IS CANCER MORTALITY INCREASING?

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To determine whether or not there is a real increase in cancer mortality we must compare cancer death rates for the same ages, since cancer is an old age disease. The effect of age distribution is so great that it is safe to say that any considerable increase in the proportion of the population at the older ages, for instance, the emigration of the young men and women, would cause a noticeable increase in the cancer deaths per 100,000 population, while an influx of young men and women would decrease them.

Dr. Frederick L. Hoffman, statistician of the Prudential Life Insurance Company, in a paper on "The Menace of Cancer" published in 1913, and in his comprehensive book on "The Mortality from Cancer" published in 1915, has given the statistics available at the time of writing in a very complete form. These statistics were drawn both from the United States and abroad. From these I have selected a few.

In the registration of 1900, the cancer death rate per 100,000 population, which will hereafter be spoken of as the cancer death rate or cancer mortality, increased from 63 in 1900 to 79 in 1913, an increase of over 25 per cent. England and Wales for the same period showed an increase from 83 to 105 and most other European states showed a very considerable increase. Going back forty years, the rate in twenty large American cities was 49 for the period 1881–1885; for 1913 it had increased to 89. In twelve European countries the rate was 69 for the period 1896–1900; for the period 1906–1910, it had increased to 81. These were general population statistics without subdivision by ages. There were also available, however, some extensive statistics subdivided by ages. The cancer death rate in the registration states of the United States of 1900 subdivided into ten-year age groups, 25–34,

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35–44, etc., for 1901 compared with 1911 shows an increase in the rate for each age group for the later year, such increase being very considerable for ages above 45, which are the significant ages in cancer. Massachusetts, for the two periods 1901–1905 and 1906–1910, with a different distribution into age groups and subdivided by sexes, showed an increase for each adult group and for each sex separately, in the later period the increase again being very considerable for the older groups. While these are but a few of the statistics, they are illustrative of the trend of practically all, and, standing alone, would appear to indicate a great and rapid increase in cancer mortality. We have, however, later and very extensive statistics from two of the great insurance companies which are not in accord with the above.

In 1919, Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company, published in this JOURNAL (1) the experience of that company on its millions of industrial policy holders for the years 1911–1916. Tables 1 and 2 are from this experience. They show fluctuations but no definite trend.

Table 1 is for the age group 55–64 only, which group Dr. Dublin chose as illustrative. We find in it the lowest mortality for white males in 1912 and 1915, the highest in 1913 and 1914; for white females the lowest in 1911 and 1914, the highest in 1912 and 1915. It is a curious accident that the years of low mortality for the one sex are in three cases the high for the other.

Table 2 compares the first two years of the period with the last two and in total shows but one per cent difference between them, a difference smaller than would be expected from merely accidental fluctuations. The two features which may be of significance are that the total of males shows an increase of 5 per cent and that the differences in each age group, as well as in the total of all ages (except perhaps 65–69), are no more than would be expected from accidental fluctuations.

The cancer experience for the Mutual Life Insurance Company for the years 1915–1920 has just been complied by Dr. Brandreth Symonds, chief medical director. This experience, given in table 3 below, is not subdivided by sexes, but as the great preponderance of insurance was on white male lives it may be taken as representing white male cancer mortality.

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TABLE 1

Metropolitan Life Industrial Department. Cancer death rate per 100,000, ages 55 to 64

YEAR	ALL CLASSES	WHITE		COLORED	
		Males	Females	Males	Females
1916	386.4	358.0	427.4	218.3	339.9
1915	380.8	336.0	427.8	175.7	394.3
1914	390.9	385.0	423.3	167.7	351.7
1913	384.1	370.3	414.6	195.2	368.3
1912	381.9	334.1	443.2	176.4	325.4
1911	368.7	353.3	400.2	158.0	373.7

TABLE 2

Metropolitan Life Industrial Department. Ratio of cancer death rate for years 1915–1916 to death rate for years 1911–1912 by percentages

AGE PERIOD	ALL CLASSES	WHITE		COLORED	
		Males	Females	Males	Females
	per cent	*per cent*	*per cent*	*per cent*	*per cent*
25 and over	101.0	105.2	98.3	105.1	160.7
25 to 34	98.0	121.0	94.1	95.5	95.0
35 to 44	100.1	104.3	96.9	142.6	98.2
45 to 54	99.1	109.7	97.0	67.7	93.1
55 to 64	102.2	101.1	101.2	118.0	105.2
65 to 74	107.0	115.9	101.9	117.2	107.0
75 and over	101.0	104.1	104.4	110.7	48.6

TABLE 3

Mutual Life Insurance Company. Cancer death rate per 100,000

AGE PERIOD	1915	1916	1917	1918	1919	1920	ALL YEARS 1915–1920
25–29	15.34	3.98	0.90	7.53	1.47	5.08	5.35
30–34	11.52	15.19	19.55	10.54	5.52	5.49	10.55
35–39	7.61	12.95	13.38	10.99	5.74	18.69	11.87
40–44	31.39	45.31	30.86	26.92	33.73	21.21	31.07
45–49	40.36	41.82	51.59	60.96	51.56	78.80	55.15
50–54	165.47	157.35	100.67	79.25	73.45	70.02	105.78
55–59	132.22	213.84	204.03	153.07	152.73	159.95	168.88
60–64	235.74	366.73	255.24	308.53	285.56	272.73	287.21
65–69	225.77	380.94	532.84	357.91	502.42	423.88	407.99
70 and over	554.09	1000.67	834.83	856.57	731.75	982.20	829.54

