

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Freedman <i>et al.</i> (2002) USA 1985–1995	6565 (4 492 M, 2073 F) non-melanoma skin cancer deaths; 130 261 (0 M; 130 261 F) female breast cancer deaths; 39 002 (0 M; 39 002 F) ovarian cancer deaths; 97 873 (97 873 M, 0 F) prostate cancer deaths; 153 511 (73 720 M, 79 791 F) colon cancer deaths; deaths were sourced from a database of all deaths in 24 states in the United States; participation rate 100%; histological confirmation was not provided	Controls were frequency matched by age, and excluded deaths from cancer and certain neurological diseases; participation rate 100%	Exposure to sunlight was assessed by state of residence, birthplace and occupation recorded on the death certificate	Female breast cancer (9), ovarian cancer (183), colon cancer (153), prostate cancer (185)	<b>Residential exposure to sunlight</b> <i>Breast cancer</i> Low Med High <i>Ovarian cancer</i> Low Med High <i>Prostate cancer</i> Low Med High <i>Colon cancer</i> Low Med High <b>Occupational exposure to sunlight</b> <i>Breast cancer</i> Indoor Mixed Outdoor Farmer <i>Ovarian cancer</i> Indoor Mixed Outdoor Farmer <i>Prostate cancer</i> Indoor Mixed Outdoor Farmer <i>Colon cancer</i> Indoor Mixed Outdoor Farmer	1.0 0.84 (0.82–0.86) 0.74 (0.72–0.76) 1.0 0.90 (0.87–0.93) 0.84 (0.81–0.88) 1.0 0.89 (0.86–0.91) 0.90 (0.87–0.93) 1.0 0.90 (0.88–0.92) 0.73 (0.71–0.74) 1.0 1.03 (0.97–1.09) 0.82 (0.70–0.97) 0.92 (0.77–1.10) 1.0 1.02 (0.94–1.10) 0.94 (0.75–1.17) 1.12 (0.88–1.41) 1.0 1.00 (0.97–1.03) 1.00 (0.96–1.05) 1.16 (1.11–1.22) 1.0 0.98 (0.96–1.00) 0.90 (0.86–0.94) 1.04 (0.99–1.09)	Age, sex, race, socioeconomic status, and physical activity.	

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<b>Colon cancer</b>								
Kampman <i>et al.</i> (2000) USA 1991–1994	1983 (1 095 M, 888 F) colon cancer cases were recruited from the Kaiser Permanente Medical Care Program of Northern California, an eight-county area of Utah (Davis, Salt Lake, Utah, Weber, Wasatch, Tooele, Morgan, and Summit counties), and the metropolitan Twin Cities of Minnesota (Anoka, Carver, Dakota, Heimepa, Ramsey, Scott, and Washington counties); aged 30 ± 79 years at diagnosis; 76% participation rate; 100% histologically confirmed	2400 (1 286 M, 1 114 F) population-based controls were recruited from the same sources as the cases; matched by 5-year age groups and by sex; participation rate 64%	Exposure data were collected by trained and certified interviewers. Exposure to the sun was obtained for the referent year by asking: “How many hours per week, on average, did you spend outside in the daylight during [Season]?”	Colon cancer	<i>Sun exposure</i> 1 quintile of exposure (low) 2 quintile of exposure 3 quintile of exposure 4 quintile of exposure 5 quintile of exposure (high)  1 quintile of exposure (low) 2 quintile of exposure 3 quintile of exposure 4 quintile of exposure 5 quintile of exposure (high)	<i>Men</i> 1.0 1.0 (0.8 ± 1.3) 1.1 (0.8 ± 1.4) 0.9 (0.7 ± 1.2) 0.9 (0.7 ± 1.1) <i>Women</i> 1.0 1.3 (1.0 ± 1.7) 0.9 (0.7 ± 1.2) 1.1 (0.8 ± 1.5) 1.0 (0.8 ± 1.4)	Analyses of sunshine and vitamin D were adjusted for calcium intake. Analyses was stratified by sex, age at diagnosis, subsite of the colon, and family history of colorectal cancer in a first-degree relative.	

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<b>Breast cancer</b>								
John <i>et al.</i> (2007) San Francisco Bay, USA 1995–2003	1788 Hispanic, African-American and non-Hispanic White women with a first primary invasive breast cancer diagnosed between 1995 and 1999 were identified through the California population-based Greater Bay Area Cancer Registry; 35–79 years; response rate 87%; participation rate not provided; 100% histologically confirmed	2129 population-based controls were identified through random digit dialling; matched by race, ethnicity and 5-year age group; response rate 84%; participation rate not provided	Interviewer administered questionnaire, portable reflectometer. Sun exposure index was based on difference between skin reflectance on usually exposed and usually unexposed body skin.	Breast cancer (advanced)	<b>Self-reported lifetime outdoor activity (hours/week)</b> <i>Light constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Medium constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Dark constitutive pigmentation</i> 1 (low) 2 3 4 (high)	1.0 0.97 (0.58–1.62) 1.29 (0.80–2.09) 0.86 (0.51–1.45) 1.0 1.17 (0.72–1.91) 1.23 (0.76–1.97) 0.77 (0.46–1.29) 1.0 1.01 (0.65–1.59) 1.31 (0.84–2.03) 1.14 (0.72–1.81)	Age, race/ethnicity, education, family history of breast cancer, personal history of benign breast disease, number of full-term pregnancies, breastfeeding, height, alcohol consumption, and a composite variable of body mass index, menopausal status, and history of hormone therapy use	

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John <i>et al.</i> (2007) (contd)				Breast cancer (advanced)	<b>Sun exposure index</b> <i>Light constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Medium constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Dark constitutive pigmentation</i> 1 (low) 2 3 4 (high)	1.0 0.78 (0.49–1.26) 0.62 (0.37–1.04) 0.53 (0.31–0.91) 1.0 1.29 (0.80–2.08) 0.90 (0.53–1.55) 1.26 (0.74–2.15) 1.0 1.15 (0.73–1.82) 1.39 (0.89–2.17) 1.28 (0.81–2.05)		
				Breast cancer (localized)	<b>Self-reported lifetime outdoor activity (hours/week)</b> <i>Light constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Medium constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Dark constitutive pigmentation</i> 1 (low) 2 3 4 (high)	1.0 0.95 (0.65–1.40) 0.89 (0.61–1.29) 1.05 (0.72–1.54) 1.0 0.79 (0.53–1.17) 1.35 (0.94–1.93) 1.02 (0.70–1.50) 1.0 0.80 (0.56–1.15) 0.94 (0.66–1.35) 0.70 (0.47–1.04)		

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Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
John <i>et al.</i> (2007) (contd)				Breast cancer (localized)	<b>Sun exposure Index</b> <i>Light constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Medium constitutive pigmentation</i> 1 (low) 2 3 4 (high) <i>Dark constitutive pigmentation</i> 1 (low) 2 3 4 (high)	1.0 1.09 (0.76–1.58) 0.96 (0.65–1.41) 1.10 (0.74–1.63) 1.0 1.12 (0.78–1.62) 1.01 (0.68–1.49) 1.06 (0.71–1.60) 1.0 1.43 (0.97–2.10) 1.30 (0.88–1.93) 1.11 (0.74–1.67)		

