

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Keller (1970), USA, 1958–1962	314 males with lip cancers were sourced from over 160 Veterans' Administration hospitals in the USA; aged 26–89 years; participation rate 100%; 100% histologically confirmed	304 male controls with neither oral nor pharynx cancers but otherwise representative of hospitalised veterans were matched by age, race and hospital size and affiliation (medical school or not); participation rate 100%	Exposure information was extracted from clinical records of VA hospitals	Lip carcinomas – squamous and basal cell	<i>Place of residence in the USA (excluding Mountain and Pacific States)</i>	None	None	ORs and 95% CIs calculated from raw data tabulated in paper
					North	1.0		
					South	2.34 (1.47–3.73)		
					<i>Place of birth in the USA (Mountain States only)</i>			
					North	1.0		
					South	6.98 (1.01–300.27)		
					<i>Occupation, principally indoors and outdoors</i>			
					Indoors	1.0		
					Outdoors	5.27 (3.17–8.84)		
					Both indoors and outdoors	1.48 (0.96–2.26)		
Unknown	0.38 (0.15–0.92)							
Spitzer <i>et al.</i> (1975), Newfoundland, USA, 1961–1971	366 male patients with squamous-cell carcinoma of the lip selected from the Newfoundland Cancer Registry at St. John's General Hospital; aged 35–69 years; response rate 93%; participation rate not provided; 100% histologically confirmed	210 randomly selected males from the population of Newfoundland, matched by age and geographic location; response rate 95%; participation rate not provided	Face-to-face interview at home with some proxy interviews when subjects were too ill or had died	Squamous-cell carcinoma of the lip	<i>Occupational outdoor exposure</i>		Age Age and occupational outdoor exposure Age, occupational outdoor exposure and pipe smoking	
					No	1.0		
					Yes	1.52 ($P < 0.05$)		
					<i>Occupation of fishing</i>			
					No	1.0		
					Yes	1.65 ($P < 0.01$)		
					Yes	1.60 ($P < 0.05$)		
Yes	1.50 ($P < 0.05$)							

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Dardanoni <i>et al.</i> (1984), Ragusa, Italy, 1980–1983	53 male lip cancer cases from the population-based Ragusa Cancer Registry; aged 37–82 years; participation rate 100%; number histologically confirmed not provided	106 controls selected from the hospitals in which cases had been observed; matched for sex, age ($\pm 2 \frac{1}{2}$ years), and municipality of residence; participation or response rate not provided	Structured questionnaire and direct observation by two interviewers	Lip cancer	<i>Working outdoors</i>	1.0	None None Ethnic risk factors SES None Ethnic risk factors Sensitivity to sunburn Outdoor work	
					No	4.87 ($P < 0.001$)		
					Yes	6.90 ($P < 0.01$)		
					Yes (farmers and greenhouse workers excluded)	7.70 ($P < 0.001$)		
					Yes	1.75 ($P < 0.001$)		
					<i>Skin lesions (eg hyperkeratosis)</i>			
					No	1.0		
					Yes	12.20 ($P < 0.001$)		
					Yes	12.90 ($P < 0.001$)		
					Yes	9.40 ($P < 0.001$)		
Pogoda and Preston-Martin (1996), California, United States, 1978–1985	74 women with lip cancer identified through the Los Angeles County Cancer Surveillance Program; aged 25–74 years; participation rate 57%; response rate 87%; 100% histologically confirmed	105 controls selected by random digit dialing; matched by decade of birth; participation rate 66%	Interviewer-administered standardized questionnaire	Lower lip, upper lip, mucosa of upper lip, mucosa of lip, lip	<i>Average annual residential UV flux</i>	1.0	Complexion, history of skin cancer, and cigarettes per day	Strata in which the exposure or confounding variables were missing for all cases or all controls were excluded from the relevant analyses
					< 400	3.8 (1.4–10.7)		
					400–429	3.8 (1.3–11.2)		
					430–449	13.5 (4.5–40.6)		
					> 450			
					<i>Average hours/yr spent doing outdoor activities</i>			
					< 30	1.0		
					30–99	2.6 (1.0–6.5)		
					100–299	1.8 (0.7–4.6)		
					≥ 300	4.7 (1.9–12.1)		
					<i>Previous skin cancer</i>			
					No	1.0		
					Yes	11.2 (3.7–33.8)		
					<i>Had outdoor occupation</i>			
No	1.0							
Yes	1.2 (0.5–2.8)							
<i>Played high school/college sports</i>								
No	1.0							
Yes	2.3 (1.2–4.4)							

