the Patch Tester

Contact Dermatitis | Haptens | Patch Testing

Edition #5
December 2020

The Metal Issue

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PURPOSE

The Patch Tester is an e-mag developed by Chemotechnique to serve as an information resource for all Patch Testers and other Dermatologists around the world; not just in Sweden, or Europe, or America, but wherever the English language can be read and understood. This fifth issue comprises 40 pages with various different topics and features. Ultimately, we plan for The Patch Tester to become the forum for all of us to communicate and cooperate, in all directions.

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ACKNOWLEDGEMENTS

Production Editors: David Niklasson & Steve Lee

CHEMOTECHNIQUE DIAGNOSTICS

The trusted name in Patch Testing

Chemotechnique MB Diagnostic AB has provided Patch Test solutions since 1981 and is proudly recognised as the Trusted name in Patch Testing.

Through continuous research and development our range of products is constantly being updated, most recently with the addition of the **IQ Ultimate™** Patch Test Unit - our most advanced Patch Test Unit to date.

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Chemotechnique offers the widest range of commercially available high quality topical haptens. The 550+ different preparations are available for purchase in sets of series or as individual preparations. The composition of the various Baseline Series as well as the additional Screening Series has been carefully selected based on published studies and in close co-operation with leading contact dermatitis societies.

IQ Ultra™

Comfortable and chemically inert - **IQ Ultra™** is the reliable patch test choice. The **IQ Ultra™** is designed to take full advantage of the acclaimed IQ Chambers. The strong adhesive properties of the premium quality, hypoallergenic and latex-free carrier tape eliminates the need for extra reinforcement for patients with normal skin. The **IQ Ultra™ Patch Test Units** are most cost effective as filter papers and protective covers are not add-ons, but integrated into the design.

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Elastic, transparent and water resistant. In addition to the features shared with the **IQ Ultra™**, **IQ Ultimate™** has the above-named added benefits as a result of the 25 micron thin carrier film. Allowing for both showers and moderate exercise - **IQ Ultimate™** is the ideal Patch Test Unit for the diagnosis of contact allergy in active patients.

Accessories

Chemotechnique provides a full range of accessories and spot tests that makes patch testing more efficient.

The importance of Comprehensive Patch Testing

A subject we discussed in the previous issue of the Patch Tester was how many physicians are now faced with the question of what haptens to test with when investigating contact dermatitis caused by protective gear. Now that COVID-19 has changed the working attire of many people, health care workers and citizens subject to COVID restrictions alike, many people are becoming exposed to new haptens. The table below showcases the most frequently encountered haptens found in the working attire of healthcare workers and is derived from Safety equipment: When protection becomes a problem, by E. Warshaw, et al in Contact Dermatitis, February 2019.

Name	Art no	S-1000	ICB-1000
Formaldehyde	F-002	YES	YES
2-BROMO-2-NITROPROPANE-1,3-DIOL	B-015	NO	YES
Thiuram mix	Mx-01	YES	YES
Mercapto mix	Mx-05	YES	YES
Carba mix	Mx-06	NO	YES
Mixed dialkyl thiourea	Mx-24	NO	YES
Nickel sulfate	N-002	YES	YES
PPD	P-006	YES	YES
Black rubber mix	Mx-04	NO	NO
Cobalt chloride	C-017	YES	YES
Mercaptobenzothiazole	M-003	YES	YES
4-tert-Butylphenol formaldehyde resin	B-024	YES	YES
Potassium dichromate	P-014	YES	YES
Colophonium	C-020	YES	YES
Bisphenol A epoxy resin	B-013	NO	NO
Diphenylguanidine	D-022	NO	YES
Iodopropynyl butylcarbamate	I-008	NO	YES
Ethyl acrylate	E-004	NO	YES

Physicians who prefer to test with series rather than hand-picking topical haptens might wonder what series are best suited when testing health care workers. As some of these haptens are lacking from slimmer baseline series such as the European Baseline Series (S-1000), a comprehensive baseline such as the International Comprehensive Baseline (ICB-1000) is required.

As shown by the table, testing with a comprehensive baseline will likely be more effective now that patients with no previous occupational exposure to HCW protective gear and the associated potential CD-causing haptens, become sensitised and so may be patch tested using such a screening series. There may be an argumnt for a dedicated baseline series for Health Care Workers to cover the haptens they may encounter in their occupation.

Health care workers are not the only ones exposed to safety equipment

Nickel barrier cream

When ACD to a hapten in a patient is confirmed, the best and only real advice to achieve a high quality of life is avoidance of the culprit hapten. With some haptens being extremely common in everyday and occupational settings, total avoidance can be hard to maintain. Nickel is one such common hapten.

NIK-L-BLOK is a revolutionary active skin barrier cream based on a patented chelating formula using the active ingredient DTPA to capture free nickel ions and block them from permeating the skin when it is in contact with metal objects. The cream's ingredients work effectively to protect the skin both internally and externally, preventing the development of allergic reactions such as eczema, blisters, redness, itching and dryness. By using NIK-L-BLOK regularly on exposed skin areas, sensitisation towards nickel will be prevented, while the skin remains protected against nickel-induced eczema. NIK-L-BLOK is the result of many years of research done by Chemotechniue CEO Bo Niklasson and has been made available for purchase from Chemotechnique MB DIagnostics' sister company Chemotechnique Cosmeceuticals Scandinavia.

If you have patients that you deem would have an increased QoL using NIK-L-BLOK, please direct them to www.niklblok.com for further information.

Cutaneous reactions to Aluminium

by S. A. Kullberg, et al

in **Dermatitis, Volume 31, No. 6, November-December 2020, pp 341-348.**

Cutaneous exposure to aluminium may occur via contact with metal items, medications, and personal care products. Despite the widespread use of aluminium, allergic contact dermatitis is relatively rare. Sensitisation is often incidentally identified during patch testing with aluminium-based chambers. This article presents several cases along with a literature review summarising prevalence and clinical manifestations of cutaneous reactions to aluminium, recommendations for patch testing, sources of aluminium, and reproducibility of aluminium allergy over time.

Exposure to aluminium is pervasive, yet documented aluminium allergy is surprisingly rare. The first case of aluminium contact allergy was reported in 1979 in a child who had previously undergone hyposensitisation therapy for allergic rhinitis who presented with persistent axillary dermatitis from antiperspirants and, upon standardised patch testing, developed prominent “ringlike” reactions to aluminium Finn Chambers. This initial case exhibited 2 of the classic reactions patients with aluminium allergy can experience: (1) a ring or edge effect with the use of aluminium patch test chambers and (2) axillary vault dermatitis from antiperspirants.

In the 1990s, 376 cases of aluminium contact allergy in children were reported as a result of clinical trials of an acellular pertussis vaccine containing aluminium hydroxide. These children developed long-lasting, itchy, subcutaneous nodules and granulomas, weeks to months after being vaccinated. Subsequent patch tests with both metallic aluminium (empty Finn Chambers) and an aluminium salt (aluminium chloride hexahydrate, 2% petrolatum [pet]) were positive.

Although the prevalence of other allergenic metals such as nickel, gold, cobalt, and chromium has been well described, less is known about the prevalence of aluminium contact allergy.

This review article includes a summary of 34 papers on aluminium sensitivity, encompassing 4,178 patients that were patch tested to aluminium, of whom 1,224 were claimed to be positive on patch test.

SOURCES OF ALUMINUM AND ASSOCIATED CLINICAL REACTIONS

1. Vaccines

Aluminium plays an important role as an adjuvant in vaccinations, particularly for viral/bacterial inac-

tivated vaccine antigens, bacterial toxoids, and polysaccharides. Salts used in vaccinations include aluminium hydroxide, aluminium phosphate, alum (potassium aluminium sulphate), and mixed aluminium salts. It was initially thought that aluminium enhances the immune response to vaccinations by preventing elimination of antigens at the inoculation site (depot effect); more recently, aluminium has also been found to activate antigen-presenting cells, cytokines, macrophages, and complement proteins. As a result, aluminium was used as an adjuvant, reducing the amount of antigen per human vaccine dose and the number of scheduled vaccinations. In the United States, the Centers for Disease Control and Prevention maintains a list of excipients used in vaccines; there are currently 24 aluminium-based vaccines including DTap, hepatitis A, hepatitis B, human papillomavirus, Td/Tdap, and some pneumococcus and meningococcus vaccines.

After vaccination, a localised inflammatory response to the antigen-adjuvant solution results in erythema and swelling, which usually resolves within a few days; rare haematomas may occur. Vaccination-induced subcutaneous granulomatous nodule formation in children has been reported with frequencies of 0.35% to 1.18%, with a median duration of 18 to 49 months. In Sweden, between 77% and 95% of post-vaccination pruritic nodules were associated with positive patch tests to aluminium. Patients with contact allergy to aluminium may present several months after vaccination with pruritic, often lichenified, subcutaneous nodules with overlying excoriations and occasional discoloration and hypertrichosis at the site of the vaccination injection.

The development of persistent, painful, and pruritic nodules or granulomas at the site of aluminium-containing injections is considered to represent type IV hypersensitivity. In a prospective cohort study of more than 4,700 children who had received either a diphtheria-tetanus-pertussis-polio-Haemophilus influenzae type b vaccine (Infanrix, Pentavac) alone or with a pneumococcal conjugate (Prevnar), both containing an aluminium adjuvant, 38 children had itchy granulomas; of the 34 children patch tested, contact allergy to aluminium was verified in 85%.

Some authors hypothesise that aluminium hypersensitivity reactions are mediated through epidermal dendritic cells and that this complication can be avoided by intramuscular injection. This theory is supported by the report of an aluminium patch test–positive patient who developed a nodule after a subcutaneous vaccination containing aluminium but did not develop symptoms with the same subsequent vaccination performed intramuscularly.

Importantly, experts agree that the small risk of injection site nodules does not outweigh the benefit of disease prevention from vaccines.

