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Rethinking the War on Cancer

Our failure to lower the U.S. cancer death rate, despite an effort spanning 35 years, shows the need for a change of strategy.

How shall we evaluate progress in our attempts to control cancer? There have been some clear successes; perhaps greatest are the improvements in treating a broad range of cancers in children and young adults. There have been some clear failures, too; outstanding among them is the long-continuing rise in the incidence of lung cancer, stemming from our limited success in reducing tobacco smoking.

But if we want to evaluate progress across cancer as a whole, to balance the various ups and downs, how shall we do so? The three main measures are mortality rates, incidence rates, and case survival rates.

- The age-adjusted U.S. cancer *mortality rate* rose from 162.2 per 100,000 population in 1975 to 170.7 in 1984. (An "age-adjusted" rate is the weighted average of the rates that apply to different age groups; for consistency in cancer research, the weights generally are derived from the U.S. population distributions of 1970.) The preliminary cancer death rate for 1985 is nearly identical to the 1984 figure. I see no reason to omit lung cancer, but some people do; the death rate for nonlung cancer was 125.4 per 100,000 in 1975 and 125.1 in 1984. Not much progress there, even when lung cancer is excluded.
- The age-adjusted cancer *incidence rate* for the Surveillance, Epidemiology, and End-Result registry area, our closest thing to national cancer incidence data, was 330.5 per 100,000 in 1975 and 351.8 in 1984. There is again no reason to omit lung cancer, but if we do, the incidence rate for nonlung cancer rose from 285.3 per 100,000 in 1975 to 296.5 in 1984. No progress there, either.
- The 5-year relative *case survival rate* ("relative" means adjusted for mortality in the general population) was 48.6 percent in 1974–76 and 48.7 percent in 1977–83. Rates for single years of diagnosis are essentially unchanged since 1975.

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TABLE 1
Age-Specific Death Rates for All Cancers Combined
Rates per 100,000 population per year

	Year			Average Annual Change	
Age	1950	1975	1984	1950–1975	1975–1984
Under 1 year	8.7	4.1	3.1	`0.18	`0.11
1–4	11.7	5.5	4.0	`0.25	`0.17
5–14	6.7	4.7	3.6	`0.08	`0.12
15–24	8.6	6.7	5.5	`0.08	`0.13
25–34	20.0	14.6	132.0	`0.22	`0.18
35–44	62.7	53.0	46.6	`0.39	`0.71
45–54	175.1	181.9	170.5	+0.27	`1.27
55–64	392.9	424.9	448.4	+1.28	+2.61
65–74	692.5	773.2	835.1	+3.23	+6.63
75–84	1153.3	1168.0	1272.3	+0.59	+13.22
85 and older	1451.0	1452.1	1604.0	+0.04	+16.63
Age-adjusted*	156.1	162.2	170.7	+0.24	+0.93

* To U S 1970 standard

Source National Center for Health Statistics

A basic, overall measure

Many alternative measures of where we stand, and where we are going, have been proposed. But in my view the most basic measure is age-adjusted mortality: It removes the effects of changes in the size and age composition of the population, prevents the selective reporting of data to support particular views, minimizes the effects of changes in diagnostic criteria related to recent advances in screening and detection, and directly measures the outcome of greatest concern—death. If we cannot reduce the age-adjusted rate of death for all cancers combined, we have failed in our primary purpose. Proponents of other measures, such as person-years of life lost, or quality-adjusted years of survival, have not made convincing cases.

No single measure, of course, can capture the rich variety of trends in incidence, mortality, and case survival for perhaps 100 kinds of cancer, or adequately express such other benefits as improved palliation (relief from symptoms), reduced side-effects of treatment, and the contributions of cancer research to other areas of research. Still, no broad cancer research program can be labeled successful unless it has an impact on the basic, overall death rate.

Table 1 provides some additional detail on trends across different age groups. The years 1950, 1975, and 1984 are appropriate because 1950 was just prior to the first major expansion of research efforts on cancer, 1975 was about the earliest anyone could expect any impact at all from the National Cancer Act of 1971, and 1984 is the most recent year for which comprehensive statistics are available for the whole set of data on cancer deaths.

