Digestive-System Cancers, Males, 1940-1988

● In Table 57-A, Column A shows that the National MortRate from Digestive-System Cancers in males fell appreciably in the 1940-1988 period. Box 1 shows that such MortRates fell much more in the TopTrio than in the LowTrio. These facts mean that a carcinogenic co-actor which can contribute to male MortRates, from Digestive Cancers, is operating more strongly in the LowTrio than in the TopTrio (Chapter 48, Part 5b). We must match the Census Divisions for this co-actor, whatever its identity. We believe that its identity is smoking.

● Of course, matching the Census Divisions for smoking does not "abolish" the steady decline in male MortRates from Digestive-System Cancers in Tables 57-B through 57-F. (Nor did the smoking adjustment "abolish" the simultaneous INCREASE in male MortRates from Respiratory-System Cancers, in Tables 51-B through 51-FF). The steady net decline in Digestive-System Cancers, for both males and females, almost certainly reflects gradual reduction of one or more carcinogenic co-actors for Digestive-System Cancers --- possibly nitrates in the diet, and/or Helicobacter pylori infections in the stomach (Munoz 1994 + WHO 1996, p.59).

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

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                                   Box 1, Chap. 57
           Digestive-System Cancers, Males:  Post-1940 Change in MortRates by Census Trios

1960 vs. 1940, by Trios:  Col.D expresses change by ratios.  Col.F expresses change by subtraction.
1988 vs. 1940, by Trios:  Col.I expresses change by ratios.  Col.K expresses change by subtraction.
MRs change inversely with PP.  High-PP Trio has lowest growth-factor.  Low-PP Trio has highest growth-factor.
```

	Col.A 1940 MortRate Tab 9-A		Col.B 1960 MortRate Tab 9-A	Col.C Ratio Col.B /Col.A	Col.D Input from Col.C	Col.E Diff: Col.B minus A	Col.F Input from Col.E		Col.G 1988 MortRate Tab 9-A	Col.H Ratio Col.G /Col.A	Col.I Input from Col.H	Col.J Diff: Col.G minus A	Col.K Input from Col.J
Pacif	63.4		46.4	0.732	Avg Chg	-17.0	Avg Chg		36.3	0.573	Avg Chg	-27.1	Avg Chg
NewE	71.7		58.9	0.821	TopTrio	-12.8	TopTrio		42.1	0.587	TopTrio	-29.6	TopTrio
MidAtl	74.7		60.1	0.805	0.786	-14.6	-14.8		43.3	0.580	0.580	-31.4	-29.4
WNoCen	59.9		46.3	0.773	Avg Chg	-13.6	Avg Chg		35.8	0.598	Avg Chg	-24.1	Avg Chg
ENoCen	64.9		53.0	0.817	MidTrio	-11.9	MidTrio		40.2	0.619	MidTrio	-24.7	MidTrio
Mtn	52.1		38.9	0.747	0.779	-13.2	-12.9		33.0	0.633	0.617	-19.1	-22.6
WSoCen	42.3		40.6	0.960	Avg Chg	-1.7	Avg Chg		36.5	0.863	Avg Chg	-5.8	Avg Chg
ESoCen	38.2		39.4	1.031	LowTrio	1.2	LowTrio		38.0	0.995	LowTrio	-0.2	LowTrio
SoAtl	43.4		43.1	0.993	0.995	-0.3	-0.3		38.5	0.887	0.915	-4.9	-3.6

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                                      Box 2, Chap. 57
                   Digestive-System Cancers, Males:  Calculation of Adjustment Factor

                        This adjustment is discussed fully in Chapter 49.
        ● Part 1:  Calculate average population-weighted MortRate for the combined TopTrio Census Divs.
```

Census Div.	Col.A 1940 MR Tab 9-A	Col.B 1940 Pop'n Tab 3-B	Col.C 1940 Popn /45,710,039	Col.D Col.A * Col.C		Census Div.	Col.A 1950 MR Tab 9-A	Col.B 1950 Pop'n Tab 3-B	Col.C 1950 Popn /53,964,513	Col.D Col.A * Col.C
Pacific	63.4	9,733,262	0.2129	13.50		Pacific	50.8	14,486,527	0.2684	13.64
NewEng	71.7	8,437,290	0.1846	13.23		NewEng	66.3	9,314,453	0.1726	11.44
Mid-Atl	74.7	27,539,487	0.6025	45.01		Mid-Atl	67.7	30,163,533	0.5590	37.84
1940		Sum TopTrio 45,710,039	Sum 1.0000	TopTrio 71.740		1950		Sum TopTrio 53,964,513	Sum 1.0000	TopTrio 62.922

