Major Trends in Cancer: 25 Year Survey

Edwin Silverberg, B.S., and
Arthur I. Holleb, M.D.

> Overall survival rates for some cancers have increased, and for most cancers have leveled off in the past 25 years. Dramatic increases in survival have occurred for cancers of the prostate, uterine corpus, thyroid, kidney, bladder and larynx, as well as for melanoma of the skin, Hodgkin’s disease and chronic leukemia.

> Age-adjusted cancer death rates have generally leveled off, as well. For some cancers—uterus, rectum, stomach, bladder (female) and lip (male)—mortality rates have decreased. In others, such as lung, ovary and pancreas, death rates have steadily increased.

> The overall incidence of cancer (excluding carcinoma in situ of the uterine cervix and non-melanoma skin cancer) has decreased slightly during this period. Cancers of the stomach, esophagus, rectum, uterus, ovary and bladder (female) have declined, while cancers of the lung, pancreas, colon (male), prostate and bladder (male) have increased.

Clearly, significant progress has been made. Twenty-five years ago, one in four patients with cancer survived five years. Today, one in three will be saved, a gain of some 55,000 lives each year.

Such success can largely be attributed to three factors: the diagnosis of more cancers in an early, localized stage; the treatment of more patients within four months of diagnosis; and the development of new diagnostic and therapeutic modalities, especially the increased use of chemotherapy. (Table 1.) Yet despite these advances, in 1975 an estimated 111,000 patients will die of cancer who might have been saved by available methods of early detection followed by prompt treatment.

In the following survey of cancer trends, the data on survival, treatment and staging of disease at diagnosis have been compiled from information collected by the End Results Section of the National Cancer Institute and from collaborating hospitals.1-2 (Table 2.) Mortality rates are from the National Center for Health Statistics of the United States Public Health Service.4,5 (Table 3.) Incidence data are from the national cancer surveys of the National Cancer Institute.6 (Table 4.) These statistics are presented for the white population only, since not all of the data for nonwhites is available.

