

**Table 2.26. Case-control studies of second-hand tobacco smoke and childhood brain and central nervous system cancers**

| Reference, study location and period  | Organ site (ICD code)        | Characteristics of cases   | Characteristics of controls   | Exposure assessment                                 | Exposure categories  | (Cases/Controls) OR (95% CI)*<br>* $P < 0.05$   | Adjustment for potential confounders | Comments |
|---------------------------------------|------------------------------|--|---|---|--|---|--------------------------------------|----------|
| Schüz <i>et al.</i> (1999)<br>Germany | Central nervous system (CNS) | 2358 cases; 1992–1997; < 15 yrs; German Cancer Registry<br><br>Residence 15 km within German nuclear installations using cases born after 1975; < 15yrs; diagnosed 1980–1994 | 2588 population based control matched on age, sex and sampled from district where case lived at date of diagnoses | Structured questionnaire<br><br>Telephone Interview | <i>Maternal smoking during pregnancy (cigarettes per day)</i><br>No (reference)<br>1–10<br>11–20<br>> 20<br><br><i>Paternal smoking before pregnancy (cigarettes per day)</i><br>No (reference)<br>1–10<br>11–20<br>> 20 | CNS ( $n = 399$ )<br><br>(320/2062) 1.0<br>(55/426) 0.8 (0.6–1.1)<br>(17/72) 1.6 (0.9–2.8)<br>(2/11) 0.8 (0.2–3.9)<br><br>(195/1336) 1.0<br>(37/293) 0.8 (0.5–1.2)<br>(112/647) 1.1 (0.8–1.4)<br>(41/264) 1.0 (0.7–1.4) |                                      |          |

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|--------------------------------------|------------------------|--|--|------------------------|---|---|---|----------|
| Sorahan <i>et al.</i> (2001)<br>UK   | Central nervous system | 555 children resident in Yorkshire, West Midlands, and North Western Regional Health Authority areas; < 15 yrs; 1980–1983; Not living with biologic mother excluded; | 555 controls matched for sex and date of birth; Practice lists of case GPs | Micro-filmed interview | <i>Fathers before pregnancy (cigarettes per day)</i><br>Lifelong non-smoker (ref.)<br>< 10<br>10–19<br>20–29<br>30–39<br>≥ 40<br><i>P</i> -value for trend (2-tailed)<br><i>Maternal smoking habit during 5<sup>th</sup> mo of pregnancy (cigarettes per day)</i><br>Lifelong non-smoker (ref.)<br>< 10<br>10–19<br>20–29<br>≥ 30<br><i>P</i> -value for trend (2-tailed) | (cases/controls = 78)<br><br>(29/23) 1.0<br>(2/4) 0.51 (0.09–2.97)<br>(12/9) 1.25 (0.42–3.72)<br>(17/20) 0.52 (0.21–1.33)<br>(1/5) 0.15 (0.01–1.54)<br>(5/4) 0.64 (0.08–4.79)<br>0.67<br>(cases/controls = 76)<br><br>(32/40) 1.0<br>(11/2) 6.56 (1.36–31.73)*<br>(16/16) 1.28 (0.55–3.03)<br>(13/14) 1.30 (0.52–3.22)<br>(0/0) 0<br>0.71 | Socioeconomic grouping, ethnic origin, parental age of child at diagnosis |          |

