

Online Supplement "Results", Table E overview on publications and SIGN grading of reporting OA or occupational COPD due to irritants. X. Baur, P. Bakehe, H. Vellguth www.eomsociety.org => Knowledge Center

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
Acids																						
" , not specified	Kipen, Blume et al. 1994	(*)	3; Case reports	4	5	4	4/4			nd		4/4		nd								
" , "	Brooks, Weiss et al. 1985		3; Case report	1		1	1/1		+	1/1		1/1		nd								
" , various	Tarlo and Broder, 1989	-	3; Case report	1	1	1	1/1		+	x*		1/1		x*								
" , " (hydrochloric, hydrofluoric, nitric, perchloric, sulfuric)	Musk, Peach et al. 1988	*	3; Survey	20	4	4 (20.0)	9/20			2/ 20		5/20		1/4								
" , glacial acetic 64-19-7	Kern 1991	*	2-; Cross-sectional	51	6	4(7.8)*	15/ 51	29.4	+	4/ 51	7.8	9/24	37.5	nd								
" , "	Rajan and Davies 1989		3; Case report	1		1*	1/1			x**		nd		nd								
" , "	Kivity, Fireman et al. 1994		3; Case report	1		1	1/1			1/1		1/1		nd		1						
" , hydrochloric 7647-01-0	Deschamps. Soler et al. 1994	-	3; Case report	1	3	1	1/1		+	1/1		1/1		nd								
" , "	Boulet 1988		3; Case report	1		1*	1/1		+	1/1		nd		nd								
" , "	Boulet 1988		3; Case report	1		1	1/1		+	0/1*		1/1		nd		0/1*						
" , sulfuric 7664-93-9	Gamble, Jones et al. 1984	*	2-; Cross-sectional	248	25	13	13/248*	5.2		x**		nd		nd								
"	El-Sadik, Osman et al. 1972		3+; Survey	33		11	11/33*	33.3		x**		nd		nd								
	Boulet 1988		3; Case report	1		1	1/1			0/1*		1/1		nd		0/1*						
" , dodecanedioic 693-23-2.1	Moore, Manney et al., 2009	-	3; Case report	1	1	1	1/1			nd		0/1		1/1		1						
Acid fluxes	Gannon and Burge 1993	-	3; Occupational diseases statistics (SHIELD)	4	4	4	4/4			nd		nd		x		x						
Acrylates																						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
" , not specified	Chatkin, Tarlo et al. 1999	-	3; Occupational diseases statistics (WCB), survey	2	2	2	2/2		+	nd		x*		nd		nd						
" , alkyl cyanoacrylates	Savonius, Keskinen et al. 1993	(*)	3+; Case reports	11	13	10	10/ 11			nd		x*		nd		10/11		1	6	3		
" , "	Yacoub, Lemière et al. 2005		3; Case report	1		1	1/1			0/1		nd		nd		1/1			1			
" , "	Nakazawa 1990		3; Case report	1		1	1/1			0/1		1/1		nd		1/1*		1	1			
" , "	Lozewicz, Davison et al. 1985		3; Case report	1		1	1/1			nd		0/1		1/1		1/1			1			
" , cyanoacrylate glue	Chan, Cheong et al. 1994	-	3; Case report	1	1	1	1/1			1/1		nd		1/1		1/1			1			
" , " [loctite®]	Toren, Järholm et al. 1999	*	2-: Population based case referent study	15	21	15	15			nd		nd		nd		nd						
" , "	Quirce, Baeza et al. 2001		3; Case reports	2		2	2/2			0/2		1/2		2/2		2/2			2			
" , "	Lozewicz, Davison et al. 1985		3; Case reports	3		3	3/3			nd		0/3		nd		3/3			1	2		
" , "	Kopp, McKay et al. 1985		3; Case report	1		1	1/1			0/1		1/1		nd		1/1			1			
" , meclilate [methylcyanoacrylate] 137-05-3	Weytjens, Cartier et al. 1999	-	3; Case report	1	4	1	1/1			0/1		0/1		nd		1/1			1			
" , "	Savonius, Keskinen et al. 1993		3; Case reports	4		2	2/4			nd		x*		nd		2/4			1	1		
" , "	Lozewicz, Davison et al. 1985		3; Case reports	1		1	1/1					0/1		nd		1/1			1			
" , methacrylates	Jaakkola, Leino et al. 2007	*	2-: Cross-sectional	512	29	29 (5.7)*	26	5.1		x*		x*		nd		nd						
" , methylmethacrylate 80-62-6	Lozewicz, Davison et al. 1985	-	3; Case report	1	2	1	1/1			nd		0/1		nd		1/1			1			
" , "	Pickering, Bainbridge et al. 1986		3; Case report	1		1	1/1			0/1		nd		nd		1/1			1			
Acrylic acid	Savonius, Keskinen et al. 1993	-	3; Case report	1	1	1	1/1			x**		x**		nd		1/1*			1			
Airbag content	Hambrook, Fink et al. 2006	-	3; Case report	1	1	1	1/1		+	nd		1/1		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC						
							Asthma		RADS		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	n/n	%											i(n)	l(n)	d(n)
Aluminum salt al.fluoride: 7724-18-1 al.sulfate: 10043-01-3	Simonsson, Sjöberg et al. 1985	*	3+; Case series with follow-up	19	19	19	19/19*			2/19***		17/19***			0/2**								
2-Aminoethanol [2-ethanolamine]	Savonius, Keskinen et al. 1994	-	3; Case report	1	1	1	1/1			nd		0/1		1/1					1				
Amino-ethyl-ethanolamine 111-41-1	Pepys, Pickering et al. 1972	-	3; Case reports	3	3	3	3/3			2/3		nd		nd				1	2				
3-Amino-5-mercapto-1,2,4-triazole 16691-43-3	Hnizdo, Sylvain et al. 2004	(*)	3+; Survey of Case series identified by System of Occupational Risks (SENSOR)	106	6	6* (5,6)	6/106	5.6		x**		6/6		3/6									
Ammonia 7664-41-7		*			≥ 15																		
"	Ali, Ahmed et al. 2001		2-; Cross-sectional	73		x*	33/73	45.2		x*		nd		nd									
"	Reinisch, Harrison et al. 2001		3+; Occupational diseases statistics (SENSOR), survey	7		7	7/7	(+)		x*		nd		nd									
"	de la Hoz, Schlueter et al. 1996		3; Case reports	3		3*	3/3	+		3/3		1/1		nd									
" , fumes	Bernstein and Bernstein 1989		3; Case reports	4		4	4/4	+		1/4		3/3		nd									
"	Leduc, Gris et al. 1992		3; Case report with 12 year follow-up	1		1	1/1	+		1/1		nd		nd									
"	Flury, Dines et al. 1983		3; Case report	1		1	1/1	+		1/1		nd		nd									
Ammonium chloride (triple salt) 12125-02-9	Weir, Robertson et al. 1989 s. Soldering flux	-	3; Case report	2	2	2	2/2			2/2		2/2		2/2				1					

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC								
							Asthma		RADS															
							n/n	%	all affected cases: + or at least one out of several cases: (+)			n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
Ammonium thioglycolate 5421-46-5	Gelfand 1963	-	3+: Case series	14	10	10	14/ 14			nd		nd		nd		10/10*								
Amprolium hydrochloride 137-88-2	Greene and Freedman 1976	-	3; Case report	1	1	1	1/1	+	0/1		nd		nd		1/1	1								
Anhydrides																								
" , various	Baur, Czuppon et al. 1995	*	2-; Cross-sectional with follow-up of cases	92	10	8* (8.7)	18/ 92		11/90		4/90		nd		nd									
" , "	Drexler, Weber et al. 1994		3+; Survey	110		2 (1.8)	14/ 110		nd		nd		nd		2/8*									
" , dioctyl phthalate 117-81-7	Cipolla, Belisario et al. 1999	-	3; Case report	1	1	1	1/1		1/1				1/1*											
" , hexahydrophthalic 37226-48-5	Chee, Lee et al. 1991	-	3; Case report	1	1	1	1/1		0/1		nd		1/1*		1/1				1					
" , himic 2746-19-2	Rosenman, Bernstein et al. 1987	-	3+; Survey	20	3	3* (15.0)	3/20		nd		nd		nd		nd									
" , maleic 31-6	108-Lee, Wang et al. 1991	-	3; Case report	1	4	1	1/1		0/1		1/1		nd		1/1							1		
" , "	Graneek, Durham et al. 1987		3; Case reports	4		3	x*		x*		3/3		x*		3/4				3					
" , methyltetrahydrophthalic 26590-20-9	Nielsen, Welinder et al. 1989	-	3; Case report	1	1	1	1/1		0/1		1/1		nd		nd									
" , phthalic anhydride 85-44-9	Nielsen, Welinder et al. 1988	**	2-; Cross-sectional	60	30	5* (8.3)	5/60		nd		nd		nd		nd									
" , "	Wernfors, Nielsen et al. 1986		3+; Survey	118		21 (17.8)	21/ 118		8/ 55		7/36		nd		2/2							2		
" , "	Frans and Pahulycz 1993		3; Case report	1		1	1/1	+	0/1		1/1		nd		nd									
" , "	Fawcett, Newman Taylor et al. 1977		3; Case reports	5		2	5/5		2/5		nd		nd		2/5							2		
" , "	Maccia, Bernstein et al. 1976		3; Case report	1		1	1/1		nd		nd		nd		1/1	1								
" , pyromellitic dianhydride 89-32-7	Meadway 1980	-	3+; Case series	7	2	2	2/7		0/7		nd		2/4*		nd									

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
" , tetrachlorophthalic anhydride 117-08-8	Venables, Topping et al. 1985	*	3; Survey with follow-up	330	24	9* (2.7)	9*/330	2.7		nd		nd		nd		nd						
" "	Howe, Venables et al. 1983		3+; Case series	7		4	7/7			0/7		nd		nd		4/4			2	2		
" "	Venables, Topping et al. 1987		3+; Case series with follow-up	7		7	7/7			0/7		5/5		nd		nd						
" "	Schlueter, Babaszak et al. 1978		3+; Case series	5		4	5/5			3/5		1/1		nd		3/5		1	2			
" , benzene-1, 2, 4- tricarboxylic acid 1,2-anhydride [trimellitic anhydride] 552-30-7	Grammer, Zeiss et al. 2000	**	2-, Case control study	80	43	12*	12/80	15.0		12/80*	15.0	nd		12/80*	15.0	nd						
" "	Grammer, Shaughnessy et al. 1999		2-; Survey with follow-up	286		14* (4.9)	14*/286	4.9		x**		nd		nd		nd						
	Grammer, Shaughnessy et al. 1998		2-; Cross-sectional with 5-year follow-up	119		10*(9,1%)	x**			x**		x**		x**		x**						
" "	Zeiss, Patterson et al. 1977		3+; Case series	14		6*	14/14			nd		nd		nd		1/1		1				
" "	Fawcett, Newman Taylor 1977		3; Case report	1		1	1/1			1/1		nd		nd		1/1				1		
Aziridine, polyfunctional (dust) 64265-57-2	Kanerva, Keskinen et al. 1995	(*)	3+; Case series	9	8	7	7/9			nd		2/9		nd		7/9		1	5	1		
"	Leffler and Milton 1999		3; Case report	1		1	1/1			1/1		1/1		0/1*		nd						
Azobisformamide [azodicarbonamide] 123-77-3	Slovak 1981	*	3+; Survey	151	36	28* (18.5)	28/ 151			0/ 28		13/ 28	46.4	0/ 11		nd						
"	Kim, Cho et al. 2004		3; Case report	1		1	1/1			1/1		1/1		0/1		1/1			1			
"	Normand, Grange et al. 1989		3; Case reports	4		4	4/4			1/2*		nd		nd		2/2			1	1		

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
"	Valentino and Comai 1985		3; Case report	1		1	1/1			0/1		nd		nd		1/1		1				
"	Malo, Pineau et al. 1985		3; Case reports	2		2	2/2			2/2		2/2		nd		2/2			1	1		
Benzalkonium chloride (fumes) 8001-54-5	Purohit, Kopferschmitt-Kubler et al. 2000	-	3; Case report	3	4	3	3/3			nd		2/3		3/3		3/3				3		
"	Bernstein, Stauder et al. 1994		3; Case report	1		1	1/1			nd		nd		nd		1/1			1			
1, 2-Benzisothiazoline-3-one (fumes) 2634-33-5	Moscato, Omodeo et al. 1997	-	3; Case report	1	1	1	1/1			0/1		0/1		nd		1/1		1				
Bisulfite, SO₂ SO ₂ : 7446-09-5	Kipen, Blume et al. 1994	-	3; Case report	1	1	1	1/1			1/1		nd		1/1		nd						
Bleaching agent (fumes)	Boulet 1988	-	3; Case report	1	1	1	1/1		+	1/1		1/1		nd		nd						
Bromine, hydrobromic acid	Burns and Linden 1997	-	3; Case reports	2	2	2/2	2/2		+	nd		2/2		nd		nd						
Bromochlorodifluoromethane (Halon 1211) 253-59-3	Matrat, Laurence et al. 2004	-	3; Case reports	4	3	3	2/4		+	4/4		4/4		nd		nd						
Bromotrifluoromethane (Halon 1301) 75-63-8	de la Hoz 1999	-	3; Case report	1	1	1	1/1		+	1/1		1/1		nd		nd						
Cadmium (fumes) 7440-43-9	Davison, Fayers et al. 1988	*	2-; Cross-sectional	101	≥ 36	33* (32.7)	33/ 101	32.7		33/77	42.8	nd		nd		nd						
"	Chan, Poh et al. 1988		2-; Cross-sectional with 3-year follow-up	44		**	14***, (3)*	31.8; (6,8)*		6/44; (3/44)*	13.6; (6,8)*	nd		nd		nd						
"	Leduc, Francquen et al. 1993		3; Case report	1		1	1/1			1/1		nd		nd		nd						
"	De Silva, Donnan et al. 1981		3+; Case series	11		2*	3/6			4/11		nd		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
"	Al-Neaimi, Gomes et al. 2001		3+; Cross-sectional	67			4/ 67	6.0		x**		nd		nd		nd						
"	Ali, Ballal et al. 1998		3+; Cross-sectional	149			nd			x*		nd		x*		nd						
"	Kalacic 1973		3+; Cross-sectional	847		95* (11.2)	95	11.2		nd		nd		nd		nd						
"	Mengesha and Bekele 1998		3+; Comparative survey	53		17** (32.1)	17/ 53	32.1		x*		nd		nd		nd						
"	Prezant, Weiden et al. 2002		3+; Cross-sectional	348			55/ 348	15.8		x*		nd		nd		nd						
"	Lockman, 2002		3; Case report	1		1	1/1			nd		nd		nd		nd						
"	de Raeve, Vandecasteele et al. 1998		3; Case report	1		1	1/1			0/1		1/1		1/ 1**		1/1*						1
"	Leroyer, Dewitte et al. 1998		3; Case report	1		1	1/1			nd		1/1		nd		1/1*		1				
"	Shirakawa and Morimoto 1996		3; Case and control	1		1	1/1			nd		nd		nd		1/1		1				
Ceramic production (dust)	Neghab, Zadeh et al., 2009	*[*]	2-; Cross-Sectional	33	44	7* (21.2)	7/33*	21.2		x**		nd		x**		nd						
"	Halvani, Zare et al., 2008		2-; Cross-Sectional	176		37 (21.0)	30/176	17		x*		nd		nd		nd						
Chloramine T (powder dust) 7080-50-4	Bourne, Flindt et al. 1979	(*)	3+; Case series	7	20	7	7/7			nd		nd		nd		nd						
"	Feinberg and Watrous 1945		3+; Case series	6		6	6/6			(+)*		nd		nd		nd						
"	Kujala, Reijula et al. 1995		3; Case report	1		1	1/1			1/1		1/1		nd		1/1						1

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC						
							Asthma		RADS		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	n/n	%											i(n)	l(n)	d(n)
"	Jouannique, Pilière et al. 1992		3; Case reports	2		2	2/2			1/2*		1/2*		nd		1/1**		1					
"	Dijkman, Vooren et al. 1981		3+; Case series	5		4	4/5			1/5		nd		nd		3/3			1	2			
Chlorhexidine 55-56-1	Waclawski, McAlpine et al. 1989	-	3; Case reports	2	2	2	2/2			0/2		1/2*		1/2**		1/2**		1					
Chlorine 7782-50-5		**			299																		
"	Glindmeyer, Lefante et al. 2003		2+; Retrospective cohort study	19601		226	x*			nd		nd		nd		nd							
"	Andersson, Olin et al. 2003		2-; Cross-sectional	385		12	53/345	15.3		nd		nd		nd		nd							
"	Gautrin, Leroyer et al. 1995		2-; Cross-sectional	239		9* (3.8)	38/ 239**	15.9		x***		x***		nd		nd							
"	Bhérier, Cushman et al. 1994		3+; Survey with follow-up	64		29*** (45.3)	58/ 64	90.6	(+)*	15/ 51**	31.4	29/ 51**	56.9	nd		nd							
"	Leroyer, Dewitte et al. 1998		3+; Longitudinal study with follow-up of case series	13		3	13/ 13		(+)	1/ 13*		2/ 13*		nd		nd							
"	Chatkin, Tarlo et al. 1999		3+; Occupational diseases statistics (WCB), survey	5		5	5/5		(+)**	nd		x*		nd		nd							
"	Chester, Gillespie et al. 1969		3; Survey	58		2	34/ 58	58.6		2/ 58	3.4	nd		2/2		nd							
"	Ferris, Burgess et al. 1967		3+; Survey	147		8*	13/67	19.4		nd		nd		nd		nd							
"	Lemière, Malo et al. 1997		3; Case report	1		1	1/1*		+	1/1		1/1		nd		1/1			1				
"	Tarlo and Broder 1989		3; Case report	1		1	1/1			x*		1/1		x*		nd							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC							
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)			
							n/n	%	all affected cases: + or at least one out of several cases: (+)														
"	Schönhofer, Voshaar et al. 1996		3; Case reports	3		3	3/3		+	nd		3/3		nd									
Chlorofluorocarbons (degradation products)	Piirilä, Espo et al. 2003	(*)	3+; Case series	7	7	3	5/7		+	0/7		3/7		nd		nd							
Hydrochlorofluorocarbons	Lee, Lee et al., 2009		3+; Case series	15		4	0/15		+	0/15		4/15	26.6	nd		nd							
Chromate (not specified) [see also cement]		(*)			38																		
"	Olaguibel and Basomba 1989		3+; Case series	5		5	5/5			nd		3/5		nd		5/5*		1	2	2			
"	Onizuka, Tanabe et al. 2006		3; Case report	1		1	1/1			1/1*		nd		nd		1/1**							
"	Fernandez-Nieto, Quirce et al. 2006		3; Case reports	4		4	4/4			0/4		4/4		nd		4/4*		1	2	1			
"	Sastre, Fernandez-Nieto 2001		3; Case report	1		1	1/1			1/1		1/1				1/1*				1			
"	Nagasaka, Nakano et al. 1995		3; Case report	1		1	1/1			+		nd		1/1		1/1			1				
"	Park, Yu et al. 1994		3; Case reports	4		4	4/4			nd		3/4		2/2		4/4*		1		3			
"	Novey, Habib et al. 1983		3; Case report	1		1	1/1			1/1		nd		nd		1/1*		1					
"	Joules 1932		3; Case report	1		1	1/1			1*		nd		nd		nd							
"	Bernstein and Merget 2006		4; Review	20		20	20/20			nd		20/20		nd		20/20		7	4	9			
Cleaning agents		* [*]			≥ 350																		