Survival

Most cancer sites showed an initial increase in survival from the 1940’s to the 1950’s with a general leveling off from the 1950’s to the 1960’s. However, five-year survival rates have continued to increase steadily from the 1940’s to the
| Cancer Site | Surgery | Radiation | Surgery + Radiation | Chemotherapy + Hormones | Chemotherapy + Surgery | Chemotherapy + Hormones + Radiation | Chemotherapy + Hormones + Surgery + Radiation | No Rx† |
|-------------|---------|-----------|---------------------|------------------------|------------------------|-------------------------------------|----------------------------------------------|-------|
| Colon       | 1940-49 (M) | 58        | 1                   | 1                      | 3                      | 4                                   | 15                                           | 40    |
|             | 1965-69 (M) | 78        | 1                   | 1                      | 3                      | 4                                   | 15                                           | 12    |
|             | 1940-49 (F) | 62        | 1                   | 1                      | 2                      | 4                                   | 15                                           | 36    |
|             | 1965-69 (F) | 77        | 1                   | 1                      | 2                      | 6                                   | 15                                           | 13    |
| Rectum      | 1940-49 (M) | 54        | 4                   | 1                      | 2                      | 2                                   | 15                                           | 40    |
|             | 1965-69 (M) | 71        | 4                   | 3                      | 2                      | 2                                   | 15                                           | 15    |
|             | 1940-49 (F) | 58        | 5                   | 2                      | 2                      | 1                                   | 15                                           | 35    |
|             | 1965-69 (F) | 67        | 4                   | 3                      | 2                      | 8                                   | 15                                           | 15    |
| Stomach     | 1940-49 (M) | 32        | 2                   | 1                      | 10                     | 2                                   | 15                                           | 65    |
|             | 1965-69 (M) | 42        | 4                   | 2                      | 10                     | 2                                   | 15                                           | 37    |
|             | 1940-49 (F) | 31        | 2                   | 2                      | 3                      | 4                                   | 15                                           | 66    |
|             | 1965-69 (F) | 43        | 3                   | 3                      | 2                      | 3                                   | 15                                           | 38    |
| Esophagus   | 1940-49 (M) | 13        | 18                  | 3                      | 1                      | 1                                   | 15                                           | 66    |
|             | 1965-69 (M) | 12        | 54                  | 6                      | 1                      | 3                                   | 15                                           | 23    |
|             | 1940-49 (F) | 16        | 18                  | 4                      | 1                      | 4                                   | 15                                           | 62    |
|             | 1965-69 (F) | 13        | 54                  | 8                      | 1                      | 4                                   | 15                                           | 19    |
| Pancreas    | 1955-64 (M) | 7         | 5                   | 7                      | 1                      | 1                                   | 15                                           | 79    |
|             | 1965-69 (M) | 9         | 3                   | 12                     | 1                      | 2                                   | 15                                           | 73    |
|             | 1955-64 (F) | 8         | 3                   | 6                      | 1                      | 2                                   | 15                                           | 81    |
|             | 1965-69 (F) | 8         | 3                   | 11                     | 1                      | 1                                   | 15                                           | 75    |
| Lung        | 1940-49 (M) | 13        | 21                  | 7                      | 1                      | 6                                   | 15                                           | 63    |
|             | 1965-69 (M) | 18        | 36                  | 7                      | 1                      | 6                                   | 15                                           | 25    |
|             | 1940-49 (F) | 12        | 17                  | 1                      | 1                      | 6                                   | 15                                           | 69    |
|             | 1965-69 (F) | 21        | 33                  | 8                      | 1                      | 7                                   | 15                                           | 22    |
| Breast      | 1940-49 (F) | 60        | 9                   | 19                     | 2                      | 5                                   | 15                                           | 9     |
|             | 1965-69 (F) | 53        | 3                   | 27                     | 2                      | 5                                   | 15                                           | 3     |
| Uterine Cervix | 1940-49 (F) | 6        | 79                  | 5                      | 2                      | 5                                   | 15                                           | 9     |
|             | 1965-69 (F) | 8        | 72                  | 3                      | 1                      | 4                                   | 15                                           | 5     |
| Uterine Corpus | 1940-49 (F) | 31       | 33                  | 23                     | 2                      | 5                                   | 15                                           | 11    |
|             | 1965-69 (F) | 13       | 13                  | 6                      | 2                      | 3                                   | 15                                           | 3     |
| Ovary       | 1940-49 (F) | 38        | 13                  | 21                     | 9                      | 18                                  | 15                                           | 27    |
|             | 1965-69 (F) | 15        | 7                   | 15                     | 9                      | 18                                  | 15                                           | 8     |
| Prostate    | 1940-49 (M) | 34        | 2                    | 2                      | 19                     | 25                                  | 15                                           | 17    |
|             | 1965-69 (M) | 23        | 2                    | 2                      | 24                     | 35                                  | 15                                           | 6     |
| Bladder     | 1940-49 (M) | 64        | 7                    | 11                     | 3                      | 1                                   | 15                                           | 17    |
|             | 1965-69 (M) | 68        | 6                    | 16                     | 3                      | 1                                   | 15                                           | 5     |
|             | 1940-49 (F) | 56        | 12                   | 10                     | 3                      | 1                                   | 15                                           | 22    |
|             | 1965-69 (F) | 65        | 9                    | 14                     | 1                      | 4                                   | 15                                           | 7     |

*White Population
**M = Male, F = Female
† No tumor directed therapy within four months of diagnosis.
Source: End Results Group, National Cancer Institute, 1940-1949 and 1965-1969.
1960’s for the following cancers:
- Prostate: 37 percent to 56 percent
- Uterine Corpus: 61 percent to 74 percent
- Thyroid: 64 percent to 85 percent
- Kidney: 26 percent to 42 percent
- Bladder: 42 percent to 61 percent
- Larynx: 41 percent to 62 percent
- Melanoma (skin): 41 percent to 66 percent
- Hodgkin’s disease: 25 percent to 54 percent
- Chronic leukemia: 15 percent to 30 percent

The increased use of chemotherapy has played a major role in higher survival rates for cancers of the prostate, uterine corpus, thyroid and kidney, as well as Hodgkin’s disease and leukemia. (Table 1.) A larger percentage of melanomas of the skin, cancers of the prostate, uterine corpus, bladder and larynx are being diagnosed in a localized stage, and more cases are being treated within four months of diagnosis.

Five-year survival rates for all breast cancer patients increased significantly from 53 percent in 1940–1949 to 60 percent in 1950–1959. Since then, however, increase has been slight, and a plateau seems to have been reached. The percentage of cancers diagnosed in a localized stage gradually increased, but has now leveled off; in 1965–1969, 47 percent of breast cancers were diagnosed as localized tumors. The survival rate for those 40 percent of patients with breast cancer which has spread to regional lymph nodes and adjacent tissue improved sharply from the 1940’s to the 1950’s and has slowly continued to improve since then, largely due to changes in treatment. Since 1950, there has been a decrease in the number of patients receiving surgery alone, and an increase in those who receive adjuvant therapy with radiation, chemotherapy and/or hormones. (Table 1.)

