**Supplementary Materials and Methods**

**Detailed description of methods.**

*Statistical methods*

In the analysis of Table 1 assessment of heterogeneity was via an analogue of Fisher’s exact test based on 106 Monte Carlo replicates. Missing values were coded as an extra level in each classification, but were otherwise treated like all the other levels for each classification. For each classifying variable the full dataset was analyzed as well as the subset with information on the variable under investigation. In the analysis of Table 2 a Poisson model was fitted, in which the expected number of cases in anatomic site  with percentage skin surface area  ( ) is given by:

 (A1)

The coefficients  record the log relative risk per unit skin area associated with anatomic site , with the coefficient corresponding to the face+head constrained to be 0 (). The exponentials of these coefficients  are therefore the relative risks per unit skin area, normalized so that the relative risk for face+head is constrained to be 1. The percentage surface areas, , that were used (as given in Table 2) were taken from standard Lund and Browder charts (1).

In order to model the relative and absolute risk associated with UVR we fitted a Poisson model, in which the expected number of cases in the stratum with person years , after cumulative UVR radiant exposure,  (in kJ cm-2), at age , and with various other explanatory covariates,  , was given by:

 (A2)

for the log excess relative risk (ERR) model and

 (A3)

for the excess absolute risk (EAR) model. The parameter  is the log-linear excess relative risk per unit of cumulative radiant exposure, and the parameter  is the linear excess absolute risk per unit of cumulative radiant exposure and per year of follow-up.

The parameters, , , , and  were determined by the model fit, via Poisson maximum likelihood (2). The potential size of the person-year table proved too large to have all the stratifying variables included simultaneously, so we generated the table twice, once with the stratifying variables (a) complexion; (b) eye color, (c) hair color at age 15, (d) Gaelic ancestry, (e) Hispanic and (f) body mass index (BMI), and then with everything else (see Supplementary Tables 3, 4 and 6, Table 4). Details of the variables and stratifying levels used to define the person year table are given in Supplementary Table 3.

The background model  for all BCCs was chosen by a forward-stepwise procedure (2). It comprises loglinear terms in the baseline questionnaire, sex, ln[*t*], ln[*t*]2, birth year, [birth year]2, [birth year]3, [birth year]4, and [birth year]5. Follow-up was assumed to start at the date of completion of the second questionnaire, and finished at the earliest of (a) date of completion of the third questionnaire or (b) date of diagnosis of first BCC (or other cancer). All technologists were required to complete the second and third questionnaires, and they could also have completed the first questionnaire. The anatomic location of BCCs were assessed via a supplementary questionnaire. Supplementary Table 1 provides details of the numbers of skin map questionnaires sent out and received. Somewhat similar models were chosen for various subsidiary endpoints, for BCCs occurring on specific anatomic locations, in particular the upper extremities, lower extremities, and trunk (within the four-level classification by anatomic site), and the unexposed, partially exposed, and exposed sites (within the three-level classification by anatomic site). Details of these subsidiary models are given in footnotes to Tables 3 and 4. As can be seen, for the purposes of the present analysis a log-linear relative risk model in UVR cumulative radiant exposure was the main model used. A parallel analysis suggested some evidence of upward curvature in the UVR cumulative radiant exposure response (3); it is because of this that the log-linear Poisson ERR model may be more appropriate than the linear EAR model. We lag cumulative UVR radiant exposure by  years, to reflect the likely induction period between cumulative UVR radiant exposure and induction of BCC. For most analyses we assume 5 years, by analogy with the latency that is often assumed for ionizing radiation exposure (4). Sensitivity to the effects of competing risks was assessed by fitting a Poisson model analogous to the subdistribution hazard of Fine and Gray (5), which assumes that all patients who did not develop BCC were censored at the last day of follow-up (31st December 2008).

We explored the effects of cumulative UVR radiant exposure in relation to various intervals of time since exposure, by fitting a model that assumed that risk for cumulative UVR radiant exposure in the intervals 2-4, 5-9, 10-14 and 15 years or more before the time at risk was given by:

 (A4)

and using also a similar model for absolute risk:

 (A5)

Here  measures the cumulative UVR radiant exposure between 2 and 5 years before the time at risk,  measures the cumulative UVR radiant exposure between 5 and 10 years before the time at risk,  measures cumulative UVR radiant exposure between 10 and 15 years before the time at risk, and  measures cumulative UVR radiant exposure 15 or more years before the time at risk. The cutpoints of 2, 5, 10 and 15 years were chosen somewhat arbitrarily, in the light of knowledge of the period of follow-up. The results of fitting these models, also slightly simplified models with the first time since exposure term, , omitted, are given in Supplementary Table 8. These models are semi-parametric analogues of those proposed by Sylvestre and Abrahamowicz (6) in the context of Cox proportional hazards regression .

Model fitting was performed using R (7) and Epicure (8). Confidence intervals (CI) were estimated from the profile likelihood (2), or were Wald-based if this did not converge.

*UVR exposure assessment*

The National Solar Radiation Database (NSRAD) is the largest ground-based solar measurement network in the US, containing statistical summaries computed from hourly measurement data (with some infilling for missing data) for 239 US radiation stations for the period 1961-1990, including monthly, yearly, and 30-year average global solar radiation measures. Tatalovich *et al* (9) incorporated AVGLO measures, latitude, longitude, and elevation from a 30 arc-second Digital Elevation Model into the ANUSPLIN spline-interpolation algorithm to deliver estimates of potential solar ambient irradiance (~100-3000 nm) at 1 km² resolution in the US. AVGLO used 30-year averages of ANUSPLIN spline-interpolated ground solar ambient irradiance measurements after initial analysis of temporal variability that showed no statistically significant difference between the three 10-year periods embedded in the 1961-1990 data summaries for each radiation station (9).

On the third questionnaire, residential location for five age periods (age <13, 13-19, 20-39, 40-64, 64+) was collected. Individual age-specific ambient UVR levels were determined by linking the residential locations with the AVGLO database (10). For the current study, these estimates were linked to lifetime locations of residence (based on zip code) as determined from the third questionnaire in the USRT study cohort. The scaling of these measures to provide cumulative UVR radiant exposure used the method previously described (3,10).

