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# **Cancer Incidence in Virginia 1998**

**Virginia Department of Health  
E. Anne Peterson, MD, MPH  
Commissioner**

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**Virginia Cancer Registry  
Division of Surveillance and Investigation  
Office of Epidemiology  
P.O. Box 2448, Room 114  
Richmond, Virginia 23218**

**<http://www.vdh.state.va.us/epi/cancer/index.htm>**

**TEL (804) 786-1668**

**FAX (804) 371-4061**

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## **Produced by the Virginia Cancer Registry**

**Robert A. Magnotti**  
Statistical Analyst, Senior

**Lisa M. Shickle, MS**  
Statistical Analysis Coordinator

### **Contributing Editors**

**Amy M. Pugh, MA**  
Director, Virginia Cancer Registry

**C. Diane Woolard, PhD, MPH**  
Director, Division of Surveillance and Investigation

### **Virginia Cancer Registry Staff**

**Bonita B. Bryant, CTR**  
Quality Assurance Coordinator

**Tonia Faro, RHIA**  
Cancer Surveillance Specialist

**Christine V. Flemming, CTR**  
Cancer Surveillance Specialist

**Blanche N. Perry, RHIT, CTR**  
Cancer Surveillance Specialist

**Leona C. Rowe, CTR**  
Cancer Surveillance Specialist

**Vivian C. Purnell**  
Administrative Program Specialist

**Morris L. Harding**  
Systems Network Administrator

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# Section I

## Introduction



## What is the Virginia Cancer Registry?

The Virginia Cancer Registry (VCR) collects, analyzes, and disseminates information about the occurrence of cancer in the Commonwealth of Virginia. The Virginia Cancer Registry exists to:

- provide data for the planning and evaluation of cancer control activities,
- provide community-based information regarding cancer incidence,
- promote cancer-related research and provide data for research studies,
- provide support and training to hospital registries,
- educate allied health professionals, health managers, and physicians about cancer reporting and data usage.

The Virginia Cancer Registry has collected demographic and clinical information on cancer patients diagnosed or treated in Virginia since 1970. The VCR became a population-based registry in 1990 when reporting of newly-diagnosed cancer cases was made mandatory for hospitals, clinics, and pathology laboratories (*Code of Virginia* Section 32.1-70). In order to improve the completeness of case reporting to the VCR, in 1998 the Virginia legislature amended the cancer registry law to require reporting by physician offices in certain instances. As a population-based cancer registry, the VCR is dedicated to the fulfillment of its legislative intent--to accurately monitor the incidence of cancer in the Commonwealth of Virginia for the purposes of understanding, controlling, and reducing the occurrence of cancer in the state. Since 1995, additional funding for the VCR

has been provided by the Centers for Disease Control and Prevention's National Program of Cancer Registries.

All confidential information received and processed by the Registry is protected from unlawful disclosure. Data are secured from unauthorized access, and published statistical reports and data summaries only provide aggregated and non-identifiable data.

The Registry employs several techniques to ensure the completeness, accuracy, comparability, and timeliness of Virginia's cancer incidence database. In order to meet national standards in these areas, ongoing internal and external activities monitor progress, highlight areas for additional focus, and provide for the continuous quality improvement of the cancer surveillance and registration program.

## **Cancer Prevention and Control**

Illness and death due to cancer are increasingly preventable through application of growing knowledge about the causes of cancer, improved screening and early diagnostic techniques, and more effective treatment. Cancer prevention includes various types of strategies designed to reduce the disease burden. These strategies may be directed at: 1) preventing a healthy individual from developing cancer (primary prevention), or 2) detecting cancer as early as possible when it can be treated most effectively and with the fewest side effects (secondary prevention).

Primary prevention rests on the removal of lifestyle or other factors that increase the risk of developing cancer. Present knowledge suggests that major reductions in population cancer rates and in an individual's likelihood of developing cancer are achievable through primary prevention strategies. For example, the elimination of tobacco use would reduce the lung cancer death rate by over eighty-five percent and would markedly reduce rates of cancers of the oral cavity and pharynx, esophagus, bladder, kidney, pancreas, and cervix. According to the American Cancer Society, a diet that is low in fat, high in fiber, and includes five or more servings per day of fruits and vegetables is likely to reduce the risk of cancers of the colon and rectum, lung, prostate, bladder, esophagus, stomach, and other organs. Regular, moderate exercise has also shown benefits in the prevention of cancer for a number of sites. The overall health benefit of these habits makes them wise choices for cancer prevention.

Secondary prevention refers to interventions that detect emerging tumors at an early stage, when they can be treated with the best likelihood of a cure. Screening for early detection has a clear role in reducing the disease burden due to cancers of the female breast and the cervix. The effectiveness of screening for cancer of the colon and rectum and prostate cancer is being increasingly recognized. For many other cancers, however, the advisability of routine tests remains controversial and recommendations by various authorities differ. The table on the following page shows the American Cancer Society's recommendations for the early detection of cancer in persons without symptoms who have an average risk for cancer.

While individual responsibility plays an important role in cancer prevention, government agencies, non-profit organizations, health care providers, and researchers have essential roles as well. Agencies such as the Virginia Department of Health create programs that promote screening and educational activities, and assure access to personal health services. Government agencies also create policies and regulations that minimize environmental hazards such as cigarette smoke, and control occupational exposure to carcinogens. Non-profit organizations provide education to health care providers and to the public, and maintain support services for cancer patients and their families. Researchers investigate new ways of detecting and treating cancer, and search for clues to the causes of cancer. Health care providers deliver care, perform screening

tests, and educate patients and their families. The war on cancer requires collaboration between these and many other entities. The Virginia Cancer Registry provides current, accurate data on the burden of cancer in Virginians to these and many other organizations and

individuals. Information provided by the Registry is the foundation for public awareness and education campaigns; research studies evaluating causes, detection, and treatment of cancer; and other cancer control initiatives.

| American Cancer Society Recommendations for the Early Detection of Cancer in Average Risk, Asymptomatic People |  |   |  |
|--|--|---|--|
| Cancer Site  | Population                                     | Test or Procedure   | Frequency  |
| Breast   | Women, age 20+                                 | Breast self-examination   | Monthly, starting at age 20  |
|  |  | Clinical breast examination   | Every 3 years, ages 20-39<br>Annual, starting at age 40*   |
|  |  | Mammography   | Annual, starting at age 40   |
| Colorectal   | Men & women, age 50+                           | Fecal occult blood test (FOBT) & flexible sigmoidoscopy†  | Annual FOBT and flexible sigmoidoscopy every 5 years, starting at age 50   |
|  |  | -or-  |  |
|  |  | Flexible sigmoidoscopy  | Every 5 years, starting at age 50  |
|  |  | -or-  |  |
|  |  | FOBT  | Annual, starting at age 50   |
|  |  | -or-  |  |
| Colonoscopy  | Colonoscopy every 10 years, starting at age 50 |   |  |
| -or-   |  |   |  |
| Double contrast barium enema (DCBE)†   | DCBE every 5 years, starting at age 50         |   |  |
| Prostate   | Men, age 50+                                   | Digital rectal examination & prostate specific antigen test   | The PSA test and the DRE should be offered annually, starting at age 50, for men who have a life expectancy of at least 10 years.‡   |
| Cervix   | Women, age 18+                                 | Pap test & pelvic examination   | All women who are, or have been, sexually active, or have reached age 18 should have an annual Pap test and pelvic examination. After a woman has had 3 or more consecutive satisfactory normal annual examinations, the Pap test may be performed less frequently at the discretion of the physician. |
| Cancer-related check-up  | Men & women, age 20+                           | Examinations every 3 years from ages 20 to 39 years and annually after age 40. The cancer-related check-up should include examination for cancers of the thyroid, testicles, ovaries, lymph nodes, oral cavity, and skin, as well as health counseling about tobacco, sun exposure, diet and nutrition, risk factors, sexual practices, and environmental and occupational exposures. |  |

\*Beginning at age 40, annual clinical breast examination should be performed prior to mammography.  
†Flexible sigmoidoscopy together with FOBT is preferred compared with FOBT or flexible sigmoidoscopy alone.  
‡Information should be provided to men about the benefits and limitations of screening.

American Cancer Society, 2001.

## Definitions

### *Reportable Cancer Cases*

The *Regulations for Disease Reporting and Control (1999)* define cancer as “all carcinomas, sarcomas, melanomas, leukemias, and lymphomas excluding localized basal and squamous cell carcinomas of the skin, except for lesions of the mucous membranes.” Any cancer meeting this definition must be reported to the VCR. Benign tumors of the brain and central nervous system are also reportable to the VCR, as well as localized basal and squamous cell skin carcinomas greater than five centimeters at the time of diagnosis. Skin cancer diagnosed at the regional or distant stages as well as any other type of skin malignancy, such as melanomas, mycosis fungoides, and Kaposi’s sarcoma, should also be reported.

### *Cancer Site Categories*

To facilitate data interpretation and comparison, the VCR uses standard categories to analyze the site of the body in which the cancer originally began. The National Cancer Institute’s Surveillance, Epidemiology, and End Results (SEER) Program has established these categories. Most cancers are grouped by the anatomical site (prostate, lung and bronchus, etc.), but some cancers, such as lymphomas and leukemias, are grouped by their cell type. Please see Appendix B for the SEER site category definitions.

