

Abstracts Submitted to the Annual Meeting of the American Contact Dermatitis Society  
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## PODIUM PRESENTATIONS

### MASS SPECTROMETRY OF TOPICAL PRODUCTS CONTAINING *TOXICODENDRON (RHUS)* EXTRACTS

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Background: Urushiol, the causative allergens in *Toxicodendron* plants such as poison ivy, is an oily mixture of organic catechols with alkyl-(C<sub>15</sub>-C<sub>17</sub>) side chains of varying degrees of saturation. Each *Toxicodendron* plant creates different mixtures of these catechols. Recently, multiple leave-on consumer products have been discovered that contain extracts from these species.

Objective: To determine if urushiol-like catechols are present in consumer products labeled as containing *Toxicodendron* extracts.

Methods: Nine consumer products were identified that were advertised to contain *Toxicodendron* extracts. Gas liquid chromatograph electron impact mass spectrometry was applied to these products, using 4-methylcatechol as a surrogate standard. Methylcatechol was defined by 2 characteristic ions, m/z 179 and 267.

Results: Methylcatechol ions were detected in 6/9 (66.66%) products tested.

Limitations: While m/z 179 and 267 ions are characteristic of urushiols, analytical sensitivity was insufficient to observe the molecular ion and assess the side chain to unambiguously classify these as urushiols.

Conclusions: Urushiol-like methylcatechol ions were detected in consumer products advertised to contain *Toxicodendron* extracts, suggesting possible allergenic potential.

## **A CASE OF DIMETHYLFUMARATE CAUSING TYPE I ALLERGY**

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**Background:** Dimethylfumarate (DMF) is a potent sensitizer causing severe contact dermatitis. We present a case of a healthy 35-year-old female who developed urticaria to face, trunk, and upper extremities with a sensation of throat closing. Her symptoms occurred at work while steaming clothes shipped in boxes from overseas, which were sprayed with a chemical to prevent shrinkage.

**Methods:** Patch testing was performed to North American Contact Dermatitis Group (NACDG) and textile Series. DMF was examined with open patch testing. A literature search was performed to review reports of a type I allergy to DMF.

**Results:** Our patient developed a localized urticaria within 30 minutes of open patch test, with no respiratory involvement. Her symptoms abated within a couple of hours with the use of cetirizine. Due to the severity of her symptoms, DMF was excluded from the textile series. Her patch test to the NACDG and textile series was negative.

**Conclusions:** To our knowledge, there have been no reports of contact urticaria with respiratory symptoms to DMF. Immediate contact urticaria and non-immunologic contact urticaria to DMF have been described. The immediate allergy and potential for anaphylaxis to aerosolized forms of this compound make it a serious and dangerous chemical. Regulation of the use of this compound should be strongly considered in North America.

# CLINICAL AND PATCH TEST PROFILE OF PATIENTS WITH PIGMENTED COSMETIC DERMATITIS AND COSMETIC CONTACT DERMATITIS: A TERTIARY CARE CENTRE EXPERIENCE

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**Introduction:** Prevalence of CD to cosmetics was estimated as 9.8% from pooled data analysis from Europe and US. Data regarding role of patch test in pigmented cosmetic dermatitis (PCD) and cosmetic contact dermatitis is limited from Asian countries.

**Objectives:** To determine the clinical profile and allergen positivity in patients with PCD and CD to cosmetics.

**Methods:** Consecutive patients presenting with clinical features and history suggestive of PCD or CD to cosmetics were included. Detailed evaluation was done. All patients were tested with Indian standard series (ISS), cosmetic series and patients' products. Those with suggestion of CD to hair dye were further tested with hair dressers series (Chemotechnique Diagnostics, Sweden). ROAT was done in cases highly suggestive of CD to cosmetics but with negative patch test.

**Results:** One hundred and six patients were recruited (F=77, M=29). Mean age was  $43.4 \pm 1.18$  years. Majority of patients (n=41, 44.1%) were in age group of 30-44 years. Pigmented cosmetic dermatitis was diagnosed in 74 cases, CD to cosmetics in 32. Most frequently used cosmetics were hair dyes (139), herbal hennas (109), skin lightening creams (108), soaps and cleansers (113), hair oils (76), moisturisers (83), shampoos and conditioners (52), foundation creams (15), anti-aging creams (13), sindoor and bindis (16), nail polish (3) and sandalwood powder (3). A total of 260 positive reactions were seen in 77 (72.6%) patients. Of these, 94.1% (241) were relevant to current dermatitis. Majority of reactions (168) were with allergen series and rest with patients' products. ROAT was positive with skin lightening creams in 4 cases. Cetrimonium, gallate mix, thiomerosal and skin lightening creams were more frequently positive in cases of PCD (P- 0.019-0.003) while PPD, PTD, p-aminophenol, m-aminophenol and nitro-PPD were predominantly positive in ACD to cosmetics (P- 0.029-0.000).

**Conclusion:** PCD may be a commoner and more psychologically debilitating problem than CD to cosmetics in Indian population. Patch testing helps identify the underlying causative agent and maybe essential for further management.

## **FORMALDEHYDE RELEASE FROM TEXTILES AND PERSONAL CARE PRODUCTS**

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**Background:** Formaldehyde is a well-known and powerful contact allergen. Formaldehyde resins are used in the textile industry for durable press finishing, and formaldehyde releasers are used in personal care products as preservatives. To our knowledge, there have been no recent, large-scale evaluations of formaldehyde release from fabrics and personal care products in the United States.

**Objective:** To investigate the release of formaldehyde from an assortment of fabrics and personal care products.

**Methods:** A variety of fabric scraps were collected from local tailor stores, and a variety of personal care products from an array of brand name companies. These were analyzed for formaldehyde release using the chromotropic acid method; a solution of chromotropic acid in sulphuric acid gives a purple color change in the presence of formaldehyde. Formalin was used as a positive control, and distilled water as a negative control.

**Results:** Thus far, no fabrics or personal care products expected to be formaldehyde free have been found to release formaldehyde.

**Conclusion:** Durable press finished textiles and personal care products may both still represent important sources of formaldehyde and should be considered when evaluating patients with allergic contact dermatitis to this allergen.

