Table 2.1. Cohort studies of bis(chloromethyl)ether (BCME) and chloromethyl methyl ether (CMME) and cancer

Reference, location, name of study	Cohort description	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of cases or deaths	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
McCallum *et al*. (1983) UK	CMME/BCME-exposed workers and former workers of plants A (Glamorgan, South-Wales, *n*=571, 1948-1980) and B (Tyneside area, *n*=1196, 1956-1980), compared with the populations in Glamorgan and the Tyneside area, respectively	Exposures in various jobs were rated 0–6. CMME production conditions changed in 1972 and led to lower exposures	Lung (162)	Risk categories, according to exposure ratings 0, no risk 1–2, low 3–4, medium 5–6, high	Lung cancer deaths (data for plant A) 1 of 151 (0.7%) 1 of 141 (0.7%) 3 of 48 (6.3%) 6 of 32 (18.8%)	SMR, observed/exposed 597.6 $P < 0.01$		SMR for lung cancer: 92, Glamorgan Urban Aggregate 156, Tyneside conurbation Exposures in plant B did not lead to lung cancer excess
Collingwood *et al*. (1987) USA	CMME/BCME-exposed and non-exposed workers at six plants (1948–1972, see Pasternack *et al*., 1977), and additional workers employed in these plants since 1973. Included were also workers at a 7th plant for follow-up from 01–01–1953 until 31–12–1980. The total cohort counted 2460 exposed and 3692 non-exposed workers. At the end of the study, 32% were employed, 56% separated or retired and 12% dead. Of the 744 dead, death certificates were obtained for 98%.	Data on CMME/BCME concentrations in air (1970s) only available from 2 plants. Exposure scale based on job classification: a 6-point scale for plant 2, an 11-point scale for plant 7.	Respiratory cancer	All plants Plant Z Unexposed Low Medium High	 21 3 4 25	301 (224–398) 120 211 64 699* *$P < 0.01$		Update and expansion of Pasternack *et al*. (1977) Expected deaths derived from US population death rates specific for sex, race, 5-yr age groups, and calendar period.

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Gowers *et al*. (1993) France	All male employees (*n*=1203) in a factory of anion-exchange resins in Chauny, France, where use of CMME/BCME started in 1958 followed to 31–12–1986, of whom 258 had documented exposure to CMME-BCME, and 945 had no exposure. Lung cancer experience was ascertained from a regional referral centre for lung diseases. Of 19 cases of lung cancer, 14 were confirmed by histology. At the end of the study, 92.2% of exposed and 87.5% of non-exposed were accounted for.	Exposures in various jobs were rated 0–6. Cumulative dose is the sum of the products of the exposure rating for each exposed job held times the time spent in that job (in yrs). Air-monitoring started in 1979.	Lung cancer	Exposure categories (median cumulative dose)		SMR		
				All exposed	11	5.0 (95% CI: 2.0–12.3)		
				0.5	0	-		
				2.5	1	2.8		
				6.3	2	4.9		
				12.5	2	16.7		
				24.0	2	40.0		
				40.0	4	18.2		
Weiss & Nash (1997) USA	A 125-man cohort assembled in January 1963 included 45 men who had worked for 3 months in building B, 48 men who had worked in buildings A1, A2 and B, and 32 non-exposed workers. Two men (1.6%) were lost to follow-up, 67 men of the cohort had died. A total of 2812 person-years were accumulated.	Exposures to CMME/BCME in various jobs were rated 1–6. TWA levels of exposure and duration of exposure were used to calculate an exposure index (0.1–61.9 among the 93 exposed men).	Lung	Exposure groups (based on exposure index)	Lung cancer deaths	Obs/exp (SMR, confidence interval)		Apart from 25 lung cancer deaths, one man developed lung cancer but died of colon cancer. One other developed bronchioalveolar adenoma and died in 1994. Smoking prevalence (1963) was 76.8% (an excess of 34% compared with USA males in 1964)
				Non-exposed: 0 (*n*=32)	Non-exposed 3	2.00, 95% CI: 0.41–5.48		
				Exposed:		1.38, 95% CI:		
				Low, < 10.0 (*n*=34)	*Low*: 2	0.17–4.98		
				Moderate, 10–19.99 (*n*=31)	*Moderate*: 8	7.49, 95% CI: 3.23–14.75		
				High, 20 (*n*=28)	*High*: 12	15.21, 95% CI: 7.87–26.6		