Western Occupational and Environmental Medical Association
CME Webinar - June 27, 2012

Occupational Dermatology

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PLEASE STAND BY - WEBINAR WILL BEGIN AT 12:00pm (Pacific Time)
FOR AUDIO: Call: 866-740-1260 / Access Code: 764 4915#
Disclosures

- SmartHealth
  - TRUE Test

- I will be discussing off-label use of patch testing and off-label treatment of contact dermatitis
Objectives

- Emphasize the importance of occupational contact dermatitis
- Discuss the epidemiology of contact dermatitis in the occupational setting
- Differentiate irritant from allergic contact dermatitis
- Understand the role of patch testing in diagnosis
- Explore common occupational allergens
- Outline treatment options and long-term management of occupational contact dermatitis
Why should we care?

- Occupational skin disease is a “hot” topic

Healthy People 2020

“Reduce occupational skin diseases or disorders among full-time workers”

ACOEM Core Competencies - Clinical Dermatology

- OEM physicians can provide early recognition, diagnosis, and management of these disorders and make necessary recommendations to minimize their occurrence both in the workplace and at home.
- Diagnose primary irritant-induced dermatoses.
- Differentiate occupational skin disorders by history, examination, and diagnostic evaluation.
- Diagnose and determine the cause of allergic contact dermatitis (including urticaria), particularly those caused by common antigens such as latex, epoxy monomer, and nickel.

http://www.acoem.org/uploadedFiles/Publications/OEM_Competencies/ACOEM%20OEM%20COMPETENCIES.pdf
ACOEM Core Competencies—Clinical Dermatology (con’t)

- Manage occupational and environmental skin injuries and dermatoses
- Treat and prevent recurrence of contact dermatitis
Epidemiology of Occupational Contact Dermatitis

Latex gloves

Contact Dermatitis

- Contact dermatitis (CD) is reported to account for up to 30% of all occupational disease in industrialized nations.
- CD is the most common occupational skin disorder.
  - About 90-95% of all cases of occupational skin diseases.
Occupational Contact Dermatitis Epidemiology

- Incidence rate of 0.5-1.9 cases per 1000 full-time workers per year
- 1 year prevalence estimate of 10%
- Lifetime prevalence rate of 20%
- Likely underestimated due to underreporting
  - Mild cases specifically
Occupational Contact Dermatitis Epidemiology

- **Hands are usually involved**
  - 80-90% of cases
  - Great impact on quality of life

- **True epidemiologic data are lacking**
  - No standardization of data, methods of collection
  - Underreporting
Occupational Contact Dermatitis Epidemiology

- This is felt to be underreported
  - Estimates are closer to 400,000 to 2 million cases per year
- 1985 Mathias estimated annual costs of Occupational CD to be between $222 million and $1 billion
Survey of established cases of Occupational CD, reported that over one year:
- 19.9% reported prolonged sick leave
- 23% experienced job loss
What percent of all contact dermatitis is allergic versus irritant?
Contact Dermatitis Overview

- **Irritant** contact dermatitis accounts for 60-80% of all CD
- **Allergic** contact dermatitis accounts for remaining 20-40%
Contact Dermatitits Overview

- ACD is a SPECIFIC immunologic reaction, requiring prior sensitization

Image from: www.dermnet.com
Contact Dermatitis Overview

- 90% of the population can be sensitized to certain antigens such as dinitrochlorobenzene
Contact Dermatitis Overview

- What percent of North American Caucasian adults are allergic to Rhus antigen?
  - 25%
  - 40%
  - 60%
  - 75%

www.ohio-nature.com  www.gmcsc.org  www.duke.edu
Contact Dermatitis Overview

- What percent of North American Caucasian adults are allergic to Rhus antigen?
  - 25%
  - 40%
  - 60%
  - 75%
Contact Dermatitis Overview

- **Irritant contact dermatitis** is NONSPECIFIC
- Requires no prior sensitization
- Clinically can be difficult to distinguish ICD from ACD

http://www.skincareguide.ca/glossary/i/irritant_contact дерматит.html
Common Occupational Irritants

- Alkalis
  - Soaps
  - Detergents
  - Cleansers
- Acids
- Hydrocarbons
  - Petroleum
  - Oils
- Solvents
Common Occupational Irritants