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)					<i>Used lip covering daily</i>			
					No	1.0		
					Yes	0.9 (0.3–2.5)		
					<i>Average UV flux and use of lip covering</i>			
					< 430, > 1 applications/day	1.0		
					< 430, ≤ 1 applications/day	1.3 (0.4–4.2)		
					≥ 430, > 1 applications/day	3.2 (1.1–9.2)		
					≥ 430, ≥ 1 applications/day	7.3 (1.9–27.2)		
Perea-Milla López <i>et al.</i> (2003), Granada, Spain, 1987 – 1989	105 males with squamous-cell carcinoma of the lip identified through the population-based Granada Cancer Registry; aged 20–70 years; response rate 81.4%; participation rate not provided; 100% histologically confirmed	239 population-based controls randomly selected from the local population registry of 1986; matched by age; response rate 70.3%; participation rate not provided	Interviewer-administered questionnaire	Lip cancer (ICD9-MC# 140)	<i>Leisure time sun exposure</i>		Age	
					Non exposed	1.0		
					1st quartile (< 1.2 wks)	1.2 (0.6 – 2.3)		
					2nd quartile (< 4.5 wks)	1.2 (0.6 – 2.3)		
					3rd quartile (< 14.3 wks)	0.8 (0.4 – 1.7)		
					4th quartile (≥ 14.3 wks)	0.3 (0.1 – 0.9)		
					<i>Holiday sun exposure</i>		Age	
					Non exposed	1.0		
					1st quartile (< 0.5 wks)	1.2 (0.6 – 2.3)		
					2nd quartile (< 2.9 wks)	0.3 (0.1 – 0.97)		
					3rd quartile (< 11.2 wks)	0.3 (0.1 – 0.97)		
					4th quartile (≥ 11.2 wks)	0.1 (0.01 – 0.6)		
					<i>Worked in farming, forestry or fishing</i>		Age	
					Never	1.0		
					At some time	3.1 (1.7–5.7)		
					<i>Sun exposure, outdoor work (April –September)</i>		Alcohol intake, leaving the cigarette on the lip, warts and phototype, and age	
					Non-exposed	1.0		
					1st quartile (< 35.4 wks)	12.6 (1.2 – 132.4)		
					2nd quartile (< 68.6 wks)	11.7 (1.2 – 115.5)		
					3rd quartile (< 122.6 wks)	12.7 (1.4 – 118.0)		
					4th quartile (≥ 122.6 wks)	11.9 (1.3 – 108.9)		
					<i>Age at first sunburn</i>		Alcohol intake, leaving the cigarette on the lip, warts and phototype, and age	
					No burn	1.0		
					≥ 15 years old	14.6 (0.8 – 255.1)		
					< 15 years old	0.1 (0.03 – 0.6)		

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<i>Squamous cell carcinoma of the conjunctiva</i>								
Napora <i>et al.</i> (1990), USA, 1981–1987	19 patients with conjunctival intraepithelial neoplasia selected from the Cornea Service, Wills Eye Hospital; aged 52–82 years; participation rate 90%; 100% histologically confirmed	19 controls without conjunctival intraepithelial neoplasia selected from the Cornea Service, Wills Eye Hospital; matched by age and sex; 51–80 years; participation rate not provided	Self-administered questionnaire and slit lamp examination	Conjunctival intraepithelial neoplasia	<i>Occupation</i> Not office work Office work	1.00 0.21 (0.04–0.99)	None	95% CI calculated from tabulated data in paper

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Lee <i>et al.</i> (1994), Brisbane, Australia, 1972–1991	60 patients (73% M) with epithelial dysplasia, carcinoma in situ, or squamous cell carcinoma of the cornea or conjunctiva were identified from pathology laboratories in Brisbane; aged 22–80 years; participation rate 40%; 100% histologically confirmed	60 controls selected from wards of the Prince Alexandra Hospital, Brisbane; matched by age (within 3 years) and sex; aged 20–80 years; participation and response rate not provided. Patients with a history of ocular surface epithelial dysplasia or those currently receiving treatment for UV-related diseases were excluded.	Self-administered questionnaire	Epithelial dysplasia, carcinoma in situ, or squamous cell carcinoma of the cornea or conjunctiva	<p><i>History of skin cancers</i></p> <p>None Age, 50yrs or later Before 50yrs of age</p> <p><i>History of solar keratoses</i></p> <p>None Age, 50yrs or later Before 50yrs of age</p> <p>Latitude of residence at specified ages</p> <p><i>0–5 yrs</i></p> <p>> 30 degrees ≤ 30 degrees</p> <p><i>20–29yrs</i></p> <p>> 30 degrees ≤ 30 degrees</p> <p><i>Cumulative exposure duration at ≤ 30 degrees latitude</i></p> <p>0–30yrs 31–49yrs ≥ 50yrs</p> <p>Proportion of time spent out doors</p> <p><i>At 0–5 years of age</i></p> <p>< 50% > 50%</p> <p><i>At 20–29 years of age</i></p> <p>< 50% > 50%</p>	<p>1.0 3.5 (0.7–16.9) 15 (2.0–113.6)</p> <p>1.0 7.7 (1.2–47.8) 10.8 (2.2–50.0)</p> <p>1.0 1.9 (0.8–4.4)</p> <p>1.0 3.0 (1.0–9.3)</p> <p>1.0 2.2 (0.6–8.3) 3.9 (1.0–14.8)</p> <p>1.0 2.7 (1.1–6.5)</p> <p>1.0 0.8 (0.4–2.0)</p>	Age	