### *Incidence Rate*

A cancer incidence rate reflects the number of new cases diagnosed per

100,000 individuals in a given population over a defined time period. Cancer rates tend to vary substantially by age, with higher rates for most cancers noted in older populations. This report provides both age-specific and age-adjusted annual incidence rates. Age-specific rates denote the incidence of cancer among persons within specific age categories (typically 0-4 years, 5-9 years, 10-14 years, etc., up to 85+ years). Age-adjusted rates are calculated by mapping age-specific rates onto a standard population to remove the effect of different age structures and to arrive at a single summary measure that may be used for comparison. All age-adjusted incidence rates were calculated by the direct method, using the age distribution of the 1970 United States population as the standard (See Appendix C). Rates were calculated by sex, race, and stage at diagnosis. Annual race-, sex-, and age-specific county population estimates from the U.S. Census Bureau (1999 release) were summed to produce population-at-risk figures (see Appendix D). *Except where noted, all incidence rates are expressed per 100,000 persons per year and exclude in situ carcinomas for all cancer sites except for the urinary bladder.*

### *Mortality Rate*

A cancer mortality rate reflects the number of deaths due to cancer per 100,000 individuals in a given area over a defined time period. Cancer death rates also tend to vary substantially by age, with higher rates for most cancers noted in older populations. This report

provides the age-adjusted mortality rates for selected types of cancer. Mortality rates were age-adjusted by the same method used for incidence rates. Except where noted, all mortality rates are expressed per 100,000 persons per year and exclude in situ carcinomas for all sites except urinary bladder. Age-adjusted mortality rates were calculated using data obtained from the Virginia Center for Health Statistics.

### *Summary Stage*

A cancer stage identifies how far a malignant tumor has spread from the site of origin at the time of diagnosis. Identifying the stage of cancer at diagnosis is useful in evaluating prognosis and choosing treatment. In this publication, stage is categorized according to the following summary stage convention:

- In situ – A malignant tumor that does not invade or penetrate surrounding tissue.
- Localized – An invasive tumor confined to the site of origin.
- Regional – A tumor that has spread by direct extension to immediately adjacent organs or tissues and/or metastasized (spread through the bloodstream) to regional lymph nodes, but appears not to have spread any further.
- Distant – A tumor that has spread by direct extension beyond the immediately adjacent organs or tissues, and/or metastasized to distant lymph nodes or other distant tissues.
- Unstaged – Insufficient information available to determine the stage of disease at diagnosis.

Stage distributions, including in situ cancers, are provided for selected sites in Section III. Cancers staged as local, regional, or distant are commonly referred to as “invasive.” This report focuses on invasive cancer but does include in situ cancer of the bladder. Section IV provides additional data on incidence by stage at diagnosis.

### *Race and Ethnicity Grouping*

The Virginia Cancer Registry collects specific information on race and ethnicity. Such detail is not readily available from all reporting sources, however, and many groups are undercounted or misclassified. Therefore, cancer incidence statistics may be incomplete for certain specific racial and ethnic groups and may not accurately reflect the true cancer burden in these populations. Due to these limitations, race-specific rates in this report are calculated for Whites, Blacks, and all other races combined. According to the modified 1990 U.S. Census data of September 1999, 76.0% of Virginia’s population was White, 20.1% Black, and 3.9% was of another race, including Asian/Pacific Islander and Native American/Alaskan Native. Note that persons of Hispanic ethnicity may be of any race.

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# Section II

## Reportable Cancer in Virginia: An Overview



## Overview

This publication is based on cancers diagnosed in Virginia residents during 1998 and reported to the VCR. All data are provisional, as facilities may continue to report additional cases diagnosed during 1998. Information is provided for all cancer sites combined and for the ten most frequently reported sites of invasive cancer diagnosed in Virginia residents, including: urinary bladder, female breast, colon and rectum, kidney and renal pelvis, lung and bronchus, skin (melanoma only), oral cavity and pharynx, prostate, uterus, and non-Hodgkin's lymphoma. Although cervical cancer is not among the ten most common sites, it is included due to the strong interest of the public, researchers, and policy makers. On page 16, information is provided on the incidence of other major cancer types.

During 1998, 25,438 new cases of invasive cancer were reported among Virginia residents, and the state had an age-adjusted incidence rate of 341.4 cases per 100,000 persons. The various forms of cancer were responsible for 12,717 deaths among Virginia residents in 1998 and accounted for 24% of all deaths (Virginia Center for Health Statistics). Consistent with previous years, cancer incidence was higher for males than females and blacks showed a slightly higher incidence rate than whites or persons of another race. The four most commonly diagnosed forms of cancer were female breast, lung and bronchus, prostate, and colon and rectum; together these sites accounted for over one-half of all new cancers diagnosed in 1998.

During 1998, female breast cancer was the most frequently reported cancer in Virginia residents with 4,272 cases

diagnosed. In Virginia females, 981 deaths from breast cancer occurred, making the disease the second leading cause of cancer death among women.

Cancer of the lung and bronchus was the second most commonly reported cancer in Virginia during 1998, with 3,747 cases diagnosed. The incidence rate in males was nearly double that of females. There were 3,761 deaths from the disease during 1998, making it the most common cause of cancer death among all Virginians.

The third most commonly reported cancer in Virginia residents was cancer of the prostate. During 1998, 3,710 residents were diagnosed with the disease, while 764 died from prostate cancer. In Virginia males, prostate cancer was the most commonly diagnosed cancer and the second leading cause of cancer death among males.

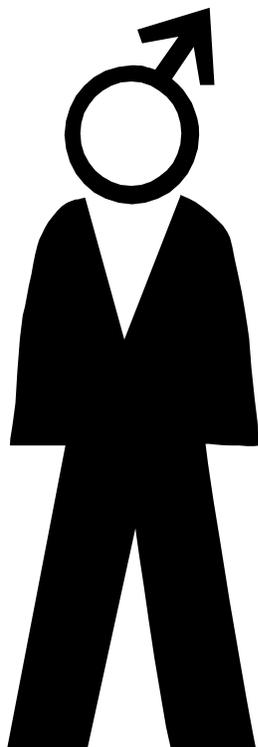
Cancer of the colon and rectum was the fourth most commonly reported cancer in Virginia residents in 1998. During the year, 3,181 Virginians were diagnosed with the disease, and 1,380 residents died from colorectal cancer. Colorectal cancer was the second leading cause of cancer death in the state.

Cancer mortality statistics from the Virginia Center for Health Statistics have been provided with the site specific incidence data. These statistics are displayed with newly diagnosed case data for ease of comparison. A listing of publications and journal articles using Virginia Cancer Registry data is also included. If you would like to receive a copy of a Virginia Cancer Registry publication, please contact the Registry or download it from our website: <http://www.vdh.state.va.us/epi/cancer/index.htm>

Distribution of Reported Cancer, Virginia, 1998  
 Number, Percentage of Cases, and Age-adjusted Incidence Rate  
 By Site  
 Total Population

| SITE                             | Cases         | %    | Rate         |
|----------------------------------|---------------|------|--------------|
| Female Breast                    | 4,272         | 16.8 | 104.0        |
| Lung and Bronchus                | 3,747         | 14.7 | 51.3         |
| Prostate                         | 3,710         | 14.6 | 117.7        |
| Colon and Rectum                 | 3,181         | 12.5 | 41.7         |
| Urinary Bladder                  | 1,092         | 4.3  | 14.4         |
| Non-Hodgkin's Lymphoma           | 904           | 3.6  | 12.0         |
| Melanoma of the Skin             | 826           | 3.2  | 10.9         |
| Oral Cavity and Pharynx          | 696           | 2.7  | 9.4          |
| Uterus                           | 691           | 2.7  | 17.3         |
| Kidney and Renal Pelvis          | 627           | 2.5  | 8.5          |
| Pancreas                         | 495           | 1.9  | 6.6          |
| Ovary                            | 481           | 1.9  | 11.6         |
| Leukemia                         | 442           | 1.7  | 6.2          |
| Stomach                          | 377           | 1.5  | 4.9          |
| Brain and Other Nervous System   | 373           | 1.5  | 5.3          |
| Thyroid                          | 314           | 1.2  | 4.0          |
| Larynx                           | 308           | 1.2  | 4.4          |
| Esophagus                        | 283           | 1.1  | 3.8          |
| Cervix                           | 283           | 1.1  | 6.7          |
| Multiple Myeloma                 | 235           | 0.9  | 3.1          |
| Liver and Intrahepatic Bile Duct | 211           | 0.8  | 2.8          |
| Testis                           | 146           | 0.6  | 3.6          |
| Hodgkin's Lymphoma               | 145           | 0.6  | 2.0          |
| Other                            | 1,599         | 6.3  | —            |
| <b>TOTAL</b>                     | <b>25,438</b> |      | <b>341.4</b> |

*Note.* Data exclude localized basal and squamous cell skin cancers and in situ carcinomas except those of the urinary bladder. All rates are per 100,000 population and are adjusted to 1970 U.S. standard population. Percentages do not sum to 100% due to rounding.



Distribution of Reported Cancer, Virginia, 1998  
 Number, Percentage of Cases, and Age-adjusted Incidence Rate  
 By Site

Ten Most Commonly Reported Sites--Males

| SITE                    | Cases | %    | Rate  |
|-------------------------|-------|------|-------|
| Prostate                | 3,710 | 28.7 | 117.7 |
| Lung and Bronchus       | 2,213 | 17.1 | 69.1  |
| Colon and Rectum        | 1,587 | 12.3 | 48.9  |
| Urinary Bladder         | 806   | 6.2  | 25.1  |
| Oral Cavity and Pharynx | 486   | 3.8  | 14.5  |
| Non-Hodgkin's Lymphoma  | 472   | 3.7  | 14.1  |
| Melanoma of the Skin    | 465   | 3.6  | 13.5  |
| Kidney and Renal Pelvis | 410   | 3.2  | 12.4  |
| Pancreas                | 271   | 2.1  | 8.3   |
| Larynx                  | 248   | 1.9  | 7.6   |

**Note.** Data exclude localized basal and squamous cell skin cancers and in situ carcinomas except those of the urinary bladder. All rates are per 100,000 male population and are adjusted to 1970 U.S. standard population.