- Frictional Dermatitis
  - Repetitive handling of objects or materials
  - Likely underappreciated

- Examples
  - Fabric
  - Paper
  - Metal objects
  - Driving
Common Occupational Irritants

- Gloves
  - Prolonged contact with skin affects the epidermal barrier
  - May be irritant itself
  - May make epidermal barrier more susceptible to allergens or other irritants

## ACD vs ICD

<table>
<thead>
<tr>
<th>Feature</th>
<th>ACD</th>
<th>ICD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain, burning</td>
<td>++</td>
<td>++++(Early)</td>
</tr>
<tr>
<td>Erythema</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td>Vesicles</td>
<td>++++</td>
<td>+</td>
</tr>
<tr>
<td>Pustules</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Hyperkeratosis</td>
<td>++</td>
<td>++++</td>
</tr>
<tr>
<td>Itch</td>
<td>++++(Early)</td>
<td>+++(Late)</td>
</tr>
</tbody>
</table>
## ACD vs ICD

<table>
<thead>
<tr>
<th>Feature</th>
<th>ACD</th>
<th>ICD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fissuring</td>
<td>++</td>
<td>++++</td>
</tr>
<tr>
<td>Sharp demarcation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Necrotic keratinocytes</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Dermal Edema</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td>Lymphocytic infiltrate</td>
<td>++++</td>
<td>++++</td>
</tr>
<tr>
<td>Neutrophilic infiltrate</td>
<td>+</td>
<td>+++</td>
</tr>
</tbody>
</table>
Photo Quiz

Allergic or Irritant Contact Dermatitis?
Allergic or Irritant?
Irritant
Allergic or Irritant?

http://hardinmd.lib.uiowa.edu/pictures22/dermnet/contact_dermatitis_04rhus080105.jpg
Allergic

http://hardinmd.lib.uiowa.edu/pictures22/dermnet/contactdermatitis_04rhus080105.jpg
Allergic or Irritant?
Irritant
Allergic or Irritant?
Allergic
Allergic or Irritant?

http://www.cdc.gov/niosh/topics/skin/occderm-slides/ocderm10.html
Allergic and Irritant

http://www.cdc.gov/niosh/topics/skin/occderm-slides/ocderm10.html
Debunking the myths...
CD Misconceptions

- Allergy only develops to new exposures/products
CD Misconceptions

- Allergy only develops to new exposures/products
  - FALSE
  - Allergy can develop after years of using the same product
CD Misconceptions

- If a change in chemical/product exposure does not clear the rash, that product is not etiologic.
CD Misconceptions

- If a change in chemical/product exposure does not clear the rash, that product is not etiologic
  - FALSE
  - There are many cross-reactants in other products, it is best to have NO exposures to topicals/cross-reactors when clearing a rash
CD Misconceptions

- If product exposure is bilateral, the eruption should be bilateral
CD Misconceptions

- If product exposure is bilateral, the eruption should be bilateral
  - NOT NECESSARILY
  - Common misconception held by MDs
  - There are many aspects affecting end-product eruption
CD Misconceptions

- ACD is NOT patchy- it is usually the same intensity at all areas of exposure
CD Misconceptions

- ACD is NOT patchy - it is usually the same intensity at all areas of exposure
  - FALSE
- Again, many factors affect the presenting eruption pattern
CD Misconceptions

- Adult onset “eczema”
CD Misconceptions

- Adult onset “eczema”
  - If no history of eczema as a child, likely ACD
  - Especially if on hands, face, neck
“The greatest abuse of patch testing is failure to use the test.”

