

# Employment characteristics of patients with occupationally related positive patch test results: An analysis using data from the Canadian sites of the North American Contact Dermatitis Group (NACDG)

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- *Slides have been updated!*

# Road Map

- Study Objectives
- NACDG Occupational Data
- Study Population
- Employment Characteristics
- Conclusions

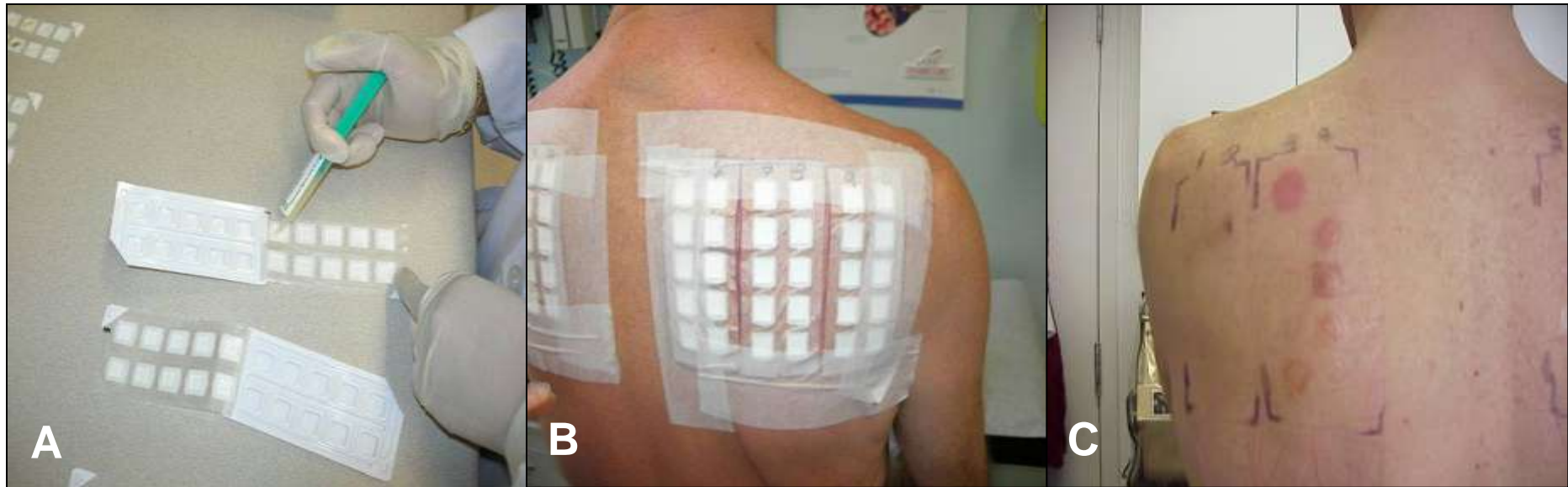
# Study Objectives

1. Explore the utility of the Canadian NACDG data source for future use
2. Describe the occupationally related positive patch test (PPT) results with respect to diagnosis, employment characteristics
3. Identify the most common occupational contact allergens (OCAs) and determine which have also been linked with occupational asthma

# Methods - Data Source

- 2001-06 data from 2 Canadian NACDG patch test clinics (12 in total)
- Standardized patch test method
  - 65 standard tray allergens
- Relevant variables:
  - Overall for each subject:
    - ▶ Diagnosis, up to 3 codes (allergic/irritant/etc.)
    - ▶ Work-related?
    - ▶ Industry of employment and occupation
  - For each of 65 allergens (within each subject):
    - ▶ Response type (allergic/irritant)
    - ▶ Work-related?

# Patch Testing



**Figure 1.** Pictures of patch testing procedure. (A) Allergens being applied to chambers. (B) Chambers applied to the back for 48 hrs. (C) After removal, responses to allergens are visible.