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Lee <i>et al.</i> (1994) (contd)					<i>Cumulative exposure outdoors at > 50% time</i>			
					0–30yrs	1.0		
					31–49yrs	1.2 (0.4–3.3)		
					≥ 50yrs	2.2 (0.7–7.1)		
					Latitude and proportion of time spent outdoors			
					<i>0–6yrs of age</i>			
					> 30 degrees	1.0		
					≤ 30 degrees, ≤ 50% time outdoors	1.7 (0.6–4.7)		
					≤ 30 degrees, > 50% time outdoors	7.5 (1.8–30.6)		
					<i>7–12yrs of age</i>			
					> 30 degrees	1.0		
					≤ 30 degrees, ≤ 50% time outdoors	2.5 (0.8–7.5)		
					≤ 30 degrees, > 50% time outdoors	3.7 (1.1–12.7)		
					<i>13–19yrs of age</i>			
					> 30 degrees	1.0		
					≤ 30 degrees, ≤ 50% time outdoors	2.7(0.8–9.1)		
					≤ 30 degrees, > 50% time outdoors	2.9 (0.9–9.4)		
					<i>20–29yrs of age</i>			
					> 30 degrees	1.0		
					≤ 30 degrees, ≤ 50% time outdoors	3.3 (0.8–9.4)		
					≤ 30 degrees, > 50% time outdoors	5.4 (1.3–22.2)		

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Newton <i>et al.</i> (2002), Uganda, 1991–1998	60 (26 M, 34 W) conjunctival cancer patients identified from all the wards and out-patient clinics of the four main hospitals in Kampala, Uganda; ≥ 15 years; participation rate 100%; 100% histologically confirmed	1214 controls who included men and women with cancers of the oral cavity (57), oesophagus (150), stomach (74), liver (103), breast (178), ovary (67), prostate (56), and other cancer sites or types (405), and with a provisional diagnosis of cancer (124); participation and response rate not provided	Interviewer-administered questionnaire	Conjunctival squamous cell carcinoma	<i>Time spend cultivating (hrs per wk)</i> 0–9 10–19 20+	1.0 1.9 2.4 (p trend = 0.05)	Age, sex, HIV-1 sero-status, personal income, and region of residence	

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Tulvatana <i>et al.</i> (2003), Bangkok, Thailand, 1995–2000	30 consecutive pathological specimens (15 M, 15 W) of conjunctival intraepithelial neoplasia, carcinoma in situ and invasive squamous cell carcinoma retrieved from tissue archives at one hospital; aged 21–84 years; participation rate 100%; 100% histologically confirmed	30 controls without conjunctival neoplasm and undergoing extracapsular cataract extraction at the same hospital as cases were treated; matched by age and sex; participation rate 100%	Two pathologists studied H & E stained, paraffin embedded conjunctival tissue. Elastin stain for solar elastosis was blindly interpreted in comparison with negative and positive controls	Conjunctival intraepithelial neoplasia, carcinoma in situ, and invasive squamous cell carcinoma	<i>Solar elastosis present in conjunctiva</i> No Yes	1 16.0 (2.49–670.96)	Age	

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<i>Ocular melanoma</i>								
Gallagher <i>et al.</i> (1985), Canada, 1979–1981	65 cases of newly diagnosed ocular melanoma from the cancer registries of four Canadian provinces (British Columbia, Alberta, Saskatchewan, and Manitoba); 20–79 years; participation rate 75%;	65 controls selected at random from provincial medical insurance plan lists of subscribers; matched by sex and age (± 2 years); participation rate 48%	Interviewer-administered questionnaire	Ocular melanoma	“Government workers” (a predominantly indoor, managerial group) No Yes	1.0 3.5 ($P = 0.006$)	None specified	The following statements were made about associations: “No association was found between ocular melanoma and total sunlight exposure, either as cumulative lifetime dose or dose over the decade before diagnosis. The three component measures of sunlight dose – occupational, recreational, and vacation exposure – were examined separately, and no relationship was found with ocular melanoma.” “No significant differences were found between ocular melanoma cases and controls for latitude of residence, over their lifetimes, over the decade before diagnosis, or at diagnosis.”