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Knight <i>et al.</i> (2007) Canada 2003–2004	972 women with an invasive first primary breast cancer diagnosed between 1 July 2003 and 31 August 2004 were identified from the Ontario Cancer Registry; aged < 70 years; response rate 72%; participation rate not provided; 100% histologically confirmed	1135 control women were identified through randomly selected residential telephone number lists for the province of Ontario; matched by 5-year age group; response rate 82%; participation rate not provided	Telephone interview	Breast cancer	<b>At ages 10 to 19</b>			Age, education, ethnicity, age at menarche, first degree family history of breast cancer, ever breast-fed, and age at first birth
					<i>Usual days outside per week in summer</i>			
					< 3	1.49 (1.00–2.22)		
					3–4	1.23 (0.85–1.80)		
					5–6	0.82 (0.63–1.06)		
					7	1.0		
					<i>Lifetime outdoor activity episodes</i>			
					< 828	1.0		
					828–1,295	0.87 (0.67–1.12)		
					1 296–2,039	0.74 (0.57–0.96)		
					2 040+	0.65 (0.50–0.85)		
					<i>Outdoor job history</i>			
					Never	1.0		
					1 y	0.69 (0.50–0.96)		
					> 1 y	0.61 (0.46–0.80)		
					<i>Limbs usually covered when outdoors</i>			
					No	1.0		
					Partial	1.36 (1.06–1.75)		
					Yes	1.68 (1.14–2.50)		
					<i>Skin usually burned or darkened in summer</i>			
No	1.55 (1.08–2.24)							
Yes	1.0							
<i>Usual sunscreen use when outdoors</i>								
No	1.0							
Yes	1.04 (0.72–1.51)							
<i>Ever trip to sunnier climate in winter</i>								
No	1.0							
Yes	1.00 (0.77–1.30)							
<i>Ever sunlamp use</i>								
No	1.0							
Yes	0.81 (0.57–1.14)							

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Knight <i>et al.</i> (2007) (contd)					<b>At ages 20 to 29</b>			
					<i>Usual days outside per week in summer</i>			
					< 3	1.40 (1.07–1.84)		
					3–4	0.86 (0.65–1.14)		
					5–6	0.72 (0.56–0.93)		
					7	1.0		
					<i>Lifetime outdoor activity episodes</i>			
					< 828	1.0		
					828–1295	0.65 (0.50–0.85)		
					1 296–2039	0.72 (0.55–0.93)		
					2040+	0.65 (0.50–0.85)		
					<i>Outdoor job history</i>			
					Never	1.0		
					1 y	1.06 (0.65–1.74)		
					> 1 y	1.22 (0.80–1.86)		
					<i>Limbs usually covered when outdoors</i>			
					No	1.0		
					Partial	1.13 (0.89–1.42)		
					Yes	1.68 (1.20–2.37)		
					<i>Skin usually burned or darkened in summer</i>			
				No	1.06 (0.75–1.49)			
				Yes	1.0			
				<i>Usual sunscreen use when outdoors</i>				
				No	1.0			
				Yes	0.89 (0.72–1.11)			
				<i>Ever trip to sunnier climate in winter</i>				
				No	1.0			
				Yes	1.05 (0.86–1.28)			
				<i>Ever sunlamp use</i>				
				No	1.0			
				Yes	0.88 (0.66–1.18)			

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					<b>At ages 45 to 54</b>			
					<i>Usual days outside per week in summer</i>			
					< 3	1.29 (0.94–1.76)		
					3–4	1.00 (0.75–1.33)		
					5–6	0.86 (0.65–1.15)		
					7	1.0		
					<i>Lifetime outdoor activity episodes</i>			
					< 828	1.0		
					828–1295	1.01 (0.68–1.50)		
					1 296–2039	0.80 (0.55–1.15)		
					2040+	0.91 (0.64–1.31)		
					<i>Outdoor job history</i>			
					Never	1.0		
					1 y	0.82 (0.41–1.64)		
					> 1 y	0.89 (0.62–1.28)		
					<i>Limbs usually covered when outdoors</i>			
					No	1.0		
					Partial	1.13 (0.88–1.45)		
					Yes	1.22 (0.93–1.60)		
					<i>Skin usually burned or darkened in summer</i>			
					No	1.24 (0.91–1.68)		
					Yes	1.0		
					<i>Usual sunscreen use when outdoors</i>			
					No	0.78 (0.64–0.96)		
					Yes	1.0		
					<i>Ever trip to sunnier climate in winter</i>			
					No	1.0		
					Yes	0.93 (0.76–1.13)		
					<i>Ever sunlamp use</i>			
					No	1.0		
					Yes	0.84 (0.64–1.11)		

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<b>Prostate cancer</b>								
Luscombe <i>et al.</i> (2001) North Staffordshire, United Kingdom 1999–2000	210 white northern-European men (not related to one another) with sporadic prostate cancer were recruited from the North Staffordshire Hospital; participation rate 85%; 90% histologically confirmed	155 patients from North Staffordshire Hospital with benign prostatic hypertrophy were chosen as controls; participation rate 85%; 79% histologically confirmed	Self-administered questionnaire	Prostate cancer	<i>Mean weeks cumulative exposure</i> Lowest exp quartile 25–50% exp quartile 50–75% exp quartile Highest exp quartile <i>Living abroad in sunny country for &gt; 6 months</i> No Yes <i>History of childhood sunburn</i> No Yes <i>Mean sunbathing score</i> <i>History of regular foreign holidays</i> No Yes <i>Mean weeks foreign holiday/year</i>	0.998 (0.997–0.999) per week 3.03 (1.59–5.78) 1.51 (0.83–2.76) 1.18 (0.65–2.16) 1.0 1.0 0.71 (0.45–1.14) 1.0 0.18 (0.08–0.38) 0.83 (0.76–0.89) per unit 1.0 0.41 (0.25–0.68) 0.85 (0.74–0.98) per week	Age at diagnosis, vasectomy status and diet	
Bodiwala <i>et al.</i> (2003) North Staffordshire, United Kingdom, 2001–2003	212 northern European Caucasian prostatic adenocarcinoma patients selected from urology clinics in the North Staffordshire Hospital; participation rate 100% (though some cases could have been randomly missed)	135 northern European Caucasian benign prostatic hypertrophy patients selected from urology clinics in the North Staffordshire Hospital; participation rate 99%	Self-administered questionnaire	Prostatic adenocarcinoma	<i>Mean weeks cumulative exposure</i> Lowest exp quartile 25–50% exp quartile 50–75% exp quartile Highest exp quartile <i>Living abroad in sunny country for &gt; 6 months</i> No Yes <i>History of childhood sunburn</i> No Yes <i>Regular foreign holidays</i> No Yes	0.998 (0.997–0.999) per week 3.21 (1.61–6.40) 1.68 (0.91–3.09) 1.40 (0.78–2.52) 1.00 1.0 0.89 (0.54–1.48) 1.0 0.42 (0.21–0.84) 1.0 0.56 (0.35–0.90)	Age at diagnosis	