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)													
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC				
							Asthma		RADS											
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
" (not specified)	Mirabelli, Zock et al. 2007	1	2-; prospective cohort study	60*		7* (11,7)	7	11,7		nd		nd		nd						
	Vizcaya, Mirabelli et al., 2011		3+; Cross-sectional	761		81	81/761*	11,7		nd		nd		nd						
" "	Massin, Hecht et al. 2007		2-; Cross-sectional	175		x*	12/175			25/175*		32/165*		nd		nd				
" "	Medina-Ramón, Zock et al. 2005		2-; Nested case control	40		x*	24/ 40			2/35**		4/22*	18.2	nd		nd				
" "	Medina-Ramón, Zock et al. 2003		3+; Cross-sectional	4521		x*	12.0% vs. 5.0%**			nd		nd		nd		nd				
" "	Rosenman, Reilly et al. 2003		3+; Occupational diseases statistics (SENSOR)	236		236*	236/236			(+)**	x***		nd		nd		nd			
" "	Reinisch, Harrison et al. 2001		3+; Occupational diseases statistics (SENSOR), survey	22		22	22/ 22			x*		nd		nd		nd				
" "	Kipen, Blume et al. 1994		3; Case report	1		1	1/1			x*		nd		nd		nd				
" "	Tabar, Álvarez 1998		3; Case report	1		1	1/1			0/1		1/1		nd		nd				
" , detergents	Murphy, Fairman et al. 1976		3; Case report	1		1	1/1			1/1		nd		nd		nd				
" "	Mapp, Pozzato et al. 2000		3; Case report	1		1*	1/1			nd		1/1		nd		nd				

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
" ,"	Christiani, Wang et al. 2001		2+; Prospective cohort	447		(25%-33%)*	x*			x**		nd		nd		nd						
" ,"	Mberikunashe, Banda et al., 2010		2-; Cross-sectional	194		54/194 (27.8)	63/194*	32.5		54/194		nd		nd		nd						
" ,"	Latza, Oldenburg et al. 2004; Oldenburg, Latza et al. 2007		2-; Cross-sectional	150		12** (8.0)	12/ 150	8.0		x***		12/ 74**	13.5	x*		nd						
" ,"	Hayes, Ye et al. 1994		2-, Cross-sectional	355		x*	x**			x***		nd		x****		nd						
" ,"	Woldeyohannes, Bergevin et al. 1991		2-; Cross-sectional	595		64 (10.8)	64	10.8		x*		nd		x*,**		nd						
" , yarn	Toren, Balder et al. 1999		2-; Case control	22		22	x*			x*		x*		nd		nd						
" ,"	Rylander and Bergström 1993		2-; Cross-sectional	35			nd			x*		0/34**		nd		nd						
" ,"	Wang, Pan et al. 2003		3+; Longitudinal study with 18 months follow-up.	225			x*			x**		x***		x****		nd						
" , yarn	Mengesha and Bekele 1998		3+; Comparative survey	91		24 (26.4)	24/91	26.4		x*		nd		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC							
							Asthma		RADS		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type			
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n											%	i(n)	l(n)	d(n)
" , "	Li, Zhong et al. 1995		3+; Longitudinal study with 1 year follow-up	110			nd			nd		x**		x***		nd								
" , "	Rylander, Haglind et al. 1985		3+; Case series	15		2	15/ 15			2/ 15		nd		nd		x*								
Cutting oil	Kipen, Blume et al. 1994	-	3; Case report	1	2	1	1/1			nd		1/1		nd		nd								
"	Hendy, Beattie et al. 1985		3; Case report	1		1	1/1			1/1		nd		1/1*		1/1**		1						
3-(Diamino-amino)propylamine [3-(dimethylamino)propylamine] 109-55-7	Sargent, Mitchell et al. 1976	(*)	2-; Survey	25	5	5(20.0)	5/25			x		nd		x*		nd								
Diamine, aliphatic + cycloaliphatic (hardener) 2855-13-2 (isophorone diamine)	Aleva, Aalbers et al. 1992	-	3; Case report	1	1	1	1/1			0/1		1/1		nd		1/1					1			
Diazonium tetrafluoroborate 14239-22-6	Luczynska, Hutchcroft et al. 1990	-	3; Comparative study	45	3	2	25/45	55.6		1/2*		nd		nd		2/2*		1				1		
"	Graham, Coe et al. 1981		3; Case report	1		1	1/1			1/1		1/1		nd		1/1*		1						
Dichlorodiethyl sulfide [mustard gas] +505-60-2	Emad and Rezaian 1997	*	3; Cross-sectional	197	15	15*(7.6)	197/197			15/197		nd		nd		nd								
Dichlorvos (organophosphate) 62-73-7	Deschamps, Questel et al. 1994	-	3; Case report	1	2	1	1/1			1/1		1/1		nd		nd								
"	Barthel 1983		3; Case report	1		1	1/1			1/1		1/1		nd		nd								
Diesel exhaust	Hart, Laden et al. 2006 and 2009**	*[*]	2-; Retrospective cohort study	536 (3913**)	303	75* (217**)	nd			nd		nd		nd		nd								

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC								
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)		
							n/n	%	all affected cases: + or at least one out of several cases: (+)															
"	Henneberger, Derk et al. 2003		3+: Occupational diseases statistics (SENSOR)	7		7	7/7		+	x		x		nd		nd								
"	Wade and Newman 1993		3: Case reports	3		3	3/3*		+	3/3		3/3		nd		nd								
"	Makker and Ayres 1999		3: Case report	1		1	1/1			1/1		nd		1/1*		nd								
Diethanolamine 111-42-2	Piipari, Tuppurainen et al. 1998	-	3: Case report	1	1	1	1/1			nd		1/1		1/1*		1/1		1						
2-Diethylaminoethanol [diethyl aminoethanol] 100-37-8	Gadon, Melius et al. 1994	(*)	3+: Case series	14	7	7	14/14			4/12		nd		10/11		nd								
2-Dimethylaminoethanol [dimethyl ethanolamine] 108-01-0	Vallières, Cockcroft et al. 1977	-	3: Case report	1	3	1	1/1			0/1		1/1		1/1		1/1							1	
"	Cockcroft, Cotton et al. 1979		3: Case report	2		2	2/2			0/2		0/2		nd		2/2						1	1	
Diinotrogen tetraoxide [dinitrogen tetraoxide] 10544-72-6	Conrad, Lo et al. 1998	(*)	3+: Case series	234	6	6	6/6		+	4/6		6/6		nd		nd								
ECG ink	Keskinen, Nordman et al. 1981	-	3: Case report	1	2	1	1/1			nd		1/1		nd		1/1							1	
"	Rodenstein and Stanescu 1982		3: Case report	1		1	1/1			nd		1/1		nd		1/1		1						
Endotoxin (see also cotton dust, swine confinement, poultry confinement, house dust)	Reinisch, Harrison et al. 2001	*	3+: Occupational diseases statistics (SENSOR), survey	8	15	8	8/8			x*		nd		nd		nd								
"	Milton, Wypij et al. 1996		3+: Cross-sectional	37		6*	14/37			x**		nd		x***		nd								
Environmental tobacco smoke 1-09-0		**			≥268																			

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)												
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC			
							Asthma		RADS							Reaction type			
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)
"	Jaakkola, Piipari et al. 2003		2+; Incident case control	239		117	x**			x**		x**		x**,***	nd				
"	Greer, Abbey et al. 1993		2+; Prospective cohort study	3119		45	x**			nd		nd		nd	nd				
"	Eisner, Balmes et al. 2005		2-; Cross-sectional	2113			x			42/47*		nd		nd	nd				
"	Fidan, Cimrin et al. 2004		2-; Cross-sectional	114		44* (38.6)	44/ 114*	38.6		x**		nd		x**	nd				
"	Radon, Büsching et al. 2002		2-; Cross-sectional	1890			x			nd		nd		nd	nd				
"	Chen, Tunstall-Pedoe et al. 2001		2-; Case-control (MONICA)	294			x**			x**		nd		nd	nd				
"	Janson, Chinn et al. 2001		2-; Cross-sectional	7882			x*			x*		x*		nd	nd				
"	Blanc, Ellbjär et al. 1999		2-; Cross-sectional; survey (ECRHS)	1562		61 (3.9)	61/1562	3.9		x*		x*		nd	nd				
"	Flodin, Jönsson et al. 1995		2-; Population-based case-referent study				x*			x*		x*		nd	nd				

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
	Lambourn, Hayes et al. 1992		3; Case report	1		1	1/1			0/1		0/1		nd		1/1			1			
Epoxy resin system see 3-(dimethylamino) propylamine 109-55-7																						
Ethylenediamine [ethylene diamine] 107-15-3		*			≥ 14																	
"	Aldrich, Stange et al. 1987		3+; Cohort study	337		x*	44/337*			nd		nd		nd								
"	Gelfand 1963		3+; Case series	7		7	7/7			nd		nd		nd		7/7*						
"	Casas, Badorrey et al. 2002		3; Case report	1		1	1/1			0/2		0/1		nd		1/1			1			
"	Nakazawa and Matsui 1990		3; Case reports	2		2	2/2			0/2		2/2		nd		2/2			2			
"	Hagmar, Bellander et al. 1982		3; Case reports	3		3	3/3*			x**		1/3		nd		nd						
"	Lam and Chan-Yeung 1980		3; Case report	1		1	1/1			0/1		1/1		nd		1/1			1			
Ethylene oxide 75-21-8	Deschamps, Rosenberg et al. 1992	-	3; Case report	1		2	1/1			1/1		1/1		nd		nd						
"	Dugue, Faraut et al. 1991		3; Case report	1		1	1/1			nd		nd		nd		1/1*						
Farming		*[*]			≥ 971																	
"	Rask-Andersen, 2011		2-; 12 years follow-up-study	276		27 (9.8)	36/276	8.9		x*		nd		nd		nd						
"	Walusiak, Krawczyk-Adamus et al. 2004		2-; Case control	100		38(38.0)	100/100			x*		x*		nd		38/100		23		15		

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
" †	Eduard, Douwes et al. 2004		2-; Cross-sectional	1614			x*			nd		nd		nd								
" †	Hoppin, Umbach et al. 2003 ; Hoppin, Umbach et al. 2004		2-; Cross-sectional (Agricultural Health Study 1994-1997)	20468/ 20898			3838*/ 20898	18.4		nd		nd		nd		nd						
" †	Melenka, Hessel et. al 1999		2-; Cross-sectional	781		36*(4.6)	108/781			x**		nd		nd		nd						
" †	Gomez, Hwang et al. 2004		2-; Cross-sectional	1620			295/ 1620**	18.2		nd		nd		nd		nd						
"	Melbostad, Eduard et al. 1998		2-; Cross-sectional	8482		263*(3.1)	263*/ 8482	3.1		x**		nd		nd		nd						
" (various)	Dosman, Graham et al. 1987		3+; Survey	1824		607(33.3)	607/ 1824			x*		nd		nd		nd						
" animals (pig, beef/veal, dairy, poultry)	Portengen, Preller et al. 2005	★ ★	2-; Cross-sectional	81	≥ 54	36(44.4)	81/81			x*		36/78**	46.1	nd		nd						
" †	Monso, Riu et al. 2004		2-; Cross-sectional	105		18(17.1)	58/105			11/105		nd		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
" "	Radon, Weber et al. 2001		2-; Prospective cohort study	76			36/ 67*			x***		nd		x***		nd						
floor sealant (aromatic hydrocarbons)	Brooks, Weiss et al. 1985	-	3; Case report	1	1	1	1/1		+	0/1		1/1		nd		nd						
Formaldehyde (gas, dust) 50-00-0		*			≥53																	
"	Nunn, Craigen et al. 1990		2-; Prospective cohort study with 6-year follow-up.	125		*	33/125**			x***		nd		nd		nd						
"	Nordman, Keskinen et al. 1985		3+; Cross-sectional with Case reports	230		12	230/230			2/5*		29/ 209				12/230		6	4	2		
"	Burge, Harries et al. 1985		3+; Case series	15		7	5/15			nd		4/14		nd		7/ 15		4	1	2		
"	Piipari and Keskinen 2005		3; Case reports	4		4	4/4			nd		nd		4/4*		4/4*						
"	Kim, Song et al. 2001		3; Case report	1		1	1/1			1/1		1/1		nd		1/1*			1			
"	Lemière, Desjardins et al. 1995		3; Case reports	3		3	3/3			0/3		3/3		3/3		3/3		1	2			
"	Porter 1975		3; Case report	1		1	1/1			1/1		nd		nd		nd						
"	Hendrick and Lane 1975		3; Case report	1		1	1/1			nd		nd		nd		1/1			1			
Foundry [see also Isocyanates(MDI)]		*[*]			≥ 7																	

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
"	Hansen 1997		2-; Historical cohort study with follow-up	3056		x*	x*			nd		nd		nd								
"	Ahman, Alexandersson et al. 1991		2-; Cross-sectional	28		*	0/28**			0/28		nd		0/28***		nd						
"	Mastrangelo, Tartari et al. 2003		3; Case control study	7		7*	7/7			0/7		nd		nd		nd						
"	Hahn, Beck et al. 1986		3; Survey	265		*	x**			50/265***	18.8	nd		nd		nd						
Freon, (freon-22)	Sjögren, Gunnare et al. 2002	-	3; Case report	1	1	0	1/1			nd		nd		nd		nd						
" , " (heated)	Malo, Gagnon et al. 1984		3; Case report	1		1	1/1			0/1		1/1		nd		1/1			1			
Fumigating agent	Brooks, Weiss et al. 1985	-	3; Case report	1	1	1	1/1	+		1/1		1/1		nd		nd						
Furan-based binder	Cockcroft, Cartier et al. 1980	-	3; Case report	1	1	1	1/1			1/1		1/1		1/1		1/1*			1			
Glutaraldehyde [glutaral] 11-30-8		*[*]			≥ 105																	
"	Vyas, Pickering et al. 2000		2-; Cross-sectional	318		*	17/318**	5.3		x***		nd		0/17		nd						
"	Curran, Burge et al. 1996		3+; Cross-sectional	20		7	13/20*	65.0		nd		nd		nd		7/8*						
"	Ross, Keynes et al. 1997		3+; Occupational diseases statistics (SWORD)	74		74	x*			x*		x*		x*		x*						
"	Gannon, Bright et al. 1995		3+; Case series	7		7	7/7			1/7		3/7		7/7		7/8		5	2			