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Tucker <i>et al.</i> (1985), USA, 1974–1979	444 consecutive patients with melanoma of the uveal tract (iris, ciliary body, and choroid) diagnosed at the Wills Eye Hospital; participation rate 89%; 57% histologically confirmed	424 controls were patients with detached retinas not due to tumours, who were seen at Wills Eye Hospital; matched by age, sex, race, and date of diagnosis; participation rate 85%	Telephone interview	Uveal tract melanoma	<i>Sunlamp use</i>		Age, eye colour, and history of cataracts	
					Never	1.0		
					Rarely	1.3 (0.8–2.3)		
					Occasionally	1.3 (0.5–3.6)		
					Frequently	2.1 (0.3–17.9)		
					<i>Sunbathing</i>			
					Never	1.0		
					Rarely	1.4 (0.9–2.2)		
					Occasionally	1.4 (0.9–2.1)		
					Frequently	1.5 (0.9–2.3)		
					<i>Eye protection in sun</i>			
					Almost always	1.0		
					Occasionally	1.5 (1.02–2.2)		
					Rarely	1.9 (1.2–3.2)		
					Never	1.4 (0.9–2.3)		
					<i>Outdoor leisure time</i>			
					None, very little	1.0		
Some	0.9 (0.6–1.4)							
Great deal	1.1 (0.7–1.6)							
<i>Gardening</i>								
No	1.0							
Yes	1.6 (1.01–2.4)							
<i>Increased sun exposure during vacations</i>								
Never	1.0							
Rarely	1.1 (0.7–1.8)							
Sometimes	1.3 (0.8–2.2)							
Frequently	1.5 (0.97–2.3)							
<i>Years lived in south</i>								
No	1.0							
Yes	2.7 (1.3–5.9)							

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Holly <i>et al.</i> (1990), USA, 1978–1987	407 white patients with uveal melanoma selected from the Ocular Oncology Unit at the University of California San Francisco and residing in 11 western states; 20–74 years; 93% participation rate; 100% histologically confirmed	870 white control subjects from the 11 western states where the patients resided were selected using random-digit dial telephone methods; matched by age and sex; participation rate 77%	Structured telephone interview	Uveal tract melanoma	<i>Vacation outdoors in sunny climate</i> No Some Most of the time <i>Leisure time indoors or outdoors</i> Mostly indoors 50% indoors/50% outdoors Mostly outdoors <i>Exposure to UV or black lights</i> No Yes <i>Welding burn, sunburn to eye, or snow blindness</i> No Yes	1.0 1.04 (0.64–1.70) 0.84 (0.59–1.20) 1.0 0.57 (0.37–0.88) 0.79 (0.59–1.04) 1.0 3.69 (1.57–8.70) 1.0 7.17 (2.50–20.57)	Eye colour, coffee, effect of 0.5 hour sun exposure on skin, leisure time, exposure to UV or black lights, history of snow blindness and eye burns, and age	

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Seddon <i>et al.</i> (1990), Massachusetts, USA, 1984–1987	Two series of cases and controls were included. Series 1: 197 white New England residents with uveal melanoma. Subjects were referred to the Massachusetts Eye and Ear Infirmary (MEEI) for treatment, identified after enucleation in the MEEI pathology laboratory, or identified by biannual mailings to ophthalmologists in all the New England states; 18–88 years; participation rate 92%, 100% clinically or histologically confirmed	385 population-based controls selected by random-digit dialling; matched by sex and age; 19–88 years; participation rate 85%.	Structured telephone interview	Uveal melanoma	Case-control series 1 <i>Birthplace</i> N of lat 40° S of lat 40° <i>Cumulative years of residence S of lat 40°</i> 0 > 0–5 > 5 <i>Cumulative sunlight score</i> Low Medium High <i>Cumulative intense sun Exposure (years)</i> 0 1–40 > 40	1.0 0.2 (0.0–0.7) 1.0 2.4 (1.4–4.3) 2.8(1.1–6.9) 1.0 1.3 (0.8–2.2) 1.0 (0.5–1.9) 1.0 0.8 (0.5–1.5) 1.7 (0.9–3.0)	Age, eye and skin colour, moles, ancestry, use of sunlamps, eye protection, outside work, fluorescent lighting, southern residence, and years of intense sun exposure	