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Bodiwala <i>et al.</i> (2003) (contd)					<i>Mean sunbathing score</i>	0.79 (0.72–0.87) per unit		
					Lowest adult sunbathing quartile	5.33 (2.38–11.6)		
					25–50% adult sunbathing quartile	3.89 (2.02–7.49)		
					50–75% adult sunbathing quartile	2.29 (1.14–4.62)		
					Highest adult sunbathing quartile	1.00		
John <i>et al.</i> (2005) San Francisco Bay, USA 1997–2000	450 non-Hispanic men with newly diagnosed primary advanced prostate cancer were identified through the Greater San Francisco Bay Area Cancer Registry; 40 – 79 years; response rate 72%; participation rate not provided; 100% histologically confirmed	455 controls were identified through random digit dialling; matched by race and 5-year age group; response rate 64%; participation rate not provided	Interviewer-administered questionnaire, and a reflectometer measured constitutive skin pigmentation on the upper underarm and facultative pigmentation on the forehead. Sun exposure index was based on difference between skin reflectance on usually exposed and usually unexposed body skin.	Prostate cancer	<i>Solar radiation in state of birth</i> Low Medium High Foreign-born <i>Duration of residence in states of low solar radiation</i> ≤ 15 1–14 0‡ 0§ <i>Lifetime outdoor activities (h/wk)</i> < 2.7 2.7–5.6 5.7–10.4 10.5–19.8 ≥ 19.9 <i>Lifetime outdoor jobs (h/wk)</i> 0 1.4 1.4–5.6 5.7–14.7 ≥ 14.8 <i>Sun exposure index</i> 1 (Light) 2 3 4 5 (Dark)	1.0 0.99 (0.67–1.47) 1.01 (0.73–1.39) 1.08 (0.62–1.87) 1.0 0.98 (0.66–1.46) 0.91 (0.61–1.35) 0.95 (0.66–1.35) 1.0 1.15 (0.76–1.73) 1.09 (0.72–1.65) 1.10 (0.73–1.67) 0.95 (0.62–1.45) 1.0 0.96 (0.65–1.43) 1.20 (0.81–1.77) 0.95 (0.64–1.41) 0.73 (0.48–1.11) 1.0 0.87 (0.58–1.30) 0.80 (0.53–1.20) 0.95 (0.64–1.42) 0.51 (0.33–0.80)	Age and family history of prostate cancer	

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<i>Haematopoietic malignancies</i>								
Freedman <i>et al.</i> (1997) USA 1984–1991	33 407 (16 798 M, 16 609 F) nonHodgkin lymphoma, deaths in a 24 state mortality database; people who identified as white or African American; ≥ 20 years of age; 100% participation rate	65 843 (33 021 M, 32 822 F) controls selected from noncancer deaths in the database; matched by sex, race, and five year age group; 100% participation rate; 100%	Death certificate and United States Weather Bureau data	NonHodgkin lymphoma (200 and 202, excluding 202.2202.6)	<i>Residence</i> Low sun Moderate sun High sun <i>Occupation</i> Indoor Mixed Outdoor (non-farmer) Farmer <i>Residence by occupation</i> Low sun – Indoor Low sun – Outdoor (nonfarmer) Mod sun – Indoor Mod sun – Outdoor (nonfarmer) High sun – Indoor High sun – Outdoor (nonfarmer)	1.0 0.95 (0.92–0.98) 0.83 (0.81–0.86) 1.0 0.95 (0.91–0.99) 0.88 (0.81–0.96) 1.31 (1.21–1.42) 1.0 0.77–1.03 (0.96–1.04) 0.87 (0.76–0.99) 0.86 (0.82–0.90) 0.74 (0.64–0.86)	Age, sex, race, socioeconomic status, and farming occupation	
van Wijngaarden and Savitz (2001) USA 1950–1986	188 men who had died from NHL who were employed full-time at any of five large electric utility companies in the United States for at least 6 months between 1 January 1950 and 31 December 1986; women were excluded; age was not restricted; 100% response rate	1880 population-based controls from the worker cohort; matched for birth year and ethnicity; controls were eligible to serve as control subjects for multiple cases	Exposure was classified according to work history and cumulative work-related sunlight exposure estimated	Non-Hodgkin lymphoma	<i>Sunlight exposure during the past 2–11 years</i> 0 > 0 to < 2.16 ≥ 2.16 to < 5.08 ≥ 5.08 to < 7.58 ≥ 7.58 <i>Sunlight exposure during the past 12–21 years</i> 0 > 0 to < 2.47 ≥ 2.47 to < 4.40 ≥ 4.40 to < 7.40 ≥ 7.40 <i>Sunlight exposure during the past 22+ years</i> 0 > 0 to < 2.27 ≥ 2.27 to < 6.06 ≥ 6.06 to < 11.78 ≥ 11.78	1.0 0.7 (0.4–1.3) 0.8 (0.4–1.5) 1.1 (0.6–2.1) 0.6 (0.3–1.3) 1.0 0.7 (0.4–1.3) 1.3 (0.7–2.4) 1.0 (0.5–1.8) 0.8 (0.4–1.5) 1.0 1.1 (0.6–2.0) 1.0 (0.5–1.8) 1.2 (0.7–2.3) 1.0 (0.5–2.0)	Work status, social class, and exposure to solvents	

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van Wijngaarden and Savitz (2001) (contd)					<i>Career sunlight exposure</i> < 4.98 ≥ 4.98 to < 10.22 ≥ 10.22 to < 19.10 ≥ 19.10 to < 27.09 ≥ 27.09	1.0 1.5 (0.9–2.5) 1.1 (0.7–1.9) 1.1 (0.6–2.1) 1.2 (0.6–2.4)		
Tavani <i>et al.</i> (2006) Northern Italy 1985–1997	446 (256 M, 190 W) from greater Milan area and the province of Pordenone, northern Italy, with histologically confirmed NHL; age 18–79 years; response rate; participation rate 97%; 100% histologically confirmed	1295 (791 M, 504 W) controls admitted to hospital for a wide range of acute, non-neoplastic, nonimmune-related diseases. Admission diagnoses known to be related to long-term modifications in diet, cigarette smoking or alcohol drinking were excluded from the control group. matched by age; participation rate 97%	Interviewer-administered questionnaire	NonHodgkin lymphoma (200 and 202)	<i>UV exposure at work</i> No Yes ≤ 10 years > 10 years	1.0 1.01 (0.72–1.43) 0.89 (0.37–2.17) 1.03 (0.72–1.49)	Age, sex, area of residence, education and smoking	Hospital-based design