## **NICKEL SULFATE 5% IS MORE SENSITIVE THAN NICKEL SULFATE 2.5% FOR THE DETECTION OF NICKEL CONTACT ALLERGY**

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Nickel is among the most common contact allergens found on patch testing worldwide and, due to its ubiquitous nature in our environment, often has important implications for allergen avoidance strategies. In both North America and Europe, nickel positivity is found in approximately 20% of patients who undergo patch testing. While in North America nickel sulfate is typically tested at a concentration of 2.5%, in Europe the higher, 5% concentration is used. We investigated 150 consecutive dermatitis patients presenting to our Contact Dermatitis Program for patch testing by placing nickel sulfate at concentrations of 2.5% (N2.5) and 5% (N5). Among all patients tested, 21% (31/150) were positive (+, ++, or +++) to N2.5 compared with 33% (49/150) to N5. Additionally, 14% (21/150) of nickel positive patients were missed by N2.5 compared to 2% (3/150) by N5 ( $\chi^2(1, N=150) = 12.0, p = 0.0005$ ). While 28% (42/150) of patients had a ++ or +++ reaction to at least one concentration of nickel, only 17% (26/150) were detected by N2.5. Given our findings, we propose additional evaluation of N5 as a standard allergen for patch testing in North America.

## INTER-RATER VARIABILITY IN STORE AND FORWARD TELEDERMATOLGY FOR PATCH TESTING

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**Background:** Little is known regarding variability among teledermatologists (TDs) in the context of patch testing.

**Objectives:** Evaluate inter-rater reliability of 8 TDs.

**Methods:** Using store-forward TD, TDs documented the strength of reactions at 48 hours and 5-7 days for 100 patients tested with a screening series. Each TD reading was compared to an in-person (IP) evaluator. Clinical significance (success, indeterminate, and failure) of IP-TD final interpretations were compared.

**Results:** Excluding negative-negative agreement, failure of TD (negative on one reading vs +++/++/+ on other) was: 3-7% for 48 hr. readings n=98; 8-20% for 5-7 day readings n=100; and 10-37% for final interpretation n=66. TD confidence was low for 19-71% of 48-hour readings and 18-42% for final readings. Image quality was rated as low for 1-32% of 48-hour readings and 4-41% for final readings.

**Conclusion:** There is wide variability in grading patch test results using photographs.

## CHEMICAL ANALYSIS OF ISOTHIAZOLINONES IN U.S. RESIDENTIAL WALL PAINTS

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**Background:** There is limited information regarding the presence of isothiazolinones in residential wall paints within the United States. This information is important for consumers as well as individuals in occupations exposed to paint.

**Objectives:** Evaluate the prevalence of five isothiazolinones – Methylisothiazolinone (MI) Methylchloroisothiazolinone (MCI), Benzisothiazolinone (BIT), Butyl benzisothiazolinone (BBIT), and Ocytlisothiazolinone (OIT) – in U.S. residential wall paints.

**Methods:** Using High Performance Liquid Chromatography, paint samples were analyzed for the presence of the aforementioned compounds.

**Results:** Isothiazolinones were detected in all 45 paints tested. However, no samples contained MCI or BBIT, and only one paint had OIT. MI and BIT were found in 96% and 98% of paint respectively. MI ranged in concentration from 17 to 358  $\mu\text{g/g}$  while BIT varied from 29 to 1111  $\mu\text{g/g}$ . Presence of isothiazolinones was mentioned in only 16% of Material Safety Data Sheets. Of interest, one sample claiming to be free of isothiazolinones was found to contain BIT at a concentration of 71.5  $\mu\text{g/g}$ .

**Conclusions:** All paints contained at least one isothiazolinone. MI and BIT were the most common isothiazolinones.

### **3 MOMENTS OF SKIN CARE: A NOVEL APPROACH FOR PREVENTION OF SKIN DISORDERS WITH SUSTAINABLE BEHAVIOR CHANGE IN THE WORKPLACE**

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Skin disorder including contact dermatitis is the second most common occupational illness and is responsible for a huge burden of cost to the US economy as well as significant human suffering with many individuals each year effectively prevented from continuing their chosen careers. Despite this and despite effective prevention often being as simple as regular application of skin creams following handwashing, rates remain stubbornly high and skin cream consumption by US workers remains stubbornly low.

We have considered barriers to adoption of best practice and designed a novel approach to effect sustainable behavior change through worker education to a simplified best practice model (our 3 Moments of Skin Care) following by goal setting and regular feedback on performance utilizing real-time data generated using a “smart” product dispenser system.

Initial results from a number of workplaces deploying the approach indicate that sustained improvement in skin care behavior can be achieved and that this in turn leads to measureable improvement in the skin health of the workforce.

We propose that adopting this approach as a preventative measure widely across at-risk workforces can lead to significant reduction in skin disorders and attendant costs.

## **UTILIZING AN ONLINE SURVEY TO ASSESS PATIENT OUTCOMES AFTER PATCH TESTING: A PILOT STUDY**

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**BACKGROUND:** The patch test clinic at the University of Alberta receives referrals from community dermatologists and allergists, providing testing to about 400 patients per year. Nearly all patients are returned to the care of their referring dermatologist, meaning patient outcome is rarely observed by the clinic. We were interested in answering the question: “How often does our patch testing have a positive impact on the patients’ dermatitis?”

**OBJECTIVES:** 1) To develop an online survey to assess patient outcomes after patch testing, and 2) To conduct a pilot study using this instrument.

**METHODS:** We developed a survey consisting of three yes/no questions, two qualitative questions, and one open-ended question. This was uploaded to Google Forms, and an individual email invitation (containing a hyperlink to the survey) was sent to 213 patients who had received patch testing from January to July 2016.

**RESULTS:** Seventy (32.9%) of the contacted patients completing the survey. The majority of respondents (88.4%) stated they would recommend patch testing to friends or family with a similar rash, but only 67.1% reported that their rash improved after patch testing.

**CONCLUSION:** Based on the patient’s subjective impression, patch testing has a positive impact on dermatitis in about two-thirds of cases. Non-response bias (i.e. the opinion of those who elected not to complete the survey) may alter these numbers.

## GETTING OCCUPATIONAL CONTACT DERMATITIS ON THE GOVERNMENT PRIORITY LIST FOR WORKPLACE PREVENTION: THE ONTARIO EXPERIENCE

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**Background:** Government identification of occupational contact dermatitis (OCD) as a priority for prevention may lead to improved prevention and reduction in OCD.

**Objective:** To describe the steps in having OCD recognized as a workplace prevention priority in the Province of Ontario, Canada.

**Methods:** A committed group of occupational health stakeholders had lobbied the Ministry of Labour for many years regarding the under-recognition of occupational disease (OD). In 2016, the Prevention Office of the Ontario Ministry of Labour added OD to its priority agenda and with a reference group, identified five system priorities for prevention including skin and lung irritants and allergens. A working group was then formed to reach consensus on priority skin and lung irritants and allergens.

