coolants
  - degreasers, soaps, detergents
  - other cleaning agents and disinfectants.

• **Allergic Contact Dermatitis**
  - Metals
  - rubber-related materials
  - epoxies, resins and acrylics
  - organic dyes, plants, foods
  - medications, biocides, germicides
Food Processing Workers

• Most common sites:
  – Hands: 36.7%
    • “wet work” (frequent hand washing)
    • Food handling: acidic (citrus) or abrasive (nuts, grains)
      – Common food: garlic & onions
  – Scattered or generalized sites: 20.2%
  – Arms: 17.4%
  – Face: 9.2%
  – Lips: 6.4%
  – Anal & genital areas: 4.6%
Hairdressers and Cosmetologists

Most Common Allergens

- glycercyl thioglycolate in permanent wave solutions,
- p-phenylenediamine in hair dyes
- nickel sulfate
- 2-hydroxyethyl methacrylate
- quaternium-15

**SUMMARY STATEMENT:** Patients suspected to have allergy to hair products should be evaluated for PT reactions to
- Cocamidopropyl betaine
- Paraphenylenediamine
- glycerol thioglycolate
Cocoamidopropyl betaine
Contract Allergen of 2004

- Amphoteric surfactant in shampoos, bath products, eye & facial cleaners, liquid detergents, surface cleaners, pet care products, other skin and hair care, liquid shower gels, roll-on deodorants, facial cleansers
- Second most common allergen in shampoo
- Less irritating but more sensitizing than older polar surfactants (sodium lauryl sulfate)
- Positive reactions to this allergen are often clinically relevant
P-phenylenediamine (PPD)
Contact Allergen of 2006

- Permanent Hair Dye
- New Route of Exposure: Body painting & temporary tattooing
- Clinical course
  (1) acute intense eczematous response within 1-2 days of tattooing
  (2) subacute response: lichenoid eruptions within 1-2 week
  • Most likely causative agent is PPD
- PPD sensitization is likely lifelong; may react to first attempts at hair coloring

Leo V. p-Phenylenediamine Dermatitis Volume 17, Issue 02, June 2006, Pages 53-55
Dickel H et al. Comparison of patch test with standard series among white and black racial groups. Am J Contact Dermat 2001;12:77-82
Types of Hair Dye

- Semi permanent: 2/4 weeks
- Demi-permanent: 6/8 weeks
  - Ammonia-free (cannot lighten hair)
- Permanent: ..forever

PPD-Free Hair Dyes

Wella Koleston Perfect (permanent) *
Wella Color Charm (demipermanent)
Schwarzkopf Igora Royal (permanent) **
Goldwell Color Chic (permanent) ***
Goldwell ReShade for Men (demipermanent)
Sanotint Light (demipermanent) ****
L’Ore´al Paris Excellence To-Go 10-Min. Cre`me Colorant (demipermanent) *****
Glycerol thioglycolate
Occupational Exposure

• Thioglycololates may remain allergenic in hair long after it has been rinsed out
• Allergic individuals may continue to have skin eruptions weeks after application of the perm
• Allergic hairdressers may be unable to cut or shape permanent waved hair
Acrylates
Contact Allergen of 2012

- Adhesives, paint, printing ink, solvents
- Soft contact lenses
- Artificial nails
  - fingertip dermatitis & paresthesia
  - periungual & eyelid dermatitis
- Bone cement, orthopedic implants
  - Dental composite resin, dentures
    - painful, burning stomatitis
- Bone cements
- Hearing aid resins

Photo from: Bruze M, Zimerson E. Dermatitis 2011, Vol 22, No 1
Acrylates
Contact Allergen of 2012

• Ethyl acrylate & methyl methacrylate are not in the TT but are in the NACD 2007 standard screen
• Methyl methacrylate can penetrate vinyl or latex gloves in as little as 60 seconds
  – Best protection: polyethylene/ethylene vinyl (inelastic & expensive)
  – Double gloving with nitrile or polyethylene gloves under nitrile may protect for 30 min to a few hours

Photo from: Bruze M, Zimerson E. Dermatitis 2011, Vol 22, No 1
SUMMARY STATEMENT: Suspect allergy to nail products when the dermatitis present locally at the distal digit or ectopically on the eyelids and face.

