# THE UNITED STATES PROGRAM ON CANCER, 1975–2003:

# A DISMAL FAILURE

**by**

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**October 28, 2006**

**(Revised February 4, 2007)**

## I. INTRODUCTION

It seems to us that we are living in a cancer epidemic in the United States. Both of us have lost parents to cancer. We have been losing more and more relatives and friends to cancer, and people that we know have been losing their parents and their friends to cancer. It is obvious that more people have been getting cancer and more people have been dying from cancer.

The life of a person who hears the diagnosis of cancer changes drastically for the worse. It also affects the entire family of the patient – who hope for a cure. Oftentimes, through treatment with chemotherapy, a cancer patient will experience severe loss of appetite and, consequently, weight loss, a weakened immune system, pain, and other forms of suffering. Death from cancer can occur quickly, or may take several months or years, and with suffering. Also, recurrence of cancer may follow an initial occurrence and start a whole process of suffering all over again. Subsequently, the possibility of death becomes part of a cancer patient's every-day reality.

Based on our own experience with family members who died from cancer, we were driven to carry out research on this matter and examine cancer and its impacts on people of the United States. This paper is the result of that research.

In this study, we assess the impact of cancer in the United States over a long number of years – 1975 to 2003 – in order: 1) to show the long-term, accurate trends in the disease, and 2) to appraise the anti-cancer program in the U.S.

Cancer affects U.S. citizens from two sides: 1) when people get cancer (incidence rate), and 2) when people lose their lives to cancer (mortality rate of cancer). The occurrence of cancer relates to ineffective prevention of cancer. Death from cancer is the result of ineffective treatment for cancer

The government's "War on Cancer" program is over thirty years old, and its primary objectives have been: 1) to prevent people from getting cancer, and 2) to provide effective treatments to people so that they get rid of their cancer and not die from it. This paper will assess whether the government's cancer program accomplished these objectives.

## II. DATA

### Period of Analysis and Data

Our analysis covers the period 1975-2003. This long time period provides data that are more informative and reliable than evaluations over shorter time periods. This is particularly relevant for cancer, which can take years to appear after a person's exposure to carcinogens.

The analysis utilizes data on cancer incidence rates, cancer mortality rates, and the probabilities of an American man or woman to contract cancer in his or her lifetime. The data for the analysis were primarily obtained from the SEER (Surveillance Epidemiology and End Results) database of the National Cancer Institute (NCI). Since 1975, SEER utilized data from five states: Connecticut, Hawaii, Iowa, Utah, and New Mexico; and four metropolitan areas: Detroit, Atlanta, Seattle, and San Francisco. This geographic area constitutes approximately 10 percent of the U.S. population. The U.S. does not have a national database on cancer incidence rates or cancer mortality rates (the Centers for Disease Control have started developing national cancer mortality rates for the last several years).

The cancer mortality data are obtained by NCI from the National Center for Health Statistics (NCHS) and are incorporated into the SEER database. Data on U.S. population were obtained for this study from the U.S. Bureau of the Census, Statistical Abstract of the United States.

### Problems with the Existing Cancer Data

There are a number of problems with the existing cancer data: on the cancer incidence rates, the cancer mortality rates, and the probabilities on cancer occurrence. With regard to the data on cancer incidence rates, the problems refer to the delays in the reporting of cancer cases, and the use of age-adjusted cancer rates. These problems are described below.

Delays in the reporting of cancer cases result in significant underestimates of the cancer cases for a particular year, leading to underestimates of the cancer incidence rate.

Consequently, the reported cancer incidence rates (by SEER) are underestimates of the actual cancer incidence rates. According to the results of a study by NCI researchers, although the SEER program allows about 2 years for the collection of newly diagnosed cancer cases, it would actually take 4-17 years for 99% or more of the cancer cases to be reported (given the incidence counts initially reported). The incidence counts initially reported, at the 2-year delay, account for just 88-97% of the estimated final incidence counts (Clegg, Feuer, Midthune, Fay, and Hankey, 2002, p. 8). Based on the results of that study, we make two adjustments to the SEER cancer incidence rate: the first relates to the incidence rate of year 2003, and the second adjusts the incidence rate for the 10 years before 2003 (1993-2002). The adjustments are described in the section on Cancer Incidence and in Appendix A.

Another problem with the available data on cancer incidence and cancer mortality is that they are presented only in age-adjusted format and not in their actual form (referred to as "crude" in official statistics). As the name implies, age-adjusted cancer data have been adjusted – that is, changed – for what is argued to be the impact of age in cancer incidence or mortality. However, when the population of the country is aging, the age-adjustment approach results in cancer incidence and mortality rates being lower in years following the benchmark year (whose age distribution is adopted as the standard population). Presently, the year 2000 population is used as the standard population, and the population of the U.S. is getting older; consequently, age-adjusted cancer data will result in lower cancer incidence rates and mortality rates for years 2001, 2002, and 2003.

We have strong misgivings in the use of age-adjusted data only – particularly when it relates to comparing cancer incidence (or mortality) rates over a number of years, in a single country, as is done in this study. These misgiving are described in Appendix B. Essentially, we believe (as do others) that cancer is the result of carcinogens, in the air, water, and land. And these carcinogens have been increasing annually over time. Consequently, older Americans have been exposed to these carcinogens for much longer periods of time than young people have. In time, they succumb to increased attacks on their immune system by ever-increasing carcinogens, and cancer occurs. By presenting only age-adjusted data, official statistics hide the impact of cancer occurrence from an increasingly carcinogenic environment. That is a very important shortcoming. In showing a more balanced view, the SEER/NCI should be present,

on an annual basis, both actual/"crude" cancer data and age-adjusted data. Thus, the public would become informed of the comprehensive, and more accurate, cancer picture.

With regard to problems with the cancer mortality data, these data are obtained by NCI from the National Center for Health Statistics (NCHS) and are incorporated into the SEER database. However, a cancer death can be missed from the death certificate, and thus in the NCHS and SEER death counts. The reason is that a death certificate has two areas for the marking (by a physician) of the cause of death. One area is marked "IMMEDIATE CAUSE" (Final disease condition resulting in death); while below this section, there is a section marked "UNDERLYING CAUSE" (Disease or injury that initiated events resulting in death). The NCHS provides to NCI mortality data on cancer from the UNDERLYING CAUSE line; these are the cases that are included in the annual SEER mortality counts from cancer. However, cancer death cases are missed when the "IMMEDIATE CAUSE" line is filled-in with "Cancer" and the "UNDERLYING CAUSE" line has nothing and the person has, in fact, died from cancer. In such a situation, the case will not be counted as a cancer death and the cancer death counts in the U.S. will be underestimated - leading to an undercounting of the U.S. cancer mortality rate. The error just described has, in fact, occurred. We do not know presently the degree of underreporting of cancer deaths as a result of such errors. A number of other studies have also revealed errors in the accuracy of cancer death certificates and the effect on cancer mortality statistics (Percy, et al., 1981; Engel, et al., 1980).

Another problem with the cancer mortality statistics is that the NCHS does not revise them. Once these statistics are collected for any year, they stay at that number. Any mistakes that may have been made in the count stay unchanged.

Another data problem that we have observed is that the reported probabilities of an American male or female in getting cancer in their lifetime, reported by SEER, are also underestimates - particularly for the years after 1992. The reason for this is that these probabilities are based on actual (crude) cancer counts, and these counts are underestimated as a result of reporting delays in cancer cases (noted previously).

In addition, with regard to official cancer data, the SEER data do not include skin cancers of the basal cell or squamous cell types. These types of skin cancers account for large numbers of cancer cases, with resulting deaths that are not

included in SEER statistics. In 1980, these skin cancers accounted for 400,000 cancer cases; this increased significantly to 600,000 cases in 1990 (Website of University of Maryland, Medical Center- in reference section). Although the cure rate of these skin cancers has been estimated at more than 95 percent (Website of the National Safety Council – in reference section), that means that 5% are not cured. Finally, data of the NCI show the estimated number of new cases of these skin cancers in 2007 to be more than 1,000,000; while less than 2,000 deaths are forecasted to take place in 2007 (Website of NCI – in reference section).

With regard to the SEER cancer mortality rates, they refer to the SEER geographical areas (noted previously). There are also cancer mortality rates based on data from the National Center for Health Statistics (NCHS), which refer to the entire country. The SEER cancer mortality rates are lower than those provided by NCHS and that difference has increased over time. For example, in 1985, SEER cancer mortality rate = 168.0; NCHS/U.S. = 171.3. In 1992, SEER cancer mortality rate = 163.8; NCHS/U.S. = 172. 2. According to these numbers, when SEER data show a declining trend in cancer mortality rates, NCHS/U.S. data show an increasing mortality trend.

In our calculations for this paper, we use cancer data (on incidence, mortality, and probabilities of getting cancer) provided by NCI/SEER. The reader should note, however, that the results shown from using these data – and they are dismal – are even worse, given the data shortcomings described. In the case of the cancer incidence rate, we make an adjustment for the shortcoming of reporting delays and this results in substantially higher cancer incidence rates than those reported by SEER.

## III. CANCER INCIDENCE

### Cancer Incidence Rates

The SEER cancer age-adjusted incidence rate (annually) refers to the numbers of people who are diagnosed with cancer in a given year, per 100,000 people in the population. Thus, an incidence rate of 200 means that 200 people per 100,000 population were diagnosed with cancer.

