Western Occupational and Environmental Medical Association
Webinar – October 21, 2010

Occupational Contact Dermatitis

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OCCUPATIONAL CONTACT DERMATITIS AND THE PATCH TEST

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Conflicts of Interest

- Schering Plough
- Neutrogena
- Pfizer
- LaRoche Posay
- Estee Lauder
- Mary Kay
ECZEMA OR DERMATITIS

- Inflammation of the skin which leads to spongiosis histologically
  - Fluid between keratinocytes – “epidermatitis”
  - Dilated blood vessels in the superficial dermis
  - Inflammatory infiltrate – neutrophils, lymphocytes and maybe eosinophils
  - TH1 response
- Morphology varies:
  - Acute
  - Subacute
  - Chronic

ACUTE DERMATITIS

SUB-ACUTE DERMATITIS
CHRONIC DERMATITIS

DIFFERENTIAL DIAGNOSIS of
DERMATITIS - LOCATION

• CONTACT DERMATITIS – hands, face, localized or generalized
• ATOPIC ECZEMA – flexural – family history
• SEBORHEIC DERMATITIS/ROSacea – face
• NUMMULAR AND XEROTIC DERMATITIS –
  – generalized
• STASIS DERMATITIS – lower legs
• PSoriasis – extensor surfaces, scalp
• Tinea – hands, feet, localized

DIAGNOSTIC WORKUP

• HISTORY
  – Family
  – Occupational
  – Exposure
• SKIN BIOPSY
• KOH AND CULTURE
• PATCH TESTING
  – To distinguish irritant and allergic contact dermatitis
PATCH TESTING - WHICH PATIENTS WITH DERMATITIS?

- DEFINITE ANTIGEN SUSPECTED
- SUGGESTIVE HISTORY OR DISTRIBUTION
- OTHER DERMATITIS
- OCCUPATIONAL SKIN DISEASE

OCCUPATIONAL SKIN DISEASE

- A SIGNIFICANT PERCENTAGE OF OCCUPATIONAL DISEASE IS SKIN DISEASE
- PATCH TESTING NECESSARY FOR CONTROL OF DISEASE TO AVOID CHRONICITY
- PATCH TESTING NECESSARY FOR MEDICO-LEGAL AND DISABILITY DECISIONS

OCCUPATIONAL CONTACT DERMATITIS INCIDENCE

- DIFFER GREATLY DEPENDING ON POPULATION AND OCCUPATIONS INVOLVED
  - KANSAS '94-99 [JAAD v46] derm referrals
    - 25% of patients referred
    - Health care, machinists, construction
  - OREGON '90-97 [ARCH DERM v41] workers comp claims
    - 5.73 per 100,000
    - Farming, forestry, fishing
  WET WORK
OCCUPATIONAL DERMATITIS BODY SITE

- NACDG data - numerous studies ‘90’s
  - Occupational dermatitis
    - HAND 60 – 70%
  - Non-occupational dermatitis
    - HAND 30 – 35%

Occupational Dermatitis
Irritant > Allergic?

- NACDG
  - NON-OCCUPATIONAL DISEASE
    - ALLERGIC 50-60%
    - IRRITANT 20%
  - OCCUPATIONAL
    - ALLERGIC 54-60%
    - IRRITANT 32%
- KANSAS
  - OCCUPATIONAL
    - ALLERGIC 60%
    - IRRITANT 34%

When hands are involved greater percentages of irritant are reported

THE PATCH TEST – WHAT?

- STANDARD SERIES – ALWAYS
  - SYRINGE BASED AMERICAN SERIES (20)
  - T.R.U.E. TEST (23)
- YOUR OWN SUPPLEMENTAL SERIES
  - NORTH AMERICAN CONTACT DERMATITIS GROUP
    - SERIES (65)
- PATIENT’S OWN PRODUCTS
- OTHER DIRECTED SERIES - LOCATION AND HISTORY DEPENDENT
  - SHOE AND RUBBER
  - COSMETIC
  - DENTAL
  - MEDICAMENT
  - WORKPLACE ALLERGENS
TESTING TO NON-STANDARD ANTIGENS

- PERSONAL CARE PRODUCTS
  - LEAVE ON PRODUCTS - AS IS
  - EXCEPTIONS, RETINOID, WARTS TREATMENT, ETC
  - WASH OFF PRODUCTS - DILUTE 1:10 OR HIGHER
- HARD SURFACE CLEANERS
  - DILUTE 1:100 – 1:1000
  - CLOTHING
    - LEAVE ON LONGER THAN 48 HOURS
- PLANTS
  - STEM, FLOWER, LEAF
  - OCCUPATIONAL PRODUCTS
  - ALWAYS WITH LABELS AND MSDS SHEETS

THE PATCH TEST - HOW?

