

Table 45. Cumulative attributable risk (AR_{15}) and cumulative baseline risk (BR_{15}) for thyroid cancer for a 20-year old age-at-exposure

Region	Model	Thyroid		
		Total lifetime exposure (mSv)	AR_{15} ($\times 10^{-2}$) (males)	AR_{15} ($\times 10^{-2}$) (females)
①	WHO weighted	63.65	0.0035	0.0159
	LSS ERR		0.0025	0.0148
	LSS EAR		0.0045	0.0171
②	WHO weighted	34.80	0.0019	0.0087
	LSS ERR		0.0014	0.0081
	LSS EAR		0.0024	0.0093
③	WHO weighted	17.83	0.0010	0.0044
	LSS ERR		0.0007	0.0041
	LSS EAR		0.0012	0.0047
④	WHO weighted	18.38	0.0009	0.0043
	LSS ERR		0.0007	0.0040
	LSS EAR		0.0012	0.0046
⑤ to ⑩	WHO weighted	15.59	0.0008	0.0036
	LSS ERR		0.0006	0.0034
	LSS EAR		0.0010	0.0039
⑪ to ⑭	WHO weighted	12.00	0.0006	0.0028
	LSS ERR		0.0005	0.0026
	LSS EAR		0.0008	0.0030
Rest of Fukushima prefecture (less affected)	WHO weighted	8.94	0.0005	0.0022
	LSS ERR		0.0003	0.0020
	LSS EAR		0.0006	0.0023
BR_{15} ($\times 10^{-2}$)			0.02	0.07

Annex K. Lifetime attributable risk (LAR) in workers based on first-year doses

The first year dose presented in this annex refers to the organ doses in colon (for all solid cancers), bone marrow (for leukaemia), and thyroid (for thyroid cancer).

Table 46. Lifetime attributable risk (LAR) due to radiation exposure and lifetime baseline risk (LBR) for all solid cancers, leukaemia and thyroid cancer based on first year exposure for male workers. The risk values are calculated for 20, 40 and 60 age-at-exposure

Scenario	Model	All solid cancers			
		First year dose (mSv)	LAR ($\times 10^{-2}$), 20y	LAR ($\times 10^{-2}$), 40y	LAR ($\times 10^{-2}$), 60y
1	WHO weighted	5	0.0859	0.0505	0.0231
	LSS ERR		0.0917	0.0605	0.0309
	LSS EAR		0.0802	0.0404	0.0152
2	WHO weighted	24.022	0.4128	0.2424	0.1108
	LSS ERR		0.4403	0.2905	0.1483
	LSS EAR		0.3853	0.1943	0.0733
3	WHO weighted	200	3.4370	2.0182	0.9221
	LSS ERR		3.6661	2.4189	1.2343
	LSS EAR		3.2076	1.6173	0.6099
4	WHO weighted	103.24	1.7742	1.0418	0.4760
	LSS ERR		1.8925	1.2486	0.6372
	LSS EAR		1.6558	1.8349	0.3148
LBR ($\times 10^{-2}$)			40.74	40.90	38.10

Leukaemia				Thyroid cancer			
First year dose (mSv)	LAR (x 10 ⁻²), 20y	LAR (x 10 ⁻²), 40y	LAR (x 10 ⁻²), 60y	First year dose (mSv)	LAR (x 10 ⁻²), 20y	LAR (x 10 ⁻²), 40y	LAR (x 10 ⁻²), 60y
5	0.0032	0.0024	0.0016	5	0.0015	0.0004	0.0001
	0.0031	0.0022	0.0015		0.0011	0.0004	0.0001
	0.0034	0.0027	0.0017		0.0020	0.0004	0.0001
24.03	0.0159	0.0120	0.0081	138	0.0416	0.0107	0.0022
	0.0151	0.0110	0.0076		0.0294	0.0102	0.0027
	0.0166	0.0130	0.0085		0.0541	0.0113	0.0018
200	0.1570	0.1189	0.0797	200	0.0603	0.0156	0.0032
	0.1512	0.1101	0.0756		0.0427	0.0148	0.0039
	0.1627	0.1277	0.0838		0.0784	0.0164	0.0026
104.26	0.0747	0.0566	0.0379	11802	3.5584	0.9184	0.1907
	0.0716	0.0521	0.0358		2.5176	0.8717	0.2298
	0.0779	0.0611	0.0401		4.6280	0.9700	0.1523
	0.57	0.52	0.44		0.21	0.19	0.14

Table 47. Cumulative attributable risk over 15 years after exposure (AR_{15}) due to radiation exposure and cumulative baseline risk over 15 years after exposure (BR_{15}) for all solid cancers, leukaemia and thyroid cancer based on first year exposure for male workers. The risk values are calculated for 20, 40 and 60 age-at-exposure