Table 1 presents data and tabulations on the SEER incidence rate of cancer, for all cancers, on an annual basis in the U.S. for 1975 to 2003. In examining the entire 1975–2003 period, the

**Table 1**

**Cancer Incidence in the U.S., 1975-2003**

| Year | Cancer incidence rate (per 100,000 of age-adjusted population) | U.S. population | Number of people in U.S. with cancer (Incidence x age-adjusted population) |
|---|---|---|---|
| | (1) | (2) | (3) |
| 1975 | 400.3 | 215,973,000 | 864,540 |
| 1976 | 407.2 | 218,035,000 | 887,839 |
| 1977 | 407.6 | 220,239,000 | 897,694 |
| 1978 | 407.2 | 222,585,000 | 906,366 |
| 1979 | 412.4 | 225,055,000 | 928,127 |
| 1980 | 417.7 | 227,726,000 | 951,212 |
| 1981 | 425.1 | 229,966,000 | 977,585 |
| 1982 | 424.3 | 232,188,000 | 985,174 |
| 1983 | 430.9 | 234,307,000 | 1,009,629 |
| 1984 | 439.6 | 236,348,000 | 1,038,986 |
| 1985 | 448.4 | 238,466,000 | 1,069,282 |
| 1986 | 451.0 | 240,651,000 | 1,085,336 |
| 1987 | 467.8 | 242,804,000 | 1,135,837 |
| 1988 | 463.5 | 245,021,000 | 1,135,672 |
| 1989 | 467.3 | 247,342,000 | 1,155,829 |
| 1990 | 481.2 | 250,132,000 | 1,203,635 |
| 1991 | 502.3 | 253,493,000 | 1,273,295 |
| 1992 | 509.8 | 256,894,000 | 1,309,646 |
| 1993 | 492.6 | 260,255,000 | 1,282,016 |
| 1994 | 482.5 | 263,436,000 | 1,271,079 |
| 1995 | 475.5 | 266,557,000 | 1,267,479 |
| 1996 | 477.3 | 269,667,000 | 1,287,121 |

| | | | |
|---|---|---|---|
| 1997 | 484.3 | 272,912,000 | 1,321,713 |
| 1998 | 485.7 | 276,115,000 | 1,341,091 |
| 1999 | 487.6 | 279,295,000 | 1,361,842 |
| 2000 | 481.9 | 282,402,000 | 1,360,895 |
| 2001 | 483.7 | 285,329,000 | 1,380,136 |
| 2002 | 478.9 | 288,173,000 | 1,380,060 |
| 2003 | 459.6 | 291,028,000 | 1,337,565 |
| | | | |
| **2003** | 494.1 | 291,028,000 | 1,437,969 |
| | (cases adjusted for reporting delay to be 7.5%) | | |
| | | | |
| Source: | | | |
| Incidence rates are obtained from SEER: | | | |
| http://seer.cancer.gov/csr/1975_2003/results_merged/ | | | |
| topic_annualrates.pdf | | | |
| Population data come from U.S. Census Bureau. | | | |
| Statistical Abstract of the United States: 2006. | | | |
| Note: Population is age-adjusted, year 2000. | | | |

alarming observation is that the incidence rate of cancer increased over the period. In 1975, 400 people (all races, all ages, male and female) per 100,000 of population were afflicted with cancer; and in 2003, twenty-eight years later, the cancer incidence had worsened significantly to 460 Americans being afflicted with cancer (per 100,000 population). With regard to subperiods, from 1975 to 1992, there was an increase in the cancer incidence rate from 400 to 510 per 100,000, and subsequently, the incidence rate (reported by SEER) declined somewhat.

The decline seen in cancer incidence rates after 1992 (as reported by SEER) is not accurate. The actual incidence rate would be substantially higher than the one shown; it would have experienced much less of a decline (if not an increase). This error in measurement in the SEER data is the result of reporting delays of cancer cases. A 2002 NCI study showed that the initial cancer incidence rates, for a particular year, are not complete until 4-17 years after the initially-reported cancer counts - due to delayed reporting of the cancer cases. This results in a lower reported incidence rate (Clegg, Feuer,

Midthune, Fay, and Hankey, 2002). The NCI study analyzed data for five types of cancer: female breast, colorectal, lung/bronchus, prostate, and melanoma. According to the findings of this study, "Although the SEER program allows about 2 years to collect newly diagnosed cancer cases, our results show that, depending on cancer site, it would take 4–17 years for 99% or more of the cancer cases to be reported, with the incidence case counts initially reported at the 2-year delay accounting for just 88%–97% of the estimated final incidence case counts." (Ibid., p. 8).

Based on the results of that study, we made an adjustment for the delay in reporting cancer cases for the year 2003. This adjustment is rough but provides a good indication of the extent of underestimation in the officially reported cancer incidence data. First, we took the average of the two percentages 88% – 97% (of cancer cases counted in the initial reporting); the result is 92.5 percent. That means, assuming that the cancers used in the NCI study are representative of all the cancers, then 7.5% of cancer cases would be missed in the cancer counts reported in 2003. Then we multiplied the SEER-reported cancer incidence rate in 2003 of 459.6 by 7.5% and added the product to the reported incidence rate; the result is a revised cancer incidence rate of 494.1 per 100,000. This adjusted rate (494.1) is expected to be significantly closer to the actual incidence rate than the currently reported cancer incidence rate of 459.6. The adjusted cancer incidence rate for 2003 is presented in Table 1.

The next item for which to adjust is the delay in the reporting years (the number of years it takes for the reported cancer cases to reach 99%). In this regard, one notes the NCI study's finding that "It would take 4–17 years for 99% or more of the cancer cases to be reported" (Ibid., p. 8). That can be interpreted that it takes an average of 11 years (average of 4-17 rounded) for 99% or more of cancer cases to be reported to SEER. With this framework, adjustments were made to the cancer incidence rates for the years 1993–2003, and they are shown in Appendix A. In addition, the increased cancer incidence rate, from the delay adjustment, increases the estimated total number of Americans afflicted with cancer in the affected years, shown in Appendix A.

The age-adjusted data on cancer incidence in the U.S. show big increases in the incidence rate over time. These data, by themselves, indicate a gross failure in government's cancer policy. Part of that policy would have been to prevent U.S.

citizens from getting cancer. The data show that this obviously did not happen.

However, the situation is even bleaker than these data indicate. This is due to the reported cancer incidence rates being substantial underestimates of the true rates, as a result of delays in reporting cancer counts, particularly for the years 1993–2003. Moreover, the use of age-adjusted cancer incidence rates (standardized to year 2000) result in lower U.S. cancer incidence rates for the years 2001, 2002, and 2003 – as noted previously.

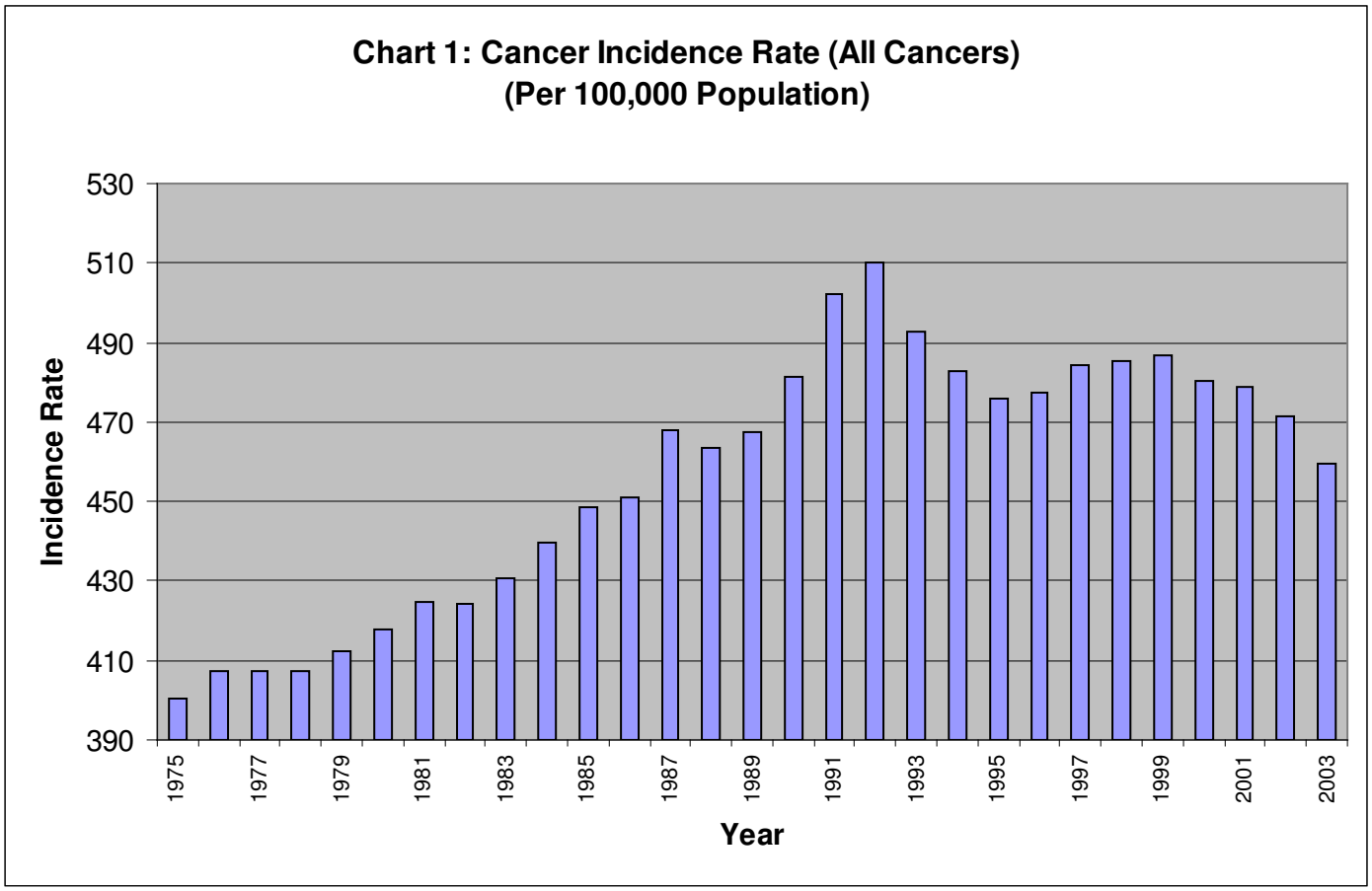
## Number of Total Cancer Cases in the U.S.

