
CHAPTER 66

Summarized Results, from Evidence Which Spans about a Half-Century

Box 1, and Collection of the Tables "A"

Box 1 of this chapter summarizes the findings from two different sets of analyses: The earliest set and the most recent set. For Cancer, the earliest analyses are for the 1940 MortRates, and the most recent are usually for MortRates of 1988 or 1990 (a few for 1980). For Ischemic Heart Disease, the earliest analyses are for the 1950 MortRates, and the most recent are for the 1993 MortRates. Appendix-M presents a directly comparable Box 1, which summarizes the results from an alternative method of making the Smoking Adjustment. The results in Appendix-M are very similar to results summarized in this chapter, except for Respiratory-System Cancers.

In this chapter, following Box 1, we reproduce the more detailed Tables A or AA, from Chapters 49 through 65 --- so that they may be easily compared with each other. Reminder: "Natl MR" means "National Mortality-Rate per 100,000 Population, Age-Adjusted to the 1940 Reference Year."

When all the findings are assembled here, it is clear that they strongly support Hypotheses 1+2. Even VERY much lower values for Fractional Causation, by medical radiation, also would have supported these hypotheses.

The Key Datum from the Year 1896

Hypothesis-1 embraces the entire Twentieth Century: Medical radiation is a highly important cause (probably the principal cause) of cancer-mortality in the United States during the Twentieth Century.

Although complete Cancer MortRates for each state and gender are not available before 1940, we have a datum from 1896 which is both highly reliable and highly informative with respect to Hypothesis-1. Namely, we know that Fractional Causation by medical radiation of the Cancer (and IHD) MortRates in 1896 was zero --- because 1896 was the very first year of any use of xrays.

Fractional Causation by medical radiation rises from ZERO percent in 1896

- to 90% of the male Observed All-Cancer MortRates in 1940,
- to 58% of the female Observed All-Cancer MortRates in 1940,
- to 75% of the female Observed All-Cancer-Except-Genital MortRate in 1940,
- to 79% of the male Observed IHD MortRate in 1950, and
- to 97% of the female Observed IHD MortRate in 1950. These mid-century percentages would almost certainly be even higher (especially for males), if we were able to adjust the 1940 cancer MortRates and the 1950 IHD MortRates to eliminate the effect of EXTRA smoking in the LowTrio and MidTrio Census Divisions, relative to the TopTrio (Chapter 49, Part 1c).

The Change in Fractional Causation after Mid-Century

After 1940, Column C of Box 1 shows that Fractional Causation of Cancer and IHD mortality, by medical radiation, declines moderately. In other words, medical radiation is a required co-actor in a somewhat lower fraction of the fatal cases at the end of the Twentieth Century than at mid-century. We suspect (but can not demonstrate) that the disparity in Fractional Causation by medical radiation, mid-century versus late-century, would have been even smaller if the population had not embraced cigarette-smoking with a vengeance.

