

The Fifty-Year Decline of Cancer in America

By Brad Rodu and Philip Cole

Purpose: From 1950 to 1990, the overall cancer mortality rate increased steadily in the United States, a trend which ran counter to declining mortality from other major diseases. The purpose of this study was to assess the impact of lung cancer on all-cancer mortality over the past 50 years.

Methods: Data from the National Centers for Health Statistics were used to develop mortality rates for all forms of cancer combined, lung cancer, and other-cancer (all-cancer minus lung cancer) from 1950 to 1998.

Results: When lung cancer is excluded, mortality

from all other forms of cancer combined declined continuously from 1950 to 1998, dropping 25% during this period. The decline in other-cancer mortality was approximately 0.4% annually from 1950 to 1990 but accelerated to 0.9% per year from 1990 to 1996 and to 2.2% per year from 1996 to 1998.

Conclusion: The long-term decline is likely due primarily to improvements in medical care, including screening, diagnosis, and treatment.

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DURING THE 20th century, cancer of the lung, a previously obscure disease, increased rapidly and became the leading cause of cancer death in the United States. The increase was so great that it was responsible for the sharp increase in the overall cancer mortality rate that occurred in the United States through 1990.¹

However, if lung cancer is excluded, the mortality rate for all other forms of cancer combined was seen to be declining as early as 1973.² The present report goes back further, to 1950, when mortality statistics highly comparable to those now in use were introduced. This permits a longer-term evaluation of the distinctive mortality patterns of lung cancer and of other cancers.

METHODS

Age-specific numbers of cancer deaths were obtained from National Center for Health Statistics (NCHS) publications for even-numbered years from 1950 to 1998.³⁻⁵ These were used with population statistics to develop age-standardized annual mortality rates for three cancer groups: all-cancer, lung cancer, and other-cancer (all-cancer minus lung cancer). The standardization was to the United States population in 1940 as is the practice of the NCHS,⁶ and rates are expressed as deaths per 100,000 person-years.

Cancer groups were designated according to the ninth revision of the International Classification of Diseases (ICD-9). All-cancer was the category "Malignant Neoplasms, Including Neoplasms of the Lymphatic and Hematopoietic Tissues" (ICD-9: 140-208). Lung cancer was "Malignant Neoplasms of the Respiratory System" (ICD-9: 160-165), a category in which 99% of deaths are due to malignancies of the trachea, bronchus, lung, or larynx.

RESULTS

Figure 1 shows the time trend in mortality rates for all-cancer, lung cancer, and other-cancer. From 1950 to 1990, all-cancer mortality increased 8% (from 125 deaths per 100,000 person-years to a peak of 135). However, during this interval, mortality from lung cancer increased 223% (from 12.8 to 41.3), while mortality from other-cancer fell 17% (from 112 to 93.5). Lung cancer mortality rates

increased most sharply from 1950 to 1970, increasing 50% in each of the two decades. The increase slowed to 28% from 1970 through 1980 and to 14% from 1980 through 1990.

After 1990, all-cancer mortality declined sharply from its peak of 135 to 123 deaths per 100,000 person-years in 1998. This downturn resulted from an unprecedented reduction in lung cancer (7.5%) as well as the continuing decline of other-cancer (9.4%).

Just as the 1950 through 1990 increase in all-cancer mortality resulted almost solely from one disease, lung cancer, it is conceivable that the simultaneous long-term decline in other-cancer largely reflected the reduction in another disease, stomach cancer, which declined 75% during the interval. However, even after excluding both lung and stomach cancer, other-cancer declined 8% from 1950 to 1990.

We repeated the foregoing analyses with age standardization to the population of the year 2000. This age standard has higher proportions of the population in middle and older age groups and has been adopted by the NCHS beginning with vital statistics for 1999. Use of this older age standard

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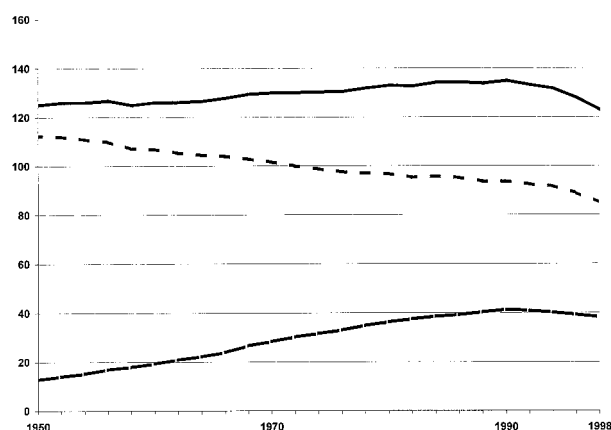


Fig 1. Mortality rates for all-cancer (—), other-cancer (---), and lung cancer (- · -) from 1950 to 1998. Deaths per 100,000 person-years, standardized to the 1940 United States population.

enhanced increases in cancer mortality rates but blunted declines (Fig 2). For example, from 1950 to 1990, all-cancer mortality increased 12% as compared with the 8% increase seen when using the 1940 standard, and lung cancer mortality increased by approximately 247% instead of 223%. The decline in the mortality rate for other-cancer was 12%, not the 17% seen when using the 1940 standard.