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Karipidis <i>et al.</i> (2007) Australia 2000–2001	694 cases of NHL first diagnosed between 1 January 2000 and 31 August 2001 and notified to the NSW Central Cancer Registry; 20–74 years; participation rate 85%; 100% histologically confirmed	694 controls were randomly selected from the NSW and ACT Electoral Rolls; approximately matched by age, sex and region of residence at diagnosis; participation rate 61%	Self-administered questionnaire and computer-assisted telephone interview. Job exposure matrix applied to detailed job histories.	Non-Hodgkin lymphoma	<i>Total occupational exposure to the sun*</i>	1.0	Age, sex, region of residence and ethnic origin	*Exposure reported as tertiles
					Unexposed	1.11 (0.81–1.51)		
					1	1.07 (0.78–1.47)		
					2	1.32 (0.96–1.81)		
					3			
					<i>5-year lag exposure</i>	1.0		
					Unexposed	1.18 (0.87–1.61)		
					1	1.08 (0.79–1.48)		
					2	1.46 (1.06–2.02)		
					3			
					<i>10-year lag exposure</i>	1.0		
					Unexposed	1.31 (0.96–1.79)		
					1	1.02 (0.74–1.42)		
2	1.50 (1.09–2.08)							
3								
Petridou <i>et al.</i> (2007) Greece 1996–2002	87 cases of childhood with non-Hodgkin lymphoma and 71 with Hodgkin lymphoma, diagnosed in Greece through the national network of childhood Hematology-Oncology Units; 0–14 years; participation rate 72%; 100% histologically confirmed	164 controls were selected and matched for age and gender among those hospitalized, in the same hospital and at the same time as the corresponding cases, for minor paediatric ailments; participation rate 90%	Interviewer-administered structured questionnaire	Non-Hodgkin lymphoma and Hodgkin lymphoma	<b>Hodgkin lymphoma</b>		Socioeconomic, perinatal and sun exposure variables	
					<i>Sun Protection</i>	1.0		
					No	0.54 (0.29–1.03)		
					Yes			
					<i>15 days spent annually at seaside resorts</i>	1.0		
					No	0.83 (0.58–1.19)		
					Yes			
					<b>Non Hodgkin Lymphoma</b>			
					<i>Sun Protection</i>	1.0		
					No	0.74 (0.39–1.39)		
					Yes			
<i>15+ days spent annually at seaside resorts</i>	1.0							
No	0.60 (0.43–0.83)							
Yes								

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Hughes <i>et al.</i> (2004) New South Wales, Australia 2001–2002	704 (410 M, 294 F) first primary non-Hodgkin lymphoma cases (NHL) as notified to the NSW Cancer Registry or directly to the investigators; 20–74 years; response rate 85%; participation rate not provided; 100% histologically confirmed	694 population-based controls randomly selected from state electoral rolls; matched by age, sex and state of residence; response rate 61%; participation rate not provided	Self-administered questionnaire and telephone interview	Non-Hodgkin lymphoma – patients with diagnoses of chronic lymphocytic leukaemia, plasma cell myeloma, precursor B and T lymphoblastic leukaemia, and lymphomatoid granulomatosis grades 1 and 2 were excluded.	<i>Working &amp; nonworking days sun exposure during the decades yrs from 10 to 60 years of age</i>	1.0	Age, sex, state, ethnicity, skin colour and ability to tan	
					Lowest exposure quartile	0.72 (0.53–0.98)		
					25–50% exp quartile	0.66 (0.48–0.91)		
					50–75% exp quartile	0.65 (0.46–0.91)		
					Highest quartile			
					<i>Working days sun exposure during the decade years</i>			
					Lowest exposure	1.0		
					25–50% exp quartile	0.98 (0.73–1.33)		
					50–75% exp quartile	0.91 (0.66–1.25)		
					Highest quartile	0.95 (0.68–1.33)		
<i>Nonworking days sun exposure during the decades</i>								
Lowest exposure quartile	1.0							
25–50% exp quartile	0.83 (0.61–1.11)							
50–75% exp quartile	0.57 (0.42–0.79)							
Highest quartile	0.47 (0.34–0.66)							

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Hughes <i>et al.</i> (2004) (contd)					<i>Lifetime occupational sun exposure (history of outdoor work)</i>			
					None	1.0		
					Lowest exp tertile	1.03 (0.76–1.40)		
					Middle exp tertile	1.04 (0.76–1.43)		
					Highest tertile	1.21 (0.87–1.69)		
					<i>Vacation sun exposure in the warmer &amp; cooler months in the decade years</i>			
					Lowest exposure quartile	1.0		
					25–50% exp quartile	0.98 (0.72–1.32)		
					50–75% exp quartile	0.82 (0.60–1.12)		
					Highest quartile	0.60 (0.43–0.85)		
					<i>Vacation sun exposure in the warmer months</i>			
					Lowest exposure quartile	1.0		
					25–50% exp quartile	0.78 (0.57–1.05)		
					50–75% exp quartile	0.81 (0.59–1.10)		
					Highest quartile	0.65 (0.47–0.91)		
					<i>Vacation sun exposure in the cooler months</i>			
Lowest exposure quartile	1.0							
25–50% exp quartile	0.87 (0.64–1.17)							
50–75% exp quartile	0.78 (0.58–1.06)							
Highest quartile	0.64 (0.46–0.88)							

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Hartge <i>et al.</i> (2006) USA 1998–2000	551 (294 M, 257 F) first primary NHL cases as notified to four Surveillance, Epidemiology, and End Results (SEER) registries (Iowa, Los Angeles County, metropolitan Detroit, and metropolitan Seattle); 20 – 74 years; response rate 79%; participation rate 25%; 100% histologically confirmed	462 (239 M, 223 F) controls were identified from households contacted via random digit dialing (under age 65 years) and from the Centers for Medicare and Medicaid Services (CMS) population rosters (65–74 years); matched by study area, age, sex, and race; response rate 51%; participation rate 19%	Self-administered questionnaire and computer-assisted personal interview	Non-Hodgkin lymphoma (ICD-O <sub>3</sub> codes 967–972; ICD-02 codes 9 590–9595, 9 670–9717, 9 823, 9 827)	<i>Hours in the mid-day sun in the past 10 years</i>	1.0	Age, gender, ethnicity, and centre	
					< 7	0.85 (0.62–1.18)		
					< 14	0.75 (0.54–1.05)		
					< 28	0.73 (0.46–1.15)		
					28+			
					<i>Hours in the mid-day sun during teens</i>			
					< 7	1.0		
					< 14	0.97 (0.59–1.61)		
					< 28	0.81 (0.52–1.27)		
					28+	0.75 (0.48–1.18)		
					<i>Hours in the mid-day sun during twenties</i>			
					< 7	1.0		
					< 14	0.86 (0.60–1.22)		
					< 28	0.83 (0.58–1.18)		
					28+	0.75 (0.50–1.11)		
					<i>Hours in the mid-day sun during thirties</i>			
					< 7	1.0		
					< 14	0.75 (0.54–1.04)		
					< 28	0.95 (0.68–1.33)		
					28+	0.78 (0.50–1.19)		
<i>Use of sunlamp or tanning booth</i>								
Never	1.0							
Ever	0.88 (0.66–1.19)							
Only after age 20	0.97 (0.69–1.37)							
Before age 20	0.72 (0.45–1.14)							
< 5 times	0.78 (0.46–1.32)							
5–9 times	0.90(0.52–1.58)							
10+ times	0.90 (0.61–1.30)							
<i>History of blistering sunburns</i>								
Never	1.0							
Ever	0.86 (0.66–1.12)							
Only after age 20	0.92 (0.65–1.31)							
Before age 20	0.83 (0.62–1.10)							
1 time	0.87 (0.62–1.23)							
2–4 times	1.02 (0.72–1.46)							
5+ times	0.68 (0.47–0.97)							