**Results:** Wet work was selected as the skin irritant and preservatives as the skin allergen. Cleaning agents were selected as the lung irritant and isocyanates as a lung allergen. These agents will be the subject of an occupational health and safety system awareness campaign. Available resources will be reviewed and gaps in resources closed.

**Conclusions:** Government recognition of OCD as a priority OD will improve prevention efforts.

**Acknowledgements:** This work was supported by the Centre for Research Expertise in Occupational Disease, funded by the Ontario Ministry of Labour

## UTILIZING A PATCH TEST DATABASE FOR PREVENTION AND HEALTH SERVICES INFORMATION

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**Background:** Many groups collect and pool patch test data in a standardized manner. There is an opportunity to collect additional information to broaden our understanding of health service utilization and prevention.

**Objectives:** To describe health service and prevention characteristics of patients being patch tested in a specialty clinic.

**Methods:** Following ethics approval, clinical information, physician utilization and workplace prevention information was collected for 2307 consecutive patients between Jan 2012 and December 2016. Simple descriptive statistics were calculated.

**Results:** The mean age was 45.3 and 34% were female. 36% had ACD, 33% ICD and 37% were work-related. Prior to being seen in the clinic, 88% had seen their family physician, 17% a walk-in clinic, 15% had been to emergency, 85% had seen a dermatologist and 32% an allergist. General workplace health and safety training was reported by 70% but only 41% reported training related to skin protection.

**Conclusions:** Useful information related to health services utilization and prevention in the workplace can easily be obtained as part of data collection for patch test database studies.

**Acknowledgements:** This work was supported by the Centre for Research Expertise in Occupational Disease, funded by the Ontario Ministry of Labour.

## **PATCH TESTING TO PROPYLENE GLYCOL: THE MAYO CLINIC EXPERIENCE.**

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**Background:** Propylene glycol is widely found in personal care products, cosmetics, and topical medicaments and is a recognized source of contact allergy.

**Objectives:** This study aims to report the incidence of positive patch test to propylene glycol (PG) at Mayo Clinic and compare our results to previously published reports by the North American Contact Dermatitis Group.

**Methods:** A retrospective series review of all patients patch tested to propylene glycol from 1997 to 2016, was undertaken.

**Results:** A total of 11, 738 patients underwent patch testing to 5%, 10%, or 20% propylene glycol during this time period, as part of the standard, pediatric, gynecology, machinist, and oral flavors & preservative series. 176 (1.5%) tested positive to PG and 41 (0.3%) had irritant reactions. Patients who positively patch tested to PG were similar in age, sex, ethnicity, occupations, and final diagnosis, to all patients patch-tested. There was an average of 8.9 concomitantly positive allergens. There was an overall increase in the percentage of positive allergic reactions, ranging from 0.6% in the period 1997 – 2001, to 3.4% from 2011 -2016. In contrast, reports published by the NACDG showed a significant decrease in positive results to PG, from 1998 – 2000 ( $p < 0.001$ , Cochran Armitage trend test).

### **Conclusions:**

The incidence of positive patch tests to PG has increased at Mayo Clinic – this could be due to the increase in PG concentration from 10 to 20% in the Mayo Clinic series, since 2009. The decreasing incidence of PG contact sensitivity reported by the NACDG could be due to a reduction in PG use in topical formulations.

## **AN INVESTIGATION OF ACCELERATOR-FREE GLOVES**

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**Background:** Allergic contact dermatitis to gloves - both latex and non-latex - has been well described in the literature. A recent transition to non-latex rubber-derived gloves, such as nitrile, has diminished the prevalence of latex-related dermatitis; however, these gloves use accelerators such as thiurams, carbamates, mercaptobenzothiazoles, and diphenylguanidine, which are added to rubber bulk in order to speed up the vulcanization process and are frequent sensitizers. In response to this problem, glove manufacturers have recently created “accelerant free/low dermatitis potential” gloves. Little research has been done, though, to confirm that these gloves are free from rubber accelerants known to cause contact dermatitis.

**Objective:** To investigate the use of accelerators in reportedly accelerator free/low dermatitis potential gloves.

**Methods and Materials:** A total of 21 commercially available medical gloves touted as “accelerator-free”, “sensitive”, or “low dermatitis potential” were obtained and analyzed via mass spectrometry (LC-ESI-HRAMS/MS) to determine if any of nine known rubber accelerators were present (thiurams, carbamates, mercaptobenzothiazole, and diphenylguanidine).

**Results:** Dipentamethylenethiuram disulfide (DPMD) was found in all 21 gloves, and some gloves had up to 5 rubber accelerators present.

**Conclusion:** Patients with ACD to accelerators should be aware of the presence of accelerators even in gloves that are reported to not contain them.

## **ALLERGIC CONTACT DERMATITIS FROM RICINOLEIC AND 12-HYDROXYSTEARIC ACIDS - A CASE SERIES**

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**Background:** Ricinoleic acid (12-hydroxyoleic acid, 12-OH, C18:1,  $\omega$ 9-cis) is the principal fatty acid in castor oil; 12-hydroxystearic acid (12-OH, C18:0) is the principal fatty acid in hydrogenated castor oil.

**Methods:** We review our experience patch testing with these fatty acids in 1050 patients with suspected contact dermatitis from skin care products. Most patch tests were performed at 1-10% pet., initially with 99.5+% pure fatty acids. Provocative use tests were performed in seven patients to assess relevance.

**Results:** Four patients (0.4%) had definitely relevant strong patch test reactions. Of these four, one patient was positive only with ricinoleic acid; the other three were positive with both ricinoleic and 12-hydroxystearic acids. Patch testing with castor oil was less sensitive than using ricinoleic acid. Non-hydroxylated C18 fatty acids (oleic and stearic) were negative. Three of these four patients also had provocative use testing performed with castor oil or 12-hydroxystearic acid 1-10%; all were positive. Implicated products included lip balms, antiperspirants, and eyeliners. Eight other patients (0.8%) had weak patch test reactions without detectable relevance. Three of these eight underwent provocative use testing; all were negative.

**Conclusions:** In patients with suspected contact dermatitis from skin care products, 0.4% had strong relevant patch test reactions from ricinoleic and/or 12-hydroxystearic acids, but another 0.8% had weak patch test reactions without detectable relevance. An ideal patch test concentration needs further study.

## **POTENTIAL ALLERGENS IN PRODUCTS MARKETED FOR BABIES**

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Atopic dermatitis (AD) is observed in 34.1-60% of children during the first year of life. Parents may be attracted to products that seem safe for atopic children through labels stating “hypoallergenic”, “calming”, “natural”, or “for babies” without realizing that these products may contain irritants or allergens. Atopic infants are more susceptible to potential allergens in topical products due to a damaged skin barrier. Studies show that children with AD are more easily sensitized to low level allergens compared to those without AD.

