

Table 2.11 Case-control studies on cancer of the brain and welding/welding fumes (web only)

Reference, location, enrolment/follow-up period	Population size, description, exposure assessment method	Organ site	Exposure category or level	Exposed cases/deaths	Risk estimate (95% CI)	Covariates controlled	Comments
Magnani et al. (1987) United Kingdom, 3 English counties 1959–1963; 1965–1979	Cases: 432; men aged 18–54 who died of the one of the five cancers under study (oesophagus, pancreas, cutaneous, melanoma, kidney and brain) Controls: 1603; deaths of other causes matched to cases on sex, county, age at death Exposure assessment method: Expert judgement; JEM applied to occupation and industry recorded on death certificates	Brain	Welding fumes	NR	1.1 (0.8–1.5)	Age (quinquennia), sex and county	Strengths: reasonably large size Limitations: death certificates No information on confounders (smoking) Large number of associations tested
Hu et al. (1999) China, Heilongjiang Province 1989–1996	Cases: 183; newly diagnosed primary meningioma histologically confirmed who presented for brain surgery for tumour removal at the hospital Controls: 366; hospital controls with non-neoplastic and non- neurological disease, individually matched to cases by sex, age and area of residence Exposure assessment method: Questionnaire; self-report of occupational exposures	Brain: meningioma Brain: meningioma	Men: Welding rod (men) Women: Welding rod (women)	4 5	1.99 (0.4–9.89) 3.05 (0.52–18.03)	Family income, education, fruit consumption, vegetable consumption Family income, education, fruit consumption, vegetable consumption, smoking pack- years	Strengths: detailed information collected on occupation Limitations: small size

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Carozza et al. (2000) USA, San Francisco Bay area 1991–1994	Cases: 476 gliomas (369 astrocytic tumours); histologically confirmed cases identified through The Northern California Cancer Center in adults of age 20 + years Controls: 462; identified by random-digit dialling Exposure assessment method: Questionnaire; lifetime job history	Brain (Astrocytoma)	Welders, cutters	6	0.7 (0.2–2)	Age, sex, education, race	
		Brain (Glioma)	Welders, cutters (10-year latency period)			Age, sex, education, race	
			Never employed	NR	1		
			Ever employed	NR	0.6 (0.2–1.7)		
			< 10 years	NR	0.4 (0.1–1.3)		
	≥ 10 years	NR	-				
Pan et al. (2005) Canada 1994–1997	Cases: 1009; incident primary cases through pathology reports, histologically confirmed Controls: 5039; residents in the same area with no prior diagnosis of cancer, matched by age (5 yr), sex, province Exposure assessment method: Questionnaire; additional telephone follow-up where needed	Brain	Men+women: Welding	183	1.26 (0.98–1.45)	Age, province of residence, education, alcohol intake, total energy intake, smoking pack years, sex	
		Brain	Men: Welding (men)	173	1.27 (0.97–1.46)	Age, province of residence, education, alcohol intake, total energy intake, smoking pack years	
		Brain	Women: Welding (women)	10	1.15 (0.57–2.33)	Age, province of residence, education, alcohol intake, total energy intake, smoking pack years	
		Brain	Duration of welding (years)			Age, province of residence, education, alcohol intake, total energy intake, smoking pack years, sex	
			0 years (ref)	766	1		
			1 to < 10	106	1.21 (0.96–1.55)		
			10 to < 20	29	0.96 (0.68–1.49)		
	20+	48	1.41 (0.98–1.84)				
					Trend-test <i>P</i> value: 0.09		

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Ruder et al. (2012) USA, Upper Midwest 1995–1998	<p>Cases: 780; histologically confirmed primary intracranial gliomas identified through participating medical facilities and neurosurgeon offices</p> <p>Controls: 1156; randomly sampled from state driver’s license records (ages 18–64 years) or from Health Care Financing Administration’s (HCFA) Medicare data tapes (ages 65–80 years)</p> <p>Exposure assessment method: Questionnaire; longest employment duration collected by questionnaire</p>	Brain (Glioma)	Welders, cutters	5	0.89 (0.29–2.76)	Age, sex, education, age group	<p>Strengths: size, participation rate, histological confirmation of diagnoses, quality of the industry and occupation coding</p> <p>Limitations: large proportion of proxy responses for cases</p>

