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# Are we winning or losing the war on cancer?

**R**ECENT GOOD AND BAD NEWS about the United States' war on cancer has left the public unsure whether to be optimistic or discouraged. Unaware of the crucial difference between the *incidence rate* and the *survival rate*, many people are still asking "Just how goes the battle?"

## ■ TWO ANALYSES, TWO CONCLUSIONS?

In an analysis of current survival rates published in the October 12, 2002, issue of the *Lancet*, Brenner<sup>1</sup> suggested that the outcome of patients with cancer may be considerably better than current statistics indicate.

In the second report, published in the October 16, 2002, issue of the *Journal of the National Cancer Institute*, Clegg and colleagues<sup>2</sup> argued that cancer is as much of a health menace as ever.

So which is it? Just how should these provocative yet seemingly contradictory reports be interpreted? And how do we explain to the public and to patients with cancer that, despite appearances, these reports do not refute each other and that they in fact both contribute substantially to our understanding of cancer incidence and survival rates?

## ■ INCIDENCE VS SURVIVAL

In discussing these studies, it is critical to distinguish the difference between incidence rate and survival rate—two related but very different terms.

*Incidence rate* refers to the risk of a particular type of cancer in a population; it gives an overview of the trends in the overall burden of cancer within our society.

*Survival rate* refers to the percentage survival of individuals with a specific tumor type at a particular point in time.

## ■ INCIDENCE MAY BE UNDERREPORTED

In their article, Clegg et al<sup>2</sup> observed that complete reporting of all cancer patients within a population may be delayed considerably. Delayed entry of cancer cases into a local tumor registry—and subsequently into either a regional or national database—reduces the total number of cancers reported during this period.

When this occurs, the apparent incidence rates of both specific types of cancer and cancer overall for that reporting period are artificially low. But just how inaccurate are they?

Unfortunately, the answer is "quite." For example, the investigators noted that unadjusted national incidence figures for melanoma in white men suggested no increase from 1996 to the present; however, when all cases are considered, melanoma actually has increased 4.1% in this population since 1981. The substantial difference in these figures leads to very different conclusions about the potential impact of this disease on future cancer mortality and the apparent success of public health initiatives to convey the risks of excessive sun exposure.

Overall, Clegg et al showed that, during a standard 2-year reporting period, only 88% to 97% of the total cancer cases during that period were appropriately reported. According to the investigators, it will take 4 to 17 years for that percentage to reach 99%. Therefore, "Ignoring reporting delay and reporting error may produce downwardly biased cancer inci-

The news from the cancer front is both bad and good



dence trends, particularly in the most recent diagnosis years.”<sup>2</sup>

Further, erroneous data may lead to false conclusions about cancer incidence and result in inappropriate decisions by both local and federal government health policy planners.

It is important to acknowledge that these deficiencies in the timely reporting of incidence data are not likely to be improved, owing to inherent inefficiencies in the process and limited funds to improve the situation.

### ■ SURVIVAL MAY BE UNDERESTIMATED

On the other hand, data about survival for patients currently undergoing treatment may lead to falsely pessimistic conclusions about what the war on cancer has accomplished.

As Brenner noted, reports of cancer survival rates that use the statistical technique of *cohort analysis* are based primarily on treatment programs used many years ago and therefore no longer accurately reflect improvements in care with state-of-the-art cancer treatment.

However, examining survival rates through *period analysis*, which focuses on the outcome of patients who are currently receiving or have recently completed treatment, leads to substantially improved survival rates for a number of tumor types.

For example, in estimating the effectiveness of current therapy, period analysis predicts that the 20-year survival rate for ovarian cancer in the United States is 50%; in contrast, the cohort analysis technique shows the rate to be 35%.

These major differences in survival rates are not a statistical trick. Instead, they indicate how inappropriate it is to focus on 10-year or 20-year survival rates for patients who received treatment 10 or 20 years ago, when the treatments those patients received may not have been as effective as those available today.

Another example of when period analysis suggests substantial improvements in long-term survival rates is prostate cancer; period analysis predicts a 20-year survival rate of 81%, compared with a rate of 44% calculated using traditional cohort analysis.

Likewise, in breast cancer, period analysis

predicts a 20-year survival rate of 65% with current therapy, compared with only 52% using traditional cohort analysis.

### ■ FOR SOME CANCERS, SURVIVAL HAS NOT IMPROVED

Other possible explanations, however, for an apparent improvement in cancer survival include differential lead-time bias, length bias, and “overdiagnosis” of indolent cancers due to increasing use of cancer screening strategies.

In situations in which the treatment of a particular type of cancer has not improved or has improved only slightly, both period and cohort analysis reach depressingly similar conclusions regarding survival. For example, for lung cancer, both techniques project 20-year survival to be less than 8%.

### ■ ARE WE WINNING? YES AND NO

Are we winning the war? The answer appears to be “yes and no.”

Screening and prevention techniques have had a favorable impact on some types of cancer (eg, cervical cancer), but the overall incidence of cancer in the United States is increasing largely because of the aging of the population and the continued epidemic of tobacco use. Despite this overall growth, however, the news is encouraging for some types of cancer.

As Brenner remarked, “Provision of up-to-date long-term survival rates is not merely an academic exercise; it could help to prevent clinicians and their patients from undue discouragement or depression by outdated and often overly pessimistic survival expectations.”<sup>1</sup>

### ■ REFERENCES

1. Brenner H. Long-term survival rates of cancer patients achieved by the end of the 20th century: a period analysis. *Lancet* 2002;360:1131–1135.
2. Clegg LX, Feuer EJ, Midthune DN, Fay MP, Hankey BF. Impact of reporting delay and reporting error on cancer incidence rates and trends. *J Natl Cancer Inst* 2002; 94:1537–1545.

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Two methods of estimating survival may give very different numbers