**Supplementary Table 1. Number of skin map questionnaires sent and received by status of questionnaires answered.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | White technologists | | |  |  | All technologists | | |  |
|  | Q1+Q3 excluding Q2 | Q2+Q3 excluding Q1 | Q1+Q2+Q3 | Total |  | Q1+Q3 excluding Q2 | Q2+Q3 excluding Q1 | Q1+Q2+Q3 | Total |
| Responders | 5858 | 10,832 | 52,533 | 69,223 |  | 6359 | 12,037 | 55,229 | 73,625 |
| reporting BCC on either/any\* | 409 | 1451 | 4432 | 6292 |  | 416 | 1469 | 4477 | 6362 |
| Sent skin Maps | 397 | 1368 | 4162 | 5927 |  | 404 | 1384 | 4202 | 5990 |
| Provided skin Maps | 217 | 823 | 3039 | 4079 |  | 219 | 833 | 3068 | 4120 |

**Supplementary Table 2. Number of BCC cases by 4-level anatomic site, among 63,912 subjects with information on ambient UVR.**

|  |  |  |  |
| --- | --- | --- | --- |
| **BCC Site** | **Males (n=13,082 )** | **Females (n=50,830)** | **Total (n=63,912)** |
| ***Head and neck* [*Face/head/neck+supraclavicular*]** |  |  |  |
| Cheek, chin or jaw | 81 (18.8) | 282 (16.4) | 363 (16.9) |
| Ear | 31 (7.2) | 20 (1.2) | 51 (2.4) |
| Eyelid | 9 (2.1) | 54 (3.1) | 63 (2.9) |
| Face (NOS) | 1 (0.2) | 4 (0.2) | 5 (0.2) |
| Forehead | 66 (15.3) | 238 (13.8) | 304 (14.1) |
| Lower lip | 0 (0.0) | 4 (0.2) | 4 (0.2) |
| Neck | 0 (0.0) | 6 (0.3) | 6 (0.3) |
| Neck or supraclavicular | 20 (4.6) | 78 (4.5) | 98 (4.6) |
| Nose | 70 (16.2) | 325 (18.9) | 395 (18.4) |
| Scalp | 16 (3.7) | 36 (2.1) | 52 (2.4) |
| Scalp or forehead (NOS) | 3 (0.7) | 3 (0.2) | 6 (0.3) |
| Upper lip | 5 (1.2) | 59 (3.4) | 64 (3.0) |
| ***Upper extremity*** |  |  |  |
| Arm (NOS) | 2 (0.5) | 1 (0.1) | 3 (0.1) |
| Back of hand | 6 (1.4) | 12 (0.7) | 18 (0.8) |
| Hand | 1 (0.2) | 0 (0.0) | 1 (0.0) |
| Lower arm | 12 (2.8) | 42 (2.4) | 54 (2.5) |
| Palms or hand (NOS) | 1 (0.2) | 1 (0.1) | 2 (0.1) |
| Upper arm | 18 (4.2) | 70 (4.1) | 88 (4.1) |
| ***Trunk*** |  |  |  |
| Buttocks | 0 (0.0) | 10 (0.6) | 10 (0.5) |
| Front trunk | 38 (8.8) | 164 (9.5) | 202 (9.4) |
| Genitals (NOS) | 0 (0.0) | 3 (0.2) | 3 (0.1) |
| Lower trunk | 0 (0.0) | 1 (0.1) | 1 (0.0) |
| Trunk (NOS) | 0 (0.0) | 1 (0.1) | 1 (0.0) |
| Trunk or back (NOS) | 1 (0.2) | 0 (0.0) | 1 (0.0) |
| Upper trunk | 38 (8.8) | 157 (9.1) | 195 (9.1) |
| ***Lower extremity*** |  |  |  |
| Foot | 1 (0.2) | 1 (0.1) | 2 (0.1) |
| Leg (NOS) | 0 (0.0) | 3 (0.2) | 3 (0.1) |
| Lower leg | 5 (1.2) | 87 (5.1) | 92 (4.3) |
| Upper leg | 1 (0.2) | 36 (2.1) | 37 (1.7) |
| NOS | 5 (1.2) | 22 (1.3) | 27 (1.3) |
| **Total** | 431 (100.0) | 1720 (100.0) | 2151 (100.0) |

**Supplementary Table 3. Categories for variables used to define person-year table.**

|  |  |
| --- | --- |
| **Description** | **Categories** |
| Questionnaire at cohort first entry | Q1 vs Q2 |
| Sex | Male vs female |
| Attained age, years | 0 / 5/ 10 / … / 95 / 100 / 999999 |
| Calendar year of follow-up | <1980 / 1985 / 1990 / 1995 / 2000 / 2005 / 2009 |
| Birth year | <1900 / 1910 / 1920 / 1930 / 1940 / 1950 / 1960 |
| Skin complexion (at Q2) | Dark vs medium vs fair vs unknown |
| Eye color (at Q2) | Brown/black vs hazel vs blue/green/gray vs other vs unknown |
| Natural hair color at age 15 (Q2) | Brown vs red/blonde vs other vs unknown |
| Gaelic ancestry (Q2) | Yes vs no vs unknown |
| Hormone replacement therapy (at Q1, Q2) | Yes vs no/unknown |
| Diuretic use (at Q2) | Yes vs no vs unknown |
| Strenuous exercise (at Q2) | Unknown vs <1 vs 1-3 vs 4+ hours per week |
| Baseline body mass index (BMI) | Unknown vs < 18.5 vs 18.5-24.9 vs 25-29.9 vs 30.0+ kg m-2 |
| Rheumatoid arthritis (Q2) | Yes vs no vs unknown |
| Thyroiditis (Q1) | Yes vs no vs unknown |
| Graves disease (Q1) | Yes vs no vs unknown |
| Baseline age at menarche (Q1, Q2) | 0-7 vs 8-9 vs 10-11 vs 12-14 vs 15+ years vs unknown |
| Age at menopause (Q1, Q2) | 0-7 vs 8-9 vs 10-11 vs 12-14 vs 15+ years vs unknown |
| Ever took oral contraceptive (Q2) | Yes vs no vs unknown |
| Blood siblings under age 30 with cancer | No cancer in siblings vs cancer in siblings and minimum age ≥ 30 vs cancer in siblings and minimum age < 30 vs unknown if siblings have cancer |
| Baseline smoking status | Never smoked vs former smoker vs current smoker vs former smoker & unknown if current vs unknown |
| Alcohol consumption (Q1) | Missing vs <1 vs 1-2 vs 3-6 vs ≥7 drinks / week |
| Racial group (at baseline) | White vs other |
| Baseline cumulative head/neck dose (Gy) | 0 / 0.010 / 0.025 / 0.050 / 0.075 / 0.100 / 0.200 / 0.300 / 0.500 / 0.750 |
| 2-year lagged cumulative AVGLO UVR ambient radiant exposure (in kJ /cm2) | missing / 0 / 200 / 400 / 600 / 800 / 1000 / 1200 / 1400 / 1600 / 1800 / 2000 / 999999 |
| 5-year lagged cumulative AVGLO UVR ambient radiant exposure (in kJ /cm2) | missing / 0 / 200 / 400 / 600 / 800 / 1000 / 1200 / 1400 / 1600 / 1800 / 2000 / 999999 |
| 10-year lagged cumulative AVGLO UVR ambient radiant exposure (in kJ /cm2) | missing / 0 / 200 / 400 / 600 / 800 / 1000 / 1200 / 1400 / 1600 / 1800 / 2000 / 999999 |
| 15-year lagged cumulative AVGLO UVR ambient radiant exposure (in kJ /cm2) | missing / 0 / 200 / 400 / 600 / 800 / 1000 / 1200 / 1400 / 1600 / 1800 / 2000 / 999999 |

