

Supplementary Table S1 – Leukaemia sub-type disease group definitions

Leukaemia subtype	ICD revision 9 ^a	ICD revision 10 ^b
Acute lymphatic (ALL)	204.0, 204.2	C91.0, C91.2
Chronic lymphatic (CLL)	204.1	C91.1
Unspecified lymphatic	202.4, 204.8, 204.9	C91.3-C91.9
Acute myeloid (AML)	205.0, 205.2, 206.0, 206.2, 207.0, 207.2	C92.0, C92.2, C92.4, C92.5, C93.0, C93.2, C94.0, C94.2
Chronic myeloid (CML)	205.1, 206.1	C92.1, C92.7, C93.1
Unspecified myeloid	205.3, 205.8, 205.9, 206.8, 206.9	C92.3, C92.9, C93.7, C93.9
Other leukaemia	207.1, 207.8, 208.0, 208.1, 208.2, 208.8, 208.9	C94.1, C94.3, C94.4, C94.5, C94.7, C95.0, C95.1, C95.2, C95.7, C95.9
All leukaemia	202.4, 204-208	C91-C95
All leukaemia excluding CLL (non-CLL)	202.4, 203.1, 204.0, 204.2-207.7 207.9-208.9	C91.0, C91.2-C95.9

^a events are coded in ICD9: 1955-2000 for mortality and 1971-1994 for incidence, ^b events are coded in ICD10: 2001-2011 for mortality and 1995-2011 for incidence.

Supplementary Table S2 - Male standardised mortality and incidence ratios (SMR/SIRs) by leukaemia subtype

Leukaemia subtype	Mortality ^a				Incidence ^b			
	Number of deaths				Number of incidences			
	Obs	Exp ^c	SMR	95%CI	Obs	Exp ^d	SIR	95%CI
ALL	18	25.3	71.2	42.2-112.5	24	26.3	91.2	58.4-135.7
CLL	87	93.4	93.2	74.6-114.9	241	229.0	105.3	92.4-119.4
Unspecified lymphatic	7	7.8	89.7	36.1-184.8	40	31.9	125.3	89.5-170.6
AML	154	188.5	81.7	69.3-95.7	174	196.5	88.5	75.9-102.7
CML	53	57.0	93.0	69.7-121.7	82	80.7	101.6	80.8-126.1
Unspecified myeloid	5	5.0	100.1	32.5-233.6	16	9.9	161.8	92.5-262.8
Unspecified leukaemia	32	24.2	132.4	90.6-187.0	23	25.4	90.5	57.4-135.8
All leukaemia	356	401.0	88.8	79.8-98.5	604	599.7	100.7	92.8-109.1
All leukaemia (except CLL)	269	307.7	87.4	77.3-98.5	363	370.8	97.9	88.1-108.5

^aMortality covers the period 1955-2011, ^bIncidence analysis based on the period 1971-2011, ^cthe expected number of deaths is based on England and Wales figures, ^dthe expected number of leukaemia incidences are based on England and Wales for 1971-2006 and England only figures for 2007-2011.

Supplementary Table S3 - Female standardised mortality and incidence ratios (SMR/SIRs) by leukaemia subtype

Leukaemia subtype	Mortality ^a				Incidence ^b			
	Number of deaths				Number of incidences			
	Obs	Exp ^c	SMR	95%CI	Obs	Exp ^d	SIR	95%CI
ALL	3	1.6	190.3	39.2-556.0	4	1.8	218.7	59.6-559.9
CLL	2	2.8	72.6	8.8-262.1	10	8.7	115.3	55.3-212.1
Unspecified lymphatic	0	0.3	0.0	0-1431.6	1	1.1	90.4	2.3-503.5
AML	10	10.5	95.4	45.8-175.5	12	12.1	99.5	51.4-173.8
CML	3	2.8	107.6	22.2-314.4	4	4.3	93.3	25.4-238.9
Unspecified myeloid	0	0.2	0.0	0-1698.4	1	0.5	203.3	5.1-1132.4
Unspecified leukaemia	1	1.1	90.6	2.3-504.6	0	1.2	0.0	0-305.0
All leukaemia	19	19.2	99.1	59.6-154.7	32	29.7	107.9	73.8-152.4
All leukaemia (except CLL)	17	16.4	103.5	60.3-165.7	22	21.0	104.9	65.7-158.7

^aMortality covers period 1955-2011, ^bIncidence analysis based on the period 1971-2011, ^cthe expected number of deaths is based on England and Wales figures, ^dthe expected number of leukaemia incidences are based on England and Wales for 1971-2006 and England only figures for 2007-2011.