Next, we estimated the total number of people getting cancer during 1975–2003. This was done by multiplying the annual cancer incidence rate by the annual population (per 100,000). The results are shown in Table 1. In 1975, 864,520 Americans were diagnosed with cancer. This number continued to climb rapidly and reached 1,009,629 by 1983 – less than 10 years after 1975. The total number of people getting cancer continued to increase; in 1992, 1,309,646 Americans were afflicted with cancer; and by 2002, the number reached a formidable 1,380,060. The numbers in 2001 and 2002 were the highest annual numbers of Americans getting cancer over the period of analysis.

Over the period 1975 to 2003, the total number of people who were afflicted with cancer reached over 33 million. In the last ten-year period of 1994 to 2003, the total number of Americans who were afflicted with cancer reached over 13 million. These are very large numbers indeed and show the dismal failure of the U.S. program on cancer.

## Graphical Illustration of Cancer Incidence

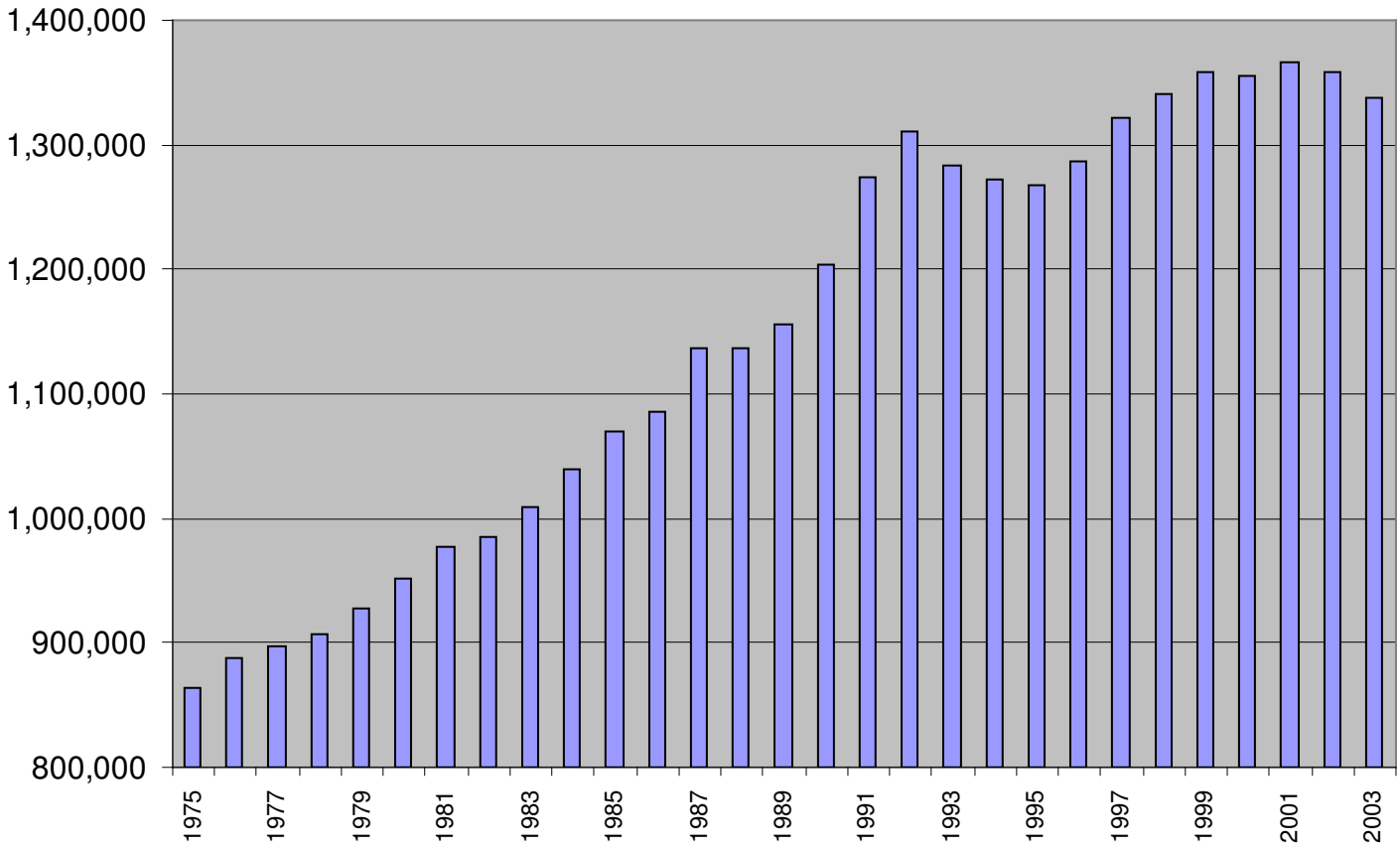
The developments of cancer incidence over time can also be shown graphically in Chart 1 (data were obtained from Table 1). The height of each bar represents the age-adjusted cancer




incidence rate for that year. The heights of the bars rise upward from 1975 - indicating a steady increase in the cancer incidence rate. The height of the bar in 2003 is significantly higher than in 1975. It is noted that the heights of these bars for 1993 to 2003 are (substantially) underestimated, due to reporting delays. The adjusted cancer incidence rate for 2003 is 494.

Chart 2 shows the total numbers of Americans who contracted cancer in each year during 1975-2003 (data were obtained from Table 1). Each bar represents the total number of people in the U.S. diagnosed with cancer each year. There is a steady increase in the heights of the bars over 1975-2003. This shows the ever-increasing number of people who were afflicted with

**Chart 2: Number of People Diagnosed with Cancer in the U.S. (All Cancers)**




cancer in the country; these increases continue up to the last years of analysis. The chart illustrates again the dismal story of the total number of Americans being afflicted with cancer in the U.S. If the U.S. cancer program was effective, the total number of Americans getting cancer would have declined even as the U.S. population increased.

It is again noted that these numbers are underestimates – particularly since 1993; this is the result of reporting delays in cancer counts (discussed previously). Consequently, the true estimates of the total number of Americans who contracted cancer (particularly since 1993) is higher than shown by the heights of the bars. Our adjustments for reporting delays are shown in Appendix A; and, for one, the number of Americans estimated to have been diagnosed with cancer in 2003 is

1,437,8222. That number would result in a substantially higher bar for 2003 that the one shown in Chart 2.

## Growth of the Cancer Incidence Rate

Over the period of analysis, 1975-2003, the incidence rate of cancer increased, and it increased at an average annual rate of 0.5 percent. The cancer incidence rate is the ratio of the numbers of people who are diagnosed with cancer to the population of the U.S. (per 100,000 persons). Consequently, a positive growth rate of the cancer incidence rate means that the number of people diagnosed with cancer every year was increasing faster than the population of the country. This again shows the failure of the U.S. cancer program. In addition, the total number of people in the U.S. who were afflicted with cancer also increased annually, at an average rate of 1.6 percent. Thus, the total number of Americans afflicted by cancer increased significantly over the entire period 1975-2003.

Finally, it is noted that these growth rates are underestimates due to the impact of reporting delays on cancer cases, explained previously. The delays would impact particularly the reported cancer counts of the most recent years, and thus result in lower growth rates of the cancer incidence rate and of the total annual number of Americans afflicted by cancer.