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|---|--|--|-----------------------------|--------------------------------|--|---|---|----------|
| Filippini <i>et al.</i> (2002) (SEARCH) International | Brain (ICD-9 191)<br><br>Astroglial (ICD-O-2 9 380, 9 382, 9 384, 9 400, 9 401, 9 410, 9 411, 9 420, 9 421, 9 424, 9 440, 9 442,<br><br>Primitive neuroectodermal tumour. (ICD-O-2 9 391-2, 9 450, 9 505 | 1218 cases (< 0-19 yrs) 9 centres; Surveillance of Environmental Aspects Related to Cancer in Humans (SEARCH); 14 yrs in Europe and Australia; 19 yrs in Israel and USA; population based cancer registries; 1980s-1990s | 2223 controls (see above)   | In-person and phone interviews | <i>Maternal smoking during pregnancy</i>                     | AT  | Age, sex, centre (years vary according to study centre) |          |
|   |  |  |                             |                                | ≤ 2 500 cigarettes   | (63/226) 1.0 (0.8-1.4)                        |   |          |
|   |  |  |                             |                                | > 2 500 cigarettes   | (48/194) 0.9 (0.6-1.2)                        |   |          |
|   |  |  |                             |                                | ≤ 2 500 cigarettes   | PNET<br>(24/226) 0.9 (0.6-1.5)                |   |          |
|   |  |  |                             |                                | > 2 500 cigarettes   | (17/194) 0.8 (0.4-1.3)                        |   |          |
|   |  |  |                             |                                | ≤ 2 500 cigarettes   | OGT<br>(18/226) 1.2 (0.7-2.1)                 |   |          |
|   |  |  |                             |                                | > 2 500 cigarettes   | (13/194) 1.1 (0.6-2.0)                        |   |          |
|   |  |  |                             |                                | ≤ 2 500 cigarettes   | Other<br>(11/226) 0.6 (0.3-1.1)               |   |          |
|   |  |  |                             |                                | > 2 500 cigarettes   | (12/194) 0.8 (0.4-1.4)                        |   |          |
|   |  |  |                             |                                | ≤ 2 500 cigarettes   | Total<br>(117/226) 1.0 (0.8-1.2)              |   |          |
|   |  |  |                             |                                | > 2 500 cigarettes   | (90/194) 0.8 (0.6-1.1)                        |   |          |
|   |  |  |                             |                                | <i>Maternal smoking during pregnancy (years)</i><br>(No/Yes) |   |   |          |
|   |  |  |                             |                                | 0-1  | (32/36) 1.3 (0.7-2.3)                         |   |          |
| 0-4   | (80/137) 0.9 (0.6-1.2)   |  |                             |                                |  |   |   |          |
| 5-9   | (63/117) 1.1 (0.8-1.5)   |  |                             |                                |  |   |   |          |
| 10-14   | (35/102) 0.7 (0.4-1.0)   |  |                             |                                |  |   |   |          |
| 15-19   | (32/65) 1.0 (0.6-1.7)  |  |                             |                                |  |   |   |          |

**Table 2.26. Case-control studies of second-hand tobacco smoke and childhood brain and central nervous system cancers**

| Reference, study location and period | Organ site (ICD code)  | Characteristics of cases   | Characteristics of controls   | Exposure assessment   | Exposure categories   | (Cases/Controls) OR (95% CI)*<br>* $P < 0.05$  | Adjustment for potential confounders                 | Comments |
|--------------------------------------|------------------------|--|---|---|---|--|--|----------|
| Pang <i>et al.</i> (2003)<br>UK      | Central nervous system | 3838 children with cancer; Hospital based;; < 15 yrs; 1991–1994 in Scotland; 1992–1994 in England and Wales; | 7629 control children; matched for sex, date of birth and geographical area of residence at diagnosis; Randomly selected from Family Health Services Authorities (FHSA) | Face-to-face structured interviews; Computerized self-administered questionnaires | <i>Paternal cigarette smoking preconception (cigarettes per day)</i><br><br>Lifelong smoker (ref)<br>1–19<br>20+<br><i>P</i> for trend<br><i>Maternal cigarette smoking during pregnancy (cigarettes per day)</i><br>Nonsmoker (ref)<br>1–19<br>20+<br><i>P</i> for trend<br><i>Primitive neuroectodermal tumours</i><br>Father preconception<br>Mother preconception<br>Mother pregnancy | (cases = 635; controls = 6 987)<br><br>(271/3082) 1.00<br>(101/1003) 1.08 (0.85-1.38)<br>(138/1440) 1.03 (0.82-1.28)<br>0.706<br>(cases = 684; controls = 7 577)<br><br>(538/5743) 1.00<br>(111/1306) 0.86 (0.68-1.08)<br>(35/528) 0.62 (0.42–0.93)*<br>0.011<br>(Cases) OR (95%CI)<br><br>(150) 0.90 (0.63–1.30)<br>(161) 0.96 (0.65–1.42)<br><br>(161) 0.55* (0.34–0.88) | Deprivation and parental age at birth of index child |          |