**Supplementary Table 4. Log excess relative risk and excess absolute risk for BCC in relation to cumulative UVR exposure unadjusted and adjusted for certain constitutional factors and for lifestyle, reproductive and medical factors for Whites among 55,781 participants in the U.S. Radiologic Technologists study followed from the second questionnaire onwards (including some responding to the first questionnaire who also responded to the second).**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Adjustment variable in baseline model | Log excess relative risk per UVR MJ/cm2 | *p*-value |  | Excess absolute risk per UVR MJ/cm2 per 104 person year | *p*-value |
| Unadjusted | 1.21 (0.72, 1.69) | <0.001 |  | 15.23 (8.19, 20.13) | <0.001 |
|  |  |  |  |  |  |
| Complexion | 1.22 (0.74, 1.70) | <0.001 |  | 10.63a (3.38, 16.17) | 0.006a |
| Eye color | 1.21 (0.72, 1.69) | <0.001 |  | 11.47a (4.70, 17.15) | 0.003a |
| Hair color at age 15 | 1.17 (0.68, 1.65) | <0.001 |  | 11.92a (5.08, 16.66) | 0.002a |
| Gaelic ancestry | 1.18 (0.70, 1.67) | <0.001 |  | 10.95 (3.26, 16.79) | 0.008 |
| Hispanic | 1.31 (0.82, 1.80) | <0.001 |  | 14.12 (7.08, 19.10) | <0.001 |
| Body mass index (BMI) | 1.14 (0.65, 1.62) | <0.001 |  | 12.31 (4.64, 17.90) | 0.003 |
| All of the above endogenous adjustments | 1.17 (0.68, 1.65) | <0.001 |  | 5.20a (-1.66b, 10.91) | 0.138a |
|  |  |  |  |  |  |
| Smoking | 1.22 (0.74, 1.70) | <0.001 |  | 15.12 (7.21, 21.09) | <0.001 |
| Alcohol consumption | 1.24 (0.76, 1.71) | <0.001 |  | 15.58 (7.97, 21.24) | <0.001 |
| Age at menarche | 1.23 (0.75, 1.71) | <0.001 |  | 17.24 (9.60, 22.72) | <0.001 |
| Age at menopause | 1.23 (0.74, 1.71) | <0.001 |  | 17.00 (9.56, 22.56) | <0.001 |
| Oral contraception | 1.22 (0.73, 1.69) | <0.001 |  | 16.91 (9.32, 22.25) | <0.001 |
| Duration of hormone replacement therapy | 1.17 (0.68, 1.65) | <0.001 |  | 15.10 (7.71, 20.51) | <0.001 |
| Rheumatoid arthritis | 1.23 (0.75, 1.71) | <0.001 |  | 16.24 (8.75, 21.65) | <0.001 |
| Thyroiditis | 1.23 (0.75, 1.70) | <0.001 |  | 16.56 (9.04, 22.01) | <0.001 |
| Hyperthyroidism (Graves disease) | 1.23 (0.75, 1.70) | <0.001 |  | 16.67 (9.12, 22.12) | <0.001 |
| Use of diuretics | 1.23 (0.75, 1.71) | <0.001 |  | 16.60 (9.06, 22.10) | <0.001 |
| Strenuous exercise (hours per week) | 1.22 (0.73, 1.69) | <0.001 |  | 15.74 (8.08, 21.32) | <0.001 |
| Siblings with any cancer under the age of 30 | 1.23 (0.75, 1.71) | <0.001 |  | 15.88 (8.36, 21.57) | <0.001 |
| Occupational radiation dose at baseline | 1.23 (0.75, 1.71) | <0.001 |  | 18.36 (10.68, 23.96) | <0.001 |
| All of the above medical/environmental adjustments | 1.16 (0.67, 1.63) | <0.001 |  | 12.75a (4.37, 20.17b) | 0.004a |

aindications of lack of convergence.

bWald-based confidence interval.

**Supplementary Table 5. Excess absolute risk of basal cell carcinoma (BCC) with cumulative ambient ultraviolet (UVR) radiant exposure according to anatomic site. a**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Males | | |  | Females | | |  | Total | | | Heterogeneity *p*-value |
|  | Cases | Excess absolute risk per UVR MJ/cm2 per 104 person year | *p*-value |  | Cases | Excess absolute risk per UVR MJ/cm2 per 104 person year | *p*-value |  | Cases | Excess absolute risk per UVR MJ/cm2 per 104 person year | *p*-value |
| All BCC at known anatomic locationsb | 426 | 7.51 (3.78, 10.86) | <0.001 |  | 1698 | 10.14 (7.44, 12.32) | <0.001 |  | 2124 | 9.62 (6.94, 11.73) | <0.001 | 0.105 |
| Four-level anatomic-location UVR-exposure classification | | | | | | | | | | | | |
| Head and neckc | 302 | 3.32d (0.14, 6.27) | 0.041d |  | 1109 | 5.92d (3.46, 7.84) | <0.001d |  | 1411 | 5.46 (2.92, 7.36) | <0.001d | 0.057d |
| Upper extremity, trunk, lower extremitye | 124 | 4.21 (2.34, 6.00) | <0.001 |  | 589 | 3.36 (1.31, 4.70) | 0.005 |  | 713 | 3.70 (2.15, 4.80) | <0.001 | 0.388 |
| Upper extremitye | 40 | 1.89 (0.53, 2.59) | 0.016d |  | 126 | 0.88 (0.09, 1.31) | 0.040d |  | 166 | 0.87 (-0.19, 1.39) | 0.087d | 0.077d |
| Trunkf | 77 | 2.97 (1.38, 4.40) | 0.003 |  | 336 | 2.39 (0.80, 3.27) | 0.011 |  | 413 | 2.56 (1.26, 3.33) | 0.003 | 0.437 |
| Lower extremitye | 7 | 0.00 (-0.30g, 0.29g) | 0.950d |  | 127 | -0.05 (-0.67g, 0.44) | 0.754d |  | 134 | -0.01 (-0.26g, 0.32) | 0.810d | 0.805d |
| *p*-value of heterogeneity (head and neck vs upper extremity +trunk +lower extremity) |  | 0.099d |  |  |  | 0.017d |  |  |  | 0.189d |  |  |
| *p*-value of heterogeneity (head and neck vs upper extremity vs trunk vs lower extremity) |  | 0.071 |  |  |  | 0.006d |  |  |  | 0.520d |  |  |

aFor definition of four-level anatomic site classification, see Table 2.

badjustment to the baseline BCC rate for baseline questionnaire, sex, ln[age], ln[age]2, birth year, [birth year]2, [birth year]3, [birth year]4, [birth year]5

cadjustment to the baseline BCC rate for sex, ln[age], ln[age]2, birth year, birth year2, birth year3, birth year4, birth year5

dindications of lack of convergence.

eadjustment to the baseline BCC rate for sex, ln[age], ln[age]2, birth year

fadjustment to the baseline BCC rate for sex, ln[age], birth year, birth year2

gWald-based confidence interval.