Census Div.	Col.A 1960 MR Tab 9-A	Col.B 1960 Pop'n Tab 3-B	Col.C 1960 Popn /65,875,863	Col.D Col.A * Col.C		Census Div.	Col.A 1970 MR Tab 9-A	Col.B 1970 Pop'n Tab 3-B	Col.C 1970 Popn /75,017,000	Col.D Col.A * Col.C
Pacific	46.4	21,198,044	0.3218	14.93		Pacific	42.9	26,087,000	0.3477	14.92
NewEng	58.9	10,509,367	0.1595	9.40		NewEng	52.5	11,781,000	0.1570	8.24
Mid-Atl	60.1	34,168,452	0.5187	31.17		Mid-Atl	54.2	37,149,000	0.4952	26.84
1960		Sum TopTrio 65,875,863	Sum 1.0000	TopTrio 55.500		1970		Sum TopTrio 75,017,000	Sum 1.0000	TopTrio 50.003

Census Div.	Col.A 1980 MR Tab 9-A	Col.B 1980 Pop'n Tab 3-B	Col.C 1980 Popn /80,615,000	Col.D Col.A * Col.C		Census Div.	Col.A 1988 MR Tab 9-A	Col.B 1990 Pop'n Tab 3-B	Col.C 1990 Popn /88,495,000	Col.D Col.A * Col.C
Pacific	39.3	31,523,000	0.3910	15.37		Pacific	36.3	37,837,000	0.4276	15.52
NewEng	46.0	12,322,000	0.1528	7.03		NewEng	42.1	12,998,000	0.1469	6.18
Mid-Atl	48.3	36,770,000	0.4561	22.03		Mid-Atl	43.3	37,660,000	0.4256	18.43
1980		Sum TopTrio 80,615,000	Sum 1.0000	TopTrio 44.429		1988		Sum TopTrio 88,495,000	Sum 1.0000	TopTrio 40.131

```
        ● Part 2:  Take ratios of these TopTrio MortRates, with 1940 as the denominator of each ratio.
          Col.D modifies Col.C by separate PhysPop adjustments for MidTrio and LowTrio Census Divisions.
```

	Col.A TopTrio Mean MR	Col.B 1940 TopTrio Mean MR	Col.C = Col.A / Col.B	Col.D ppAdju Tab 47-B	Col.E = Col.C * Col.D	DIGESTIVE-SYSTEM CANCERS. Males.
				MidTrio		
1950	62.922	71.740	0.877	0.99	0.87	= MidTrio Adjustment Factor, 1950
1960	55.500	71.740	0.774	0.97	0.75	= MidTrio Adjustment Factor, 1960
1970	50.003	71.740	0.697	0.95	0.66	= MidTrio Adjustment Factor, 1970
1980	44.429	71.740	0.619	0.94	0.58	= MidTrio Adjustment Factor, 1980
1988	40.131	71.740	0.559	0.94	0.53	= MidTrio Adjustment Factor, 1988
				LowTrio		
1950	62.922	71.740	0.877	1.00	0.88	= LowTrio Adjustment Factor, 1950
1960	55.500	71.740	0.774	1.01	0.78	= LowTrio Adjustment Factor, 1960
1970	50.003	71.740	0.697	1.02	0.71	= LowTrio Adjustment Factor, 1970
1980	44.429	71.740	0.619	1.04	0.64	= LowTrio Adjustment Factor, 1980
1988	40.131	71.740	0.559	1.07	0.60	= LowTrio Adjustment Factor, 1988

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                                      Table 57-B
                 Digestive-System Cancers, Males:  Fractional Causation in 1950
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Part 1.
Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).
The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