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC							
							Asthma		RADS							Reaction type							
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)			
"	Gannon and Burge 1993		3+: Occupational diseases statistics (SHIELD)	6		6	6/6			nd		nd		x		x							
"	Jachuck and Bound 1989		3+: Survey	9		1*(11.1)	1/9*			nd		nd		nd		nd							
"	Ong, Tan et al. 2004		3: Case report	1		1	1/1			0/1		1/1		1/1*		1/1						1	
"	Cullinan, Hayes et al. 1992		3: Case reports	2		2	2/2			0/2		1/2		x*		1/2**						1	
"	Corrado, Osman et al. 1986		3: Case reports	4		1	4/4			0/4		nd		nd		1/4*						1	
Grain dust		**			≥ 133																		
"	Toren, Balder et al. 1999		2-: Case control	7		7	x*			x*		x*		nd		nd							
"	Post, Heederik et al. 1998		2-: Cross-sectional study with follow-up after 5 years	140		*	8/ 140	6.0		x**		nd		nd		nd							
"	Schwartz, Thorne et al. 1995		2-: Population based cross-sectional	410		58(14.1)	58	14.1		x*		45/410	11.0	nd		nd							
"	Chan-Yeung, Schulzer et al. 1980		2-: Comparative survey	610			x*			x*		nd		x*		nd							
"	Williams, Skoulas et al. 1964		3+: Survey	502		35	35/ 502			nd		nd		nd		nd							
"	Skoulas, Williams et al. 1964		3+: Survey	51		31	31*	61.0		x*		nd		nd		nd							
"	Pahwa, Senthiselvan et al. 1994		3+: Longitudinal study	1396		*	x**			x**		nd		nd		nd							
"	Baur, Preisser et al. 2003		3: Case reports	2		2	2/2			2/2		2/2		nd		2/2*						2	
"	Chan-Yeung, Dimich Ward et al. 1992		4: Review				nd			nd		nd		nd		nd							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC							
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)			
							n/n	%	all affected cases: + or at least one out of several cases: (+)														
, rice dust	Ye, Huang et al. 1998	[*]	2-; Cross-sectional	474	20	20 (4.2)*	x**			x***		nd		x****		nd							
Hairdressing chemicals	Piipari and Keskinen 2005	(*)	3+; Occupational diseases statistics, Finland	6	6	6	x*			nd		nd		6/6*		6/6*							
Health Care Workers	Kogevinas, Zock et al. 2007	*[*]	2-; Prospective cohort study (ECRHS II)	913*	409	27(3.0)*	27/913*			nd		nd		nd		nd							
"	Pechter, Davis et al. 2005		3+; Occupational disease statistics (SENSOR 1993-1997)			305*	305			x**		nd		nd		nd							
"	Arif and Delclos 2012		2-; Cross-sectional	3650		33 (0.8)	206/3650*	5.6			nd		nd		nd		nd						
"	Arif, Delclos et al., 2012		2-; Cross-sectional	448		44 (9.8)	44/448	9.8			nd		116/448	25.9	nd		nd						
Hexachlorophene 70-30-4	Nagy and Orosz 1984	-	3; Case report	1	1	1	1/1			nd		1/1		nd		1/1						1	
Hexamethylenetetramine 100-97-0	Merget, Topcu et al. 1999	*	3+; Cross-sectional	17	≥ 15	x**	3/17*	11.8		0/17		4/17**	24	nd		nd							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC								
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)		
							n/n	%	all affected cases: + or at least one out of several cases: (+)															
" +	Ross, Keynes et al. 1997		3+; Occupational diseases statistics (SWORD)	310		310	x*			x*		x*		x*										
" +	Piipari and Keskinen 2005		3+; Occupational diseases statistics Finland	6		6	6/6*			nd		nd		6/6*										
" +	Latza and Baur 2005		3+; Occupational diseases statistics	54		54	x*			x*		nd		x*										
" +	Chatkin, Tarlo et al. 1999		3+; Occupational diseases statistics (WCB), survey	9		9	9/9			(+)**		nd		9/9*										
" +	Tarlo, Liss et al. 2002		3+; Retrospective review of new OA claims of occupational diseases statistics, (WCB) between 1980-1992	425		425	x*			x*		x*		nd										
" +, Diphenylmethane diisocyanate [MDI] 5873-54-1	Bernstein, Korbee et al. 1993	**	2-; Cross-sectional	243	142	2* (0.8)	9/243					nd		nd										
" +	Hur, Koh et al., 2008		2-; Cross-sectional	58		5 (8.6)	30*	51.7				nd		11/26	42.3	nd		5/15	33.3	1	2	2		
" +	Liss, Bernstein et al. 1988		3+; Comparative survey	26		7 (26.9)	7/26					x*,**		nd				nd						
" +	Woellner, Hall et al. 1997		3+; Case series	18		15	18/18					x*		15/16				nd						
" +, Mapp, Boschetto et al. 1988	Mapp, Boschetto et al. 1988		3+; Case series	162		93	162/162					15/93		93/162*				93/162		27	32	34		
" +, Zammit-Tabona, Sherkin et al. 1983	Zammit-Tabona, Sherkin et al. 1983		3+; Case series	78		6	12/78					5/11		9/11*				6/11			4	2		
" +, Perfetti, Brame et al. 2003	Perfetti, Brame et al. 2003		3; Case report	1		1	1/1					1/1		1/1				1/1				1		
" +, prepolymers	Vandenplas, Malo et al. 1993	-	3+; Case series	8	2	2	8/8					0/8		1/8				nd						
" +, HDI biuret plus 4035-89-6	Vandenplas, Cartier et al. 1993	(*)	3+; Case series	20	12	10	20/20					6/20		15/20				nd				4	2	4
" +, Hexamethylene diisocyanate [HDI]; plus isodurane diisocyanate 822-06-0	Lemière, Malo et al. 1996		3; Case report	1		1	1/1					0/1		1/1				nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
" ,"	Belin, Hjortsberg et al. 1981		3; Case report	1		1	1/1*			1/1		1/1		nd		nd						
" ," 3-Isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate [isophorone diisocyanate, IPDI] 4098-71-9	Clarke and Aldons 1981	-	3; Case report	1	1	1	1/1			1/1		nd		nd		1/1*						1
" ," Methyl isocyanate [MIC] 624-83-9	Kamat, Patel et al. 1992	*	3+; Longitudinal study, follow-up of cases	113	≥ 144	97	97/97			x*		nd		nd		nd						
" ,"	Baur, Chen et al. 2001		3+; Case series	6		3	5/6			nd		3/5*		nd		3/5*		1	1	1		
" ,"	Vijayan and Sankaran 1996		3+; Case series	54		17	54/54			17/54		nd		nd		nd						
" ,"	Kamat, Mahashur et al. 1985		3+; Case series	82		24	82/82			24/82*		nd		nd		nd						
" ,"	Harries, Burge et al. 1979		3; Case reports	3		3	3/3			2/3		1/3		nd		3/3			2	1		
" ,"	Mehta, Mehta et al. 1990		4; Review	41			nd			nd		nd		nd		nd						
" ," 1,5-Naphthylene diisocyanate [NDI] 3173-72-6	Fuortes, Kiken et al. 1995	*	2-; Survey	46	24	13*	17/46			x*		2/3	66.6	3/8	37.5	nd						
" ,"	Baur and Marczynski, 2000		3; Case series	5		5	5/5			3/5		3/5		nd		3/5		1	1	1		
" ,"	Alexandersson, Gustafsson et al. 1986		3+; Survey	23			8/23			nd		nd		nd		nd						
" ," Polymethylene polyphenyl isocyanate 9016-87-9	Séguin, Allard et al. 1987	*	2-; Survey	42	6	6 (11.8)	14/ 42	33.3		4/ 10	40.0	nd		nd		6/ 10	60		2	4		
" ," Toluene diisocyanate, TDI 2,4: 584-84-9; 2,6:91-08-7	Butcher, Jones et al. 1977	**	2-; Prospective cohort	103	≥ 152	9	26/ 89			x**		8/ 11				9/ 13		5	*	*		
" ,"	Ott, Klees et al. 2000		3+; Cohort study	313		19	x*			x*		nd		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
" ,"	Omae, Higashi et al. 1992		3+; Cross-sectional study with follow-up	57		*	**			x*		nd		nd		nd						
" ,"	Chatkin, Tarlo et al. 1999		3+; Occupational diseases statistics (WCB)	5		5	5/5	+	nd		x*		nd		2/5**							
" ,"	Marabini, Brugnamo et al. 1994		3+; Case series with follow-up	40		40	x*		x*,**		nd		nd		40/ 40		9	25	6			
" ,"	Karol, Tollerud et al. 1994		3+; Case series	63		34	63/ 63		nd		32/34*		nd		34/ 63		12	13	9			
" ,"	Paggiaro, Bacci et al. 1990		3+; Case series with follow-up	10		10	10/ 10		5/ 10		10/ 10				10/ 10			4	6			
" ,"	Axford, McKerrow et al. 1976		3+; Case series with 4 year follow-up	35		30	30/35	(+)*	x**		nd		nd		nd							
" ,"	Vandenplas, Cartier et al. 1992		3; Case reports	2		2	2/2		1/2		2/2		nd		2/2*			2				
" ,"	Luo, Nelsen et al. 1990		3; Case reports	2		2	2/2	+	1/2		2/2		nd		nd							
" ,"	Tarlo and Broder 1989		3; Case report	1		1	1/1	+	x*		1/1		x*		nd							
" ,"	Wisnewski, Liu et al. 2005		4; Review																			
" ," Triglycidil isocyanurate 2451-62-1	Piirilä, Estlander et al. 1997	-	3; Case report	1	1	1	1/1		nd		1/1		1/1		1/1		1					
" ," Triphenylmethane triisocyanate	Buick and Todd 1997	-	3; Case report	1	1	1	1/1		1/1		nd		nd		nd							
Isothiazolinone 55965-84-9	Bourke, Convery et al. 1997	-	3; Case report	1	1	1	1/1		1/1		1/1		1/1*		nd							
Lauryl dimethyl benzyl ammonium chloride 139-07-1	Burge and Richardson 1994	-	3; Case report	1	1	1	1/1		nd		1/1		1/1		1/1			1				

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC							
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type			
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)	
Lubricants (not specified)	Henneberger, Derk et al. 2003	(*)	3+; Occupational diseases statistics (SENSOR)	46	54	46	46/46			x		x		nd		nd							
"	Latza and Baur 2005		3; Occupational diseases statistics	8		8	x*			x*		nd		nd		x*							
Metal coat remover (coating removing chemical)	Brooks, Weiss et al. 1985	-	3; Case report	1	1	1	1/1		+	1/1		1/1		nd		nd							
Metal oxide fume	Dube, Puruckherr et al. 2002	-	3; Case report	1	1	1	1/1		+	1/1		nd		nd		nd							
Metal working fluids [MWF]	Zacharisen, Kadambi et al. 1998	-	3+; Survey	30	12	12 (40.0)	30/ 30	100.0		5/ 30	16.7	12/ 30	40.0	nd		nd							
Metallurgical Industry Workers	Bala and Tabaku, 2010	*	2-; Cross-Sectional	459	73	73/316* (23.1)	nd			112/459	24.4	nd		nd		nd							
Iron-steel production				166		27.10 %																	
Iron-steel processing				134		20.89 %																	
Ferrochrome production				117		21.36 %																	
Metam sodium [methylthiocarbamate] 144-54-7	Cone, Wugofski et al. 1994	-	3+; Retrospective case series	197	20	20 (10.1)	48/ 197	24.3	(+)*	15/ 30	50.0	23/ 23	100.0	nd		nd							
Methylmercaptan 74-93-1	Chatkin, Tarlo et al. 1999	-	3; Occupational diseases statistics (WCB)	1	1	1	nd		+	nd		x*		nd		nd							
Monoethanolamine 141-43-5	Gelfand 1963	-	3+; Case series	14	10	10	14/14			nd		nd		nd		10/10*							
Mustard gas (see dichlorodiethyl sulfide)																							
N-methylmorpholine 109-02-4	Belin, Wass et al. 1983	[*]	3; Comparative survey	48		x*	13/ 48			nd		8/44		nd		nd							
Nickel sulphate →anhydrous 7786-81-4 →hexahydrate 10101-97-0	Estlander, Kanerva et al. 1993	(*)	3; Case report	1	5	1	1/1			0/1		0/1		1/1		1/1						1	
"	Block and Yeung 1982		3; Case report	1		1	1/1			0/1		1/1		1/1		1/1					1		
"	Malo, Cartier et al. 1982		3; Case report	1		1	1/1			0/1		0/1		1/1		1/1					1		
"	Novey, Habib et al. 1983		3; Case report	1		1	1/1			1/1		nd		nd		1/1							1
"	McConnell, Fink et al. 1973		3; Case report	1		1	1/1			nd		nd		nd		1/1					1		
Ninhydrin 485-47-2	Piirilä, Estländer et al. 1997	-	3; Case report	1	1	1	1/1			1/1		1/1		1/1		1/1					1		

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC							
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)	
							n/n	%	all affected cases: + or at least one out of several cases: (+)														
Nitrogen chloride [nitrogen trichloride, trichloramine] 10025-85-1	Jacobs, Spaan et al. 2007	[*]	2-; Cross-sectional	624	≥ 3	x*	x*			nd		x**		nd		nd							
"	Thickett, McCoach et al. 2002		3; Case reports	3		3	3/3			1/3		0/3		2/2*		3/3		2				1	
Oil (spill)	Zock, Rodrigues-Tigo et al. 2007	*	2-; Cross-sectional	6700		x*	x*			nd		nd		nd		nd							
Ozone (gassings) 10028-15-6	Mehta, Henneberger et al. 2005	*	2-; Cross-sectional with follow up	66	9	9*	nd			9/66*	13.6	nd		nd		nd							
Paint (fumes)	Wieslander, Norbäck, et al. 1997	*	2-; Longitudinal study	175	39	7(4.0)	7/175	4.0		x*		35	20.0	nd		nd							
" (see also welding)	Temel, Coskum et al., 2010		3+; Cross-Sectional	97		13	13/97			x*		nd		x*		nd							
"	Wieslander, Janson et al. 1994		3+; Survey and clinical study	415		18 (4.3)	28*	6.7		18/23		20/23		nd		nd							
"	Tarlo and Broder 1989		3; Case report	1		1	1/1			x*		1/1		x*		nd							
Palladium 7440-05-3	Daenen, Rogiers et al. 1999	-	3; Case report	1	1	1	1/1			1/1		1/1		nd		1/1		1					
Paper dust A111	Toren, Balder et al. 1999	(*)	2-; Case control	32	32	32	x*			x*		x*		nd		nd							
Paraphenylenediamine 106-50-3	Silberman and Sorrell 1959	(*)	3+; Case series	80	37	37	59/ 80			nd		nd		nd		*37/ 50							
Paraquat 4685-14-7	Schenker, Stoecklin et al. 2004	(*)	2-; Cross-sectional (SALUD)	219			41/338**	12.1		10/338* ,**	3.0	nd		nd		nd							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																			
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC										
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)				
							n/n	%	all affected cases: + or at least one out of several cases: (+)																	
"	Castro-Gutiérrez, McConnell et al. 1997		2-; Cross-sectional	134			20/71*	28.2		14/134**	10.5	nd		nd		nd										
Perfume agents (research lab)	Kipen, Blume et al. 1994	-	3; Case report	1	2	1	1/1			nd		nd		1/1*		nd										
"	Baur, Schneider et al. 1999		3; Case report	1		1	1/1			1/1		nd		nd		1/1*		1								
Persulfate																										
" , not specified	Moscato, Pignatti et al. 2005	(*)	3+; Case series	47		21	47/47			0/21		12/21**	57.1	nd		21/47*	57.0	4	14	3						
" "	Pankow, Hein et al. 1989		3; Case report	1	22	1	1/1			*		1/1		nd		1/1		1								
" , ammonium	Harth, Raulf-Heimsoth et al. 2006	-	3; Case report	1	1	1	1/1			0/1		1/1		nd		1/1			1							
" , potassium [7727-21-1] and ammonium peroxydisulfate [7727-54-0]	Wrbitzky, Drexler et al. 1995	[*]	3; Cross sectional	52			15/52*			x**		nd		nd		nd										
" , alcalic	Therond, Gérard et al. 1989	-	3+; Case series	5	4	4	1/5			1/5		nd		nd		4/5		2	2							
" , Sodium persulfate 7775-27-1	Parra, Igea et al. 1992	-	3; Case report	1	1	1	1/1			nd		1/1		nd		1/1			1							
" , Dipotassium peroxy-peroxydisulfate [potassium persulfate] 7727-21-1	Muñoz, Cruz et al. 2003	(*)	3; Follow-up of cases	8	7	7	8/8			5/6		7/8		nd		7/7		1	5	1						
" , Diammonium peroxodisulfate [ammonium persulfate] 7727-54-0	Schwaiblmair, Vogelmeier et al. 1997	*	3; Survey	55	16	9 (16.4)	38/55	69.1		3/55		32/53		nd		9/41	28.0	5							4	
" "	Blainey, Ollier et al. 1986		3; Survey	23		4 (17.4)	7/23	30.4		0/23		6/23		1/12		4/9			4							
" "	Gamboa, de la Cuesta et al. 1989		3; Case report	1		1	1/1			0/1		1/1		nd		1/1			1							
" "	Baur, Fruhmann et al. 1979		3; Case reports	2		2	2/2			1/2		nd		2/2		nd										
Pesticides (not specified)	Boers, van Amelsvoort et al., 2008	*[*]	2-; Prospective multicenter study	248	≥ 91	8 (3.3)*	40/248	16.3		nd		nd		nd		nd										
"	Jones, Burks et al. 2003		2-; Prospective case-control	135		x*	22/135**	16.3		11/135**	8.0	nd		nd		nd										