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|--|-------------------------|---|--|---|---|---|--|----------|
| Cordier <i>et al.</i> (2004)<br><br>7 countries SEARCH International | Brain & Cranial nerves  | 1218 cases; 1976–1994 (65% between 1985–1989); 9 centres; 14 yrs in Europe and Australia; 19 yrs in Israel and USA; | 2223 randomly selected controls from general population were either pair matched (6 centres) or frequency matched (3 centres) to cases by sex and birth year (or by age at one centre) | In-person Interviews at Patients home with biologic mother (some telephone interviews with fathers); occupational exposures to PAHs estimated using job exposure matrix | <u>Maternal exposure during pregnancy from smoking but not occupation</u> |   | Study centre, child's age, sex and maternal smoking during pregnancy |          |
|  |                         |   |  |   | All tumours   | (152/305) 0.9 (0.7–1.2)                       |  |          |
|  |                         |   |  |   | Astroglial  | (82/305) 1.0 (0.8–1.3)                        |  |          |
|  |                         |   |  |   | Primitive neuroectodermal   | (31/305) 0.8 (0.5–1.2)                        |  |          |
|  |                         |   |  |   | Other glial   | (22/305) 1.1 (0.7–1.7)                        |  |          |
|  |                         |   |  |   | <u>from both smoking and occupation</u>                                   |   |  |          |
|  |                         |   |  |   | All tumours   | (13/22) 1.2 (0.6–2.5)                         |  |          |
|  |                         |   |  |   | Astroglial  | (7/22) 1.3 (0.5–3.0)                          |  |          |
|  |                         |   |  |   | Primitive neuroectodermal   | (3/22) 1.2 (0.4–4.2)                          |  |          |
|  |                         |   |  |   | Other glial   | (2/22) 1.5 (0.3–6.6)                          |  |          |
|  |                         |   |  |   | <u>Paternal preconceptional exposure from smoking but not occupation</u>  |   |  |          |
|  |                         |   |  |   | All tumours   | (273/590) 1.1 (0.9–1.3)                       |  |          |
|  |                         |   |  |   | Astroglial  | (155/590) 1.4 (1.1–1.9)                       |  |          |
|  |                         |   |  |   | Primitive neuroectodermal   | (53/590) 0.8 (0.6–1.2)                        |  |          |
| Other glial  | (32/590) 1.1 (0.6–1.7)  |   |  |   |   |   |  |          |
| <u>from both smoking and occupation</u>                              |                         |   |  |   |   |   |  |          |
| All tumours  | (272/464) 1.4 (1.1–1.7) |   |  |   |   |   |  |          |
| Astroglial   | (142/464) 1.6 (1.2–2.1) |   |  |   |   |   |  |          |
| Primitive neuroectodermal  | (54/464) 1.0 (0.7–1.5)  |   |  |   |   |   |  |          |
| Other glial  | (34/464) 1.3 (0.8–2.1)  |   |  |   |   |   |  |          |

