During the past year, 2 developments of particular relevance to the American Cancer Society’s (ACS) mission of “eliminating cancer as a major health problem” were prominent in national headlines. These included an escalation in the “war on cancer” and a vigorous dialogue on healthcare reform (the outcome of which remains uncertain at the time of this writing). Both have been viewed by much of the public and many healthcare professionals with a mix of optimistic enthusiasm and hope despite ongoing debate about the value of current accomplishments and the potential for future success.

In that context, I have chosen to take this opportunity as the incoming ACS president to comment on our progress in cancer prevention, early detection, and treatment. But, we must not use evidence of our progress as an excuse to accept the status quo. Rather, we must recognize our responsibility to use these successes as the foundation for future progress as well as critically examine areas of more limited progress to determine how we can do better.

Most views on cancer progress are framed by a mix of personal experiences and mass media. On a personal level, we see the cancer experiences of our family and friends, which can be biased in several ways. A personal cancer experience is blind to progress in cancer prevention. We can easily name individuals we know who are living with or have died of cancer, but we cannot do this for persons whose cancers were prevented. Also, although each of us probably knows several of the 11 million or more cancer survivors in the United States, we may not be aware that these individuals have had cancer. Thus, it is difficult to see a balanced picture through the lens of our own personal experiences with cancer.

It is also difficult to get a balanced view of cancer progress through today’s mass media. There may be too much media coverage at both extremes of the optimism-pessimism spectrum. Surprising or controversial data receive the brightest lights. And what is reported is frequently interpreted outside the context of reality by those who receive the news. At one extreme are the “cure for cancer” stories of promising breakthroughs. Subsequent analysis shows that all too often such stories are based entirely on limited studies of cell cultures or laboratory animals. At the other extreme are claims that the cancer research endeavor has been a failure.

Unsurprisingly, the truth is somewhere in between these extremes, and I believe that the metaphorical glass is more full than empty. The age-standardized US cancer death rate has declined by 16% since the death rates peaked in 1991 and by 9% since passage of the National Cancer Act in 1971. These mortality declines represent real progress and are occurring for the most common cancer sites in men and women—lung cancer in men, breast cancer in women, prostate cancer in men, and colorectal cancer in men and women—the single exception being lung cancer in women, where death rates have finally plateaued after several decades of increase (Fig. 1). These graphs show that cancer mortality trends during the 20th century are dominated by trends in lung cancer, particularly in men. Although tobacco remains the major preventable cause of cancer in the United States, tobacco-control advocacy has made important progress in reducing smoking rates through policy and legislative initiatives and...
funding for comprehensive tobacco-control programs. Smoking rates among US adults declined from 42% in 1964, when the first Surgeon General’s report on Smoking and Health was released, to 20% in 2007.3 Declines in lung cancer death rates in men since the early 1990s is a direct result of declining smoking prevalence, with the later peak and stabilization in women relating to later uptake and later declines in smoking prevalence.

The negative impact of tobacco-related cancers on the total cancer burden in the 20th century was moderated to some extent by a dramatic decline in stomach cancer that was largely attributable to improved food preservation and better nutrition.4 In addition, declines in death rates for several cancers have resulted from public health and medical interventions that the Society has advocated and helped to identify. Death rates for colorectal cancer declined in recent decades, with particularly steep rates of decline of 3% per year during the last 5 years, largely due to introduction and dissemination of colorectal cancer screening and effective treatment. Similarly, declining breast cancer death rates of 2%-3% per year since 1990 were achieved through dissemination of mammography screening and improved treatment. Cervical cancer death rates declined from 5.5 per 100,000 in 1975 to 2.4 per 100,000 in 2006 as a result of widespread use of screening. Unfortunately, these dramatic and important gains were not universal. Greater progress has been made among members of the population with higher levels of education and resources, including access to medical care. Although there has been some progress, African Americans still have higher death rates for most cancers than whites, and individuals without private health insurance are much less likely to receive colorectal cancer screen-