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments						
Hartge <i>et al.</i> (2006) (contd)					<i>Months per year with a tan as a teenager</i>	None	1.0							
					1–3	0.94 (0.63–1.39)								
					4–6	0.91 (0.60–1.39)								
					7–12	0.99 (0.59–1.67)								
					<i>Months per year with a tan in past 10 years</i>	None	1.0							
					1–3	0.96 (0.69–1.32)								
					4–6	0.76 (0.52–1.13)								
					7–12	0.90 (0.55–1.45)								
					<i>Lifetime average residential UV level</i>		0.76 (0.50–1.15) per 50 RB units							
					Soni <i>et al.</i> (2007) Nebraska, USA 1999–2002	387 (214 M, 173 F) newly diagnosed cases were identified through the Nebraska Lymphoma Study Group and area hospitals using a rapid case ascertainment system; age 20 – 75 years; participation rate 73.2%; 100% histologically confirmed	535(281 M, 254F) population-based controls without a history of HIV infection or cancer were randomly selected by two-stage random digit dialling from the same geographical area as the cases; matched by age (five-year age groups); participation rate 76.8%		Telephone interview and mailed questionnaire	Non-Hodgkin lymphoma	<i>Usual duration of sun exposure in spring (h/day)</i>	< 2	1.0	Age, sex, and a family history of cancer
											2–4	1.0 (0.7–1.5)		
											> 4	0.9 (0.6–1.4)		
											<i>Usual duration of sun exposure in summer (h/day)</i>	< 3	1.0	
											3–5	1.0 (0.7–1.4)		
> 5	0.9 (0.6–1.2)													
<i>Usual duration of sun exposure in fall (h/day)</i>	< 2	1.0												
2–4	1.0 (0.7–1.4)													
> 4	0.7 (0.5–1.0)													
<i>Usual duration of sun exposure in winter (h/day)</i>	≤ 1	1.0												
> 1	0.9 (0.7–1.2)													
<i>Usual duration of sun exposure in whole year (h/week)</i>	< 14	1.0												
14–30	0.9 (0.6–1.2)													
> 30	0.7 (0.5–1.1)													

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Zhang <i>et al.</i> (2007) Connecticut, USA 1996–2000	601 incident female non-Hodgkin lymphoma cases from the Rapid Case Ascertainment Shared Resource at the Yale Cancer Center; 21 – 84 years; participation rate 72%; 100% histologically confirmed	717 population-based female controls with Connecticut addresses selected by random digit dialing methods for those < 65 years or randomly selected from files provided by the Centers for Medicare and Medicaid Service for those ≥ 65 years; matched by age; participation rate 69% for those < 65 years and 47% for those ≥ 65 years	Interviewer-administered standardized structured questionnaire	Non-Hodgkin lymphoma	<i>Duration of suntan (years)</i> Never Tertile 1 Tertile 2 Tertile 3 <i>Months of suntan per year</i> Never < 3 ≥ 3 <i>Duration of spending time in strong sunlight during summer (years)</i> Tertile 1 Tertile 2 Tertile 3 <i>Hours per week of time in strong sunlight during summer (years)</i> Tertile 1 Tertile 2 Tertile 3 <i>Duration of spending time in tropics (years)</i> Never Ever 1 week 2–3 weeks > 3 weeks <i>Frequency of having sunburns</i> Never 1 ≥ 2	1.0 0.9 (0.5–1.4) 1.1 (0.7–1.7) 1.5 (1.0–2.4) 1.0 1.4 (0.9–2.1) 1.0 (0.6–1.6) 1.0 1.3 (1.0–1.7) 1.7 (1.2–2.4) 1.0 1.2 (0.9–1.6) 1.1 (0.8–1.5) 1.0 1.2 (1.0–1.5) 1.4 (0.9–2.1) 1.1 (0.8–1.5) 1.1 (0.9–1.5) 1.0 1.0 (0.7–1.3) 0.8 (0.6–1.0)	Race, age, family history of non-Hodgkin’s lymphoma, highest educational status, eye colour, and skin type	

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Smedby <i>et al.</i> (2005) Denmark and Sweden 1999–2002	3740 (2 184 M, 1 556 F) selected through a rapid case ascertainment system set up for the purposes of the study in Denmark and Sweden. A network of contact physicians was established with all hospital clinics in which malignant lymphomas are diagnosed and treated, involving 39 departments in Denmark and 118 in Sweden; age 18–74 years; participation rate 83%; 100% histologically confirmed	3187 (1 767 M, 1 420 F) population-based controls randomly selected from continuously updated computerized population registers that encompass the entire Danish and Swedish populations; participation rate 71%	Telephone interview using a computer-aided questionnaire	Non-Hodgkin lymphoma, including chronic lymphocytic Leukaemia; Hodgkin lymphoma	<b>Non-Hodgkin lymphoma</b>			
					<i>Sunbathing 5 – 10 years ago</i>			
					Never	1.0	Age (in 5-year intervals), sex, and country	
					Once/week or less	0.9 (0.7–1.0)		
					2–3 times/week	0.8 (0.7–0.9)		
					4 times/week or more	0.7 (0.6–0.9)		
					<i>Sunbathing at 20 years of age</i>			
					Never	1.0		
					Once/week or less	0.8 (0.7–0.9)		
					2–3 times/week	0.7 (0.6–0.9)		
					4 times/week or more	0.7 (0.6–0.9)		
					<i>Sun vacations abroad</i>			
					Never	1.0		
					1–5 times	1.0 (0.9–1.1)		
					6–20 times	0.9 (0.8–1.0)		
					> 20 times	0.7 (0.6–0.8)		
					<i>Solaria/sun lamp use</i>			
					Never	1.0		
					< 10 times	1.0 (0.9–1.2)		
					10–49 times	0.9 (0.8–1.0)		
50 times or more	0.8 (0.7–1.0)							
<i>Outdoor occupation</i>								
Never	1.0							
Ever	1.1 (1.0–1.2)							
<i>Sunburns 5–10 years before interview</i>								
Never	1.0							
< 1/year	0.9 (0.8–1.0)							
1/year	0.8 (0.6–0.9)							
≥ 2/year	0.8 (0.6–1.1)							
<i>Sunburns at 20 years of age</i>								
Never	1.0							
< 1/year	1.0 (0.9–1.2)							
1/year	0.8 (0.7–0.9)							
≥ 2/year	0.6 (0.5–0.8)							
<i>Sunburns in childhood</i>								
Never	1.0							
< 1/year	0.8 (0.7–1.0)							
1/year	0.8 (0.6–0.9)							
≥ 2/year	0.7 (0.6–0.9)							