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Box 1 of Chapter 66					
Final Summary for Fractional Causation, by Medical Radiation, of Cancer and Ischemic Heart Disease.					
<ul style="list-style-type: none"> • - The range of values below represents the earliest year and the most recent year named in Column A. The values come from the "A" or "AA" tables in Chapters 49 - 65. "Diff-Ca" = All-Cancers except Respiratory. • - Hypotheses 1+2 are strongly supported by all of the percentages in Column C. 					
Col.A: M = Male. F = Fem.	Col.B: Natl Age-Adjusted Mortality Rate	Col.C: Frac. Causation by Medical Radn	Col.D: R-squared	Col.E: X-Coefficient	Col.F: Ratio of XCoef/Std.Error
Ch49, 1940-88, All-Cancer: M	Big net rise. 115.0 --> 162.7	90% --> 74%	0.95 --> 0.93	0.76 --> 0.75	11.6 --> 10.1
Ch50, 1940-88, All-Cancer: F	Net decline. 126.1 --> 111.3	58% --> 50%	0.86 --> 0.87	0.53 --> 0.34	6.6 --> 6.9
Ch51, 1940-88, Resp'y Ca: M	Enormous rise. 11.0 --> 59.7	~100% --> 74%	0.87 --> 0.78	0.12 --> 0.27	6.8 --> 5.0
Ch52, 1940-88, Resp'y Ca: F	Enormous rise. 3.3 --> 24.5	97% --> 83%	0.96 --> 0.90	0.02 --> 0.13	13.4 --> 7.8
Ch53, 1940-88, Diff-Ca: M	Approx. flat. 104.0 --> 103.0	84% --> 72%	0.93 --> 0.92	0.64 --> 0.46	10.0 --> 8.7
Ch54, 1940-88, Diff-Ca: F	Big decline. 122.8 --> 86.8	57% --> 48%	0.85 --> 0.84	0.50 --> 0.25	6.3 --> 6.1
Ch55, 1940-90, Breast-Ca: F	Flat. 23.3 --> 23.1	~100% --> 83%	0.92 --> 0.89	0.19 --> 0.12	8.7 --> 6.7
Ch56, 1940-80, AllExcGen: F	Flat. 94.0 --> 94.8	75% --> 66%	0.87 --> 0.93	0.51 --> 0.43	6.8 --> 9.6
Ch57, 1940-88, Digest-Ca: M	Big decline. 60.4 --> 38.8	97% --> 82%	0.91 --> 0.87	0.43 --> 0.20	8.3 --> 7.0
Ch58, 1940-88, Digest-Ca: F	Big decline. 50.1 --> 23.5	80% --> 68%	0.76 --> 0.86	0.29 --> 0.10	4.6 --> 6.7
Ch59, 1940-80, Urinary-Ca: M	Approx. flat. 7.4 --> 8.2	~100% --> 83%	0.92 --> 0.61	0.08 --> 0.05	9.0 --> 3.3
Ch60, 1940-80, Urinary-Ca: F	Decline. 4.0 --> 3.0	86% --> 78%	0.94 --> 0.91	0.02 --> 0.02	10.4 --> 8.5
Ch61, 1940-90, Genital-Ca: M	Some rise. 15.2 --> 16.9	79% --> 47%	0.77 --> 0.79	0.09 --> 0.05	4.9 --> 5.2
Ch63, 1940-80, Buccal-Phar: M	Approx. flat. 5.1 --> 4.6	~100% --> 81%	0.72 --> 0.73	0.04 --> 0.03	4.3 --> 4.4
Ch64, 1950-93, IHD: M	Enormous fall. 256.4 --> 131.0	79% --> 63%	0.95 --> 0.73	1.49 --> 0.50	11.2 --> 4.3
Ch65, 1950-93, IHD: F	Enormous fall. 126.5 --> 64.7	97% --> 78%	0.87 --> 0.68	0.90 --> 0.30	6.8 --> 3.9

Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	115.0	90%	0.9508	0.7557	0.0650	11.6276	Chap.6
1950	132.8	84%	0.9330	0.8462	0.0857	9.8703	Tab 49-B
1960	145.7	83%	0.9407	0.9251	0.0878	10.5397	Tab 49-C
1970	155.1	79%	0.9415	0.9073	0.0855	10.6122	Tab 49-D
1980	164.5	75%	0.9386	0.8480	0.0820	10.3418	Tab 49-E
1988	162.7	74%	0.9348	0.7488	0.0748	10.1056	Tab 49-F

Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	126.1	58%	0.8608	0.5279	0.0802	6.5801	Chap.7
1950	123.2	53%	0.8644	0.4894	0.0733	6.6803	Tab 50-B
1960	114.9	54%	0.8689	0.4661	0.0684	6.8105	Tab 50-C
1970	111.7	52%	0.8799	0.4285	0.0598	7.1600	Tab 50-D
1980	108.5	52%	0.8839	0.3857	0.0528	7.3005	Tab 50-E
1988	111.3	50%	0.8703	0.3393	0.0495	6.8536	Tab 50-F

Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	11.0	~100%	0.8673	0.1169	0.0173	6.7640	Chap.16
1950	21.6	89%	0.7168	0.1403	0.0333	4.2087	Tab 51-BB
1960	35.2	86%	0.7917	0.2241	0.0435	5.1581	Tab 51-CC
1970	47.3	79%	0.7951	0.2677	0.0514	5.2118	Tab 51-DD
1980	59.4	71%	0.7948	0.2984	0.0573	5.2076	Tab 51-EE
1988	59.7	74%	0.7816	0.2652	0.0530	5.0050	Tab 51-FF

Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	3.3	97%	0.9625	0.0238	0.0018	13.4046	Chap.17
1950	4.6	76%	0.9420	0.0341	0.0032	10.6614	Tab 52-B
1960	5.3	85%	0.9521	0.0346	0.0029	11.7954	Tab 52-C
1970	11.7	83%	0.8987	0.0721	0.0091	7.8795	Tab 52-D
1980	18.0	81%	0.8624	0.1005	0.0152	6.6231	Tab 52-E
1988	24.5	83%	0.8975	0.1265	0.0162	7.8277	Tab 52-F

Table 53-A							
Difference-Cancers, Males: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	104.0	84%	0.9342	0.6388	0.0641	9.9695	Chap.18
1950	111.2	80%	0.9099	0.6722	0.0799	8.4103	Tab 53-B
1960	110.5	78%	0.9153	0.6603	0.0759	8.6991	Tab 53-C
1970	107.8	75%	0.9167	0.5975	0.0681	8.7784	Tab 53-D
1980	105.1	75%	0.9113	0.4858	0.0573	8.4805	Tab 53-E
1988	103.0	72%	0.9158	0.4622	0.0530	8.7250	Tab 53-F

Table 54-A							
Difference-Cancers, Females: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	122.8	57%	0.8528	0.5041	0.0792	6.3682	Chap.19
1950	118.6	53%	0.8601	0.4711	0.0718	6.5597	Tab 54-B
1960	109.6	52%	0.8528	0.4279	0.0672	6.3677	Tab 54-C
1970	100.1	53%	0.8499	0.3573	0.0567	6.2968	Tab 54-D
1980	90.5	51%	0.8561	0.3143	0.0487	6.4521	Tab 54-E
1988	86.8	48%	0.8437	0.2536	0.0413	6.1462	Tab 54-F

Table 55-A							
Breast-Cancers, Females: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	23.3	~100%	0.9153	0.1906	0.0219	8.6965	Chap.8
1950	22.5	93%	0.9098	0.1572	0.0187	8.4021	Tab 55-B
1960	22.9	90%	0.9043	0.1569	0.0193	8.1309	Tab 55-C
1970	23.1	87%	0.8875	0.1467	0.0197	7.4317	Tab 55-D
1980	22.6	85%	0.8717	0.1335	0.0194	6.8964	Tab 55-E
1990	23.1	83%	0.8924	0.1187	0.0156	7.6213	Tab 55-F

Table 56-A							
All-Cancers-Except-Genital, Females: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	94.0	75%	0.8675	0.5087	0.0751	6.7698	Chap.20
1950	96.0	69%	0.8946	0.5012	0.0650	7.7074	Tab 56-B
1960	92.5	68%	0.9084	0.4794	0.0575	8.3301	Tab 56-C
1970	93.7	67%	0.9201	0.4658	0.0519	8.9763	Tab 56-D
1980	94.8	66%	0.9290	0.4292	0.0448	9.5711	Tab 56-E
1988							None

Table 57-A Digestive-System Cancers, Males: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	60.4	97%	0.9078	0.4262	0.0513	8.3009	Chap.9
1950	55.4	93%	0.8591	0.3874	0.0593	6.5325	Tab 57-B
1960	49.7	92%	0.8673	0.3488	0.0516	6.7647	Tab 57-C
1970	45.7	89%	0.8709	0.2986	0.0434	6.8722	Tab 57-D
1980	41.7	86%	0.8718	0.2454	0.0356	6.9002	Tab 57-E
1988	38.8	82%	0.8745	0.1984	0.0284	6.9825	Tab 57-F

Table 58-A Digestive-System Cancers, Females: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	50.1	80%	0.7550	0.2895	0.0623	4.6442	Chap.10
1950	42.4	76%	0.7707	0.2431	0.0501	4.8506	Tab 58-B
1960	35.8	75%	0.7985	0.2048	0.0389	5.2675	Tab 58-C
1970	31.0	73%	0.8365	0.1668	0.0279	5.9850	Tab 58-D
1980	26.2	70%	0.8547	0.1271	0.0198	6.4177	Tab 58-E
1988	23.5	68%	0.8637	0.0999	0.0150	6.6597	Tab 58-F