Distribution of Reported Cancer, Virginia, 1998  
 Number, Percentage of Cases, and Age-adjusted Incidence Rate  
 By Site

Ten Most Commonly Reported Sites--Females

| SITE                   | Cases | %    | Rate  |
|------------------------|-------|------|-------|
| Breast                 | 4,272 | 34.1 | 104.0 |
| Colon and Rectum       | 1,594 | 12.7 | 36.3  |
| Lung and Bronchus      | 1,534 | 12.3 | 37.6  |
| Uterus                 | 691   | 5.5  | 17.3  |
| Ovary                  | 481   | 3.8  | 11.6  |
| Non-Hodgkin's Lymphoma | 432   | 3.5  | 10.4  |
| Melanoma of the Skin   | 361   | 2.9  | 8.7   |
| Urinary Bladder        | 286   | 2.3  | 6.5   |
| Cervix                 | 283   | 2.3  | 6.7   |
| Pancreas               | 224   | 1.8  | 5.2   |



**Note.** Data exclude localized basal and squamous cell skin cancers and in situ carcinomas except those of the urinary bladder. All rates are per 100,000 female population and are adjusted to 1970 U.S. standard population.



# Section III

## Descriptive Epidemiology of Invasive Cancer for Selected Sites

## All Sites Combined

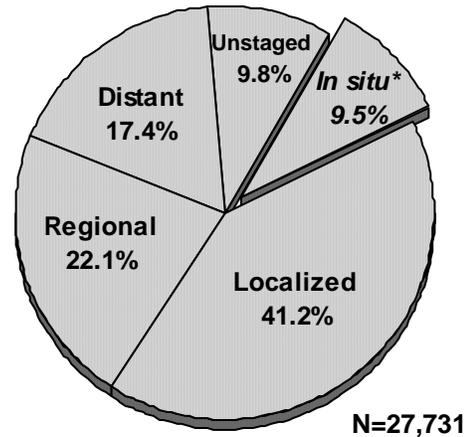
**Number of Cases and Age-Adjusted Rates By Sex and Race**

|        | Incidence |       | Mortality |       |
|--------|-----------|-------|-----------|-------|
|        | Cases     | Rate  | Deaths    | Rate  |
| Total  | 25,438    | 341.4 | 12,717    | 164.8 |
| Male   | 12,920    | 398.6 | 6,629     | 206.4 |
| Female | 12,518    | 301.5 | 6,088     | 137.0 |
| White  | 20,346    | 337.5 | 9,965     | 157.7 |
| Black  | 4,392     | 362.9 | 2,587     | 212.4 |
| Other  | 469       | 224.9 | 165       | 88.3  |

Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude localized basal and squamous cell skin cancers and in situ carcinomas except urinary bladder. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

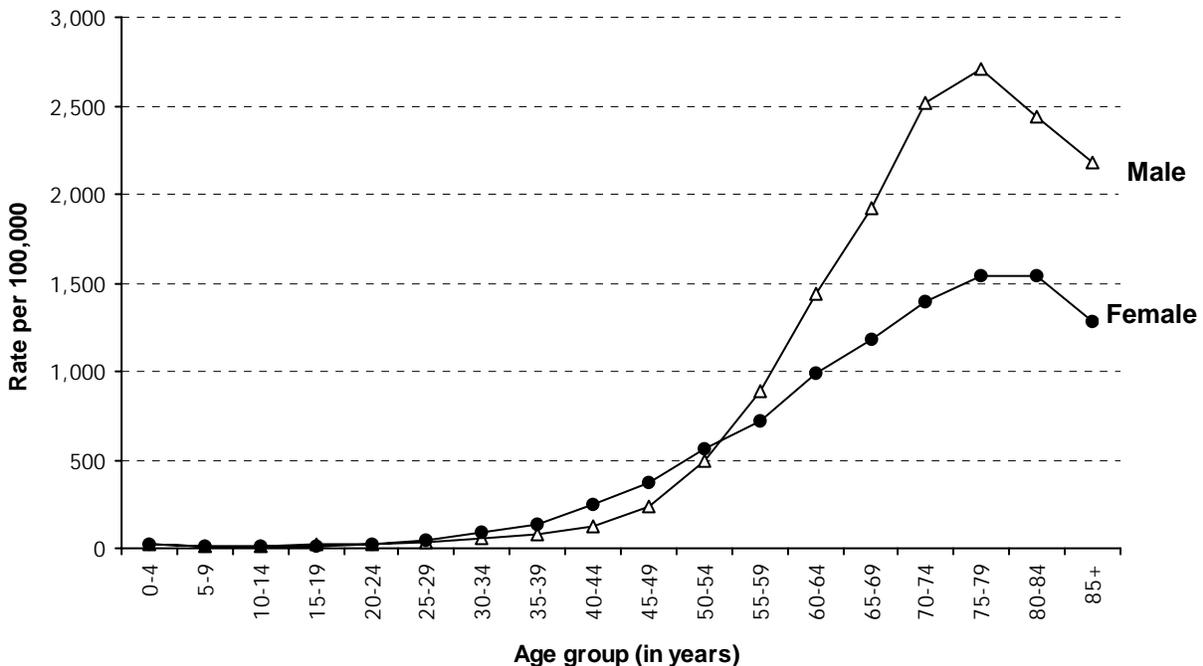
Total figures include persons of unknown race.

**Percentage of Cases by Stage at Diagnosis for All Sites Combined**



\*In situ cancers except those of the urinary bladder have been excluded from all rates presented.

**Invasive Cancer, All Sites Combined Age-Specific Incidence Rate by Sex**



## Female Breast Cancer

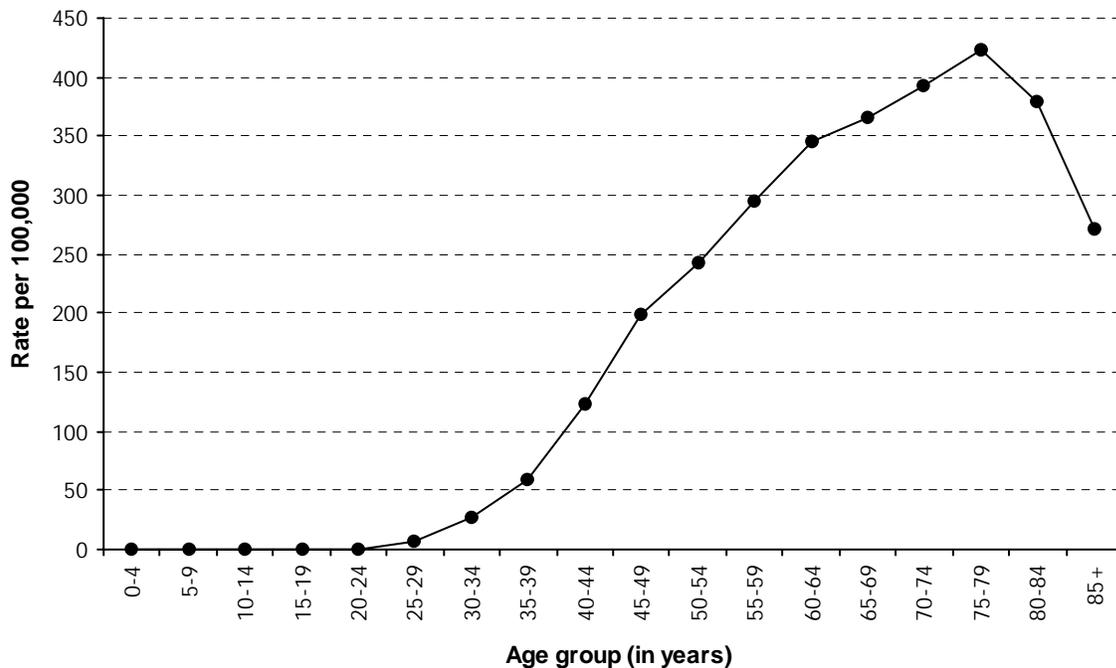
| Number of Cases and Age-Adjusted Rates By Race |           |       |           |      | Percentage of Cases By Stage at Diagnosis |  |
|--|-----------|-------|-----------|------|---|--|
|  | Incidence |       | Mortality |      |   |  |
|  | Cases     | Rate  | Deaths    | Rate |   |  |
| Total  | 4,272     | 104.0 | 981       | 22.9 |   |  |
| White  | 3,509     | 107.4 | 756       | 21.8 |   |  |
| Black  | 658       | 91.6  | 216       | 30.1 |   |  |
| Other  | 88        | 64.3  | 9         | †    |   |  |

Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 female population and are adjusted to the 1970 U.S. standard population. An additional 49 cases of breast cancer occurred in males.

Total figures include persons of unknown race.  
 † Rates based on fewer than 10 cases are not reported because they are unreliable.

\*These in situ cancers have been excluded from all rates presented.