It is apparent from Table 1 that cancer death rates have generally been going down in young people and up in older ones; the age-adjusted rate has risen because of the larger absolute change among older people. It is also apparent from Table 1 that there has been no overall acceleration in recent years in the average yearly declines in cancer deaths at young ages, and that the average year-to-year increases at older ages were actually larger for 1975–84 than they were for 1950–75. Although there may have been some improvement in the accuracy of death certificates over time, most of it likely occurred in the earlier period—the use of autopsies widened considerably during the 1950s, for example—than in the latter.

Table 2 shows what happened between 1975 and 1984 for some of the major forms of cancer. Mortality, incidence, and survival all moved up or down a bit for one or another form of cancer, but the figures for cancer as a whole are remarkably stable.

During these same years, countless technical reports, research papers, and general news stories have reported a rapid rise in knowledge about cancer and, presumably, progress in controlling its effects. How can this flood of new knowledge, with all its clinical implications, be reconciled with the rising death rate, rising incidence rate, and essentially unchanged survival chances of cancer victims?

TABLE 2
Trends in All Cancers, and Cancers with Highest Age-Adjusted* Death Rates
Rates per 100,000 population per year

	Death Rate (U.S.)		Incidence (SEER)		5-Year Survival** (SEER)	
	1975	1984	1975	1984	1974–1976	1977–1983
All cancers	162.2	170.7	330.5	351.8	48.6	48.7
All except lung, bronchus	125.4	125.1	285.3	296.5	54.4	55.1
Lung, bronchus	36.8	45.6	45.2	55.3	12.1	12.8
Colon, rectum	21.7	21.0	47.3	50.3	48.9	51.6
Breast	14.6	15.3	47.7	51.8	73.7	73.8
Prostate	8.4	8.9	28.5	33.2	66.1	70.3
Pancreas	8.6	8.6	9.5	9.5	NA	2.6
Leukemias	6.6	6.5	10.3	9.3	32.7	32.5
Non-Hodgkin's lymphoma	4.7	5.4	9.3	12.0	46.6	48.3
Stomach	6.6	5.3	9.2	8.1	NA	16.6
Ovary	4.7	4.3	7.5	7.3	36.4	37.8
Brain, nervous system	3.8	4.0	5.4	5.4	NA	23.3

* To U.S. 1970 standard
** Survival Rates relative, rates for breast cancer for females only
SEER: Surveillance. Epidemiology, and End-Result registry area
NA: Not available from this source
Source National Cancer Institute

Promises unfulfilled

The conclusion from these data is inescapable: We have had very little success in reducing overall cancer death rates or incidence rates, or in improving case survival rates. To the extent that these measures embody national targets or goals, we are losing the war against cancer.

This overall conclusion does not deny the real and welcome successes in some efforts to control cancer. Treatment of the disease in children and young adults has become markedly more effective in recent years, as shown in Table 3. For one form of cancer after another, death rates in the youngest age groups have been reduced. In addition, there have been marked improvements in palliation at all ages, which has made cancer victims more comfortable and extended their productive lives.

We have also learned a great deal about cancer as a biological phenomenon and as a clinical problem, and we have learned much about how to study the disease—that is, about research methods—at levels from molecules to whole populations. These new techniques have paid off in many ways, not all of them directly related to cancer—for example, in the diagnosis of AIDS and in the development of drugs that reduce its progression. My point, though, is that these have always been secondary goals, and that we have yet to make much of a dent in the three basic measures of overall success against cancer: incidence, mortality, and case survival.

Some experts argue that information already in hand—about chemotherapy, for example—could have a large impact if it were only applied more widely and more effectively. But that argument is far from new; it was in fact a driving force behind the National Cancer Act of 1971. We therefore must ask why 16 years of effort have accomplished so little in improving the application of knowledge available from the start, and whether the argument, updated to 1987, has any more merit now than it did in 1971. Was it based on false premises in 1971, now replaced by true premises in 1987?

