

Table 2.7. Case-control studies of residential radon exposure and cancer

Reference, study location and period	Characteristics of cases	Characteristics of controls	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of exposed cases	OR (95% CI)*	Adjustment for potential confounders
Lubin et al. (1998) USA, 1989–1993	638 cases < 15 years of age excluding Down Syndrome patients; residents of a midwestern state; 83% response rate	620 population-based controls matched by age, race and phone number; 86% response rate; selected by RDD	Radon detectors were placed in current and previous homes of subjects where they resided ≥ 6 months	ALL	Radon concentration (Bqm ⁻³)			Conditional logistic regression adjusted for matching factors and sex
					< 37	116	1.0 (ref.)	
					37–73	90	1.22 (0.8–1.9)	
					74–147	48	0.82 (0.5–1.4)	
					≥ 148	27	1.02 (0.5–2.0)	
Total	281	p for trend = 0.18						
Kaletsch et al. (1999) Lower Saxony, Germany, 1988–1993	173 children with leukaemia and 175 children with CNS tumours, nephroblastoma, neuroblastoma and rhabdomyosarcoma; 85% and 79% response rates, respectively; < 15 years of age	433 population-based controls selected from the same community as patients or randomly selected from communities in Lower Saxony	EMF measurements and radon dosimeters placed in child's bedroom, another room, and in the cellar for ≥ 1 year	<i>Acute leukaemia</i> versus local controls versus state controls versus all controls <i>Tumour patients</i> versus all controls <i>CNS tumours</i> versus all controls	Radon measurements in child's room			SES, degree of urbanization also adjusted for age and gender
					> 70 Bqm ⁻³	82	1.12 (0.24–5.14)	
						82	1.71 (0.31–9.47)	
						82	1.30 (0.32–5.33)	
						82	2.61 (0.96–7.13)	
	41	3.85 (1.26–11.81)						

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Steinbuch et al. (1999) USA and Canada, 1989–1993	173 newly diagnosed patients with AML or MDS as defined by the French-American-British (FAB) classification; less than 18 years of age at time of diagnosis	254 regional population controls; 1:1 match for AML cases and 2:1 match for MDS cases; matched on age, race and geography; selected via RDD.	Questionnaire and α -track radon detectors.	TWA radon concentration (Bqm ⁻³)	< 37	96	1.0	Maternal race, maternal education, family income, age	Controlling for confounders did not appreciably alter the results in multiple logistic models. Stratification by FAB morphology did not indicate increased risks for specific morphologic subgroups.
					37–100	53	1.16 (0.7–1.8)		
					> 100	24	1.12 (0.6–2.0)		
							p-trend = 0.58		
Law et al. (2000) England, United Kingdom, 1991–1996	578 from cancer registry, aged 16–69 years; response rate 76%; all confirmed cases (not further specified)	983 randomly selected from the list of patients for the family physician with whom the case was registered, matched by age and sex; response rate 65%	Radon gas measurement (by passive detection) in houses in which participants lived at diagnosis or pseudo-diagnosis (controls).	Acute lymphoid and myeloid leukaemia	Radon in fifths (Bq/m ³)		1.0	Conditional logistic regression modelling for matched sets. Adjustment for socioeconomic status.	
					< 8.1	129			0.67 (0.48–0.95)
					8.1–12.6	98			1.06 (0.75–1.49)
					12.6–20.2	127			1.11 (0.78–1.59)
					20.2–36.0	123			0.83 (0.55–1.23)
					> 36.0	101			
					Radon predetermined (Bq/m ³)				
					< 25	404			1.00
					25–49	110			1.20 (0.90–1.60)
					50–99	42			0.82 (0.53–1.25)
100–199	14	0.55 (0.28–1.11)							
> 200	8	0.90 (0.31–2.62)							

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Maged et al. (2000) Cairo, Egypt, 1996–1998	50 cases with ALL aged 2–14 years, lived in same houses since birth, mothers were not exposed	110 healthy controls selected by private communication; matched by age and gender; resided in Cairo since birth	Radon detectors placed in subjects' homes (child's bedroom)	Radon concentration (Bq/m ³)	< 40 40–60 60–90 ≥ 90	3 13 23 11	1.0 (ref.) 4.64 (1.2–18.0) 7.42 (2.0–27.3) 5.42 (1.3–21.1)	Unclear Unclear how controls were selected; mean indoor radon in cases (75Bq/m ³) controls (55Bq/m ³) (<i>P</i> < 0.001)
Raaschou-Nielsen et al. (2008) Denmark 1968–1994	2400 incident cases of leukaemia, CNS tumour, and malignant lymphoma diagnosed in children; Danish Cancer Registry	6697 control children selected from the Danish Central Population Registry; 2:1 matched by sex and birthday (within 1 year) for leukaemia; 3:1 for CNS tumour; 5:1 for lymphoma.	CR-39 track detectors in the living room of Danish dwellings	Radon exposure (10 ³ Bq/m ³ -yrs) <i>Combined cancers</i> 0- < 0.26 0.26- < 0.89 ≥ 0.89 Per 10 ³ Bq/m ³ -yrs ^a <i>Leukaemia</i> 0- < 0.26 0.26- < 0.89 ≥ 0.89 Per 10 ³ Bq/m ³ -yrs ^a		Not reported	1.00 1.01 (0.89–1.14) 1.14 (0.93–1.39) 1.04 (0.87–1.26) 1.00 1.17 (0.97–1.41) 1.31 (0.92–1.88) 1.34 (0.97–1.85)	^a In the trend analyses, radon exposure was entered as a continuous variable, disregarding the 3 exposure categories.