

**Table 2.3 Cohort studies of painters and bladder cancer**

Reference, location, time period	Cohort description	Exposure assessment	Organ site (ICD code)	Exposure categories	No. of cases/deaths	RR/SIR/SMR (95% CI)	Adjustment for potential confounders	Comments
OPCS (1958) United Kingdom 1949-53	Registered deaths of 221,941 men aged 20-64 yrs in the broad occupational category of painters and decorators	Occupation at time of death or last occupation from death certificates; Occupations coded according to the Census 1951, Classification of Occupations	Bladder (ICD6 181.)	Other painters & decorators	58	<b>SMR (95% CI)</b> [1.09 (0.83-1.41)]	Age, sex	Reference, population of England and Wales
				Aerographers, paint sprayers	3	[1.50 (0.31- 4.38)]		
Enterline & McKiever (1963); Guralnick (1963) USA 1950	Men aged 20-64 who died in the USA in 1950	Usual occupation and industry recorded from death certificates, coded using International Occupational Classification	Bladder and other urinary organs (ICD 181)	Painters and plasterers	42	<b>SMR (95% CI)</b> 1.50 [1.08-2.03]	Age, race	Reference, 1950 US census population
				White	38	1.46 [1.03-2.00]		
				Non-white	4	NG		
				Painters (construction), paperhangers, glaziers	30	1.43 [0.96-2.04]		
				White	29	1.45 [0.97-2.08]		
				Non-white	1	NG		
OPCS (1971) United Kingdom 1959-63	Registered deaths of men aged 15-64 in England and Wales	Last occupation recorded on the death certificate?	Bladder (181.)	Painters & decorators	79	<b>SMR (95% CI)</b> 1.18 [0.93-1.47]	Age, sex	Reference, population of England and Wales

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OPCS (1978), no.1 United Kingdom 1970-72	Registered deaths of 273,129 men aged 15-64	Last occupation recorded on the death certificate, as coded by the <i>1970 Classification of Occupations</i>	Bladder (188)	Painters & decorators	66	<b>SMR (95% CI)</b> 1.52 [1.18-1.93]	Age, sex	Reference, population of England and Wales; The occupation unit of 'painters and decorators' was comprised of aerographers, paint sprayers, painters, decorators n.e.c., coach painters
Logan (1982) United Kingdom 1851-1971	Mortality of men in 1931-71, ages 15-64	Occupation recorded at the time of cancer registration/death and coded using various methods	Bladder	Painters & decorators 20-64 yrs (1951) 15-64 yrs (1961) 15-64 yrs (1971)	NG NG NG	<b>SMR (95% CI)</b> 1.09 (NG) 1.18 (NG) 1.52 (NG)	Age, sex, calendar year	Reference, all men in the 3 or 5 year period under review; Based upon decennial occupational mortality analyses of the Registrar General of England and Wales (1851-1971); <i>Excluded from meta-analysis because of overlap with OPCS 1958, 1971, 1978 and lack of data to calculate confidence intervals for 1931 data</i>
Whorton <i>et al</i> (1983) USA 1976-1978	2200 painting union members (2197 men, 3 women) linked to the California Tumor Registry	1976-77 union membership files	Bladder (ICDO )	Painter	3	<b>SIR (95% CI)</b> 1.31 [0.27-3.81]	Age, sex, year	Reference, mid-year SMSA California population
OPCS (1986), no.6 United Kingdom 1979-80, 1982-83	Men aged 20-64 in Great Britain who died during 1979-80 and 1982-83 Mortality of men aged 15-64 in England & Wales in 1981	Last full-time occupation recorded on the death certificate, coded by the OPCS 1980 occupational classification	Bladder (ICD9 188)	Painters, decorators, french polishers  Painters & decorators	48  NG	<b>SMR (95% CI)</b> 1.16 [0.86-1.54]  1.52 (NG)	Age, sex	Reference, populations of Great Britain, England & Wales, or Scotland as appropriate

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Matanoski <i>et al</i> (1986) USA 1975-79	Mortality of 57175 white male painters and allied tradesmen currently or formerly members of a painters' union for $\geq 1$ year during 1975-79; 33,098 men from "mixed" locals were primarily or exclusively painters	Painters' union records from local chapters	Bladder (ICD 188)	Mixed local members, consisting primarily or exclusively of painters	40	<b>SMR (95% CI)</b> 1.26 (0.90-1.72)	Age	Reference, US white males; The union represents most unionized painters in the US; <i>Excluded from meta-analysis because later updated by Steenland &amp; Palu (1999)</i>
Malker <i>et al</i> (1987) Sweden	The 1960 Swedish census was linked to the Swedish Cancer Registry to follow-up for bladder cancer incidence from 1961-79	Occupations and industries were obtained from the 1960 census and coded using ILO standards.	Bladder	Painter as one's specific occupation Artistic painter	186 42	<b>SIR (p-value)</b> 1.0 (not given) 1.7 [1.23-2.30]	Age, sex, region	The census code is not given for 'artistic painters' and thus may correspond to the Swedish 'pictorial artists' studied in Brown <i>et al</i> (2002). <i>Excluded from meta-analysis because artists have different exposures than painters</i>
Olsen & Jensen (1987) Denmark 1970-79	12,166 male incident cancer cases from the Danish Cancer Registry were linked with employment records	Longest employment held from pension fund registries, coded using ISIC	Bladder including papilloma (ICD7 181)	Painters in the construction industry	24	<b>SPIR (95% CI)</b> 1.12 (0.75-1.66)	Age, calendar time	Reference, Danish population; No information on smoking habits available. An earlier study showed that 60-80% of Danish men, aged 30-59 years, smoked; SPIR approximates the SIR when the cancer under investigation constitutes a minor part of all the malignancies included in the study and when exposure has no effect on cancer risk in general.