The US Food and Drug Administration has determined that the recommended schedule of vaccines for infants results in no more than 4.335 mg of aluminium in the first year of life. On the basis of minimal risk levels established by the Agency for Toxic Substances and Disease Registry, the aluminium body burden in infants from both diet and vaccines during their first year would be unlikely to exceed safe aluminium burden thresholds (1 mg/kg per day).

In addition, the Global Advisory Committee on Vaccine Safety, an advisory board for the World Health Organisation, has stated that there is no scientific evidence of harm related to aluminium-adjuvant vaccines, specifically denying links with autism and other autoimmune/inflammatory neurological diseases. Additional reports dispute the theoretical association between human papillomavirus vaccine and macrophagic myofasciitis (a rare muscle inflammatory disease that presents with aluminium salt inclusions).

Dear Reader, if you have any particular article or book or website that you would like to have reviewed in a future issue of The Patch Tester, then please contact the Editor here.

2. Hapten-Specific Immunotherapy

Several reports describe itchy nodules at the site of hapten-specific immunotherapy (ASIT) injections using aluminium-precipitated antigen extracts. A cross-sectional study compared more than 60 children with asthma or allergic rhinitis who were either exposed (ASIT) or unexposed (no ASIT). Patch tests demonstrated aluminium contact allergy in 8 of the exposed patients. A separate, randomised, controlled, single-blind multicentre study involved patch testing of 205 children and adults patch tested before and during ASIT using the European Baseline Series supplemented with aluminium (aluminium chloride hexahydrate 2.0%, 10.0%, and 20.0% pet and an empty Finn Chamber). Four of the initially aluminium patch test–negative patients became positive after immunotherapy.

3. Antiperspirants

Common forms of aluminium used in antiperspirants include aluminium chloride, aluminium chlorohydrate, aluminium zirconium trichlorohydrex gly, and aluminium zirconium tetrachlorohydrex gly; these complexes react with electrolytes found in sweat and form plugs in sweat gland ducts, preventing excretion of sweat. A common presentation of aluminium contact allergy is axillary vault dermatitis due to antiperspirants; many case reports describe this clinical scenario.

Concern about topical application of aluminium originates from its potential association with breast cancer. This topic was first hypothesised by Darbre, who suggested a link between breast cancer occurrence in the upper outer quadrant and application of antiperspirant in this area. This researcher documented higher amounts of aluminium accumulating in human breast tissue than in blood. Although overall studies have remained inconclusive, investigators have documented that aluminium can lead to genomic instability, as well as inappropriate proliferation, increased migration, and invasion of breast epithelial cells. In addition, as a metal-oestrogen, aluminium chlorohydrate can increase oestrogen receptor α protein levels and overall oestrogen signalling. A retrospective study comparing 209 breast cancer patients with 209 healthy controls revealed a significant association between self-reported use of antiperspirant more than once daily when younger than 30 years and both aluminium content in the breast and breast cancer. Importantly, this type of study is limited by recall bias.

Several studies have investigated the cutaneous absorption of aluminium from daily antiperspirant use. Pineau et al measured transdermal uptake of aluminium chlorohydrate with in vitro Franz diffusion cells, evaluating 3 different formulations: 14.5% roll-on aluminium chlorohydrate emulsion, 21.2% aluminium chlorohydrate “stick,” and 38.5% aluminium chlorohydrate aerosol. After 24 hours of skin contact, the aluminium assays demonstrated insignificant transdermal absorption, less than 0.07% of the aluminium deposited on intact human skin samples. Stripped skin samples, evaluated with the stick formulation only, demonstrated significantly increased uptake of aluminium (11.50 vs 1.81 μg/cm2) as compared with healthy skin, suggesting possible clinical relevance for shaved axillae and other damaged skin. A separate study performed by Flarend et al evaluated absorption of aluminium chlorohydrate via radiolabelling of 26Al isotopes and found that only 0.012% of skin-applied aluminium was absorbed. Comparing these 2 intradermal studies with an estimated 2.5% of gut-exposed aluminium (via food) absorbed, these represent insignificant exposure.

4. Other Personal Care Products and Medical Uses

Other than antiperspirants, there are a few other sources of aluminium, in personal care products and medicaments. Systemic contact dermatitis was reported in 3 children previously sensitised to aluminium from vaccinations with subsequent exposure to toothpaste containing 30% to 40% aluminium oxide. Aluminium was introduced into sunscreens to prevent agglomeration of particles (e.g., titanium dioxide). More recently, theoretical concerns have been raised of UV-induced pro-oxidant reactions to aluminium, leading to skin cancer. Aluminium functions in cosmetics both as a pigment and as a thickening agent. We were unable to identify any reports of patients with clinically relevant dermatitis from aluminium-containing sunscreen or makeup products.

Aluminium is also found in several medicaments. The most common are aluminium-containing antacids. Topical aluminium chloride hexahydrate is used for haemostasis during minor procedures and for hyperhidrosis treatment. Colloidal aluminium hydroxide suspensions and aluminium hydroxide gels are used during surgical treatment of peptic ulcers or bowel fistulas. After ingestion, aluminium hydroxide has the ability to neutralise gastric contents, as well as bind bile acids in the gut. Historically, aluminium acetotartrate, 1% aq., was used as a topical medicament for eczema and venous leg ulcers. Meding et al described 2 patients treated with aluminium acetotartrate who were patch test positive to the Al-test, aluminium acetotartrate, 1% aq., an empty Finn Chamber, aluminium foil, and aluminium chloride hexahydrate, 2% and 5% pet.

5. Tattoos

In an in vitro quantitative chemical analysis study investigating the composition of 30 tattoo inks using scanning electron microscopy, 87% of these inks identified aluminium as an ingredient, making the overall frequency of exposure to those undergoing tattoo placement relatively high. Granulomatous reactions to aluminium-containing tattoo pigments have been documented in 2 patients; scanning electron microscopy and energy dispersive x-ray microanalysis demonstrated intradermal particles containing aluminium, and intradermal tests with either aluminium silicate or aluminium chloride were positive.

6. Elemental Exposures

A comprehensive literature search found few reports of occupational allergic contact dermatitis to aluminium. Hall described 4 aluminium patch test–positive aircraft workers with dermatitis most prominent on the flexor surfaces of the forearms and wrists associated with exposure to aluminium dust, filings, and burrings. In addition, there have been reports of a hospital attendant and a machine construction plant worker becoming sensitised to aluminium through workplace exposures.

TYPE I IMMEDIATE HYPERSENSITIVITY REACTIONS TO ALUMINIUM

The authors of the article state that they did not find any cases of Type I Immediate Hypersensitivity to aluminium though there is one case in the literature, to the 0.01% concentration of aluminium on Norwegian coins, as reported by Helgesen & Austad.

PATCH TEST MATERIALS

Like other metal salts, aluminium salts are “problematic” antigens in which improper concentrations

Compounds and Concentrations of Aluminium Used for Patch Testing*

Aluminium Compound	Vehicle	Concentration(s) (% wt/wt)
Aluminium chloride hexahydrate	aq and pet	0.1, 0.5, 1.0, 2.0, 5.0, 10.0
Aluminium hydroxide	aq and pet	0.5, 10.0
Aluminium subacetate	aq	1.0, 2.0
Aluminium acetotartrate	aq	1.0
Aluminium sulfate	aq	2.0
Aluminium acetate	aq	2.0, 1.3
Aluminium sulphide	aq	2.0
Potassium aluminium sulfate	aq and pet	0.98, 1.98, 3.93
Aluminium phosphate	pet	0.25, 0.5, 1.0
Aluminium oxide	aq and pet	10.0
Aluminium powder	aq and as is	2.0
Aluminium metal/sheet		
Empty Finn Chamber		

**Adapted from Siemund’s1Contact Allergy to Aluminium doctoral dissertation.*

and/or vehicles may lead to false-positive or irritant reactions. Many experts recommend testing with both metallic aluminium (an empty Finn Chamber) and aluminium chloride hexahydrate 2% pet. Importantly, false negatives may occur in adults at this concentration; current recommendations for diagnosing aluminium allergy include testing to both an empty Finn Chamber and aluminium chloride hexahydrate (2% pet for children younger than 8 years and 10% for adults).

A variety of different aluminium salts and media have been used for patch testing in the past. A comprehensive review performed by Siemund and by Netterlid et al discusses historical patch testing with multiple salts in various concentrations (See the Table above).

Intradermal testing has also been performed to diagnose aluminium allergy, traditionally using 0.1% to 0.5% aluminium hydroxide in 0.5% sodium chloride or water, with a final reading 2 to 3 days later. Such intradermal testing will detect cases of IgE-mediated Type I Immediate Hypersensitivity.

If aluminium allergy is suspected, plastic chambers should be used for patch testing. Because of the higher frequency of aluminium allergy in children, some contact dermatitis clinics routinely use plastic chambers for children (generally younger than 16–18 years) undergoing patch testing.

LOSS OF ALLERGY OVER TIME

It is unclear whether aluminium sensitivity diminishes over time or whether aluminium reactions have a high non-reproducible rate compared with other haptens. In a 1954 study, Danish patients underwent repeat testing 2 to 19 years after a positive patch test to aluminium; 111 of 188 positive reactions (59%) were not reproducible. Lidholm et al retested 241 children with previously identified reactions to 2% aluminium chloride hexahydrate 5 to 9 years later, and 186 (77%) were negative; a negative test result was associated with older age, longer time elapsed from first aluminium-absorbed vaccine dose, less severe cutaneous reactions, and resolution of vaccination site itching.

MANAGEMENT OF ALUMINIUM ALLERGY

Management of aluminium contact allergy is based on avoidance. For aluminium, this includes evaluation of antiperspirants, medications, clasps/buttons/pins, inks/tattoos, sunscreens, implants, metal contactants (e.g., aluminium foil, cans), and various occupational exposures. Aluminium-free hapten extracts are options for aluminium-allergic patients requiring immunotherapy. Barriers (e.g., gloves) may be used for metal exposures.

