

Table 2.1. Case-control studies of sun exposure and basal cell carcinoma, published after 1992

Reference, study location & period	Cases	Controls	Exposure assessment	Exposure categories	Relative risk (95%CI)*	Adjustment for potential confounders	Comments
Gallagher <i>et al</i> (1995a), Alberta, Canada, 1983–1984	226 M with incident BCC from cancer registry, 25–79 yrs, stratified by site; response rate 72%; 100% histol confirmed	406 male controls selected from population-based health care register, stratified by age and sex; response rate 71%	Interviewer-administered standard q'aire	<i>Sunburn pain</i> ≥2d life	N	1.0	Age, mother's ethnicity, skin colour, hair colour
				Y	0.9 (0.6–1.3)		
				<i>Sunburn pain</i> ≥2d last10y	N	1.0	
				Y	2.3 (0.8–6.6)		
				<i>Mean recreation sun/yr, 0–19yrs</i>	Lowest	1.0	
				Low-med	1.1 (0.6–2.0)		
				High-med	1.4 (0.7–3.0)		
				High	2.6 (1.1–6.5)		
				<i>Mean rec sun/yr 0–19 Non-tanners</i>	Lowest	1.0	
				Low-med	1.1 (0.5–2.3)		
				High-med	1.7 (0.7–4.4)		
				High	3.1 (1.0–10.4)		
				<i>Mean rec sun/yr, life</i>	Lowest	1.0	
				Low-med	0.9 (0.6–1.7)		
				High-med	0.6 (0.3–1.3)		
				High	0.4 (0.2–1.0)		
				<i>Mean occupatn sun</i>	Lowest	1.0	
				Low-med	1.0 (0.6–1.8)		
				High-med	1.3 (0.8–2.3)		
				High	1.4 (0.8–2.4)		
<i>Mean cumul sun/yr</i>	Lowest	1.0					
Low-med	1.3 (0.8–2.2)						
High-med	1.2 (0.7–2.2)						
High	1.3 (0.7–2.4)						
<i>Mean cumul sun/yr Tanners</i>	Lowest	1.0					
Low-med	1.8 (0.7–4.8)						
High-med	1.5 (0.5–4.6)						
High	2.2 (0.7–7.2)						

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Kricke <i>et al</i> (1995 a,b) Geraldton, Western Australia, 1988	201cases with incident BCC from population survey, 40–64 yrs, response rate 89%; 100% histol confirmed	700 controls selected from disease free at population survey or year before; response rate 89%	Personal calendar and interviewer-administd standard q'aire	Ambient solar radiatn at places residence (mWh cm² x10⁻⁵)			
				<i>Whole year</i>			
				Lowest	1.0	Age, sex, ability to tan	
				Low-med	1.3 (0.7–2.6)		
				High-med	1.7 (0.7–4.1)		
				High	2.2 (0.8–5.8)		
				Lifetime sun hours			
				<i>Tanners</i>			
				Lowest	1.0	Age, sex	
				Low-med	0.6 (0.1–2.8)		
				High-med	2.2 (0.6–7.4)		
				High	2.5 (0.7–8.4)		
				<i>Poor or non-tanners</i>			
				Lowest	4.6 (1.6–13.5)		
				Low-med	4.9 (1.7–14.6)		
				High-med	5.9 (2.0–18.1)		
				High	2.2 (0.7–6.9)		
				Painful sunburns-site			
				None	1.0		
				1-2	1.1 (0.7–1.8)		
3-10	1.8 (1.0–2.9)						
11+	1.5 (1.0–2.3)						
Intermittency of sun 15–19 yrs							
<i>Tanners</i>			Age, sex, ability to tan, site				
Least	1.0						
Low-medium	1.0 (0.4–2.5)						
High-medium	1.0 (0.4–3.0)						
Most	0.9 (0.3–3.0)						
<i>Poor or non-tanners</i>							
Least	1.1 (0.5–2.4)						
Low-medium	1.9 (0.9–4.0)						
High-medium	2.5 (1.1–5.5)						
Most	5.9 (2.4–14.2)						