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Seddon <i>et al.</i> (1990) (contd)					<i>Amount outside work 15yrs ago</i>			
					Minimal	1.0		
					Not working	1.0 (0.6–1.8)		
					Moderate	0.5 (0.2–1.1)		
					High	0.6 (0.3–1.4)		
					<i>Fluorescent lighting hrs per week</i>			
					0	1.0		
					1–39	0.9 (0.6–1.5)		
					> 39	1.2 (0.6–2.1)		
					<i>Welding arcs</i>			
					No	1.0		
					Yes	1.3 (0.5–3.1)		
					<i>Outdoor hobbies, times per year 15 yrs ago</i>			
					0	1.0		
					1–9	1.5 (0.7–3.4)		
					> 9	0.7 (0.4–1.4)		
					<i>Sunbathing, times per year 15 yrs ago</i>			
					0	1.0		
					1–9	1.1 (0.7–2.0)		
					> 9	0.7 (0.4–1.2)		
				<i>Sunglasses or visor 15 yrs ago</i>				
				Almost always	1.0			
				Occasionally	0.8 (0.5–1.5)			
				Rarely, never	1.1 (0.6–1.7)			
				<i>Years used glasses or contact lenses most of waking hours</i>				
				15+	1.0			
				1–14	0.9 (0.4–2.0)			
				0	0.6 (0.4–1.0)			

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Seddon <i>et al.</i> (1990) (contd)	Series 2: 337 white US residents with uveal melanoma and living siblings referred to MEEI for treatment or pathology evaluation; 18 – 88 years; 87% participation rate; 100% clinically or histologically confirmed	800 sibling controls selected; those of the same gender as, or closest in age to, the case were chosen when more than four siblings were identified; 97% participation rate			Case-control series 2 <i>Cumulative intense sun Exposure (years)</i> 0 1–40 > 40 <i>Amount outside work 15yrs ago</i> Minimal Not working Moderate High <i>Fluorescent lighting hrs per week</i> 0 1–39 > 39 <i>Welding arcs</i> No Yes <i>Outdoor hobbies, times per year 15 yrs ago</i> 0 1–9 > 9 <i>Sunbathing, times per year 15 yrs ago</i> 0 1–9 > 9 <i>Sunglasses or visor 15 yrs ago</i> Almost always Occasionally Rarely, never		1.0 1.5 (1.0–2.2) 2.1 (1.4–3.2) 1.0 0.9 (0.6–1.3) 0.8 (0.5–1.3) 0.4 (0.2–0.8) 1.0 1.1 (0.8–1.6) 1.7 (1.1–2.5) 1.0 0.9 (0.6–1.5) 0.7 (0.5–1.1) 1.0 0.9 (0.7–1.4) 0.8 (0.5–1.2) 1.0 1.0 (0.7–1.4) 1.4 (1.0–2.0)		

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Seddon <i>et al.</i> (1990) (contd)					<i>Years used glasses or contact lenses most of waking hours</i> 15+ 1–14 0	1.0 0.8 (0.5–1.4) 0.8 (0.6–1.1)		
van Hees <i>et al.</i> (1994), the Netherlands, 1990–1992	Cases were 109 (47 M, 62 F) patients with melanoma of the uveal tract who had consecutively visited the ophthalmology department of Leiden University Hospital; age 30–89 years; participation rate 98%; number histologically confirmed not provided	149 (57 M, 92 F) controls selected from three sources: patients attending the ophthalmology out- or inpatient department for reasons other than melanoma, patients attending several general practitioner clinics in the area, and attending the dermatology clinic for reason other than pigmented lesions; participation rate not provided	Interviewer-administered questionnaire and skin examination	Uveal melanoma	<i>Excessive sun exposure < 15 years of age</i> No Yes <i>Excessive sun exposure sun > 15 years of age</i> No Yes <i>Blistering sunburn < 15 years of age</i> No Yes <i>Blistering sunburn > 15 years of age</i> No Yes <i>Actinic skin damage</i> Normal for age More than normal	1.0 1.5 (0.5–4.2) 1.0 0.6 (0.4–4.3) 1.0 0.5 (0.2–1.0) 1.0 0.6 (0.4–1.2) 1.0 1.1 (0.5–2.2)	Age and sex	

