

Table 2.2. Cohort and proportionate mortality studies of professionals exposed to formaldehyde

Reference, location, name of study	Cohort Description	Exposure assessment	Organ site	Exposure Categories	No. of cases/deaths	SMR and PMR (95% CI)	Adjustment for potential confounders	Comments
British pathologists and medical technicians								
Hall <i>et al.</i> (1991), United Kingdom, 1974–87 (update of Harrington & Oakes, 1984, plus new members since 1973)	Pathologists, SMR	None	All cancers		53 deaths	0.45 (0.34–0.59)		Data presented for men and women from England and Wales
			Nasopharynx		NR	NR		
			Nasal cavity		NR	NR		
			Lymphohaematopoietic		10 deaths	1.44 (0.69–2.65)		
			Hodgkin lymphoma		1 death	1.21 (0.03–6.71)		
			Leukaemia		4 deaths	1.52 (0.41–3.89)		
			Lung		9 deaths	0.19 (0.09–0.36)		
Brain and central nervous system		6 deaths	2.18 (0.80–4.75)					
Anatomists and pathologists in the USA								
Stroup <i>et al.</i> (1986), USA, 1925–79	Anatomists, SMR	Duration	All cancers		118 deaths	0.64 (0.53–0.76)		0.5 expected Analysis limited to 1969–79 No trend with duration Trend with duration
			Nasopharynx		NR	NR		
			Nasal cavity		0 deaths	(0.0–7.2)		
			Lymphohaematopoietic		18 deaths	1.2 (0.7–2.0)		
			Lymphoma		2 deaths	0.7 (0.1–2.5)		
			Leukaemia		10 deaths	1.5 (0.7–2.7)		
			Chronic myeloid leukaemia		3 deaths	8.8 (1.8–25.5)		
			Other lymphatic tissue		6 deaths	2.0 (0.7–4.4)		
			Buccal cavity/pharynx		1 death	0.2 (0.0–0.8)		
			Lung		12 deaths	0.3 (0.1–0.5)		
			Brain and central nervous system		10 deaths	2.7 (1.3–5.0)		

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Logue <i>et al.</i> (1986), USA, 1962–77	Pathologists, SMR (5585 men)	None	Nasopharynx		NR	NR		Rate of buccal cavity/pharyngeal cancer was twice as high among pathologists than among radiologists.
			Nasal cavity		NR	NR		
			Lymphohaematopoietic		NR	0.48 (NR)		
			Leukaemia		NR	1.06 (NR)		
			Buccal cavity/pharynx		NR	0.71 (NR)		
Respiratory system		NR	0.24 ($p < 0.01$)					
Embalmers and funeral directors								
Walrath & Fraumeni (1983), New York, USA, 1925–80	Embalmers and funeral directors, PMR/PCMR (1132 white men)	Time since first licence, age at first licence	All cancers		243 deaths	PCMR 1.00		2.3 expected
			Nasopharynx		NR	NR		
			Nasal cavity		0 deaths	NA		
			Lymphohaematopoietic		25 deaths	PMR 1.21		
			Lympho- and reticulosarcoma		5 deaths	PMR 0.82		
			Other lymphatic cancers		6 deaths	1.23		
			Hodgkin lymphoma		2 deaths	PCMR NR		
			Leukaemia		12 deaths	1.19		
			Myeloid leukaemia		6 deaths	[1.5]		
			Buccal cavity/pharynx	Overall	8 deaths	1.03		
			Lung	Embalmer only	7 deaths	2.01		
Brain and central nervous system	Both	1 death	0.28					