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Rosso <i>et al.</i> (1996), Rosso <i>et al.</i> (1998); 8 centres in Italy, France, Spain, 1989–1993	1549 cases, diagnosed in 5 cancer registries+ 2 hospitals, 20–70 yrs, 100% histol confirm	1795 controls From 5 pop registers+ non-cancer, non-dermatology patients of 3 hospitals	Interviewer-administd standard q'aire	<i>Sunburns life</i>	1.0	Age, sex, centre	Prevalent cases	
				None	1.3 (1.1–1.6)			
				1	1.5 (1.1–2.2)			
				2	1.7 (1.2–2.2)			
				3+				
				<i>Holidays at beach in life, hrs</i>				Age, sex, centre, other risk factors
				Never	1.0			
				Medium	1.1 (1.0–1.3)			
				High	1.5 (1.2–1.8)			
				<i>Life outdoor work, h</i>				
Low	1.0							
Medium	1.0 (0.8–1.2)							
High	1.0 (0.8–1.2)							
Rosso <i>et al.</i> (1999), Valais, Switzerland, 1994–1996	120 cases from cancer registry, 25–75y, 100% histol confirmn	144 controls from two volunteer registers, 81% resp rate	Interviewer-administd standard q'aire	<i>Painful sunburns</i>	1.0	Age, sex	Prevalent cases; sparse sun exposure data	
				None	1.0 (0.6–1.6)			
				1	1.3 (0.4–3.9)			
				2	2.4 (1.7–3.4)			
Vlajinac <i>et al.</i> (2000), Belgrade & Zrenjanin, Yugoslavia, 1996–1997	200 (124M) consec cases at Skin Dept, >30yrs	399 controls Dermatology patients same Dept, non-cancer	Physician-administd standard q'aire	<i>Seaside hols wks/yr</i>	1.0	Not stated	Incomplete exposure data	
				0	Not stated			
				1–6	1.8 (1.2–2.6)			
				7+				
				<i>Outdoor work summr</i>				
				?N	1.0			
				?Y	4.0 (1.6–10.0)			

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Corona <i>et al</i> (2001) Rome, Italy, 1995–1997	166 cases (87M, 79F) with incident BCC from referral hospital, 18+ yrs, 100% histol confirmed	158 dermatology patients with minor skin conditions from same hospital	Interviewer-administd standard q'aire	<i>Sunburn <20yrs</i>			Age, sex, hair-eye pigment traits, family history skin cancer
				N	1.0		
				Y	0.9 (0.4–1.6)		
				<i>Sunburn >20yrs</i>			
				N	1.0		
				Y	0.7 (0.4–1.4)		
				<i>Beach summer hols wk/yr <20yrs</i>			
				0–2	1.0		
				3–4	1.8 (0.8–4.4)		
				5–8	3.7 (1.5–9.0)		
				>8	4.5 (1.9–10.5)		
				<i>Beach summer hols wk/yr >20yrs</i>			
				0–2	1.0		
				3–4	0.7 (0.3–1.6)		
				5–8	0.3 (0.1–0.7)		
>8	0.9 (0.4–2.4)						
<i>Outdoor work, yrs</i>							
0–8	1.0						
>8	1.7 (0.7–4.1)						
<i>Solar lentigines arm</i>							
Absent	1.0						
Present	1.7 (0.9–3.1)						
<i>Actinic keratoses</i>							
None	1.0						
Present/past Hx	3.2 (1.1–9.4)						
						Age, sex, hair-eye pigment traits, freckles on face, family history skin cancer	

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Kennedy <i>et al</i> (2003) Leiden, The Netherlands, 1985–1997	454 cases with incident and prevalent BCC diagnosed in referral hospital, 30–80 yrs, 100% histol confirmed	386 ophthalmology patients from same hospital	Residence Work Calendar+ Interviewer-administd standard q'aire	<i>Sunburn <20yrs</i>	<i>Nodular BCC</i>	Age, sex, skin type	Prevalent cases diagnosed up to 12 years before included
				N	1.0		
				Y	1.6 (1.1–2.2)		
				<i>Sunburn 20–39yrs</i>			
				N	1.0		
				Y	1.2 (0.9–1.7)		
				<i>Sunburn 40–59yrs</i>			
				N	1.0		
				Y	1.5 (0.9–2.4)		
				<i>Superficial Multifocal BCC</i>			
				<i>Sunburn <20yrs</i>			
				N	1.0		
				Y	2.6 (1.7–3.8)		
				<i>Sunburn 20–39yrs</i>			
				N	1.0		
				Y	1.0 (0.7–1.5)		
				<i>Sunburn 40–59yrs</i>			
				N	1.0		
Y	0.9 (0.4–1.8)						
<i>Lifetime sun exp, hrs</i>	<i>Nodular BCC</i>						
Lowest	1.0						
Low-medium	1.2 (0.6–2.2)						
High-medium	1.5 (0.7–3.3)						
Highest	2.3 (1.0–5.7)						
<i>Lifetime sun exp, hrs</i>	<i>Superficial Multifocal BCC</i>						
Lowest	1.0						
Low-medium	1.1 (0.5–2.3)						
High-medium	1.9 (0.8–4.6)						
Highest	1.6 (1.6–4.4)						