# Definitions

- Allergic Contact Dermatitis (ACD)
  - any diagnosis code = 'allergic'
- Irritant Contact Dermatitis (ICD)
  - any diagnosis code = 'irritant'

# Study Population

		All Subjects
Overall (n, %)		3676 (100)
Sex (n, %)	Male	1155 (31)
	Female	2521 (69)
Race (n, %)	White	3265 (89)
	Black	88 (2)
	Asiatic	205 (6)
	Hispanic	35 (1)
	Other	83 (2)
Age (mean, sd)		45.5 (15.9)
Patients per year (n, range)		613 (489-753)

# Diagnoses

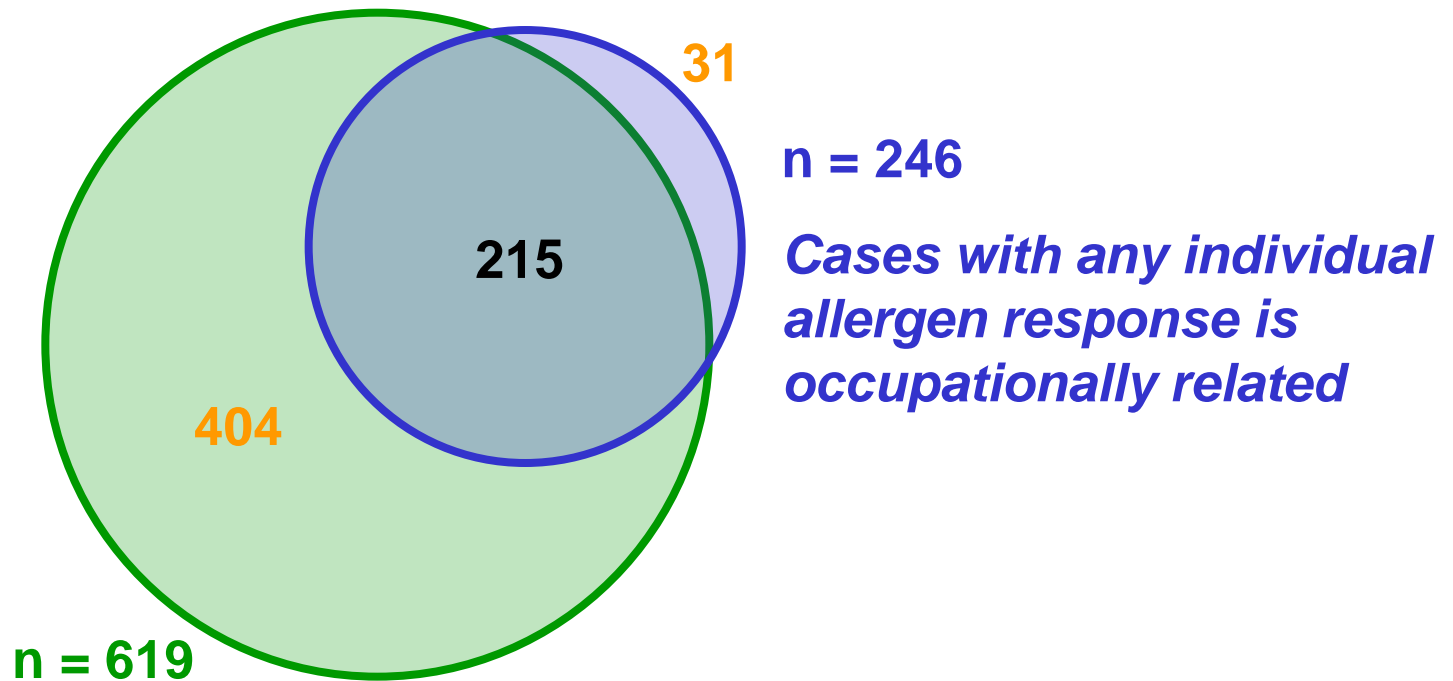
		ICD	
		No	Yes
ACD	No	1237 (34)	631 (17)
	Yes	1454 (39)	354 (10)

# Diagnoses

		All Subjects	ACD	ICD
Overall (n, %)		3676 (100)	1808 (49)	985 (28)
Work-related (n, %)	Yes	<b>619 (17)</b>	397 (22)	333 (34)
	No	2854 (78)	1321 (73)	503 (51)
	Unsure	203 (5)	90 (5)	149 (15)