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Dolin & Cook-Mozaffari (1992) United Kingdom 1965-80	Male British painters, aged 25-64, who died from bladder cancer during 1965-80	Information on occupation and industry of usual employment was extracted from death certificates and coded according to English standards	Bladder	All painters Coach painters Painter, decorators Spray painters	65 5 57 3	<b>SMR (95% CI)</b> 1.27 (0.99-1.61) 7.03 (2.28-16.38) 1.20 (0.93-1.56) 0.92 (0.19-2.70)	Age, urbanization	<i>Excluded from meta-analysis because of large overlap with Pukkala et al (2009).</i>  Degree of urbanization was used as a proxy for smoking data that were unavailable. <i>Excluded from the meta-analysis because of overlap with OPCS 1978, 1986</i>
Skov et al (1993) Denmark 1970-80, Finland 1971-80, Norway 1961-84, Sweden 1961-79	87 004 economically active, male painters and lacquerers included in the national census of 4 Scandinavian countries were followed-up for cancer incidence by linking individual records with national cancer registries	Painters were identified by combining census codes for occupation and industry	Bladder	Painter	380	<b>SIR (95%CI)</b> [1.05 (0.95-1.16)]	Birth cohort, sex, site	Reference, economically active census population or total population in same region (Sweden only); <i>Excluded from meta-analysis because of overlap with Pukkala et al (2009).</i>

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Hrubec <i>et al</i> (1995) USA 1954-80	1178 painters were followed during 1954-80 within a cohort assembled from a roster of approximately 300 000 white male WWI veterans who served in the US Armed Forces some time during 1917-40 and who held active government life insurance policies	Mailed questionnaire that inquired about tobacco use, usual industry of employment and occupation, coded using 1950 Census Occupation and Industry codes	Bladder	Painters, construction and maintenance	4	<b>SMR (95% CI)</b> 0.60 [0.16-1.54]	Smoking, age, calendar time	Reference, US white males
Andersen <i>et al</i> (1999) Denmark 1971-87, Finland 1971-90, Norway 1971-91, Sweden 1971-89	65 868 male and 2121 female painters and wallpaper hangers, aged 25-64 years at 1970 censuses, were followed-up for cancer incidence during 1987-91 by linkage to national cancer registries	Occupation was obtained from census data and coded according to national adaptations of the Nordic Occupational Classification or according to a special Danish nomenclature.	Bladder	Painters & wall paper hangers Men Women	566 5	<b>SIR (95%CI)</b> 1.10 (1.01-1.20) 1.46 (0.47-3.41)	Age, sex, time period	Reference, national populations; The Swedish component partly overlaps Brown <i>et al</i> (2002) who also included painters from the 1960 Swedish census. <i>Excluded from meta-analysis because of overlap with Pukkala et al (2009).</i>

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Steenland & Palu (1999) USA 1975-94	42 170 painters and 14 316 non-painters with $\geq$ 1 yr union membership were identified from union records and followed from 1975-94 by linkage to national and local registers; Restricted to white men (98% of the cohort).	Job titles were inferred from union membership records which identified the specialty affiliation and trade of the local union for all members	Bladder	Painter	166	<b>SMR (95% CI)</b> 1.23 (1.05-1.43)	Age, calendar time.	Update of Matanoski <i>et al</i> (1986); Reference, general US population; No information on trade of individual members; SRRs compared painters to non-painters;
Brown <i>et al</i> (2002) Sweden 1971-89	People in the painting trades or painting industry (42 433 male painters and 6662 male and 2136 female pictorial artists) obtained from 1960 and 1970 Swedish census data were linked to the Cancer Environment Register to follow-up for cancer incidence from 1971-89	Job title and industry were obtained from census data and coded using Swedish occupational codes.	Bladder	Male painters (classified either in 1960 or 1970)	344	<b>SIR (95%CI)</b> 1.1 (1.0-1.2)	Age, sex, calendar year	Reference, national population; Lung cancer risk was not increased among artists; <i>Excluded from meta-analysis because of overlap with Pukkala et al (2009)</i>

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Pukkala <i>et al</i> (2009) Denmark 1971-2003, Finland 1971-2005, Iceland 1982-2004, Norway 1961-2003, Sweden 1961-2005	15 million people aged 30-64 years in the 1960, 1970, 1980/1981 and/or 1990 censuses and the 2.8 million incident cancer cases diagnosed in these people in a follow-up until about 2005 were linked to Nordic national registries	Occupation from self-administered census questionnaire, coded using ISCO codes adapted to Nordic countries	bladder, ureter, and urethra	Painters Men Women	1657 1642 15	<b>SIR (95%CI)</b> [1.08 (1.03-1.14)] 1.08 (1.03-1.14) 1.52 (0.85-2.51)	Country, sex, age, period	Reference = national populations; Estimated 69.1% of Norwegian male painters smoked; Nordic Occupational Cancer (NOCCA) project; <i>Update of Andersen et al (1999)</i>

Abbreviations: RR, relative risk; SIR, standardized incidence ratio; SMR, standardized mortality ratio; CI, confidence interval; ASCR, Association of Swiss Cancer Registries; SIC, Standard Industrial Classification; ISCO, International Standard Classification of Occupations; ISIC, International Standard Industrial Classification; NG, not given