For patients experiencing clinically relevant contact allergy to aluminium with persistent axillary dermatitis, aluminium-free deodorants as well as homemade recipes are available Some natural “aluminium-free” deodorants are formulated with “natural deodorant crystals” including potassium alum or ammonium alum. Alum salts contain aluminium sulphate; tolerance to these alum salts in individuals allergic to aluminium is unclear. In patients who experience persistent itchy nodules or granulomas, topical steroids, colloid bandages, and intra-lesional corticosteroid injections may be helpful.

SUMMARY

Aluminium exposure is ubiquitous, but allergy is relatively rare. Classic presentations of aluminium allergy include diffuse ring reactions to aluminium Finn Chambers during patch testing, itchy subcutaneous nodules or granulomas soon after vaccinations or ASIT, and axillary dermatitis from antiperspirants. In individuals referred for patch testing who are suspected of having aluminium allergy, patch testing with plastic chambers is recommended. Aluminium allergy is typically confirmed by a positive patch test reaction to an empty Finn Chamber or aluminium chloride hexahydrate (2% pet for children younger than 8 years and 10% for adults).

Metal Haptens

Patch Testing with an Extended Metal Allergen Series at the Massachusetts General Hospital 2006-2117

by Idy Tam, et al

in **Dermatitis, Volume 31, No. 6, November-December 2020, pp 359-366.**

There are only limited reports of patch test data with an extended metal series that includes rare metals. The aims of this retrospective review of 150 patients referred for suspected metal allergy were to analyse and report patch testing results from an extended metal series, and to examine associations with sex and age, and highlight concomitant reactions toother metals.

The most common indications for evaluation referral were those patients having symptoms after implantation of a metal device (55.3%) and those with a history and concern about metal allergy before implantation of a metal device (22.0%).

Sources of metal exposures are ubiquitous in the environment. Nickel, in particular, is known to be a common precipitant of allergic contact dermatitis (ACD). Biomedical devices containing metal alloys have a broad array of therapeutic uses in different fields, including orthopaedic surgery, cardiology, and gynaecology procedures. The use of metal devices will likely increase over time. Device hypersensitivity is uncommon but well documented in the literature.

Currently, the criterion standard for detecting metal allergy is patch testing. However, no evidence-based guidelines have been established to guide surgical implant–based patch testing, although several society-derived opinions-based guidelines do exist.

Nickel, cobalt, and chromium are routinely tested on most standard patch test series, and hapten prevalence is broadly reported. However, little is known about the sensitisation rates of other rarer metal haptens. There are only 2 studies that have been published with a similar topic to this study. Patients who underwent patch testing for suspected ACD at the Massachusetts General Hospital Contact Dermatitis and Occupational Dermatology Clinic from 1st January 1 2007 to 31st December 2016 were identified retrospectively. During this period, 150 patients were referred for metal allergy evaluation and patch tested with the Extended Metal Series purchased from Chemotechnique Diagnostics (Vellinge, Sweden). The composition of this series varied slightly during the study, with haptens being added or removed by the manufacturer. In addition to the Extended Metal Series from Chemotechnique Diagnostics, all patients were tested with nickel sulphate 2.5%, cobalt chloride 1%, and potassium dichromate 0.25% as found in the North American Standard Series (Chemotechnique Diagnostics).

Information regarding patients' patch testing results, age, sex, date of testing, indications for patch testing, sites of dermatitis, and final diagnoses was extracted by reviewing electronic records. For patients who were referred for pre-implanted and post-implanted device metal allergy evaluation, the type of implanted device was further divided into 4 groups: orthopaedic, cardiovascular, dental/oral, and other (e.g., surgical clips, staples, copper intrauterine devices).


Boston, MA

Patch Test Interpretation and Clinical Relevance
Patch testing was conducted using standardised techniques in accordance with the International Contact Dermatitis Research Group recommendations. Haptens were loaded into IQ chambers (Chemotechnique Diagnostics), affixed with Scanpor tape (Norgesplaster Alpharma AS, Vennesla, Norway), and were applied to the patient's upper back. Patch tests remained in place for 48 hours, and reactions were evaluated after 48 hours and 72 or 96 hours. Patch test readings were classified as allergic (+, ++, +++), questionable (?), irritant (i), or negative (n). Seven-day readings were not performed. Questionable, irritant, and negative reactions were considered non-allergic. Positive patch test (PPT) reactions were further evaluated for relevance based on the patient's history and clinical judgment.

One hundred and fifty patients were patch tested with the Extended Metal Series consisting of up to 45 haptens during the 10-year study period.

Most patients were female (72.0%). The mean ± SD age for the study cohort overall was 53.7 ± 16.6 years (range, 13–90 years). The most common anatomical distributions of dermatitis were the leg (29.3%), trunk (22.0%), and arm (19.3%). The most frequent primary diagnosis was ACD (58.0%).

Patients were referred for patch testing evaluation in most cases because of concerns about metal allergy. In many cases, these were either those concerned about metal reactions before device

implantation 22.0%) [orthopaedic implant (48.5%), dental implant (17.6%), cardiovascular implant (20.6%), and other (copper intrauterine device, clips, and staples; 11.8%)] or those having symptoms (e.g., dermatitis, pain, implant failure, other) after device implantation (55.3%) [orthopaedic implant (59%), dental implant (25.3%), cardiovascular implant (6%), and other (clips and staples; 9.6%)].

Occupational referrals consisted of 4 cases (2.7%), which included a bartender, a wastewater treatment operator, a metal welder, and a painter/construction worker.

Metal Sensitivity and Clinical Relevance

- In the overall study cohort, ≥1PPT was found in 58.0% and ≥1RPPT in 41.3%.
- Women had ≥1PPT in 64.8% and ≥1RPPT in 48.1%.
- Men had ≥1PPT in 40.5% and ≥1RPPT in 23.8%.
- Women had significantly higher rates than men of ≥1PPT and ≥1RPPT with the metallic haptens.
- Overall, rates of positive reactions to metals were higher in younger age groups (<18 and 19–40 years) and declined successively with age.
- In female patients, the highest rate was observed in the age group of 19 to 40 years (81.3%) and then declined thereafter to 25.0% in the age group older than 80 years.
- In male patients, this trend was less apparent because of the limited numbers tested in different age groups.
- When stratified by age, women were significantly more likely to have a relevant metal allergy than men in the age group of 41 to 60 years. This association was attenuated in the other age groups.

Patch Test Results

In the overall study cohort, PPTs and RPPTs were (highest to lowest):

- Nickel sulphate 2.5% (26.2% / 23.4%)
- Gold sodium thiosulphate 0.5% (23.0% / 12.2%)
- Gold sodium thiosulphate 2.0% (20.7% / 10.0%)
- Palladium chloride 2.0% (19.6% / 14.2%)
- Cobalt chloride 1.0% (12.0% / 9.8%)

In female patients, PPTs and RPPTs were (highest to lowest):

- Nickel sulphate 2.5% (33.7% / 29.8%)
- Gold sodium thiosulfate 0.5% (26.4% / 13.2%)
- Gold sodium thiosulfate 2.0% (25.9% / 13.9%)
- Palladium chloride 2.0% (25.5% / 18.5%)
- Cobalt chloride 1.0% (14.3% / 12.2%)

In male patients, PPTs and RPPTs were (highest to lowest):

- Gold sodium thiosulphate 0.5% (14.3% / 9.5%)
- Manganese (II) chloride 2.0% (9.5% / 9.5%)
- Vanadium 5.0% (7.1% / 2.4%)
- Gold sodium thiosulphate 2.0% (7.1% / 0%)
- Nickel sulphate 2.5% (5.4% / 5.4%)

In comparison of reaction rates between sexes, nickel sulphate 2.5%, palladium chloride 2.0%, and gold sodium thiosulphate 2.0% were significantly higher in female patients than in male patients.
In patients younger than 40 years, PPTs and RPPTs were:

- Nickel sulphate 2.5% (37.0% / 37.0%)
- Palladium chloride 2.0% (33.3% / 29.6%)
- Cobalt chloride 1.0% (22.7% / 18.2%)

In patients older than 40 years, PPTs and RPPTs were:

- Gold sodium thiosulphate 0.5% (24.0% / 12.4%),
- Nickel sulphate 2.5% (23.7% / 20.2%),
- Gold sodium thiosulphate 2.0% (23.0% / 12.4%).

Patients 40 years or younger were more likely to be sensitised to mercury 0.5%.
One or more positive patch test reactions were observed in 87 patients (58.0%).

Metals with the highest frequencies were:

- Nickel sulphate 2.5% (26.2%)
- Gold sodium thiosulphate 0.5% (23.0%)
- Gold sodium thiosulphate 2.0% (20.7%)
- Palladium chloride 2.0% (19.6%)
- Cobalt chloride 1.0% (12.0%)
- Manganese chloride 2.0% (10.1%)

Of the 45 metals tested, 15 caused no patch test reactions.

Female patients were more likely to be sensitised to nickel, gold, and palladium. Younger patients (≤40 years) had higher reaction rates to nickel, mercury, palladium, and cobalt. Concomitant reactions of the top metals (nickel, palladium, gold, and cobalt) were statistically associated bidirectionally, except for cobalt and gold.

Concomitant Reactions of the Most Prevalent Metal Haptens
Analysis demonstrates the percentage of patients who had a PPT reaction to nickel, gold, cobalt, or palladium (independent variable) with concurrent reactions to the other top prevalent metals (dependent variable).

Of the 37 patients who reacted to nickel, 22 (59.5%) had concomitant reactions to palladium, 15 (40.5%) had concomitant reactions to gold 0.5%, 12 (32.4%) had concomitant reactions to gold 2.0%, and 11 (29.7%) had concomitant reactions to cobalt.

Of the 29 patients who reacted to palladium, 22 (75.9%) had concomitant reactions to nickel, 12 (41.4%) had concomitant reactions to gold 2.0%, 11 (37.9%) had concomitant reactions to gold 0.5%, and 10 (34.5%) had concomitant reactions to cobalt.