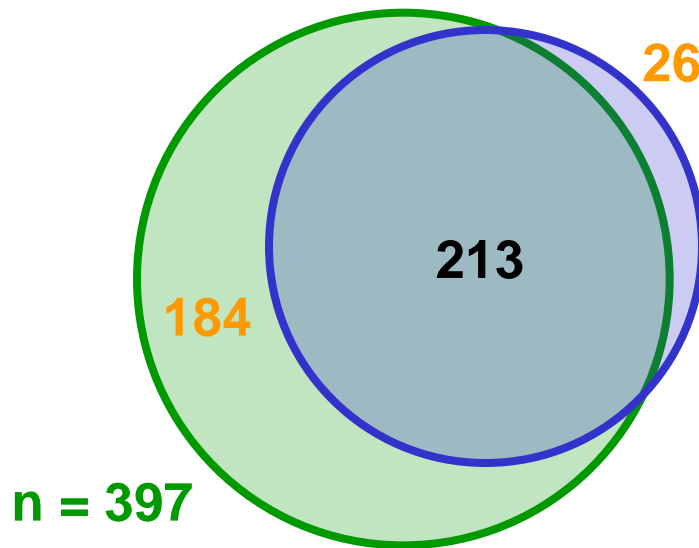
**Of the 619, 404 (65%) did not have a work-related response to any of the standard tray allergens**

# Standard Tray - All Patients (n=3676)



***Cases where overall diagnoses is occupationally related***

# Standard Tray - ACD Only (n=1808)



n = 239

*Cases with any individual allergen response is occupationally related*

*Cases where overall diagnoses is occupationally related*

# ACD - Work Relatedness

		ACD	WR ACD	nonWR ACD	WR v. nonWR p-value
Overall (n, %)		1808 (100)	397 (22)	1411 (78)	
Sex	Male	554 (31)	200 (50)	354 (25)	<0.0001
	Female	1254 (69)	<b>197 (50)</b>	<b>1057 (75)</b>	
Race	White	1601 (89)	339 (85)	1262 (89)	N.S.
	Black	45 (2)	15 (4)	30 (2)	
	Asiatic	105 (6)	27 (7)	78 (6)	
	Hispanic	11 (1)	4 (1)	7 (1)	
	Other	46 (2)	12 (3)	34 (2)	
Age (mean, sd)		45.5 (15.9)	<b>39.3 (11.2)</b>	<b>47.1 (16.6)</b>	<0.0001

# ICD - Work Relatedness

		ICD	WR ICD	nonWR ICD	WR v. nonWR p-value
Overall (n, %)		985 (100)	333 (34)	652 (66)	
Sex	Male	339 (34)	179 (54)	160 (25)	<0.0001
	Female	646 (66)	<b>154 (46)</b>	<b>492 (75)</b>	
Race	White	883 (90)	303 (91)	580 (89)	0.0481
	Black	28 (3)	5 (2)	23 (4)	
	Asiatic	50 (5)	18 (5)	32 (5)	
	Hispanic	8 (1)	5 (2)	3 (<1)	
	Other	16 (2)	2 (1)	14 (2)	
Age (mean, sd)		42.2 (14.3)	<b>39.2 (15.4)</b>	<b>43.8 (15.4)</b>	<0.0001

# WR ACD - Industry of Employment (n=397)

INDUSTRY	n (%)
*Aircraft and Parts	59 (15)
Beauty Shops	33 (8)
Hospitals	28 (7)
Electrical machinery, equipment and supplies	22 (6)
Dentists offices	19 (5)
Radio, TV and communication equipment	18 (5)
*Construction	16 (4)
Automotive repair and related services	15 (4)
Eating and drinking places	7 (2)
Nursing and personal care facilities	7 (2)

*89 separate industries reported*

# WR ICD - Industry of Employment (n=333)

INDUSTRY	n (%)
*Aircraft and Parts	35 (10)
Hospitals	31 (9)
Beauty Shops	28 (8)
Automotive repair and related services	15 (4)
Construction	15 (4)
Eating and drinking places	13 (4)
Dentists offices	13 (4)
Hotels and motels	8 (2)
Motor vehicle dealers	7 (2)
Health services	7 (2)

