Table 2.8. Case–control studies of exposure to benzene and chronic lymphatic leukaemia

Reference, study location and period	Characteristics of cases	Characteristics of controls	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of exposed cases	Odds ratio (95% CI)*	Adjustment for potential confounders	Comments
Blair *et al*. (2001) USA	All cases of leukaemia in the cancer registry of Iowa between March 1981 and October 1983, and from a surveillance network of hospitals in Minnesota from October 1980 to September 1992. 578 of 669 men cases age 30 or more participated.	Population-based controls frequency-matched to cases by 5-yr age group, vital status at the time of the interview, and state of residence. 474 controls for cases less than 65 yr of age were selected by random digit dialing 519 controls for cases 65 yr or older were selected from listings provided by the Health Care Financing Administration, and 550 controls for deceased cases were selected from state death certificate files. Response rates 77–79%	Personal interviews of 340 cases and 278 surrogates of cases and 1245 controls. Detailed occupational history, with job exposure matrix for specific exposures.	CLL 204.1	Benzene Low High	 50 3	 0.8 (0.6–1.2) 0.8 (0.2–2.9)		Referent for OR not specified.

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Costantini *et al.* (2008) Italy (11 areas)	All cases of haematolympho-poietic malignancies, incident in men and women aged 20–74 yr in the period 1991–1993 were identified. A total of 2737 cases of haematolympho-poietic malignancies were interviewed.	1779 subjects randomly selected through the demographic files of the municipalities in each of the areas under study, stratified by sex and 5-yr age groups.	Job or industry-specific questionnaires and subsequent expert ratings used to assign a level of exposure to a definitive list of agents. Industrial hygiene experts from each geographic area examined questionnaires and assessed a level of probability and intensity of exposure to substances at the individual level for each case and control.	CLL 204.1	Benzene Unexposed Very low/low Medium/high Yr worked with benzene: Unexposed ≤ 15 > 15 p for trend	 103 11 12 355 9 3	 1.0 0.7 (0.3–1.4) 1.8 (0.9–3.9) 1.0 1.8 (0.7–4.6) 4.7 (0.8–26.5) 0.05	Sex, age, education, area	The unexposed referent group never used any chemicals.

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Reference, study location and period	Characteristics of cases	Characteristics of controls	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of exposed cases	Odds ratio (95% CI)*	Adjustment for potential confounders	Comments
Wang *et al*. (2009) USA	832 cases of Non-Hodgkins lymphoma in women age 21–84 diagnosed in Connecticut, 1996–2000, 601 (72%) interviewed.	Women with Connecticut addresses frequency matched by age to cases and recruited by random digit dialing from among women aged less than 65 yr (69% participation) or by random selection from centres for Medicare and Medicaid Service files for women aged 65 yr or older (47% participation). 717 controls interviewed.	In person interviews collected lifetime occupational histories on jobs held for at least a yr. Exposure to organic solvents and formaldehyde associated with each job assessed by linking the coded occupational data with a job-exposure matrix by industrial hygienists.	CLL 204.1	Benzene exposure Never Ever Average intensity: Low Medium-high p for trend	 54 26 14 12	 1.0 (0.6–1.7) 0.8 (0.4–1.6) 1.4 (0.7–2.7) 0.22	Age, family history of haematopoietic cancers, alcohol consumption, and race.	Cases of small lymphocytic lymphoma included with CLL.

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Reference, study location and period	Characteristics of cases	Characteristics of controls	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of exposed cases	Odds ratio (95% CI)*	Adjustment for potential confounders	Comments
Cocco *et al*. (2010) (Epilymph study – 6 European countries)	All consecutive adult patients first diagnosed with lymphoma 1998–2004 resident in the referral area of the participating centres. 2 348 cases provided informed consent, overall participation 88%	Controls from Germany and Italy were selected by random sampling from the general population, and matched to cases by sex, 5-yr age group, and residence area. The other 4 centres used matched hospital controls, with eligibility criteria limited to diagnoses other than cancer, infectious diseases and immuno-deficient diseases. 2 462 controls provided informed consent, participation rate 52% for population controls and 81% for hospital.	Trained interviewers conducted in-person interviews with cases and controls, using the same structured questionnaire translated to the local language. Questions included information on a list of all fulltime jobs held for 1 yr or longer. Industrial hygienists in each participating centre coded the occupations and industries.	CLL 204.1	Benzene Unexposed All exposed Low Medium High p for trend Combined or isolated benzene exposure: All exposed Isolated exposure Unexposed to toluene Unexposed to xylene	 217 34 11 6 17 70 19 19 23	 1.0 1.4 (0.9–2.2) 1.4 1,0 1.8 0.14 1.5 (1.1–2.2) 1.8 (1.0–3.2) 1.7 (1.0–3.0) 2.0 (1.2–3.5)	Age, sex, education and centre.	Only subjects whose exposure was assessed with high degree of confidence were included in the analysis of trend of exposure.

CLL, chronic lymphatic leukaemia; yr, year or years