A similar pattern was evident for cobalt, gold 0.5%, and gold 2.0% as independent variables. Concomitant reactions of cobalt and gold 0.5% and 2.0% were not associated in either direction.

Nickel
In 1994, the European Union Nickel Directive was implemented in efforts to limit the nickel content in jewellery for piercing, thus limiting exposure. After the introduction of this regulation, European countries have observed a decreasing prevalence in nickel allergy over the years, although female patients are still more likely to be sensitised to nickel than male patients. Nevertheless, nickel remains one of the top sensitisers with a prevalence of approximately 8% to 19% in European countries and 17.5% in the United States. Nickel continues to be ubiquitous in our environment. Occupational nickel exposure is common in construction, metal, and healthcare workers, bar staff,

and hairdressers. Nickel is also pervasive in various consumer items, such as jewellery, clothing, electronic devices, accessories, toys, and tools. High exposure to nickel-rich foods, such as chocolate, legumes, shellfish, grains, nuts, and canned food, can also result in systemic dermatitis in certain individuals.

Palladium
Paladium exposure can come from jewellery, dental implants, and occupational items, such as catalytic converters, electronics, spark plugs, and dental materials. It has also been noted that white gold may contain up to 20% palladium, and dental alloys may contain up to 10% palladium. In addition, it has been suggested that other metals, such as palladium and cobalt, may be substituted for nickel in consumer items, leading to the increase in prevalence of these metals. This may explain the high sensitisation rates of palladium observed in our cohort, especially in female patients (25.9%).

Gold
Before the 1980s, gold allergy was thought to be rare because of its inert nature. However, more recent reports show a gold sensitivity prevalence of 9.5% of patients. It is often associated with facial and eyelid dermatitis especially when combined with sunscreen chemicals, including titanium and zinc. Gold sensitisation may be related to gold containing dental restorations. In asymptomatic individuals, the rate of gold allergy was higher in those with gold in their mouth compared with controls, as well as higher with longer duration of gold exposure. Gold sensitivity may also present as oral lichenoid lesions in patients with dental implants. As observed in the patch test reactions to various concentrations and preparations of gold, female patients consistently demonstrated higher sensitisation rates than male patients: gold sodium thiosulphate 0.5% (26.4% vs 14.3%), gold sodium thiosulphate 2.0% (25.9% vs 7.1%), and potassium dicyanoaurate (8.6% vs 2.4%).

Mercury.
Exposure to mercury occurs in 3 forms: metallic mercury, mercury salts, and inorganic mercury, such as thimerosal. The most common contact to mercury is through thimerosal. This is an antiseptic and a preservative that is nowadays rarely used in topical medications and cosmetics, and as a preservative in some vaccines. This was a common sensitiser with low clinical relevance in children from exposure to certain vaccines. Organic and inorganic mercury may cross-react. Therefore, higher reaction rates to mercury among younger individuals may be related to cross-reactions to thimerosal because true allergy to mercury is rare. Other sources of mercury include dental amalgams. Sensitisation to mercury 0.5% was statistically higher among younger individuals (≤40 years).

Concomitant Reactions of Most Prevalent Metals
Previous literature has indicated the tendency that patients are sensitised to multiple metals. The authors examined the association of those with a positive reaction to the most prevalent metals and those having concomitant reactions with other top sensitising metals (nickel, gold 0.5%, gold 2.0%, palladium, and cobalt). The high accordance rates of these metals may be due to frequent concurrent exposures of these metals, as they are commonly used in jewellery and dentistry.

Concomitant reactions with nickel and palladium were most common. Seventy-five percent of patients who reacted to palladium also reacted to nickel. This corresponds to previous findings that have explained that concomitant sensitisations to palladium and nickel are likely due to cross-reactivity. However, we also found that more than half (59.5%) of our patients who were sensitised to nickel were significantly associated with a palladium allergy. Cobalt and gold have been commonly reported to react concomitantly with nickel. In a recent study, Rastogi et al found that 37.0% of patients who reacted to nickel had co-reactions with palladium and these co-reactions were highly relevant. Cobalt and gold also co-reacted highly with palladium. Nickel, cobalt, and gold are usually included in standard series, such as the American Contact Dermatitis Society's Core Hapten Series and North American Contact Dermatitis Group Series, but palladium is not.

Precious haptens

Taken together, patients who are allergic to these common metals may benefit from being tested with palladium or empirically avoiding palladium.

It remains unclear whether sensitivities to multiple metals are due to cross-reactivity or co-sensitisations, and studies have demonstrated various findings. More investigations are still needed to determine the cause for these observations.

Conclusions

Findings from this study demonstrate that allergic reactions to metals, including those not included in standard series, may be more prevalent than previously suspected. The culprits of metal allergy extend beyond those metals that are often included in standard series and known to cause dermatitis.

Patch test results from this larger series of metal haptens may be a useful overview for those who are planning to patch test patients with rarer metal haptens. However, it remains unclear which metals should be included in patch testing, as well as which metal salts and concentrations are appropriate to use. It is also difficult to interpret the unexpectedly high sensitisation rates for less common metals. Future prospective studies are required to answer these uncertainties more definitively.

Occupational Exposure to Nickel, Cobalt and Chromium in the Lithuanian hard metal industry

by K. Linauskiene et al
in **Contact Dermatitis, Dec 2020,**

Contact with metals is involved in a wide range of occupations, including mechanics, construction workers, welders, assemblers, tool makers, cashiers, and many others. Prolonged contact with the skin in already sensitised subjects can elicit allergic contact dermatitis. Prolonged contact with the skin is defined as contact with the skin to articles containing nickel of potentially more than 10 minutes on ≥3 occasions within 2 weeks, or 30 minutes on one or more occasions within 2 weeks. Also ACD risk may be related to the metal dose deposited on the skin.

In order to quantify the amount of metals deposited on the skin, different techniques (e.g., acid wipe sampling, sampling by swab, and finger immersion method) can be used. The passive finger immersion method is accurate and confidently can be used for the detection of Ni deposition on hands. The finger immersion technique is known for some advantages over other methods such as wipe testing and tape stripping in terms of proved extraction efficacy, speed, and ease of technique.

The author's study aimed to find a relation between in vitro release of Co, Ni, and Cr to artificial sweat from nails and wire made of different alloys and deposition of these metals on metalworkers' fingers using the passive finger immersion method.

Ni, Cr and Co were detected in nearly all the extracts from metal workers and office staff in metal working companies.

Of course, nickel allergy is more common than to any other metal, but what is not generally known is that the regulations (REACH) on nickel content cover not only the common consumer items such as belts and jewellery but also cover tools and other instruments used in occupational activities. Therefore, industrial workers and perhaps in particular IT workers are exposed to significant amounts of nickel in the items and materials they interact with, such as hard wire and nails as examined in this study, but also in laptop computers, phones and other consumer electronic products.

The study showed that if workers are not already previously sensitised to nickel then the levels measured in the study would probably not have been high enough to elicit signs and symptoms of allergic contact dermatitis. In contrast, any workers who were already sensitised to nickel or chromium can elicit ACD, so preventative measures should be employed in the workplace.
Cobalt can be present in alloys even if not mentioned in Safety Data Sheets, and so at least theoretically could pose a risk for aggravated dermatitis on already compromised skin.

For further information, please read the original article.

At-risk occupation

Assessment of the quality of life (QoL) of patients with dermatitis and the impact of patch testing on QoL: A study of 519 patients diagnosed with dermatitis

by W Boonchai, et al

in **Contact Dermatitis, Volume 83, Issue 3, September 2020, pp 182-188.**

The Dermatology Life Quality Index (DLQI) is a standard questionnaire that measures the impact and effect of various skin disorders. The DLQI scores of dermatitis patients can be influenced by multiple factors, such as disease severity, frequency of disease exacerbation, sex, and age group.

The DLQI questionnaire consists of 10 questions that evaluate six aspects of QoL: symptoms and feelings, daily activities, leisure, work and school, personal relationships, and treatment during the preceding 7 days.

Q1 evaluates itch
Q2 corresponds to embarrassment
Q3 assesses shopping/home/gardening problems
Q4 deals with clothing choices
Q5 evaluates social/leisure activities
Q6 is concerned with sport
Q7 assesses work/study limitations
Q8 focuses on partner/close friends/relatives
Q9 deals with sexual difficulties
Q10 addresses problems caused by treatment.

Each question scores from 0 to 3; a higher score indicates a worsened QoL.
The total score ranges from 0 to 30.

As to the global assessments, 359 patients (of total 519 patients) in the study were asked to grade their own disease severity using a score of 0 to 4, with 0 representing no signs and 4 signifying severe signs. The physicians also rated the severity using the same grading system.

The 107 patients were tested using the European Baseline Series as well as additional haptens based on the individual patient histories and physical examinations. The haptens (Chemotechnique Diagnostics, Vellinge, Sweden) in aluminium Finn Chambers (SmartPractice, Phoenix, Arizona) were placed on unaffected skin on the upper back. The patches were removed after 48 hours. Reactions were evaluated on D2 and D4 after the placement of the patches. The results were interpreted according to the International Contact Dermatitis Research Group criteria.

There were several interesting indications from the various tests; which are listed below:

1. The mean score of all patients was 9.5, which is not inconsistent with other similar studies

2. The highest score in the study was for itching

3. The lowest score was for sexual difficulties, though males place more emphasis on their sex life

4. Facial dermatitis caused considerably more embarrassment than for other sites

5. No statistical difference on the sites of the lesions

6. Disease duration of more than one year had no impact on the overall QoL

7. The clinical severity assessed by the patients was directly associated with their DLQIs

8. Hand dermatitis unsurprisingly caused more impairments for work and study than other sites, because many occupations are heavily hand-dominated

9. After the tests were conducted, the DLQI scores decreased significantly for patients overall, both for patients with positive patch test results and for those with negative results

10. Patch testing was found to improve almost every aspect of DLQI, irrespective of whether the results were positive or negative.