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|--|---|--|--|--|--|---|--------------------------------------|----------|
| Plichart <i>et al.</i> (2008)<br>France    | Brain & CNS (ICD-O-3 9 470/3, 9 471/3, 9 473/3, 9 474/3, 9 480/3, 9 508/3, 9 390/3–9393/3, 9 380/3, 9 400/3, 9 420/3, 9 424/3, 9 424/3, 9 440/3, 9 380/3, 9 382/3, 9 430/3, 9 450/3, 9 451/3) | 209 incident cases; 2003–2004; Hospital based; < 15 yrs; Residing in mainland France at time of diagnosis of primary malignant CNS tumour; | 1681 population based controls matched on age and sex of child | Standardized telephone interview of the biological mothers French national Registry of Childhood Haematopoietic Malignancies and French national Registry of Childhood Solid Tumours (NRCST) | <i>Maternal smoking (pregnancy) (cigarettes per day)</i><br>No/Yes<br>< 10<br>≥ 10<br><i>P</i> for trend<br><i>Paternal smoking (year before birth) (cigarettes per day)</i><br>No/Yes<br>< 10<br>≥ 10<br><i>P</i> for trend | CNS<br><br>(44/325) 1.1 (0.8–1.6)<br>(29/220) 1.1 (0.7–1.6)<br>(13/99) 1.1 (0.6–2.0)<br>NS<br><br>(103/746) 1.2 (0.9–1.6)<br>(52/426) 1.1 (0.8–1.6)<br>(51/310) 1.4 (1.0–2.1)<br>0.04<br>(see subtypes below) | Age and sex                          |          |
| Plichart <i>et al.</i> (2008)<br>Continued | <b><i>Maternal smoking (pregnancy)</i></b>  | <b>PNET</b>  | <b>Ependymomas</b>   | <b>Astrocytomas</b>  | <b>Other gliomas</b>   |   |                                      |          |
|  | No/Yes  | (21/325) 1.1 (0.7–1.8)   | (6/325) 1.0 (0.4–2.4)  | (6/325) 1.3 (0.5–3.2)  | (10/325) 1.2 (0.6–2.4)   |   |                                      |          |
|  | < 10 CPD  | (16/220) 1.2 (0.7–2.1)   | (4/220) 0.9 (0.3–2.7)  | (4/220) 1.3 (0.4–3.8)  | (5/220) 0.9 (0.3–2.3)  |   |                                      |          |
|  | ≥ 10 CPD  | (5/99) 0.9 (0.3–2.2)   | (1/99) 0.6 (0.1–4.3)   | (2/99) 1.4 (0.3–5.9)   | (4/99) 1.6 (0.5–4.5)   |   |                                      |          |
|  | <i>P</i> for trend  | NS   | NS   | NS   | NS   |   |                                      |          |
|  | <b><i>Paternal smoking (year before birth)</i></b>  |  |  |  |  |   |                                      |          |

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|--------------------------------------|-------------------------------------|--------------------------|-----------------------------|------------------------|------------------------|---|--------------------------------------|----------|
|                                      | <b>Maternal smoking (pregnancy)</b> | <b>PNET</b>              | <b>Ependymomas</b>          | <b>Astrocytomas</b>    | <b>Other gliomas</b>   |   |                                      |          |
|                                      | No/Yes                              | (49/746) 1.2 (0.8–1.8)   | (18/746) 1.6 (0.8–3.3)      | (18/746) 3.1 (1.3–7.6) | (17/746) 0.8 (0.4–1.4) |   |                                      |          |
|                                      | < 20 CPD                            | (27/426) 1.2 (0.7–1.9)   | (7/426) 1.0 (0.4–2.6)       | (10/426) 3.1 (1.2–8.4) | (8/426) 0.7 (0.3–1.5)  |   |                                      |          |
|                                      | ≥ 20 CPD                            | (22/310) 1.2 (0.7–2.1)   | (11/310) 2.6 (1.2–5.9)      | (8/310) 3.2 (1.2–9.1)  | (9/310) 0.9 (0.4–2.0)  |   |                                      |          |
|                                      | <i>P</i> for trend                  | NS                       | 0.02                        | 0.02                   | NS                     |   |                                      |          |