# IV. CANCER MORTALITY

## Mortality Rate of Cancer

Death is the frequent outcome of cancer. Of those who are diagnosed with cancer, a significant number, unfortunately, succumb to the disease and die, and oftentimes with considerable suffering. To show the fatal results of cancer, Table 2 presents data on mortality rates. The mortality rate is the number of people who die from cancer per 100,000 population, age-adjusted. We have discussed our misgiving with age-adjusted cancer incidence rates; they apply as well to age-adjusted mortality rates. The cancer mortality rates over time show a similar pattern as observed for the cancer incidence. The SEER-

| **Table 2** | | | |
|---|---|---|---|
| | | | |
| **Cancer Mortality in the U.S., 1975-2003** | | | |

| Year | Mortality rate of cancer (per 100,000 of age-adjusted population) | U.S. population | Number of people in U.S. that died from cancer (mortality rate x population) |
|---|---|---|---|
| | (1) | (2) | (3) |
| 1975 | 199.1 | 215,973,000 | 430,002 |
| 1976 | 202.3 | 218,035,000 | 441,085 |
| 1977 | 203.0 | 220,239,000 | 447,085 |
| 1978 | 204.4 | 222,585,000 | 454,964 |
| 1979 | 204.5 | 225,055,000 | 460,237 |
| 1980 | 207.0 | 227,726,000 | 471,393 |
| 1981 | 206.4 | 229,966,000 | 474,650 |
| 1982 | 208.3 | 232,188,000 | 483,648 |
| 1983 | 209.2 | 234,307,000 | 490,170 |
| 1984 | 210.9 | 236,348,000 | 498,458 |
| 1985 | 211.3 | 238,466,000 | 503,879 |
| 1986 | 211.8 | 240,651,000 | 509,699 |
| 1987 | 211.9 | 242,804,000 | 514,502 |
| 1988 | 212.6 | 245,021,000 | 520,915 |
| 1989 | 214.3 | 247,342,000 | 530,054 |
| 1990 | 214.9 | 250,132,000 | 537,534 |
| 1991 | 215.1 | 253,493,000 | 545,263 |
| 1992 | 213.7 | 256,894,000 | 548,982 |
| 1993 | 213.4 | 260,255,000 | 555,384 |
| 1994 | 211.7 | 263,436,000 | 557,694 |
| 1995 | 209.9 | 266,557,000 | 559,503 |
| 1996 | 207.0 | 269,667,000 | 558,211 |
| 1997 | 203.6 | 272,912,000 | 555,649 |
| 1998 | 200.8 | 276,115,000 | 554,439 |
| 1999 | 200.7 | 279,295,000 | 560,545 |
| 2000 | 198.7 | 282,402,000 | 561,133 |
| 2001 | 195.9 | 285,329,000 | 558,960 |
| 2002 | 193.7 | 288,173,000 | 558,191 |
| 2003 | 190.1 | 291,028,000 | 553,244 |
| | | | |
| | | | |
| Sources: Same as Table 1. | | | |
| Note: Population is age-adjusted, year 2000. | | | |

reported mortality rate in 1975 was 199 (per 100,000) and steadily increased up to 1991 when it reached 215, the highest rate over the period. From that year, it began to decline, but it was still higher than in 1975. This continued until the year 2000 – when the mortality rate reached 199 again (rate rounded).

This means that over the 1975-1999 period, the mortality rate from cancer – instead of improving or even remaining the same as in 1975 – continued to get worse, and it worsened significantly. That is, for every year following 1975, more Americans died from cancer per 100,000 population than died in 1975. And this number increased with every succeeding year until 2000. If the cancer treatment program of the U.S. had been successful, there would have been declines in the cancer mortality rate since 1975. However, this did not happen for 25 years after 1975 (in the SEER-reported mortality statistics).

It was only after the year 2000 that the age-adjusted mortality rate fell below what it was in 1975. Thus, it took over 25 years for the program of the NCI toward cancer treatment to show some impact, when using the age-adjusted rate.

Moreover, there is a problem with the reliability of the cancer mortality data, which could be a substantial one. The cancer death counts that NCHS provides to NCI/SEER come from the death certificate; however, there are two places on the death certificate for the cause of death: IMMEDIATE CAUSE and UNDERLYING CAUSE. The NCHS provides to SEER the mortality data on cancer from the UNDERLYING CAUSE line of the death certificate. However, it is possible that a patient's death from cancer is noted in the IMMEDIATE CAUSE section rather than in the UNDERLYING CAUSE section, even though the underlying cause was cancer. In such a circumstance, the case would not be counted by NCHS as a cancer death and would not be included in the cancer mortality data provided to SEER. This has occurred. Of course, that would result in an undercounting of cancer deaths. We contacted NCHS regarding this issue, but as of the writing of this paper we have not received a reply. In the absence of a reply, we surmise that the number of cancer deaths provided by NCHS, and used by SEER, is an underestimate – and it could be a significant underestimate.

An additional shortcoming of the cancer mortality data provided by NCHS to SEER is that once NCHS reports cancer deaths for a particular year, that is the final estimate provided by NCHS. There are not revisions or updating of those statistics. Since large data series typically need to be revised and updated

over time, we wonder about the quality and reliability of the death statistics of NCHS, and used by SEER, that undergoes no updating.

Finally, we point out that, given the aging population of the U.S., the age-adjusted cancer mortality rates (used in the analysis) will be lower than the actual/crude cancer mortality rates for the years 2001, 2002, and 2003.

**Number of Americans who Died from Cancer**

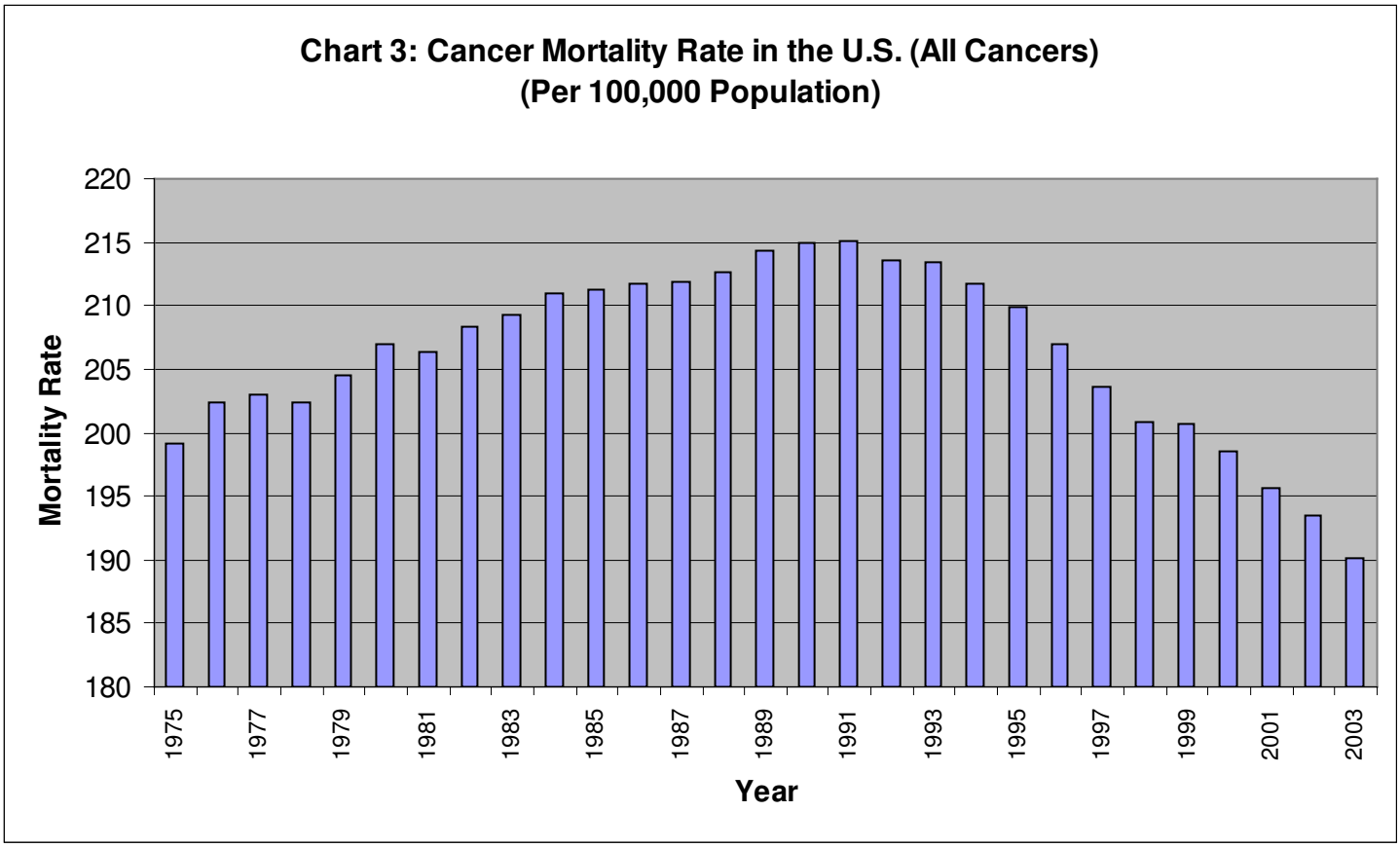
In order to calculate the total number of Americans who lost their lives to cancer annually, the annual mortality rates of Table 2 were multiplied by the annual population (in 100,000). The result is shown in column 3. These numbers also tell a story of failure. The numbers of Americans who died from cancer in 1975 was 430,002. That number did not decrease over time but, instead, increased steadily. By 1985, the number of Americans losing their life to cancer had surpassed 500,000 people per year. Moreover, this number continued to climb and reached 559,000 people by 1995; and it continued to increase, reaching the highest level at over 561,000 Americans dying from cancer in the year 2000.

A disturbing finding is that a much higher number of Americans lost their lives to cancer in 2003 – 553,244 – than in 1975 – 430,002. The total number of Americans who died from cancer, over 1975-2003, was 15 million. During the last decade of 1994-2003, almost 6 million lost their lives to cancer.

In putting the mortality numbers in a different perspective, it is a sad fact that the number of Americans who have been losing their lives to cancer, daily, during the 1990s and 2000s, reached the count of a World Trade Center building (9/11/2001 tragedy). It is as though the U.S. is stricken by a World Trade Center building catastrophe every day – with over 1,500 people dying from cancer. This number, unfortunately, translates into 63 Americans dying from cancer every hour of the day – which is 1 American dying from cancer every minute. These are indeed grim statistics that have been the terrible outcome from the failure of the U.S. cancer program. (The cancer death situation worsened over time since 1975.)