Patch testing has again been confirmed to be a useful tool to help improve QoL, regardless of whether the results were positive or negative. The process surrounding patch testing might itself be a reason for the improved QoL. This may be because patients undergoing patch testing have a few additional visits with the dermatologist that involve detailed discussions of the causes and the treatments. Given that patch testing is a beneficial tool in that it tends to allay the concerns and anxiety that patients may have, the referral of dermatitis patients for patch testing should be encouraged. The authors therefore suggest that healthcare practitioners inform all dermatitis patients of the benefits of patch testing and refer them for testing to provide them with the best patient care, including improving their QoL.

For further information, please read the original article.

Harnessing cooperative immune augmentation by contact allergens to enhance the efficacy of viral vaccines

by L.S. Cunningham et al

in **Contact Dermatitis, November 2020, Vol 83, Issue 5, pp 432-435.**

Although the development of successful vaccines against coronaviruses may well have been achieved by a number of different pathways and developed by several different and separate commercial and research organisations, for some individuals the immune response that the vaccine stimulates may prove to be insufficient for that patients' effective host defence.

The principle that a relatively strong contact hapten will have an enhancing effect on sensitisation compared with a less potent contact hapten if they are co-administered, may not, at first, appear relevant to this issue. However, this augmentation effect is thought to be due to the sharing of common or complementary pathways. In this proposal paper, the authors consider aspects of the shared and complementary pathways between skin sensitisation induced by exposure to a hapten and the immune response to viruses, with particular reference to COVID-19.

The relationship led them to explore whether this principle, which they named as "co-operative immune augmentation" may be extended to include viral vaccination.

They considered evidence that even relatively weak haptens, that are already used in vaccines for other purposes, can show enhanced sensitisation; which is in keeping with a co-operative augmentation principle.

There is a global concerted effort in many countries and numerous research and commercial organisations to develop effective vaccines against COVID-19.

Despite early research investigations, and very recently including actual clinical usage of the first of the vaccines, there is merit in considering whether strategies exist that could be employed to enhance the effectiveness of an otherwise sub-optimal vaccine.

In this paper, the authors review the principle of "co-operative immune augmentation", observed when haptens of different potencies are administered, refer to the common and complementary immune pathways between contact haptens and viruses, and outline the evidence to date for enhanced immunogenicity of contact sensitisers used as adjuvants/additives in viral vaccines.

They attribute this effect to co-operative immune augmentation between the hapten and viral components, leading them to consider whether this principle could be applied for the purpose of augmenting the immunogenicity of viral vaccines via simultaneous administration of a safe but potent topical hapten.

During the history of vaccine development several agents have been used as co-formulants that display some potential to induce skin sensitisation, although their inclusion within vaccines has not been specifically for this property. These include adjuvants, antibacterial substances and preservatives.

Aluminium salts have been used as adjuvants in virus vaccines for decades. Bergfors et al described

cases of contact sensitisation to aluminium salt (aluminium hydroxide and aluminium phosphate) from diphtheria-tetanus-pertussis-polio (DTP)-Haemophilus influenza type b vaccine, usually manifesting as granulomas at the original site of injection, which occured on average 3 months after injection.

Twenty-nine of 34 children (age 3–12 months and representing just under 1% of 34 children receiving this vaccine) with this clinical presentation, had a positive patch test to a 2% aluminium chloride patch test. In all but three cases there were ++ to ++ + reactions.

Additionally, in a study where 20 subjects had both documented allergic contact dermatitis to aluminium and a + or stronger reaction to an aluminium patch test, two of four who had ++ or +++ to a 2% aluminium chloride 2% patch test, provided a history of local reactions to immunotherapy/vaccination as the

potential sensitising exposure to aluminium.

These strong reactions are unexpected as aluminium exposure through other sources (deodorants, ear drops, antiseptics, sun creams/lotions, tattoos, patch test chambers) only rarely leads to sensitisation. Furthermore, 2% aluminium chloride has often been adjudged to be too weak for patch testing purposes. Therefore, when aluminium salts are used as adjuvants, the immune response to the usually weak sensitiser (aluminium) appears to be augmented.

The use of mercury/thimerosal in vaccines was extensive in the past but has decreased in the last 20 years because of toxicity concerns. Marked allergic contact reactions to mercury/thimerosal from vaccines have also been described. The high rate of mercury allergy amongst patients in Finland (over 10% in ages 10–59 years) was a reflection of previous vaccinations containing mercury.

If, as expected, the augmentation principle applies to a virus vaccine then administration of a potent (but safe) hapten at the same time as vaccination, and at a site that will likely drain into the same lymphatic system, might be expected to augment the viral antigenic signal and resultant protective immunity. This could, potentially, be of significant benefit in enhancing the effectiveness of the vaccination per se, but of particular value in those individuals where there is reason to believe that the adaptive immune responses may be suboptimal.

It would be inappropriate to use haptens that may be encountered in everyday life; so this leaves few options. Furthermore, preclinical experience with vaccines for earlier coronaviruses causing Severe Respiratory Disease (SARS1 and Middle East Respiratory Syndrome) raised concern about exacerbating lung disease, either directly or through antibody enhancement.

Diphenylcyclopropenone (DPCP) is a potent topical sensitiser, that delivers a predominantly Th1 response and has been in use as immunotherapy for decades, usually in the treatment of alopecia areata. It has also been used in the treatment of recalcitrant verrucae. In a study of 27 patients who were first sensitised with DPCP (0.5%–1% concentrations applied to the arm) and the verrucae then treated by immunotherapy (1%–2% DPCP), eliciting DPCP skin reactions appeared to eliminate the verrucae.

For safety reasons, a trend in vaccination has been to replace inactivated organisms with antigenic proteins. Whilst making the vaccine safer this can sometimes reduce the immune response, hence the potential importance of co-administration of adjuvants.

The authors reviewed the potential for strong experimental haptens to be used in special circumstances, i.e. where there has been an ineffective response to the original viral vaccine. One such agent could be DPCP, which, even when applied at a marginally lower dose than the usual sensitising dose of 2% to reduce allergic skin reactions, may still be expected to give a strong immune reaction. The proposal is that topical exposure to an appropriate dose of DPCP, at the time of vaccination, and at an adjacent anatomical location draining into the same lymphatic bed, could boost the immunogenicity of viral vaccines significantly and improve host resistance to infection.

Only time and exhaustive analysis of data will prove the efficacy of the various COVID-19 vaccines now starting to be administered clinically. There will doubtless be an enormous amount of debate about safety and efficacy, brands, dosage schedules and all the multitude other factors involved. However, if there is any doubt about the efficacy of the current crop of vaccines then the concept of an immune augmentation by a contact hapten should be seriously considered as a possible simple and easy means to enhance the clinical efficacy of a COVID-19 vaccine, without going back to the drawing board.

For further information, please read the original article.

Optoacoustic Mesoscopy shows potential to increase accuracy of patch testing

by B. Hindelang, et al

in **Contact Dermatitis, Volume 83, Issue 3, pp 206-214**

Differentiation between irritant and allergic skin reactions in epicutaneous patch testing is based largely on subjective clinical criteria, with the risk of high intra-observer and inter-observer variability. Novel dermatological imaging using optoacoustic mesoscopy allows quantitative three-dimensional assessment of microvascular biomarkers. The authors of this study investigated the potential of optoacoustic imaging to improve the precision of patch test evaluation and thereby increase the clinical utility of patch testing.

The potentially long-term implications of an ACD diagnosis mean that this should be as accurate as possible. Epicutaneous patch testing constitutes the gold-standard diagnostic technique.

The patch test has at least three limitations.

1. The clinical assessment is subjective and therefore subject to inter-physician variation.

2. It distinguishes poorly between allergic skin reactions characteristic of ACD and irritant contact reactions arising when the test substance triggers cytotoxic effects on the skin. Such irritant reactions are not indicators of underlying disorder, yet their misinterpretation as an allergic reaction can bring a misdiagnosis of ACD, with long-term consequences for the patient.

3. It can give results that cannot be confidently assigned to allergic or irritant reactions. The ICDRG recommends rating such a reaction as doubtful positive (?+), with uncertain clinical implications for the patient.

Objective complementary methods are needed to assist in the correct classification of epicutaneous patch test results.

Histology can provide diagnostic clues in some cases. However, histology of allergic and irritant reactions can differ depending on the test substance, and skin reactions to a test substance have been shown to contain elements of both allergic and irritant reactions. Moreover, the invasiveness of skin biopsy makes histology unacceptable for routine use.

A number of non-invasive approaches have been suggested to help in the differentiation of allergic from irritant reactions. Several trials have indicated the potential of reflectance confocal microscopy (RCM) and high-definition optical coherence tomography (HD-OCT) for identifying discriminatory biomarkers. In RCM imaging, allergic reactions present more epidermal vesicle formation, while irritant reactions tend to show more pronounced disruption of the stratum corneum, more severe epidermal necrosis and parakeratosis, and stronger inflammatory infiltrate in superficial epidermal layers. HD-OCT imaging also appears capable of resolving some of these features. However, RCM does not penetrate beyond approximately 300 µm, while HD-OCT does not penetrate beyond approximately 570 µm. In addition, they rely mainly on morphological rather than functional assessment of structures in the epidermis and superficial dermis. Also, they offer small fields of view, and

they cannot resolve the microvascular network. Moreover, vesicles are a feature of strong reactions which may need no imaging technique to be diagnosed clinically.

An imaging method capable of comprehensively assessing skin microvasculature may be beneficial for differentiating between allergic and irritant skin reactions. Results from colorimetry, laser Doppler flowmetry, and infrared thermography suggest that in mild irritant reactions, vasodilation may occur primarily in superficial dermal microvasculature, whereas allergic reactions may involve the global microvasculature. Flow-sensitive dynamic OCT (D-OCT) is capable of imaging parts of the dermal microvasculature at high resolution. However, it is limited to an imaging depth of about 500 µm and, moreover, is affected by strong artifacts in the axial direction, which limits image analysis mostly to the en-face views.