Nevertheless, while survival rates
Table 3.  
Death Rates* for Selected Sites  
White Population by Sex  
United States, 1950-1970

| Site   | Year | Male | Female | Site   | Year | Male | Female |
|--------|------|------|--------|--------|------|------|--------|
| Colon  | 1950 | 14.8 | 16.4   |        |      |      |        |
|        | 1955 | 14.9 | 15.8   |        |      |      |        |
|        | 1960 | 15.0 | 15.2   |        |      |      |        |
|        | 1965 | 16.1 | 14.8   |        |      |      |        |
|        | 1970 | 16.4 | 14.4   |        |      |      |        |
| Breast | 1950 |     |        |        |      | 24.5 |        |
|        | 1955 |     |        |        |      | 25.1 |        |
|        | 1960 |     |        |        |      | 24.3 |        |
|        | 1965 |     |        |        |      | 25.0 |        |
|        | 1970 |     |        |        |      | 25.3 |        |
| Rectum | 1950 | 8.4  | 5.6    |        |      | 15.8 |        |
|        | 1955 | 7.9  | 5.3    |        |      | 15.8 |        |
|        | 1960 | 6.9  | 4.5    |        |      | 13.3 |        |
|        | 1965 | 6.2  | 3.8    |        |      | 11.8 |        |
|        | 1970 | 5.7  | 3.3    |        |      | 9.0  |        |
| Stomach | 1950 | 20.4 | 11.1   |        |      | 7.6  |        |
|        | 1955 | 16.8 | 8.7    |        |      | 8.3  |        |
|        | 1960 | 13.7 | 7.0    |        |      | 8.4  |        |
|        | 1965 | 10.6 | 5.4    |        |      | 8.5  |        |
|        | 1970 | 8.8  | 4.3    |        |      | 8.5  |        |
| Esophagus | 1950 | 3.9  | 1.0    |        |      | 15.7 |        |
|        | 1955 | 4.0  | 0.9    |        |      | 16.2 |        |
|        | 1960 | 3.8  | 0.9    |        |      | 14.8 |        |
|        | 1965 | 3.8  | 1.0    |        |      | 15.0 |        |
|        | 1970 | 3.7  | 1.0    |        |      | 14.9 |        |
| Pancreas | 1950 | 7.2  | 4.8    |        |      | 6.1  | 2.6    |
|        | 1955 | 8.3  | 5.1    |        |      | 6.2  | 2.5    |
|        | 1960 | 8.8  | 5.3    |        |      | 6.1  | 2.0    |
|        | 1965 | 9.5  | 5.6    |        |      | 5.8  | 2.0    |
|        | 1970 | 9.8  | 5.7    |        |      | 6.1  | 1.8    |
| Lung   | 1950 | 20.6 | 4.4    |        |      | 0.6  | 0.0    |
|        | 1955 | 28.6 | 4.7    |        |      | 0.4  | 0.1    |
|        | 1960 | 35.1 | 5.1    |        |      | 0.2  | 0.0    |
|        | 1965 | 43.0 | 6.9    |        |      | 0.2  | 0.0    |
|        | 1970 | 52.1 | 10.3   |        |      | 0.1  | 0.0    |

*Rates per 100,000 population age-adjusted to 1950 U.S. census population.  
Source of data: U.S. National Center for Health Statistics.

have not decreased for any cancer site in the past 25 years, they remain extremely low for too many cancers. Five-year survival for patients with esophageal cancer diagnosed in the 1940's was one percent; for those diagnosed in the 1960's, the survival rate was four percent. During this period, stomach cancer survival rates rose from nine percent to 12 percent. Liver cancer survival rates went from two to five percent; acute leukemia, from zero percent to three percent. Five-year survival for patients with pancreatic cancer has remained the same, one percent.