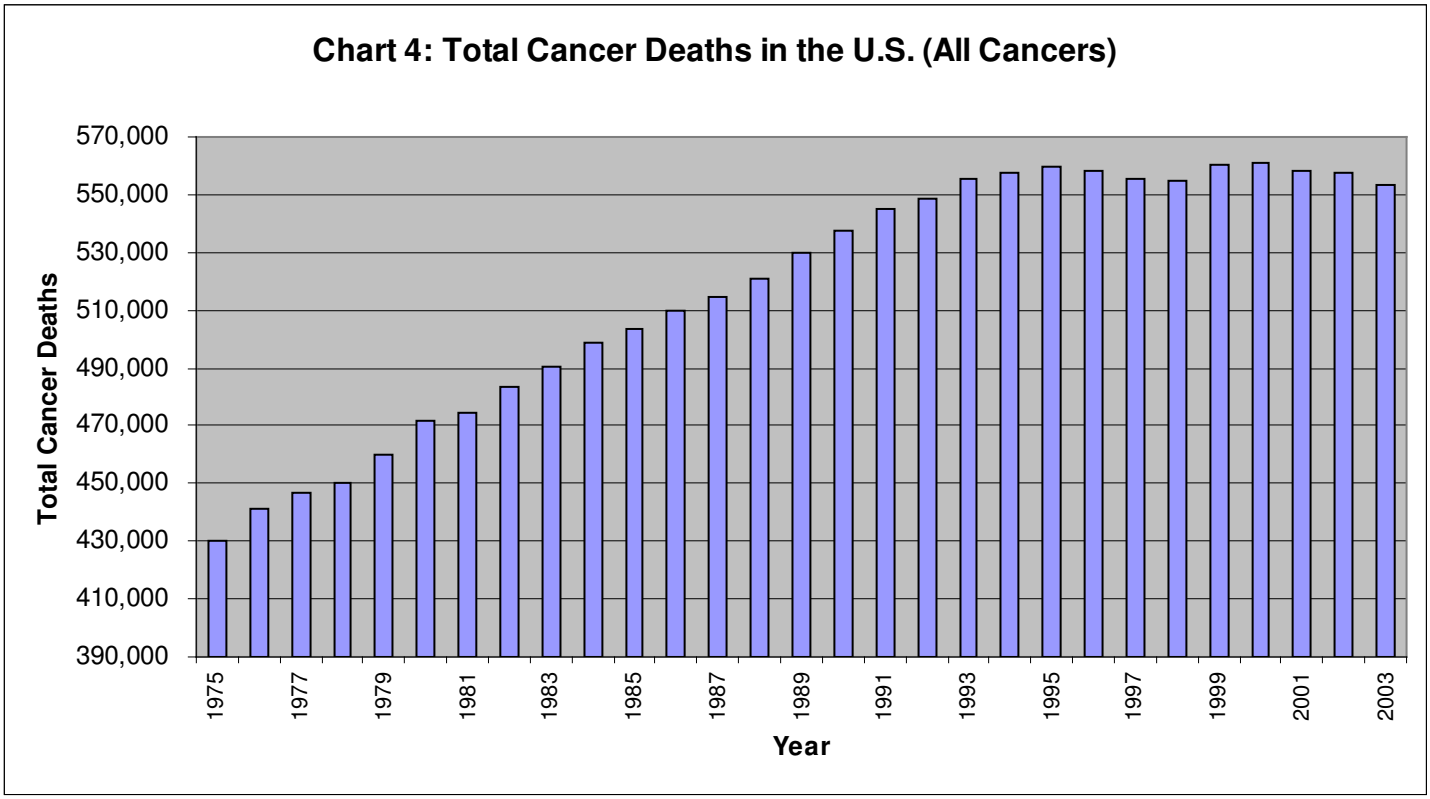
## Graphical Illustration of Cancer Mortality

The mortality rates of cancer in the U.S. are also shown graphically in Chart 3. From 1975, the bar heights showing the mortality rate continue to rise over time, reaching their highest level in 1991. That is, for 16 consecutive years after 1975 the number of Americans dying from cancer (per 100,000)




continued to rise.

The total numbers of Americans who lost their lives to cancer are shown graphically in Chart 4. There, it is observed that from 1975 the bar heights rise steadily over time – indicating an ever-increasing number of people dying from




cancer. The bar heights continued to rise and reach a peak in 2000.

We again note our reservations with the cancer mortality data provided by the NCHS and published by NCI/SEER. The officially-reported cancer mortality statistics can be substantially underestimated – as a result of erroneous markings on the death certificates, and because the cancer death statistics once recorded by the NCHS are not revised or updated.

## V. PROBABILITY OF AMERICANS GETTING CANCER

The third statistic examined in this study is the probability of an American getting cancer in his, or her, lifetime – over the 1975-2002 period. This statistic provides information into the future (future expectations) while the incidence and mortality rates provide information of the past. Information from the past would be used to provide information for the future.

These probabilities are shown in Table 3. Each probability relates to a three-year period and includes separate data for males and females. The numbers are the result of calculations by staff of the National Cancer Institute (SEER). In examining

**Table 3**

**PROBABILITY OF GETTING CANCER IN ONE'S LIFETIME IN THE U.S.A.**
**Lifetime Risk (Percent) of being Diagnosed with Cancer (Age group 0-95+)**

| Time Period | Male - Percentage | Female - Percentage |
|---|---|---|
| 1975-1977 | 33.67 | 34.33 |
| 1978-1980 | 35.88 | 34.60 |
| 1981-1983 | 37.95 | 36.04 |
| 1984-1986 | 39.71 | 38.31 |
| 1987-1989 | 42.83 | 39.77 |
| 1990-1992 | 49.64 | 41.02 |
| 1993-1995 | 47.04 | 40.65 |
| 1996-1998 | 46.78 | 42.51 |
| 1999-2001 | 48.07 | 42.41 |
| 2000-2002 | 47.72 | 42.09 |

Source: SEER Cancer Statistics Review 1975-2002.
Website: http://canques.seer.cancer.gov/

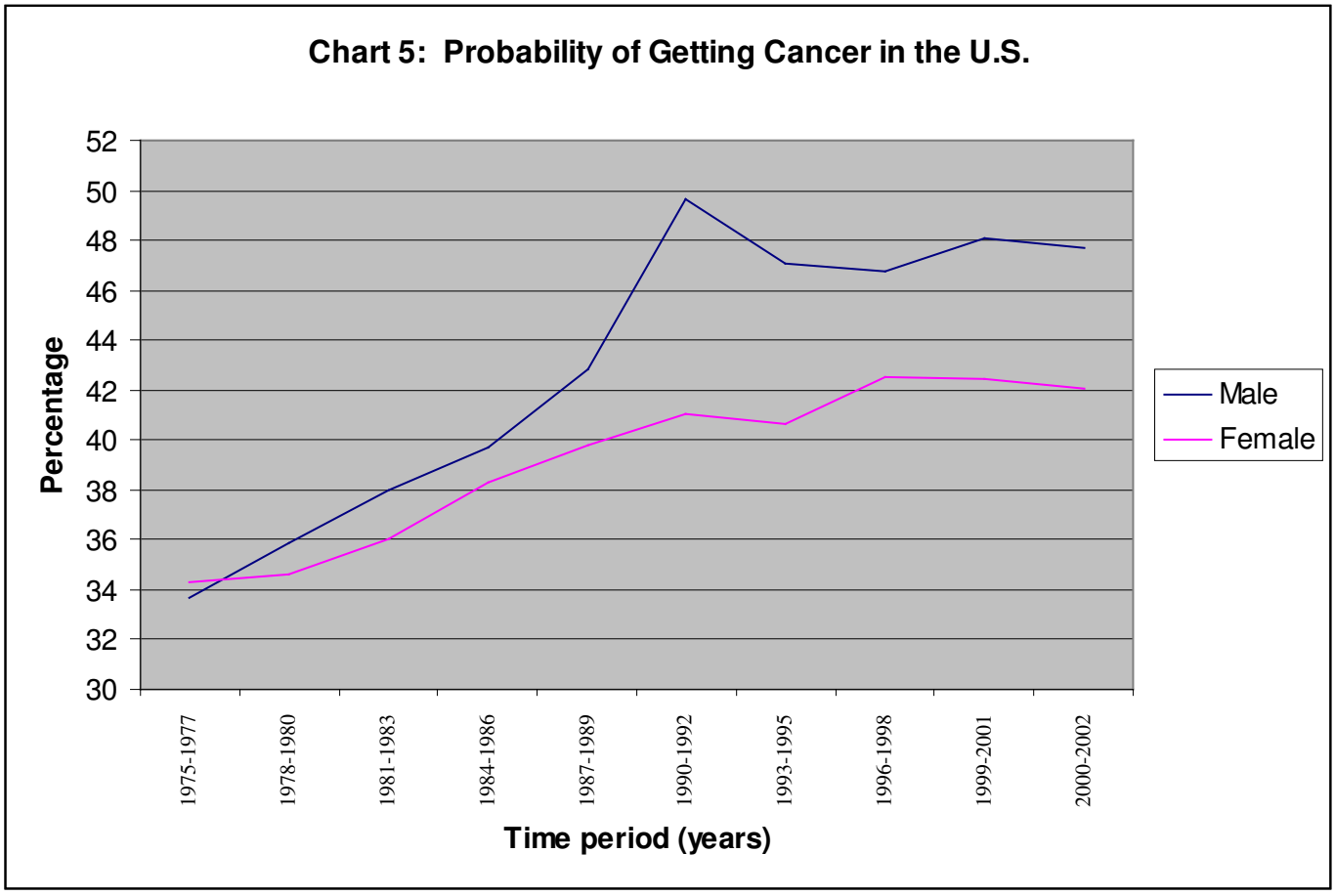
these numbers, we were astonished to find that these probabilities were already high in 1975-1977. We do not recollect such high numbers being publicized in the news media during that time.