Trio-Sequence	Col.A 1950 PopFrac Tab 3-B	Col.B 1950 Obs MR Tab 9-A	Col.C A * B		Col.D 1940 MR Mid,Low Tab 9-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1950 Adju MortRates	Col.G A * F
Pacific	0.0961	50.8	4.882				50.8	4.882
New England	0.0618	66.3	4.097				66.3	4.097
Mid-Atlantic	0.2002	67.7	13.554				67.7	13.554
WestNoCentral	0.0933	51.9	4.842		59.9	0.87	52.11	4.862
EastNoCentral	0.2017	60.0	12.102		64.9	0.87	56.46	11.389
Mountain	0.0337	43.7	1.473		52.1	0.87	45.33	1.528
WestSoCentral	0.0965	42.9	4.140		42.3	0.88	37.22	3.592
EastSoCentral	0.0762	41.3	3.147		38.2	0.88	33.62	2.562
SouthAtlantic	0.1406	45.2	6.355		43.4	0.88	38.19	5.370

```
                                          Sum =   54.6                              Sum =
          1950 Observed MR from Table 9-B         55.4      1950 Natl Adjusted MR =        51.8345
```

Part 2. --

Trio-Seq.	Col.A Mean1940 thru1950 PPs from Tab 47-A x'	Col.B 1950 Adju MRs from Col.F Part 1 y	Col.C Digestive Sys. Cancers, Males: 1950 Adjusted MortRates regressed on Mean 1940 thru 1950 PPs		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Digestive Cancers, Males: 1950 Adjusted MortRates regressed on 1940 PhysPops
Pac	154.16	50.8	Regression Output:		159.72	Regression Output:
NewEng	162.03	66.3	Constant 0.5831		161.55	Constant 0.8384
MidAtl	169.24	67.7	Std Err of Y Est 4.9522		169.76	Std Err of Y Est 5.2586
WNoCen	121.60	52.11	R Squared 0.8591		169.76	R Squared 0.8411
ENoCen	128.53	56.46	No. of Observation 9		123.14	No. of Observation 9
Mtn	119.64	45.33	Degrees of Freedom 7		133.36	Degrees of Freedom 7
WSoCen	102.64	37.22			119.89	
ESoCen	84.44	33.62	X Coefficient(s) 0.3874		103.94	X Coefficient(s) 0.3802
SoAtl	99.91	38.19	Std Err of Coef. 0.0593		85.83	Std Err of Coef. 0.0625
			XCoef / S.E. = 6.5325		100.74	XCoef / S.E. 6.0872

Part 3-A.
Calculation of Fractional Causation
from Averaged PhysPops

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.C) =   0.5831

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.G = 51.8345)
    minus Nonradiation rate (0.5831) =   51.2513

3. 1950 Fractional Causation is radiation
    rate (51.2513) divided by OBSERVED
    Natl MR Part 1,Col.C=   55.4   =   0.93

Part 3-B.
Calculation of Fractional Causation
from 1940 PhysPops

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.E) =   0.8384

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.G = 51.8345)
    minus Nonradiation rate (0.8384) =   50.9961

3. 1950 Fractional Causation is radiation
    rate (50.9961) divided by OBSERVED
    Natl MR Part 1, Col.C=   55.4   =   0.92

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                                        Table 57-C
                    Digestive-System Cancers, Males:  Fractional Causation in 1960
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Part 1.
Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).
The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

	Col.A 1960 PopFrac Tab 3-B	Col.B 1960 Obs MR Tab 9-A	Col.C A * B		Col.D 1940 MR Mid,Low Tab 9-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1960 Adju MortRates	Col.G A * F
Trio-Sequence								
Pacific	0.1182	46.4	5.484				46.4	5.484
New England	0.0586	58.9	3.452				58.9	3.452
Mid-Atlantic	0.1905	60.1	11.449				60.1	11.449
WestNoCentral	0.0858	46.3	3.973		59.9	0.75	44.93	3.855
EastNoCentral	0.2020	53.0	10.706		64.9	0.75	48.68	9.832
Mountain	0.0382	38.9	1.486		52.1	0.75	39.08	1.493
WestSoCentral	0.0945	40.6	3.837		42.3	0.78	32.99	3.118
EastSoCentral	0.0672	39.4	2.648		38.2	0.78	29.80	2.002
SouthAtlantic	0.1448	43.1	6.241		43.4	0.78	33.85	4.902
		Sum =	49.3				Sum =	
1960 Observed MR from Table 9-B			49.7		1960 Natl Adjusted MR =		45.5866	

Part 2.