- APPLICATION
- READING
  - TWO MORPHOLOGIC READINGS
  - INTERPRETATION
  - CLINICAL RELEVANCE
  - INSTRUCTION OF PATIENT

APPLICATION

- UPPER BACK
- 48 HOURS
- REMOVE IN YOUR OFFICE
- MARK WELL
- TWO READINGS
PATCHES APPLIED

PATCHES REMOVED AND MARKED – 48 HOURS

PATCH READING

POSITIVE ++
MORPHOLOGIC READINGS

• +/- ERYTHEMA
• + EDEMA OR PAPULES
• ++ VESICLES
• +++ BULLOUS OR SPREADING
• IRRITANT
• NEGATIVE

INTERPRETATION

• IS IT IRRITANT OR ALLERGY?
  – +/- USUALLY IRRITANT
  – IRRITANT MORPHOLOGY
    • GLAZED
    • COLOR
    • PUSTULES
  – CRESCE(ND)(all) VS DECRESCE(ND)(irr)
  – EXCITED SKIN
  – EDGE EFFECT

CLINICAL RELEVANCE

• CONFIRM EXPOSURE TO THE
  ALLERGENS WHICH TESTED
  POSITIVE – EXPOSURE LISTS AND
  REFERENCE WORKS
  – PRESENT
  – PAST
PATIENT INSTRUCTION

• EXPOSURE LISTS
  – NAME AND SYNONYMS
  – USES
  – ALTERNATIVES
• RETAKE HISTORY
• INSTRUCT PATIENT IN AVOIDANCE AND SUBSTITUTIONS

MOST COMMON ALLERGENS

• NON-OCCUPATIONAL
  – NICKEL (COBALT)
  – FRAGRANCE
  – NEOMYCIN (BACITRACIN)
  – CARBA AND THIURAM MIXES
  – FORMALDEHYDE AND QUATERNIUM 15
  – P-PHENYLENEDIAMINE
• OCCUPATIONAL
  – CARBA AND THIURAM MIXES
  – EPOXY RESIN
  – FORMALDEHYDE AND GLUTARALDEHYDE
  – NICKEL

ALLERGENS

• IMPORTANT TO REMEMBER THAT OCCUPATIONAL ALLERGENS CAN OCCUR IN THE HOME OR RECREATIONAL ENVIRONMENT
ALLERGENS

• MEDICAMENTS
  – NEOMYCIN SULFATE
  – CAINE MIX [BENZOCAINE]

  – CROSS REACTS WITH GENTAMYCIN AND TOBRAMYCIN
  – EYE DOCS LOVE TOBRADEX
  – CO-REACTS WITH BACTRAZIN
  – INCREASING RATE OF POSITIVES

• CAINE MIX [BENZOCAINE]
  – CAINE MIX CONTAINS BENZOIC ACID (BENZOCAINE, TETRACAINE) AND ANILIDE AMIDE DERIVATIVES (DIBUCAINE)
  – LIDOCAINE ALLERGY DOES OCCUR

HEALTH CARE WORKERS – CHILD CARE WORKERS
BENZOCAINE CROSS REACTORS

- P-phenylenediamine
- paba
- pas
- sulfurylureas
- sulfonamides
- thiazide
- azo & aniline dyes
- resorcinol
- caines - procainamide
- hydroquinone

ALLERGENS - RUBBER ACCELERATORS

- THIURAM MIX
  - GLOVES
- MERCAPTOBENZOTHIAZOLE
- MERCAPTO MIX
  - SHOES
- CARBA MIX
  - BLEACHED RUBBER
- BLACK RUBBER MIX -- ISOPROPYL-PHENYL-P-PHENYLENEDIAMINE
  - INDUSTRIAL