FIGURE 1. Annual age-adjusted cancer death rates for selected cancers, United States, 1930–2005. Rates are age adjusted to the 2000 US standard population. Source: US mortality data, 1960 to 2005, US Mortality Vol. 1930 to 1959, National Center for Health Statistics, Centers for Disease Control and Prevention, 2008. (Upper panel) Males. Due to changes in the World Health Organizations’ International Classification of Diseases (ICD) coding, numerator information has changed over time. Rates for cancers of the lung and bronchus, colon and rectum, and liver are affected by these changes. (Lower panel) Females. Uterus includes uterine cervix and uterine corpus. Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the uterus, ovary, lung and bronchus, and colon and rectum are affected by these changes. Reprinted with permission from Jemal A, Siegel R, Ward E, et al. Cancer Statistics, 2009. CA Cancer J Clin. 2009;59:225–249. © 2009 American Cancer Society. This material is reproduced with permission of Wiley-Liss, Inc., a subsidiary of John Wiley & Sons, Inc.
ing and mammography and more likely to be diagnosed at later stages of disease. The Society has consistently advocated for programs and funding to bring these life-saving services to underserved populations and to increase coverage of these services by public and private insurance plans. Even more progress could be achieved by meaningful healthcare reform that removes insurance and other barriers to health care, including prevention and early detection services.

Despite important progress against the most commonly fatal cancers in the United States and the overall burden of cancer mortality, some limitations and challenges should be acknowledged. Breast and colorectal cancers sometimes arise among individuals younger than the age at which routine screening is recommended, some of whom have no familial or medical risk factors that could have identified them for early screening. Some cancers progress very rapidly and are detected between regular screenings. Screening can result in identification and treatment of cancers that may never have progressed during a patient’s lifetime, particularly for cancers like prostate cancer where the prevalence of asymptomatic cancers is high, the screening test, prostate-specific antigen (PSA), is imprecise, and treatment is associated with high rates of morbidity. Even for cancers like breast cancer, where the benefits of early detection and treatment are well-accepted, some women probably receive more treatment than is necessary to control their disease because we can’t predict accurately enough which patients are at low risk for cancer recurrence or progression. And there are still a number of cancers for which progress has been much more limited, with no significant breakthroughs in early detection, treatment, or survival. One of the Society’s most important roles is to provide accurate, understandable, and balanced information about cancer so that individuals can make informed decisions about the risks and benefits of cancer screening and treatment.

One important trend that is likely to impede continued progress against cancer is the obesity epidemic, which has already gathered too much momentum to be stopped over the short term. This epidemic is driven by economic factors including availability and marketing of food products as well as changes in the physical environment and transportation patterns, which tend to increase caloric consumption and reduce physical activity. Since rates of obesity began to increase in the late 1980s, it is not clear when their effects on the cancer burden will be fully realized, but data suggest that obesity is associated with higher death rates for many cancers and can act throughout the cancer continuum, from initiation through survival. The good news is that obesity is widely recognized as a public-health priority with increasing attention to community-based as well as individual interventions. Today it is estimated that more than half of all cancer deaths could be avoided if everything we have learned about healthy behaviors were put into practice.

A major challenge recognized by the general public and the medical and cancer research community is that advances in medical, surgical, and radiation therapies have had more impact on some cancer types than others. Progress has been most dramatic in treating several cancers of children and young adults, with far greater impact on averting lost years of life than on averting deaths. But, what the public often expects as progress from cancer research is “the cure for cancer” or at least “cures for most cancers.” One way to think about progress toward this goal is to distinguish between “what to do” and “how to do it.” The idea of cancer resection or ablation (“what to do”) was recognized in ancient times, but effective surgical oncology could not develop without progress in related fields such as antisepsis, anesthesia, and transfusion medicine (“how to do it”). Similarly, until recently, medical therapy has been limited by our immature understanding of molecular targets (“what to do”). But as our understanding of these multiple targets expands, we are slowly developing an understanding of “how to do it.” Recognition of cell replication (nucleic acid metabolism and mitosis) as a target process in tumor growth led to substantial progress in cytotoxic chemotherapy and radiotherapy during the second half of the 20th century. This was especially true in the development of technology for administering complex regimens and managing toxicities.