### Invasive Female Breast Cancer Age-Specific Incidence Rate



## Cancer of the Cervix

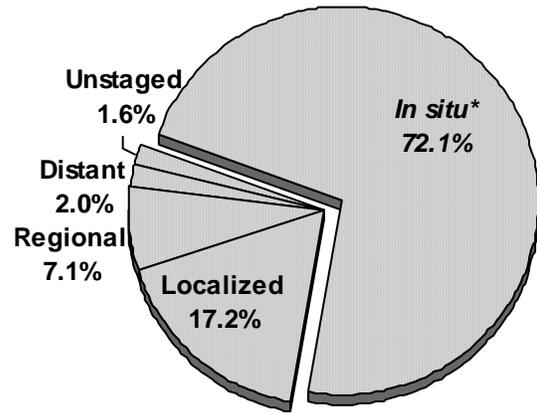
### Number of Cases and Age-Adjusted Rates By Race

|       | Incidence |      | Mortality |      |
|-------|-----------|------|-----------|------|
|       | Cases     | Rate | Deaths    | Rate |
| Total | 283       | 6.7  | 102       | 2.3  |
| White | 211       | 6.5  | 66        | 1.9  |
| Black | 56        | 7.1  | 33        | 4.0  |
| Other | 10        | 6.0  | 3         | †    |

Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 female population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.  
 † Rates based on fewer than 10 cases are not reported because they are unreliable.

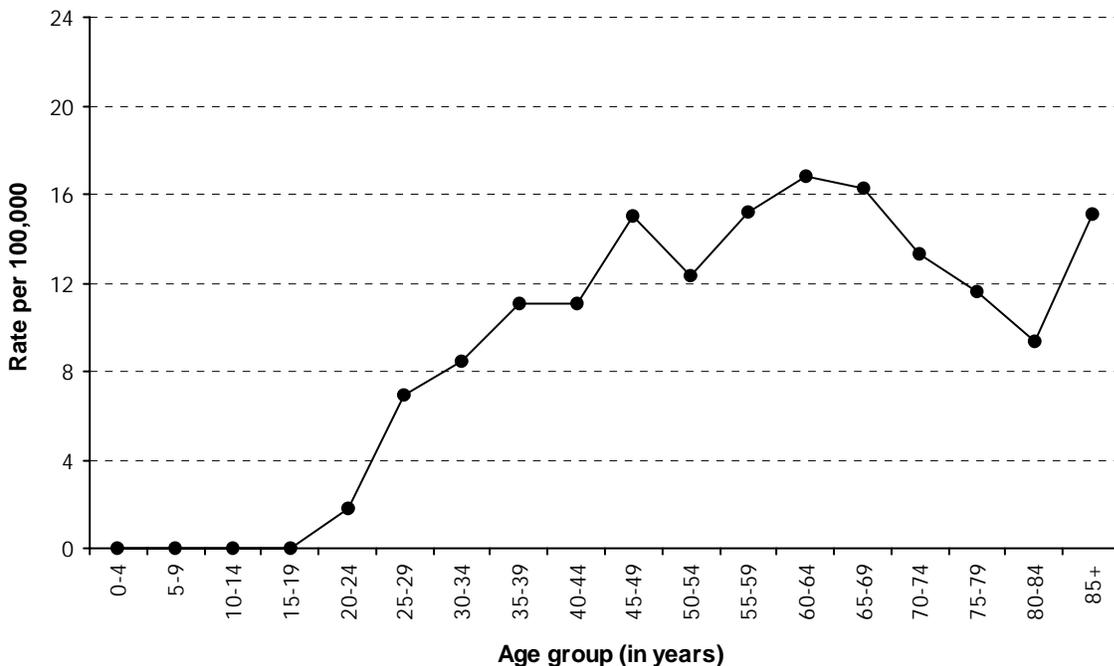
### Percentage of Cases By Stage at Diagnosis



N=1,019

\*These in situ cancers have been excluded from all rates presented.

### Invasive Cancer of the Cervix Age-Specific Incidence Rate

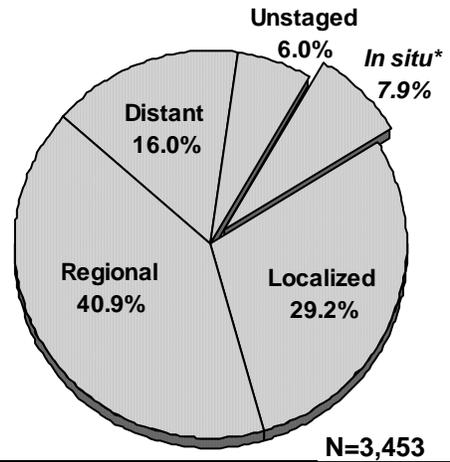


# Cancer of the Colon and Rectum

**Number of Cases and Age-Adjusted Rates By Sex and Race**

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 3,181     | 41.7 | 1,380     | 17.7 |
| Male   | 1,587     | 48.9 | 667       | 20.9 |
| Female | 1,594     | 36.3 | 713       | 15.3 |
| White  | 2,490     | 39.8 | 1,070     | 16.6 |
| Black  | 621       | 51.5 | 297       | 24.4 |
| Other  | 56        | 28.8 | 13        | 7.5  |

**Percentage of Cases By Stage at Diagnosis**

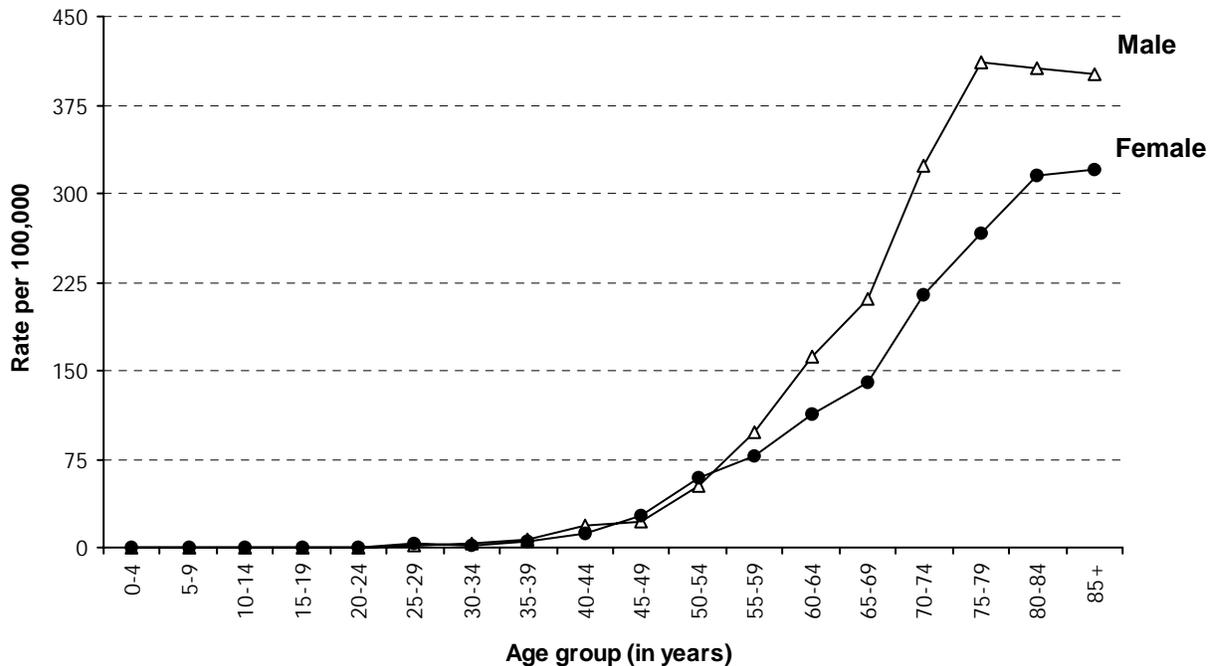


Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

\*These in situ cancers have been excluded from all rates presented.

**Invasive Cancer of the Colon and Rectum Age-Specific Incidence Rate by Sex**

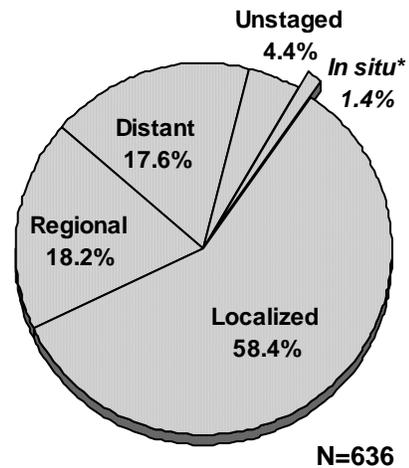


## Cancer of the Kidney and Renal Pelvis

**Number of Cases and Age-adjusted Rates By Sex and Race**

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 627       | 8.5  | 261       | 3.4  |
| Male   | 410       | 12.4 | 155       | 4.8  |
| Female | 217       | 5.4  | 106       | 2.4  |
| White  | 488       | 8.2  | 211       | 3.4  |
| Black  | 124       | 10.3 | 47        | 3.9  |
| Other  | 13        | 5.9  | 3         | †    |