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Walther <i>et al</i> (2004), Ulm & Dresden, southern Germany, 1985–1997	*213 cases (103M, 110F) with sporadic BCC in past 5 years, diagnosed in dermatology department, all ages, 100% histol confirmed	**411 patients with allergic, vascular or genital conditions from same department and general surgical patients	Interviewer-administd standard q'aire	<i>Sunburn</i> Never Ever <i>Occupational UV exposure</i> Never/Rare S'times/Frequent <i>Solar lentigo</i> None Any <i>Actinic keratosis</i> None Any	1.0 3.6 (1.9–6.8) 1.0 2.4 (1.3–4.7) 1.0 2.5 (1.2–5.3) 1.0 2.7 (1.3–5.9)	Not stated	Prevalent cases diagnosed up to 5 years before included; *146 cases, **264 controls in multivariate analyses
Zanetti <i>et al</i> (2006), 14 centres in Italy, Spain, France, Portugal, Denmark, Germany, Argentina, 2001–2002	215 cases with incident BCC diagnosed in hospitals in study centres, 20–75 yrs, 100% histol confirmed	349 non-dermatology patients of same hospitals	Interviewer-administd standard q'aire	<i>Sunburn</i> Never Sometimes Often <i>Holidays at beach, weighted hrs in life</i> Low High <i>Outdoor work, weighted hrs in life</i> Never Low Low-medium High-medium Highest	1.0 1.4 (1.0–2.4) 1.7 (1.0–2.8) 1.0 2.1 (1.1–4.0) 1.0 1.4 (0.8–2.5) 0.7 (0.4–1.4) 1.4 (0.8–2.4) 1.2 (0.7–2.1)	Age, 'significant independent risk factors'	
Pelucchi <i>et al</i> (2007); Naldi <i>et al</i> , 2000, North & South Italy 1995–96	528 consecutive cases with incident BCC diagnosed in 16 hospital-based study centres, median age 65 yrs, 100% histol confirmed	512 acute patients of same hospitals, age and sex matched to cases	Interviewer-administd standard q'aire	<i>Severe sunburn</i> N Y <i>Age 1st severe s'burn</i> <18yrs ≥18yrs <i>No. severe sunburns</i> 1 2+	<i>Nodular</i> 1.0 3.4 (2.3–5.2) 6.9 (3.0–16.2) 2.8 (1.8–4.5) 3.2 (2.0–5.3) 6.5 (3.1–13.8)	Age, sex, study centre, education, eye, hair, and skin colour	

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Pelucchi <i>et al</i> (2007); Naldi <i>et al</i> , (2000) (contd)				<i>Severe sunburn</i>	<i>Superficial</i>		
				N	1.0		
				Y	1.7 (1.0–2.8)		
				<i>Age 1st severe s'burn</i>			
				<18yrs	3.3 (1.2–8.7)		
				≥18yrs	1.3 (0.7–2.4)		
				<i>No. severe sunburns</i>			
				1	1.1 (0.5–2.1)		
				2+	4.5 (2.0–10.2)		
				<i>Life occupational sun</i>	<i>Nodular</i>		
				Never	1.0		
				Ever	1.5 (1.1–2.2)		
				Short duration	1.7 (1.1–2.6)		
				Long duration	1.4 (0.9–2.1)		
					<i>Superficial</i>		
				Never	1.0		
				Ever	0.7 (0.4–1.2)		
				Short duration	0.9 (0.5–1.6)		
				Long duration	0.5 (0.3–1.0)		
				<i>Life recreational sun</i>	<i>Nodular</i>		
			Never	1.0			
			Ever	1.8 (1.3–2.4)			
			Short duration	2.1 (1.4–3.1)			
			Long duration	1.4 (1.0–2.2)			
				<i>Superficial</i>			
			Never	1.0			
			Ever	1.4 (0.9–2.0)			
			Short duration	1.3 (0.8–2.2)			
			Long duration	1.3 (0.8–2.2)			