**Supplementary Table 6. Modification by constitutional risk factors of excess absolute risk of basal cell carcinoma (BCC) by anatomic site in relation to cumulative ultraviolet radiation (UVR) radiant exposure.a**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Excess absolute risk per UVR MJ/cm2 per 104 person year (=*δ*) (95% CI) | | | | | |
|  | Cases | All BCC, known anatomic locationsb | Head and neckc | Upper and lower extremity, trunkd | Upper extremityd | Trunke | Lower extremityd |
| Skin complexion | | | | | | | |
| Dark | 12 | -0.56f (-11.98g, 12.68) | -0.06f (-6.41g, 6.30g) | 2.93f (0.73, 7.61) | 0.98 (0.06, 4.31) | 0.98 (0.06, 4.31) | -0.05f (-1.73g, 3.16) |
| Medium | 540 | 11.98f (4.86g, 19.09g) | 8.94f (5.24g, 12.65g) | 7.57f (5.10, 9.06) | 1.50 (1.07, 2.04) | 4.88 (4.05, 5.80) | 0.02f (-1.00g, 1.05g) |
| Fair | 826 | 19.21f (8.50g, 29.93g) | 17.41f (12.08g, 22.74g) | 5.97f (2.49g, 8.78) | 0.10 (-1.79g, 3.20) | 4.15 (2.98g, 5.35) | 0.01f (-1.68g, 1.70g) |
| Unknown | 10 | 30.77f (-11.96g, 73.51g) | 28.32f (-2.07g, 58.70g) | 9.48f (2.36, 24.59) | 3.16 (0.18, 13.92) | 6.32 (1.05, 19.52) | 0.00f (-0.01g, 0.01g) |
| *p*-value (heterogeneity) |  | 0.035f | 0.229f | 0.247f | 0.654 | 0.146 | 0.991f |
| Eye color | | | | | | | |
| Brown/black | 345 | 11.38 (4.14, 16.93) | 9.59 (4.29, 13.32) | 4.30f (0.43, 6.65) | 0.99f (0.41, 1.84) | 2.80f (-1.15, 4.51) | 0.25f (-0.25g, 0.96) |
| Hazel | 294 | 12.44 (2.00, 19.97) | 7.21 (-1.03g, 12.76) | 8.08f (2.79, 11.48) | 1.51f (0.55, 2.68) | 4.70f (-2.40, 7.30) | 0.09f (-0.31g, 1.68) |
| Blue/green/grey | 734 | 19.56 (10.53, 26.10) | 13.91 (7.09, 18.31) | 5.93f (-1.23, 10.02g) | 2.27f (1.40, 3.19) | 2.66f (-1.94g, 5.74) | 0.69f (-0.02g, 1.40g) |
| Other | 1 | 5.75 (0.33, 25.34) | 5.75 (0.33, 25.34) | 8.56f (3.07, 18.40) | 1.71f (0.10, 7.54) | 6.85f (2.11, 15.97) | 0.00f (0.00g, 0.00g) |
| Unknown | 14 | 16.11 (-19.46g, 50.79) | 7.05 (-17.41g, 33.82) | 0.00f (0.00g, 0.00g) |
| *p*-value (heterogeneity) |  | 0.276 | 0.227 | 0.238f | 0.134f | 0.421f | 0.473f |
| Natural hair color at age 15 | | | | | | | |
| Black | 21 | 8.67f (-3.38g, 20.72g) | 7.21 (-1.18g, 14.99) | 4.47f (-0.71g, 9.64g) | 0.61 (0.03, 2.68) | 2.43f (0.75, 5.65) | 0.00f (0.00g, 0.00g) |
| Brown/black | 944 | 13.61f (5.57g, 21.65g) | 10.34 (5.60g, 13.31) | 5.34f (1.79g, 8.89g) | 2.01 (1.59, 2.50) | 2.53f (-1.29g, 6.34g) | 0.07f (-1.11g, 1.25g) |
| Red/blonde | 408 | 19.69f (5.08g, 34.31g) | 14.35 (4.42g, 21.34) | 6.43f (-0.34g, 13.21g) | 2.34 (1.50, 3.33g) | 0.54f (-0.90, 10.87g) | -0.13f (-1.86g, 1.60g) |
| Other | 6 | -2.01f (-43.71g, 39.70g) | -0.57 (-8.95g, 7.81g) | -1.06f (-20.28g, 18.17g) | 5.63 (0.32, 24.80) | 3.82f (-25.81g, 22.92) | 0.00f (-0.01g, 0.01g) |
| Unknown | 9 | 29.07f (11.10g, 47.04g) | 13.53 (-9.36g, 36.42g) | 17.82f (3.75g, 31.89g) | 2.89 (0.16, 12.74) | -1.84f (-20.40g, 16.72g) | 0.79f (-7.56g, 9.14g) |
| *p*-value (heterogeneity) |  | 0.414f | 0.780 | 0.777f | 0.692 | 0.990f | 0.949f |
| Gaelic ancestry | | | | | | | |
| No | 689 | 11.68 (4.00, 16.93) | 8.84 (3.24, 12.32) | 5.98 (0.96, 8.19) | 1.19f (-0.17g, 2.12) | 3.77 (-0.38, 5.20) | -0.07f (-1.14g, 1.04) |
| Yes | 392 | 30.05 (20.43, 37.92) | 22.49 (15.84, 27.76) | 6.76 (-0.57, 10.24) | 2.04f (-0.03, 3.21) | 4.14 (1.11g, 6.93) | 0.44f (-0.99g, 1.98) |
| Unknown | 307 | 16.11 (7.11, 22.92) | 12.04 (5.32, 16.70) | 6.17 (1.42, 9.00) | 1.99f (0.71g, 3.15) | 2.50 (-0.88g, 5.40) | 0.22f (-0.79g, 0.82) |
| *p*-value (heterogeneity) |  | <0.001 | <0.001 | 0.913 | 0.097f | 0.531 | 0.689f |
| Hispanic | | | | | | | |
| No | 1372 | 15.40f (7.46g, 23.34g) | 11.54f (6.20, 14.92) | 6.04f (2.63g, 9.45g) | 1.75 (1.18, 2.36g) | 3.63f (-1.22, 5.54) | 0.02f (-1.17g, 1.22g) |
| Yes | 12 | 1.24f (-11.55g, 14.03g) | 5.44f (-5.66g, 16.68) | -0.15f (-3.95g, 3.65g) | 0.00 (-0.01g, 0.01g) | 0.00f (0.00g, 0.00g) | -0.04f (-1.82g, 3.74) |