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Smedby <i>et al.</i> (2005) (contd)					<b>Hodgkin lymphoma</b>			
					<i>Sunbathing 5–10 years ago</i>			
					Never	1.0		
					Once/week or less	0.8 (0.6–1.0)		
					2–3 times/week	0.7 (0.5–1.0)		
					4 times/week or more	0.7 (0.5–1.0)		
					<i>Sunbathing at 20 years of age</i>			
					Never	1.0		
					Once/week or less	0.8 (0.5–1.2)		
					2–3 times/week	0.6 (0.4–1.0)		
					4 times/week or more	0.9 (0.6v1.4)		
					<i>Sun vacations abroad</i>			
					Never	1.0		
					1–5 times	0.8 (0.6–1.0)		
					6–20 times	0.7 (0.5–0.9)		
					> 20 times	0.8 (0.6–1.2)		
					<i>Solaria/sun lamp use</i>			
					Never	1.0		
					< 10 times	0.8 (0.6–1.0)		
					10–49 times	0.7 (0.5–0.9)		
					50 times or more	0.7 (0.5–0.9)		
					<i>Outdoor occupation</i>			
					Never	1.0		
					Ever	1.2 (0.9–1.6)		
					<i>Sunburns 5–10 years before interview</i>			
					Never	1.0		
					< 1/year	0.8 (0.6–1.0)		
					1/year	0.7 (0.5–0.9)		
					≥ 2/year	0.7 (0.4–1.0)		
					<i>Sunburns at 20 years of age</i>			
					Never	1.0		
					< 1/year	0.9 (0.7–1.3)		
					1/year	0.8 (0.5–1.1)		
					≥ 2/year	0.8 (0.5–1.3)		
					<i>Sunburns in childhood</i>			
					Never	1.0		
					< 1/year	0.9 (0.7–1.2)		
					1/year	0.9 (0.7–1.3)		
					≥ 2/year	0.7 (0.5–1.1)		

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Weihkopf <i>et al.</i> (2007) Germany	710 cases of malignant lymphoma were prospectively identified by all hospital and ambulatory physicians involved in their diagnosis and therapy; age 18–80 years; participation rate 87.4%,	710 population-based controls selected from the population registration office; gender, region and age-matched; participation rate 51.4%	Face-to-face interviews	Lymphoma	<b>Hodgkin lymphoma</b> <i>Vacations at sun-exposed location (cumul. days)</i> ≤ 350 days > 350 ≤ 720 days > 720 ≤ 1 190 days > 1 190 days <i>Outdoor leisure activities (cumul. hrs.), vacations excluded</i> ≤ 24 000 hours > 24 000 ≤ 37 000 hours > 37 000 ≤ 53 000 hours > 53 000 hours <i>Occupational sunlight UV-exposure (cumul. hrs.)</i> None > 0 ≤ 1 600 hours > 1 600 ≤ 7 600 hours > 7 600 hours <i>Use of sunbeds (cumul.)</i> No sunbed use 1–15 times 16–118 times > 118 times <b>B-non-Hodgkin lymphoma</b> <i>Vacations at sun-exposed location (cumul. days)</i> ≤ 350 days > 350 ≤ 720 days > 720 ≤ 1 190 days > 1 190 days <i>Outdoor leisure activities (cumul. hrs.), vacations excluded</i> ≤ 24 000hrs > 24 000 ≤ 37 000hrs > 37 000 ≤ 53 000 hours > 53 000 hours	1.0 0.6 (0.4–1.0) 0.4 (0.2–0.9) 0.5 (0.2–1.3) 1.0 1.4 (0.8–2.4) 1.3 (0.7–2.4) 2.0 (0.8–4.8) 1.0 1.2 (0.6–2.4) 1.3 (0.5–3.1) 1.9 (0.9–3.9) 1.0 0.6 (0.3–1.2) 1.1 (0.6–2.0) 1.1 (0.6–2.2) 1.0 0.8 (0.6–1.1) 0.7 (0.5–1.0) 0.6 (0.4–0.9) 1.0 1.3 (1.0–1.7) 1.3 (0.9–1.8) 1.3 (0.9–2.0)	Smoking (in pack years) and alcohol consumption	

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Weihkopf <i>et al.</i> (2007) (contd)					<i>Occupational sunlight UV-exposure (cumul. hrs.)</i>			
					None	1.0		
					> 0 ≤ 1 600 hours	0.8 (0.6–1.2)		
					> 1 600 ≤ 7 600 hours	0.8 (0.5–1.2)		
					> 7 600 hours	0.9 (0.6–1.4)		
					<i>Use of sunbeds (cumul.)</i>			
					No sunbed use	1.0		
					1–15 times	0.8 (0.6–1.2)		
					16–118 times	0.9 (0.6–1.3)		
					> 118 times	0.6 (0.4–0.9)		
					<b>T-non-Hodgkin lymphoma</b>			
					<i>Vacations at sun-exposed location (cumul. days)</i>			
					≤ 350 days	1.0		
					> 350 ≤ 720 days	1.1 (0.5–2.5)		
					> 720 ≤ 1 190 days	1.5 (0.6–3.8)		
					> 1 190 days	-		
					<i>Outdoor leisure activities (cumul. hrs.), vacations excluded</i>			
					≤ 24 000 hours	1.0		
					> 24 000 ≤ 37 000 hours	1.8 (0.7–4.8)		
					> 37 000 ≤ 53 000 hours	0.4 (0.1–2.1)		
					> 53 000 hours	3.3 (1.0–11.0)		
					<i>Occupational sunlight UV-exposure (cumul. hrs.)</i>			
					None	1.0		
					> 0 ≤ 1 600 hours	0.8 (0.2–2.9)		
					> 1 600 ≤ 7 600 hours	1.8 (0.6–5.4)		
					> 7 600 hours	0.9 (0.3–3.5)		
					<i>Use of sunbeds (cumul.)</i>			
					No sunbed use	1.0		
					1–15 times	1.0 (0.3–3.1)		
					16–118 times	0.9 (0.3–2.7)		
					> 118 times	1.3 (0.4–3.8)		