We evaluated potential allergens found in cleansers and moisturizers marketed for babies in an online United States drug store. Thirteen shampoos for babies were evaluated and the most prevalent potential allergens include fragrances and botanicals (9/13), sodium benzoate (7/13), glucosides (7/13), and cocamidopropyl betaine (6/13). Fifty-five cleansers for babies were evaluated. Fragrances and botanicals were the most common potential allergen (46/55) followed by sodium benzoate (27/55) and cocamidopropyl betaine (26/55). Of the 62 moisturizers for babies, fragrances and botanicals were the most prevalent (44/62) followed by essential oils (34/62) and tocopherol acetate (29/62).

We demonstrate that products marketed for babies are not free of potential allergens. Further study is needed to determine whether these products are relevant allergens in infants.

## **THE COMPLEXITY OF CHEILITIS: IRRITANT VERSUS ALLERGIC CONTACT DERMATITIS**

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**Background:** Cheilitis is a common presenting complaint in dermatology. There are multiple causes of cheilitis, but the most common reported underlying etiology is irritant contact dermatitis.

**Objective:** To review representative cases and clinical features of irritant and allergic contact cheilitis as well as atopic dermatitis affecting the lips.

**Methods:** We present and compare interesting cases of recalcitrant cheilitis, referred to a tertiary care centre. Each patient had a detailed history, physical examination and patch testing.

**Results and Conclusions:** There is often more than one factor contributing to the development of cheilitis. Patch testing remains of utmost importance in the work up and management of patients presenting with cheilitis, as relevant contact allergies are often revealed.

## **SINGLE-ITEM QUALITY OF LIFE ASSESSMENT IN PATIENTS REFERRED FOR PATCH TESTING**

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Objective: To assess quality of life (QoL) in patients referred for patch testing.

Methods: Retrospective review of 258 consecutive patients referred for patch testing between May 2016 and May 2017 who answered the following question: “*In the last 2 months, how much has your skin condition affected your life?*” with answer choices “*very much, somewhat, a little, or not at all.*”

Results: Approximately half (53.5%) of patients stated their skin condition affected their life *very much*. Comparison of the *very much* group with the three other groups combined (*somewhat, a little, and not at all*) showed a significant association between occupationally-related skin disease and poorer QoL ( $P=0.0385$ ). There was no significant association between QoL and sex, age, race, atopy, duration of dermatitis, site of dermatitis, or final diagnosis. A separate analysis of only individuals with a final diagnosis of allergic contact dermatitis ( $n=181$ ) also showed a significant association between occupationally-related skin disease and poorer QoL ( $P<0.0001$ ) but not with other characteristics.

Conclusions: Patients referred for patch testing suffer from impaired QoL. Occupationally-related skin disease was significantly associated with a poorer QoL and this association was stronger in the allergic contact dermatitis subgroup. This is likely due to the additional stress of economic burden of occupationally-related health issues.

## **UTILITY OF PATCH TESTING FOR EOSINOPHILIC ESOPHAGITIS**

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Eosinophilic esophagitis (EoE) is a chronic disease process characterized by esophageal dysfunction and the histopathological presence of eosinophils. The diagnosis of EoE is dependent on the persistence of esophageal eosinophilia after the exclusion of gastroesophageal reflux disease (GERD) with a sufficient eight-week trial of acid suppression. Over the last decade, the incidence and prevalence of EoE is rising. Although patients are increasingly being diagnosed with EoE, the pathogenesis is incompletely understood resulting in a difficult to treat disease entity. The mainstay of initial treatment has been an eight-week course of topical corticosteroids. However, there is a high rate of relapse after therapy discontinuation. Maintenance therapy with long courses of topical corticosteroids has only been partially effective with high rates of relapse. Recent studies have therefore been focused on identifying pathologic triggers for EoE. Atopy patch and skin prick testing has not been promising, with some studies showing patch test positivity as low as 11% and skin-prick positivity as low as 13%. We hypothesized that the responsible allergens for EoE may not be detected by traditional food allergy panels. We are currently performing a prospective study to determine the relevance of consumed allergens in EoE patients (N=17) through patch testing with metals, preservatives, flavorants, odorants, dyes, and texturizing allergens. We have found that the majority of those tested were found to be sensitive to fragrance mix or balsam of peru and a portion those patients were also sensitive to cinnamic aldehyde. We have placed these patients on a balsam of peru-free diet and most report a complete resolution of their symptoms. In conclusion, we have found that patch testing for consumed allergens may represent a viable test for the assessment of patients with EoE.

## POSTER PRESENTATIONS

### **REVIEW OF METALLIC ALLERGY IN PEDIATRIC POPULATION**

#### **AUTHORS**

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#### **TITLE**

Review of metal allergy in pediatric population

#### **OBJECTIVE**

Metals are one of the most common contact allergens in the pediatric population, and can cause which can cause significant morbidity in children. Recent data has shown increased incidence of metal allergy in industrialized countries. Awareness of the potential sources of metal allergens is essential to aid prevention of contact dermatitis. The following review strives to highlights the most common and emerging metal allergens, and the potential sources in children

#### **METHODS**

Comprehensive literature search conducted through the National Library of Medicine (PubMed, MEDLINE) using appropriate keywords. Research papers were identified, appraised, and significant findings synthesized.

#### **FINDINGS**

The most frequently reported causes of metallic contact dermatitis in children are nickel and cobalt, and less commonly chrome, gold and mercury. Many of these reactions occur from metallic toys, which can release considerable amounts of the allergen on prolonged contact. Metallic allergens can also be found in costume jewelry, belt buckles, wristwatches, zippers, snaps, hooks on clothing. Metals can be found in dental hardware and braces for children. An emerging source of metal exposure are mobile phones, often associated with a unilateral dermatitis on the pre-auricular area and lateral cheek. Other electronics include iPad, laptops, video-game controllers.

#### **CONCLUSION**

Given the diversity of potential metallic allergen sources, in the management of allergic contact dermatitis, it is important to consider seemingly unique exposures. It is vital to investigate for presence of allergens in substances children come in regular contact with, using simple test kits.

## ALLERGIC CONTACT DERMATITIS TO “SLIME”

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**History:** A 10-year-old atopic girl presented with a 3-year history of intermittent, pruritic dermatitis of the bilateral fingers. Suspected contactants included her clarinet, iPad, and “slime,” a homemade stretchable material made from polyvinyl acetate glue, contact lens solution, shaving cream, and sodium borate. The patient had created over 100 different formulations of slime and sold these to schoolmates.