Mortality

From 1950 to 1970, death rates per 100,000 population decreased for the following cancers:

- Uterine: 19.0 to 9.0
- Rectum: 8.4 to 5.7 in males and from 5.6 to 3.3 in females
- Stomach: 20.4 to 8.8 in males and from 11.1 to 4.3 in females
- Bladder: 2.6 to 1.8 in females
- Lip: 0.6 to 0.1 in males
Table 4
Comparison of Incidence Rates for Selected Sites
White Population by Sex
NCI Surveys 1947 and 1969

| Site       | Sex       | 1947  | 1969  | % Change |
|------------|-----------|-------|-------|----------|
|            | Male      | 23.4  | 29.6  | 26.5     |
|            | Female    | 25.2  | 25.0  | -0.8     |
| Colon      | Male      | 19.8  | 15.5  | -21.7    |
|            | Female    | 13.3  | 9.4   | -29.3    |
| Rectum     | Male      | 31.4  | 12.9  | -58.9    |
|            | Female    | 17.3  | 5.8   | -68.6    |
| Stomach    | Male      | 6.1   | 4.4   | -27.9    |
|            | Female    | 1.7   | 1.4   | -17.6    |
| Esophagus  | Male      | 8.8   | 10.7  | 21.6     |
|            | Female    | 5.6   | 6.8   | 21.4     |
| Pancreas   | Male      | 28.7  | 67.0  | 133.4    |
|            | Female    | 6.5   | 13.5  | 107.7    |
| Lung       | Male      | 70.0  | 72.5  | 3.6      |
|            | Female    | 60.7  | 38.1  | -37.2    |
| Breast     | Female    | 14.7  | 13.3  | -9.5     |
| Uterus     | Female    | 36.4  | 44.7  | 22.8     |
| Ovary      | Female    | 16.3  | 19.7  | 20.9     |
| Prostate   | Male      | 7.0   | 5.2   | -25.7    |

Source: Cutler, S.J., and Davesa, S.S.: Trends in Cancer Incidence and Mortality in the U.S.A. In: Doll, R., and Vodopija, I.: Host Environment Interactions in the Etiology of Cancer in Man. International Agency for Research on Cancer, Lyon, 1970.

Dramatic decreases in cancer mortality are often associated with early detection and treatment. For instance, the decline in uterine cancer death rates is primarily due to increased use of the Papanicolaou smear combined with more thorough gynecologic examination and better patient hygiene. The decrease in rectal cancer mortality rates can similarly be attributed to routine proctosigmoidoscopy which has detected many cancers in a localized stage. Lip cancer is easily diagnosed and readily accessible to treatment.

On the other hand, the decline of stomach cancer death rates is not easily explained. Some investigators feel that changes in diet may have contributed to reduced stomach cancer mortality rates. A decrease in bladder cancer death rates in women may also be related to environmental factors; women are less exposed than men to industrial carcino- gens—such as aniline dyes—which are associated with bladder cancer. Data from the Third National Cancer Survey show that the incidence of stomach cancer and bladder cancer in women have also decreased from 1947 to 1969.

In children, cancer death rates have declined from 8.4 per 100,000 population under 15 years of age in 1950 to 6.2 in 1970. The actual number of deaths, as well as the rate, has also decreased during this period.

Although breast cancer death rates...
have not increased, they remain at approximately 24 per 100,000 females, the highest mortality rate in females. Breast cancer kills more than 30,000 women each year.

Data also show that lung cancer death rates have been steadily increasing in both sexes. In males, the rate rose from 20.6 per 100,000 in 1950 to 52.1 in 1970, and in females from 4.4 to 10.3 with a rapid increase in the last 10 years. Simultaneously, cigarette consumption continues at a high level. Also increasing, though at a lower rate, pancreatic cancer death rates in males rose from 7.2 per 100,000 in 1950 to 9.8 in 1970, and in females from 4.8 to 5.7. Mortality rates for cancer of the ovary increased from 7.6 per 100,000 females in 1950 to 8.5 in 1970.

Incidence

The overall incidence of cancer has decreased slightly during the past 25 years. From 1947 to 1969 the incidence of the following cancers decreased by the following substantial percentages:
- Stomach: 63 percent
- Uterus: 37 percent
- Bladder: 26 percent (females)
- Rectum: 26 percent
- Esophagus: 23 percent
- Ovary: 10 percent

Also during the past 25 years, cancer incidence increased 125 percent for lung; 27 percent for colon (males); 23 percent, prostate; 21 percent, pancreas; 21 percent, bladder (males). The incidence of breast cancer and colon cancer in women has remained unchanged from 1947 to 1969.

Incidence trends are being carefully evaluated to pinpoint why certain cancers have decreased, increased or remained at the same level. Environmental factors, such as changes in occupational exposures and perhaps diet, seem to be involved.

References

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