

**Table 2.3 Cohort studies on lung cancer in populations exposed to dioxins in industrial cohorts and in studies on industrial accidents**

Reference, location, name of study	Cohort description	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of cases/deaths	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Steenland <i>et al.</i> (1999, 2001), USA	Cohort of 5132 workers (men) in 12 plants, producing chemicals contaminated by TCDD; 3538 workers with estimated TCDD exposure; 608 workers subcohort with chlracne; mortality follow-up 1948?-1993; vital status >99%	Company questionnaires and TCDD contamination, individual occupational history; chlracne 608 workers; job-exposure matrix (JEM) 3538 workers; 177 TCDD serum	Lung (162)	All	125	1.06(0.88-1.26)		SMR SMR Internal comparison. Cox Regression p-value trend= 0.15 (cumulative exposure); 0.03 (log cumulative exposure)
				Chloracne subcohort	30	1.45(0.98-2.07)		
				Cumulative exposure score based on JEM, septile 7 vs septile 1, 15 yr lag		1.62(0.76-3.44)		
Ott & Zober (1996), Germany,	243 workers accidentally exposed to TCDD in a TCP unit in a chemical plant; exposed during accident or in clean-up or demolition; mortality and incidence 1953-1992; vital status 100%; cause of death >99%	TCDD levels in 138 subjects in 1988-92; model based estimation other workers	Lung	All	11	1.1(0.6-2.0)		Incidence
				TCDD >1µg/kg bw	8	2.2(1.0-4.3)		
Becher <i>et al.</i> (1996), Germany	2479 workers from four plants involved in production of phenoxy herbicides and chlorophenols; mortality 1950s-89; vital status, 95%	Herbicides, PCDDs, PCDFs, 2,4,5-T, TCP, 2,3,7,8-TCDD, chlorophenols TCP, Chlorophenols, 2,3,7,8-TCDD	Lung (162)	All	47	1.43(1.05-1.9)		SMRs, Boehringer Ingelheim Cohort included Blood TCDD in 190 workers: 3-2252ng/kg; Nimerous cases of chlroracne in that plant
				20+ yrs since first exposure	25	1.35(0.87-2.0)		
				Boehninger lugelheim Plant	31	1.5 (1.02-2.13)		
				Bayer Uerdingen Plant	2	0.7 (0.08-2.5)		
				Bayer Dormogen Plant	3	1.6 (0.3-4.6)		
BASF Ludwigshalen	11	1.5 (0.7-2.6)						

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Hooiveld et al. (1998), The Netherlands	1156 male workers from Factory A involved in production of phenoxy herbicides; industrial accident in 1963; mortality 1955-1991; follow-up 99%	Company questionnaire and individual occupational history; serum TCDD levels for 47 exposed workers; modelled TCDD levels for all workers	Lung (162)	Exposed to phenoxy herbicides	14	1.0(0.6-1.7)		
				Exposed during accident	6	1.3(0.5-2.8)		
				Medium TCDD vs Low		6.4(0.8-53)		
				High TCDD vs Low		6.8(0.9-54)		
Boers et al. (2010), The Netherlands	2106 male workers from Factories A and B producing phenoxy herbicides (Factory A, TCDD contaminated; Factory B, TCDD not contaminated; follow-up 99%)	Company questionnaire and individual occupational history;	Lung (C33-C34)	Factory A	27	1.15(0.5-2.8)		
				Factory B	24	1.22(0.6-2.7)		
				Accident, Fact A	14	1.02(0.4-2.8)		
Kogevinas et al. (1997), International	21863 in 36 cohort from 12 countries; Mortality 20851 men, 1012 women	2,3,7,8-TCDD or higher chlorinated PCDDs versus not exposed to 2,3,7,8-TCDD or higher chlorinated PCDDs or no PCDD exposure	Lung (162)	Exposed to 2,3,7,8-TCDD and higher	225	1.1(1.0-1.3)		Combined PCDD-exposed workers (production and spraying) from 36 cohorts with varied follow-up from 1939 to 1992
				Exposed to lower or no PCDD	148	1.0(0.9-1.2)		

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Bertazzi et al (2001), Italy	Residents in contaminated zones after the Seveso accident: Zone A, 724; Zone B, 4824; Zone R, 31647; age, 20-74 years; mortality follow-up 1977-1996	2,3,7,8-TCDD: Zone A; soil levels, 15.5-580µg/m <sup>2</sup> ; median blood levels in adults, 389 ng/kg (back-calculation) Zone B; soil levels, <50µg/m <sup>2</sup> ; median blood levels in adults, 78 ng/kg (back-calculation)	Lung (162)	Zone A & B				
				All	61	1.2(0.9-1.6)		
				15+ yrs latency	21	1.4(0.9-2.2)		
				Men	64	1.3(1.0-1.7)		
				15+ yrs latency	19	1.5(0.9-2.4)		
				Women	4	0.6(0.2-1.7)		
+15 yrs latency	2	0.9(0.2-3.8)						
Pesatori et al (2009), Italy	Residents in contaminated zones after the Seveso accident: Zone A, 724; Zone B, 4824; Zone R, 31647; age, 20-74 years; incidence follow-up 1977-1996	2,3,7,8-TCDD: Zone A; soil levels, 15.5-580µg/m <sup>2</sup> ; median blood levels in adults, 389 ng/kg (back-calculation) Zone B; soil levels, <50µg/m <sup>2</sup> ; median blood levels in adults, 78 ng/kg (back-calculation)	Lung (162)	Zone A	7	1.12(0.5-2.4)		
				15+ yrs latency	4	2.04(0.8-5.5)		
				Zone B	37	0.96(0.7-1.3)		
				15+ yrs latency	12	1.09(0.6-1.9)		
				Zone R	280	1.04(0.9-1.2)		