**Testing:** She was patch tested to the North American Contact Dermatitis Group (NACDG) screening series, as well as selected corticosteroids, emulsifiers and preservatives, in addition to several personal products including 3 different glitter formulations of “slime.”

**Results:** Final reactions showed a ++ reaction to methylchloroisothiazolinone/methylisothiazolinone (MCI/MI) and + reactions to bronopol as well as all 3 “slime” samples. Pertinent negatives included triethanolamine (shaving cream ingredient) as well as 3 preservatives in the contact lens solution (ethylenediamine tetraacetic acid, ethylenediamine dihydrochloride, and polyaminobiguanide).

**Importance:** MCI/MI is an important allergen found in a number of non-skin products including household paints and glues. The glues used in typical “slime” recipes may contain this preservative. Clinicians should be aware of this important, trendy source of MCI/MI.

## **SUSPECTED ALLERGIC CONTACT DERMATITIS TO ETHYLENE VINYL ACETATE FLIP FLOPS**

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A 5-year-old girl with no significant past medical history presented for patch testing as a result of recurring bullae on her bilateral soles occurring when she wore a certain pair of flip flops. She was tested to the NACDG standard series, our plastics and glues, shoe, and isocyanate series, in addition to a selection of her personal products including the flip flops. No common culprits associated with shoe dermatitis were positive on testing, but she had a strong (2+) reaction to the flip flops themselves as well as to many plant and fragrance allergens. The manufacturer reported the flip flop insole and outsole were 100% ethylene vinyl acetate, a foam-like material that is typically considered inert. Due to recent reports of acetophenone azine being the allergen in ethylene vinyl acetate, we tested our patient to this, but she was negative; thus, the definitive allergen has yet to be elucidated, but she has been able to wear other flip flops without a recurrence in her reaction. This rare case demonstrates the importance of testing patients to their own products as novel allergens or sources of allergens may otherwise go unrecognized.

## **NICKEL RELEASE FROM SURGICAL INSTRUMENTS AND OPERATING ROOM EQUIPMENT**

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**Background:** There has been no systematic study assessing nickel release from surgical instruments and equipment used within the operating suite, which represent important potential sources of exposure for nickel-sensitive patients and hospital staff.

**Objective:** To investigate nickel release from commonly used surgical instruments and operating room equipment.

**Methods:** Using the dimethylglyoxime nickel spot test, a variety of surgical instruments and operating room equipment were tested for nickel release at Hennepin County Medical Center in Minneapolis, MN.

**Results:** Of the 128 surgical instruments tested, only 1 was positive for nickel release. Of the 43 operating room items tested, 19 were positive for nickel release with 7 having the potential for direct contact with patients and/or hospital staff.

**Conclusion:** Hospital systems should be aware of surgical instruments and operating room equipment as potential sources of nickel exposure.

## **THE ROLE OF SKIN BARRIER ACIDIFICATION IN IMMUNE DYSFUNCTION AND ATOPIC DERMATITIS**

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Under normal physiologic conditions phospholipase A2, sodium-hydrogen exchanger 1, and polycarboxylic acid pathways maintain the skin barrier pH. Disruptions in these pathways lead to barrier impairment and increased skin pH with subsequent loss of protective capacity of the stratum corneum. Dilute bleach baths reduce Staph colonization, however, these increase skin pH, which subsequently disturbs the acid mantle, alters skin barrier lipid production, breaks down proteases and cathelicidins, initiates inflammatory pathways, induces contact dermatitis and disrupts epidermal cell cycling through aberrant calcium gradients. Three cases are presented to demonstrate that natural skin barrier acidification in conjunction with short term use of topical steroid compounded into a bio-corrective moisturizer and the pre-emptive (allergen) avoidance strategy constitute a highly effective skin barrier treatment protocol for atopic dermatitis confounded by contact sensitization.

## **CONTACT ALLERGY TO CARDIAC DEVICES**

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**Purpose:** To determine the frequency, relevance, and the trend over time of positive patch test results to pacemakers and defibrillators.

**Background:** Hypersensitivity reactions to cardiac devices have been reported yet the exact incidence is unknown. Patch testing is the gold standard for making a diagnosis of allergic contact dermatitis (ACD). Our aim is to evaluate the presentations, patch test results and clinical outcomes in this population.

**Methods:** Patients with pre- or post-implant cardiac testing for contact dermatitis were included. We utilized a pre-existing database, including patients who underwent patch testing between 3/1/2012 and 12/31/2017. Of the 1300 patients tested, less than 30 had cardiac device patch testing. Various factors were analyzed from the database in patients who had cardiac device patch testing: Demographics, location of dermatitis, occurrence of atopic dermatitis, results, relevance of results and follow-up information.

**Results:** The absolute numbers and percentage of patients with contact allergies will be calculated. The relevance of positive patch test results will be examined and a percentage calculated for the percent of positive patch tests that were deemed relevant. Comparisons will be made by gender and other demographics. Categorical variables (e.g. race, location of primary lesions) will be summarized with frequency counts and percentages.

**Conclusion:** Given the paucity of information on contact allergy to implanted cardiac devices (pacemakers and defibrillators), we will describe the presentations, patch test results and clinical outcomes in this population.

## USE OF ESSENTIAL OILS: A GENERAL POPULATION SURVEY IN MINNESOTA

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**Background:** Limited information exists regarding essential oil (EO) use in the general population.

**Objectives:** To characterize the extent and usage patterns of EO use in those surveyed.

**Methods:** Individuals attending the Minnesota State Fair, over the age of 18, were invited to complete a survey regarding EO use.

**Results:** Of 282 individuals who completed the survey, 133 (47.2%) had used EO. Most EO users surveyed were female (86.3%), Caucasian (91.7%), with post-secondary education (59.4%). Within each demographic, those who labeled themselves Hispanic or black (87.5%), aged 41-50 (62.2%) and graduated from trade school (55%) were the most likely to use EO compared to other groups in each demographic. The most common reason for EO use was treatment of medical conditions (47%). Body and muscle aches (50%), emotional wellbeing (37%) and cold-like symptoms (37%) were the most frequent conditions treated. Lavender, tea tree, peppermint, and eucalyptus were the most commonly used EOs (75%, 62%, 57%, 52% respectively). Only 7.8% of respondents reported an adverse reaction to EO use (2.9% rash, 1.9% difficulty breathing).

**Conclusions:** Almost half of respondents had used EO. Many used EO to treat medical conditions. Few adverse events were reported.

## **LONG-TERM LIKELIHOOD OF PATCH TESTING, ACADEMIC PRACTICE, AND SOCIETY MEMBERSHIP AMONG ALEXANDER FISHER AWARD WINNERS FROM 1989-2012**

Dathan Hamann, The Ohio State University, Ohio, USA; James Taylor, The Cleveland Clinic, Ohio, USA.