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC							
							Asthma		RADS									Reaction type					
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)			
"	Senthilselvan, McDuffie et al. 1992		2-; Cross-sectional	1939		83 (4.3)*	x**			x***		nd		nd		nd							
"	Lings 1982		3+; Survey	274		*	x**			8/181***	4.4	nd		nd		nd							
"	Barthel 1983		3; Case reports	2		2	2/2		(+)	2/2		1/2		nd		nd							
Phenyglycine acid chloride 39478-47-2	Kammermeyer and Mathews 1973	(*)	3+; Case series with controls	24	15	15	15/ 24			x*		nd		nd		2/2		2					
Phosgene 75-44-5	Tarlo and Broder 1989	-	3; Case report	1		1	1/1			x*		1/1		nd		nd							
"	Wyatt and Allister 1995		4; Case report	1	2	1	1/1		+	nd		nd		nd		nd							
Piperazine dihydrochloride 142-64-3	Hagmar, Bellander et al. 1982	*	3+; Survey	130	185	13 (10.0)	13/130*	10.0		nd		6/15		nd		1/1					1		
"	Hagmar, Bellander et al. 1984		3+; Cross-sectional	516		170 (32.9)	170/ 516	32.9		nd		nd		nd		nd							
"	Pepys, Pickering et al. 1972		3; Case reports	2		2	2/2			0/2		nd		nd		2/2					2		
Platinum salts (7440-06-4)	Mergel, Kulzer et al. 2000	**	2+; Prospective cohort study	227	≥ 131	6*(2.6)	9/ 227			x		11/ 187		nd		nd							
"	Calverley, Rees et al. 1995		2+; Prospective cohort study	78		7 (9.0)	32/ 78	41.0		7/10*	70.0	nd		nd		nd							
"	Hnizdo, Esterhuizen et al. 2001		3+; Occupational diseases statistics (SORDSA)	29		29	x*			x*		x*		nd		x*							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)											i(n)	l(n)	d(n)
"	Merget, Reineke et al. 1994		3+: Case series with follow-up	24		24	23/ 24			2/ 24		23/ 24		nd		24/ 24*						
"	Baker, Gann et al. 1990		3+: Cross-sectional	107		x**	28/ 107			6/ 107		3/ 107*		nd		nd						
"	Venables, Dally et al. 1989		3+: Survey with follow-up	91		49 (53.8)	49*/91			nd		nd		nd		nd						
"	Pickering 1972		3+: Case series	12		6	12/12			nd		nd		nd		6/12*	5		1			
"	Pepys, Pickering et al. 1972		3+: Case series	16		10	16/ 16			5/ 16		nd		nd		10/16	7	2	1			
Polyamines , aliphatic	Ng, Lee et al. 1995	[*]	3+: Cross-sectional	12	1	1	4/12			0/12		nd		4/12*		1/2*				1		
Polyester	Zuskin, Mustajbegovic et al. 1998	(*)	3+: Comparative survey	400	5	4 (1.0)	4/ 400			x**,**		nd		x**		nd						
"	Cartier, Vandenplas et al. 1994		3; Case report	1		1	1/1			1/1		1/1				1/1*	1					
Polyethylene 9002-88-4		-			3																	
" , heated to 140°C	Stenton, Kelly et al. 1989		3; Case report	1		1	1/1			1/1		1/1		1/1		1/1*			1			
" , heated to 160°C	Gannon, Burge et al. 1992		3; Case report	1		1	1/1			1/1		1/1		1/1		1/1*				1		
" , heated to 200°C	Skerfving, Akesson et al. 1980		3; Case report	1		1	1/1			1/1		1/1		1/1		nd						
Polymethyl-methacrylate [plexiglas powder] 9011-14-7	Kennes, Garcia-Herreros et al. 1981	-	3; Case report	1	1	1	1/1			1/1*		nd		nd		1/1**	1					
Polypropylene , heated to 250 °C 9003-07-0	Atis, Tutluoglu et al. 2005	[*]	2-Cross-sectional	50	≥ 1	x*	13/50**	26.0		x***		nd		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
"	Malo, Cartier et al. 1994		3; Case report	1		1	1/1			1/1		1/1		nd		1/1			1			
Polyvinyl chloride (fume) 9002-86-2	Tuomainen, Stark, Seuri et al. 2006	**	3+; Survey	10	≥ 8		0/10			0/10		0/10		nd		0/10						
"	Lee, Ng et al. 1991		3+; Survey	48		x*	8/48**	16.7		x***		nd		x****		nd						
"	Wegman, Eisen et al. 1987		3+; Cross-sectional	230		x*	x*			24/230*		nd		nd		nd						
"	Baser, Tockman et al. 1985		3+; Cross-sectional	163			57/163*	34.9		x**		nd		x**		nd						
"	Andrasch, Bardana et al. 1976		3+; Survey with case series	96		3	33/96*			14/14		nd		nd		3/11			3			
"	Muñoz, Cruz et al. 2003		3; Case report	1		1	1/1			1/1		1/1		nd		1/1			1			
" , (resin dust)	Lee, Yap et al. 1989		3; Case report	1		1	1/1			nd		1/1		1/1*		1/1			1			
" , (fume and dust)	Sokol, Aelony et al. 1973		3; Case reports	3		3	3/3			2/3		nd		nd		3/3*		2	1			
Potassium dichromate 7778-50-9 (see also chromium cement)	Bright, Burge et al. 1997	(*)	3+; Case series	7	7	7	7/7			4/7		nd		4/4		7/7		2	1	4		
Potassium aluminum tetrafluoride 14484-69-6	Hjortsberg, Nise et al. 1986	(*)	3+; Case series	7	5*	5	5/7			nd		5/7*		nd		2/2*						
Potroom aluminum smelting	Musk, de Klerk et al. 2000	*[**]	2-; Cross-sectional	2388	≥ 470	*	x**			x**		nd		nd		nd						
"	Kongerud, Grønnesby et al. 1990		2-; Longitudinal study	641		122 (19.1)	122/641	19.1		x*		nd		nd		nd						
"	Sarić, Godnic-Cvar et al. 1986		3+; Survey	227		7 (3.1)	7/227*	3.1		20/227	8.8	5/7		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC								
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)		
							n/n	%	all affected cases: + or at least one out of several cases: (+)															
"	Chan-Yeung, Wong et al. 1983		3+; Comparative survey	797		126 (15.1)	126/ 797*	15.1		x***		nd		x**		nd								
"	Sorgdrager, de Looft et al. 1998; Sorgdrager, de Looft et al. 2001		3+; Case series with follow up	179		179	x**			x*,**		x**		nd		nd								
"	O'Donnell, Welford et al. 1989		3+; Case series	57		34	57/ 57			7/ 57		34/ 57		x**		nd								
"	Burge, Scott et al. 2000		3; Case report	1		1	1/1			1/1		1/1		0/1*		1/1								1
"	Desjardins, Bergeron et al. 1994		3; Case report	1		1	1/1			0/1		1/1		1/1*		nd								
"	Bernstein and Merget 2006		4; Review				x*			x*						x*								
Poultry confinement	Rylander and Carvalho 2006	*[*]	2-; Cross-sectional	42	54	x*	x*,**			x**,***		x**,****		nd		nd								
"	Hagmar, Schütz et al. 1990		3+; Cross-sectional	23		2 (8.6)	2/ 23	8.6		0/23		nd		x*		nd								
"	Danuser, Wyss et al. 1988		3+; Survey	26		10 (38.0)	14/ 26	53.8		10/26	38.0	nd		nd		nd								
"	Danuser, Weber et al. 2001		3+; Case series (representative sample)	37		37	37/ 37			nd		nd		nd		nd								
" , slaughter house	King, Page et al. 2006	*	2-; Cross-sectional	68	5	0	18/68*	26.0		nd		nd		0/34		nd								
" , "	Borghetti, Magarolas et al. 2002		2-; Cross-sectional	15		1 (7.1)	5/14	35.7		2/5	40.0	nd		nd		1/5*	20.0							1

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC								
							Asthma		RADS															
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)				
"	Perfetti, Cartier et al. 1997		3; Case reports	4		4	4/4			0/4		nd		4/4		nd								
Powder paints	Blomqvist, Düzakin-Nystedt et al. 2005	(*)	2-; Cross-sectional	118	23	23 (21.9)	23/105*	30.5		x**		nd		nd		nd								
Pyrazolone (s.reactive dye)	Nakano, Tsuchiya et al. 2000	-	3; Case report	1		1	1/1			1/1		1/1		nd		1/1*		1						
Reactive dyes	Nilsson, Nordlinder et al. 1993	*	3; Survey	162		4* (2.5)	6/162	3.7		2/15	13.3	3/6	50.0	0/2		nd								
"	Park, Lee et al. 1991		3; Survey	309		13 (4.2)	78/ 309			nd		38/ 78		nd		13/78		5	1	7				
"	Romano, Sulotto et al. 1992		3; Case report	1		1	1/1			0/1		0/1		nd		1/1*		1						
"	Park, Lee, et al. 1990		3; Case reports	3		3	3/3			0/3		1/3				3/3*		3						
"	Alanko, Keskinen et al. 1978		3; Case reports	4		4	4/4			nd		3/4		nd		4/4*		4						
Refractory ceramic fibers [RCF]	Lemasters,Lockey et al. 1998	*	2-; Cross-sectional and longitudinal study	742	≥ 1	x*	x**			x**		nd		nd		nd								
" , phosphoric acid binder mixture	Forrester 1997		3; Case report	1		1	1/1		+	1/1		nd		nd		nd								
Rosin core solder , thermal decomposition [colophony] 8050-09-7		*			≥ 178																			
"	Burge, Edge et al. 1981		2-; Cross-sectional	45		5 (11.1)	5/45	11.1		x		nd		nd		nd								
"	Burge, Harries et al. 1980		3+; Case series	51		34	51/51*			nd		16/ 31		nd		34/51**		34						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC						
							Asthma		RADS		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	n/n	%											i(n)	l(n)	d(n)
	Ross, Keynes et al. 1997		3+; Occupational disease statistics (SWORD)	94		94	x*			x*		x*		x*									
	Gannon and Burge 1993		3+; Occupational diseases statistics (SHIFLD)	41		41	41/ 41			nd		nd		x		x							
	Maestrelli, Alessandri et al. 1985		3; Case reports	4		4	4/4			4/4		4/4				3/4		2		1			
	Malo, Park et al. 2006		4; Review	237			x			x						x							
Smoke (fires, pyrolysis products)	Greven, Krop et al., 2011	*[*]	2-; Cross-sectional	402	96	34	34/402			19/402	4.7	63/392		nd		nd							
	Almeida, Duarte et al. 2007		2-; Cross-sectional	203		24*	x**			24/203	11.8	nd		nd		nd							
	Reinisch, Harrison et al. 2001		3+; Occupational diseases statistics (SENSOR), survey	34		34	34/34			x*		nd		nd		nd							
	Moisan 1991		3; Case reports	3		3	3/3		+	1/3		1/1		nd		nd							
	Brooks, Weiss et al. 1985		3; Case reports	1		1	1/1		+	nd		1/1		nd		nd							
*, (oil fire and dust storm)	Kelsall, Sim et al. 2004	*	2-; Cross-sectional	1424		141* (10.2)	171	12.4		68/ 1341**	6.4	nd		nd		nd							
, (biomass, indoor)	Ekici, Ekici et al. 2005	()	3+; Cross-sectional	397	113	113 (28.5)	113/397			x		nd		nd		nd							
Sodium azide (powder dust) 26628-22-8	Weiss 1996	-	3; Case reports	2	2	2	2/2		+	2/2		2/2		nd		nd							
Sodium iso-nonanoyl oxybenzene sulphonate [SINOS] 123354-92-7	Stenton, Dennis et al. 1990	(*)	3; Case reports	3	5	3	3/3			0/3		2/3		nd		3/3				3			
	Hendrick, Connolly et al. 1988		3; Case report	1		1	1/1			nd		1/1		0/1		1/1				1			
	Ferguson, Thomas et al. 1990		3; Case report	1		1	1/1			nd		nd		nd		1/1				1			
Sodium metabisulfite [metabisulfite sodium] 7681-57-4	Pugnet, Lodde et al., 2010	(*)	3; Case report	1	6	1	1/1			nd		1/1		1/1		nd							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC						
							Asthma		RADS		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type		
							n/n	%	n/n	%											i(n)	l(n)	d(n)
	Steiner, Scaife et al., 2008		3; Case reports	3		1	3/3			0/2		½		½*		1/2*			1				
"	Merget and Korn 2005		3; Case report	1		1	1/1			0/1		1/1		1/1		1/1		1					
"	Madsen, Sherson et al. 2004		3; Case report	1		1	1/1			1/1		1/1		nd		1/1		1					
"	Malo, Cartier et al. 1995		3; Case report	1		1	1/1			0/1		0/1		nd		1/1		1					
"	Valero, Bescos et al. 1993		3; Case report	1		1	1/1			1/1		nd		1/1		1/1		1					
Soldering flux (fumes)	Lee, Koh et al. 1994	*	2-; Cross-sectional	150	19	0*	5/144	3,5		x**		nd		9/134**		nd							
"	Burge, Perks et al. 1979		2-; Cross-sectional survey	106		16	58			x*		nd		16/48**	33,0	9/9***							
"	Weir, Robertson et al. 1989 s.amm.chloride, s. zinc chloride		3; Case reports	2		2	2/2			2/2		2/2		2/2		2/2		1	1				
"	Stevens 1976		3; Case report	1		1	1/1			0/1		nd		nd		1/1		1					
Solvents (not specified)	Ebbehoj, Hein et al., 2008	*	3+; Cross-Sectional	292	≥ 46	0	nd			nd		nd		nd		nd							
"	Toren, Balder et al. 1999		2-; Case control study	294		38	x*			x*		x*		nd		nd							
"	Cakmak, Ekici et al. 2004		3+; Cross-sectional	411		*	202/ 411*	49,1		x*		nd		nd		nd							
"	Henneberger, Derk et al. 2003		3+; Case series	8		8	8/8			x		x		nd		nd							
" , glue	Chatkin, Tarlo et al. 1999	(*)	3+; Occupational diseases statistics (WCB)	5	5	5	5/5			(+)**		nd		x*		nd							

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																	
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC								
							Asthma		RADS													Reaction type		
							n/n	%	all affected cases: + or at least one out of several cases: (+)	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)		
Spray paint	Brooks, Weiss et al. 1985	-	3; Case reports	3	3	3	3/3		+	3/3		3/3		nd		nd								
Styrene monomer 100-42-5	Lorimer, Lilis et al. 1976	*	3+; Survey	488	≥ 3	x*	56/488*	11.0		163/451*	36.1	nd		nd		nd								
"	Hayes, Lambourn et al. 1991		3; Case report	1		1	1/1			0/1		1/1		1/1		1/1								1
"	Moscato, Biscaldi et al. 1987		3; Case reports	2		2	2/2			0/2		2/2		nd		2/2		2						
Sulfur dioxide 7446-09-5	Andersson, Knutsson et al. 2006	*[*]	2-; Cross-sectional	674	86	35 (5.2)	35/ 674	5.2		nd		nd		nd		nd								
"	Koksal, Hasanoglu et al. 2003		3+; Survey	69		10 (14.5)	55/ 69*	79.7		nd		nd		10/69**		nd								
"	Andersson, Nilsson et al. 1998		3+; Case reference study	186		33**	x*			x*		x*		x*		x*								
"	Härkönen, Nordman et al. 1983; Piirilä, Nordman et al. 1996		3+; Case series with follow-up	9		7	9/9		(+)*	6/9		4/7		nd		nd								
"	Tarlo and Broder 1989		3; Case report	1		1	1/1			x*		1/1		x*		nd								
Sulfathiazole 72-14-0	Rosberg 1946	-	3; Case reports	2		2	2/2			nd		nd		nd		2/2*								
Swine confinement		**			≥ 371																			
"	Vogelzang, v. d. Gulden et al. 2000		2-; Cohort study with 3-years follow-up.	171		12*	82/171			x**		12/82	15	x**		nd								
"	Reynolds, Donham et al. 1996		2-; Longitudinal study with 5years follow-up	151			x*			x*		nd		x*		nd								

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																			
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC									
							Asthma		RADS		n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	Reaction type					
							n/n	%	n/n	%											i(n)	l(n)	d(n)			
"	Schwartz, Donham et al. 1995		2-; Population based longitudinal cohort study	168			x**,**			x**,**		nd		x**,**		nd										
"	Preller, Heederik et al. 1995		2-; Cross-sectional	194		x*	94/194	48.4		x*		nd		nd		nd										
"	Radon, Büsching et al. 2002		2-; Cross-sectional	2278		554 (24.3)*	x			x**		nd		nd		nd										
"	Vogelzang, van der Gulden et al. 1998		3+; Longitudinal study with follow-up	171			82/ 171			x*		nd		nd		nd										
"	Dosman, Lawson et al. 2004		3; Case reports	4		4	4/4			0/4		3/4		nd		nd										
"	Cormier, Coll et al. 1996		3; Case report	1		1	1/1			+		1/1		1/1		nd										
Tall oil	Tarlo 1992	-	3; Case report	1	1	1	1/1			0/1		1/1		1/1**		1/1*		1								
Tear gas	Hill, Silverberg et al. 2000	-	3; Case report	1	4	1	1/1			+		1/1		nd		nd										
"	Bayeux-Dunglas, Deparis et al. 1999		3; Case report	1		1	1/1			nd		1/1		nd		nd										
"	Roth and Franzblau 1996		3; Case report	1		1	1/1			+		1/1		nd		nd										
"	Hu and Christiani 1992		3; Case report	1		1	1/1			+		1/1		1/1		nd										
Terpene (3-carene) 13466-78-9	Eriksson, Levin et al. 1997	-	3+; Cross-sectional	38	1	0	0*			x**		nd		x***		nd										
"	Seaton, Cherrie et al. 1988		3; Case report	1		1	1/1			nd		nd		0/1		1/1		1								
Tetrachloroisophthalonitrile (fungicide)	Honda, Kohrogi et al. 1992	-	3; Case report	1	1	1	1/1			0/1		1/1		1/1		1/1										1
Tetrahydrothiopene 110-01-0	Baur and Bittner 2009	-	3; Case reports	2	2	2	2/2			2/2*		nd		nd		nd										

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC						
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)
							n/n	%	all affected cases: + or at least one out of several cases: (+)													
Tetramethrin [1-(5-tretrazoly)- 4-guanyl-tetrazene hydrate] 7696-12-0	Vandenplas, Delwiche et al. 2000	-	3; Case report	1	2	1	1/1			0/1		1/1		nd		1/1				1		
"	Burge and Richardson 1994		3; Case report	1		1	1/1			0/1		1/1		nd		1/1			1			
Tributyl tin oxide [carpet fungicide]	Shelton, Urch et al. 1992	-	3; Case report	1	1	1	1/1			0/1		1/1		nd		1/1	1					
Triethanolamine 102-71-6	Savonius, Keskinen et al. 1994	-	3; Case report	2	2	2	2/2			0/2		1/2		2/2		2/2		1		1		
Tungsten carbide 11130-73-7	Bruckner 1967	-	3; Case report	1	1	1	1/1			nd		nd		nd		nd						
Turpentine 8006-64-2	Dudek, Wittczak et al., 2009	-	3; Case report	1	1	1	1/1			0/1		1/1		nd		1/1			1			
Uranium hexafluoride 7783-81-5	Brooks, Weiss et al. 1985	-	3; Case report	1	2	1	1/1	+		nd		1/1		nd		nd						
"	Frigas, Filley et al. 1981		3; Case report	1		1	1/1			0/1		nd		nd		1/1	1					
Urea (fume) 57-13-6	Cockcroft, Hoepfner et al. 1982	-	3; Case reports	2	2	2	2/2			0/2		2/2		nd		2/2*		1		1		
Urea formaldehyde foam 64869-57-4 Phenol-formaldehyde resin 9003-35-4	Bertrand, Simon et al. 2007	-	3+; Cross-sectional	89	0	0	3/80	3,7		0/89		nd		nd		nd						
Vanadium 7440-62-2		*			90																	
" , divanadium pentoxide 1314-62-1	Irsigler, Visser et al. 1999		2-; Case control study	375		12	40/ 375			3/ 40		12/ 40		nd		nd						
" "	Pistelli, Pupp et al. 1991		3+; Survey	11		7	x*			0/11		7/11		nd		nd						
" "	Esterhuizen, Hnizdo et al. 2001		3+; Occupational diseases statistics (SORDSA)	8		8	x*			x*		x*		nd		x*						
" "	Kielkowski and Rees 1997		3+; Occupational diseases statistics	333		59	59/ 333			52/ 326		nd		nd		nd						
" "	Musk and Tees 1982		3; Case reports	4		4	4/4			3/4		2/4		nd		nd						
Welding fumes	El-Zein, Malo et al. 2003	**	2+; Epidemiological prospective cohort study	194	≥ 160	5	14/ 193			22/ 194		46/ 194		nd		nd						