**Percentage of Cases By Stage at Diagnosis**

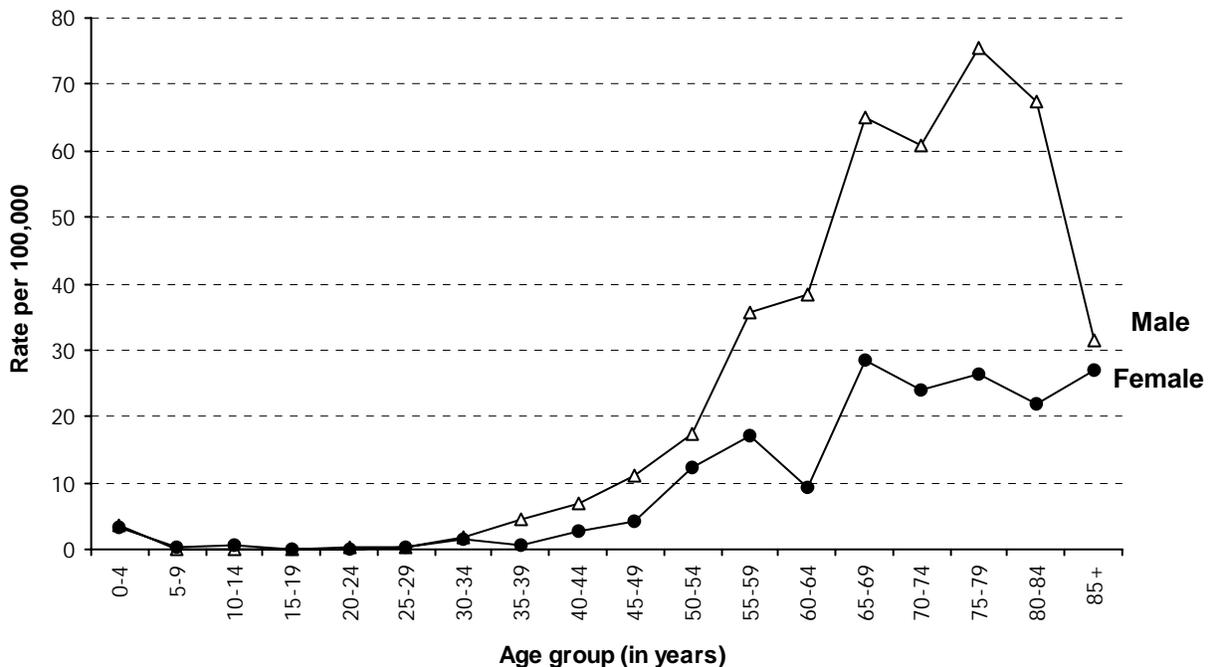


**Note.** Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.  
 † Rates based on fewer than 10 cases are not reported because they are unreliable.

\*These in situ cancers have been excluded from all rates presented.

**Invasive Cancer of the Kidney and Renal Pelvis Age-Specific Incidence Rate by Sex**

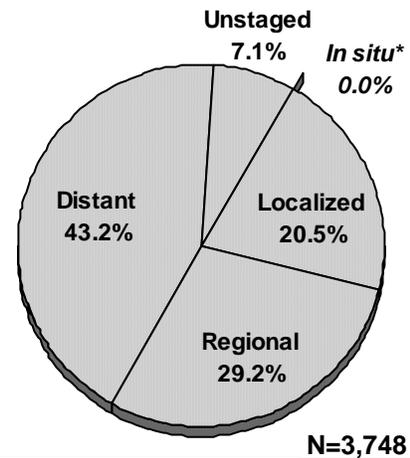


# Cancer of the Lung and Bronchus

**Number of Cases and Age-Adjusted Rates By Sex and Race**

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 3,747     | 51.3 | 3,761     | 50.3 |
| Male   | 2,213     | 69.1 | 2,304     | 72.4 |
| Female | 1,534     | 37.6 | 1,457     | 34.3 |
| White  | 3,069     | 51.6 | 3,021     | 49.4 |
| Black  | 646       | 55.1 | 706       | 60.1 |
| Other  | 30        | 17.5 | 34        | 19.1 |

**Percentage of Cases By Stage at Diagnosis**

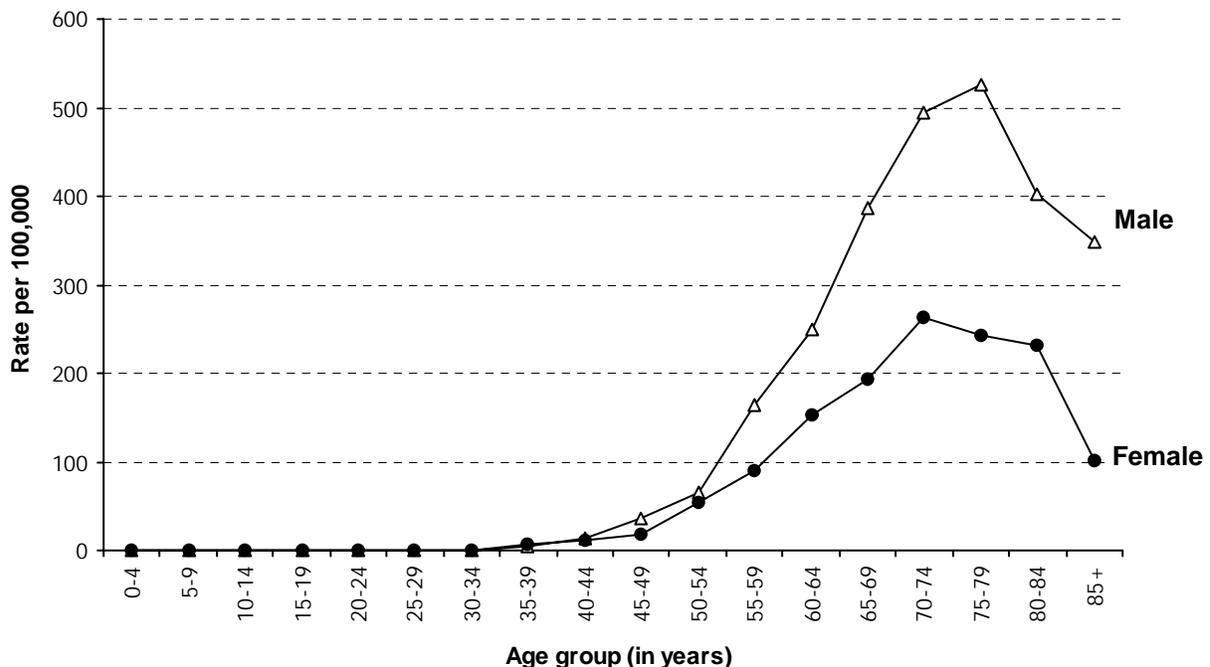


Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

\*These in situ cancers have been excluded from all rates presented.

**Invasive Cancer of the Lung and Bronchus Age-Specific Incidence Rate by Sex**

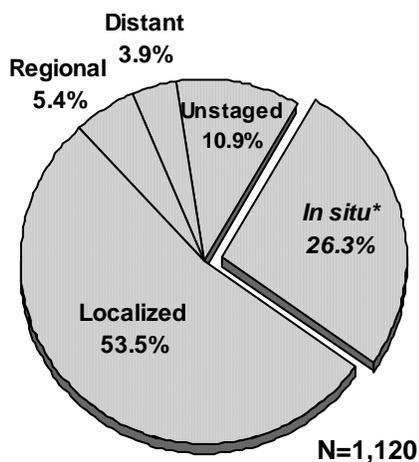


# Melanoma of the Skin<sup>‡</sup>

## Number of Cases and Age-Adjusted Rates By Sex and Race

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 826       | 10.9 | 183       | 2.3  |
| Male   | 465       | 13.5 | 124       | 3.7  |
| Female | 361       | 8.7  | 59        | 1.3  |
| White  | 757       | 12.5 | 180       | 2.9  |
| Black  | 13        | 1.1  | 2         | †    |
| Other  | 5         | †    | 1         | †    |

## Percentage of Cases By Stage at Diagnosis



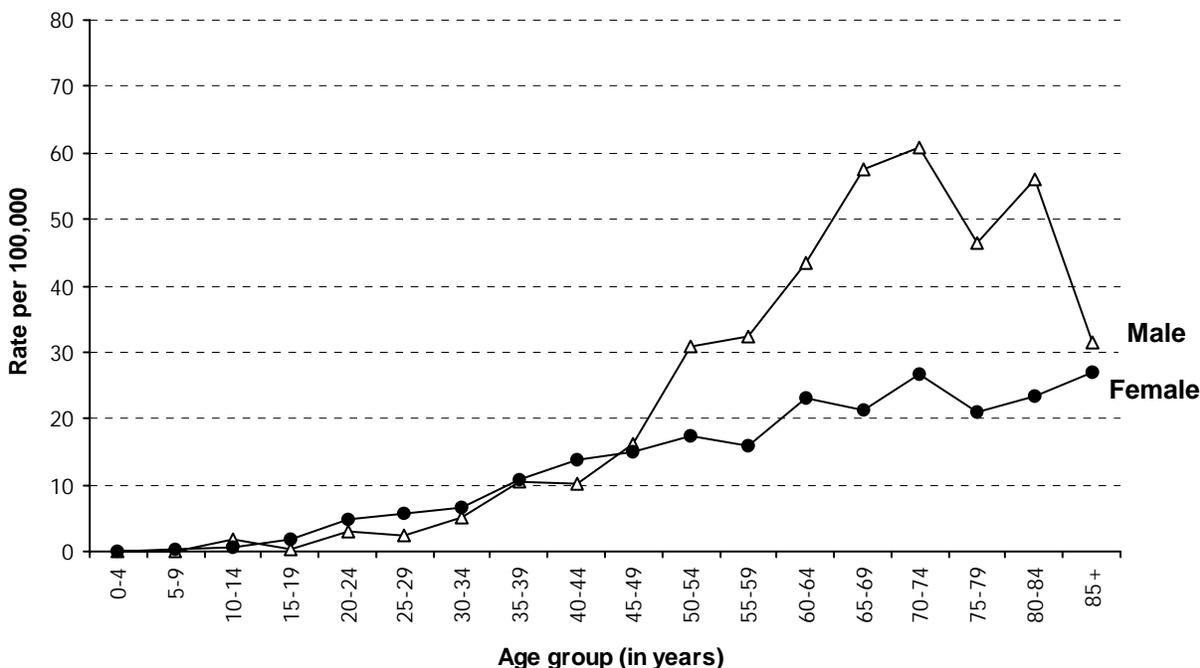
**Note.** Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ melanomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

† Rates based on fewer than 10 cases are not reported because they are unreliable.