With respect to men, during 1975-1977, the probability of a man getting cancer during his lifetime was 34 percent. That meant that one in three males would get cancer - already a bad enough situation. However, despite the NCI program, the probability for an American male of getting cancer climbed to a shocking 50 percent during the 1990-1992 period. This led to the extraordinary bad expectation for U.S. males that half of them would get cancer during their lifetime. To put it simply, if there were two males in a family, in 1990-1992, one of them

would be expected to get cancer during his lifetime. Since 1990, the probability of getting cancer for a American male has hovered in the range of 47-50 percent.

With respect to women, the situation is also dismal. During 1975-1977, a woman in the U.S. had a 34 percent probability of getting cancer in her lifetime. Unfortunately, this already high likelihood worsened substantially over time, so that by 2000-2002, the probability rose to 42 percent that a woman in the U.S. would get cancer. That means that 42 out of 100 women would get cancer.

The probabilities for a man or a woman in the U.S. of getting cancer are graphed in Chart 5. There, one readily observes the upward movement of both graphs - for men and women. This movement indicates the increasing probabilities for men and




women of getting cancer in their lifetime. In the last few years of analysis, there have been rather stagnant probabilities after the highest point reached in the 1990-1992 period;

however, these probabilities are based on cancer counts that are underestimates, due to reporting delays. Thus, it is very likely that these probabilities, reported by SEER, are erroneously lower than the true probabilities.

The rising slope of the graphs for men and women, over the period 1975-2002, indicate continual increases in the probabilities facing U.S. citizens in getting cancer in their lifetime. American men and women in the most recent 2000-2002 period were much more likely to get cancer in their lifetime than was the case in 1975-1977. This is very consistent with the ongoing scourge of cancer on the American people.

The dismal results of these probabilities have been observed by all of us as we continually see our parents, relatives, and friends afflicted by cancer in ever increasing numbers. Presently, cancer could strike anyone of us with a very high probability. The situation has deteriorated to the point where the question is not <u>whether</u> an American will get cancer; the question has now become <u>when</u> he or she will get cancer.

The reported data on cancer probabilities (by SEER) are also expected to be underestimates – particularly for years after 1992. The reason is that they are based on crude cancer incidence counts, and these counts are underestimated as a result of reporting delays in cancer cases. Therefore, the actual (correct) probabilities of getting cancer for an American male or female are even higher than those shown in Table 3 and Chart 5.

## VI. SHORT-TERM VS LONG-TERM CANCER STATISTICS

The cancer data presented in this study span 1975-2003, a period of 28 years. This results in an assessment of the cancer effects over the long-term, which provides for a more accurate and reliable assessment than a short-term evaluation.

When cancer statistics cover only a short time period – e.g., two to three years – one should be very careful in interpreting them, so as not to be misled, since a small period does not reveal the whole picture. Such a short time period is often observed in the cancer statistics presented in the news (newspapers, television, and Internet sources) which can create an inaccurate impression of the true cancer situation. For a valid assessment, data over the long-term should be used as the basic framework in which short-term cancer statistics can be

presented. This is especially true for what appear to be good news on the cancer situation – but really are not.

For example, if someone – such as the National Cancer Institute – were to make an announcement, stating that the cancer incidence rate declined from 1992 to 1993, that would be technically correct. But it would not provide the accurate long-term picture. If there was not also a statement of the incidence rate from 1975 until 1993, there would be an incomplete, inaccurate, and misleading picture provided of the cancer incidence.

To the average person uninformed of the long-term picture of cancer in the U.S., the isolated data for 1992 and 1993 would indicate an improvement (decline) in the cancer incidence rate. And the tendency of that person would be to think that the improvement was following other improvements (declines) in the incidence rate. That would be a very incorrect interpretation because, as we have shown in this study, the long-term, and accurate picture shows a grossly failing cancer program.

The same consideration applies to statistics announced to the public (through media) on mortality rates from cancer. These statistics typically provide a very short-term picture, and thus a limited and incomplete view of the cancer mortality situation. Such a narrow time period can be misleading and inaccurate. Any short-term statistics – particularly when they indicate an improvement in the cancer mortality rate – need to be placed in a framework that provides cancer mortality statistics over a long number of years – as we have done in this study.

Finally, any announcement relating to short-term statistics on cancer incidence – particularly when it presents a positive picture of cancer – should be suspect, due to the impact of reporting delays of cancer cases. These delays result in substantial undercounting of cancer cases and, thus, underestimates of cancer incidence.

## VII. IMPLICATIONS

### Implications of Increasing Cancer Incidence and Mortality

The cancer incidence (cancer occurrence) is related to the **prevention** of cancer; an increasing incidence rate indicates a lack of prevention of cancer. The cancer mortality relates to the effectiveness of the **treatments** for cancer. An increasing

mortality rate shows a lack of effectiveness in cancer treatment. If the cancer prevention program of the U.S. had been effective, there would have been a significant reduction in the cancer incidence rate since 1975. However, instead of decreases in the rate, there have been increases in the incidence rate over time. And this resulted in the total number of Americans getting cancer to steadily and continually increase. Therefore, the program of the National Cancer Institute toward cancer prevention has been a gross and dismal failure; and Americans have been, and are, paying a heavy price for this failure – as more and more of them are afflicted by cancer.

With regard to the cancer mortality rate, that rate increased from 1975 until 2000. That shows a gross failure of the NCI's program toward the treatment of cancer during that time period. And more Americans have paid with their lives for this failure. Moreover, the officially-reported cancer death rates may well be (substantially) underestimated, as previously discussed.

## VIII. THE BUDGET OF THE NATIONAL CANCER INSTITUTE

The people of the United States have been making a very big investment in the anti-cancer program, through the budget of the National Cancer Institute. The funds provided to the NCI are shown in Table 4 and these data show the rapid increase in the

**Table 4**

**NCI Budget**

| Year | Appropriations (Thousands of dollars) | Growth – Percentage |
|---|---|---|
| 1975 | $ 691,666 | |
| 1976 | $ 914,628 | 32.2 |
| 1977 | $ 815,000 | -10.9 |
| 1978 | $ 872,388 | 7.0 |
| 1979 | $ 937,129 | 7.4 |
| 1980 | $ 1,000,000 | 6.7 |

| | | |
|---|---|---|
| 1981 | $ 989,355 | -1.1 |
| 1982 | $ 986,617 | -0.3 |
| 1983 | $ 987,642 | 0.1 |
| 1984 | $ 1,081,581 | 9.5 |
| 1985 | $ 1,183,806 | 9.5 |
| 1986 | $ 1,264,159 | 6.8 |
| 1987 | $ 1,402,837 | 11.0 |
| 1988 | $ 1,469,327 | 4.7 |
| 1989 | $ 1,593,536 | 8.5 |
| 1990 | $ 1,664,000 | 4.4 |
| 1991 | $ 1,766,324 | 6.1 |
| 1992 | $ 1,989,278 | 12.6 |
| 1993 | $ 2,007,483 | 0.9 |
| 1994 | $ 2,082,267 | 3.7 |
| 1995 | $ 2,135,119 | 2.5 |
| 1996 | $ 2,251,084 | 5.4 |
| 1997 | $ 2,382,532 | 5.8 |
| 1998 | $ 2,547,314 | 6.9 |
| 1999 | $ 2,927,187 | 14.9 |
| 2000 | $ 3,332,317 | 13.8 |
| 2001 | $ 3,757,242 | 12.8 |
| 2002 | $ 4,190,405 | 11.5 |
| 2003 | $ 4,622,394 | 10.3 |
| | | |
| TOTAL: | $ 53,844,617 | |
| | | |
| | | |
| Average annual growth rate (1975-2003) | | 7.3 |
| | | |
| Source: National Cancer Institute, Financial Management Branch. | | |
| | | |
| | | |

monies provided to the NCI from 1975 to 2003 (these funds continued to increase beyond 2003). The NCI appropriations rose, almost continually over time, from $691,660,000 in 1975 to $4.62 million in 2003 (and continued to increase in 2005). The total amount of monies given to NCI over 1975 to 2003 sum to $53 billion – a very large amount indeed, by any standard. The monies going to the National Cancer Institute increased, on the

average, every year by 7.3 percent. That is a rapid rate of increase.

However, these increases in the NCI budget were accompanied – to our shock and dismay – by increases in the cancer incidence rate, in the cancer mortality rate, and in the probability of an American (male or female) of getting cancer in their lifetime. One would have expected to observe that as more monies were provided to the NCI, fewer Americans would have been afflicted by cancer and fewer would have died from the disease. Sadly, the opposite happened and that is a national disgrace and failure. Given these failing results, over so many years, one cannot understand why the NCI leadership did not finally understand the failing performance of its programs of cancer prevention and cancer treatment. Common sense would dictate that if something doesn't work, it should be changed. This obviously did not happen for the failing U.S. cancer program.

From a health economics perspective, one could ask, "What did the American people get in return for their huge investment in the federal cancer agency?" Typically, people would not give money to an agency or enterprise that did not provide the service it was supposed to deliver. In fact, they would go elsewhere to obtain that service, and the ineffective agency would eventually go out of business. What doesn't make sense is that the NCI program failed the American people, and instead of "going out of business," it was funded at even higher levels over time.