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)															
							WORK-RELATED SYMPTOMS				LFT		NSBHR		SFT		SIC					
							Asthma		RADS <small>all affected cases: + or at least one out of several cases: (+)</small>										Reaction type			
							n/n	%											n/n	%	n/n	%
"	Jafari 2004		2-; Case control	63		4	4/ 63			x		nd		nd		nd						
"	Toren, Balder et al. 1999		2-; Case control	26		26	x*			x*		x*		nd		nd						
" (see also paint)	Temel, Coskum et al., 2010		3+; Cross-Sectional	97		13	13/97			x*		nd		x*		nd						
"	Nakadate, Aizawa et al. 1998		2-; Cross-sectional	143		x*	x*			x*		nd		nd		nd						
"	Beach, Dennis et al. 1996		2-; Cross-sectional	682		x*	x*			x*		x*		nd		nd						
"	Hannu, Piipari et al. 2006		3+; Case series with follow-up	34		34	34/ 34			18/ 34		9/ 15		nd		34/ 34	9	16	9			
"	Latza and Baur 2005		3+; Occupational diseases statistics	28		28	x*			x*		nd		nd		x*						
"	Piipari and Keskinen 2005		3+; Occupational diseases statistics (SORDSA)	6		6	6/6*			nd		nd		6/6*		6/6*						
"	Karjalainen, Martikainen et al. 2002		3+; Occupational diseases statistics	14		14	14/ 14			14/ 14		nd		nd		nd						
"	Reinisch, Harrison et al. 2001		3+; Occupational diseases statistics (SENSOR), <small>survey</small>	9		9	9/9			x*		nd		nd		nd						
"	Contreras and Chan-Yeung 1997		3+; Case series	6		3	6/6			0/6		5/6		nd		3/6	3					
"	Hannu, Piipari et al. 2005		3; Case reports	2		2	2/2			0/2		0/2		1/1*		2/2**		2				
" , aluminium	Vandenplas, Delwiche et al. 1998		3; Case report	1		1	1/1			0/1		1/1		nd		1/1			1			
"	Ross, Keynes et al. 1997		3+; Occupational diseases statistics (SWORD)	22		22	x*			x*		x*		x*		x*						
"	Vandenplas, Dargent et al. 1995		3; Case report	1		1	1/1			1/1		1/1		nd		1/1*			1			
"	Keskinen, Kalliomäki et al. 1980		3+; Case series	7		5	5/7			0/7*		2/7		nd		2/3	1	1				
"	Bernstein and Merget 2006		4; Review																			
						[incidence about 3.0 - 5.0]																

Agents (specification) [synonyms] CAS No.	Publication	Strength of evidence per agent (three star system of RCGP)	Evidence grading, applied to individual study (modified SIGN system); Study type	Occupationally exposed subjects studied, n	Total no. of irritant-induced occupational asthma/ occupational COPD cases per agent	Irritant-induced occupational asthma/ occupational COPD cases, n (prevalence, %)	EVIDENCE (pathological results)																			
							WORK-RELATED SYMPTOMS			LFT		NSBHR		SFT		SIC										
							Asthma		RADS	n/n	%	n/n	%	n/n	%	n/n	%	n/n	%	i(n)	l(n)	d(n)				
							n/n	%	all affected cases: + or at least one out of several cases: (+)																	
World Trade Center disaster 2001	Wheeler, McKelvey et al. 2007	★★	2+; prospektive cohort study	25748	≥ 1420	926 (3.6)**	x*			x*		x*		x*		x*										
"	Banauch, Hall et al. 2006		2+; Longitudinal study	11766		48 [incidence (0.4)]	x			x		nd		nd		nd										
"	Banauch, Alleyne et al. 2003; Banauch, Dhala et al. 2005		2+; Prospective cohort study / review	123		20 (16.3)	20/123*	+	27/ 151		24/ 112		nd		nd		nd									
"	Mauer, Cummings et al., 2010		3+; Follow-up survey	518		65	65/518	13	nd		nd		nd		nd		nd									
"	Herbstman, Frank et al. 2005		3+; Survey	119		22 (18.5)	22/ 119		x*		nd		nd		nd		nd									
"	Salzman, Moosavy 2004		3+; Survey	240		55 (18.5)	55/ 240	+	37/ 240		nd		nd		nd		nd									
"	Prezant, Weiden et al. 2002		3+; Survey with follow-up of exposed workers			332 (3.3)	332/ 9914	+	332/ 9914		332/ 9914		nd		nd		nd									
Zinc (fume) 7440-66-6	Malo and Cartier 1987	-	3; Case report	2	4	2	2/2		2/2		2/2		nd		2/2											
"	Malo and Cartier 1993		3; Case report	1		1	1/1		0/1		1/1		1/1*		1/1**		1									
"	Kawane 1988		3; Case report	1		1	1/1		1/1		1/1		1/1		nd		nd									
Zinc chloride (fume) 7646-85-7	Weir, Robertson et al. 1989	-	3; Case reports	2	2	2	2/2		2/2		nd		2/2		2/2		2									

Remarks
1 fire inspector and 3 hazardous waste investigators exposed to fumes of acid drum waste
Welder. Co-exposure to welding fumes
Profession not mentioned. *Individual data for LFT/SFT not given
20 Workers in a mineral analysis laboratory
Hospital employees exposed to spill. *Cases for RADS sign. dose-response related, OR for RR in subjects with high exposure 9.8, ns
Maintenance fitter exposed to massive spill. *Development of interstitial pneumonitis (P+); **reversible FVC and FEV1 decline
Cannery worker
Profession not mentioned. Co-exposure to sodium hypochlorite. Resp. symptoms after 5 min inhalation; duration of asthma post exposure > 2 years
Pool cleaner; exposure to agent for 1 hour. *Severe work-exacerbated asthma
Cleaner. *LFT and SIC normal at examination 2 yrs post exposure
Lead acid battery workers.*WRS (' wheeze') ns vs. controls; **individual data not given; <u>dose-response relationship ns.</u>
Workers of battery manufacturing plants. *Cases defined as chronic bronchitis/chronic asthmatic bronchitis; sign. higher prevalence of cases in smokers (13/20) vs. non-smokers (2/13). **Individual data not given, decline of FEV1 and FVC ns vs. controls
Cleaner. *LFT and SIC normal at examination 2 yrs post exposure
Electronics instructor
4/500 OA cases in 1989-1991

Remarks
2/469 asthma claims between mid 1984 and mid 1988, identified by retrospective review; *2/2 NSBHR+ and/or BD+
Factory employees working with glue. *Individual data not given.
Exposure while making miniature planes
Worker of hearing aids industry. *SIC done twice on different days using "Aron Alpha".
Forklift operator in loudspeaker production industry
Door factory worker
15/251 OA in 1996 (physician-diagnosed). OR 1.8, sign.
2 Assembly operators in weather strips and rubber-processing factory
Solderer of electronic industry, 2 factory workers assembling lampshades
Accountant and computer representative building remote control model airplanes
Auto bodyshop worker. Preceding rhinitis
Factory workers: 1 working with glue, 1 in manufacture of earplugs, 1 producing dental fillings, 1 working with dentin primer. *Individual data not given
Worker of instrument manufacture
799 female dental assistants in Finland of whom 512 were exposed. *sign. OR 2.76 for risk of doctor-diagnosed asthma in the last 12 months vs. non-exposed group (n=287)
Dental assistant
Theatre sister handling bone cement
Mechanic in paper mill. *SIC with ink containing acrylic acid (30%), hydroxypropanolic acid (30%), bronze powder (25%), white spirit (4%), ethanol (10%); **Individual data not given.
Head-on motor vehicle accident

Remarks
Aluminum salt workers. *Average of 4.1 months of exposure before having WRS; 2/19 work-exacerbated asthma. **SIC done with al. fluoride (1 person) and al. sulfate. ***At follow-up changes of LFT and NSBHR ns. Mean aluminum dust exposure between 0.2 and 4 mg/m ³
Cleaner. Subfebrile temperature 7h after SIC
Cable joiners
Chemical plant workers. Co-exposure to N-(2,6-difluorophenyl)-5-methyl-[1,2,4]triazolol (1,5-a]pyrimidine-2-sulfonamide); *6/106 physician-diagnosed OA; **individual data not given
Ammonia workers. *FEV1 sign. reduced in symptomatic nonsmokers and high cumulative exposure group (> 50 mg/m ³ -of air-years) vs. controls, individual data not given
7/430 new-onset asthma in 1993-1996. *Individual data not given
Factory worker, engine testing operator, truck driver. Exposure to massive leaks of refrigerators/spill of tank. *Development of restr., COPD and small airway disease over the years after accident
Profession not mentioned. Massive accidental exposure, 4/4 P+, resp. symptoms persisted for 12-32 months
Solderer of industrial butter plant. Massive accidental exposure; P+; persisting severe airflow obstruction over 12 years
Profession not mentioned. Pulmonary edema with acute pulmonary distress after massive exposure
1 tin maker, 1 car radiator repair man; use of soft corrosive soldering fluxes. Co-exposure to zinc chloride (see also zinc chloride). Also 2/2 SIC+ with soldering flux (2 immediate)

Remarks
14 subjects exposed in the beauty culture industry. Co-exposure to monoethanolamine and ethylene diamine; *individual reaction type not given
Worker of poultry-food additive manufacturing (Pancoxin). Massive accidental exposure
Chemical workers. *8/18 dyspnoeic subjects with sign. obstr.; 15/92 spec. IgE+
Employees of epoxy resin plant. *Individual reaction type not given; 16/109 spec. IgE+
Bottle stopper production worker. *SFT+: immediate
Laboratory technician. *SFT done over one month
Chemical plant workers. 3/20 wheezing and spec. IgE+; 7/20 rhinitis
Assistant technician in chemical plant
Profession not mentioned. *Individual data not given
Worker of plastic manufacturing factory. SPT+ and spec.IgE+. resp. symptoms exposure
Workers of plants producing alkyde and unsaturated polyester resins. Average conc. 0.4 mg/m ³ , peaks 6.6 mg/m ³ ; *all cases in high exposed group; 7/60 chronic bronchitis (6/7 heavily exposed); 4/60 spec. IgE+,
Workers of plants producing alkyde and/or unsaturated polyester resins. Average conc. 3-13 mg/m ³ . 3/37 skin scratch test +; 4/54 spec. IgE+
Tanker driver exposed to massive spill. At follow-up after about 1.5 years asymptomatic and NSBHR-
Workers of plastic and paint industry
Chemical foreman. SPT+; spec. IgE+
Employees working with epoxy resins. *SFT done while exposed to a.) already mixed and b.) while mixing adhesives (a.1 immediate with FEV1 of 15% decline, b.1 late with FEV1 of 18% decline)

Remarks
Factory workers.*9/396 WR chest symptoms, not related to IgE+; 24/300 IgE+, related to smoking
Factory workers with epoxy resin systems. 7/7 spec. IgE+
Factory workers with epoxy resin systems. 4 yrs follow-up; 7/7 spec. IgE+ and SPT+; persistent asthmatic symptoms over 4 years in spite of avoidance
5 plastic industry workers
Workers of TMA manufacturing plant. *Individual data not given for LFT/PFT. 17/80 positive for late resp. systemic syndrome. Difference in frequency of any HLA antigens vs. controls ns
Workers of TMA manufacturing industry. Average conc. < 0.00045-1.7 mg/m³. *14/286 developed TMA-related resp. symptoms within 3 years; **Individual data not given ; 18/286 spec. IgE+; IgG sign. disease- and exposure-related
Workers of TMA factory. *Individual data not given, details of investigation see study above. **Before follow-up, 3 subjects with OA, additionally 7 new OA cases within follow-up; 9/10 spec. IgE+
Chemical plant workers. 2/14 asthma-rhinitis syndrome (mediated by spec.IgE for TMA hapten), *4/14 late-onset asthma, 2/14 both diseases; 6/14 irritant syndrome; 3/14 spec. IgE+
Maintenance fitter
5 parquet varnishers, 1 spray painter, 2 painters, 1 sales agent. 3 subjects also dermatitis. 4/7 SIC+ also SPT+;4/7 SIC+ with rhinitis
Spray painter. *5% across-shift drop in PEF rate; contact dermatitis
Profession not mentioned. Average conc. 2-5 mg/m³. *Asthma type at onset of symptoms: 6 immediate, 16 late, 6 dual
Factory worker. Resp. symptoms after a latency period of 7 years; SPT negative
Workers of plastic industry. *For 2/4 subjects individual data not given.

Remarks
Factory worker
Profession not mentioned
Medical, surgical and paediatric nurses
Worker in cleaning products manufacturing
Worker of chemical factory
Profession not mentioned
Acute accidental exposure to fumes, with low density phosphate, sodium metasilicate, chloride 18%. Patient tested 6 years after accident
Non-occupational exposure during single hot tube bathing for 5-10 min
Accidental release of fire extinguisher content. 1/4 subjects with exacerbated asthma
Accidental exposure to fumes, caused by leak of a tank (belonging to a fire extinguishing system). Obstructive lung patterns for > 7 years; BD+
Cadmium workers. *33/101 FEV1 or FEV1/VC sign. reduced (average 30% below predicted), cumulatively dose-related; lung function and chest X-ray indicate emphysema in 14/75
Battery workers. Data consisting of previous and *current results (3 years later, see in brackets). sign. reduction of cadmium in-air-levels achieved; sign. reduction of resp. symptoms and sign. improvement of LFT. **Asthma was not a spec. target. ***Definition of WRS not specified
Furnace worker producing cadmium salts and -oxides. Chest X-ray and lung function indicates emphysema. Severe impairment of symptoms within 10 years of follow-up. Additional development of pulmonary adenocarcinoma
Workers of cadmium pigment manufacturing plant. *Asthma cases with moderate and severe emphysema. 6/12 with chronic cadmium poisoning, of these 2/6 with asthma and LFT+

Remarks
Workers of chalk powder plant. sign. highest FEV1/FVC decline in workers of chalk sacking correlated with sign. dose-response relationship, *individual data not given
Profession not mentioned. Persistent asthmatic symptoms for 1.5 to 3 years; 1/2 co-exposed to welding fumes; *individual data for not given
Chemical worker
Workers of rubber factory with exposure to carbon black dust. 25% of them wheezing sign. associated with work-exposure. *FEV1 and SFT results not listed in detail. SFT: post-shift parameters 73.97+/- 11.97) sign. different from pre-shift (77.76+/- 13.29).
Employees in the cement production industry. 252/4265 had self-reported or diagnosed asthma. 15 with diagnosed asthma and FEV1/FVC \leq 0.7. 139 with chronic bronchitis.
117 cement workers vs. 105 controls. *22/117 COPD (18.9% vs. 4.8% of controls), sign. dose-response relationship for asthma symptoms (10mg/m ³ daily for \geq 2 years) and the risk of developing COPD (10mg/m ³ daily for \geq 10 years)
412 portland cement workers vs. 179 controls. Dyspnea sign. increased (8.7 vs. 7.2% of controls); wheezing also sign. increased (7.6 vs. 6.2% of controls); *LFT sign. reduced (FVC, FEV1, FEF50, FEF75) with individual data not given
Cement workers. *COPD increased (4.1% vs. 3% of controls); **dyspnea sign. increased (5.4% vs. 2.7% of controls); no sign. lung function changes, individual data not given
Former Portland cement workers . *14.3% COPD cases with mean reduction of FEV1/FVC of 74.3%, sign.; prevalence of COPD ns vs. controls (exposed to ammonia, high risk of confounding) ; **attacks of dyspnea selected as asthma symptoms

Remarks
67 cement workers vs. 134 controls. *4/67 asthma symptoms (6% vs. 3% of controls); 9/67 bronchitis; other chronic resp. symptoms: dyspnea 14/67 (20.9% vs. 4.5%). **individual data not given
Cement factory workers. *Sign. post-shift reduction in FEV1, FEV1/FVC, FEF25-75 with exposure related decreases compared to controls.
Cement workers. *COPD sign. increased (11.2% vs. 4.3% of controls); wheezing sign. increased (7.4% vs. 3.7% of controls, more pronounced in smokers); *high risk of selection-bias/ confounding because study based on questionnaire
Workers of a cement factory. 14/53 chronic bronchitis; *individual data not given; high risk of confounding and selection-bias, because inadequate description of controls and **asthma diagnose based on questionnaire (32.1% vs. 8.5% of controls, ns)
Portland cement workers; asthma symptoms sign. dose-response related; *individual data not given; high risk of confounding and selection bias.
Leather tanning worker. SPT+ with potassium dichromate
Floorer. *SIC with potassium dichromate;**SFT done for 50 days (17 days at work, 33 days off work); first symptoms after 34 years of exposure
Roofer. *SIC with potassium dichromate
Worker of metal plating factory. Spec. IgE+
Workers of ceramic producing factory. Detailed results not listed. *7/33 with wheezing, asthma symptoms sign. higher than in controls. ** no sign. difference in LFT and SFT between exposed and controls.
Workers of ceramic factory. LFT results not listed in detail. Mean LFT lower than in controls but not significant. 37/176 with chronic obstructive pulmonary symptoms.
Brewery workers. Recovery after removal; 7/7 SPT+ done with clortol
Co-exposure to halazone; *1/6 RADS
Cleaner

Remarks
Laboratory workers. *1/2 with normal LFT only nasal provocation test (positive) 2 cleaners, 2 technicians, 1 nurse. 4/4 SPT+
1 nursing auxiliary with *NSBHR+ and FEV1 decline of 13% after SIC; 1 midwife with **SIC+ and **SFT+
Workers of U.S.pulp/ paper mills (RR 1.3, sign. for new asthma cases). *Individual data not given. **Annual incidence 0.16 vs. 0.13% of controls. Additionally 5/447 new asthma cases in group of gassed (highly exposed) workers *99 workers of paper department and 210 workers of bleaching department exposed to gassing (Cl ₂ /ClO ₂ , also to SO ₂). HR 5.6, sign., for gassing as a strong risk factor of asthma **38/239 workers from the smelting area with accidental puffs over a 3 year period. *9/239 current asthma; ***LFT (FEV ₁ , FVC, FEV ₁ /FVC) and NSBHR sign. lower and increased respectively in group with >10 puffs compared to other exposed groups; 3/239 chronic bronchitis 289 construction workers. After multiple exposures, *71/289 with resp. symptoms and possible RADS; at follow-up 18 to 24 months **51/58 symptomatics underwent pulmonary testing; ***29/51 with obstr. and/ or NSBHR+ 13/278 workers of metal production plant with accidental exposure. *3/13 transient FEV ₁ or NSBHR deterioration 5/469 asthma claims between mid 1984 and mid 1988 identified by retrospective Review. *All 5 cases accident-related with BD+ and/or NSBHR+; **1/5 RADS 139 men of a chlorine gas-production plant Pulpmill workers. Co-exposure to sulphur dioxide. *7 COPD, *1 asthma (physician-diagnosed) Worker of water-filtration plant.*Persistent symptoms and steroid medication until 5 months after accidental inhalation; P+ Profession not mentioned. Persistent asthmatic symptoms for 6 months; *individual data for LFT/SFT not given.