Or is there something more fundamental at work? Perhaps it is a failure by program leaders to appreciate why patients and their physicians hesitate to embark on painful, debilitating, risky, and expensive courses of treatment for marginal increases in the probability of survival. Perhaps it is a failure to understand how medicine is really practiced—just as the military is rightfully criticized for developing weapons that the average soldier cannot use, so too can policymakers be faulted for sponsoring cancer treatment methods that can't be readily applied by the average physician or in the average hospital.

Another group of experts argues that our greatly increased understanding of cancer will surely have a large, beneficial impact in the future. This view basically accepts all the data presented here on trends up to the present, but concludes that there will be a major payoff at some future time. This view of the future is

TABLE 3
Age-Adjusted Cancer Death Rates in U.S. Children
Rates per 10,000 population ages 0–14 years
White only, SEER area

	1975	1984	% Change
All sites	4.8	3.5	`22.5
Acute lymphosytic leukemia	1.2	0.8	`33.5
Brain, nervous system	1.0	0.9	`10.4
Bone	0.2	0.2	`13.6
Hodgkin's disease	0.0	0.0	`50.0
Non-Hodgkin's lymphoma	0.4	0.2	`35.3
Kidney, renal pelvis	0.2	0.1	`34.3
Soft tissue	0.5	0.2	`64.0

SEER: Surveillance, Epidemiology, and End-Result registry area
Source National Cancer Institute

also far from new, and there has been a long history of extravagant claims of research progress. Within recent decades these have included waves of enthusiasm over broad screening of thousands of chemical substances for antitunior activity, studies of virology related to cancer, immunologic approaches, the selection or "design" of drugs on metabolic or biological principles, and perhaps now molecular biology.

Yet, despite frequent public claims by leading cancer research organizations, cancer program leaders, and cancer investigators that major progress in cancer treatment was either at hand or within reach, great success still eludes us. If we take the beginning of the modern era of cancer research to be the early 1950s, we have had 35 years of unfulfilled promises. That is surely long enough to raise questions about the promises of today.

John Cairns of the Harvard School of Public Health has also discussed the results of the effort to develop cures for cancer. His approach is largely clinical and biological, whereas that given here is largely epidemiologic and statistical. Yet we come to similar conclusions about the poor rate of success to date and the need to reconsider present directions in research as well as applications.

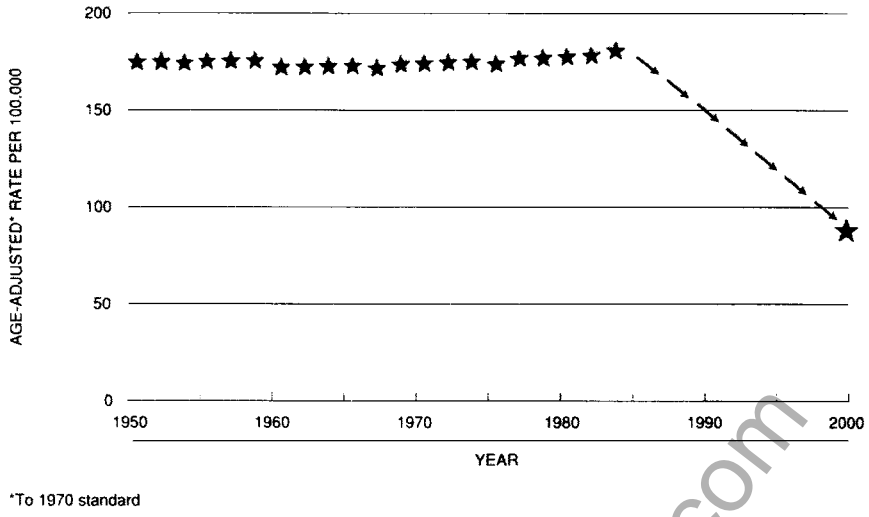
The General Accounting Office, an agency of the U.S. Congress, also concluded in a report issued earlier this year that claims of progress against cancer have been substantially overstated. The director of GAO's Program Evaluation and Methodology Division summarized the report as showing that "the improvements in patient survival have been most dramatic for the rarer forms of cancer and least dramatic for the more prevalent ones. As a result, even though the absolute number of lives extended is considerable, this number remains small relative to all cancer patients.... From an absolute perspective, progress has been considerable. From a relative perspective, we must conclude that not much progress has been made."