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Pelucchi <i>et al</i> (2007); Naldi <i>et al</i> , 2000 (contd)				<i>Life sun total</i>	<i>Nodular</i>			
				No	1.0			
				Yes	2.0 (1.5–2.8)			
				Rec or Occ Sun	2.0 (1.4–2.7)			
				Rec + Occ Sun	2.9 (1.6–5.4)			
					<i>Superficial</i>			
				No	1.0			
				Yes	1.0 (0.7–1.5)			
				Rec or Occ Sun	1.0 (0.7–1.5)			
				Rec + Occ Sun	1.2 (0.6–2.6)			
					<i>Solar lentigines</i>	<i>Nodular</i>		
				None	1.0			
				Any	1.5 (1.0–2.1)			
					<i>Actinic keratoses</i>			
				None	1.0			
			Any	1.7 (1.1–2.6)				
				<i>Solar lentigines</i>	<i>Superficial</i>			
			None	1.0				
			Any	0.9 (0.5–1.6)				
				<i>Actinic keratoses</i>				
			None	1.0				
			Any	3.4 (2.1–5.5)				

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Pelucchi <i>et al</i> (2007); Naldi <i>et al</i> , 2000 (contd)				<i>Severe sunburn</i>	<i>H&N</i>		
				N	1.0		
				Y	3.4 (2.3–5.1)		
				<i>Age 1st severe s'burn</i>			
				<18yrs	6.0 (2.6–14.0)		
				≥18yrs	2.9 (1.9–4.6)		
				<i>No. severe sunburns</i>			
				1	3.2 (2.0–5.2)		
				2+	6.7 (3.1–13.7)		
				<i>Severe sunburn</i>	<i>Trunk</i>		
				N	1.0		
				Y	2.4 (1.5–3.9)		
				<i>Age 1st severe s'burn</i>			
				<18yrs	4.2 (1.5–11.2)		
				≥18yrs	2.1 (1.2–3.6)		
				<i>No. severe sunburns</i>			
				1	1.7 (0.9–3.2)		
				2+	6.0 (2.7–13.5)		
				<i>Life occupational sun</i>	<i>H&N</i>		
				Never	1.0		
			Ever	1.5 (1.0–2.1)			
			Short duration	1.7 (1.1–2.7)			
			Long duration	1.2 (0.8–1.9)			
				<i>Trunk</i>			
			Never	1.0			
			Ever	0.7 (0.4–1.2)			
			Short duration	0.9 (0.5–1.7)			
			Long duration	0.5 (0.2–1.1)			

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Pelucchi <i>et al</i> (2007); Naldi <i>et al</i> , 2000 (contd)				<i>Life recreational sun</i>	<i>H&N</i>			
				Never	1.0			
				Ever	1.9 (1.4–2.6)			
				Short duration	2.1 (1.4–3.1)			
				Long duration	1.7 (1.2–2.5)			
					<i>Trunk</i>			
				Never	1.0			
				Ever	1.6 (1.1–2.5)			
				Short duration	1.8 (1.1–3.0)			
				Long duration	1.4 (0.8–2.3)			
					<i>Life sun total</i>	<i>H&N</i>		
				No	1.0			
				Yes	2.0 (1.4–2.7)			
				Rec or Occ Sun	1.9 (1.4–2.6)			
				Rec + Occ Sun	3.4 (1.9–6.0)			
					<i>Trunk</i>			
				No	1.0			
				Yes	1.2 (0.8–1.3)			
				Rec or Occ Sun	1.2 (0.8–1.8)			
				Rec + Occ Sun	1.5 (0.7–3.3)			
					<i>Solar lentigines</i>	<i>H&N</i>		
				None	1.0			
				Any	1.5 (1.0–2.1)			
				<i>Actinic keratoses</i>				
			None	1.0				
			Any	1.8 (1.2–2.7)				
				<i>Solar lentigines</i>	<i>Trunk</i>			
			None	1.0				
			Any	1.0 (0.6–1.6)				
				<i>Actinic keratoses</i>				
			None	1.0				
			Any	3.0 (1.8–5.1)				

1. When data from a case-control study have been published in different papers, the most comprehensive and/or detailed version of the data have been tabulated