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Holly <i>et al.</i> (1996), USA, 1978–1987	Cases were 221 white male patients diagnosed with uveal melanoma at the Ocular Unit of the University of California San Francisco or patients referred there for treatment; age 20–74 years; participation rate 93%; 100% histologically confirmed	447 white males who lived in the same geographic area selected by random digit dialling; matched by 5-year age group; participation rate 77%	Interviewer-administered questionnaire	Uveal melanoma	Occupation <i>Sailors, ship officers, or fishermen</i> Never Ever ≤ 5 yrs exposed ≥ 6 yrs exposed <i>Welders/welding</i> Never Ever ≤ 1 yrs exposed 2–10 yrs exposed ≥ 10 yrs exposed <i>Labourers</i> Never Ever <i>Agricultural occupations</i> Never Ever <i>Constructions occupations</i> Never Ever	1.0 3.0 (1.2–7.8) 3.4 ((0.98–12.0) 2.7 (0.60–12.2) 1.0 2.2 (1.3–3.5) 2.2 (0.70–7.0) 1.8 (0.88–3.6) 1.9 (1.0–3.6) 1.0 0.98 (0.63–1.5) 1.0 1.2 (0.74–1.9) 1.0 1.3 (0.81–2.0)	Age, number of large nevi, eye colour, tanning, or burning, response to ½ hour sun exposure in the summer noonday sun	

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Pane and Hirst (2000), Queensland, Australia, 1972–1996	125 (69 M, 56 W) confirmed primary ocular melanomas selected from pathology laboratories in Queensland and the Queensland Cancer Registry; age 9–81 years; 65% participation rate; 98% histologically confirmed	375 controls randomly-selected by sequential dialing from a randomized list of Queensland residential phone numbers; matched by sex and age (within three years); participation rate not provided	Telephone interview	Ocular melanoma	<i>Latitude born</i>		Residual age	
					≤ 20 degrees	1.0		
					20–30	1.25 (0.62–2.55)		
					30–40	0.76 (0.33–1.73)		
					40–50	0.28 (0.06–1.42)		
					50+	1.09 (0.44–2.67)		
					<i>Latitude most of life</i>			
					≤ 20 degrees	1.0		
					20–30	1.69 (0.80–3.57)		
					30–40	0.79 (0.32–2.00)		
					40–50	0.57 (0.11–3.05)		
					50+	0.95 (0.29–3.12)		
					<i>History of skin cancers</i>			
					No	1.0		
					Yes	1.52 (0.99–2.35)		
					<i>History of skin melanoma</i>			
					No	1.0		
					Yes	2.42 (0.88–6.62)		
					<i>Painful sunburns</i>			
					Never	1.0		
Once	1.35 (0.73–2.48)							
2–5 times	1.62 (0.95–2.78)							
6 or more times	0.78 (0.40–1.52)							
<i>Wearing of prescription sunglasses</i>								
No	1.0							
Yes	0.78 (0.48–1.25)							
<i>Sunglasses</i>								
No	1.0							
Yes	1.00 (0.64–1.56)							
<i>Frequency of wearing sunglasses</i>								
Less than half the time	1.0							
About half the time	3.85 (1.36–10.92)							
More than half time	1.19 (0.48–2.98)							
All the time	1.03 (0.45–2.31)							

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Pane and Hirst (2000) (contd)					Cumulative ocular UV-B exposure – Melbourne sun years <i>As a child</i> ≤ 0.2850 0.2851–0.3105 > 0.3105 <i>As an adult</i> ≤ 0.2850 0.2851–0.3105 > 0.3105 <i>Lifetime</i> ≤ 0.2850 0.2851–0.3105 > 0.3105	1.0 1.92 (0.92–3.98) 1.18 (0.74–1.87) 1.0 0.81 (0.47–1.41) 0.67 (0.37–1.19) 1.0 1.45 (0.83–2.51) 0.91 (0.50–1.65)		
Guénel <i>et al.</i> (2001), France, 1995–1996	Cases were 50 patients with uveal melanoma (29 M, 21 W) selected from a cancer registry; 35–70 years; participation rate 100%; number histologically confirmed was not provided	479 (321 M, 158 W) population-based controls randomly selected from electoral rolls; matched by age, gender and study area; participation rate 76%	Face-to-face interview using a standardized questionnaire and exposure matrix	Uveal melanoma	<i>Number of eye burns</i> None One to five More than five Unknown <i>Occupation (men)</i> Agricultural workers or fishermen Electrical and electronics workers Welders and sheet-metal workers Painters and construction workers <i>Cumulative exposure to solar UV radiation</i> Not exposed Exposure < median Exposure ≥ median <i>Cumulative exposure to artificial UV radiation</i> Not exposed Exposure < median Exposure ≥ median	1.0 0.9(0.3–2.7) 3.3 (1.1–9.6) - 0.5 (0.2–1.6) 1.6 (0.5–4.8) 7.3 (2.6–20.1) 1.1 (0.4–3.1) 1.0 1.2 (0.5–2.8) 0.9 (0.4–2.3) 1.0 2.6 (0.5–12.4) 5.5 (1.8–17.2)	Age Age and gender	