Raster-scan optoacoustic mesoscopy (RSOM) is a novel dermatological imaging method that can assess dermal microvasculature at high resolution. In this technique, skin is illuminated with pulsed laser light that is absorbed by certain molecules in the skin, which generate ultrasound waves that are reconstructed into an image of the distribution of the absorbing molecules. Green laser light (532 nm) is absorbed nearly exclusively by melanin and haemoglobin, so the ultrasound waves generated can be reconstructed into three-dimensional (3D) images of the epidermal melanin layer and the comprehensive microvascular structure of the skin. Using an ultrasound transducer with a central frequency of 55 MHz, RSOM can penetrate as deep as 1 to 1.5 mm and offers a resolution of about 8 µm in the axial dimension and 30 µm in the lateral dimension through the entire skin depth. When compared with D-OCT, RSOM thus offers a similar image quality in en-face images but allows for significantly better transverse cross-sectional images and a much greater penetration depth. Overall, RSOM provides the highest resolution-to-depth ratio of all dermatological imaging techniques.

The authors of this investigation hypothesised that RSOM could be employed for routine examination of the microvascular structure in epicutaneous patch test reactions, and that this ability could contribute to a less subjective, more robust basis for differentiating between allergic and irritant patch test reactions.

The RSOM system utilised in the study was constructed in-house and based on the integration of various commercially supplied devices. For example, the ultrasound transducer was manufactured by Sonaxis of Besançon, France, and the pulsed laser light was provided by a device manufactured by PI-Physik Instrumente of Karlsruhe, Germany.

The original article shows illustrations of the superficial skin surface correlating with RSOM images, for Healthy Skin, for Irritant Reaction and for ++ Allergic Reaction.

This is the first report on the use of RSOM in allergy diagnosis. The study demonstrates that RSOM is suitable for imaging patch test reactions in a clinical setting and that its unique ability to resolve skin microvasculature comprehensively enables the analysis of novel biomarkers that may increase the accuracy of interpreting patch test results. Here we provide evidence that two biomarkers in particular, vessel fragmentation and ratio of low- to high-frequency content, may differ significantly between allergic and irritant results, allowing more accurate assessment.

The results from this study established the potential of RSOM to improve the accuracy of patch testing, expanding the range of clinical contexts where the technique enables precision dermatology.

Considering the high prevalence of contact allergies in the general population and the shortcomings of current patch test reading, our findings have important implications for precision allergology.

For further information, please read the original article.

Freestyle Libre 2: The new Isobornyl acrylate free generation

by E. Oppel, et al

in **Contact Dermatitis, Volume 83, Issue 5, November 2020, pp 429-431**

Freestyle Libre (Abbott, Chicago, Illinois) is a continuous glucose monitoring (CGM) device, widely used in patients with diabetes. Soon after its market launch, severe skin reactions to the device were reported. Isobornyl acrylate (IBOA) was identified in 2017 to be the major hapten responsible for the allergic skin reactions. Subsequent studies confirmed IBOA as the cause of severe allergic contact dermatitis (ACD) to diabetic devices. The only therapeutic option is avoidance of the hapten by switching to another CGM device.

Extensive discussions with the manufacturer finally led to the avoidance of IBOA in the production of their new model Freestyle Libre 2, which was launched in spring 2019. However, contact allergies were still observed in patients using the new Freestyle Libre 2.

Consultations with the manufacturer revealed that, although elimination of IBOA from plastic housing was seen as a demanding task, it had recently been achieved. Subsequently, it was observed that patients with a known IBOA allergy could tolerate Freestyle Libre 2.

The aim of this study was to confirm that IBOA was removed from housing of the glucose sensor of the Freestyle Libre 2. However, a new substance was detected –butylhydroxytoluene (BHT) – which was not contained in the original Freestyle Libre.

In the original Freestyle Libre model, IBOA was found in the plastic material used for the glucose sensor housing. When Freestyle Libre 2 was introduced to the market in spring 2019, expectations were high for ACD to cease. However, ACD still occurred. The manufacturer subsequently admitted that some manufacturing sites continued using IBOA-containing glues or housings. However, the present analysis of Freestyle Libre and Freestyle Libre 2 with different expiration dates showed that all the Freestyle Libre 2 devices were free of IBOA. This is consistent with our observation that patients with known IBOA allergy can tolerate the Freestyle Libre 2.

However, the contact hapten BHT was identified in the eluate of the Freestyle Libre 2 housing, while adhesives in the Freestyle Libre 2 were free of BHT.

BHT is used in plastic as a slip agent. This chemical acts as an antioxidant in food, petroleum-based products, rubber, plastics, and cosmetics. Allergic reactions from BHT have been described following the use of medication and cosmetics. BHT is widely used and was regarded as a safe antioxidant in normally used concentrations. Results from the extensive testing by the Information Network of Departments of Dermatology (IVDK) showed that the substance is a rare sensitiser despite widespread application. This may be explained by the use of mostly lower concentrations of BHT. However, it must be noted that the Freestyle Libre 2 devices remain on the skin of patients with diabetes for several days and even weeks, leading to a more intense contact than usual. Therefore, the probability of developing contact allergy increases.

In conclusion, newly occurring contact eczema in the context of diabetic devices should be more closely monitored in the future to diagnose possible triggering haptens.

For further information, please read the original article.

Allergic Contact Dermatitis and other Occupational Skin Disorders in Health Care Workers in the Finnish Register of Occupational Diseases (FROD) in 2005 – 2016.

by K. Aalto-Korte, et al
in **Contact Dermatitis, Dec 2020.**

Health care workers are an important risk group for occupational skin disease (OSD). The authors studied diagnoses and causes of health care workers' OSDs in the Finnish Register of Occupational Diseases (FROD) in 2005-2016, by searching the FROD for dermatological cases in health care-related occupations and in the industrial branch of health care.

Health care workers comprised 19% of all OSD cases in the FROD, and irritant contact dermatitis dominated the diagnoses. Nurses and assistant nurses were the largest occupational groups with irespective ncidence rates of 3.3 and 2.7 per 10 000 person years.

Rubber chemicals were by far the most common causative agents of allergic contact dermatitis. (ACD) followed by preservatives. The latter mainly comprised isothiazolinones and formaldehyde. Acrylates were important haptens in dental professions. Metals and coconut fatty acid derivatives were the next largest causative groups for ACD. Drugs caused only 1% of the ACD cases.
Their investigation was based on two analyses:

1. The registered branch of industry involved
2. The registered occupations involved

The most common diagnosis was Irritant Contact Dermatitis (ICD) affecting 45% of all the cases; in 43% it was the main diagnosis. Allergic Contact Dermatitis (ACD) was among the diagnoses in 25% of cases. Contact Urticaria/Protein Contact Dermatitis (CU/PCD) appeared in 3% of the cases. When skin infections were excluded, then ICD was 59%, ACD 33% and CU/PCD 4%.

Skin infections were a large group of 24% of the cases of which the vast majority were scabies. In the search by occupation, the authors identified twenty health care occupations with cases. The largest groups (including skin infections) were nurses and midwives (N=423), health care assistants (N=399), and dental assistants (N=87). The original article provides several tables with the raw data and in-depth evaluation of the individual cases. The highest incidences were in dental professions (7−19/10 000 person years). The largest groups, nurses and assistant nurses, had incidences of 3.3 and 2.7, respectively.

For comparison, the incidence of OSDs (infections excluded) in the total labour force was 1.71/10000 person years (95% CI 1.67−1.76; N = 4814). (With skin infections included, the corresponding figures were 1.88 cases/10 000 person years and 5265).

According to the search by industrial branch, rubber chemicals were by far the largest group of causes of ACD. Occupation-specific search showed that rubber allergy was the leading cause in 9 occupations. Acrylates, in turn, caused ACD only in dental professions. Isothiazolinones, formaldehyde, and other preservatives and disinfectants were all relatively important as causes of ACD. Health care workers comprised 19% of all OSD cases in the FROD (15% when skin infections were excluded). This is in line with similar studies of prevalence in Australia, where health care workers comprised 21% of OSDs, and in Denmark in 2010, it was 26%.

In line with the previous literature, ICDs dominated diagnoses in the present study: Skin infections excluded, they comprised 57% of primary diagnoses, while ACD was diagnosed in 32%. In Denmark, ICD was diagnosed in 88% and ACD in 18% of their OSD cases. In Australia ICD comprised 51% of all primary diagnoses and ACD 23%.

In our analysis on individual health care occupations, incidence of ICD was usually higher than that of ACD. Apart from the very small groups with three cases or less, only medical doctors, dentists and dental technicians had a higher incidence rate of ACD than that of ICD. The differences in figures can possible be explained by the not unambiguous definitions used of health care workers in the different countries and different studies.

In the present material, the incidence rates for OSDs varied a lot in different occupations. All four dental care professions had incidences of 7/10 000 person year or higher (skin infections excluded). Only prosthetist-orthotists' incidence rate was of the same order, 7.4, a figure that resulted from a single case during 6 years in a very small labour force (224 workers). Three pharmacy-related occupations had low incidence rates (0.48−0.52) together with medical doctors and head nurses ('Nursing and midwifery professionals'). The largest groups, nurses and assistant nurses, had incidences of 3.3 and 2.7, respectively.

In Northern Bavaria in 1990s, the incidence rate was given for 'health care workers', 7.3/10 000 person years, and separately for dental technicians, 10.8 2. The incidence of 'health care workers' was much higher than the incidences of possibly comparable groups 'nurses' and 'assistant nurses' in our material, but the reverse was true for dental technicians (10.8 v. 19). In Australia, the incidence of all OSDs in healthcare workers was 2.1, which is somewhat lower than in our 'nurses' and 'health care assistants'. In the UK, dermatologists reported an incidence rate of 1.1 and occupational physicians 3.4 for health and social care workers, which is of the same order as our results 12.