Remarks
Policemen exposed to chlorine gas spill. resp. symptoms > 2.5 years
6 restaurant employees and 1 refrigerator maintenance worker; refrigerator fluid spill
Workers who inhaled HCFC accidentally. *11/15 workers with restrictive ventilatory abnormalities (FVC <80%). LFT done at 3 days post-exposure, except for 1 worker, all ventilatory impairments recovered within 3 months.
2 workers of concrete industry, 1 tanning, 1 metal plating, 1 construction worker. *SIC done with potassium dichromate Stone mason. *individual data not given. **SIC done with chrome dust, reaction type not given; asthma onset after 8 years of exposure, contact dermatitis after 3 years; SPT+/spec IgE+ to potassium dichromate and nickel sulfate
2 electro-plating, 1 welder, 1 cement worker. *SIC done with potassium dichromate. 3/4 co-exposure to nickel with 2/3 SIC+ to nickel. 2/4 SPT+ to chromium and nickel
Electro-plating employee. Co-exposure to nickel sulfate, gold and silver. SPT+ to NiSO4 and potassium dichromate. *SIC done with potassium dichromate, additionally SIC+ to NiSO4 (dual reaction type)
1 worker with accidental exposure of a chrome pellet manufacturing plant. 1/1 SPT+ to potassium dichromate
2 metal plating, 1 construction worker, 1 worker of cement industry. *SIC done with potassium dichromate
Metal plating worker. SIC done with chromium sulfate, additionally SIC+ to nickel sulfate (late reaction type)
Chromium plating. Asthma with subsiding dermatitis; *1/1 SPT+ with potassium dichromate

Remarks
Nurses or nurses related occupations. Population-based study in the Community Respiratory Health Survey (ECRHS II). *60/332 nurses exposed to ammonia and/ or bleach with new onset asthma (RR 2.16, sign.)
* 761 current employees of cleaning companies in Barcelona. 81 had current work-related asthma (OR=1.9), 95 (13%) had chronic cough (OR=1.8) and 83 (11%) were wheezing (OR=1.3). All irritant cleaning products were associated with a higher risk of asthma.
Food industry cleaners. *Results vs. controls; exposure mainly to chlorine and nitrogen trichloride; sign. dose-response relation between upper resp. symptoms and exposure level
Workers of different cleaning professions. *22/40 cases tested for BHR, not clear if cases with NSBHR+ additionally asthma symptoms; **2/35 COPD cases, not clear if work-related; asthma symptoms associated with high level ammonia exposure (OR 3.1.sign.)
593 women (13%) employed in domestic cleaning work. *Inadequate, because cases not given, asthma sign. more prevalent than in non-cleaning workers (OR 1.46); **prevalence of WR resp. symptoms in cleaning workers 12% vs. 5% in non-cleaning workers
*236/1915 OA cases 1993- 2001. 189 new-onset asthma including **42 cases of RADS; ***individual data not given
22/430 new-onset asthma in 1993-1996. *Individual data not given.
Profession not mentioned. Low dose irritant-induced asthma; *BD+
Worker of bottle-filling process with cleaning agents. Low dose irritant-induced asthma. At follow-up 6 months after leaving the workplace cessation of symptoms and NSBHR
Housewife. Symptoms started 6-8 weeks after mixing several cleansing agents to unstop a kitchen drain
*22 year old cleaner with preexisting asthma. Immediate-onset asthma followed by toxic lung oedema

Remarks
Cobalt production workers. Co-exposure to nickel; *15/110 suspected asthma cases by questionnaire (sign.), high risk of confounding
Former and current hard metal industry workers. *Asthma cases were not a spec. target. **Low cobalt concentration (<50micg/m³) as a sign. risk factor. Relation between sensitivity to cobalt and asthmatic symptoms not sign.
Saw filers.*Asthma cases were not a specified target; **wheezing sign. related to work; ***sign. FEV1<80% only for tungsten carbide wet grinding (current job) with average cobalt exposure of 5,6micg/m³. ****sign. FEV1 drop >5% average change
Tungsten carbide production workers. *WR wheezing dose-response related (Cobalt>50micg/m³, OR 2.1, sign.); **workers with asthma symptoms more affected with obstr., but no further specification
Cobalt industry workers. *For a case definition either LFT+ and/or NSBHR+; **5/6 SIC with cobalt chloride, 1/6 SIC with cobalt dust, individual reaction types not given
9 cobalt industry workers. 3 year follow-up: 1/9 still exposed (with obstr.), 7/9 NSBHR+, 1/1 SIC+ (late reaction type)
Workers in shaping, grinding, sintering. *SIC with cobalt chloride; 4/8 IgE+
Workers in grinding, sintering, powdering. *SIC with cobalt chloride; 6/12 spec.IgE+
Hard metal plant workers. **SIC with cobalt chloride; *NSBHR before SIC with nickel; 6/8 SPT+; 5/8 spec.IgE+; co-sensitization to nickel sulfate
Diamond workers. *SIC done with cobalt powder 4/500 OA cases in 1989-1991
Worker of glassware factory. After SIC also systemic response Diamond grinder
Diamond polishing disc former. SIC with cobalt chloride; SPT+ with cobalt chloride

Remarks
Largest work population in hard metal industry; *SIC+ (mostly late)
Workers exposed to coffee dust. *In both cases, asthma was work-exacerbated and IgE mediated, ** SFT could not be performed in 5 workers due to respiratory complaints.
7/372 new onset asthma; *exposure-time-related FEV1 decline; 35/362 SPT+; 24/331 IgE+
9 coffee industry workers; SIC done with aqueous extract; 5/9 symptomatics SPT+; 4/9 BD+
Factory worker (at machine roasting green coffee beans). Asthma symptoms after 3-4 years of work. SPT+, spec.IgE+ for roasted coffee beans
Worker in coffee-roasting establishment. Spec.IgE+, SPT+
Construction workers (CW) with new OA between 1991-1995 in Pirkanmaa region of Finland from register of *Employment Pension Fund of CW and hospital records. OR for OA of male and female workers: 1.81, sign. and 2.5, sign. respectively (compared with Pirkanmaa population);
Tunnel workers. *COPD cases: 14.2% vs. 8% of controls with OR 2.5, sign.; **Mean FEV1 decline 74.4% for exposed, individual data not given
Construction workers exposed to different agents (inorganic dust, irritants, fumes, wood dust). *COPD cases within the follow-up 1971-1999; ** individual data not given; increased mortality rate from COPD, except for wood dust, RR 1.12, sign. (n=523)
Finnish carpenters and painters. Higher association between outdoor painting and chronic bronchitis than indoor painters and carpenters. 63/793 with chronic bronchitis.
Construction workers (laborers, tunnel workers, operating engineers). *Not clear, if obstruction correlates with WRS.

Remarks
15-yr follow-up of 447 cotton textile workers. *25-33% chest symptoms; 67/447 dyspnea; **across-shift FEV1 decline is correlated with longitudinal FEV1 decline, also FVC decline
Workers in a textile manufacturing company. * 32.5% with wheezing.; **44.4% abnormal lung function using auscultation findings, spirometry test results not listed but 54/194 (27.8%) with severe respiratory obstruction (FEV1<65%)
Cotton-spinning mill workers. *74/74 subjects with sign. FEV1/FVC% declines across-shift and current endotoxin exposure-related; **sign. NSBHR+ increase across-shift; ***individual data not given
Workers of textile cotton industry. *Asthma cases not mentioned; **sign. elevation of resp. symptoms (chronic cough 18.3%, chronic bronchitis 21.7%); *** in baseline preshift ns; ****sign. FEV1, FVC mean decline across-shift (-2.07 vs. 0.05%) and also sign. in FEF25-75 (-0.03 vs. 0.18)
Cotton mill workers. *Individual data not given; **dose-response relationship across-shift ns; duration of exposure over years with prevalence of asthma sign. correlated; 100/595 cases with byssinosis
22/294 OA cases in 1996 (textile factory workers) with OR 1.9, sign.; *individual data not given
Textile cotton workers. **Decline of FEV1 >20,0% ns, 4/34 >10% FEV1 decline after NSBHR testing NSBHR. FEV1 decline dose-response related to endotoxine
Cotton mill workers. 31/101 SPT+(atopics); *asthma or asthma symptoms were not a specific target; **sign. longitudinal decline in FEV and FVC in overall group (atopics/ non-atopic) after 12 and 18 months of follow-up; ***sign. FEV1 decline at highest methacholine dose in atopics after 18 months; ****trend of greater FEV1 decline cross shift in atopics.
Workers of a cotton-yarn factory. sign. prevalence of 24/91 subjects with asthma symptoms (26.4% vs. 8.5% in controls) and 25/91 (27.5% vs. 9.5) with chronic bronchitis;* individual data not given

Remarks
Cotton mill workers. *Increase in non-spec. BHR during follow-up in the atopic group (for cotton dust SPT+), -8.1% vs. -4.2%, ns. **FEV1 decline across-shift 3.3% and 5.2% after 1 year for atopics, for NSBHR and SFT individual data not given; exposure range of cotton dust 0.2 - 2.01mg/m ³ , of endotoxin 0.004-1.73 µg/m ³
Cotton mill workers. *SIC with cotton samples in experimental cardroom, sign. mean FEV1 declines in 8/15; FEV1 declines and symptoms related to endotoxin exposure; dose-response relationship between cotton dust level and individual FEV1 changes ns
Profession not mentioned
Toolsetter. *SFT over a period of 5 months; **also SIC+ with reodorant (immediate), heated colophony (immediate) and artists' turpentine (immediate)
Assemblers, pressmen and other mold room workers. use of an epoxy resin system; *sign. FEV1 and FEF50 decreases across-shift and cross-week of slightly exposed and symptomatics
Salesman selling industrial floor-covering materials
Workers manufacturing flourine polymer precursor. 9/43 spec.IgE+; *hospital admission 2/45 for LFT and SIC
Production of photocopy paper. *SIC with diazonium chloride
Iranian veterans. Single massive exposure 10 years ago; 116 with chronic bronchitis, *89 COPD cases
Cook. Persistent asthma
Cook. First, symptomless in between usages; after repetitive use of insecticide within years, development of asthma symptoms independantly of usage.
*COPD mortality cases of railroad workers. *75/536 conductors and engineers with exposure ≥ 16 years of operating trains had a sign. increase in COPD mortality (OR 1.35 (1.17-2.39)), sign. dose-response relationship.**For workers employed after 1945 after the conversion to diesel locomotives, the risk of COPD mortality increased by 2.5% (sign.) for each additional

Remarks
7/424 OA cases between 1993-1995 (7/123 RADS)
Railroad workers. RADS after a high exposure over several hours in second locomotive units 2/3 "reversible restrictive" ventilation pattern; twice hospital administration after high exposure
Aircraft engine mechanic. *SFT done over a 50 days' period with sign. PEF decline over 5-day working week and improvement on weekends
Metal worker. *SFT for 12 days
Steam leak in heating system of a State office building, 7 asthma cases and 7 suspected asthma cases
Spray painter
Profession not mentioned, occupational exposure to hardeners in paints. Co-exposure to HDI
6/234 symptomatics developed RADS after massive release from a railroad tanker; 207/234 shortness of breath, 151/231 wheezing after massive exposure
Laboratory nurse. Also SIC+ with methyl blue (immediate) and Patent Blau V; SPT+ to methyl blue, Patent Blau V, methylene blue
Technician. SIC+ also with methyl blue (immediate)
8/430 new-onset asthma between 1993-1996. *Individual data not given
Maintenance and production workers of fiberglass manufacturing. Co-exposure to phenolics and formaldehyde. *6/37 new-onset asthma; **FEV1 and FVC reduction exposure-related; ***endotoxin-related PEF decline across-shift with SFT over 10 days

Remarks
<p>*49.2% of asthma attributable to ETS (workplace + home) during the past year (among 239 ETS-exposed). 8% attributable fraction for the whole working-age population (n=487), resp. in asthmatics lifetime workplace ETS sign. increased, OR 2.16, > 150 cigarette-years adjusted OR 2.21. In total population for lifetime workplace ETS OR 1.84; **no individual data given.; ***SFT for 2 weeks</p>
<p>Cohort of n=3914 in 1977 and again in 1987. ETS in the workplace increases asthma sign., OR 1.45; *45 subjects with new onset asthma between 1977 and 1987; **individual data not given</p>
<p>Population-based sample. COPD sign. increased (OR for > 23 yrs workplace ETS 1.36); population-attributable fraction of ETS exposure at work = 7%; subpopulation n=47: *42/47(89.4%) obstructive ventilation pattern</p>
<p>Coffeeshouse workers (86% smokers). *Airway disease cases with sign. higher risk of prevalence vs. controls (OR 5.35, sign.), especially for smoking personal (OR 4.52, sign.); **individual data not given; sign. time exposure relationship (OR 3.59 < 4yrs., sign.; OR 7.89 >13yrs., sign.)</p>
<p>Sample of population-based ECHRS. Increased asthma: OR for ETS at home and in the workplace 1.5; chronic bronchitis (OR 1.9) sign. increased</p>
<p>Never-smoking workers. Asthma was not a spec. target. **Individual data not given. Sign. dose-response relationship to high level exposure of ETS, increase of resp. symptoms and FEV1-, FVC- declines at work (OR 3.09-3.12 for FEV1, sign., and OR 2.47-2.53, sign.)</p>
<p>Subjects of 36 centers in 16 countries. ETS in the workplace associated with resp. symptoms and current asthma OR 1.9, sign.; NSBHR+ dose-related trend with ETS; *individual data not given</p>
<p>Population-based sample of ECHRS resp. work disability; increased asthma PR for workplace ETS, OR 1.8; workplace ETS associated with NSBHR+ and WRS; *individual data not given</p>
<p>ETS in the workplaces increased asthma cases, OR 1.5 sign.; *individual data not given</p>

Remarks
Mould maker and fitter
Factory workers with EDA exposure of 8 years or more. *High risk of confounding bias, not clear if WR-asthma cases. 38/337 EDA rhinitis, coughing and wheezing; mean latency period for symptoms 15.2 months; 6/38 sensitized had asthma
6 shellac handlers and 1 rubber industry worker. *Individual reaction types not given
Worker of laundry powder industry with 14 years of work before symptoms started.
2 chemical workers. 2/2 i.c.+
Chemical workers; co-exposure to other amines. *Asthma type according to onset of symptoms: 1 late, 2 dual; **individual data not given
Photography laboratory worker. SIC+ also with sulphur dioxide (immediate)
Worker of railway station
factory worker. 1/3 spec.IgE+; *individual reaction type not given
Follow-up of Swedish farmers. * Lung function parameters not listed in detail (mean FEV1: 100+/- 15). 27/36 farmers with non-IgE mediated asthma. The farmers with non-IgE-mediated asthma had significantly lower FEV1 and VC than the IgE-mediated asthma cases: FEV1 76% of predicted versus 97% of predicted. 27 workers had chronic bronchitis.
Polish farmers. SIC with grain dust, animal epidermis, furs and feathers; sign. risk factors of resp symptoms, cereal farming, animal breeding; 47/100 SPT+; *individual data not given

Remarks
Norwegian farmers. *asthma sign. elevated in cattle and pig farmers (OR 1.8 or 1.6); exposure to endotoxines, fungal spores and ammonia pos. associated with non-allergic asthma
20 468, and 20 898 farmers (pesticide applicators). 3838 wheezing; OR for wheeze 1.26 (dairy), and 1.70 (eggs); wheezing sign. dose-response related for poultry and number of livestock; OR for driving diesel tractor: 1.31 (sign.), for solvents 1.16-1.33 sign.
Farmers, growing grain crops and raising livestock. *36 asthma cases correlated with cumulative dust exposure with OR 1.05, not sign.; **individual data not given. sign. dose-response relationship associated with reduction of FEV1 and FEV1/FVC (%) and cumulative dust exposure
Farmers of New York State. Data from telephone interviews with questionnaire. *Asthma cases were not a specific target. **Participants were asked for occurrence of wheezing in the past year. Despite smoking and allergic reaction, sign. predictors for wheeze were having goats, more acreage in corn for silage
Farmers of Norway. *Cases of self-reported asthma with 'current asthma'. sign. relationship between animal production and prevalence of current asthma without family history with OR 2.16, sign. **Individual data not given. Another important risk factor for asthma was an asthma family history
Farmers. 607 dyspnea, 500 wheezing; *sign. declines of FEV1, FVC, FEV1/VCV with individual data not given
Pig farmers. *Individual data not given;** NSBHR sign. increased (46% vs. 17% of controls); FEV1 sign. reduced; endotoxin-associated with BHR or lower lung function
58/105 participants of sample of European never-smoking farmers' study reported wheezing. 18 COPD; COPD sign. dust-related

Remarks
40 pig farmers (Denmark) and 36 poultry farmers (Switzerland), randomly chosen subsample out of a European study (n=3544). Asthma was not a spec. target; *spec. asthma symptoms not given; **individual data not given;***sign. Lower FEV1 and MMEF25-75 of farmers with symptoms; sign. lower lung function (FEV1, FVC, MMEF25-75) of pig farmers with higher temperature (>19°C) inside the pig houses
Grocery clerk. RADS for 14 months
Workers of chemical factory. *Asthma was not a specific target. **Neither wheezing, nor other resp. symptoms were sign. different from controls; ***FEV1/FVC decline in exposed groups
230 formaldehyde workers.; 5 Case reports, *individual data only given in 3 cases
1 plastic molder, 1 printer, 1 formaldehyde manufacturer, 1 medicine packer, 1 farmworker, 6 printers/ laminators of flexible packaging, 1 laminated tray worker, 2 core shop workers; 9/15 subjects co-exposed to isocyanates
4/306 OA cases in 2002. *Individual data not given
Textile factory worker. *Workplace challenge; average workplace-conc.: 6 ppm, several short-term peaks of 0.12-0.13 ppm
1 chemist, 1 carpenter, 1 wood chips factory worker
Neurology resident. P+
Nurse