- ~ 80% appear on the neck, face, lips, eyelids
  - 27% in periungual region of hands/feet
  - unusually: gluteal, perianal, genital
- Most ACD to nail polish & artificial nail products are to Tosylamide/formaldehyde resin
  - nail polish enamel
  - nail hardeners
  - setting lacquers
- Most react to water-soluble monomers & dimers of tosylamide/ formaldehyde resin in dry polish
  - some react only to wet polish
- Alternative: alkyl polyester resin

Lazzarini, Duarte et al. 2008
Orton and Wilkinson 2004
Health professionals hand dermatitis

- IgE-mediated contact urticaria
- Irritant CD
- Allergic CD
  - rubber accelerants in gloves
  - bisphenol A in vinyl gloves

- Study of 3,448 patients (1,058 healthcare workers) suspected of OD/glove allergy
  - 13% were sensitized to thiurams
  - 3.5% to dithiocarbamates
  - 3% to mercaptobenzothiazole and/or derivatives
  - 0.4% to thioureas
  - 3% to 1,3-diphenylguanidine
Rubber

- Mercaptobenzothiazole (MBT)*
- Thiuram mix*
- Black rubber mix*
- Carba mix*
- Mercapto mix*

Most rubber-sensitive individuals are positive to several antigens
Cross sensitization between carbamates & thiuram

*antigen in T.R.U.E. test
Farmers

- Allergic CD
  - metals
  - disinfectants,
  - rubber
  - pesticides (most important allergens)
  - propolis (especially bee keepers)
- Irritant CD lesions
  - chemicals in fertilizers and pesticides
Cleaners/housekeepers

- Allergic CD
  - Formaldehyde
  - Rubber additives (thiurams, zinc diethyldithiocarbamate and mercaptobenzothiazole)

Military

• Allergic CD
  – plants and insects
  – formaldehyde resins
  – uniforms: disperse dyes & chromate-containing dyes
  – MSI/MI in coolants & cutting oils
  – metal allergy to embedded shrapnel
  – vaccines: phenoxyethanol, formaldehyde, neomycin, aluminum, thimerosal

Gardeners, Landscapers, Maintenance Workers, Park and Wildlife Officials

- Genus Toxicodendron, species Rhus (poison ivy, poison oak, poison sumac): most common causes of plant dermatitis in outdoor workers
  - *Urushiol*: allergenic substance
    - mixture of catechols and resorcinols
    - avidly binds to skin, but readily degraded by water
    - soak skin with cool water as soon as contact is suspected
    - non-leaf portions can also induce dermatitis, even in the winter
    - *Urushiol* in cashew nut trees, Japanese lacquer, Ginkgo biloba, mango
  - Linear vesicles & bullae
    - Vesicle fluid is not antigenic
      - oleoresin can transfer in clothing, sports equipment, pet dander
  - Patch testing to Toxicodendron is contraindicated
    - can cause sensitization and large bullous reactions
Floral workers

- **Irritant CD**: Calcium oxalate crystals in plant sap
- **Allergic CD**
  - *Alstroemeria* (Peruvian lily or Inca lily): most frequent cause of hand dermatitis
- **Allergen**: alpha-methylene-gamma-gamma-butyrolactone or tulipalin A
  - present in both flowers and bulbs
  - penetrates latex and vinyl gloves
  - Consider PT to fresh plants or flowers - but proceed with caution as severe bullous reactions may result from their high allergen content

# Topical Skin Care Product Databases

<table>
<thead>
<tr>
<th></th>
<th>CAMP Contact Allergen Management Program (American Contact Dermatitis Society)</th>
<th>CARD Contact Allergen Replacement Database (MAYO Clinic)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Web Address</strong></td>
<td><a href="http://www.contactderm.org">www.contactderm.org</a></td>
<td><a href="http://www.AllergyFreeSkin.com">www.AllergyFreeSkin.com</a></td>
</tr>
<tr>
<td><strong>Physician Cost</strong></td>
<td>$300/yr per provider Requires ACDS Membership For reference, send CV: Luz Fonacier, MD. Head of Allergy Winthrop University Hospital Professor of Clin Medicine, SUNY at Stony Brook <a href="mailto:Ifonacier@winthrop.org">Ifonacier@winthrop.org</a></td>
<td>$200/yr per practice Complimentary 6 mo trial No membership requirements</td>
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<tr>
<td><strong>Patient Cost</strong></td>
<td>None</td>
<td>$15 per year for customized list</td>
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