Scenario	Model	All solid cancers			
		First year dose (mSv)	LAR ($\times 10^{-2}$), 20y	LAR ($\times 10^{-2}$), 40y	LAR ($\times 10^{-2}$), 60y
1	WHO weighted	5	0.0033	0.0080	0.0126
	LSS ERR		0.0025	0.0082	0.0173
	LSS EAR		0.0041	0.0077	0.0080
2	WHO weighted	24.022	0.0160	0.0384	0.0607
	LSS ERR		0.0122	0.0396	0.0831
	LSS EAR		0.0199	0.0371	0.0384
3	WHO weighted	200	0.1335	0.3193	0.5055
	LSS ERR		0.1015	0.3298	0.6915
	LSS EAR		0.1655	0.3089	0.3194
4	WHO weighted	103.24	0.0689	0.1648	0.2609
	LSS ERR		0.0524	0.1703	0.3570
	LSS EAR		0.0854	0.1594	0.1649
BR_{15} ($\times 10^{-2}$)			0.36	3.71	21.03

Leukaemia				Thyroid cancer			
First year dose (mSv)	LAR (x 10 ⁻²), 20y	LAR (x 10 ⁻²), 40y	LAR (x 10 ⁻²), 60y	First year dose (mSv)	LAR (x 10 ⁻²), 20y	LAR (x 10 ⁻²), 40y	LAR (x 10 ⁻²), 60y
5	0.0011	0.0011	0.0011	5	0.0003	0.0001	0.0001
	0.0006	0.0005	0.0009		0.0002	0.0001	0.0001
	0.0017	0.0016	0.0014		0.0004	0.0001	0.0000
24.03	0.0056	0.0053	0.0056	138	0.0076	0.0036	0.0015
	0.0031	0.0026	0.0043		0.0055	0.0034	0.0018
	0.0081	0.0080	0.0070		0.0098	0.0038	0.0011
200	0.0552	0.0523	0.0556	200	0.0110	0.0052	0.0021
	0.0308	0.0265	0.0430		0.0080	0.0050	0.0026
	0.0797	0.0782	0.0683		0.0142	0.0055	0.0016
104.26	0.0264	0.0250	0.0265	11802	0.6505	0.3086	0.1245
	0.0146	0.0125	0.0204		0.4726	0.2946	0.1526
	0.0381	0.0374	0.0327		0.8371	0.3246	0.0968
	0.04	0.08	0.23		0.02	0.05	0.09

Annex L. Baseline cancer incidence data

Table 48. Comparison between the cumulative baseline incidence up-to 15 years after exposure and the lifetime baseline incidence (both expressed as %) for infants, children and young adults of both sexes

Cancer site	1 year infant				10 years child			
	up-to 15 years after exposure		up-to 89 years old		up-to 15 years after exposure		up-to 89 years old	
	male	female	male	female	male	female	male	female
Leukaemia	0.03	0.03	0.60	0.43	0.02	0.02	0.58	0.41
Thyroid	0.0014	0.0040	0.21	0.77	0.01	0.03	0.21	0.77
Breast	–	0.0003	–	5.53	–	0.01	–	5.54
All solid cancers	0.08	0.08	40.6	29.04	0.13	0.16	40.71	29.09

Note: These numbers are derived from 2004 cancer incidence data for Japan (104)

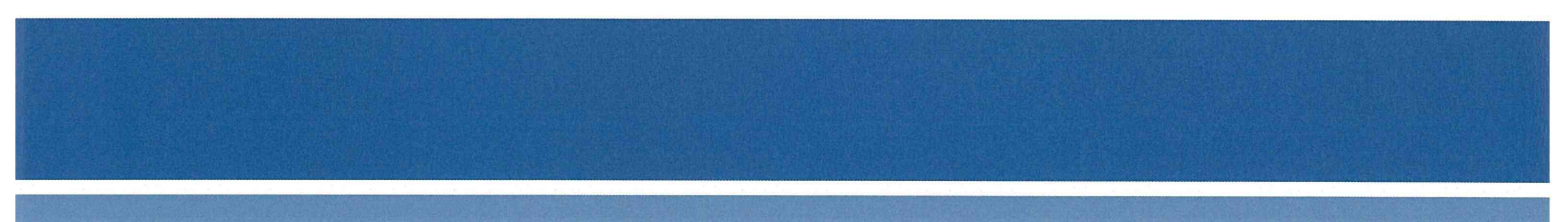
Table 49. Comparison between the cumulative baseline incidence up-to 15 years after the exposure and the lifetime baseline incidence (both expressed as %) for male adults of 20y, 40y and 60y

Cancer site	60 years old		40 years old	
	up-to 15 years after exposure	up-to 89 years old	up-to 15 years after exposure	up-to 89 years old
Leukaemia	0.23	0.44	0.08	0.52
Thyroid	0.09	0.14	0.05	0.19
All solid cancers	21.03	38.10	3.71	40.90

Note: These numbers are derived from 2004 cancer incidence data for Japan (104)

20 years adult			
up-to 15 years after exposure		up-to 89 years old	
male	female	male	female
0.04	0.02	0.57	0.40
0.02	0.07	0.21	0.76
–	0.19	–	5.55
0.36	0.67	40.74	29.0

20 years old	
up-to 15 years after exposure	up-to 89 years old
0.04	0.57
0.02	0.21
0.36	40.74



HEALTH RISK ASSESSMENT

The earthquake and tsunami in Japan on 11 March 2011 led to releases of radioactive material into the environment from the Fukushima Daiichi nuclear power plant. This health risk assessment is intended to give an indication of the potential public health implications of the accident to support the identification of needs and priorities for public health actions. This report, based on a preliminary dose estimation published by WHO in May 2012, represents the first international effort to assess the radiation health risks from this accident at the global level.



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