*93 separate industries reported*

# Comparisons - ICD & ACD Combined

Author	Rietschel et al (2002)	McDonald et al (2006)	McDonald et al (2006)
Data	NACDG 1998-2000 (Derm)	OPRA 1996-2001 (Occ MD)	EPIDERM 1996-2001 (Derm)
Top 5 Industries	Hospitals	Metal & auto manuf.	Others
	Motor vehicles	Health & social services	Metal & auto manuf.
	Construction	Petrochemical, rubber, plastic manuf.	Health & social services
	Beauty shops	Others	Food and organic material manuf.
	Dental offices	Food and organic material manuf.	Utilities & construction

# Main Findings

- 17% of all cases were work-related
  - 65% of work-related cases seemed to have non-standard tray responses
  - This data may not be capturing important OCAs
- 22% of ACD cases were work-related
- 34% of ICD cases were work-related

# Main Findings (2)

- Common ICD and ACD industries are recognized as high risk for WR CD
  - similar to other published studies
  - exception aerospace (local industry) and communication workers (?)
  - implication for generalizability and prioritization

# Limitations

- Data does not seem to be capturing all relevant WR allergens
  - Many appear to be on additional trays, or custom allergens
- Data is sensitive to local industry and to case clusters
  - May be resolved with longer period of data collection

# Conclusions, Next Steps

- With some caveats, patch test data is a valuable tool for identifying emerging occupational contact allergens (OCAs) as well as local clusters of WR-CD
- Continue to monitor the NACDG as a source of information on emerging occupational contact allergens and industries at risk
- Efforts to set up an electronic database of patch test data at our own centre, possibly including other Canadian centres



***Thank you!***

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Centre for Research Expertise in Occupational Disease

# WR ACD - Occupation (n=397)

INDUSTRY	n (%)
Electrical equipment assemblers	44 (11)
Precision assemblers	35 (9)
Hairdressers and cosmetologists	31 (8)
Molding and casting machine operators	22 (6)
Auto mechanics	17 (4)
Registered nurses	16 (4)
Dental assistants	13 (3)
Assemblers	12 (3)
Nursing aides and orderlies	9 (2)
Labourers	9 (2)

*115 separate occupations reported*

# WR ICD - Occupation (n=333)

INDUSTRY	n (%)
Hairdressers and cosmetologists	29 (9)
Precision assemblers	23 (7)
Auto mechanics	19 (6)
Registered Nurses	17 (5)
Cooks	14 (4)
Machinists	11 (3)
Nursing aides, orderlies	10 (3)
Electrical equipment assemblers	8 (2)
Dental assistants	7 (2)
Bus and truck mechanics	7 (2)
Construction trades	7 (2)
Miscellaneous machine operators	7 (2)

*107 separate occupations reported*

# Common OCAs

	<b>Standard Tray Allergen</b>	<b>Frequency</b>	<b>OA link?</b>
1	Epoxy Resin	49	Established #
2	Thiuram	39	<i>No Evidence</i>
3	Carba Mix	36	<i>No Evidence</i>
4	Nickel Sulfate	22	Established
5	Cobalt Chloride	21	Established
6	Potassium Dichromate	20	Established
6	Glyceryl Thioglycolate	20	<i>No Evidence</i>
8	P-phenylenediamine (PPD)	19	Possible
8	Formaldehyde	19	Possible
10	Gluteraldehyde	16	Established

# Why asthma and contact dermatitis?

- Animal evidence suggests sensitization through the skin can result in asthma like response after first inhalation challenge

*(Zhang, J All Clin Imm, Feb'04; Howell, Int Arch All Imm, July'02)*

- Limited evidence of reverse sensitization - challenge process

*(Ebino, Tox Letters, April'01)*

- Case reports of workers with co-existing ACD and OA

*(refs)*

# Why asthma and contact dermatitis?

- Implications for occupational environment
  - possible role for dermal exposure in sensitization phase of OA
  - possible under recognition of dermal exposure in the workplace