- Coleman, 1982
Patch testing

- Intended to detect allergens relevant to eruption
- Is at least a week-long process
- Detects Type IV allergic reaction (delayed-type hypersensitivity)
- Requires at least 2-3 visits to clinic for complete testing
T.R.U.E. Test

- Thin-layer Rapid Use Epicutaneous Test
- Allerderm product
- Only FDA-approved patch testing product
- 29 allergens with an additional 7 recently FDA-approved
- Comes pre-filled
T.R.U.E. Test

- Nickel Sulfate
- Wool Alcohols
- Neomycin Sulfate
- Potassium Dichromate
- Caine Mix
- Fragrance Mix
- Colophony
- Paraben Mix
- Negative Control
- Balsam of Peru
- Ethylenediamine Dihydrochloride
- Cobalt Dichloride
- p-tert-Butylphenol Formaldehyde Resin
- Epoxy Resin
- Carba Mix
- Black Rubber Mix
- Me- Cl- Isothiazolinone (MCI/MI)
- Quaternium-15
- Mercaptobenzothiazole
- p-Phenylenediamine
- Formaldehyde
- Mercapto Mix
- Thimerosal
- Thiuram Mix
T.R.U.E. Test

- Diazolidinyl urea
- Imidazolidinyl urea
- Budesonide
- Tixocortol-21-pivalate
- Quinoline mix
TRUE versus Chamber

- TRUE testing is helpful, but many patients have at least one relevant allergen not detected by TRUE testing.
- Consider referral for more extensive patch testing if no improvement.

Patch testing

- **Step 1: Take extensive exposure history**
  - Include home exposures, work tasks and exposures, implants, intermittent exposures, MSDS if appropriate

- **Step 2: Determine allergen panel**
  - Would be pre-determined if only TRUE Test is available
Patch testing

- Step 3: Prepare allergen tray as appropriate
  - TRUE test is pre-prepared
Patch testing

- Step 4: Apply patches to back
  - Back must be clear of rash
  - Patches are marked
  - Securing paper tape is used
Patch testing

- Step 5: Patches removed in 48 hours
  - Variability in how this is done
  - Areas remarked
  - Reactions noted- Irritant
Patch testing

- Step 6: Patches read at 3-7 days after application
  - Our clinic reads at 4 days
  - Consider delayed read for late reactors
Patch testing

- Step 7: Determine clinical relevance
  - Consider the Mathias Criteria for Occupational cases
    - Excellent tool for ascertaining occupational causation
  - Keep in mind that irritant CD remains a diagnosis of exclusion, and dermatitis may be both ICD and ACD, multifactorial, etc.

Patch testing

- Step 8: Instruct in avoidance of allergen(s) and cross-reactors
  - If in topical medicaments, cosmetics, etc. it is best to print out the CAMP “safe list”
    - On American Contact Dermatitis Society member webpage
    - Mayo Clinic also has a database
  - Also consider all objects that may contain allergen
  - Information (written) and verbal counseling of patient is KEY
  - May include modified work, increased or alternative PPE, modified environment- both home and work

Mathias Criteria

1. Is the clinical appearance consistent with contact dermatitis?
2. Are there workplace exposures to potential cutaneous irritants or allergens?
3. Is the anatomic distribution of the dermatitis consistent with cutaneous exposure in relation to work tasks?
4. Is there a temporal association between onset of dermatitis and exposure consistent with contact dermatitis?

Mathias Criteria

5. Are non-occupational exposures excluded as probable causes?
6. Does dermatitis improve away from work exposure to the suspected allergen or irritant?
7. Do patch or provocation tests identify a probable causal agent?

Mathias Criteria

• Answer of “yes” to 4 or more of the 7 criteria yields a greater than 50% probability of occupational cause
• Provides a “reasonable degree of medical certainty”

Pearls Regarding Patch Testing

- Do NOT test when dermatitis anywhere is acute or severe
  - Leads to angry back syndrome
  - Worsening of existing dermatitis

http://dermnetnz.org/procedures/patch-tests.html
Pearls Regarding Patch Testing

- Do NOT test when dermatitis is present on the back

Pearls Regarding Patch Testing

- What about medications?
  - Wait at least 1 week after d/c of oral steroids
  - If unable to stop oral steroids, taper to 10mg/day or less, may cause false-negative rxn
  - Do not test within 2 weeks of using topical steroids on back
  - Systemic antihistamines do not interfere with results
Pearls Regarding Patch Testing

- What about sunburn?
  - Do not test back within 1-2 weeks of sunburn (false-negatives are possible)
Pearls Regarding Patch Testing

● What about hairy backs?
  ■ The patient will need to shave 24-48 hours PRIOR to patch application
  ● DO NOT shave in the office prior to placing patches- leads to irritant and false-positives

The patient will need to shave 24-48 hours PRIOR to patch application.