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Boffetta <i>et al.</i> (2008) France, Germany, Ireland, Italy and Spain 1998–2004	2028 (1 135 M, 893 F) patients admitted to participating hospitals in several areas in seven European countries during 1998–2003 with newly diagnosed lymphoma or multiple myeloma; ≥ 17 years; participation rate 88%; 100% histologically confirmed	2124 (1 136 M, 988 F) population or hospital controls were recruited. Controls in Germany and Italy were randomly sampled from population registers, while in France, Ireland and Spain they were recruited from patients admitted to the same hospitals of the cases or to general hospitals serving the same population for various diseases, excluding neoplasms and immunological diseases; Matched by age (5-year groups), sex and study area, except in Germany where they were individually matched to cases on the same variables; participation rate 52% (population controls) and 81% (hospital controls)	Interviewer-administered standardized questionnaire	Non-Hodgkin lymphoma, Hodgkin lymphoma, and multiple myeloma	<b>Non-Hodgkin lymphoma</b>			
					<i>Free days sun exposure during childhood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	1.06 (0.84–1.35)		
					3 <sup>rd</sup> Quartile	1.12 (0.89–1.41)		
					4 <sup>th</sup> Quartile	1.07 (0.81–1.43)		
					<i>Schooldays sun exposure during childhood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	0.98 (0.74–1.31)		
					3 <sup>rd</sup> Quartile	1.05 (0.81–1.36)		
					4 <sup>th</sup> Quartile	1.01 (0.76–1.35)		
					<i>Free days sun exposure during adulthood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	0.79 (0.63–0.98)		
					3 <sup>rd</sup> Quartile	0.93 (0.75–1.16)		
					4 <sup>th</sup> Quartile	0.76 (0.61–0.95)		
<i>Workdays sun exposure during adulthood</i>								
1st Quartile	1.0							
2 <sup>nd</sup> Quartile	1.21 (0.92–1.60)							
3 <sup>rd</sup> Quartile	0.96 (0.74–1.24)							
4 <sup>th</sup> Quartile	0.97 (0.73–1.29)							
<i>Sunlamp use</i>								
Never	1.0							
1–24 times	0.79 (0.59–1.04)							
25 times or more	0.69 (0.51–0.93)							
<i>Occupational exposure to natural UV</i>								
Never	1.0							
Ever	1.02 (0.81–1.29)							
Duration (years)								
Never exposed	1.0							
1st Tertile	0.99 (0.79–1.25)							
2nd Tertile	1.07 (0.69–1.66)							
3rd Tertile	0.97 (0.73–1.30)							

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Boffetta <i>et al.</i> (2008) (contd)					Exposure frequency weighted duration (years)			
					Never exposed	1.0		
					1st Tertile	0.92 (0.73–1.16)		
					2nd Tertile	1.00 (0.71–1.43)		
					3rd Tertile	1.08 (0.74–1.56)		
					<i>Occupational exposure to artificial UV</i>			
					Never	1.0		
					Ever	1.30 (0.78–2.16)		
					Duration (years)			
					Never exposed	1.0		
					≤ median	1.29 (0.67–2.49)		
					> median	1.14 (0.77–1.70)		
					Exposure frequency weighted duration (years)			
					Never exposed	1.0		
					≤ median	1.27 (0.86–1.88)		
					> median	1.05 (0.58–1.89)		
					Intensity			
					Never exposed	1.0		
					Low	1.81 (0.75–4.36)		
					Medium	0.79 (0.53–1.19)		
				High	1.74 (0.78–3.86)			
				<b>Multiple myeloma</b>				
				<i>Free days sun exposure during childhood</i>				
				1st Quartile	1.0			
				2 <sup>nd</sup> Quartile	1.07 (0.65–1.78)			
				3 <sup>rd</sup> Quartile	0.83 (0.51–1.37)			
				4 <sup>th</sup> Quartile	1.10 (0.68–1.78)			
				<i>Schooldays sun exposure during childhood</i>				
				1st Quartile	1.0			
				2 <sup>nd</sup> Quartile	0.88 (0.51–1.52)			
				3 <sup>rd</sup> Quartile	0.82 (0.48–1.42)			
				4 <sup>th</sup> Quartile	1.22 (0.68–2.19)			

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Boffetta <i>et al.</i> (2008) (contd)					<i>Free days sun exposure during adulthood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	1.45 (0.79–2.68)		
					3 <sup>rd</sup> Quartile	1.55 (0.95–2.55)		
					4 <sup>th</sup> Quartile	1.55 (0.95–2.55)		
					<i>Workdays sun exposure during adulthood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	1.69 (1.01–2.82)		
					3 <sup>rd</sup> Quartile	1.35 (0.79–2.30)		
					4 <sup>th</sup> Quartile	1.38 (0.77–2.50)		
					<i>Sunlamp use</i>			
					Never	1.0		
					1–24 times	0.76 (0.41–1.41)		
					25 times or more	1.10 (0.59–2.05)		
					<i>Occupational exposure to natural UV</i>			
					Never	1.0		
					Ever	1.03 (0.72–1.47)		
					Duration (years)			
					Never exposed	1.0		
					1st Tertile	0.74 (0.37–1.47)		
					2nd Tertile	1.21 (0.77–1.91)		
				3rd Tertile	1.17 (0.76–1.82)			
				Exposure frequency weighted duration (years)				
				Never exposed	1.0			
				1st Tertile	0.76 (0.42–1.38)			
				2nd Tertile	1.28 (0.81–2.03)			
				3rd Tertile	1.13 (0.73–1.76)			
				<i>Occupational exposure to artificial UV</i>				
				Never	1.0			
				Ever	1.06 (0.57–1.97)			
				Duration (years)				
				Never exposed	1.0			
				≤ median	1.01 (0.41–2.48)			
				> median	1.00 (0.39–2.55)			

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Boffetta <i>et al.</i> (2008) (contd)					Exposure frequency weighted duration (years)			
					Never exposed	1.0		
					≤ median	0.44 (0.17–1.18)		
					> median	0.90 (0.39–2.10)		
					Intensity			
					Never exposed	1.0		
					Low	1.49 (0.54–4.10)		
					Medium	0.83 (0.36–1.92)		
					High	0.47 (0.08–2.90)		
					<b>Hodgkin lymphoma</b>			
					<i>Free days sun exposure during childhood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	0.71 (0.40–1.27)		
					3 <sup>rd</sup> Quartile	0.66 (0.39–1.13)		
					4 <sup>th</sup> Quartile	0.69 (0.32–1.48)		
					<i>Schooldays sun exposure during childhood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	0.86 (0.50–1.47)		
					3 <sup>rd</sup> Quartile	1.06 (0.59–1.89)		
					4 <sup>th</sup> Quartile	1.30 (0.24–7.11)		
					<i>Free days sun exposure during adulthood</i>			
					1st Quartile	1.0		
					2 <sup>nd</sup> Quartile	0.63 (0.31–1.29)		
				3 <sup>rd</sup> Quartile	0.60 (0.37–1.00)			
				4 <sup>th</sup> Quartile	0.75 (0.42–1.36)			
				<i>Workdays sun exposure during adulthood</i>				
				1st Quartile	1.0			
				2 <sup>nd</sup> Quartile	1.52 (0.82–2.85)			
				3 <sup>rd</sup> Quartile	0.74 (0.38–1.44)			
				4 <sup>th</sup> Quartile	1.62 (0.38–6.95)			
				<i>Sunlamp use</i>				
				Never	1.0			
				1–24 times	0.86 (0.53–1.39)			
				25 times or more	0.93 (0.57–1.50)			

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Boffetta <i>et al.</i> (2008) (contd)					<i>Occupational exposure to natural UV</i>			
					Never	1.0		
					Ever	0.99 (0.70–1.41)		
					Duration (years)			
					Never exposed	1.0		
					1st Tertile	0.91 (0.58–1.44)		
					2nd Tertile	1.04 (0.50–2.15)		
					3rd Tertile	1.35 (0.67–2.70)		
					Exposure frequency weighted duration (years)			
					Never exposed	1.0		
					1st Tertile	0.84 (0.53–1.33)		
					2nd Tertile	0.84 (0.47–1.50)		
					3rd Tertile	1.62 (0.62–4.27)		
					<i>Occupational exposure to artificial UV</i>			
					Never	1.0		
					Ever	0.82 (0.42–1.63)		
					Duration (years)			
					Never exposed	1.0		
					≤ median	0.69 (0.29–1.66)		
					> median	1.27 (0.46–3.50)		
				Exposure frequency weighted duration (years)				
				Never exposed	1.0			
				≤ median	0.60 (0.48–0.74)			
				> median	1.30 (0.43–3.95)			
				Intensity				
				Never exposed	1.0			
				Low	0.53 (0.17–1.69)			
				Medium	1.22 (0.54–2.76)			
				High	0.54 (0.45–0.65)			