RUBBER

- Graphics of gloves and shoes
RUBBER ACCELERATOR ALLERGY

IRRITANT – MORE COMMON IN ATOPICS
- POWDER
- HAND WASHING

ALLERGIC
- T-CELL MEDIATED
  - ACCELERATORS – THIURAM
  - PATCH TEST
- IgE MEDIATED – MORE COMMON IN ATOPICS
  - SYSTEMIC SYMPTOMS CAN OCCUR
  - HEVEA BRAZILIENSIS PROTIENS
    - RAST
    - USAGE TESTING
    - PRICK TEST

GLOVE ALLERGY

IRRITANT, IgE AND T-CELL MEDIATED CAN OCCUR IN ANY COMBINATION

ECZEMATOUS MORPHOLOGY CAN OCCUR WITH IgE MEDIATED ETIOLOGY

HAND AND FOOT DISEASE CAN OCCUR AS WELL AS WAISTBAND INVOLVEMENT

IgE DISEASE CAN BE LIFE THREATENING
- CROSS REACTIVITY WITH FOODS
RUBBER ALLERGENS

- Also used in
  - Ranching and farming as fungicides and insecticides
  - Cutting oils
  - Veterinary medicine
- Antabuse – Disulfiram is a thioram
  - Golfers’ itch

COSMETICS AND PERSONAL CARE PRODUCTS

- Balsam of Peru [fragrance mix]
  - Most common
- Preservatives

FRAGRANCE AND PRESERVATIVES
FRAGRANCE EXPOSURE

• FRAGRANCES ARE FLAVORINGS
  – FOOD HANDLERS
  – SYSTEMIC CONTACT DERMATITIS
• UNSCENTED IS NOT FRAGRANCE FREE
• FRAGRANCES FREE IS NOT ALWAYS FAGRANCE FREE

FRAGRANCE FREE

COVERT FRAGRANCE INGREDIENTS
  – BENZYL ALCOHOL
  – BENZALDEHYDE
  – BISABOLOL (CHAMOMILE OIL)
  – CITRUS OILS
  – CYCLOPENTADECANOLIDE
  – ESSENTIAL OILS AND FLOWER AND PLANT EXTRACTS
  – ETHYLENE BRASSYLATE
  – FARNESEOL
  – LONICEROL
  – MENTHOL
  – PERUVIAN BALSAM
  – PHENYL ETHYL ALCOHOL
  – VANILLA, ALMOND OIL AND OTHER FLAVORINGS

TRUE FRAGRANCE FREE

• SOAPS
  – KISS MY FACE PURE OLIVE OIL SOAP
  – CETAPHIL GENTLE SKIN CLEANSER LIQUID
  – CVS TRANSPARENT FACIAL BAR SOAP-UNSCENTED
  – NEUTROGENA THERAPEUTIC FACIAL BAR-FRAGRANCE FREE

• MOISTURIZERS
  – CVS UNSCENTED DRY SKIN CARE LOTION
  – EUCERIN ORIGINAL MOISTURIZING CREAM
  – VANICREAM CREAM AND LOTION
  – CURELL LOTION FRAGRANCE FREE
  – VASELINE

TRUE FRAGRANCE FREE

• SHAMPOOS
  – FREE AND CLEAR SHAMPOO AND CONDITIONER
  – T-SAL SHAMPOO
• DEODORANTS
  – ALMAY CLEAR GEL FRAGRANCE FREE DEODORANT
  – BAN UNSCENTED ROLL-ON
• SUNSCREENS
  – NEUTROGENA SENSITIVE SKIN SUNBLOCK SPF 17
  – VANICREAM SUNSCREEN SPF 15


FRAGRANCES

• SALAM and FOWLER - JAAD, '01
• PTS WITH BALSAM OF PERU OR FRAGRANCE MIX + 45PTS
• BALSAM FREE DIET WITH CHALLENGE - 47% CLEAR OR IMPROVED