| Unknown | 4 | -2.87f (-48.01g, 42.27g) | 32.71f (-24.06g, 72.21) | 0.81f (-4.10g, 5.72g) | 0.00 (-0.19g, 14.91) | 0.00f (0.00g, 0.00g) | 0.00f (-0.02g, 0.02g) |
| *p*-value (heterogeneity) |  | 0.144f | 0.581f | 0.044f | 0.253 | 0.300f | 0.969f |
| Cancer in siblings and minimum age of development of cancer in any sibling | | | | | | | |
| No cancer in siblings | 1176 | 15.28 (5.53g, 21.21) | 12.32 (4.42g, 20.22g) | 6.79f (4.88g, 8.36) | 1.78 (1.17, 2.44) | 0.97f, h (-2.26g, 4.21g) | 0.14 (-1.17g, 1.45g) |
| Cancer in siblings, age unknown | 6 | 27.90 (11.09, 56.53) | 7.07 (-21.27g, 39.92) | -0.01f (-4.34g, 22.79) | 0.00 (-0.33g, 0.33g) | -0.23 (-8.19g, 7.72g) |
| Cancer in siblings, age 30+ | 140 | 8.79 (-12.47g, 29.80) | 14.17 (3.08g, 23.59) | 7.23f (3.00g, 11.23) | 0.62 (0.03, 2.98) | -4.49f (-15.83g, 6.85g) | -0.02 (-1.67g, 1.63g) |
| Cancer in siblings, age <30 | 35 | 25.96 (-11.31g, 63.23g) | 25.25 (4.66g, 39.91) | 13.73f (-0.19g, 27.65g) | 0.00 (0.00g, 0.00g) | 11.49f (5.52, 20.72) | 0.05 (-4.17g, 4.26g) |
| Unknown if siblings have cancer | 31 | 31.47 (-8.75g, 32.59) | 20.19 (-6.77g, 44.14) | 9.77f (-1.26g, 20.80g) | 5.98 (1.86, 13.89) | 0.97f, h (-2.26g, 4.21g) | 0.00 (0.00g, 0.00g) |
| *p*-value (heterogeneity) |  | 0.830 | 0.729 | 0.735f | 0.199 | 0.396f | 0.984f |
| Age at menarche (years) | | | | | | | |
| 0-9 | 14 | 22.44f (10.69g, 34.20g) | 19.24 (10.30, 32.26) | 3.03 (0.53, 8.17) | 0.03f (-1.10g, 1.16g) | 3.47f (-0.60g, 7.53g) | -0.13f (-11.32g, 11.07g) |
| 10-11 | 203 | 14.72f (2.07, 24.36) | 10.16 (-1.59g, 18.45) | 1.26f (0.59, 2.23) | -1.33f (-8.41g, 5.75g) |
| 12-14 | 777 | 17.71f (8.79, 24.10) | 12.68 (7.01, 17.36) | 5.93 (1.46g, 9.23) | 0.73f (-0.94g, 2.40g) | 2.95f (-2.72, 6.55g) | -0.35f (-4.95g, 4.25g) |
| 15+ | 94 | 29.90f (17.84g, 35.19) | 17.18 (3.58, 25.83g) | 7.13 (5.63, 8.81) | -0.01f (-1.77g, 4.05) | -0.01f (-6.21g, 6.20g) |
| Unknown | 300 | 16.64f (7.67, 23.11) | 13.07 (4.69, 18.67) | 2.06f (1.20g, 3.03) | 0.44f (-1.14g, 2.02g) |
| *p*-value (heterogeneity) |  | 0.312f | 0.521 | 0.460 | 0.230f | 0.806f | 0.846f |
| Age at menopause (years) | | | | | | | |
| 0-24 | 8 | 21.67f (5.02g, 37.33) | -2.33f (-47.33g, 53.35) | 9.43f (1.57, 29.13) | 4.85f (-14.23g, 23.93g) | 1.08f (-3.35g, 5.51g) | 0.24f (-1.83g, 2.30g) |
| 25-34 | 55 | 16.51f (5.40g, 27.62g) | 12.87f (1.64, 18.40) | 0.00f (-1.14g, 2.61) | 4.47f (-6.37g, 15.31g) | -0.88f (-7.98g, 6.21g) |
| 35-44 | 87 | 15.15f (0.99g, 26.84) | 11.06f (-0.47g, 22.60g) | 9.39f (6.33, 13.32) | 2.80f (0.90g, 4.70g) | 2.04f (-5.46g, 9.54g) | -0.02f (-5.64g, 5.59g) |
| 45-54 | 100 | 23.54f (6.36, 35.46) | 10.42f (-3.26g, 24.09g) | 6.28f (1.42g, 10.36) | 0.60f (-0.24g, 1.44g) | 4.07f (-3.77g, 11.90g) | -0.87f (-7.25g, 5.50g) |
| 55+ | 9 | 20.06f (-27.02g, 67.13g) | 8.20f (1.36, 25.32) | 0.00f (0.00g, 0.00g) | -5.72f (-39.99g, 28.56g) | 0.13f (-30.36g, 30.63g) |
| Unknown | 1129 | 17.43f (9.75, 23.01) | 12.40f (4.81g, 20.00g) | 5.88f (2.83g, 7.92) | 1.86f (1.20g, 2.52g) | 2.36f (-2.47g, 7.19g) | 0.38f (-0.73g, 1.48g) |
| *p*-value (heterogeneity) |  | 0.730f | 0.926f | 0.555f | 0.275f | 0.893f | 0.932f |
| Ever use oral contraception | | | | | | | |
| No | 291 | 17.31 (3.73, 26.55) | 12.73f (2.99, 18.67) | 8.86f (7.14, 10.82) | 1.69f (-0.85g, 4.23g) | -0.15f (-6.89g, 6.59g) | -0.26f (-6.76g, 6.23g) |
| Yes | 813 | 16.68 (7.36, 23.39) | 12.20f (6.09, 16.24) | 1.99f (-6.59, 7.38) | 1.19f (-3.43g, 5.82g) | 2.03f (-4.16g, 8.23g) | -1.32f (-6.40g, 3.76g) |
| Unknown | 284 | 17.10 (8.18, 23.58) | 12.46f (5.15, 17.64) | 7.08f (5.58, 8.83) | 2.78f (0.15g, 5.42g) | 4.88f (0.86g, 6.02) | 0.14f (-1.75g, 2.03g) |
| *p*-value (heterogeneity) |  | 0.990 | 0.978f | 0.270f | 0.643f | 0.184f | 0.343f |