**Objective:** To investigate the long-term likelihood of patch testing, academic practice, and American Contact Dermatitis Society (ACDS) membership among US and Canadian Alexander Fisher award winners (AFAWs) from 1989-2012.

**Methods:** AFAWs from 1989 to 2012 were identified with internet searches to obtain their current practice location. Each practices was contacted by phone and staff was asked if the AFAW performed patch testing. Current ACDS membership was confirmed by ACDS leadership. Academic status was assessed by university association on practice websites.

**Results:** Of the 62 winners from 1989 to 2012, there are 51 practicing AFAWs from US (43) and Canada (8). 18/51 (35%) of practicing AFAW are active patch testers; 30/51 (59%) do not perform patch testing, and 3/51 (6%) could not be reached or staff declined to answer. 14/51 (28%) of AFAWs practice in an academic setting. 10/51 (20%) of AFAWs are current ACDS members.

**Conclusions:** AFAWs have a high likelihood of academic practice (20%) compared to average graduating US dermatology residents (8%, Wu JJ 2006), a moderate likelihood of long-term patch testing (35%), and a relatively-low likelihood of long-term ACDS membership (20%). Further survey of AFAWs' who do not patch test may be warranted to identify specific logistical, economic, or other barriers to patch testing.

## **PATCH TESTING AND AIRPORT SECURITY: A POST-9/11 UPDATE**

Dathan Hamann, The Ohio State University, Ohio, USA; Carsten R Hamann, Department of Dermatology and Allergy - University of Copenhagen, Denmark; Curtis P Hamann, Contact Dermatitis Institute - Phoenix, AZ, USA.

**Objective:** To investigate the plausibility of undergoing patch testing while traveling through modern airport security methods

**Methods:** 2 patients with Finn chambers placed on the back entered ProVision millimeter wave (MMW) radio frequency scanners a total of 3 times at major international airports in the United States and Japan in Spring of 2017.

**Results:** The MMW security detector displayed a rectangular rendering for each Finn Chamber panel but additional screening was limited to pat-down. Notably, there was not visibility or a rendering of the individual aluminum chambers. The same 2 patients also passed through standard metal detectors 4 times during this same time and these were not activated by Finn Chambers and no further screening was performed.

**Conclusions:** Patch testing may be safely performed in patients who are traveling. Patients should inform TSA agents that they are wearing a non-removable external medical device in the official category as a neurostimulator, port, feeding tube, insulin pump, or ostomy. An official doctor's note is not explicitly required, but is recommended. Patch tests may require additional screening by careful and gentle inspection.

## CONTACT DERMATITIS AND SKIN OF COLOR

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Individuals with skin of color constitute a wide range of racial and ethnic groups including but not limited to Africans, African Americans, African Caribbeans, Asians, Native Americans, Indians, and Hispanics [1]. Conflicting findings regarding the varying susceptibility to allergic contact dermatitis in skin of color have been reported [2]. Our study aims to consolidate the literature on susceptibilities to contact dermatitis in skin of color. A PubMed search was performed using keywords “contact dermatitis” with “ethnic skin” or “skin of color” or “African American” or “Black” or “Asian” or “Hispanic” or “Caucasian.” This yielded 29 studies and 9 were excluded. In our review of 20 studies, 13 (of 20, 65%) suggest unique incidence of contact dermatitis among ethnoracial groups, 4 (of 20, 20%) endorse similar incidence across races, and 3 studies (of 20, 15%) were unable to draw a clear conclusion. Of the studies that report a unique incidence of contact dermatitis among ethnoracial groups, 12 (of 13, 92%) are level of evidence 2 and one (of 13, 8%) is level of evidence 3. Of the studies that report similar incidence across groups, 3 (of 4, 75%) is level of evidence 2 and one (of 4, 25%) is level of evidence 5. Trends in the current body of literature support unique susceptibility to contact dermatitis across race and ethnicity. With populations of color expected to comprise approximately half of the population by the year 2020, unique considerations in the context of contact dermatitis become increasingly relevant [3].

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## **HOSPITAL OCCUPATIONAL HEALTH NURSES EXPERIENCE WITH MILD HAND DERMATITIS**

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**Background:** Healthcare workers (HCW) often develop mild hand dermatitis.

**Objectives:** To describe hospital occupational health nurses' (OHN) understanding of mild dermatitis and barriers and facilitators to its identification and management.

**Methods:** Following ethics approval, 15 OHN were interviewed, obtaining information on their practice related to mild hand dermatitis, barriers and facilitators and knowledge needs.

**Results:** OHN focused on breaks in the skin as a key indicator, as this would lead to removing the HCW from clinical activity. With increased financial pressure, OHN are proactively seeing fewer HCW and relying more on HCW reporting problems. HCW often do not present to the occupational health service as they think hand dermatitis is part of the job, self-manage and do not want to be put on modified duties. OHN generally manage the HCW initially and refer the HCW to their family physician if the problem persists. While OHN attempt to follow-up with the HCW, the HCW often do not return for follow-up.

**Conclusions:** There are opportunities to improve the identification and management of HCW with mild hand dermatitis.

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## **PREVENTING WORK-RELATED SKIN DISEASE: A QUALITATIVE STUDY TO IDENTIFY CHARACTERISTICS OF A DESIRABLE TRAINING PROGRAM**

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**Background:** Work-related contact dermatitis (WRCD) is common. Training and education may be effective for preventing WRCD. There is some information in the literature related to skin specific training experiences, but very little available on workers' preferences for content and format.

**Objectives:** To understand workers preferences for workplace training and the elements of training perceived to be effective.

**Methods:** Following ethics approval, 24 patch test patients with suspected WRCD participated in semi-structured interviews obtaining information on training experiences, perceived training effectiveness and desired training characteristics. An inductive thematic analysis was used to identify themes.

**Results:** Though many workers had received general workplace health and safety training, none had experienced training about skin protection. Workers were dissatisfied with previous training experiences and desired training about hazardous materials in their workplace as well as the potential health consequences of exposure. They favoured multi-modal training from a competent trainer, which included hands-on activities and would also be useful outside the workplace.

**Conclusions:** These findings can help to shape more effective workplace training programs for skin protection.

## **CHARACTERIZATION OF PATIENTS AND FREQUENCY OF CAUSATIVE ALLERGENS AT THE MCMASTER UNIVERSITY ALLERGY AND DERMATOLOGY PATCH TEST (ADPT) CLINIC**

**Background:** This is the first Allergy and Dermatology Patch Test (ADPT) clinic in a tertiary care setting, at the Hamilton Health Sciences (HHS), McMaster University Medical Centre (MUMC) site in Hamilton, Ontario. The characteristics of contact allergen sensitization in this population are reported.