As regards the registered causes of ACD, this study confirms previous findings that rubber compounds form by far the most important hapten group, followed by preservatives. In Denmark, rubber chemicals were the most common occupationally relevant contact haptens followed by biocides, perfumes and nickel/cobalt (50, 13, 6 and 3 cases respectively in 2010). In this study, isothiazolinones were the largest group of preservatives, followed by formaldehyde and its liberators. Among the 16 isothiazolinone ACD cases, 7 were due to benzisothiazolinone (BIT). During the study period, there was a small epidemic of BIT allergy due to PVC gloves and most cases were in dental professionals. This study did not have any cases of perfume allergy (in the industrial-branch-specific search), and acrylates, (the third largest group), were not among the reported allergic exposures in the Danish material. Metals, mostly nickel, were the fourth largest hapten group in our material, which is in line with the Danish report.

In Australia in 1993-2014, rubber and preservatives were also the most important causative hapten groups in healthcare workers with occupational ACD. Formaldehyde was the third most important cause in the Australian study, followed by coconut diethanolamide (CDEA) that caused 3 cases of ACD in our material. In this Finnish study, cocamidopropyl betaine-related haptens caused more cases than CDEA. In this Finnish study, the number of OSD cases in health care workers is high due to the large labour force, and generally ICD dominates the diagnoses. As incidences for all OSDs and especially ACD in different occupations vary a lot, workers in this field don't have a uniform risk for OSD, but they do share the risk for ACD due to rubber chemicals and preservatives.

For further information, please read the original article.

Contact urticaria/angioedema caused by nickel from metal dental braces

by F. J. Navarro-Triviño, et al

in **Contact Dermatitis, Volume 83, Issue 5, November 2020, pp 425-427.**

Nickel allergy is common, and it is considered the most frequent contact allergen in the world. It is a ubiquitous hapten, present in metallic materials, cosmetics, and even food. Persons with piercings, mainly women, constitute a special group at risk of developing sensitisation to nickel. Nickel sensitisation from exposure to orthodontic treatments has been studied.

Kalimo et al examined and patch-tested 153 students, and they observed that nickel-sensitised students may have acquired the allergy by exposure to dental braces. Saliva could play an important role in this phenomenon. It may potentially corrode the dental braces (brackets, bands, mesh, pads, and arches), with the consequent release of nickel into the intraoral cavity. The oral mucosa, due to the rich vascularisation and non-keratinised epithelium, could be considered a special area to allow a greater absorption of haptens.

The level of nickel in saliva and serum increases significantly after the insertion of orthodontic appliances. Nickel-free brackets as an alternative to stainless steel include ceramic, polycarbonate, gold, and titanium components.

It is important to ensure the diagnosis, as the cost can increase up to 30% with nickel-free brackets. Clinically, angioedema and urticaria, without eczema, point toward type I hypersensitivity, as stated by Saluja et al who presented 11 cases who were prick-test positive to nickel, whereof 6 had histories consistent with contact urticaria to various jewellery, including earrings. Some reports have shown evidence of concurrent type I and type IV hypersensitivities to nickel, as might be suspected in this particular patient.

In conclusion, the authors presented a case of contact urticaria/angioedema caused by nickel from metal dental brackets. Several complementary tests had been performed, and different specialists been consulted in such a patient. This is an infrequent clinical presentation of nickel allergy, which requires a high degree of suspicion to achieve a correct diagnosis.

In this case report, the patient´s dental brace was composed of nickel according to the information offered by the orthodontist. Patch tests were performed with the European Comprehensive Baseline Series (Chemotechnique MB Diagnostics AB, Vellinge, Sweden) and Metal Series (Chemotechnique). The results were interpreted according to the criteria of the International Contact Dermatitis Research Group. Patch tests were read on day D2 and D4.

The patient showed a positive patch test reaction to nickel (+++). Prick test with nickel sulphate 5% pet. was positive (>5 mm) at the reading at 20 minutes and with a negative control. Contact urticaria/angioedema caused by nickel was diagnosed. Dental braces were exchanged for ceramic material. The dimethylglyoxime test was positive on the patient´s metal bracket. Complete improvement without treatment was observed in 7 days, and no recurrence was observed at 3 and 6 months' follow-up.

For further information, please read the original article.

Quantification of aluminium release from Finn chambers under different in vitro test conditions of relevance for patch testing

by Y. S. Hedberg, et al

in **Contact Dermatitis, Volume 83, Issue 5, November 2020, pp 380-386.**

Contact allergy to aluminium (Al) among dermatitis patients in general has not often been reported, and as this substance is not included in the baseline series in most countries, the real frequency of this contact allergy is unknown. In a recent French study, a surprisingly high frequency of contact allergy to Al (21.6%) was reported in consecutively patch-tested children.

Vaccines and immunotherapy seem to be main causes of the development of contact allergy to Al; however, a recent study could not confirm the clear role of immunotherapy.

In a Swedish prospective cohort study comprising 4,758 children, 0.83% of vaccinated children developed intensely itching subcutaneous nodules at the injection site for Al-adsorbed vaccines.

Generally, the higher the Al dose and the more frequently injections are given, the higher the risk for developing contact allergy to Al.

Individuals with atopic dermatitis seem to have an increased risk.

Once sensitised, other elicitation sources can be cosmetics, deodorants, Al metal, eardrops, toothpaste, and tattoos, but the bioavailability of different Al sources is not well investigated.

A recent Danish questionnaire study of 177 Al-allergic children and their parents compared with a reference group concluded that itching vaccination granulomas and Al allergy have a considerable negative impact on these children and their families, causing for instance, reduced adherence to vaccination programs and a lower score on overall life quality as compared to the reference group.

Contact allergy to Al is not easily diagnosed, as the elicitation threshold might be higher than the patch test substance used and since there is a considerable individual over-time variation in patch test results, resulting in a high risk of false-negative results in Al-allergic individuals.

A recent study on 241 children with previous vaccine-induced itching nodules found that patch testing with 2% Al chloride hexahydrate in pet. gave more positive reactions as compared with an empty Al Finn chamber.

It has been reported, however, that false-positive reactions to various allergens applied in Finn chambers can occur in Al-allergic individuals.

The objectives of this study were to:

(a) quantify the release of Al from Al Finn chambers and Finn chambers Aqua (covered Al chambers) as compared to common patch-test skin doses of Al chloride hexahydrate

(b) to quantify the release of Al from aluminium Finn chambers containing different baseline

patch-test substances.

The Al release from Finn chambers (about 0.05 g weight) and Finn chambers Aqua was tested in vitro in artificial sweat (ASW, 5.0 g/L NaCl, 1.0 g/L urea, 1.0 g/L lactic acid, pH adjusted to 6.5 ± 0.05 with NaOH).

Al belongs to the passive metals that are protected by a thin surface oxide that hinders corrosion and dissolution effectively in neutral aqueous solutions. However, Al metal is susceptible to localised corrosion and sometimes other types of corrosion in salt solutions, solutions containing certain anions and organic acids, in contact with other metals, and strongly acidic or alkaline solutions. Chlorides have particularly strong effects on localised corrosion of Al metal, which can explain the high release from Finn chambers observed in this study.

The release of metal ions from passive metals is further strongly influenced by the surface preparation or storage conditions of the metals prior to testing. Generally, longer storage time and a more humid, warmer, and acidic storage atmosphere will result in lower subsequent release of metal ions when tested without any further surface preparation (i.e., as-received).

In this study, three different batches of Finn chambers with slightly different (unknown) age and storage conditions were tested and showed partially statistically significant (up to 30-fold) differences in Al release at similar test conditions for as-received (non-treated) Al Finn chambers. This result is interesting, as it could possibly explain the differences observed in reactivity to empty Finn chambers observed in different studies. Further studies are required to understand this baseline variation of Al release from empty Finn chambers.

Considering the fact that neither AlCl36H2O in pet. (2% or 10%) nor any other Al patch-test substance is currently included in the Swedish National Baseline Series or in International Baseline Series, it might be difficult to recognise Al allergy, and hence there is a risk of false-positive reactions, and consequent misdiagnosis, to other haptens in Al-sensitised individuals.

Al allergy is relatively common in some countries and age groups (about 1% of general population) and might therefore pose a serious risk of jeopardising a correct diagnosis using patch testing with Finn chambers.

Several Swedish studies are currently ongoing to investigate whether Al release from Finn chambers could influence diagnostic outcomes. This has also been discussed recently for isolated palladium allergy. From a chemical point of view, release of Al from Al Finn chambers could be of concern for current patch-test diagnostic outcomes.

Although most patch-test substances reduced the release of Al from the Al Finn chambers, some substances significantly increased the release of Al from the Finn chambers, most notable for Caine mix II 10% pet., M. pereirae resin 25% pet., and sodium tetrachloropalladate hydrate 3.0% pet. (corresponding to 0.5% Al chloride hexahydrate).

We strongly recommend patch testing of Al chloride hexahydrate 10% pet. in a plastic chamber as a control substance if Al Finn chambers are used for patch testing

The release of Al from Finn chambers should be considered for the further development of diagnostic patch testing.

For further information, please read the original article.

Website Review

You are invited to notify us If there is a website you would like to have reviewed in a future issue of The Patch Tester or if there is a society or other website that you would like to have included in these lists.

Dermatology Society Websites

ILDS:	*International League of Dermatology Societies*	www.ilds.org
ICDRG:	*International Contact Dermatitis Research Group*	www.icdrg.org
EADV:	*European Academy of Dermatology & Venerology*	www.eadv.org
ESCD:	*European Society of Contact Dermatitis*	www.escd.org
ACDS:	*American Contact Dermatitis Society*	www.contactderm.org
APEODS:	*Asia-Pacific Envmntl & Occupational Dermatology Society*	www.apeods.org
EAACI SAM:	*European Academy of Allergy & Clinical Immunology*	www.eaaci.org
BAD:	*British Association of Dermatology*	www.badannualmeeting.co.uk
AAD:	*American Academy of Dermatology*	www.aad.org
PDA:	*Pacific Dermatololologic Association*	www.pacificderm.org
APD:	*Association of Dermatology Professors*	www.dermatologyprofessors.org
NDA:	*Nordic Dermatology Association*	www.nordicdermatology.com
GDA:	*German Dermatology Society*	www.derma.de
FSA:	*French Society of Dermatology*	www.sfdermato.org
CDA:	*Caribbean Dermatology Association*	www.caribbeanderm.org
ACD:	*Australian College of Dermatologists*	www.dermcoll.edu.au
NZDS:	*New Zealand Dermatology Society*	www.nzdsi.org
DNA:	*Dermatology Nurses Association*	www.dnanurse.org
DermNET NZ:	*Dermatology Infomation Resource for Patients*	www.dermnetnz.org

Dermatology Meeting Websites

www.eadv.org
www.aad.org
www.dermatologymeeting.com
www.asiaderma.sg
www.dubaiderma.com
www.cairoderma.com

British Association of Dermatologists

www.bad.org.uk

The BAD website is intended primarily for dermatology professionals in UK, and provides a plethora of services and information.