| Duration of use of hormone replacement therapy (years) | | | | | | | |
| 0 | 18 | 14.12 (-3.02g, 33.27) | 18.24f (10.28, 29.53) | 5.21f (1.62, 12.11) | 1.08 (0.18, 3.33) | 2.13f (-13.61g, 17.87g) | 0.02f (-7.83g, 7.86g) |
| 1-2 | 25 | 20.28 (5.27, 32.99) | 13.30f (-1.92g, 28.51g) | 4.56f (-2.55g, 11.10) | 0.00f (-0.03g, 0.03g) | 0.13f (-11.90g, 12.15g) |
| 3-4 | 25 | 16.97 (-5.58g, 39.87) | -1.85f (-21.44g, 17.75g) | 0.95f (-8.90g, 10.80g) | 0.00 (-0.01g, 0.01g) | -2.43f (-17.53g, 12.66g) | -0.35f (-8.91g, 8.21g) |
| 5-9 | 33 | 34.78 (24.22, 48.03) | 25.84f (4.57g, 47.10g) | 3.77f (1.61, 12.33) | 2.11 (0.35, 6.51) | -0.80f (-16.28g, 14.68g) | 0.00f (-0.01g, 0.01g) |
| 10+ | 48 | 41.19 (10.90, 60.53) | 15.76f (-6.26g, 37.79g) | 14.03f (2.26g, 26.32) | 0.00 (-0.17g, 3.35) | -0.76f (-25.26g, 23.74g) | 0.24f (-16.12g, 16.59g) |
| no/unknown | 1239 | 17.76 (10.42, 22.58) | 12.32f (5.48g, 16.08) | 6.56f (4.25g, 8.21) | 2.00 (1.56g, 2.45g) | 1.67f (-3.87g, 7.22g) | 0.02f (-1.28g, 1.33g) |
| *p*-value (heterogeneity) |  | 0.230 | 0.574f | 0.810f | 0.322 | 0.765f | 0.999f |
| Rheumatoid arthritis | | | | | | | |
| No | 1318 | 16.67f (9.27, 22.13) | 12.42f (6.50, 16.43) | 6.87 (5.56, 8.26) | 0.88f (-3.06g, 4.83g) | 2.79f (-1.04g, 6.63g) | 0.35f (-0.72g, 1.42g) |
| Yes | 41 | 14.74f (-11.60g, 41.08g) | 16.47f (-0.33g, 32.98) | 3.27 (0.20, 12.13) | 0.90f (-11.54g, 13.34g) | -0.26f (-9.63g, 9.10g) | 0.00f (-2.57g, 4.69) |
| Unknown | 29 | 5.61f (-17.09g, 26.34) | 7.38f (-8.91g, 21.78) | 0.01 (-0.35g, 9.04) | 0.00f (0.00g, 0.00g) | -1.34f (-12.02g, 9.34g) | 0.14f (-2.83g, 3.11g) |
| *p*-value (heterogeneity) |  | 0.557f | 0.736f | 0.206 | 0.347f | 0.128f | 0.890f |
| Thyroiditis | | | | | | | |
| No | 1152 | 15.02f (6.24, 21.39) | 13.02f (6.47, 18.03) | 6.51f (5.06, 8.01) | 1.55f (0.99, 2.20) | 2.72 (-2.98, 6.88g) | 0.36f (-0.81g, 1.54g) |
| Yes | 11 | 35.44f (-9.12, 65.17) | 23.96f (-4.18, 54.52) | 6.92f (1.15, 21.38) | 0.00f (0.00g, 0.00g) | 3.46 (0.20, 15.24) | 0.06f (-6.91g, 7.04g) |
| Unknown | 225 | 18.97f (8.81, 26.64) | 14.96f (8.26, 18.92) | 8.65f (6.87, 10.72) | 2.00f (1.21, 3.07) | 2.97 (-1.42g, 7.35g) | 0.42f (-0.73g, 1.57g) |
| *p*-value (heterogeneity) |  | 0.518f | 0.557f | 0.277f | 0.440f | 0.976 | 0.901f |
| Hyperthyroidism (Graves disease) | | | | | | | |
| No | 1345 | 16.67 (9.15, 22.13) | 12.21f (6.35, 16.26) | 6.64 (2.95, 8.17) | 1.94f (1.50, 2.45) | 3.85f (2.38g, 5.32g) | 0.42f (-0.67g, 1.51g) |
| Yes | 17 | 27.89 (-9.09g, 55.80) | 24.76f (0.90, 45.59) | 8.57 (2.66, 19.91) | 0.00f (0.00g, 0.00g) | 5.49f (-1.23g, 12.22g) | 0.16f (-5.93g, 6.26g) |
| Unknown | 26 | 6.69 (-23.04g, 37.76) | 17.49f (9.86, 28.32) | 10.15 (-2.12g, 23.69) | 1.69f (0.10, 5.18g) | -0.02f (-4.56g, 4.53g) | 0.23f (-3.61g, 4.07g) |
| *p*-value (heterogeneity) |  | 0.633 | 0.455f | 0.742 | 0.405f | 0.483f | 0.909f |
| Ever use diuretics | | | | | | | |
| No | 1204 | 16.19f (8.34, 21.88) | 12.43 (6.41, 16.47) | 6.26f (1.79, 8.31) | 2.05f (1.65, 2.51) | 3.19f (0.06g, 6.33g) | 0.18f (-1.09g, 1.45g) |
| Yes | 167 | 16.94f (3.59, 27.06) | 11.41 (2.33, 17.81) | 4.43f (-0.57g, 8.92) | 1.41f (0.48, 2.69g) | -1.33f (-8.20g, 5.53g) | -0.06f (-1.55g, 1.43g) |
| Unknown | 17 | 28.03f (-3.56g, 48.37) | 16.72 (-2.99g, 32.11) | 12.86f (5.52, 24.87) | 1.84f (0.10, 8.09) | 3.37f (-17.95g, 24.68g) | 0.00f (0.00g, 0.00g) |
| *p*-value (heterogeneity) |  | 0.827f | 0.850 | 0.301f | 0.052f | 0.035f | 0.787f |
| Smoking status | | | | | | | |
| Missing+never smoked | 713 | 16.32 (8.15, 22.41) | 12.21 (6.14, 17.54) | 7.84f (5.29g, 10.40g) | 2.04f (1.15, 2.81) | 4.92f (2.40, 6.87) | 0.24f (-0.80g, 0.85) |
| Former smoker | 434 | 20.75 (10.39, 28.66) | 16.42 (8.60, 21.02) | 7.79f (5.41g, 10.18g) | 2.24f (1.55, 3.11) | 2.82f (-0.50, 5.02) | 0.81f (-0.35g, 1.90) |