**Methods:** A retrospective chart review was conducted on 207 adult patients assessed at the ADPT Clinic from July 2014 to August 2015, who underwent patch testing to 80 standardized reagents for assessment of contact dermatitis. Patients who did not undergo patch testing were excluded from the analysis.

**Results:** Of 207 participants, the median age was 49.2 years, and 70% were female. 122 participants (62%) had at least one positive test, with a maximum of 6 positives (1%). Most prevalent positives were nickel sulfate hexahydrate (14%), fragrance mix I (8%) and cobalt chloride hexahydrate (8%). Neither gender nor age was a statistically significant determinant of the number of positive tests. Participants positive to nickel sulfate and gold (I) sodium thiosulfate dehydrate were primarily female (26 female: 1 male,  $P=0.002$ ; 11 female: 0 male,  $P=0.031$  respectively). For Cinnamal and Cananga odorata oil / (Ylang-Ylang oil), reactors were mainly male (1 female: 4 males,  $P=0.01$ ; 0 female; 2 males,  $P=0.024$  respectively). Significant cross reactivity was noted between certain groups of reagents including Quaternium-15 and formaldehyde, Balsam of Peru and fragrance mix I, and Methylisothiazolinone (MI) and 2-n-octyl-4-isothiazolin-3-one (OIT).

**Conclusions:** There is a significant demand for patch test services. The prevalence of positivity described is similar to those of other contact dermatitis studies in academic centres, thus supporting the technical validity of the new ADPT clinic. An exception is nickel, where positive patients were significantly younger than negatives, a finding which differs from other studies. Cross-reactivity was noted among certain groups of reagents in keeping with prior studies.

## **ALLERGIC CONTACT DERMATITIS TO BRIMONIDINE: CLINICAL AND EPICUTANEOUS TESTING FOR OCULAR SENSITIZATION**

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**BACKGROUND.** Brimonidine tartrate is an  $\alpha_2$  receptor agonist used for the treatment of glaucoma and persistent erythema in rosacea. Allergic contact blepharitis caused by brimonidine eye drops for the treatment of open angle glaucoma was described on numerous occasions in the past but without epicutaneous testing to demonstrate causality.

**MATERIAL AND METHODS.** We retrospectively reviewed the cases of ten patients with a suspected diagnosis of allergic contact blepharitis to brimonidine that had undergone patch testing in our hospital setting. Different dilutions of brimonidine as well as the patients own products were used. Each product was tested with three different techniques: patch test, scratch patch test and strip patch test.

**RESULTS.** Four patients demonstrated positive results with the scratch patch test technique. The most sensitive dilution appeared to be brimonidine 5% in petrolatum. Clinically, eyelid follicles may be a useful diagnostic clue for the ophthalmologist in evaluating the hypersensitivity reaction.

**CONCLUSIONS** Our results provide important insights on the clinical and epicutaneous testing evaluation of a suspected allergic contact dermatitis to brimonidine tartrate.

## **THE USE OF ONLINE NETWORKS TO PROMOTE CONTACT DERMATITIS AWARENESS AND EDUCATION**

Chandler W. Rundle, BS, Brittany A. Limone, MA, BS, and Sharon E. Jacob, MD

**Background:** Social media websites are increasingly being utilized to promote awareness and education. Health care providers utilize these avenues to interact with patients, each other, students, and allied health professionals.

**Purpose:** To assess the impact of interactive, evidenced based quizzes.

**Methods:** The interactive feedback quizzes are an open-access de-identified interface developed using evidence-based literature and an online quiz-maker program. Seventeen quizzes covering 15 different contact allergens were distributed through the world wide web. Collected data was stratified by topic, geographic location, and score percentage.

**Results:** The 54,367 responses came from 2,309 participants hailing from 6 continents, 52 countries, & 44 states in the United States. The ‘nickel savvy quiz’ had the largest respondent rate with 601 participants, while the ‘topical steroid withdrawal quiz’ had the highest percentage correct (89.7%), but only 35 respondents. Quiz engagement reflects recent prevalence rates of allergens reported by the North American Contact Dermatitis Group (NACDG).

**Discussion:** The alignment of the ranking with the NACDG data suggests that those who suffer with the disease are more likely to take the quiz. Results reflect worldwide internet utilization rates with highest percentage of users in North America, Europe, and Australia/Oceania.

**Conclusion:** The data obtained from the contact allergen interactive feedback quizzes supports the functionality of social media to successfully reach people across the globe in efforts to educate on contact dermatitis.

## **THE CONTACT SENSITIVITY PATTERN AND MED FOR NB-UVB AND UV-A IN HAIR DYE DERMATITIS ASSOCIATED WITH PHOTSENSITIVITY**

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Photodermatoses encompasses a group of disorders characterized by an abnormal response to ultraviolet radiation. Photoallergy is a Type IV hypersensitivity due to a photoallergic substance and UV radiation. After ethical approval, we recruited 50 patients with lesions in photo-exposed areas and/or photosensitivity. The objective of the study was to elicit Minimal Erythema Dose (MED) to UVA and narrow band (NB)-UVB as well as perform patch and photo- patch test.

After informed consent, patch and photo-patch testing was done with Indian standard series (Chemotechnique Diagnostics, Sweden). Phototesting was done using a leather template with dose ranges of NB-UVB and UV-A being 150 mJ/cm<sup>2</sup> to 600 mJ/cm<sup>2</sup> and 2 J/cm<sup>2</sup> to 20 J/cm<sup>2</sup> respectively.

To our surprise, out of the 50 patients, 8 patients had positive patch test to PPD and/or “as is” hair dye sample. The morphological variants seen were lichenoid/papular dermatitis, papulo-vesicular, hyperpigmentation and generalized pattern.

Out of the 8 patients, two patients had reduction in MED for UV-A and NB-UVB, while one had reduction for UV-A only. There was a statistically significant association between presence of widespread dermatitis and reduction in MED for NB-UVB (p value = 0.03). Often overlooked, hair dye dermatitis with associated photosensitivity maybe an important cause for generalized photosensitivity dermatitis.

## **BARRIER DYSFUNCTION PREDISPOSES TO SENSITIZATION TO INGESTED OR INHALED ALLERGENS IN EXTRINSIC ATOPIC DERMATITIS**

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### Objective:

Skin barrier dysfunction often precedes the development of respiratory atopy in extrinsic atopic dermatitis (AD). Specifically, innate immune signals derived from genetic barrier defects and augmented by wet work predispose patients to developing allergen-specific IgE and T<sub>H</sub>2-skewing after initial cutaneous sensitization. We compared the prevalence of positive patch tests to ingested or inhaled allergens between AD patients with and without respiratory atopy (extrinsic and intrinsic AD, respectively) in wet work occupations.