Supplementary Table S4 – Combined male and female Leukaemia incidence in relation to external radiation dose: ERR/Sv estimates, observed and expected number of leukaemia cases from the Poisson regression analysis

Leukaemia subtype	Observed cases [expected cases ^a] by cumulative external dose (mSv), 2 year lag							Total	ERR/Sv ^b (90% CI)	p-value ^c
	<10	10-20	20-50	50-100	100-200	200-400	>400			
ALL	17 [18.0]	2 [3.4]	5 [3.3]	3 [1.7]	1 [1.1]	1 [0.6]	0 [0.2]	29 [28.4]	0.84 (<-0.60,19.25)	0.432
CLL	127 [128.7]	32 [30.4]	37 [39.9]	24 [22.6]	13 [15.2]	8 [9.0]	3 [5.1]	244 [250.9]	-0.60 (<-0.60,0.63)	0.823
Other lymphatic	21 [22.7]	5 [3.7]	7 [4.7]	2 [2.6]	1 [1.7]	0 [0.9]	0 [0.6]	36 [36.8]	-0.60 (<-0.60,1.56)	0.818
AML	120 [115.5]	13 [19.4]	25 [25.1]	11 [14.2]	13 [9.4]	6 [4.8]	1 [2.5]	189 [190.8]	-0.28 (<-0.60,2.08)	0.601
CML	53 [49.6]	9 [7.9]	9 [9.4]	6 [5.0]	6 [2.8]	3 [1.7]	6 [0.9]	92 [77.3]	6.49 (2.01,14.80)	0.001
Other myeloid	12 [9.5]	3 [2.5]	1 [3.2]	1 [1.8]	0 [0.8]	1 [0.5]	0 [0.2]	18 [18.4]	-0.60 (<-0.60,6.87)	0.644
Unspecified leukaemia	21 [20.7]	3 [3.6]	3 [4.6]	5 [2.4]	2 [1.3]	1 [0.8]	0 [0.4]	35 [33.8]	1.13 (<-0.60,15.52)	0.394
Total leukaemia	372 [366.4]	67 [71.2]	88 [90.2]	52 [50.1]	36 [32.1]	20 [18.1]	11 [9.8]	646 [637.7]	0.35 (-0.44,1.44)	0.253
Non-CLL	245 [236.7]	35 [40.8]	51 [50.2]	28 [27.5]	23 [17.0]	12 [9.2]	8 [4.8]	402 [386.2]	1.28 (-0.02,3.16)	0.053
Myeloid leukaemia ^d	185 [173.7]	25 [29.5]	35 [36.9]	18 [20.4]	19 [12.6]	10 [6.7]	7 [3.5]	299 [283.4]	1.70 (0.16,4.03)	0.031
Lymphatic leukaemia ^e	165 [169.9]	39 [37.7]	49 [48.1]	29 [26.9]	15 [18.1]	9 [10.5]	3 [6.0]	309 [317.1]	-0.60 (<-0.60,0.28)	0.898

^aThe expected number of deaths is the estimated number of background cases using the Poisson regression model in the absence of occupational radiation exposure, ^bERR/Sv estimates are calculated from a linear ERR model that contains background adjustments for age, calendar time, gender, industrial status and first employer, ^cp-value represents a 1-sided test of the linear ERR/Sv parameter. ^dThe myeloid leukaemia disease group consists of all events in AML, CML and other myeloid groupings. ^eThe lymphatic leukaemia disease group consists of all events in ALL, CLL and other lymphatic groupings.

Supplementary Table S5 – non-CLL leukaemia, variation in Relative Risk per Sv (RR/Sv) by gender

	Main analysis ^a		Mortality		Incidence ^a	
	N	RR/Sv (90% CI)	N	RR/Sv (90% CI)	N	RR/Sv (90% CI)
Overall^a	402	2.66 (0.98; 6.64)	286	2.37 (0.77 6.54)	352	2.94 (1.04; 7.58)
Sex						
Male	380	2.79 (1.03; 6.95)	269	2.49 (0.81; 6.84)	333	3.11 (1.11; 8.01)
Female	22	>0 ^b (>0; 15.34)	17	>0 (>0; 23.80)	19	>0 (>0; 5.73)
test for heterogeneity ^c		p=0.15		p=0.15		P=0.12

^aIn the main and incidence analysis a small number of leukaemia events occurring after first cancer registration (excluding non-melanoma skin cancers) are ignored as follow-up is truncated at the date of first cancer event, ^b>0 in the table indicates that the RR estimate was <0.001 and > zero, ^ctest for heterogeneity based on the likelihood ratio test comparing the overall model with model's that allows the RR to vary by sex.