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Lutz <i>et al.</i> (2005), Denmark, Latvia, France, Germany, Italy, Sweden, Portugal, Spain, and United Kingdom, 1995–1996	292 (164 M, 128 W) incident cases of uveal melanoma identified via personal contacts to ophthalmology and pathology departments, or via manual or computerized hospital records or cancer registries; 35–69 years; participation rate 91%; number histologically confirmed not provided	2062 (1440 M, 622 W) population based controls; matched by region, sex, and five-year birth cohorts; participation rate 61%	Interviewer-administered questionnaire	Uveal melanoma	<i>Occupational exposure to sunlight</i>		Country, sex, and 5-year age group	
					No	1.0		
					Yes	1.24 (0.88–1.74)		
					<i>Yes by dose</i>			
					< median	1.34 (0.90–1.99)		
					≥ median	1.10 (0.68–1.79)		
					<i>Yes by sex</i>			
					Men	1.09 (0.74–1.62)		
					Women	1.83 (0.94–3.54)		
					<i>Occupational groups with previously reported associations</i>			
					Seamen and fishermen	2.46 (0.94–6.41)		
					Farmers	1.09 (0.72–1.66)		
					Miners, etc stone cutters, etc	1.05 (0.36–3.10)		
					Electrical fitters, broadcasting station workers, etc	1.26 (0.74–2.15)		
Welders and sheet metal workers	1.95 (1.08–3.52)							
Bricklayers, and other construction workers	1.29 (0.69–2.41)							
<i>Occupational groups without previously reported associations</i>								
Forestry workers, hunters and related workers	1.28 (0.47–3.47)							
Painters	1.18 (0.45–3.08)							
Other transport, labourers	0.60 (0.32–1.11)							

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Vajdic <i>et al.</i> (2002), Australia, 1996–1998	290 primary ocular melanomas ascertained from ophthalmologists and population-based cancer registries in Australia; age 18–79 years; participation 92%; 100% histopathologically or clinically confirmed	893 randomly selected from the Australia electoral roll; matched by age, sex and state; participation rate 67%	Self-administered questionnaire and a telephone interview	Melanomas originating in the choroid, ciliary body, iris and conjunctiva	<i>Total hours of exposure on weekdays and weekends during the decade years 10, 20, 30 and 40 years of age</i>		Age, sex, place of birth, eye colour, ability to tan and squinting as a child	
					26.1–1,085	1.0		
					107.6–148.4	1.5 (1.0–2.4)		
					148.5–197.0	1.4 (0.9–2.2)		
					197.1–401	1.6 (1.0–2.6)		
					<i>Total hours of exposure on weekdays during the decade years 10, 20, 30 and 40 years of age</i>			
					0.0–40.0	1.0		
					40.0–74.0	1.4 (0.9–2.1)		
					74.0–132.8	1.7 (1.1–2.6)		
					132.8–355.0	1.8 (1.1–2.8)		
					<i>Total hours of exposure on weekends during the decade years 10, 20, 30 and 40 years of age</i>			
					4.0–42.4	1.0		
					42.4–60.0	0.9 (0.6–1.4)		
					60.0–80.6	1.3 (0.9–2.0)		
					80.6–253.0	0.8 (0.5–1.3)		
<i>Total lifetime occupational hours of exposure</i>								
None								
250–9,833	1.0							
9 834–35 293	0.8 (0.5–1.2)							
35 294–136 175	1.6 (1.0–2.4)							
<i>Total recreational hours of exposure since leaving school</i>								
0–4,454	1.0							
4 455–11 726	1.5 (1.0–2.2)							
4 455–11 726	0.8 (0.5–1.3)							
24 289–131 452	0.8 (0.5–1.3)							