\*These in situ cancers have been excluded from all rates presented.

## Invasive Melanoma of the Skin Age-Specific Incidence Rate by Sex



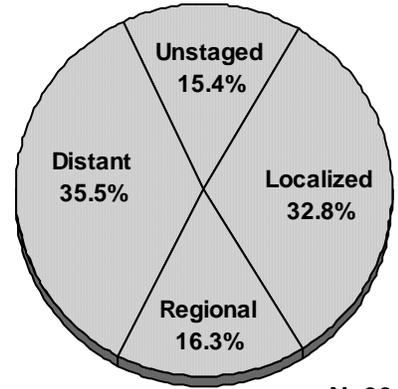
‡ Data exclude basal and squamous cell skin cancers.

# Non-Hodgkin's Lymphoma

**Number of Cases and Age-Adjusted Rates By Sex and Race**

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 904       | 12.0 | 475       | 6.1  |
| Male   | 472       | 14.1 | 242       | 7.4  |
| Female | 432       | 10.4 | 233       | 5.1  |
| White  | 752       | 12.4 | 419       | 6.6  |
| Black  | 127       | 10.0 | 53        | 4.3  |
| Other  | 20        | 9.5  | 3         | †    |

**Percentage of Cases By Stage at Diagnosis**



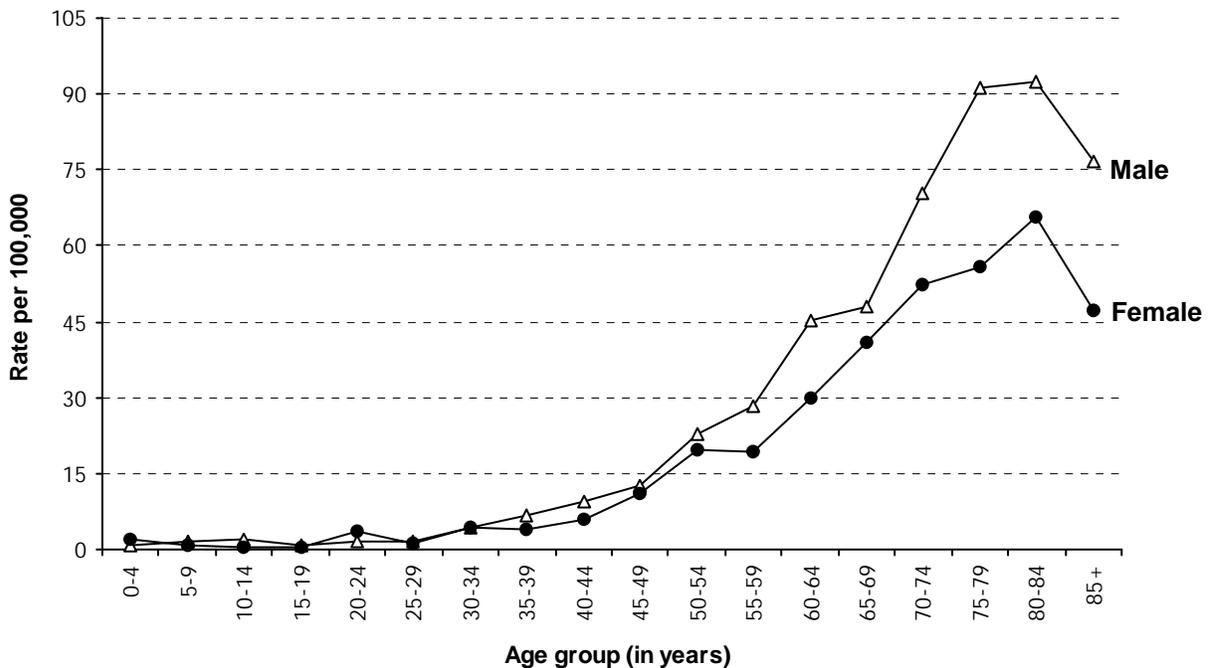
N=904

Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

† Rates based on fewer than 10 cases are not reported because they are unreliable.

**Non-Hodgkin's Lymphoma Age-Specific Incidence Rate by Sex**

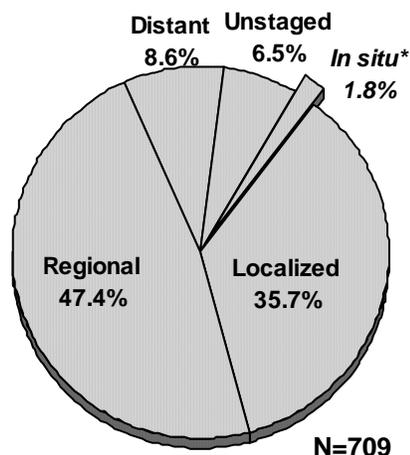


## Cancer of the Oral Cavity and Pharynx

**Number of Cases and Age-Adjusted Rates By Sex and Race**

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 696       | 9.4  | 206       | 2.7  |
| Male   | 486       | 14.5 | 140       | 4.3  |
| Female | 210       | 5.0  | 66        | 1.5  |
| White  | 539       | 9.0  | 149       | 2.4  |
| Black  | 141       | 11.8 | 54        | 4.6  |
| Other  | 15        | 6.1  | 3         | †    |

**Percentage of Cases By Stage at Diagnosis**



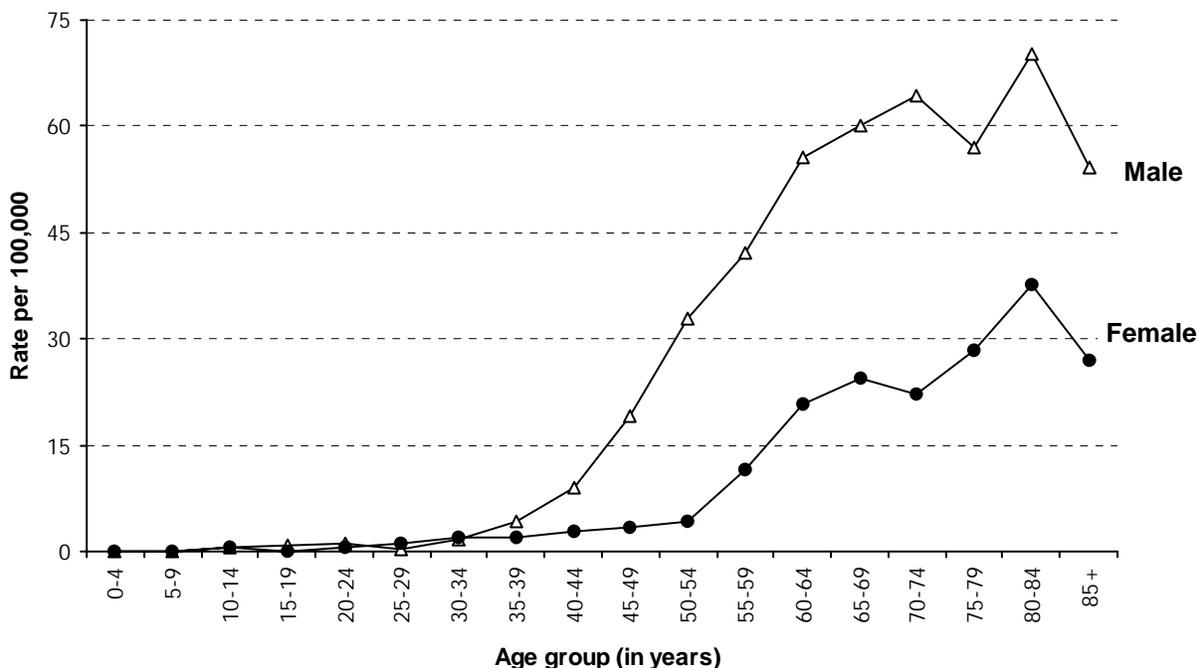
Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

† Rates based on fewer than 10 cases are not reported because they are unreliable.

\*These in situ cancers have been excluded from all rates presented.

**Invasive Cancer of the Oral Cavity and Pharynx Age-Specific Incidence Rate by Sex**



# Prostate Cancer

## Number of Cases and Age-Adjusted Rates By Sex and Race

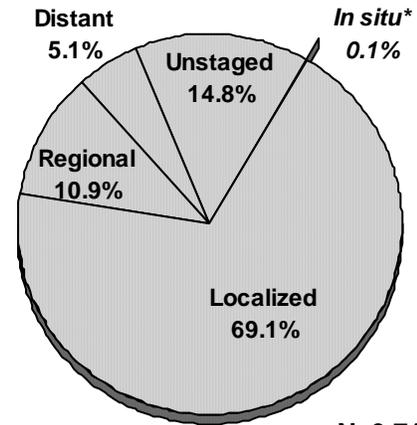
|       | Incidence |       | Mortality |      |
|-------|-----------|-------|-----------|------|
|       | Cases     | Rate  | Deaths    | Rate |
| Total | 3,710     | 117.7 | 764       | 24.3 |
| White | 2,778     | 107.1 | 523       | 20.0 |
| Black | 783       | 163.7 | 238       | 50.1 |
| Other | 45        | 64.6  | 3         | †    |

Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data exclude in situ carcinomas. All rates are per 100,000 male population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

† Rates based on fewer than 10 cases are not reported because they are unreliable.