Of particular interest in these current COVID-19 times is the BAD publication on “Quality Standards for Teledermatology”. See https://www.bad.org.uk/shared/get-file.ashx?itemtype=document&id=794

Skin Health and Disease
There is a Facebook page for the BAD titled Skin Health and Disease that is the open access Journal of the British Association of Dermatologists, and is accessible at https://www.facebook.com/SkinHealthDis/ and via @SkinHealthDis

Skin Health and Disease is a new multidisciplinary international open-access journal from the British Association of Dermatologists, covering all aspects of dermatology from basic science, translational and clinical research. The overarching aim of the journal is to improve patient outcomes. All papers presented for publication undergo rigorous and fast peer review, as well as short publication times.

The British Journal of Dermatology.
The British Journal of Dermatology is the printed journal mouthpiece of the BAD and is one of the top dermatology journals in the world. The BJD publishes papers on all aspects of the biology and pathology of the skin. Originally the journal, founded in 1888, was devoted almost exclusively to the interests of the dermatologist in clinical practice. However, the rapid development, since the 1950s, of research on the physiology and experimental pathology of the skin has been reflected in the contents of the Journal, which now provides a vehicle for the publication of both experimental and clinical ethical research and serves equally the laboratory worker and the clinician.

Clinical and Experimental Dermatology
Clinical and Experimental Dermatology delivers excellence in dermatology education. It is the British Association of Dermatologists education journal for practicing clinicians and dermatological researchers. It aims to advance the understanding, management and treatment of skin disease and improve patient outcomes. It incorporates CPD modules, original articles, reviews and concise reports.

The BAD Patient Hub
This is a section within the BAD website that is intended for the Public. This links through to a separate website, at www.skinhealthinfo.org.uk that was designed and provided by the British Association of Dermatologists to provide helpful, impartial information and advice and to provide other information and support for people with dermatological conditions. As well as information on skin diseases and treatments, there are tips on navigating the NHS, finding a dermatologist, how to get involved with research, advocating for local services, and much more. There are sections on skin conditions, symptoms, treatments, Patient Information Leaflets, and contact information.

British Skin Foundation

www.britishskinfoundation.org.uk

The British Skin Foundation is the only UK charity that raises money to fund research into all types of skin diseases including skin cancer. Founded in 1996, the British Skin Foundation has supported 400 research projects and awarded £16,000,000 in funding across all skin diseases. Whilst they are dedicated to raising money for research, they also aim to raise awareness of skin diseases in the wider community. They're committed to educating people about the different skin conditions, helping to reduce stigma and promote understanding. The British Skin Foundation receives no statutory funding and relies completely on donations.

British Dermatological Nursing Group

www.bdng.org.uk

The BDNG was established in 1989 to offer an independent speciality group of nurses and healthcare professionals in UK and Ireland with an interest in dermatology.
The aims of the BDNG are to:

- Promote the development of the highest standard of care for the patient receiving dermatological care
- Promote the development and recognition of the nurse's role in dermatology, for the benefit of the patient
- Promote and support education of nurses for their role in dermatology
- Promote and support research into all aspects of dermatology nursing and dermatological nursing care
- Provide a source of expertise for nurses facing clinical and managerial challenges in the field of dermatology nursing
- Provide a forum for the dissemination of developments and knowledge in the field of dermatology nursing.

The BDNG website includes a section on e-learning, and information on their annual conference and other events, awards and a gateway into the dedicated Dermatology Nurses journal.

The BDNG has eleven sub-groups, including the Contact Dermatitis Sub-group.

Scottish Dermatological Society

www.sds.org.uk

The Scottish Dermatological Society was founded in 1924. The object of the Society is to promote, for the public benefit, the knowledge, teaching, and practice of dermatology. It pursues this object in a variety of ways including by collecting, collating and publishing information about dermatology by stimulating, promoting and publishing appropriate medical and scientific research, and by holding conferences, meetings and seminars. The Society has a President, a Secretary and an Executive Committee who meet regularly. Clinical and scientific meetings are held 3 times a year, and regular symposia on relevant topics are held jointly with members of other disciplines. The President represents Scottish Dermatologists on the Executive of the British Association of Dermatologists.

Scottish Dermatological Nursing Society

www.sdns.org.uk

The Scottish Dermatological Nursing Society (SDNS) was established to offer a Speciality group for nurses and health care professionals with an interest in Dermatology. The society is affiliated to the British Dermatological Nursing Group (BDNG) and the Scottish Dermatological Society (SDS).

Irish Association of Dermatologists

www.irishdermatologists.ie

The IAD is an all-Ireland professional body of dermatologists. The society was established some 50 years ago to advance knowledge on diseases of the skin. The IAD fulfils its objective by organising twice yearly meetings in the spring and autumn at which both national and international speakers who are at the cutting edge of dermatology research present their work. Our trainee members also present both scientific work and clinical papers for discussion at these meetings. The society offers scholarships/bursaries for attendance of trainees at international meetings and for electives at centres of excellence abroad.

The association has 135 members north and south of the Island. It has charitable status and was incorporated as a limited company in 2015. The support of the pharmaceutical industry has been invaluable in helping the society meets its educational objectives.

This new website is in its infancy and as the IAD develops it they will have an interactive website for patients, members, trainees and anyone interested in promoting dermatology on the Island.

Irish Dermatology Nurses Association Ltd

www.irishdermatologynurses.ie

The Irish Dermatology Nurses Association was established in April 2002 to provide support for the practice and development of dermatology nurses on the island of Ireland. It was registered as a limited company in 2008.

The IDNAL aims to:

- Provide a forum for the support of research, the sharing of knowledge, and the dissemination of developments in the practice of dermatology nursing
- Provide educational support for nurses in developing their dermatology practice
- Promote evidenced based practice in the delivery of dermatological nursing care
- Elevate the national and international status of Irish dermatology nurses
- Foster communication and establish links with national and international dermatology professional organisations and charities.

Irish Skin Foundation

www.irishdermatologists.ie/information-supports/irish-skin-foundation

The ISF offer information, support and guidance to people living with skin conditions, their families and carers. They operate a free nurse Helpline which provides access, on an appointment and call-back model, to dermatology nurse specialists to ensure equitable access to basic dermatology supports.

They work with people in the dermatology community (people with skin conditions, pharmacists, GPs, nurses, consultant dermatologists and allied healthcare professionals) to produce accessible, evidence-based and up-to date information on common skin conditions.

Their aim is to empower people with skin conditions, support timely diagnosis and treatment, and promote public awareness and understanding of skin conditions.

The ISF represents people with skin conditions and advocates on their behalf on issues ranging from personal advocacy to policy and service provision. They are also very active in the community and in promoting awareness of issues of importance to dermatology patients.

The ISF relies on the clinical community to assist them in writing and reviewing materials for their website and leaflets, participating in talks and panel discussions, and in raising awareness generally about skin conditions at health promotion events or in the media.

Contact Dermatitis / Patch Testing

~~**19th to 23rd March 2021**~~
~~**American Academy of Dermatology**~~
~~San Fransisco, USA~~
~~*www.aad.org*~~
Cancelled

17th to 18th March 2021
32nd Annual Meeting of ACDS
Virtual Meeting
https://www.contactderm.org/events/acds-annual-meeting
Online

1st to 3rd September 2021
European Society for Contact Dermatitis
Amsterdam, Netherlands
www.escd2021.com

8th to 10th June 2022
European Society for Contact Dermatitis
Amsterdam, Netherlands
www.escd2022.com

Dermatology - International

19th to 23rd January 2021
20th Annual Caribbean Dermatology Symposium
Palm Beach, Aruba
https://www.clocate.com/conference/caribbean-dermatology-symposium/63351/

6th to 8th May 2021
16th EADV Symposium
Porto, Portugal
https://eadv.org/calendar/show/598

7th to 8th May 2021
21st European Dermatology Congress
Amsterdam, Netherlands
https://www.clocate.com/conference/european-dermatology-congress/66472/

12th to 14th May 2021
ESPD Annual Meeting
Vienna, Austria
www.espd.info

21st to 22nd June 2021
22nd World dermatology Congress
Tokyo, Japan
https://www.clocate.com/conference/world-dermatology-congress/65366/

15th to 18th September 2021
Ibero-Latin American Congress of Dermatology 2021 (CILAD)
Madrid, Spain
www.cilad2021.org

22nd to 25th September 2021
14th World Congress of Paediatric Dermatology
Edinburgh, Scotland
www.wcpd2021.com

22nd to 25th September 2021
European Society for Dermatological Research
Amsterdam, Netherlands
www.esdrmeeting.org

29th September to 2ND October 2021
EADV Congress
Vienna, Austria
https://eadv.org/calendar/show/60

3rd to 6th November 2021
18th World Congress of Cancers of the Skin
Buenos Aires, Argentina
www.cilad.org/wccs/

10th to 13th November 2021
International Congress of Dermatology
Melbourne Australia
www.icd2021.com.au

The COVID-19 pandemic has caused the postponement or cancellation or change of format for all congresses originally scheduled for the latter part of 2020 and well into 2021. Check the society and congress websites frequently for updated information.