LSS Report 12 Noncancer Mortality Data

July 3, 2001

The following notes describe files that are being distributed by RERF in conjunction with the publication of Report 12 Part 2 on noncancer mortality in Life Span Study cohort of atomic bomb survivors. The paper by Shimizu et. al. [*Radiat Res* 152:374-389, 1999] presents the results of some of RERF's analyses of these data. The data which we are making available includes the detailed data file and some analysis script files that provide information on how these data can be used to reproduce the principal results.

The primary file being provided is:

r12nonca.dat	detailed person year table with data on the non-cancer causes considered in the analyses (DOS text file)

The data set is a detailed tabulation of person years, case counts, and summary data constructed from data on individual survivors. The cohort for analysis includes 86,572 survivors. This total includes 263 survivors with DS86 shielded kerma estimates greater than 4 Gy. The data sets are structured to make it easy to exclude survivors with total shielded kerma estimates above 4 Gy as was done for some of the Report 12 analyses.

Data on individual survivors were stratified on city, sex, age at exposure, attained age, calendar time, and dose to produce this data set. Dose categories are defined in terms of total weighted colon dose categories. These weighted doses are computed as the gamma dose plus ten times the neutron dose. The mean dose values included in this file are RERF survivor dose estimates of the expected "true" dose for cohort members allowing for the effects of random errors and the fact of selection for the LSS cohort. These values were computed from the standard DS86 dose estimates using the methods described by Pierce, Stram, and Vaeth . [*Radiat Res* 123:275-284, 1996]. For survivors whose DS86 total shielded kerma estimate exceeds 4 Gy, the dose components were rescaled so that the total shielded kerma equals 4 Gy with dose error adjustments applied to these truncated doses. Survivors who were beyond 3,000m from the hypocenter are classified into a separate "dose" category.

In addition to detailed documentation of the content of each of the data files, Epicure command script and log files for fitting some of the models that were used in the analyses for the published report are also available. These scripts also illustrate how the data can be read.

If these data are used as the basis for analyses in any publication including working papers or technical reports, a statement of acknowledgment must be included in the manuscript. This statement should read:

> This report makes use of data obtained from the Radiation Effects Research Foundation (RERF), Hiroshima and Nagasaki, Japan. RERF is a private, non-profit foundation funded by the Japanese Ministry of Health, Labour and Welfare and the U.S. Department of Energy the latter through the National Academy of Sciences. The conclusions in this report are those of the authors and do not necessarily reflect the scientific judgment of RERF or its funding agencies.

Please send a copy of any manuscripts which make use of these data to:

Archives Unit, Library and Archives Section
Information Technology Department
Radiation Effects Research Foundation
5-2 Hijiyama Koen
Minami-ku
Hiroshima 732-0815 JAPAN

Information on obtaining these data is also available from the RERF Internet home page (http://www.rerf.or.jp).

Format for the LSS Report 12 Noncancer Mortality Data Files

File Name	Records	Record Length	Variables	File Size (bytes)
r12nonca.dat	16,513	221	34	3.68 MB

File format: DOS text files and have been compressed using WinZip.

Creation date: February 23, 2001

The first seven variables index the cross-classification used to define the tables. The next variable indexes the dose-distance categories used in Table 1 of the paper. The next six variables (beginning with *person years* in the following table) are summary variables describing person years and numbers of people at risk, age, and time for each cell. The file includes both colon and marrow dose estimates. These are average survivor dose estimates computed with an adjustment for bias in risk estimates that arises as a result of random errors in individual dose estimates. The details of this adjustment are given in Pierce et al *Radiat Research* **123**(2) 275-84. The dose categories were defined in terms of unadjusted weighted colon dose (with a neutron weight of 10). The remaining variables are counts of the number of deaths for various causes of death.

	Variable	Description				Columns
1	City					1 - 3
		1 - Hiroshima 2 – Nagasaki				
2	Sex					4 - 6
		1 - Male 2 – Female				
3	Total shielded kerma over 4 Gy					7 - 9
		1 - Yes 0 – No				
4	Age at exposure category index					10 - 12
		1	0 - 4	9	40 - 44	
		2	5 - 9	10	45 - 49	
		3	10 - 15	11	50 - 54	
		4	15 - 19	12	55 - 59	
		5	20 - 24	13	60 - 64	
		6	25 - 29	14	65 - 69	
		7	30 - 34	15	70+	
		8	35 – 39			
5	Attained age category index					13 - 15
		1	5 – 9	11	55 - 59	
		2	10 - 15	12	60 - 64	
		3	15 - 19	13	65 - 69	
		4	20 - 24	14	70 - 74	
		5	25 - 30	15	75 - 79	
		6	35 - 39	16	80 - 84	
		7	35 - 39	17	85 - 89	
		8	40 - 44	18	90 - 94	
		9	45 - 49	19	95 - 99	
		10	50 - 54	20	100+	