| Current smoker | 234 | 11.25 (-0.32, 20.25) | 10.98 (2.79, 15.62) | 3.23f (-0.31g, 6.76g) | 1.22f (0.40, 2.26) | 0.51f (-3.93g, 3.26) | 0.42f (-0.62g, 1.80) |
| Former smoker unknown if current | 7 | 22.36 (-21.10g, 48.30) | 18.54 (-11.26g, 47.09) | 0.00f (0.00g, 0.00g) | 0.00f (0.00g, 0.00g) | 0.00f (0.00g, 0.00g) | 0.00f (0.00g, 0.00g) |
| *p*-value (heterogeneity) |  | 0.335 | 0.312 | 0.011f | 0.221f | 0.107f | 0.603f |
| Alcohol consumption (drinks per week) | | | | | | | |
| Missing/unknown | 23 | 9.66f (-9.65g, 28.46) | 4.94f (-8.06, 15.65) | 7.49f (3.42, 13.94) | 0.00f (-0.02g, 0.02g) | 0.83f (-8.14g, 9.79g) | 1.77 (0.10, 5.78) |
| <1 | 755 | 16.34f (7.24, 22.46) | 13.69f (8.38, 17.06) | 4.71f (-2.20, 7.35) | 1.85f (1.02, 2.52) | 1.56f (-3.11g, 6.23g) | 0.46 (0.08, 1.38) |
| 1-2 | 214 | 10.23f (-5.20g, 19.47) | 10.91f (-0.35g, 17.05) | 3.86f (-1.83g, 8.17) | 0.97f (0.16, 2.47) | 4.64f (0.86g, 8.42g) | 0.39 (0.02, 1.75) |
| 3-6 | 238 | 22.87f (9.50, 32.78) | 10.77f (-2.24g, 18.17) | 9.51f (0.22, 14.77) | 2.39f (0.91, 4.30) | 3.41f (-3.46g, 10.28g) | 0.00 (-0.02g, 1.01) |
| 7+ | 158 | 24.82f (12.24, 35.37g) | 15.75f (5.74, 23.20) | 8.30f (3.58, 11.05) | 1.71f (0.82, 3.07) | 5.66f (1.20g, 7.45) | 0.45 (0.03, 1.90) |
| *p*-value (heterogeneity) |  | 0.222f | 0.349f | 0.162f | 0.090f | 0.299f | 0.558 |
| BMI (kg/m2) | | | | | | | |
| Missing | 32 | 9.92 (-12.26g, 34.62) | 18.04f (1.10, 29.54) | -4.33f (-24.77g, 16.11g) | 0.00 (-0.02g, 3.08) | -3.63f (-18.48g, 11.22g) | -0.03f (-2.58g, 2.52g) |
| <18.5 | 56 | 17.04 (0.38, 32.38) | 11.46f (0.83, 21.01) | 4.40f (-8.14g, 16.95g) | 1.08 (-1.74g, 6.45) | 1.14f (-8.10g, 10.37g) | 0.44f (-3.93g, 4.81g) |
| 18.5-24-9 | 930 | 13.50 (4.59, 19.97) | 11.38f (4.99, 15.36) | 1.98f (-4.66g, 8.61g) | 1.71 (1.11, 2.37) | 0.61f (-5.07g, 6.28g) | 0.08f (-1.15g, 1.30g) |
| 25.0-29.9 | 267 | 11.13 (3.66, 16.87) | 9.29f (3.92, 13.24) | 2.17f (-2.98g, 7.32g) | 1.72 (1.05, 2.60) | 0.49f (-4.37g, 5.35g) | 0.09f (-0.79g, 0.97g) |
| ≥30 | 103 | 14.22 (5.48, 23.37) | 11.90f (5.10, 17.64) | 4.55f (-0.40g, 9.51g) | 1.44 (0.57, 2.60g) | 1.54f (-3.37g, 6.45g) | 0.17f (-0.83g, 1.17g) |
| *p*-value (heterogeneity) |  | 0.704 | 0.639f | 0.853f | 0.661 | 0.998f | 0.880f |
| Strenuous hours of exercise per week | | | | | | | |
| Unknown | 108 | 11.27 (-5.89g, 25.52) | 8.13 (-5.73g, 17.91) | 5.06f (1.23, 9.76) | 0.00f (-0.21g, 1.81) | 3.93f (2.26, 6.26) | 0.83 (0.06, 2.69) |
| <1 | 873 | 13.78 (4.52, 20.38) | 11.59 (4.88, 15.87) | 5.92f (4.45, 7.56) | 1.64f (0.95g, 2.33g) | 1.38f (-0.01, 7.22g) | 0.30 (0.05, 0.87) |
| 1-3 | 249 | 19.96 (10.08, 28.70) | 12.85 (5.96, 18.20) | 10.53f (7.34, 13.20) | 2.58f (1.61, 3.73) | 4.39f (-0.21g, 8.98g) | 0.47 (0.03, 1.94) |
| 4+ | 158 | 18.87 (3.24, 31.79) | 14.22 (1.64, 22.69) | 6.81f (3.31, 11.34) | 1.63f (-0.14g, 3.40g) | 2.83f (-3.80g, 7.74) | 0.66 (0.04, 2.78) |
| *p*-value (heterogeneity) |  | 0.500 | 0.739 | 0.065f | 0.024f | 0.565f | 0.811 |
| Occupational head and neck dose at baseline (Gy) | | | | | | | |
| <0.01 | 68 | 15.88 (1.63, 29.19) | 15.35f (5.40, 22.49) | 2.01f (-3.92g, 8.88) | 2.96f (1.35, 5.51) | -0.25f (-3.38g, 2.89g) | 0.02 (-0.42g, 4.07) |
| 0.010-0.049 | 669 | 14.75 (5.28, 21.34) | 10.92f (3.49, 15.69) | 5.43f (1.20g, 8.20) | 1.88f (1.33, 2.49g) | 3.94f (1.10g, 6.78g) | 0.18 (0.01, 0.76) |
| 0.050-0.099 | 371 | 26.42 (19.10, 30.11) | 18.47f (13.67, 20.99) | 7.20f (3.40, 9.96) | 1.76f (1.15, 2.57) | 3.63f (0.85g, 6.41g) | 1.04 (0.17, 2.62) |
| 0.100-0.199 | 211 | 9.30 (-5.68g, 20.08) | 5.57f (-5.49g, 13.29) | 10.46f (8.23, 13.07) | 2.62f (1.59, 4.02) | 2.91f (-1.20g, 7.01g) | 0.87 (0.15, 2.58) |
| ≥0.200 | 69 | 13.77 (-4.83g, 32.29) | 15.60f (3.08g, 28.42) | 4.95f (2.65, 8.31) | 0.41f (0.02, 1.82) | 2.89f (0.75g, 5.03g) | 0.00 (0.00g, 0.00g) |
| *p*-value (heterogeneity) |  | 0.014 | 0.008f | 0.060f | 0.050f | 0.448f | 0.375 |