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Grandin <i>et al.</i> (2008) France 2000–2004	813 recently diagnosed non-Hodgkin lymphoma, Hodgkin lymphoma, lymphoproliferative syndrome or multiple myeloma cases selected from hospitals in the French cities of Bordeaux, Brest, Caen, Lille, Nantes, and Toulouse; 20 – 75 years; participation rate 94%	748 patients with no prior history of hematological neoplasm recruited in the same hospitals as the cases, and living in the hospital's geographical area, were selected; matched by centre, age ( $\pm$ 3 years) and gender; participation rate 88%	Self-administered questionnaire and interviewer-administered questionnaire	Non-Hodgkin lymphoma, Hodgkin lymphoma, lymphoproliferative syndrome or multiple myeloma cases	<b>Non-Hodgkin lymphoma</b>			
					<i>Frequency of outdoor activities since leaving school (h/week)</i>			
					0–1.0	1.0		
					1.0–2.5	0.9 (0.7–1.2)		
					2.5–6.0	0.9 (0.7–1.3)		
					6.0–31.5	0.8 (0.6–1.2)		
					<i>Frequency of outdoor activities in the preceding 10 years (h/week)</i>			
					0–1.5	1.0		
					1.5–3.5	1.2 (0.8–1.7)		
					3.5–7.5	1.0 (0.7–1.5)		
					7.5–52.5	0.9 (0.6–1.3)		
					<i>Aesthetic use of artificial UV radiation</i>			
					No	1.0		
					Yes	1.1 (0.7–1.7)		
					Regularly	0.5 (0.2–1.3)		
Occasionally	1.4 (0.8–2.3)							
<i>Medical use of artificial UV radiation</i>								
No	1.0							
Yes	1.8 [0.7–4.5]							
<i>All uses of artificial UV radiation</i>								
No	1.0							
Yes	1.1 [0.7–1.7]							
<b>Hodgkin's lymphoma</b>								
<i>Frequency of outdoor activities since leaving school (h/week)</i>								
0–1.0	1.0							
1.0–2.5	0.9 (0.5–1.8)							
2.5–6.0	0.8 (0.4–1.6)							
6.0–31.5	0.7 (0.4–1.5)							
<i>Frequency of outdoor activities in the preceding 10 years (h/week)</i>								
0–1.5	1.0							
1.5–3.5	1.1 (0.5–2.3)							
3.5–7.5	1.4 (0.6–3.0)							
7.5–52.5	0.6 (0.2–1.6)							

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments	
Grandin <i>et al.</i> (2008) (contd)					<i>Aesthetic use of artificial UV radiation</i>				
					No	1.0			
					Yes	1.6 (0.7–3.6)			
					Regularly	0.6 (0.1–3.3)			
					Occasionally	2.2 (0.9–5.5)			
					<i>Medical use of artificial UV radiation</i>				
					No	1.0			
					Yes	3.2 (0.8–13.2)			
					<i>All uses of artificial UV radiation</i>				
					No	1.0			
					Yes	1.5 (0.7–3.2)			
					<b>Lymphoproliferative syndrome</b>				
					<i>Frequency of outdoor activities since leaving school (h/week)</i>				
					0–1.0	1.0			
					1.0–2.5	1.0 (0.6–1.8)			
					2.5–6.0	0.9 (0.5–1.6)			
					6.0–31.5	0.8 (0.5–1.6)			
					<i>Frequency of outdoor activities in the preceding 10 years (h/week)</i>				
					0–1.5	1.0			
					1.5–3.5	1.7 (0.9–3.1)			
				3.5–7.5	0.8 (0.4–1.6)				
				7.5–52.5	1.1 (0.6–2.2)				
				<i>Aesthetic use of artificial UV radiation</i>					
				No	1.0				
				Yes	1.5 (0.7–3.5)				
				Regularly	0.9 (0.2–4.6)				
				Occasionally	1.9 (0.7–4.7)				
				<i>Medical use of artificial UV radiation</i>					
				No	1.0				
				Yes	0.4 (0.1–3.9)				
				<i>All uses of artificial UV radiation</i>					
				No	1.0				
				Yes	1.3 (0.6–2.7)				

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Grandin <i>et al.</i> (2008) (contd)					<b>Multiple myeloma</b>			
					<i>Frequency of outdoor activities since leaving school (h/week)</i>			
					0–1.0	1.0		
					1.0–2.5	0.6 (0.3–1.3)		
					2.5–6.0	0.6 (0.3–1.4)		
					6.0–31.5	0.5 (0.2–1.3)		
					<i>Frequency of outdoor activities in the preceding 10 years (h/week)</i>			
					0–1.5	1.0		
					1.5–3.5	0.7 (0.3–1.7)		
					3.5–7.5	0.5 (0.2–1.2)		
					7.5–52.5	0.6 (0.3–1.4)		
					<i>Aesthetic use of artificial UV radiation</i>	1.0		
					No	1.2 (0.4–3.6)		
					Yes	0.8 (0.1–7.3)		
				Regularly	1.4 (0.4–4.9)			
				Occasionally				
				<i>Medical use of artificial UV radiation</i>				
				No	1.0			
				Yes	0.9 (0.1–8.7)			
				<i>All uses of artificial UV radiation</i>				
				No	1.0			
				Yes	1.2 (0.4–3.1)			

**Table 2.11. Case-control studies of exposure to natural sunlight and cancers at other sites**

Reference, study location & period	Cases	Controls	Exposure assessment	Organ site (ICD code)	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Morales-Suarez-Varela <i>et al.</i> (2006) Denmark, Sweden, France, Germany, Italy and Spain 1995–1997	76 (40 M, 36 F) mycosis fungoides (MF) cases diagnosed between 1995 – 1997 were selected from Denmark, Sweden, France, Germany, Italy and Spain; age 35 – 69 years; participation rate 92%; 100% histologically confirmed	2904 population-based controls selected from population registries or electoral rolls in Denmark, Sweden, France, Germany, and Italy. Because no population registry was available in Spain, colon cancer controls were provided from the participating hospitals by using a selection procedure identical to that used for cases; matched by sex, age, and region; participation rate 63%	Interviewer-administered structured questionnaire	Mycosis fungoides [peripheral T-cell cutaneous lymphoma]	<b>Occupational sun exposure</b> <i>Men</i> Non-exposed Exposed <i>Women</i> Non-exposed Exposed	1.0 1.4 (0.8–2.0) 1.0 1.3 (0.8–2.0)	Age, country, number of jobs, and region	