BALSAM FREE DIET

• CITRUS FRUIT AND ANYTHING CONTAINING SUCH FRUIT COMPONENTS
• FLAVORING AGENTS - AS IN PASTRY, CANDY CHEWING GUM
• SPICES - CINNAMON, CLOVES, VANILLA, SUGAR, ALLSPICE, ANISE, GINGER
• PICKLES AND PICKLED VEGETABLES
• WINE, BEER, GIN AND VERMOUTH
• PERFUMED OR FLAVORED TEAS AND TOBACCO
• CHOCOLATE
• COUGH MEDICINES AND LOZENGES
• ICE CREAM
• COLA AND OTHER SPICED DRINKS LIKE Dr pepper
• STELLI PIZZA, ITALIAN AND MEXICAN FOOD AND RED SAUCES
• TOMATOES AND TOMATO-CONTAINING PRODUCTS
BALSAM FREE DIET

• ADD BACK ONE AT A TIME AND CONTINUE TO AVOID THE THINGS WHICH CAUSE FLARE

COSMETICS AND PERSONAL CARE PRODUCTS 2

• PRESERVATIVES
  – FORMALDEHYDE RELEASES
    • Imidazolidinyl urea, diazolidinyl urea, DMDM hydantoin, 2-bromo-2-nitropropane diol QUATERNIUM-15
  – PARABEN MIX
  – METHYLCHLOROISOTHIAZOLINONE/
    METHYLISOTHIAZOLINONE – KATHON CG
  – THIMEROSAL
  – METHYLDIBROMO GLUTAROMITRILE
  – IODOPROPYL BUTYLCARBAMATE

COSMETIC PRESERVATIVES ARE ALSO BIOCIDES

• MACHINISTS
• MECHANICS
• HOUSEKEEPERS
COSMETICS AND PERSONAL CARE PRODUCTS 3

• VEHICLES
  – LANOLIN [WOOL ALCOHOL]
  – PROPYLENE GLYCOL

LANOLIN & PROPYLENE GLYCOL

WHEN TREATMENTS DON’T WORK THINK

• PRESERVATIVE ALLERGY
• BASE ALLERGY
• CORTICOSTEROID ALLERGY
PCMX ALLERGY

PATIENT REACTED TO EKG PASTE WAS TREATED WITH VALISONE CREAM AND THEN ULTRAVATE OINTMENT

CORTICOSTEROIDS

• RECOGNIZED IN 1959
• 0.2 - 10.7% OF PTS IN PATCH TEST SERIES
• DIFFICULT TO DIAGNOSE
  – DERMATITIS WHICH FLARES OR WORSENS

CORTICOSTEROIDS - 2

• PATCH TESTING
  – REACTIONS MAY BE DELAYED
  – REACTIONS MAY EXHIBIT A “REVERSE EDGE EFFECT”
  – FALSE NEGATIVES MAY OCCUR
  – MORE LIKELY WITH HIGHER CONCENTRATIONS
  – STANDARD SCREENING AGENTS NOT WELL DEFINED
    • TEST TO AGENTS USED BUT IN A CREAM BASE
      • TIXOCORTAL PIVILATE
      • BUDENONIDE
      • HYDROCORTISONE BUTYRATE
CORTICOSTEROID ALLERGY

SCREEN FOR CLASS A STEROIDS

CORTICOSTEROIDS - 3

• CLASS A - HYDROCORTISONE AND TIXOCORTAL TYPES
  – CORTISONE
  – HYDROCORTISONE
  – TIXOCORTAL
  – Methylprednisolone
  – Methylprednisone

• CLASS B - “IDES” TRIAMCINOLONE ACETONIDE TYPE
  – Triamcinolone Acetonide
  – Halcinonide
  – Fluocinonide
  – Fluocinolone Acetonide
  – Desonide
  – Budesonide

CORTICOSTEROIDS - 4

• CLASS C - Betamethasone Type
  – Betamethasone
  – Dexamethasone
  – Fluocortolone

• CLASS D – “ATES” - HYDROCORTISONE BUTYRATE TYPE
  – Hydrocortisone Butyrate and Valerate
  – Clobetasone Butyrate
  – Clobetasol Propionate
  – Betamethasone Valerate and Dipropionate
  – Fluocortolone Hexonate and Pivalate
  – Alclometasone Dipropionate
COSMETICS AND PERSONAL CARE PRODUCTS 4