### Methods:

We retrospectively reviewed patients with AD, defined as childhood onset flexural dermatitis, patch tested to 23 allergens known to cause systemic contact dermatitis.

### Results:

A total of 2778 and 5754 patch tests were identified for extrinsic and intrinsic AD patients, respectively. Compared to intrinsic AD patients, extrinsic AD patients in wet work occupations had a higher prevalence of positive patch tests to inhaled or ingested allergens (OR 1.48;  $p=0.02$ ), including propylene glycol (OR 6.02;  $p=0.005$ ). There was also a trend for increased patch test positivity to ingested or inhaled allergens in extrinsic AD patients, regardless of wet work occupation (OR 1.28, 95% CI 0.99-1.66;  $p=0.06$ ), which reached statistical significance for metals (OR 1.63;  $p=0.01$ ), including cobalt (OR 2.51;  $p=0.02$ ).

### Conclusions:

Patients with extrinsic AD are more likely to have positive patch tests to ingested or inhaled allergens that are known to cause systemic contact dermatitis.

## TROUBLE WITH A CAPITAL TEA: ACUTE PHOTOTOXICITY FOLLOWING INGESTION OF ATHAMANTA DECOCTION

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The genus *Athamanta* in the Apiaceae (Umbelliferae) family consists of 9 species of flowering plants that are native to Europe and North Africa. Utilized in traditional medicine to treat vitiligo, *Athamanta* species have been shown to contain furanocoumarins. Phototoxicity following cutaneous exposure to or ingestion of such furanocoumarins as psoralen, bergapten, and xanthotoxin, is a well-documented phenomenon. We present a case of a 73-year-old male who experienced an acute phototoxic reaction, comprised of erythema, edema, and blistering, following ingestion of *Athamanta* decoction for the treatment of vitiligo. We reviewed the literature on phototoxicity attributable to the ingestion of photosensitizing plants, and found *Chenopodium album*, *Apium graveolens*, and *Ammi majus* to be among the most common culprits, whereas *Athamanta* species have not previously been implicated. The clinical presentation of acute phytophototoxicity can vary greatly, ranging from mild erythema to tissue necrosis, with UV exposure from direct sunlight or tanning beds. This case and review illustrate the need for healthcare providers to consider a wide range of causative agents and circumstances when patients present with acute phototoxicity, given the frequent use of herbal remedies in medical care in the developing world, the growing popularity of plant-derived alternative treatments among American healthcare consumers, and the ready access to these treatments that has been promoted by both globalization and the growth of Internet retail.

## **ALLERGIC CONTACT DERMATITIS SECONDARY TO BENZALKONIUM CHLORIDE IMPREGNATED IN A BANDAGE**

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Case Description: A 30-year-old female developed a well-demarcated, rectangular area of pruritic dermatitis that persisted on her left anterior shin for two weeks after treatment of an insect bite in that location with an antibacterial bandage. The patient was patch tested to the North American Contact Dermatitis Group (NACDG) screening series in addition to panels for preservatives, emulsifiers, personal care products, adhesives, and her own products. Clinically-relevant positive allergens included ++ reactions to benzalkonium chloride and cetrimonium chloride. We were surprised to find that the non-adherent portion of the bandage was impregnated with benzalkonium chloride.

Discussion: Benzalkonium chloride is a quaternary ammonium compound used as a preservative. It is a well-known irritant, though in recent years has gained recognition as a potential contact allergen. Our patient developed allergic contact dermatitis secondary to benzalkonium chloride in the non-adherent portion of her bandage. Several companies manufacture benzalkonium chloride-containing bandages, including Curad, Equate, Up & Up, CVS, and Walgreens. Additionally, benzalkonium chloride (or cross-reactors) are present in approximately 20% of personal care products in the SkinSAFE database.

Conclusions: It is important to: 1) inspect patient products, especially nontraditional products such as bandages, for potential allergens; and 2) remember that mild irritants, such as benzalkonium chloride, can be relevant allergens.

## **A REVIEW OF THE MEDICAL NECESSITY OF COMPREHENSIVE PATCH TESTING**

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### **Abstract**

Allergic contact dermatitis (ACD) is associated with significant disease and economic burden in the United States. To properly manage ACD, it is important to accurately diagnose the substance(s) implicated in the dermatitis to prevent disease recurrences. The commercially available T.R.U.E TEST (36 allergens) screening panel has been reported to have a conservative hypothetical allergen detection rate of 66.0%. Importantly, these calculations are based on the 78% of patients who had clinically relevant reactions to allergens present on the NACDG standard series (80 Allergen Series), without the use of supplemental allergens. Testing for supplemental allergens beyond a standard series can fully evaluate an individual's environmental and occupational exposure, which may significantly increase diagnostic accuracy. Comprehensive patch testing with additional allergens in sunscreens, emulsifiers, cosmetics, and fragrances for example, can increase the diagnostic yield of the patch test performed. Therefore, comprehensive patch testing remains a medical necessity for patch test providers in achieving an increased probability of a correct diagnosis and cure of the chronic, recalcitrant dermatitis.

## **SURVEY OF PATCH TEST BUSINESS MODELS IN THE UNITED STATES BY THE AMERICAN CONTACT DERMATITIS SOCIETY**

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**Background:** Allergic contact dermatitis (ACD) remains a significant burden of disease in the United States. Patch testing is the gold standard for diagnosing ACD but its use may be limited by reimbursement challenges.

**Objective:** This study aimed to assess the current rate of patch test utilization among dermatologists in academic, group, or private practice settings to understand different patch testing business models that address these reimbursement challenges.

**Methods:** All members of the American Contact Dermatitis Society received an online survey regarding their experiences with patch testing and reimbursement.

**Results:** The survey response rate was 20%. A “yes” response was received by 28% of survey participants to the question, “Are you or have you been less inclined to administer patch tests or see patients needing patch tests due to challenges with receiving compensation for patch testing?” The most commonly reported barriers to patch testing were inadequate insurance

reimbursement across all practice types and lack of departmental support for academic-based providers.

**Conclusions:** Compensation challenges to patch testing limit patient access to appropriate diagnosis and management of ACD. This can be addressed through a variety of innovative business models, including eliminating or raising patch testing caps, negotiating RVU compensation, utilizing a fixed salary model with directorship support from the hospital, and raising the percentages of collection reimbursement for physicians.