Table 59-A Urinary-System Cancers, Males: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	7.4	~100	0.9208	0.0750	0.0083	9.0208	Chap.11
1950	8.1	93%	0.9329	0.0832	0.0084	9.8635	Tab 59-B
1960	8.5	86%	0.9170	0.0833	0.0095	8.7960	Tab 59-C
1970	8.35	84%	0.9220	0.0761	0.0084	9.0993	Tab 59-D
1980	8.2	79%	0.9275	0.0676	0.0071	9.4602	Tab 59-E
1950	8.1	99%	0.5967	0.0601	0.0187	3.2180	Tab 59-BB
1960	8.5	91%	0.5901	0.0585	0.0184	3.1746	Tab 59-CC
1970	8.35	86%	0.6018	0.0524	0.0161	3.2526	Tab 59-DD
1980	8.2	83%	0.6089	0.0458	0.0139	3.3016	Tab 59-EE

Table 60-A Urinary-System Cancers, Females: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	4.0	86%	0.9395	0.0247	0.0024	10.4305	Chap.12
1950	3.9	76%	0.9508	0.0223	0.0019	11.6295	Tab 60-B
1960	3.6	77%	0.9346	0.0211	0.0021	10.0025	Tab 60-C
1970	3.3	77%	0.9263	0.0189	0.0020	9.3816	Tab 60-D
1980	3.0	78%	0.9112	0.0161	0.0019	8.4777	Tab 60-E

Table 61-A Genital Cancers, Males: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	15.2	79%	0.7754	0.0932	0.0190	4.9160	Chap.13
1950	14.9	58%	0.7241	0.0676	0.0158	4.2865	Tab 61-B
1960	14.6	55%	0.7486	0.0628	0.0137	4.5658	Tab 61-C
1970	14.8	52%	0.7840	0.0585	0.0116	5.0402	Tab 61-D
1980	15.0	50%	0.8044	0.0517	0.0096	5.3656	Tab 61-E
1990	16.9	47%	0.7921	0.0498	0.0096	5.1650	Tab 61-F

We uncovered no dose-response between PhysPop and Female Genital Cancers.

Table 63-A Buccal-Pharynx Cancers, Males: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	5.1	~100%	0.7234	0.0382	0.0089	4.2782	Chap.15
1950	5.0	89%	0.7137	0.0377	0.0090	4.1778	Tab 63-B
1960	4.7	88%	0.7135	0.0389	0.0093	4.1754	Tab 63-C
1970	4.65	86%	0.7101	0.0356	0.0086	4.1405	Tab 63-D
1980	4.6	81%	0.7327	0.0315	0.0072	4.3806	Tab 63-E
1950	5.0	81%	0.6094	0.0303	0.0092	3.3048	Tab 63-BB
1960	4.7	88%	0.6129	0.0316	0.0095	3.3293	Tab 63-CC
1970	4.65	84%	0.6003	0.0286	0.0088	3.2425	Tab 63-DD
1980	4.6	81%	0.6177	0.0252	0.0075	3.3630	Tab 63-EE

Table 64-A Ischemic Heart Disease, Males: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	No data available						No data
1950	256.4	79%	0.9475	1.4852	0.1321	11.2446	Chap. 40
1960	306.5	74%	0.8733	1.7259	0.2485	6.9463	Tab 64-B
1970	259.7	72%	0.8344	1.3710	0.2309	5.9387	Tab 64-C
1980	212.8	70%	0.7714	1.0117	0.2081	4.8608	Tab 64-D
1993	131.0	63%	0.7279	0.4969	0.1148	4.3271	Tab 64-E

Table 65-A Ischemic Heart Disease, Females: Fractional Causation by Medical Radiation over Time							
Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	No data available						No data
1950	126.5	97%	0.8669	0.9041	0.1339	6.7531	Chap. 41
1960	152.5	89%	0.8084	1.0346	0.1904	5.4353	Tab 65-B
1970	124.9	86%	0.7980	0.8074	0.1535	5.2593	Tab 65-C
1980	97.2	83%	0.7620	0.5620	0.1187	4.7340	Tab 65-D
1993	64.7	78%	0.6816	0.3025	0.0782	3.8710	Tab 65-E