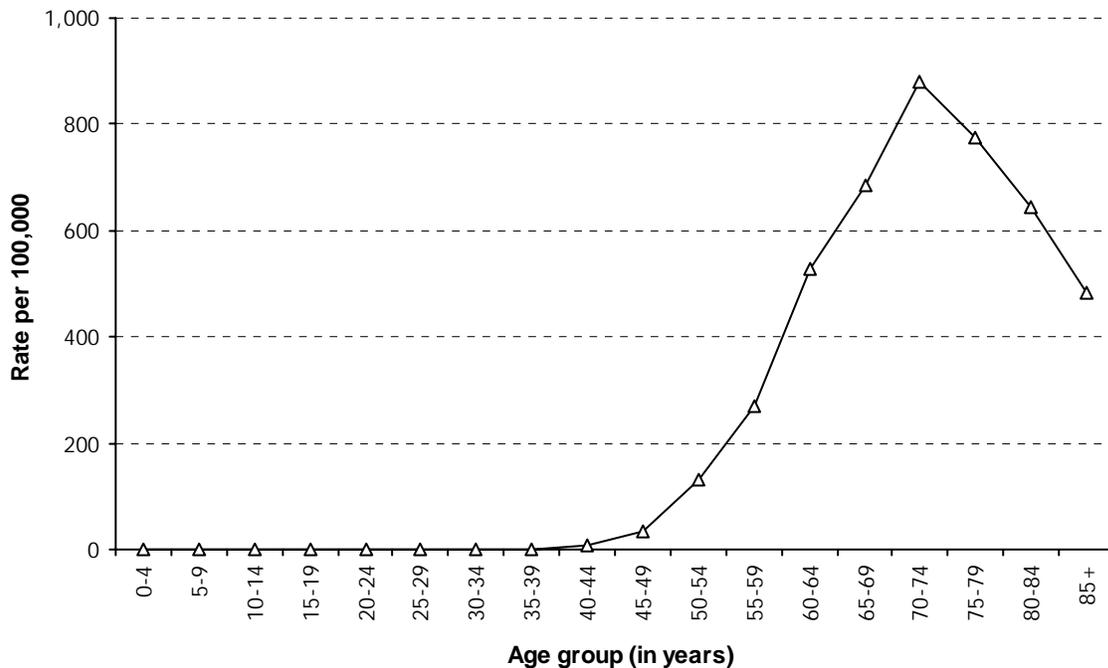
## Percentage of Cases By Stage at Diagnosis



N=3,713

\*These in situ cancers have been excluded from all rates presented.

## Invasive Prostate Cancer Age-Specific Incidence Rate

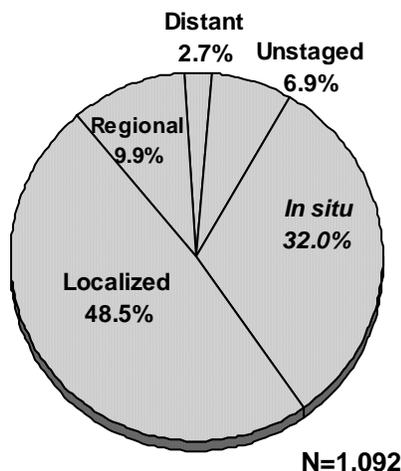


## Cancer of the Urinary Bladder

**Number of Cases and Age-Adjusted Rates By Sex and Race**

|        | Incidence |      | Mortality |      |
|--------|-----------|------|-----------|------|
|        | Cases     | Rate | Deaths    | Rate |
| Total  | 1,092     | 14.4 | 235       | 2.9  |
| Male   | 806       | 25.1 | 151       | 4.8  |
| Female | 286       | 6.5  | 84        | 1.6  |
| White  | 961       | 15.5 | 199       | 3.0  |
| Black  | 116       | 9.5  | 34        | 2.7  |
| Other  | 13        | 7.5  | 2         | †    |

**Percentage of Cases By Stage at Diagnosis**

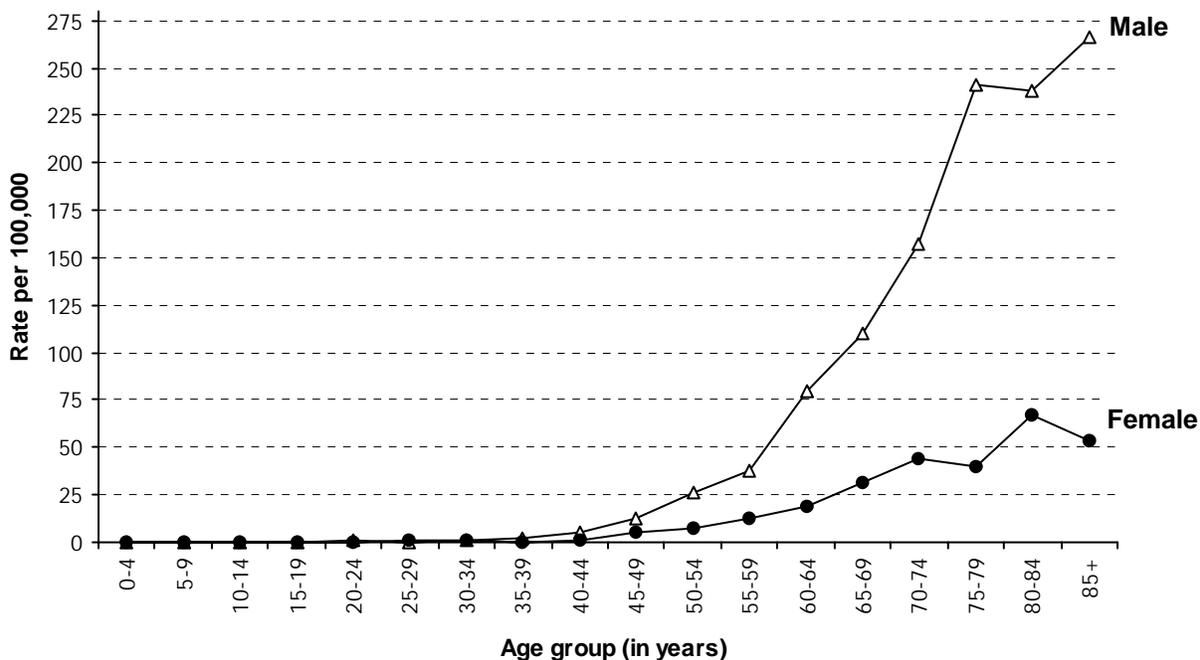


Note. Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Incidence data include in situ carcinomas. All rates are per 100,000 population and are adjusted to the 1970 U.S. standard population.

Total figures include persons of unknown race.

† Rates based on fewer than 10 cases are not reported because they are unreliable.

**Cancer of the Urinary Bladder Age-Specific Incidence Rate by Sex**



## Cancer of the Uterus

**Number of Cases and Age-Adjusted Rates By Sex and Race**

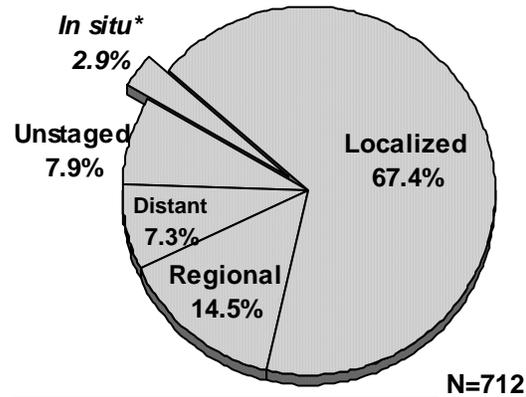
|       | Incidence |      | Mortality |      |
|-------|-----------|------|-----------|------|
|       | Cases     | Rate | Deaths    | Rate |
| Total | 691       | 17.3 | 155       | 3.5  |
| White | 579       | 18.2 | 109       | 3.0  |
| Black | 96        | 14.2 | 43        | 6.1  |
| Other | 13        | 9.5  | 3         | †    |

*Note.* Mortality data were obtained from the Virginia Center for Health Statistics (VCHS). Rates are per 100,000 female population and are adjusted to the 1970 U.S. standard population. Data exclude in situ carcinomas.

Total figures include persons of unknown race.

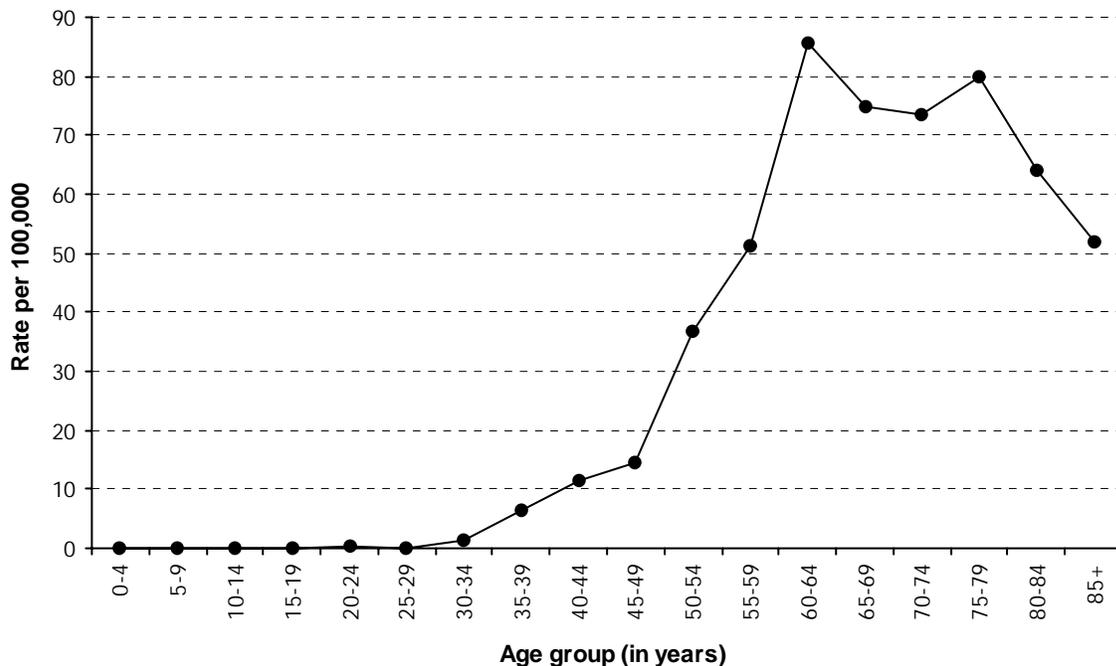
† Rates based on fewer than 10 cases are not reported because they are unreliable.