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Sadetzki et al. (2016) international 2000–2004	Cases: 1906; primary meningioma cases Controls: 5565; population controls randomly selected and either frequency or individually-matched by sex and age Exposure assessment method: Expert judgement; updated version of the Finnish Job Exposure Matrix (FINJEM)	Brain: meningioma	Ever exposed to welding fumes			Matching (sex, age, region), education	No significant trend were observed in this study across cumulative or life-time exposure to welding fumes (overall or in men/women separately) Strengths: very large size trained occupational hygienists coded job titles
			Never exposed to welding fumes	NR	1		
			Welding fumes (all)	94	1.19 (0.91–1.56)		
			Welding fumes (men)	82	1.15 (0.86–1.54)		
		Brain: meningioma	Welding fumes (women)	12	1.79 (0.78–4.1)	Matching (sex, age, region), education	
			Lifetime cumulative exposure to welding fumes in quartiles (men and women combined)				
			Never exposed to welding fumes	1621	1		
			< 120	23	1.2 (0.73–1.97)		
			120–324	14	0.97 (0.53–1.77)		
			324–1119.8	23	1.2 (0.72–1.97)		
		Brain: meningioma	1119.8+	34	1.32 (0.85–2.03)	Matching (sex, age, region), education	
			Trend-test <i>P</i> value: 0.18				
			Duration of exposure to welding fumes in years (men and women combined)				
			Never exposed to welding fumes	1621	1		
1–4	31		1.31 (0.84–2.02)				
5–14	27		1.16 (0.73–1.84)				
15+	36	1.12 (0.75–1.69)	Trend-test <i>P</i> value: 0.35				

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CI, confidence interval; NR, not reported

References

- Carozza SE, Wrensch M, Miike R, Newman B, Olshan AF, Savitz DA, et al. (2000). Occupation and adult gliomas. *Am J Epidemiol.* 152(9):838–46. <http://dx.doi.org/10.1093/aje/152.9.838> PMID:11085395
- Hu J, Little J, Xu T, Zhao X, Guo L, Jia X, et al. (1999). Risk factors for meningioma in adults: a case-control study in northeast China. *Int J Cancer.* 83(3):299–304. [http://dx.doi.org/10.1002/\(SICI\)1097-0215\(19991029\)83:3<299::AID-IJC2>3.0.CO;2-Z](http://dx.doi.org/10.1002/(SICI)1097-0215(19991029)83:3<299::AID-IJC2>3.0.CO;2-Z) PMID:10495419
- Magnani C, Coggon D, Osmond C, Acheson ED (1987). Occupation and five cancers: a case-control study using death certificates. *Br J Ind Med.* 44(11):769–76. PMID:3689708
- Pan SY, Ugnat AM, Mao Y; Canadian Cancer Registries Epidemiology Research Group (2005). Occupational risk factors for brain cancer in Canada. *J Occup Environ Med.* 47(7):704–17. <http://dx.doi.org/10.1097/01.jom.0000165747.95801.c5> PMID:16010197
- Ruder AM, Waters MA, Carreón T, Butler MA, Calvert GM, Davis-King KE, et al.; Brain Cancer Collaborative Study Group (2012). The Upper Midwest Health Study: industry and occupation of glioma cases and controls. *Am J Ind Med.* 55(9):747–55. <http://dx.doi.org/10.1002/ajim.22085> PMID:22715102
- Sadetzki S, Chetrit A, Turner MC, van Tongeren M, Benke G, Figuerola J, et al. (2016). Occupational exposure to metals and risk of meningioma: a multinational case-control study. *J Neurooncol.* 130(3):505–15. <http://dx.doi.org/10.1007/s11060-016-2244-4> PMID:27664150