	Col.A Mean1940 thru1960 PPs from Tab 47-A x'	Col.B 1960 Adju MRs from Col.F Part 1 y	Col.C Digestive Sys. Cancers, Males: 1960 Adjusted MortRates regressed on Mean 1940 thru 1960 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Digestive Cancers, Males: 1960 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Trio-Seq.							
Pac	155.69	46.4	Constant	-0.1152	159.72	Constant	-0.6028
NewEng	162.81	58.9	Std Err of Y Est	4.2648	161.55	Std Err of Y Est	4.0169
MidAtl	167.04	60.1	R Squared	0.8673	169.76	R Squared	0.8823
WNoCen	118.15	44.93	No. of Observation	9	123.14	No. of Observation	9
ENoCen	123.87	48.68	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	117.40	39.08			119.89		
WSoCen	102.31	32.99	X Coefficient(s)	0.3488	103.94	X Coefficient(s)	0.3456
ESoCen	85.63	29.80	Std Err of Coef.	0.0516	85.83	Std Err of Coef.	0.0477
SoAtl	101.72	33.85	XCoef / S.E. =	6.7647	100.74	XCoef / S.E.	7.2439

Part 3-A.
Calculation of Fractional Causation
from Averaged PhysPops

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.C) = NEGATIVE   0.0

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.G = 45.5866)
   minus Nonradiation rate (0.0) =   45.5866

3. 1960 Fractional Causation is radiation
   rate (45.5866) divided by OBSERVED
   Natl MR Part 1,Col.C=   49.7   =   0.92

Part 3-B.
Calculation of Fractional Causation
from 1940 PhysPops Negative

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.E) = NEGATIVE   0.0

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.G = 45.5866)
   minus Nonradiation rate (0.0) =   45.5866

3. 1960 Fractional Causation is radiation
   rate (45.5866) divided by OBSERVED
   Natl MR Part 1, Col.C=   49.7   =   0.92

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                                           Table 57-E
                     Digestive-System Cancers, Males:  Fractional Causation in 1980
=======================================================================================================
Part 1.
Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).
The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.
```

	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 9-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 9-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1980 Adju MortRates	Col.G A * F
Trio-Sequence							
Pacific	0.1398	39.3	5.494			39.3	5.494
New England	0.0546	46.0	2.512			46.0	2.512
Mid-Atlantic	0.1630	48.3	7.873			48.3	7.873
WestNoCentral	0.0759	38.5	2.922	59.9	0.58	34.74	2.637
EastNoCentral	0.1846	43.7	8.067	64.9	0.58	37.64	6.949
Mountain	0.0502	33.7	1.692	52.1	0.58	30.22	1.517
WestSoCentral	0.1049	37.0	3.881	42.3	0.64	27.07	2.840
EastSoCentral	0.0646	38.4	2.481	38.2	0.64	24.45	1.579
SouthAtlantic	0.1624	40.1	6.512	43.4	0.64	27.78	4.511

```
                                           Sum =   41.4                              Sum =
             1980 Observed MR from Table 9-B       41.7        1980 Natl Adjusted MR = 35.9112
```

```
Part 2.  ---------------------------------------------------------------------------------------------
```

	Col.A Mean1940 thru1980 PPs from Tab 47-A x'	Col.B 1980 Adju MRs from Col.F Part 1 y	Col.C Digestive Sys. Cancers, Males: 1980 Adjusted MortRates regressed on Mean 1940 thru 1980 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Digestive Cancers, Males: 1980 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Trio-Seq.							
Pac	177.35	39.3	Constant	0.0426	159.72	Constant	-0.2819
NewEng	185.86	46.0	Std Err of Y Est	3.2382	161.55	Std Err of Y Est	2.3234
MidAtl	186.11	48.3	R Squared	0.8718	169.76	R Squared	0.9340
WNoCen	128.82	34.74	No. of Observation	9	123.14	No. of Observation	9
ENoCen	133.71	37.64	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	133.45	30.22			119.89		
WSoCen	114.66	27.07	X Coefficient(s)	0.2454	103.94	X Coefficient(s)	0.2747
ESoCen	99.46	24.45	Std Err of Coef.	0.0356	85.83	Std Err of Coef.	0.0276
SoAtl	124.62	27.78	XCoef / S.E. =	6.9002	100.74	XCoef / S.E.	9.9539