If the cancer incidence rate were decreasing over time, that would indicate a positive rate of return to investment in the NCI activities to prevent cancer. If the incidence rate had stayed constant over time, since its level in 1975, that would indicate a zero rate of return in the NCI's activities to prevent cancer. By contrast, however, the cancer incidence rate increased over time; this worsening of the rate indicates a negative rate of return in the NCI's cancer prevention activities – that is, a failure in the cancer prevention program of that agency.

With regard to the treatment for cancer, the big investment of the country in the NCI program has had a near zero return, in terms of benefits (lowering cancer mortality rates) over the 25-year period since 1975. This is the aggregate picture of all cancers combined. If there were some positive outcomes for some cancers, these effects were more than offset by ever-worse outcomes of other cancers.

## IX. OTHER STUDIES ON THE U.S. CANCER PROGRAM

Other studies have found results similar to those of this study. A study in the 1980s by two Harvard scientists also noted the dismal record of the U.S. campaign/NCI to eradicate cancer in the U.S. (Bailar and Smith, 1986, pp. 1226-32). They pointed out that there is "no evidence that some 35 years of intense and growing efforts to improve the treatment of cancer have had much overall effect on the most fundamental measure of clinical outcome - death." Another more recent update of these results by Bailar and Gornick showed that age-adjusted mortality due to cancer in 1994 was 6.0% higher than in 1970 (Bailar and Gornick, 1997, p. 1569).

Another study of the issue is available in the recent book by G. Faquet, M.D. (The War on Cancer - An Anatomy of Failure, 2005). In that work, Dr. Faquet states that "The message of this book is that, contrary to recurrent announcements of breakthroughs in the *War on Cancer* designated to influence policy makers and impress the public, little progress has been made in the treatment of cancer since the enactment of the *National Cancer Act of 1971*" (p. 1).

Also, in chapter 7, Dr. Faquet states "In conclusion, an objective analysis of cancer chemotherapy outcomes over the last three decades reveals that, despite vast human and financial expenditures, the cell-killing paradigm has failed to achieve its objective, the former rallying phrase *War on Cancer* has been abandoned by the NCI, and the conquest of cancer remains a distant and elusive goal" (p. 89). He also writes, "… the three crucial measures of progress in the War on Cancer, cure rates, prolongation of survival, and quality of life, remain stagnant despite enactment of the National Cancer Act of 1971" (p. 93).

In addition, Dr. S. Epstein has been a persistent critic of the anti-cancer program as carried out by the National Cancer Institute. His assessments point out the failings of the programs of NCI in the prevention and in the treatment sides. He argues for a much stronger cancer prevention program by NCI. Such a program would reduce the exposure of Americans to industrial chemicals. It would also entail a much better management of technologies which have resulted in progressive contamination of air, water, soil, food, and workplaces with carcinogenic chemicals (Epstein, 2006).

In addition, a relatively recent article by Clifton Leaf presents a critical assessment, and a significant and very convincing amount of evidence to show "Why We're Losing The War On Cancer" (Leaf, 2004). In this article, Mr. Leaf evaluates the treatment side of the cancer program, led by NCI. He notes that even adjusting for age (age-adjusted rates), the death rates of Americans dying from cancer (per 100,000) was about the same in 2002 as it was in 1970 – and in 1950.

Leaf talked to various experts on the reasons why the cancer program is not working. Consequently, he concluded that, when taken together, their testimony describes a dysfunctional "cancer culture" which results in attempts to find the tiniest improvement in existing treatments rather than genuine breakthroughs, and rewards academic publications over everything else. And he points out that "research has become increasingly narrow, so much so that physician-scientists who want to think systematically about cancer or the organism as a whole – or who might have completely new approaches – often can't get funding."

Therefore, studies by other researchers have pointed out that the cancer program of the U.S. – guided by NCI – has been a failure, and this refers to both the prevention side and the treatment side.

## X. CONCLUSIONS

The National Cancer Institute has been the lead government agency in the fight against cancer. Over the period of analysis – 1975 to 2003 – the program pursued by the NCI was funded by very large and increasing amounts of funds. One would expect that this would be accompanied by decreases in the cancer incidence and mortality rate of the country, and in the total number of people dying from cancer.

This study assesses the U.S. cancer program, as guided by the NCI, by examining three basic measures of that program. These measures are: 1) the cancer incidence rate; 2) the cancer mortality rate; and 3) the probability of getting cancer for a male or a female.

The findings of our research on the impacts of cancer on Americans are grim and shocking. The situation since 1975, of the effects of cancer on the people, has been continuously and steadily worsening – with the following dismal outcomes:

1) The reported incidence rate of Americans getting cancer (per 100,000 persons) in 2003 was 460, as compared to 400 in 1975. That is a significant worsening/increase of cancer occurrence in the U.S. However, the situation is even worse because of the delays in the reporting of cancer cases. The reported cancer incidence in 2003 is actually an underestimate of the correct incidence – due to delayed reporting of cancer cases – and is more likely to be 494 per 100,000.

2) Given the reported cancer incidence rates, many more Americans got cancer (absolute numbers) in 2003 – 1,337,565 – than in 1975 – 864,540. Moreover, with the adjustment for the delayed reporting, the number increases further to 1,437,969 people getting cancer in 2003.

3) Over the period of analysis, 1975-2003, the reported cancer incidence rate increased at an average annual rate of 0.5 percent. This positive growth rate means that the number of people diagnosed with cancer every year was increasing faster than the population of the country. Moreover, this growth rate will be even higher with the higher cancer counts, adjusted for reporting delays of cancer cases (1993 to 2003). In addition, the total number of Americans afflicted by cancer increased every year (of 1975-2003) by 1.6 percent. That number would also be higher after adjusting the cancer incidence rate for reporting delays.

4) During each of the 25 years since 1975 – until 2001 – more Americans died from cancer, per 100,000, than in 1975. Also, many more Americans died from cancer in 2003 – 553,244 – than in 1975 – 430,002. Furthermore, we surmise that the number of cancer mortality rates reported by SEER are an underestimate due to the likely misses of cancer deaths when they are marked in the IMMEDIATE CAUSE section of the death certificate rather than the UNDERLYING CAUSE section; this shortcoming can result in a substantial undercounting of cancer deaths. Another shortcoming of the cancer mortality data provided by NCHS to SEER is that once NCHS reports cancer deaths for a particular year, that is the final estimate provided. There are not revisions or updating of those statistics. Given that possibility of missing cancer death cases on the death certificate, and the fact that NCHS death statistics are not revised, we wonder about the quality and reliability of the NCHS death statistics reported by NCI/SEER – particularly with regard to undercounting cancer deaths.

It is a disturbing fact that the number of Americans who have been losing their lives to cancer, in the 1990s and 2000s – on a daily basis – reached the count of a World Trade Center tower tragedy, at 1,500 people dying. This number translates into 63 Americans dying from cancer every hour of the day – which is 1 American dying from cancer every minute of each hour. These are indeed grim statistics, attributable to the failure of the cancer program.

5) The total number of people in the U.S. who lost their lives to cancer also increased annually at an average rate of 0.9 percent. The dismal result of these increases was that at the end of the period, 2003, many more people were dying from cancer than died in the first year of the analysis period, 1975.

6) Over the period of analysis (1975–2003), a total of 33 million Americans were afflicted by cancer. Even this is an underestimate due to delayed reporting of cancer cases; the actual number would be considerably higher. During that period, a total of 15 million Americans lost their lives to the disease. The ratio between these two numbers provides an approximation of those who die in relation to those afflicted by cancer – at 45 percent. That is, almost half of those who get cancer will eventually die from it. This is a grim statistic for all Americans.

7) As of 2002, American males faced a staggering probability, close to 50 percent, of contracting cancer in their lifetime, while American females were facing a 42 percent probability of getting cancer in their lifetime. Moreover, these probabilities have been getting worse over time. By contrast, the probability in 1975–1977 for an American man or woman to contract cancer was 34 percent (which was already a high number). Furthermore, the actual probabilities are higher since cancer probabilities are calculated from incidence rates and these are underestimated due to reporting delays.

There are a number of shortcomings with the existing cancer data. With regard to the data on cancer incidence rates, the problems refer to reporting delays of cancer cases, and the use of age-adjusted rates. Delays in the reporting of cancer cases result in significant underestimates of cancer cases, for a particular year, leading to underestimates of the cancer incidence rate.

Another shortcoming is that cancer data are presented only in age-adjusted format and not in their actual format. The age-

adjustment hides the actual cancer situation (with 2000 as the benchmark year) and results in lower incidence rates, and mortality rates, for years 2001, 2002, and 2003. By presenting only age-adjusted cancer data, official statistics hide the impact of cancer occurrence from an increasingly carcinogenic environment. This is a very important shortcoming. In order to show a more comprehensive and accurate cancer picture, official cancer statistics should present, on an annual basis, both actual/crude and age-adjusted cancer data (incidence and mortality data).

With regard to problems with the cancer mortality data, these data that NCHS provides to SEER have a strong likelihood of being incomplete and underestimates. This would be the result of missed cancer death cases when the wrong line is marked on the death certificate. In such a situation, the case will not be counted as a cancer death and the cancer death counts in the U.S. will be underestimated – leading to an undercounting of the U.S. mortality rate.

Another data shortcoming is that the probabilities of an American male or female of getting cancer in their lifetime, calculated and reported by NCI/SEER, are also underestimates. This is due to these probabilities being based on actual (crude) cancer counts, and these counts are underestimated as a result of reporting delays of cancer cases.