aFor definition of anatomic site classification, see Table A1. Analysis is based on follow-up starting at second questionnaire.

badjustment to the baseline BCC rate for baseline questionnaire, sex, ln[age], ln[age]2, birth year, [birth year]2, [birth year]3, [birth year]4, [birth year]5 and the respective risk factor.

cadjustment to the baseline BCC rate for sex, ln[age], ln[age]2, birth year, birth year2, birth year3, birth year4, birth year5 and the respective risk factor

dadjustment to the baseline BCC rate for sex, ln[age], ln[age]2, birth year and the respective risk factor

eadjustment to the baseline BCC rate for sex, ln[age], birth year, birth year2 and the respective risk factor

findications of lack of convergence.

gWald-based confidence interval.

hcoefficients for (a) no cancer in siblings, (b) cancer in siblings, age unknown and (c) unknown if siblings have cancer were constrained to be equal.

**Supplementary Table 7. Log excess relative risk and excess absolute risk of basal cell carcinoma (BCC) among Whites with cumulative ultraviolet (UVR) radiant exposure according to latency.a**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Latency (years) | Log excess Relative risk per UVR MJ/cm2 | *p*-value |  | Excess absolute risk per UVR MJ/cm2 per 104 person year | *p*-value |
| 2 | 1.21 (0.82, 1.60) | <0.001 |  | 8.68 (6.19, 10.63) | <0.001 |
| 5 | 1.27 (0.86, 1.68) | <0.001 |  | 9.63 (6.94, 11.73) | <0.001 |
| 10 | 1.39 (0.92, 1.84) | <0.001 |  | 11.69 (8.59, 14.09) | <0.001 |
| 15 | 1.51 (0.99, 2.02) | <0.001 |  | 14.70 (11.00, 17.50) | <0.001 |

**Supplementary Table 8. Log excess relative risk and excess absolute risk of basal cell carcinoma in relation to windows of time since exposure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Log excess relative risk per UVR MJ/cm2 | Heterogeneity *p*-value |  | Excess absolute risk per UVR MJ/cm2 /104 person years | Heterogeneity *p*-value |
| 5-9 years after exposure | -3.61 (-21.87, 14.49) | 0.043 |  | -54.69a (-352.90b, 243.50b) | 0.163a |
| 10-14 years after exposure | 15.06 (-4.16, 34.32) |  | 40.50a (-267.20b, 348.20b) |
| 15+ years after exposure | 0.07 (-0.94, 1.07) |  | 18.33a (7.87b, 28.78b) |
| 2-4 years after exposure | -34.53 (-73.91, 8.99) | 0.026 |  | -65.75a (-859.80b, 728.30b) | 0.311a |
| 5-9 years after exposure | 21.28 (-14.93, 55.25) |  | -10.94a (-646.40b, 624.50b) |
| 10-14 years after exposure | 9.97 (-9.98, 30.22) |  | 36.34a (-287.10b, 359.70b) |
| 15+ years after exposure | 0.13 (-0.87, 1.14) |  | 18.28a (7.83b, 28.73b) |

aindications of lack of convergence.

bWald-based confidence interval.

**Supplementary Table 9. Log excess relative risk and excess absolute risk of basal cell carcinoma (BCC) evaluated using Fine-Gray type competing risks model among Whites with cumulative ultraviolet (UVR) radiant exposure according to anatomic site.a**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Cases | Log excess relative risk per UVR MJ/cm2 | *p*-value |  | Excess absolute risk per UVR MJ/cm2 per 104 person year | *p*-value |
| All BCC at known anatomic locationsb | 2124 | 1.25 (0.84, 1.66) | <0.001 |  | 2.58 c (-2.42d, 5.97) | 0.182c |
| Four-level anatomic-location UVR-exposure classification | | | | | | |
| Head and necke | 1411 | 1.24 (0.75, 1.73) | <0.001 |  | 0.66 (-3.15d, 3.40) | 0.647 |
| Upper extremity, trunk, lower extremityf | 713 | 1.27 (0.53, 2.00) | <0.001 |  | 4.72 (4.27, 5.17) | <0.001 |
| Upper extremityf | 166 | 2.22 (0.73, 3.66) | 0.004 |  | 0.32 (-0.83d, 1.48d) | 0.510 |
| Trunkg | 413 | 0.58 (-0.39, 1.53) | 0.240 |  | 2.60c (1.03, 3.04) | 0.011c |
| Lower extremityf | 134 | 0.14 (-1.61, 1.80) | 0.874 |  | 0.00c (-0.37d, 0.30) | 0.893c |

aFor definition of four-level anatomic site classification, see Supplementary Table 2. Analysis is based on full follow-up, starting at first or second questionnaire.

badjustment to the baseline BCC rate for baseline questionnaire, sex, ln[age], ln[age]2, birth year, [birth year]2, [birth year]3, [birth year]4, [birth year]5

cWald-based confidence interval.

dindications of lack of convergence.

eadjustment to the baseline BCC rate for sex, ln[age], ln[age]2, birth year, birth year2, birth year3, birth year4, birth year5

fadjustment to the baseline BCC rate for sex, ln[age], ln[age]2, birth year

gadjustment to the baseline BCC rate for sex, ln[age], birth year, birth year2

**Supplementary Figure 1. Flow diagram showing the numbers of persons in the analysis cohort resulting from successive exclusions**

**A screenshot of a cell phone

Description automatically generated**

**References**

1. Murari A, Singh KN. Lund and Browder chart-modified versus original: a comparative study. Acute Crit Care **2019**;34(4):276-81 doi 10.4266/acc.2019.00647.

2. McCullagh P, Nelder JA. Generalized linear models. 2nd edition. Boca Raton, FL: Chapman and Hall/CRC; 1989. 1-526 p.

3. Little MP, Linet MS, Kimlin MG, Lee T, Tatalovich Z, Sigurdson AJ*, et al.* Cumulative solar ultraviolet radiation exposure and basal cell carcinoma of the skin in a nationwide US cohort using satellite and ground-based measures. Environmental health : a global access science source **2019**;18(1):114 doi 10.1186/s12940-019-0536-9.

4. United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). UNSCEAR 2006 Report. Annex A. Epidemiological Studies of Radiation and Cancer. New York: United Nations; 2008. 13-322 p.

5. Fine JP, Gray RJ. A proportional hazards model for the subdistribution of a competing risk. J Am Statist Assoc **1999**;94(2):496-509 doi 10.2307/2670170.

6. Sylvestre MP, Abrahamowicz M. Flexible modeling of the cumulative effects of time-dependent exposures on the hazard. Stat Med **2009**;28(27):3437-53 doi 10.1002/sim.3701.

7. R Project version 3.6.1. R: A language and environment for statistical computing. https://www.r-project.org. Vienna, Austria: R Foundation for Statistical Computing; 2019.

8. Risk Sciences International. Epicure version 2.0.1.0. 55 Metcalfe, K1P 6L5, Canada: Risk Sciences International; 2015.

9. Tatalovich Z, Wilson JP, Cockburn M. A comparison of Thiessen polygon, kriging, and spline models of potential UV exposure. Cartogr Geograph Information Sci **2006**;33(3):217-31 doi 10.1559/152304006779077318.

10. Little MP, Tatalovich Z, Linet MS, Fang M, Kendall GM, Kimlin MG. Improving assessment of lifetime solar ultraviolet radiation exposure in epidemiologic studies: comparison of ultraviolet exposure assessment methods in a nationwide U.S. occupational cohort. Photochem Photobiol **2018**;94(6):1297-307 doi 10.1111/php.12964.