DO NOT shave in the office prior to placing patches- leads to irritant and false-positives.
Pearls Regarding Patch Testing

- What about showering?
  - No showering or wetting the back for the entire testing period, up until the final read (at least 5 days)
  - Modified work note for outside workers or heavy laborers
Pearls Regarding Patch Testing

- Patient comes in convinced that a liquid he works with is the “cause” of his rash
- He wants you to patch test this, what should you do?
Pearls Regarding Patch Testing

- Patient comes in convinced that a liquid he works with is the “cause” of his rash
- He wants you to patch test this, what should you do?
  - DO NOT TEST UNKNOWNS!
  - MSDS
  - DeGroot (4300 chemicals for test concentrations)
Allergens
Top 10 Allergens in North America

- Nickel sulfate
- Balsam of Peru
- Fragrance mix I
- Quaternium-15
- Neomycin
- Bacitracin
- Formaldehyde
- Cobalt chloride
- Methyldibromoglutaronitrile
- p-Phenylenediamine

Top Allergens in the Workplace

- Carba Mix
- Thiuram Mix
- Epoxy Resin
- Formaldehyde
- Nickel

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- Epoxy Resin
- Formaldehyde
- Nickel

Formaldehyde-Releasers

- Carba Mix
- Thiuram Mix
- Epoxy Resin
- Formaldehyde
- Nickel

- Quaternium-15
- Imidazolidinyl urea (Germall 115)
- Diazolidinyl urea (Germall II)
- DMDM hydantoin (Glydant)
- 2-Bromo-2-nitropropane-1,3-diol (Bronopol)
- Sodium hydroxymethyl glycinate
Top Allergens in the Workplace

- Carba Mix
- Thiuram Mix
- Epoxy Resin
- Formaldehyde
- Nickel
The prevalence of ACD to nickel is:

- Greater in women than in men
- Greater in younger than older patients
- Higher than ACD to palladium
- All of the above
- None of the above

Cellphone contact dermatitis with nickel allergy; CMAJ • January 1, 2008; 178 (1)
The prevalence of ACD to nickel is:

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- All of the above
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Cellphone contact dermatitis with nickel allergy; CMAJ • January 1, 2008; 178 (1)
Dealing with Nickel Allergy

- Lobbying Congress to pass nickel standard
- Manufacturers would have to limit content of any item with prolonged skin contact to restrict release of nickel to 0.5 mcg/cm² per week
- Similar 2001 legislation in Europe decreased childhood nickel dermatitis from 19% to 6%
Dealing with Nickel Allergy

- **Dimethylglyoxime spot test**
  - Can purchase at www.delasco.com

- **Barrier coating**
  - Nickel Guard (Athena Allergy) is best
  - Can also use Beauty Secrets Nail Hardener
  - Super glue not so super (within 7 days consumers had rashes)

- **AVOID nickel**
  - Take magnet shopping
    - Does not attract aluminum, does attract nickel
North American Contact Dermatitis Group

- Publish update on “most commons”
- Pool results from major centers
- Review trends (increasing and decreasing reactivity in the population)
- Make changes to recommended trays from this population-based data
Allergen of the Year 2009

- Mixed dialkyl thioureas
- Mixed quaternium bases
- Mixed thiuram alkylates
- Mixed tetra-alkyl thiurams
Allergen of the Year 2009

- Mixed dialkyl thioureas
- Mixed quaternium bases
- Mixed thiuram alkylates
- Mixed tetra-alkyl thiurams
Allergen of the Year 2009

- Mixed dialkyl thioureas (MDTU)
  - Used as an accelerant in rubber and antioxidant in neoprene production
  - Combination of diethylthiourea and dibutylthiourea (most prevalent in mix)
  - NOT in TRUE test, but present in standard rubber series
Allergen of the Year 2009

- Mixed dialkyl thioureas
  - Occupational: most commonly on hands
    - Gloves leaching MDTU
  - Non-occupational: most commonly on the feet
    - Foot supports, athletic shoes leaching MDTU
  - Sleep apnea masks, wetsuits, neoprene braces, goggles
Allergen of the Year 2010