DISCUSSION

Since 1950, adults in the United States have experienced unprecedented gains in life expectancy. This resulted mainly from decreasing cardiovascular disease mortality, but other major diseases also declined. The overall cancer mortality rate began its decline only after 1990. Thus for four decades cancer seemingly ran counter to the general

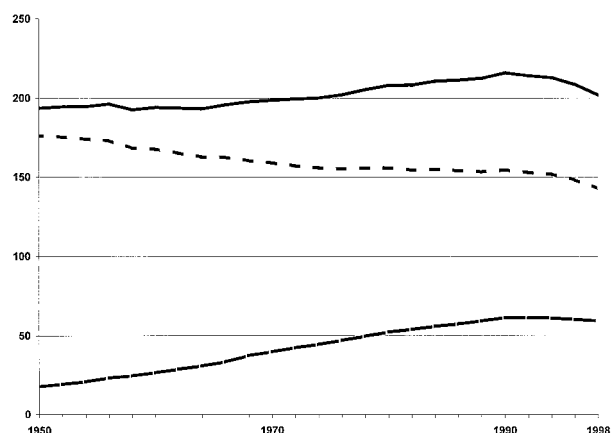


Fig 2. Mortality rates for all-cancer (—), other-cancer (---), and lung cancer (- · -) from 1950 to 1998, standardized to the 2000 United States population.

pattern of declining mortality. However, the present findings indicate that, excluding lung cancer, cancer mortality also has declined steadily since 1950.

It is widely recognized that the increase in lung cancer resulted almost solely from increases in cigarette smoking. However, the increases in lung cancer do not reflect the full impact of smoking on cancer mortality. Cancers of the oral cavity, pharynx, esophagus, pancreas, urinary bladder, and kidney, with a combined smoking-attributable mortality 25% of that of lung cancer, also were rising after 1950, thus increasing the overall cancer rate. When mortality from all smoking-related cancers is excluded, the decline in other-cancer from 1950 to 1998 was 31% (from 109 to 75 deaths per 100,000 person-years).

It is unlikely that the 50-year decline in mortality from other-cancer resulted from a decrease in incidence rates. Long-term incidence rates are difficult to interpret but suggest that most forms of cancer were stable or increasing slowly after 1950. More likely, improvements in medical care (including screening, diagnosis, and treatment) played the major role in the long-term reduction of other-cancer mortality rates. We reported a reduction in cancer case fatality of about 0.5% annually from 1950 to 1990 that was not due to lead-time bias (exaggerated gains in survival created by earlier diagnosis) or to disproportionate increases in relatively benign tumors, such as early-stage prostate cancer.¹ A reduction in case fatality of 0.5% annually may seem small, but the cumulative effect over several decades indicates that considerable progress has been made.

The widespread emphasis on increasing all-cancer mortality rates since 1950 brought important social consequences. In 1971 the federal government launched the "war" on cancer because of a perception that little progress was being made against the disease. Nonetheless, all-cancer mortality continued upward. By 1985 the war was being criticized as ineffectual,⁷⁻⁹ and pessimism persisted well into the 1990s.¹⁰ In reality, the war on cancer accelerated progress. In the prewar period (1950 to 1972) and through 1990, other-cancer mortality fell about 0.4% per year. However, the decline increased to 0.9% annually from 1990 to 1996 and to 2.2% per year from 1996 to 1998. Thus the rate of decline in cancer mortality increased two- to five-fold in less than two decades. Prospects for continuing mortality reductions are excellent as medical progress continues, as gains become more widely available, and as all smoking-related cancers continue their inevitable decline.

The focus on all-cancer mortality also led to the widespread perception of a cancer epidemic caused by environmental pollution. A typical commentary blamed "increasing

cancer rates” on “exposure to industrial chemicals and run-away modern technologies whose explosive growth has clearly outpaced the ability of society to control them.”¹¹ There is no denying the existence of environmental prob-

lems, but the present data show that they produced no striking increase in cancer mortality. In reality, the cancer “epidemic” consisted of one disease, cancer of the lung, and was due to one lifestyle factor, cigarette smoking.

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