Remarks
Workers of iron- (93%), steel- (3%), or metal- (4%) foundry. Exposure to silica dust, metal fumes, organic combustion products, engine exhaust, pyrolysis products; *within follow-up, 886 deaths with sign. increase of resp. diseases (mainly: chronic bronchitis/emphysema, pneumoconiosis)
Foundry workers (molding/core making). *Asthma was not a spec. target; **complaints of upper resp. symptoms which show a dose-response relationship to cumulative furan resin sand exposure; ***24/28 with sign. FVC (but not FEV1) decline over a work shift
Foundry workers. *COPD cases selected for study with sign. increased risk, OR 12.0; exposure mainly to mineral dust and irritant gases
Foundry workers. *Asthma was not a spec. target. **sign. prevalence of chronic bronchitis symptoms in exposed group (21.1% vs 10.2%); ***individual data not given
Refrigerator company worker. After massive exposure resp. symptoms with dypnoe, cough and blood-stained sputum; development of pulmonary inflammation, death by myocardial infarction one month later
Refrigerator company worker. Asthma aggravation at work for two years
Housewife fumigating her kitchen. Duration of symptoms for 6 months
Mold maker. *3 SICs+ (late): furfuryl alcohol combined with acid catalyst, sulfuric acid, or butyl alcohol
Nurses of endoscopy units throughout the UK. *Asthma was not a specific target. **WR chest tightness. ***Individual data not given.
Hospital employees. *SIC done in 8/13 with LFT+, individual data on reaction type not given, 2/13 IgE+ and 3/13 false positive IgE
74/1765 physician-diagnosed asthma cases in 1996
Workers of endoscopy and X-ray departments

Remarks
6/500 asthma cases in 1989-1991
Employees of endoscopy unit. *1 subject with breathlessness
Laboratory technician
Radiographers. *Individual data not given; **SIC done with 11% glutaraldehyde solution in first patient (+); in second patient with SIC-solution of 1 and 2% and additionally with fixative solution (SIC+, imm.), containing acetic/hydrochloric acids
Nurses of endoscopy units. *SIC with alkaline glutaraldehyde
7/294 OA cases in 1996. OR 4.2, sign.; *individual data not given
Workers of grain processing and animal feed industry. sign. higher annual FEV1 decline in workers with 5-10 years of exposure vs. workers <5 years of exposure; sign. dose-response relationship to grain dust (>4mg/m ³) / endotoxin (>20ng/m ³) and rapid annual FEV1 decline (>90ml/s), OR 3.3/OR 3.2, sign.
Grain workers. *FEV1 sign. reduced and sign. endotoxin dose-related
Workers of grain elevator terminals. Increased chest symptoms; across-shift and -week decrease in FEV1 and FVC (FEV1 drop of > 10% in 4.3% of the survey)
Grain elevator industry workers. 78 with WR breathlessness; 35 (7.0%) wheezing and breathlessness without cough, 20 (4.0) with cough, breathlessness and wheezing
51 grain elevator workers out of 175 with resp. symptoms. *Most severe (n=31) symptoms associated with sign. FEV1 decline; 31/51 SPT+(settled barley dust), 61% vs. 32% of controls
Grain workers. *Asthma was not a spec. target; **individual data not given; trend of increased annual declines in FEV1 and FVC. Trend of dose-response relationship
1 farmer, 1 manager of grain warehouse (SIC with wheat dust); *SIC in workplace with rye dust
across-shift and chronic decreases in lung function exposure-related

Remarks
<p>Rice handlers, processors from granaries. *Asthma cases: 4.2%(n=20) vs. 3.0%(n=7) of controls, ns. **sign. higher prevalences of resp. symptoms (e.g chronic cough/bronchitis/phlegm.) in exposed group. ***Individual data not given, no sign. FEV1/FVC changes in exposed vs. controls.****Trend of higher FEV1 decrements across-shift in exposed. Range of rice dust concentration at workplace 6.6mg/m³- 59.8mg/m³.</p>
<p>6/306 OA cases in 2002. *Individual data not given</p>
<p>High risk occupations for WRA. *sign. increase for workers exposed to agents with low-molecular-weight, OR 1.58; Highest sign. risk of WRA was nursing, OR 2.22; exposure to cleaning products also associated with sign. high risk of WRA, OR 1.80</p>
<p>*Majority of cases were nurses (63%) working in hospitals. **Individual data not given. Nurses affected by latex (33%), cleaning products (21%), glutaraldehyde/ formaldehyde (19%)</p>
<p>Physicians, nurses, respiratory and occupational therapists co-exposed to different clinic-related chemicals. Population from survey conducted in 2004. * 74/206 (3.3) had work-related asthma, 41/206 (1.1) had work-exacerbated asthma, 33/206 (0.8) had occupational asthma. Significantly elevated odds of OA after exposure to chloramines OR (4.84)</p>
<p>448 nurses compared to 3,634 other health care professionals. Population from survey conducted in 2004. Nurses included in study of Arif et al., 2012 (see above). Asthma was significantly increased among nursing professionals involved in medical instrument cleaning (OR=1.67) and exposure to general cleaning products and disinfectants (OR=1.72)</p>
<p>Children's nurse</p>
<p>HMT production workers. *Results ns different from controls; **not clear if workers with NSBHR+ additionally asthma symptoms; 0/17 SPT+</p>

Remarks
Workers of tire manufacturing plant. 8/52 wheezing, 14/52 chest tightness, 10/52 dyspnea; *LFT reduction ns Laquer handlers with asthma. 7/7 SPT+
Power plant utility worker. Massive exposure to pouring of 35% solution; symptoms for 34 months
Members of police department. Massive exposure by truck accident
Profession not mentioned. Asthmatic symptoms persistent for 2 years
Profession not mentioned. BD+
Cleaning with HF containing rust stain remover once. Asthmatic symptoms persistent for > 3 years
Worker of electrochemical factory. SPT+ (immediate); individual data not given
Workers of wooden furniture industry. Exposure to two-component paint (polyalcohols and polyisocyanates) with sign.higher prevalence of WRA vs. non-exposed (n=609), OR 4.61,sign.
Isocyanate workers of different companies. 26/247 symptomatics exposure-related COPD; spec.IgE+ (14% symptomatic vs. 0.3% asymptomatic isocyanate workers); 26.4% (14/53) symptomatics SPT+ vs. 0% (n=150) asymptomatics
Asthma cases diagnosed 1976-1992. Mainly exposed to polyurethane foams production or spray painting;*individual data not given;**case diagnosed by NSBHR or SFT or SIC (mainly); 91 patients re-examined in 1995 with sign. impairment of FEV1
Profession not mentioned. 8/16 SIC+ also SIC+ with MDI (4 immediate, 4 dual), 3/8 SIC+ with 3rd agent HDI (1 immediate, 2 late)
Workers of foam industry (spray painters and others. 8/29 SIC+ with spec.IgE+ and
Workers of foam industry. Asthma cases of SWORD-study between 1989-1993.24/27 TDI, 3/27 MDI-exposed. Higher TWA-exposures for cases vs. referents: 1.5ppb vs. 1.2 ppb respectively. OR (for 0.1ppb increase in 8h TWA-exposures) 1.08. ns.

Remarks
310/1765 physician-diagnosed asthma cases in 1996
6/306 OA cases in 2002. *Individual data not given.
54/835 OA cases in 2003 (54/210 irritant asthma cases). *Individual data not given.
9/465 asthma claims between mid 1984 and mid 1988 identified by retrospective Review. *9/9 BD+ and/or NSBHR+; **2/9 RADS
Review of of Ontario Workers' compensation board. Diisocyanates represented 50% of all OA claims. *Individual data not given.
Workers of urethane mold plant. *At follow-up, 2/3 physician diagnosed OA, additionally showed NSBHR+.
Workers of a car upholstery factory. *30 had work-related lower-respiratory symptoms (cough, sputum, wheezing episodes, or shortness of breath). MDI-induced asthma confirmed in 5 workers, 2 with eosinophilic bronchitis (NSBHR and SIC negative)
Current mould and core room (foundry) workers. *sign. FEV1 decrease across-shift; **individual data not given; 1/26 IgE+
Workers of a wood products plant. *Individual data not given.
Profession not mentioned. *NSBHR sign. lower in 93 SIC+ vs. 69 SIC-
Foundry workers. 0/6 with SIC+ spec.IgE-
Spray painter. RADS after accidental spill
Workers of woodchip board manufacturing; 8/8 SIC+ with sign. declines of FEV1 and FVC, only *2/8 with sign. obstr. (no individual reaction type not given); 7/8 spec IgE+; 4/8 BD+
Profession not mentioned; *SIC with monomer and prepolymers of HDI (4 only with HDI prepolymers, 1 only with HDI monomer, 5 with both)
Mechanic; co-exposure to several organic solvents; P+

Remarks
Gasoline station manager; spec.IgE+; *severe asthma symptoms after exposed to high concn of car (polyurethane) paint twice Spray painter; asthma associated with abnormal chest X-ray (interstitial infiltration); *SIC by increasing exposure on following days
Persistently symptomatic residents exposed to MIC at Bhopal tragedy 1984. 97/113 dyspnea; 32% with lung function fluctuations; *sign. FEV1/FVC decline after 18 months, also gradual FEF25-75 decline over 24 months, in a previous study 24/82 subjects;
1 elastomer-, 5 synthetic resin production workers. 1/6 rhinitis; *SIC+ workers also NSBHR+
Bhopal tragedy. 17 subjects investigated symptomatic and moderately or severely exposed subjects with obstructive lung pattern; FEV1/FVC sign. negatively related to exposure and to BAL neutrophils (P+)
Exposed residents at Bhopal tragedy. Predominating restr.s (64/82); 24/82 BD+
1 chemist, 1 foreman, 1 polyurethane caster of plastic mould factory Bhopal tragedy: Mainly mixed resp ailments
Workers of wheel factory employed in production and administrative section. Co-exposure to MDI; *7 cases reported to NIOSH and 6 additional cases identified by questionnaire; *individual data not given.
Workers in production of car equipment
Production of tires. * 12/17 eye irritation, 6/17 productive cough, 2/17 chronic bronchitis, 6 exertional dyspnoe. Significant DV decline in 8 workers after 2 days of work.
Paint shop workers
103 TDI workers of Longitudinal study 1973-1975. 89/103 became continuously/intermittently exposed; *4/9 SIC reaction type late or dual; **LFT not sign.
TDI production employees between 1967-1992.*Individual data not given.

Remarks
Workers of polyurethane foam industry. *Asthma and asthma symptoms were not a spec. target; **individual data not given; sign. increase of average annual loss of pulmonary function (FEV1,FEF75, PEF) in high exposuregroup(n=15) with mean and maximal TWA conc. of 8.2 and 30ppb
5/469 asthma claims between mid 1984 and mid 1988 identified by retrospective review; 5/5 BD+ and/or NSBHR+; for SIC individual reaction type not given
Profession not mentioned. *Individual data not given.; **at follow-up 4-8 years after first diagnosis sign. decline of FEV1 and FVC of workers with SIC+ (late)
63 asthmatic isocyanate workers. *NSBHR+ associated with SIC+
Profession not mentioned. At follow-up 3-39 months after cessation no sign. difference in FEV1 and NSBHR. Biopsy of bronchial mucosa with inflammatory changes in 8/8 (P+)
35 firemen at accidental exposure. 20/35 persistent resp. symptoms 4 years later with small **FEV1/FVC decline; *8/35 chest tightness during the fire (immediate), additionally 22 within 8 hours to 3 weeks (delayed symptoms); 7/33 asthmatic symptoms after 6 months, 2/32 after 44 months
Workers of wood roof industry. *SIC with TDI prepolymers, TDI monomers negative
Police officers exposed to spill. Persistent asthmatic symptoms > 7years with considerable improvement
RADS lasting for 1.5 years
Accelerated loss of FEV1 within 4-year-period. Dose-response relationship remains unclear
Laboratory technician. Spec.IgE+
Salesman, dealing with rubber products. Initially, exacerbation of interstitial lung disease
Chemical plant operator; *SFT on 3 consecutive days with I. (asthma onset late)
Pharmacist

Remarks
46/424 OA cases in 1993-1995
8/835 OA cases in 2004. 3 classified as allergic asthma, 5 as irritant asthma (total irritant asthma cases = 210); *individual data not given
Remover of coatings from metals and plastics. RADS for 39 months
Metal industry worker. RADS associated with metal fume fever
30 workers of an automobile engine manufacturing plant: 12 OA, 6 industrial bronchitis, 7 hypersensitivity pneumonitis
Iron-steel and ferrochrome industry workers. *Prevalences of COPD is higher in units, where the concentrations of pollutants are higher than in other units of enterprise.
Massive spill of pesticide, 197 out of c. 3,000 exposed subjects clinically examined. 20 new onset asthma (*17/20 RADS) plus 10 work-exacerbated asthma
1/469 asthma claims between mid 1984 and mid 1988 identified by retrospective review; *1/1 BD+ and/or NSBHR+
Subjects exposed in the beauty culture industry. Co-exposure to ammonium thioglycolate and ethylene diamine; *individual data not given
Polyurethane foam industry workers; 13/48 wheezing and dyspnea (27 vs. 17% of controls, ns); NSBHR sign. increased, *not clear if 8/44 with BHR+ have asthma symptoms; co-exposure to 1,4-diaza-bicyclo-(2,2,2) octane and to isocyanates
Manual grinding of metal casting. Co-exposure to chromium; spec. IgE+; allergic contact dermatitis
Metal polisher. SPT+; contact dermatitis
Metal plating factory worker. **SFT for 2 weeks; spec. IgE+
Metal plating worker. Co-exposure to chromium; spec. IgE+
Metal plating worker. SPT+; contact dermatitis
Forensic laboratory worker; preceding rhinitis; spec. IgE+ (low); SPT+

Remarks
Swimming-pool employees. *sign. elevation of asthma attacks during the last 12 months compared to the general Dutch population (OR 2.6 sign.); 60% of pool employees completed questionnaire; **ns
2 life guards of indoor swimming pools, 1 swimming teacher. Latency periods 10-14 years; *SFT over 4 weeks
Fishermen who participated in clean-up work after wreckage of oil tanker Prestige next to spanish coast. sign. prevalence for lower resp. symptoms, i.e. wheeze and breathlessness, OR 1.73; sign. dose-resp.onse relationship (i.e. number of exposed days)
Pulp mill workers. *Asthma was not a spec. target but chronic airflow limitation(FEV1/FVC <70%); higher risk of chronic airflow limitation in group with pre-baseline survey and both pre-baseline and interval of follow-up survey with ozone gassings (PR 4.3-5.5 for chronic airflow limitation, sign.)
House painters, working with water based and solvent-based paints. Sign. dose-response relationship; highest TVOC 100-380mg/m ³ ; *individual data not given
Welders and painters of a bicycle factory. *LFT and SFT results not listed in detail: mean FEV1 in painters: 98.1+/-7.2 and PEF: 71.9+/- 19.6.
House painters, working with water based paint. *28 with self-reported asthma, 23/28 took part in clinical study
Consecutive worker; asthmatic symptoms persistent for 3 months
Electric industry worker. SPT+
32/294 OA cases in 1996. OR 2.1.sign.;*individual data not given.
80 fur industry workers. Patch test (2% PPD)+: 12/33; 18/80 contact dermatitis; individual reaction type not given
Workers of banana, coffee and palm oil farms. sign. shortness of breath and wheeze associated with cumulative paraquat exposure, OR 2.3; *association to paraquat exposure ns; **data for overall group: 219

Remarks
Workers of banana farms. *Group with intense exposure, OR 2.9 sign.; **NSBHR+ OR 0.93-1.3,ns; dose-response relationship between intensity of exposure and exertional dyspnea, grade 3, OR 2.8-4.6, sign.
Profession not mentioned. "Low dose RADS" ; *BD+
Saleswoman. *SIC with perfume "Must de Cartier"; SPT- and spec.IgE-
Hairdressers. SIC with ammonium persulfate; 11/21 rhinitis; 8/21 dermatitis; 6/21 BD+; **NSBHR+ sign. associated with SIC+
Hairdresser. *LFT could not be finished, because of non-compliance
Hairdresser
Workers of persulfate producing factory (ammonium- and potassium- persulfate). *Resp. symptoms not specified; **trend (ns) of lung function decline in workers with SPT+ (8/52), compared to workers with SPT-
Hairdressers
Hairdresser; SPT+, spec.IgE-
3 cosmetic industry workers, 5 hairdressers
Hairdressers; 13/54 SPT+
Hairdressers. SIC with bleach, 3/4 SIC+ also challenged with potassium peroxodisulfate (3/3 late); 1/23 SPT+
Hairdresser
Chemical factory workers
Workers exposed to pesticides. *Doctor diagnosed asthma. Asthma and asthma symptoms were negatively associated with exposure to pesticides (OR=0.41)
Pesticide aviators. *Not clear if 11/ 135 with LFT+ additionally asthma symptoms; **symptoms and LFT sign. different vs. controls (community selected). At follow-up, dose-response relationship

Remarks
Farmers. *Asthmatic group, asthma physician diagnosed; **sign. higher prevalence of wheezing and shortness of breath in asthmatics; ***sign. reduction of FEV1/FVC ratio in asthmatics; sign. association of carbamate insecticide use with asthma, POR 1.8; co-exposure to grain dust as possible cause for asthma
Fruit growers. *Neither asthma nor **asthmatic symptoms were a spec. target (only resp. symptoms: cough, expectoration, dyspnea); ***difference of resp. symptoms in group that used masks compared to group of non-users ns
Midwife and insecticide worker.
Plant workers. 7/24 allergic, 8/24 irritant resp. symptoms; 9/24 SPT+; *individual data not given
Profession not mentioned. co-exposure to hydrochloric acid; duration of symptoms 2 years; *individual data not given
Refrigeration worker. Asthma symptoms immediate while using hot welding torch to cut refrigeration pipe containing freon (gas); exertional dyspnoe for further 2 weeks
Factory workers with co-exposure to other amines. *According to WRS, 12 late and 1 dual asthma type; additionally 16 former employees had suspected OA, exposure-related; also bronchitis increased (24/117)
Chemical workers. 33% WR attacks of dyspnea, 27% WR wheezing, 12% chronic bronchitis; sign. dose-response relationship Chemical industry workers
Catalyst production employees. Exposure related resp. symptoms, lung function decline and NSBHR+; 9/14 with new chest symptoms within 5 yrs. smoking-related; 14/227 SPT+; *6/227 SPT- with new chest symptoms
New recruits of refinery workers. 32/78 new-onset symptoms (bronchospasm, rhinitis etc.) within 24 months; *10/32 PSS with SPT-; 22/30 SPT+; dose-related increase of risk of asthma for smokers
29/324 OA cases due to platinum in 1997-1999. Individual data not given