Mid-course corrections

What then needs to be done, given the failures—or at best, the modest progress—cited above? First we must accelerate the shift of emphasis, in medical training and practice as well as in research, toward the *prevention* of cancer. Treatment must come to be seen as a second line of defense.

I do not say this out of any blind conviction that prevention is always better in principle than is treatment. Cancer prevention on a large scale is likely to require substantial changes in our personal habits, very expensive measures to clean up the environment and the workplace, abandonment of certain useful and pleasing consumer products, adoption of new ways to build houses and modify existing ones, and the like. Treatment, had it worked, would be better, but we must now ask quite seriously whether we can afford to continue putting most of our resources into efforts that may never solve some of the biggest problems of cancer.

The need for such a major shift in attitude and emphasis already seems to be better understood by the public than by the "cancer establishment." But the public needs substantial information and guidance if it is to avoid both the grave perils of faddism and a loss of faith in the well-established benefits of orthodox medical treatment at its best. [It is important to note that my comments about lack of progress are in no way an argument against the earliest possible diagnosis and the best possible treatment of cancer. Modern medicine already has much to offer to virtually every cancer patient, for palliation if not always for cure; the problem is the lack of any substantial recent *improvement* in treating the most common forms of cancer. There is no comfort here for the "medical countercul-



FIGURE

Mortality Rates for Cancer, All Types Combined, 1950–1984, with Year 2000 Goal of the National Cancer Institute

ture"; nonstandard (or "unorthodox") treatments are likely to be dangerous as well as utterly ineffective.]

A second critical need is for a thorough review of where we stand, how we got there, and where we are going. The National Cancer Institute (NCI) has argued forcefully that it has its own extensive mechanisms for this purpose, but such internal review, however technically competent it may be, cannot have the necessary degrees of independence and objectivity that are needed.

It will not be easy to find a sufficiently broad and technically competent group of experts who are not already committed to many of the unsuccessful efforts of the past. But this long background of disappointments must nevertheless be addressed; a straightforward and comprehensive analysis must be made before we go much further in pursuit of the cure that always seems just out of reach.

The third need is for a prompt revision of NCI's stated goal of cutting the age-adjusted cancer death rate by 50 percent by the year 2000. The figure above very nearly says it all: That goal is not only utterly unattainable, it is so far from reality as to cast doubt on the credibility of NCI in other matters. If we "start the clock" with the National Cancer Act of 1971, we are already past the half-way mark, with not even the beginnings of a downturn yet evident for overall cancer mortality. I am concerned about the loss of public support that such massive failure will provoke, even if there is some real reduction in mortality over the next 13 years. This goal surely was honest at the time it was formulated, but it must now be reconsidered—in full view of the public.

The fourth need is to reorient personnel and projects. There is enormous momentum in any program as large and as old as our national cancer effort. It is critical that the leadership of that effort be totally dedicated to making the needed changes rapidly, with careful attention to quality and scope of the science, but with minimal disruption to careers and institutions. Recent comments from the present leadership suggest that they are not up to it.

NCI's response to date has alternated between ignoring its own evident problem and "blaming the messengers." This seems particularly odd because most of the data cited here and elsewhere come from or through NCI, and because supporters of the present program orientation have not made any serious attack on the validity of these data.

Finally, there is a need—now alas evident throughout government—to encourage greater objectivity on the part of senior program managers as they report progress, or the lack of it, to their peers in science, to Congress, and to the public. This goes deeper than accuracy and honesty; I know of no deliberate misstatement or misrepresentation, ever, by any cancer program leader regarding any of the matters raised here. But some of them have consistently denied the implications of their own data. The result has been further delay in making needed changes, the misuse of funds to support unproductive research, and mounting damage to the credibility of science.

Recommended reading

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