- MISCELLANEOUS
  - P-PHENYLENEDIAMINE
    - HAIR COLOR
    - TEXTILE DYES

- P-PHENYLENEDIAMINE
  - HAIR DRESSERS
  - FURRIERS
  - TEXTILE WORKERS

- COLOPHONY - rosin
  - ADHESIVES, VARNISHES
  - WOOD WORKERS
  - Musicians

- ETHYLENEDIAMINE DIHYDROCHLORIDE
  - NYSTATIN CREAM
METALS

• NICKEL SULFATE
  – JEWELRY
  – MONEY - CASHIERS
• POSTASSIUM DICHROMATE
  – Leather
  – Cement and building materials
• CONSTRUCTION WORKERS
• COBALT CHLORIDE
  – Co-reacts with nickel
  – Colored cosmetics

Metal Allergy

RESINS

• P-TERT-BUTYLPHENOL
  FORMALDEHYDE
  – GLUE FOR SMALL LEATHER GOODS
  AND SHOE UPPERS
• EPOXY
  – TWO COMPONENT GLUES
  – OTHER INDUSTRIAL USES
Resin allergy

- P-tertyl phenol formaldehyde resin
- Glue for small leather objects
- Vamps of shoes

EPOXY RESINS

- DIGLYCIDYL ETHER MONOMERS
  - BISPHENOL A
  - EPICHLOROHYDRIN
- HARDENERS
- ALLERGY
  - MONOMER 90%
  - LOW MOLECULAR WEIGHT < 624
  - PLASTICS, ADHESIVES, PVC, COATINGS, LAMINATES, PAINTS, INKS

OTHER COSMETICS ALLERGENS

- TOSYLAMIDE/FORMALDEHYDE RESIN
  - NAIL POLISH
- ETHYL ACRYLATE & METHYL METHACRYLATE
  - FAKE NAILS, WRAPS
  - BONE AND DENTAL CEMENTS
- GLYCERYL THIOGLYCOLATE
  - ACID PERMS
NAIL COSMETIC ALLERGY

- ETHYL ACRYLATE
- BONE AND DENTAL CEMENT

COCAMIDOPROPYL BETAINE

- AN AMPHOTERIC SURFACANT
  - FOAMING, NON-IRRITATING
- SHAMPOOS, SHOWER GELS, LIQUID SOAPS, CONTACT LENS SOLUTION, GYNECOLOGIC AND ANAL HYGIENE PRODUCTS
- "WASH-OFF" VS "LEAVE-ON"
- LIQUID HAND WASHES IN THE WORKPLACE

TEXTILES

- ETHYLENEUREA/MELAMINE FORMALDEHYDE RESIN
- DISPERSE BLUE DYES 106 AND 124
TEXTILE DERMATITIS

- Usually clothing or bed linens
- Either resin or dye allergy
  - Resins are formaldehyde based
    - Ethylene urea melamine formaldehyde
    - Formaldehyde - screen
  - Dyes are of the disperse type
    - Disperse blue 106 and 124
    - P-phenylenediamine - screen
    - Specific dyes

RESIN ALLERGY

- Generalized dermatitis
- Smoldering, sub-acute or chronic eczematous reaction
- Numular-like

DYE ALLERGY

- More acute and recurrent rather than chronic
- In areas of close contact
- Younger population
SUNSCREENS - OXYBENZONE

- BENZOPHENONE 3
- MOST COMMON CAUSE OF PHOTOALLERGIC CONTACT DERMATITIS
- PRESENT IN MANY NON-SUNSCREEN COSMETICS
- CROSSREACTS WITH OTHER BENZOPHENONES

SYSTEMIC AND TOPICAL MEDICAMENTS WITH BZP MOIETY

- NSAID'S
  - KETOPROFEN
  - TIAPROFENIC ACID
- CHOLESTEROL LOWERING AGENTS
  - FENOFIBRATE
- LE COZ, 1998 - 12 PATIENTS WITH ALLERGY TO TOPICAL KETOPROFEN OR ORAL TIAPROFENIC ACID CROSS REACTED - CONTACT AND/OR PHOTO

SUMMARY

- ALLERGIC CONTACT DERMATITIS OCCURS FREQUENTLY IN THE WORKPLACE
- PATCH TESTING IS NECESSARY TO CONFIRM THE DIAGNOSIS OF ACD AND TO RULE IN ICD
- EARLY DIAGNOSIS OF ACD IS CRUCIAL IN THE WORKPLACE
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