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If the first two years, 1915–1916, combined are compared with the last two, 1919–1920, we find that up to age 65 the cancer mortality ran in general considerably lower for the later than for the earlier period, while for ages 65 and older the reverse was true. Of the nine five-year groups (including "70 and over" as such a group), beginning with age 30–34, five show a higher mortality in the earlier two-year period and four in the later. Had the subdivision into age groups been the ten-year groups of the Metropolitan, beginning with 25–34, every group up to age 65 would evidently have shown a higher mortality in the earlier period.

The year 1915, for some unexplained reason, was a year of very low cancer mortality in the Mutual, a peculiarity which did not appear in the Metropolitan experience and which was, therefore, probably accidental. It is consequently worth while to see what would have been the result had 1915 been eliminated so that we should have compared the years 1916–1917 with 1919–1920. We find that of the nine five-year groups, seven would have shown a higher mortality for the earlier period and only two for the later; moreover, had the grouping been by ten-year groups, as in the Metropolitan experience, each ten-year group from age 25 up would evidently have shown a higher mortality in the earlier period than in the later.

Again, a comparison of the last two years combined with the preceding four years combined, shows that of the nine groups five had a higher mortality in the earlier period; we must recognize, however, that two of the four were 65–69 and "70 and over" which are of greater importance than groups near the lower age limit. Had the exceptional year 1915 been eliminated, however, the result would have again looked extremely favorable for the later period.

In order to have the most recent possible data, the approximate cancer mortality for the year 1921 has been worked out, although exact figures are not yet available. The 1921 results compared with the average for the preceding six years show a lower mortality for each of the seven five-year age groups from 30–34 to 60–64, but a higher mortality for 65–69 and "70 and over."

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Emphasis is given to the failure of the Mutual experience to show any tendency to an increasing death rate by the fact that the lives involved were nearly all white males, and in other experiences where the sexes are separated any tendency towards increase has generally been more among males than females.

The Metropolitan experience has been extended from 1915 through 1920 but has not yet been made public. Through the courtesy of Dr. Dublin I have had an opportunity to see these statistics and to include in this paper the deductions from them. They show in general the same lack of any tendency to increase in the age groups from age 30 to age 65, but they show an increasing tendency from age 65 upwards.

Thus, we have had the experience of the two companies covering the eleven-year period from 1911 to 1921, inclusive. The data in these experiences should probably be at least as accurate as to the causes of death as those of any other experience, because the insurance companies try to obtain accurate knowledge of the cause of death at the time the claim is paid. The figures indicate, taken at their face value without considering whether there are any modifying influences, for ages below 65 either a fluctuating or a slightly decreasing cancer mortality; for ages 65 and over they vary, but probably, on the whole, indicate some increase.

The above are the direct deductions from the statistics. Before accepting these as final results, however, we must go back of the statistics and inquire whether there are any circumstances or considerations relating to the data on which these statistics are based tending to modify the results. One such consideration should be mentioned. With the development of medical science there has been a gradual increase in correctness of diagnosis of the cause of death. Professor Walter F. Willcox (2) showed in 1917 that a very considerable apparent increase in cancer mortality would result simply from the continued improvement in the correctness of diagnosis, which increase in correctness had probably continued up to the present day. Undoubtedly in the past many deaths attributed to old age should properly have been set down as cancer, and many others attributed to other causes would undoubtedly have been attributed to cancer if the correct diagnosis had been made. The result of this would be

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that if there were a really stationary cancer mortality it would, nevertheless, appear to be increasing considerably because of the increasing correctness of diagnosis.

How effective this could be to cause an apparent increase where no real one exists may be seen in the statistics of appendicitis mortality which show an increase of 40 per cent from 1900 to 1915; yet undoubtedly the real rate was decreasing in this period because of surgical advance and readiness to resort to surgery.

Moreover, increasing correctness in diagnosis works almost altogether in one way; that is, it results in attributing to cancer many deaths which would formerly have been incorrectly attributed to some other cause, and in changing but few the other way. The effect of increased correctness in diagnosis, which is undoubtedly more important at the advanced ages, would seem to me enough to explain what apparent increase in cancer mortality there is in ages above 65, and it would emphasize the fact that for ages below 65 there has not been even an apparent increase.

Meanwhile the statistics of the United States Registration Area show a continuous increase in cancer deaths. These are population statistics, however, and are not analyzed as to ages; hence, as compared to such statistics as we have considered, they have very little meaning, since a change in the age proportion of the population might be responsible for the entire apparent cancer increase.

My conclusion would be, even taking into account the registration area's apparent increase, that we cannot now determine whether the cancer mortality is slightly increasing, practically stationary, or slightly decreasing, but that we can be sure it is not greatly increasing. A more exact result is something for future investigations when reliable statistics for a long period of years are obtainable.

Lest what I have said be misinterpreted I would add that such a conclusion does not lessen at all the seriousness of the cancer problem. It merely holds out hope that the terrible scourge will not increase without limit.

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