Remarks
Refinery workers. *Individual reaction type not given; at follow-up change in NSBHR and SIC ns after removal from exposure for 19 months (1-77)
Current workers in metal industry. 15/107 SPT+; *NSBHR+ done with cold air ;**not clear if people with LFT+ and/or BHR+ additionally combined with asthma symptoms
Refinery workers; 22/49* SPT+, related to smoking
Platinum refinery workers; *SIC done with ammonium hexachlorplatinate, 6/7SPT+; SIC additionally done with a.tetra-cl-pl: 4/6 imm., 2/6 late; Sodium hexa-cl-pl:3/7 imm.
Platinum refinery workers; 10/16 SPT+; 7/11 nasal challenges+
Polyamide resin factory workers. *SFT for 1-2 weeks with sign. greater diurnal variation (in DV-PEFR%) compared to unexposed workers
Synthetic textile workers. Dyspnea sign. increased in male workers (32/92); *sign. FEF75 decline; **individual data not given
Painter. Exposure to powder paint, containing polyethylene terephthalate and polybutylene terephthalate; *SIC done with granulated polyester (bisphenol based epoxide); after SIC, additionally occurrence of alveolitis-type reaction with leukocytosis, fever and declines of DL,co plus FVC
Electric cable repairer; *SIC with heated repair tape
Paper packer; *SIC with heated polyethylene (76°C)
Food industry worker. Lowest values of LFT after 5 day working week, normal values of LFT after 5 days holiday
Plexiglass factory worker. *BD+, **SIC done with plexiglas dust, additionally hemoptysis, re-SIC+ (dual) 2 days later
Workers of polypropylene flock processing plant. *Asthma was not a spec. target; **asthma symptoms not spec.; ***individual data only partly given; sign. pulmonary function decline (FEV1,FVC,FEF25-75) in exposed group vs. controls; sign. time-exposure relationship in years for lung function decline. Dust concentration < 0.2 -

Remarks
Bag factory worker
PVC workers. SIC done with 2-ethylhexanol, sign. increase of resp symptoms next morning after SIC (n=5) compared to morning after control exposure (n=0). Workers of PVC industry, mixers (n=24) with high PVC exposure (mean conc. 1.6 mg/m ³) and non mixers (n=24) with low exposure (mean conc. 0.4 mg/m ³). *Asthma was not a spec. target; **sign. wheezing in mixers (n=7/8); ***individual data not given; ****sign. higher diurnal variation (6.5%) of mixer group.
Food store workers. *5% higher prevalence of obstr. vs. unexposed control group; resp symptoms not investigated. At follow-up, lung function decline sign. associated with exposure to PVC-fumes of "hot-wire" cutting of meat wrap
Workers of PVC industry. * Trend of increasing prevalence over a 5-day week: Monday 16.2% and Friday 34.9%; sign. increase of chronic wheeze in non-smoking workers (3.54-fold higher than community population prevalence); **pre and post shift spirometry with reduction of FEV1/FVC across-shift, ns
Meatwrappers. *33/96 with bronchospasm at work
Fish-processing factory worker
Bottle caps factory worker. SIC with PVC dust; *SFT for 3 weeks Meatwrappers; *SIC at workplace; BD+ 2/2
Electroplating industry workers. 2/7 SPT+; in 2 subjects co-sensitization to nickel chloride proven
Soldering workers. More spec. data not given
Alumina refinery workers. **sign. higher prevalence of WRS (wheeze) in digestion, precipitation and calcification workers, PR 2.2 -2.9, sign. WRS sign. associated with decline of FEV1/FVC and FEV1/FVC ratio
Employees with > 10 yrs of exposure. *FEV1 sign. negatively related to duration of exposure
Workers of aluminum smelter; *7/227 wheezing and dyspnea; 54/227 chronic bronchitis;

Remarks
Workers of aluminum smelter. *Wheezing (15.1% vs. 10.5% of controls); **SFT not sign. vs. controls; resp. symptoms sign. higher and ***FEV1 decreased in workers with >50% working time in potroom. Evidence for healthy worker effect
179 cases in 1970-1990 (during 2845 person years); incidence density 6.1/1000 workers; 122/179 workers at follow up 5 years later ; *sign. FEV1 decline after more than 1 year of exposure; **individual data not given
Workers of aluminium smelter ; *7/7 BD+; **individual data not given.
Caster of molten aluminium. SIC with aluminium chloride; *SFT with positive occupational effect (OASYS-2 score 2.67)
Worker of aluminum plant. SFT for 3 weeks
First asthma symptoms between 1 week and 10 years after first exposure. *Individual data not given; about 40% of former workers continue to have asthma; association to RADS possible. The causative agent(s) are unknown
Poultry workers.*Asthma and asthma symptoms were not a spec. target. **Individual data not given; ***sign. FEV1-decline in exposed group; ****sign. FEV1 decline in exposed group after methacholine-challenge; endotoxin range between 10 - 1003ng/m ³ in poultry house
Shacklers of poultry slaughter houses. 2/23 chest symptoms; *sign. VC and FEV1 declines across-shift
Swiss poultry farm workers. FEV1 decline sign. related to duration of occupation
Swiss poultry farm workers. Asthma OR 2.87, ns
Poultry processing workers of evisceration department. *Asthma symptoms ns different vs. controls. At follow-up (n=34) upper resp. symptoms sign. associated to trichloramine/soluble chlorine mean TWA concentration
Spanish poultry farmers who participated in the European Farmers' Project. *Subject with SIC+ also allergic to storage mite

Remarks
Slaughterhouse workers. 4/4 SPT+ to chicken feathers
Employees of powder paint shops. *WR asthmatic symptoms (according to physician) sign. exposure-related; IgE-; co-exposure to various organic acid anhydrides and to triglycidyl isocyanurate; **LFT declines ns; 32/119 asthmatic symptoms (according to questionnaire)
Chemical manufacturing worker, making silver halide photographic paper . SIC done with pyrazolone-derivative.
Workers of textile plants in dye houses. *4 workers with asthma symptoms and LFT+ or NSBHR+
Korean workers in dye-industry. 55 SPT+(5 with SIC+ had SPT-); 53/309 spec.IgE+ (23/53 also SIC+ were asymptomatic)
Worker of textile manufacturing; *SIC with lanasal yellow 4G and anaphylactic reaction; SPT+
Workers of dye industries. Exposure to "Black GR" with 3/3 SPT+ and spec.IgE+. SIC done with "Black GR"
Workers of dye industry. *SIC with levafix brilliant yellow E-36, drimaren brilliant yellow K-GL, cibachrome brilliant scarlet 3 R, drimaren brilliant blue K-BL; 3/4 spec.IgE+; 4/4 SPT+
Refractory ceramic fibers industry workers. *Asthma was not a spec. target. **Individual data not given. sign. resp symptoms: dyspnea 1° in males (15.7% vs. 2.5% of controls), dyspnea 2° in females (10.5% vs. 0.0% of controls). sign. FEV1 and FVC declines in exposed male smokers per 10 years of work
Millwright in steel mill exposed to spill (dust). Asthma symptoms persistent for > 4 years
Solder manufacturers. Prevalence of asthma dose-related (4% in lowest exposure group, 21% in highest and intermediate exposure group)
Electric industry workers. *34/51 with OA and 17/51 with asthmatic symptoms before survey, **only sensitized with SIC+; SIC also with abietic acid (5/6 immediate)

Remarks
*94/1765 physician-diagnosed asthma cases in 1996; *Individual data not given
41/500 OA cases in 1989-1991
Female electronic factory workers. Persisting resp symptoms after avoidance
Firefighters from previous survey. * LFT: no association between exposure and lung function parameters. Asthma cases were <u>asthma diagnosed by a physician</u>
Firefighters. *11/24 non-smoking; **individual data not given
23/430 new-onset asthma in 1993-1996; *individual data not given
1 fire fighter, 2 accidental exposures. Persistent asthma symptoms
Accidental smoke exposure in burning book store. RADS for 13 months
Australian Gulf War veterans.*Asthma by ECRHS definition; **lung function decline ns compared to controls
Stove smoke-exposed non-smoking women. COPD prevalence 28.5% vs. 13.6% of controls
Material handlers exposed to massive spill. Asthmatic symptoms > 2 years
Development technicians
Laboratory technician
Research worker with high exposure over 18 months
Fisherman

Remarks
One trawlerman, two prawn processors. *Serial peak flows done away from work, confirmed significant variability compatible with asthma.
Radiographer
Fisherman
Agricultural producer
Factory worker. Work-exacerbated asthma
Solderers of electronic factory manufacturing computers.*OA cases were not found; **FEV1/FVC sign. lower in workers with exposure duration > 5 years; all other pulmonary function tests <u>not given.</u>
Workers of electronic factory. OA cases defined by symptoms(30), taking asthma medication for at least 12 months(13) and asthma symptoms over the week (all); *FEV1 sign. reduced before exposure on Monday mornings compared to controls; **SFT with FEV1 decline more than 10% compared to controls (5%); ***individual data <u>not given.</u>
1 tin maker and 1 car radiator repair man. Use of soft corrosive soldering fluxes; co-exposure to zinc chloride, see also zinc chloride;1/1 SIC+ (ammonium chloride): <u>immediate</u>
Electronic assembler developing resp. symptoms within days after exposure
292 surviving men of Copenhagen Male Study exposed to solvents > 5 yrs. 63 had chronic bronchitis: nonsmoking solvent exposed (OR=1,8), smoking solvent exposed (OR= 8.8)
38/294 OA cases in 1996. OR 2.1, sign.; *individual data <u>not given</u>
Gun factory workers.*Group with definite asthma not mentioned, asthma-related symptoms <u>not specified.</u>
8/424 OA cases in 1993-1995. 8/131 RADS cases
5/469 asthma claims between mid 1984 and mid 1988 identified by retrospective review: 4 cases with work-exacerbated asthma; *5/5 BD+ and/or NSBHR+;**1/5 RADS

Remarks
Painters. 2 RADS for 4 months, 1 RADS for 56 months
Production workers. Sign. correlation of dose-response relationship and recurrent episodes or severity of WRS. *No specified information if workers with LFT+ also had asthma symptoms
RAF air frame technician
Plastic factory workers
Sulfite mill workers. Asthma incidence rate sign. increased; attributable fraction of incident asthma due to SO ₂ exposure 63%, and 75% due to SO ₂ passing
Workers of apricot farms. *55/69 dyspnea; **SFT+ with sign. declines also as a group in FVC, FEV ₁ , FEV ₁ /VC
Sulfite mill workers. Mortality study of deceased workers aged 40-75 years. * physician diagnosed with individual data not given; **sign. increased mortality from asthma (n=13) and COPD (n=20), OR1.6; other sign. increased causes of death were brain tumors (n=5), OR 3.3
Men accidentally exposed to SO ₂ in pyrite mine in 1977. *7/9 with RADS; 6/7 re-examined after 4 and 13 years; 1 subject died hours post exposure due to pulmonary edema; 4 subjects with persisting NSBHR; 2/6 with persistent obstr.
Profession not mentioned; persistent asthma symptoms; co-exposure to sulphuric acid and chlorine; *individual data not given..
Nurses; *individual reaction type not given.
Pig farmers. *Asthma or COPD cases; **individual data not given; long term average exposure to dust: 2.63mg/m ³ , to endotoxin 105ng/m ³ , to ammonia 150mg/m ³
Swine production workers. *Individual data not given; **sign. across-shift change in FEV ₁ for 46 workers with exposure of 10-13 years; levels of 2.5 mg/m ³ for total dust and 7.5 ppm for ammonia are associated with sign. across-shift decrease in FEV ₁ .

Remarks
Pig farmers. *sign. longitudinal declines in FEV1, FVC, and FEF25-75 related to across-shift declines, additionally sign. relationship of FEV1 and FEF25-75 decline to endotoxin exposure; **individual data not given
Pig farmers.*Sign. decline of baseline lung function (FVC,FEV1, PEF, FEF25-75) vs. controls. Sign. and positive association between resp. symptoms and duration (OR 4.2 for >10min) of disinfection procedure (medium and high pressure: OR 7.1); average exposure to dust: 2.7 mg/m ³ ; endotoxins: 112 ng/m ³ ; ammonia: 1.7mg/m ³
Pig farmers in the European Farmers' Project. *24.3% with WR resp. symptoms, sign. exposure-related; **individual data not given
Pig farmers. *sign. FEV1 decline 73 mL/yr, sign. related to endotoxin exposure
Intensive swine facility workers. Onset of first resp symptoms between 4.5 and 48 months; 1/1 BD+
Profession not mentioned. Massive exposure
Rubber tyre industry worker. SIC with Pamtac 1500 (heated); **SFT for 2 weeks
Prisoner. Massive exposure with generalized symptoms (spongiotic lichenoid dermatitis, fever); SPT+; general and resp symptoms over > 6 months
Teacher with repeated exposure. "Low level RADS"; duration of symptoms over 6 months
Prison guard. Agent 'Deep Freeze' containing 1% orthochlorobenzalmalonitrile. Persistent symptoms >3 years
Massive spill in nightclub; resp symptoms > 2 years
Joinery workers. *Only occurrence of upper resp symptoms. **Sign. lower FEV1 and FEV1/Vc ratio in joinery workers, compared to controls.***No sign. change of LFT across working shift. Total terpene exposure between 40-400µg/m ³ during a work shift.
Laboratory technician for about 10 years. Asthma provoked by rubber glove vapors
Farmer
Workers engaged in odorizing natural gas; *2/2 BD+

Remarks
Worker of insect pest extermination firm
Hospital pharmacist
Venipuncture technician
Metal workers
Tungsten carbide worker
Art painter
Chemical worker with accidental exposure
UF foam exposure
Carpenters. Exposure to dust from western red cedar chips with urea formaldehyde; *SIC with cedar urea formaldehyde sawdust with 1/2 borderline immediate (FEV1 decline – 14%)
Coal miners exposed to ureaformol and also formophenolic-based resins; *sign. increase of resp. symptoms, e.g. chronic bronchitis and wheezing, compared to workers exposed to MDI-based resins
40 open cast miners with persistent resp. symptoms
Workers exposed during removal of ashes and clinker in oil-fired power station. NSBHR sign. increased; *individual data not given
8/324 OA cases due to vanadium in 1997-1999; *individual data not given.
Employees of vanadium plant. WRA sign. increased (17.7% vs. 5.1% of controls); 22/333 chronic bronchitis
Refinery workers
5/194 new-onset asthma cases /incidence 3%) plus 1/6 exacerbated asthma; increase in incidence of NSBHR (11.9%); sign. FEV1 decline (- 8.4%)

Remarks
Manual steel arc welders. sign. asthma symptoms (6.3% vs. 1.3%) and sign. spirom. declines in VC, FVC, FEV1, FEF 25-75% as a group
26/294 OA cases in 1996. OR 2.0, sign.; *individual data not given
Welders and painters of a bicycle factory. *LFT and SFT results not listed in detail: mean FEV1 in welders: 99.3+/-9.7 and PEF: 73.7+/- 19.3.
Electric arc welders. Cumulative exposure sign. associated with chronic cough (11/143) and FEV1/VC decline; *individual data not given
Welders. NSBHR+ sign. exposure-related; *individual data not given
Workers of metal industry
28/835 OA cases in 2003 (28/210 irritant asthma cases); *individual data not given
6/324 OA cases due to welding fumes in 1997-1999; *individual data not given
Construction workers
9/430 new onset asthma in 1993-1996. *individual data not given
Welders. SIC with mild steel, stainless steel and/or galvanised steel; conc. 3.4-150 mg/m ³
Metal arc welders on stainless steel. **SIC with SMO steel or duplex steel with an nickel/molybdenum electrode; *SFT for 1 week
Welder performing manual metal arc welding on aluminium
22/1765 physician-diagnosed asthma cases in 1996. *Individual data not given
Welder manufacturing automatic gates. *SIC with gas metal arc welding on mild steel
Metal arc stainless steel welders. (2 years later, 3 subjects re-examined, out of them 2/3 SIC+: 1 immediate, 1 late)
Stainless steel sign. stronger irritant than "mild steel"

Remarks
<p>Workers and volunteers who were involved at the WTC site from 09/11/01 to 06/30/02. *Individual data not given; **new onset asthma, physician diagnosed after 09/11/01; sign. risk faktor for arrival date(OR 1.81-1.69) within the first week and >90 days of work at WTC site (OR 1.74); sign. elevated risk for new onset asthma for professionals compared to volunteers (unadjusted OR 1.88-</p>
<p>Exposed FDNY rescue workers. Resp. symptoms sign. time of arrival-related: Severity (i.e., greater number) early- > intermediate-> late-arrival; sign. loss of FEV1 after desaster in each group; FEV1< 60% in 45 exposed before, in 93 after desaster</p>
<p>17/83 of highly, 3/40 of moderately exposed fire-fighters developed RADS (diagnosed 6 months after disaster). NSBHR exposure-related (31%, 10%); after 6 mo. persistent NSBHR in 55%; *sign. declines of spirometric parameters post WTC</p>
<p>New York State employees. Asthma reported in 13% of non-exposed. Chronic bronchitits symptoms in 20/518</p>
<p>Clean-up and recovery workers; 22/119 new-onset wheezing with *sign. decline of FEV1; prevalence of symptoms sign. exposure-related</p>
<p>Emergency services police officers. Dyspnea and prevalence of abnormal spirometry sign. related to exposure intensity</p>
<p>Firefighters. 332/9914 persistent cough; sign. FEV1 and FVC declines; 315 dyspnea; dose-related cough (8% of high, 3% of moderate, 1% of low exposure), and NSBHR (23% of high, 8% of moderate exposure)</p>
<p>Solderers exposed to fume of galvanized metal. 1 subject with metal fever</p>
<p>Metal plant worker. *SFT+ (late); **SIC done with zinc sulfate; SPT+</p>
<p>Welder. Presenting additionally metal fume fever.</p>
<p>1 worker of tin making industry and 1 car/truck repairer. Use of soldering fluxes, co-exposure to ammonium chloride (see also ammonium chloride)</p>

Remarks