	Variable	Description			Columns
6	RBE10 weighted colon dose category (Sv)				16 - 18
		1	0 (> 3000m)	8	0.5 - 0.75
		2	< 0.005 (< 3000m)	9	0.75 - 1
		3	0.0005- 0.02	10	1 - 1.5
		4	0.02 - 0.05	11	1.5 - 2
		5	0.05 - 0.1	12	2 - 3
		6	0.1 - 0.2	13	3 - 4
		7	0.2 - 05	14	4+
7	Dose-distance categories for Table 1				19 – 21
		1	0 (> 3000m)	5	0.2 - 0.5
		2	< 0.005 (< 3000m)	6	0.5 - 1
		3	0.005- 0.1	7	1 – 2
		4	0.1 - 0.2	8	2+
8	Time period index				22 – 24
		1	October 1, 1950 – December 31, 1953		
		2	January 1, 1954 – December 31, 1957		
		3	January 1, 1958 – December 31, 1960		
		4	January 1, 1961 – December 31, 1965		
		5	January 1, 1966 – December 31, 1970		
		6	January 1, 1971 – December 31, 1975		
		7	January 1, 1976 – December 31, 1980		
		8	January 1, 1981 – December 31, 1985		
		9	January 1, 1986 – December 31, 1990		
9	Person years				25 - 34
		Total person years at risk for the cell			
10	Subjects entering study (*subjects*)				35 – 39
		This variable counts the number of people who began follow-up in a given cell in the table. It is zero for all cells corresponding to time periods after the first one. Summing this value gives the actual number of people ever at risk. It can be used to compute person-weighted mean doses and ages.			
11	Attained age				40 – 49
		Person year weighted mean attained age for all people ever at risk in the cell.			
12	Age at exposure				50 – 59
		Person year weighted mean age at exposure for all people ever at risk in the cell.			
13	Years since exposure				60 – 69
		Person year weighted mean years since exposure for all people ever at risk in the cell.			
14	Year				70 – 79
		Person year weighted mean calendar year for all people ever at risk in the cell.			

	Variable	Description	Columns
15	Gamma colon dose (Sv)		80 – 91
		Person-year weighted mean gamma colon dose with allowance for dose errors and truncation of high doses	
16	Neutron colon dose (Sv)		92 – 103
		Person-year weighted mean neutron colon dose with allowance for dose errors and truncation of high doses	
17	Weighted colon dose (Sv)		104 – 115
		RBE 10 weighted mean colon dose, i.e. gamma + 10*neutron) with allowance for dose errors and truncation of high doses.	
18	Gamma marrow dose (Sv)		116 – 127
		Person-year weighted mean gamma colon dose with allowance for dose errors and truncation of high doses	
19	Neutron marrow dose (Sv)		128 – 139
		Person-year weighted mean neutron colon dose with allowance for dose errors and truncation of high doses	
20	Weighted marrow dose (Sv)		140 – 151
		RBE 10 weighted mean marrow dose, i.e. gamma + 10*neutron) with allowance for dose errors and truncation of high doses.	

The above variables are followed by a set of case count variables, that give the number of deaths due to specific causes in each cell of the table. The case count variables listed below are included in r12nonca.dat file.

	Cause of Death	ICD (9^{th} Rev)	Columns
21	All deaths	001 - 999	152 – 156
22	Disease total (including cancer)	001 - 799	157 – 161
23	Noncancer disease total	001 – 139, 240 - 799	162– 166
24	Stroke	430 – 438	167 – 171
25	Heart disease	390 – 429, 440 - 459	172 – 176
26	Digestive diseases	520 - 579	177 – 181
27	Respiratory diseases	460 – 519	182 – 186
28	Infectious diseases	001 - 139	187 – 191
29	Other diseases (except blood diseases)	240 – 279, 290 – 389, 580 - 799	192 – 196
30	Blood diseases	280 - 289	197 – 201
31	Benign tumors or tumors of unspecified nature	210 - 239	202 – 206
32	External causes except suicide	800 – 999	207 – 211
33	Suicide	950 - 959	212 – 216
34	Unknown cause	999	217 – 221

Supplementary files

The supplementary files in this package include several Epicure script and log files that may help you make use of these data.

File name	Type	Description
r12nonca.scr	epicure script	Commands to read r12nonca.dat into Epicure
r12ncmods.scr	epicure script	Commands to produce some of the results described in the LSS Report 12 non cancer report
r12nonca.log	epicure log file	Epicure log file for the r12ncmods.scr script

The models fit using these Epicure scripts include:

- the linear dose response models fit to the major groupings in Table 2 and Figure 1;
- the linear, linear-quadratic, and quadratic models fit to the post-1965 data to produce the coefficients given on page 379 of the paper;
- the selection effect model (described on page 383 of the paper) that was used to produce the expected numbers in Table 1

While this dataset is stratified on distance from the hypocenter (less than or greater than 3000m), most of the analyses described in the paper were carried out on a data set without this stratification. Because of the more detailed stratification used for the released data set there are some minor differences between the parameters estimates given in the paper and those obtained from analyses of these data.