During the last quarter of the 20th century, many alterations in oncogenes and tumor-suppressor genes were identified, but clinicians have not been able to reverse these alterations in patients. Likewise, the host immune system has long been recognized as a potential ally, but immunotherapies still have a very limited role in oncology. However, research in the past couple of decades has resulted in a large and
expanding list of molecular targets in pathways that regulate proliferation, differentiation, and death of malignant cells and their accomplices (endothelial cells, stromal cells, inflammatory cells, etc).

With a few very important exceptions, current therapies targeting these pathways represent incremental progress rather than breakthroughs that produce cures or long remissions as single agents. A few of these important exceptions include imatinib, which has dramatically improved the prognosis for chronic myeloid leukemia; trastuzumab, which substantially improves the survival rate for women with HER-2–positive breast cancer; and rituximab, which has revolutionized treatment of B-cell lymphomas and substantially improved survival and quality of life. And, it is important to recognize incremental progress as the success that it is. When clinical trials report 10% or 20% improvement in survival, it’s tempting to take the “half empty” view that the new drug was not a breakthrough in curative treatment. However, incremental progress is a lot like compound dividends—both can yield very valuable returns on investments. Length limits for this editorial preclude more detailed discussion of promising targets and modalities, but it suffices to say that they exist and that more will be discovered. The short-term clinical impact of fundamental discoveries is nearly always uncertain, but over the long term, the combination of basic and applied research has yielded progress in many areas of medicine.

It is important to recognize that research progress is accelerating in at least 2 ways. Science is often compared to solving a puzzle. Think of a crossword puzzle, for example. Every “across” word you recognize provides important clues about several more “down” words. In the same way, advances in basic or applied research make the next discovery easier, faster, and less expensive. For example, the first human genome sequence was completed in 2003 at a cost of approximately $3 billion. The cost for the second, only a few years later, was $70 million. Current costs for genome sequencing are estimated at $10,000 to $100,000, and many researchers believe the cost can be reduced to $1000 within a few years. In addition, advances in technologies initially unrelated to oncology or even biology (such as computer science or nanotechnology), can accelerate progress in cancer research.

Some critics perceive insufficient (or excessive) emphasis on basic research; but the same is often said about clinical research, prevention, screening, treatment, environmental causes, genetic causes, palliative care, complementary therapies, and so forth. Choosing the perfect research portfolio is feasible only in retrospect, but diversification is clearly important.

The pace of progress is terribly frustrating to patients and their loved ones in need of successful treatments. Although there is no consensus on major changes to the research endeavor, there are some very good ideas for improvement. One opportunity for improvement is quantity and consistency of funding. The funds for medical research allocated in the economic-stimulus package are undoubtedly welcome relief after several years of declining real dollars in National Cancer Institute (NCI) funding. However, substantial fluctuations in funding make it challenging to attract and retain the best and brightest cancer researchers. Once economic and political downturns in research funding require researchers to shut down their labs and work in full-time clinical practice, teaching, or unrelated fields, restarting their research is unlikely or, at best, inefficient.

The diversity of suggestions for improving cancer research (including suggestions for no change) is likely exceeded only by suggestions for healthcare reform. This topic is too large and complex to address in detail here. It is, however, important to acknowledge that despite the limitations and inequities in the healthcare system, the United States has been a world leader in the fight against cancer, and that many of these accomplishments have come about because of the strong voice and commitment of cancer advocates. These accomplishments include earlier and wider implementation of breast and colorectal cancer screening in the United States than in many industrialized countries, successes in tobacco control, especially at the state level, support of high-quality cancer registries and other resources for surveillance of population risks and trends, government and private support for some of the most outstanding cancer treatment facilities in the world, and leadership in public and private research ranging from molecular to population science. The challenge before us is great, but as incoming president of the American Cancer Society, I believe that we will meet it and play an important role in shaping national
policies and priorities that will make the greatest impact against cancer in the coming decades. After all, it is our progress to date that is our best predictor of how much better we can do.

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