Despite these data shortcomings – that result in significant underestimates of cancer statistics – even the existing official cancer data show a dismal situation with respect to cancer prevention and treatment. The grim statistics are typically not depicted in the news media. Over the years, the news media has focused on diseases resulting in relatively small numbers of deaths, like the bird flu, and have ignored the horrendous fact that millions of Americans have died, and continue to die, from cancer.

If the cancer program worked, positive benefits to Americans would have been shown by a decrease in the cancer incidence rate from its level in 1975. That did not happen; on the contrary, the rate increased. Even a rudimentary evaluation of the costs of the NCI compared to the benefits obtained by the American people would conclude that it has been a horribly inefficient use of national funds.

A single main recommendation arises from the big and continuing failure of the NCI cancer program: The National

Cancer Institute to be drastically restructured and its programs to be significantly changed, in order to develop and make effective programs of **prevention** and programs of **treatment** of cancer. The American people have been paying too high a price – with their lives – for an extremely misguided and ineffective cancer program.

**REFERENCES**


Bailar, John C. III, and Elaine M. Smith. "Progress Against Cancer?" The New England Journal of Medicine. Vol. 314, No. 19, May 8, 1986, pp. 1226-1232.

Bailar, John C. III, M.D., Ph.D., and Heather L. Gornick, M.H.S. "Cancer Undefeated." The New England Journal of Medicine. Vol. 336, No. 22, May 29, 1997, pp. 1569-1574.

Clegg, Limin X., Feuer, Eric J., Midthune, Douglas N., Hankey, Benjamin F. "Impact of Reporting Delay and Reporting Error on Cancer Incidence Rates and Trends." Journal of the National Cancer Institute. Vol. 94, No. 20, Oct. 16, 2002, pp. 1537-1545.

Engel, Linda W., Strauchen, James A., Chiazze, Leonard Jr., and Heid, Marian. "Accuracy of Death Certification in an Autopsied Population with Specific Attention to Malignant Neoplasms and Vascular Diseases." American Journal of Epidemiology. Vol. 111, No. 1, 1980, pp. 99-112.

Epstein, Samuel S. Cancer-Gate, How to Win the Losing Cancer War. Amityville, NY: Baywood Publishing Company, 2005.

Faquet, Guy B., M.D. The War on Cancer – An Anatomy of Failure – A Blueprint for the Future. Dordrecht, The Netherlands: Springer, 2005.

Landrigan, Philip J., M.D., M.Sc. "Commentary: Environmental Disease – A Preventable Epidemic." American Journal of Public Health. Vol. 82, No. 7, July 1992, pp. 941-943.

Leaf, Clifton. "Why We're Losing The War On Cancer." Fortune. March 22, 2004.

National Cancer Institute (NCI). Surveillance, Epidemiology and End Results (SEER), 1975-2002. Available on these Internet sites of the NCI – http://canques.seer.cancer.gov/ and

http://seer.cancer.gov/csr/1975_2003/results_merged/topic_annual rates.pdf

National Cancer Institute, Financial Management Branch – personal communication.

National Cancer Institute, website, for data on skin cancer: www.cancer.gov/cancertopics/types/skin.
National Safety Council, website: htttp://www.nsc.org/EHC/sunwise/health.htm.

Percy, Constance, Stanek, Edward III, and Gloeckler, Lynn. "Accuracy of cancer death certificates and its effect on cancer mortality statistics." American Journal of Public Health. Vol. 71, No. 3, March 1981, pp. 242-250.

United States Bureau of the Census. Statistical Abstract of the United States: 2006; section on Population.

United States, Government Accountability Office. "CHEMICAL REGULATION – Options Exist to Improve EPA's Ability to Assess Health Risks and Manage Its Chemical Review Program"; June 2005; GAO-05-458.

University of Maryland Medical Center; website: http://www.umn.edu/ency/article/000824.htm.

NOTE: The criticisms levied in this paper are towards the top-level decision makers of the NCI cancer program and not for the civil servants at NCI.

## APPENDIX A

## ADJUSTMENTS FOR REPORTING DELAYS OF CANCER COUNTS

| Year | SEER Cancer incidence rate '(1) | Adjustment percentage for reporting delay '(2) | Incidence rate adjusted for reporting delay '(3) | U.S. Population '(4) | Total number of people with cancer – adjusted for reporting delays '(5) |
|---|---|---|---|---|---|
| 1992 | 509.8 | | 509.8 | 256,894,000 | 1,309,646 |
| 1993 | 492.6 | 0.007 | 496.05 | 260,255,000 | 1,290,990 |
| 1994 | 482.5 | 0.014 | 489.26 | 263,436,000 | 1,288,874 |
| 1995 | 475.5 | 0.020 | 485.01 | 266,557,000 | 1,292,828 |
| 1996 | 477.3 | 0.027 | 490.19 | 269,667,000 | 1,321,873 |
| 1997 | 484.3 | 0.034 | 500.77 | 272,912,000 | 1,366,651 |
| 1998 | 485.7 | 0.041 | 505.61 | 276,115,000 | 1,396,075 |
| 1999 | 487.6 | 0.048 | 511.00 | 279,295,000 | 1,427,211 |
| 2000 | 481.9 | 0.054 | 507.92 | 282,402,000 | 1,434,384 |
| 2001 | 483.7 | 0.061 | 513.21 | 285,329,000 | 1,464,325 |
| 2002 | 478.9 | 0.068 | 511.47 | 288,173,000 | 1,473,905 |
| 2003 | 459.6 | 0.075 | 494.07 | 291,028,000 | 1,437,882 |

Note: Author's calculation from data obtained from Clegg et. al., 2002. The adjustments to the cancer incidence rate reported by SEER, for reporting delays of cancer cases, are based on an estimated average missed percentage of cancer cases of 7.5% for the year 2003, and on the estimated 11 years from the initially-reported cancer cases until these cases reach 99% of the eventual total. This means that cancer cases for 1993 (and, thus, the cancer incidence rates) are initially underestimated substantially and eventually reach 99% of the correct total in 2003.

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## APPENDIX B

**Actual and Age-Adjusted Cancer Data**

Official cancer statistics of SEER/NCI are presented in age-adjusted rates, rather than actual (crude) rates. These official statistics do not show both sets of rates. In deriving a cancer-incidence rate, the number of cancer cases, in a given

time period (e.g., a year), is divided by the population from which the cancer cases came. The result is the actual (crude) cancer incidence rate. That rate is typically expressed per 100,000 population.

Besides the actual incidence rate, the rate can also be age-adjusted. That rate expresses the number of cancer cases that would be expected in the population if the age distribution of the population did not change over time. In this calculation, the actual incidence rate for each age-specific bracket is weighted (multiplied) by the age-distribution of a "standard" population. The same age distribution is used as weights for each year of analysis.

The justification for age-adjusted rates is based on the rationale that older people get cancer more than younger people do. Thus, when the population of a country ages – which is the case for the U.S. – the cancer incidence will increase, affected by the greater number (percentage) of the older citizens. SEER/ NCI adjusts for this and calculates cancer incidence as though the population structure did not change over time.

We believe that the age adjustment justification is on weak grounds, when it relates to cancer data over time of a country – such as the data used in this study. An implicit assumption of the age adjustment is that the environmental pollution remains the same in the U.S. as years pass, whereas in fact, the environment has been becoming increasingly carcinogenic. There is broad consensus that cancer is the result of carcinogens in the environment – in the air, water, and land. And these carcinogens have been increasing over time. Consequently, older Americans have been exposed to these carcinogens for much longer periods of time than younger people. Eventually, they succumb to increased attacks on their immune system by exposure to more and more carcinogens, and the result is cancer.

Consequently, there are two components to an increasing cancer incidence in older people: 1) the link between **age** and cancer – with a **constant** level of carcinogenic background; and 2) the link between an **increasing** carcinogenic environment and cancer. Using age-adjusted data hides the impact of an increasing carcinogenic environment on cancer incidence rates.

A result of the age-adjustment is that with an aging population, the age-adjusted incidence rate or mortality rate will be lower than the actual (non age-adjusted) rate, in the years following the year whose population is used as the

standard population. Consequently, when the 2000 U.S. population is used as the standard population for age-adjustment (which is used presently by SEER), the result will be lower age-adjusted cancer incidence rates or mortality rates in the years following 2000 as compared to the actual (non age-adjusted) rates.

One could argue that the actual data - on cancer incidence (or mortality) rates that have not been adjusted for age - would be preferable as they would show the actual situation on the numbers of aging people getting cancer and dying from cancer. Actual data (non age-adjusted) on cancer incidence rates and cancer mortality rates are not readily presented in official statistics of SEER/NCI. There are difficulties to accessing such data, which could be considered barriers. Such barriers should not exist. The authors recommend that, at a minimum, SEER/NCI/ present both the actual (crude) incidence and mortality rates of cancer and the age-adjusted ones, on an annual basis. Then, the public would be better informed of the comprehensive, and more correct, situation on cancer. The current situation can easily mislead the public who - not being aware of the meaning and calculations behind age adjustments - can easily misinterpret the publicly available cancer rates as the actual ones.

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**Note about future papers**

We plan to write additional papers on cancer in the future. They will address several key areas: 1) Causes of cancer; 2) Treatments for cancer; and 3) Recommendations for individuals and the government.

*Readers that have comments on this paper can send them to the authors at: cancer_paper(at)yahoo.com*

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