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Walrath & Fraumeni (1983) Contd.				embalmer and funeral director				
				Overall	70 deaths	1.11		
				Overall	9 deaths	1.38		
				Embalmer only	6 deaths	2.34		
			Both embalmer and funeral director	3 deaths	0.93			
Walrath & Fraumeni (1984), California, USA, 1925–80	Embalmers, PMR/PCMR (1007 white men)	Duration				PCMR		<i>p</i> < 0.05 for PMR 0.6 expected PMR PMR PCMR; <i>p</i> < 0.05 for PMR; trend with duration PMR PCMR, inverse trend with duration; 0 deaths from nasopharyngeal cancer PCMR, no trend with duration PCMR; <i>p</i> < 0.05 for PMR; no trend with duration
			All cancers	205 deaths	1.00			
			Nasopharynx	NR	NR			
			Nasal cavity	0 deaths	NA			
			Lymphohaematopoietic	19 deaths	1.22			
			Lympho- and reticulosarcoma	3 deaths	[1.0]			
			Hodgkin lymphoma	0 deaths	NR			
			Leukaemia	12 deaths	1.40			
			Myeloid leukaemia	6 deaths	[1.50]			
			Buccal cavity/pharynx	8 deaths	0.99			
			Lung	41 deaths	0.87			
			Brain	9 deaths	1.68			

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Levine <i>et al.</i> (1984), Canada, 1950–77	Embalmers, SMR (1413 men)	None	All cancers		58 deaths	SMR 0.87 [0.66–1.12]		0.2 expected
			Nasopharynx		NR	NR		
			Nasal cavity		0 deaths	NA		
			Lymphohaematopoietic Leukaemia		8 deaths	1.23 [0.53–2.43]		
			Buccal cavity/pharynx		4 deaths	[1.60] [0.44–4.10]		
			Lung		1 death	[0.48] [0.01–2.65]		
			Brain and central nervous system		19 deaths	0.94 [0.57–1.47]		
					3 deaths	[1.15] [0.24–3.37]		
Hayes <i>et al.</i> (1990), USA, 1975–85	Embalmers /funeral directors, PMR (3649 white men, 397 non-white men)	None	All cancers		900 deaths	SMR 1.07 (1.01–1.15)		White Non-white
					102 deaths	1.08 (0.87–1.31)		
			Nasopharynx		3 deaths	1.89 (0.39–5.48)		
					1 death	4.00 (0.10–22.3)		
			Nasal cavity		0 deaths	NA		
					White and non-white, 1.7 expected			

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Hayes <i>et al.</i> (1990) Contd.			Lymphohaematopoietic		100 deaths	1.31 (1.06–1.59)		White
					15 deaths	2.41 (1.35–3.97)		Non-white
			Lympho- and reticulosarcoma		11 deaths	1.08 (0.54–1.93)		White
			Hodgkin lymphoma		1 death	1.89 (0.05–10.5)		Non-white
					3 deaths	0.76 (0.16–2.22)		White
					0 deaths	NR		Non-white
			Non-Hodgkin lymphoma		33 deaths	1.29 (0.89–1.81)		White
					1 death	0.69 (0.02–3.89)		Non-white
			Multiple myeloma		12 deaths	0.97 (0.50–1.69)		White
					8 deaths	3.69 (1.59–7.26)		Non-white
			Lymphatic leukaemia		5 deaths	0.57 (0.19–1.33)		White
					2 deaths	2.99 (0.36–10.7)		Non-white
			Myeloid leukaemia		23 deaths	1.61 (1.02–2.41)		White
					1 death	1.06 (0.02–5.93)		Non-white
			Other and unspecified leukaemia		17 deaths	2.08 (1.21–3.34)		White
					3 deaths	4.92 (1.01–14.36)		Non-white
			Buccal cavity/pharynx		26 deaths	1.19 (0.78–1.74)		White
					4 deaths	1.25 (0.34–3.20)		Non-white
			Lung		285 deaths	0.97 (0.86–1.09)		White
					23 deaths	0.75 (0.47–1.13)		Non-white men
		Brain and central nervous system		24 deaths	1.23 (0.80–1.84)		White	
				0 deaths	NA		Non-white, 0.8 expected	