- Bacitracin
- Nickel sulfate
- Neomycin
- Polymyxin B sulfate
Allergen of the Year 2010

- Bacitracin
- Nickel sulfate
- Neomycin
- Polymyxin B sulfate
Allergen of the Year 2010

- **Neomycin**
  - In medicaments
  - ACD in healthcare workers, veterinarians
  - Cross-reacts:
    - Paromycin, butirosin
    - Framycetin
    - Tobramycin, kanamycin
    - Gentamycin
    - Streptomycin
Allergen of the Year 2011

- Dimethyl Fumarate
- No occupational relevance at this time
Allergen of the Year 2012

- Gold
- Propolis
- Quaternium-15
- Acrylates
Allergen of the Year 2012

- Gold
- Propolis
- Quaternium-15
- Acrylates
Occupations at High-Risk for Hand Dermatitis

- Hairdressers
- Musicians
- Food Industry workers
- Agricultural workers
- Factory workers
- Electronics workers
- Cleaners/Washers
- Housekeepers
- Printers
- Builders
- Medical and Dental workers
Treating Hand Dermatitis - Step 1

- Recommended short-term high-potency topical steroids for hands:
  - Clobetasol propionate
    - Ointment
  - Halcinonide ointment
    - No propylene glycol, no sensitizers
    - “Halog”

- For body:
  - Short-term hydrocortisone 2.5% bid for face, neck, axillae, groin, intertriginous areas
  - Short-term triamcinolone 0.1% bid for body
Treating Hand Dermatitis - Step 1

- Avoid more than a few weeks of potent steroid use topically
- Can thin the skin making hands more susceptible to allergen/irritant!
- Consider IM steroids x 1
- Doxycycline for anti-inflammatory effects
Treating Hand Dermatitis—Step 1

- Barrier creams
  - Tetrix creams
  - Creams with ceramide, urea and dimethicone
  - Studies are variable in demonstrating any benefit from barrier creams when compared to regular emollients
Treating Hand Dermatitis - Step 1

- Appropriate gloves
  - Match task with glove
  - “Quick Selection Guide to Chemical Protective Clothing” by Forsberg and Mansdorf
  - ACDS website lists glove manufacturers
Treating Hand Dermatitis - Step 2 (Maintenance)

- Calcineurin inhibitors
  - Tacrolimus 0.1%
  - Pimecrolimus 0.1%
- Therapeutic moisturizers
  - MimyX
    - Palmitate monoethanolamine
  - Shea butter
  - Aquaphor
  - Petrolatum
- Lower potency steroids for hands:
  - Triamcinolone 0.1%
  - Fluticasone cream or lotion (great for atopics)
  - Hydrocortisone butyrate lipid cream
    - (Locoid lipocream)
  - Clocortolone cream
    - (Cloderm)
Treating Hand Dermatitis - Step 3 (Recalcitrant)

- Hand psoralen- ultraviolet A therapy (PUVA)
- Narrow-band UV B therapy (NBUVB)
  - Often used for recalcitrant body dermatitis
- Excimer laser
  - 308 nm
Treating Hand Dermatitis - Step 3 (Recalcitrant)

- Methotrexate
- Mycophenolate mofetil
  - 2-3g/day recommended for control
- Acitretin
  - Best for psoriasiform hand dermatitis
  - 2-4 month course

- Cyclosporine
  - 2.5-5 mg/kg daily
- Azathioprine
  - 1-3 mg/kg daily
- Biologics are not helpful overall
Summary

- Allergic and irritant contact dermatitis can be difficult to distinguish
- We are constantly being exposed to new allergens, often earlier in life
- Occupational contact dermatitis is underreported

- Patch testing for ACD is the gold standard
- Can try TRUE test, consider referral for comprehensive panels
- History, history, history
Summary

- Think outside the box
- Try a stepwise approach
  - Elimination
  - Treatment
  - Escalate treatment
- Will be chronic if exposure continues
- You can make a huge difference in patient’s quality of life
References

References

Thank you for participating in today’s webinar. At the conclusion of this call you will receive an email with a link to a post-webinar questionnaire.

You will need to complete this questionnaire in order to receive CME for this webinar.

This webinar presentation can be downloaded at www.woema.org