```
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Part 3-A.                                          |    Part 3-B.
Calculation of Fractional Causation                |    Calculation of Fractional Causation
from Averaged PhysPops                              |    from 1940 PhysPops Negative
                                                   |
1.  Nonradiation rate is Adjusted                  |    1.  Nonradiation rate is Adjusted
      Constant (Part 2, Col.C) =        0.0426     |          Constant (Part 2, Col.E) = Neg.       0.0
                                                   |
2.  Radiation rate is Natl Adjusted                |    2.  Radiation rate is Natl Adjusted
      MortRate (Part 1, Col.G = 35.9112)           |          MortRate (Part 1, Col.G = 35.9112)
      minus Nonradiation rate (0.0426) =  35.8687  |          minus Nonradiation rate (0.0) =      35.9112
                                                   |
3.  1980 Fractional Causation is radiation         |    3.  1980 Fractional Causation is radiation
      rate (35.8687) divided by OBSERVED           |          rate (35.9112) divided by OBSERVED
      Natl MR Part 1,Col.C=   41.7     =   0.86    |          Natl MR Part 1, Col.C=   41.7    =    0.86
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                                        Table 57-F
                    Digestive-System Cancers, Males:  Fractional Causation in 1988
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```

Part 1.
Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).
The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

Trio-Sequence	Col.A 1990 PopFrac Tab 3-B	Col.B 1988 Obs MR Tab 9-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 9-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1988 Adju MortRates	Col.G A * F
Pacific	0.1535	36.3	5.572			36.3	5.572
New England	0.0527	42.1	2.219			42.1	2.219
Mid-Atlantic	0.1527	43.3	6.612			43.3	6.612
WestNoCentral	0.0721	35.8	2.581	59.9	0.53	31.75	2.289
EastNoCentral	0.1713	40.2	6.886	64.9	0.53	34.40	5.892
Mountain	0.0543	33.0	1.792	52.1	0.53	27.61	1.499
WestSoCentral	0.1087	36.5	3.968	42.3	0.60	25.38	2.759
EastSoCentral	0.0621	38.0	2.360	38.2	0.60	22.92	1.423
SouthAtlantic	0.1725	38.5	6.641	43.4	0.60	26.04	4.492

```
                                        Sum =   38.6                           Sum =
              1988 Observed MR from Table 9-B   38.8        1988 Natl Adjusted MR =   32.7572
```

Part 2.

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 Adju MRs from Col.F y	Col.C Digestive Sys. Cancers, Males: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Digestive Cancers, Males: 1988 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	36.3	Constant	0.8879	159.72	Constant	1.3466
NewEng	208.20	42.1	Std Err of Y Est	2.7922	161.55	Std Err of Y Est	1.9620
MidAtl	204.72	43.3	R Squared	0.8745	169.76	R Squared	0.9380
WNoCen	141.14	31.75	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	34.40	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	27.61			119.89		
WSoCen	126.28	25.38	X Coefficient(s)	0.1984	103.94	X Coefficient(s)	0.2398
ESoCen	113.28	22.92	Std Err of Coef.	0.0284	85.83	Std Err of Coef.	0.0233
SoAtl	142.93	26.04	XCoef / S.E. =	6.9825	100.74	XCoef / S.E.	10.2915

Part 3-A.
Calculation of Fractional Causation
from Averaged PhysPops

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.C) =   0.8879

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.G = 32.7572)
   minus Nonradiation rate (0.8879) =   31.8694

3. 1988 Fractional Causation is radiation
   rate (31.8694) divided by OBSERVED
   Natl MR Part 1,Col.C=   38.8   =   0.82

Part 3-B.
Calculation of Fractional Causation
from 1940 PhysPops

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.E) =   1.3466

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.G = 32.7572)
   minus Nonradiation rate (1.3466) =   31.4106

3. 1988 Fractional Causation is radiation
   rate (31.4106) divided by OBSERVED
   Natl MR Part 1, Col.C=   38.8   =   0.81