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Vajdic <i>et al.</i> (2002) (contd)					<i>Ambient UVB radiation from birth to 9 years of age (J/m²)</i>			
					10.44–29.20	1.0		
					29.21–33.32	0.7 (0.4–1.2)		
					33.33–36.86	0.5 (0.3–0.9)		
					36.87–55.45	0.8 (0.5–1.3)		
					<i>Total lifetime ambient UVB radiation (J/m²)</i>			
					57.10–152.39	1.0		
					152.40–192.73	0.7 (0.4–1.1)		
					192.74–235.49	0.5 (0.3–0.9)		
					235.50–405.20	0.5 (0.2–0.9)		
					<i>Latitude band at birth (degrees)</i>			
					> 36	1.0		
					30–36	0.8 (0.5–1.2)		
					< 30	1.2 (0.7–1.8)		
					<i>Latitude band at diagnosis (degrees)</i>			
					> 36	1.0		
					30–36	0.9 (0.6–1.3)		
				< 30	0.9 (0.6–1.3)			
				<i>Wore tinted or untinted spectacles</i>				
				No	1.0			
				Yes	0.9 (0.7–1.3)			
				First wore before 20 years of age	0.6 (0.4–1.0)			
				First wore at 20 years of age or after	1.1 (0.8–1.5)			

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Vajdic <i>et al.</i> (2002) (contd)					Men			
					<i>Unweighted occupational outdoor hours during the first four decade years of life</i>			
					None	1.0		
					1–1750	1.1 (0.6–2.1)		
					1751–3600	2.3 (1.3–3.9)		
					≥ 3601	1.9 (1.1–3.3)		
					<i>Ambient UVB-weighted (J/m²) occupational outdoor hours during the first four decade years of life</i>			
					None	1.0		
					0.1–9.7	1.5 (0.8–2.7)		
					9.8–33.0	1.6 (0.9–2.8)		
					≥ 33.1	2.2 (1.3–3.9)		
					<i>Ambient UVA-weighted (J/m²) occupational outdoor hours during the first four decade years of life</i>			
					None	1.0		
					0.1–481.3	1.6 (0.9–3.0)		
					4 81.4–1684	1.6 (0.9–2.9)		
					≥ 1685.0	2.0 (1.1–3.4)		
					Women			
					<i>Unweighted occupational outdoor hours during the first four decade years of life</i>			
					None	1.0		
					1–1750	0.6 (0.3–1.3)		
					1751–3600	1.8 (0.7–4.5)		
					≥ 3601	2.4 (0.6–10.0)		

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Vajdic <i>et al.</i> (2002) (contd)					<i>Ambient UVB-weighted (J/m²) occupational outdoor hours during the first four decade years of life</i>			
					None	1.0		
					0.1–9.7	0.8 (0.4–1.6)		
					9.8–33.0	1.4 (0.5–4.0)		
					≥ 33.1	2.0 (0.5–8.7)		
					<i>Ambient UVA-weighted (J/m²) occupational outdoor hours during the first four decade years of life</i>			
					None	1.0		
					0.1–481.3	0.6 (0.3–1.3)		
					481.4–1684	1.8 (0.7–4.6)		
					≥ 1685.0	3.8 (0.6–24.8)		

Table 2.7. Case-control studies of exposure to natural sunlight and cancer of the lip

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95% CI)*	Adjustment for potential confounders	Comments
Schmidt-Pokrzywniak <i>et al.</i> (2009), Germany, 2002–2005	459 (243 M, 216 F) incident primary uveal melanoma cases identified through the ophthalmic clinic at the University Clinics of Essen, Germany; 20–74 years; response rate 94%; participation rate not provided; 100% histologically and clinically confirmed	827 (454 M, 373 F) population-controls randomly selected from mandatory lists of residence that cover the total population of the city or local district; matched by age, sex and region; response rate 55%; participation rate not provided	Self-administered postal questionnaire and computer-assisted telephone interview	Uveal melanoma	<i>Ever worked outside > 4 hour/d</i>		Age, gender, and region	
					No	1.0		
					Yes	1.2 (0.9–1.6)		
					<i>Total lifetime occupational years of sun exposure</i>			
					0	1.0		
					> 0–< 5	1.3 (0.9–1.9)		
					> 5–< 15	1.2 (0.7–2.0)		
					> 15	1.1 (0.8–1.7)		
					<i>Eye burns caused by welding, sunburn or snow blindness</i>			
					No	1.0		
					Yes	1.3 (0.9–1.9)		
					<i>At least 5 eye burns caused by welding, sunburn or snow blindness</i>			
					No	1.0		
					Yes	1.9 (1.0–3.4)		
<i>Wearing sunglasses or hats</i>								
No	1.0							
Yes	0.8 (0.6–1.1)							
<i>Regular sunlamp use</i>								
No	1.0							
Yes	1.3 (0.9–1.8)							
<i>Age at first sunlamp use</i>								
Never used	1.0							
> 20 y	1.3 (0.9–1.9)							
< 20 y	1.7 (0.8–3.6)							