**Percentage of Cases By Stage at Diagnosis**



\*These in situ cancers have been excluded from all rates presented.

**Invasive Cancer of the Uterus Age-Specific Incidence Rate**





# Section IV

## Data Tables

**Table 1. Cancer Incidence in Virginia Health Districts**  
 Number of Cases and Annual Age-adjusted Incidence Rate  
 by Health District for Selected Cancers, 1998

| HEALTH DISTRICT                 | All Sites Combined |              | Lung and Bronchus |             | Female Breast |              |
|---------------------------------|--------------------|--------------|-------------------|-------------|---------------|--------------|
|                                 | Count              | Rate         | Count             | Rate        | Count         | Rate         |
| Alexandria                      | 431                | 322.8        | 44                | 30.9        | 91            | 124.4        |
| Alleghany                       | 789                | 364.0        | 124               | 58.0        | 139           | 117.0        |
| Arlington                       | 616                | 319.7        | 63                | 34.0        | 124           | 110.6        |
| Central Shenandoah              | 1,123              | 364.1        | 163               | 54.2        | 153           | 94.6         |
| Central Virginia                | 989                | 348.0        | 150               | 52.2        | 152           | 99.0         |
| Chesapeake                      | 699                | 378.0        | 111               | 63.3        | 116           | 108.0        |
| Chesterfield                    | 1,006              | 443.5        | 147               | 70.3        | 178           | 130.6        |
| Crater                          | 640                | 369.6        | 119               | 68.9        | 100           | 107.6        |
| Cumberland Plateau <sup>†</sup> | 389                | 262.4        | 64                | 41.8        | 70            | 88.7         |
| Eastern Shore                   | 249                | 334.2        | 48                | 61.8        | 38            | 90.2         |
| Fairfax                         | 2,970              | 332.6        | 282               | 34.3        | 603           | 117.2        |
| Hampton                         | 471                | 325.6        | 77                | 52.5        | 86            | 103.1        |
| Hanover                         | 487                | 348.8        | 74                | 53.3        | 64            | 83.9         |
| Henrico                         | 988                | 340.0        | 137               | 47.3        | 195           | 121.8        |
| Lenowisco <sup>†</sup>          | 141                | 120.2        | 12                | 10.1        | 27            | 42.9         |
| Lord Fairfax                    | 608                | 271.1        | 115               | 50.7        | 75            | 62.6         |
| Loudoun                         | 448                | 405.4        | 47                | 50.3        | 95            | 138.1        |
| Mount Rogers <sup>†</sup>       | 577                | 218.1        | 77                | 29.1        | 94            | 68.2         |
| New River <sup>†</sup>          | 585                | 342.1        | 91                | 53.5        | 87            | 98.0         |
| Norfolk                         | 871                | 389.5        | 163               | 72.2        | 132           | 110.6        |
| Peninsula                       | 1,010              | 326.8        | 154               | 51.3        | 176           | 103.2        |
| Piedmont                        | 513                | 427.8        | 79                | 65.7        | 67            | 109.8        |
| Pittsylvania/Danville           | 586                | 374.6        | 85                | 54.9        | 77            | 93.4         |
| Portsmouth                      | 448                | 364.7        | 79                | 63.2        | 64            | 95.9         |
| Prince William                  | 674                | 352.2        | 104               | 64.3        | 134           | 117.7        |
| Rappahannock                    | 809                | 395.2        | 121               | 63.1        | 119           | 103.2        |
| Rappahannock/Rapidan            | 518                | 332.6        | 69                | 44.8        | 91            | 112.2        |
| Richmond                        | 1,023              | 406.3        | 170               | 69.9        | 142           | 101.8        |
| Roanoke                         | 506                | 376.5        | 71                | 53.2        | 98            | 128.8        |
| Southside                       | 419                | 350.3        | 59                | 48.7        | 75            | 118.8        |
| Thomas Jefferson                | 859                | 398.2        | 121               | 55.9        | 140           | 123.4        |
| Three Rivers                    | 733                | 380.9        | 147               | 78.6        | 101           | 104.4        |
| Virginia Beach                  | 1,199              | 331.7        | 216               | 62.7        | 186           | 89.2         |
| West Piedmont                   | 637                | 344.6        | 80                | 44.0        | 99            | 101.9        |
| Western Tidewater               | 481                | 345.1        | 84                | 61.3        | 84            | 108.8        |
| <b>VIRGINIA</b>                 | <b>25,492</b>      | <b>342.0</b> | <b>3,747</b>      | <b>51.3</b> | <b>4,272</b>  | <b>104.0</b> |

Note. Data exclude localized basal and squamous skin cell cancers and in situ carcinomas except urinary bladder. Rates are per 100,000 population and are age-adjusted to the 1970 U.S. standard population. See Appendix A for a table of counties and cities that make up each health district.

<sup>†</sup> Virginia residents diagnosed and treated in Tennessee are not included in these figures. See Appendix A for more information.

**Table 1 (continued). Cancer Incidence in Virginia Health Districts**  
 Number of Cases and Annual Age-adjusted Incidence Rate  
 by Health District for Selected Cancers, 1998

| HEALTH DISTRICT            | Prostate     |              | Colon and Rectum |             | Urinary Bladder |             |
|----------------------------|--------------|--------------|------------------|-------------|-----------------|-------------|
|                            | Count        | Rate         | Count            | Rate        | Count           | Rate        |
| Alexandria                 | 57           | 108.4        | 52               | 35.7        | 11              | 8.7         |
| Alleghany                  | 102          | 105.4        | 98               | 43.1        | 35              | 14.8        |
| Arlington                  | 94           | 124.1        | 70               | 36.2        | 20              | 10.2        |
| Central Shenandoah         | 177          | 127.5        | 146              | 44.8        | 44              | 13.3        |
| Central Virginia           | 156          | 126.2        | 147              | 49.8        | 40              | 13.4        |
| Chesapeake                 | 89           | 115.3        | 87               | 47.6        | 45              | 25.5        |
| Chesterfield               | 154          | 161.8        | 126              | 57.7        | 44              | 20.9        |
| Crater                     | 96           | 130.6        | 76               | 42.3        | 29              | 16.7        |
| <i>Cumberland Plateau†</i> | 33           | 51.2         | 49               | 32.6        | 23              | 14.2        |
| Eastern Shore              | 30           | 88.4         | 29               | 32.6        | 6               | 9.0         |
| Fairfax                    | 487          | 126.6        | 316              | 37.8        | 121             | 14.4        |
| Hampton                    | 52           | 83.8         | 76               | 52.8        | 26              | 17.3        |
| Hanover                    | 84           | 136.4        | 65               | 46.0        | 22              | 15.6        |
| Henrico                    | 147          | 125.0        | 105              | 34.4        | 37              | 11.9        |
| <i>Lenowisco†</i>          | 16           | 30.6         | 27               | 22.4        | 6               | 4.0         |
| Lord Fairfax               | 72           | 72.5         | 85               | 36.8        | 31              | 12.9        |
| Loudoun                    | 71           | 159.4        | 50               | 48.4        | 16              | 14.5        |
| <i>Mount Rogers†</i>       | 75           | 63.5         | 88               | 31.0        | 24              | 8.8         |
| <i>New River†</i>          | 71           | 93.5         | 69               | 38.2        | 40              | 22.2        |
| Norfolk                    | 115          | 122.1        | 86               | 37.6        | 34              | 13.9        |
| Peninsula                  | 138          | 105.6        | 132              | 42.0        | 36              | 11.4        |
| Piedmont                   | 87           | 156.9        | 77               | 60.3        | 29              | 23.3        |
| Pittsylvania/Danville      | 93           | 139.7        | 93               | 56.1        | 34              | 20.7        |
| Portsmouth                 | 58           | 116.8        | 76               | 56.7        | 14              | 10.9        |
| Prince William             | 95           | 130.2        | 74               | 40.8        | 32              | 18.8        |
| Rappahannock               | 97           | 114.1        | 109              | 53.4        | 29              | 14.4        |
| Rappahannock/Rapidan       | 68           | 95.6         | 45               | 29.6        | 20              | 12.3        |
| Richmond                   | 208          | 198.7        | 114              | 42.0        | 27              | 9.6         |
| Roanoke                    | 64           | 112.8        | 79               | 53.3        | 25              | 16.5        |
| Southside                  | 75           | 138.6        | 54               | 43.4        | 18              | 14.3        |
| Thomas Jefferson           | 118          | 123.3        | 95               | 43.4        | 46              | 21.1        |
| Three Rivers               | 118          | 128.7        | 109              | 49.8        | 17              | 8.1         |
| Virginia Beach             | 140          | 93.6         | 127              | 35.9        | 63              | 18.1        |
| West Piedmont              | 114          | 136.3        | 92               | 48.0        | 34              | 16.9        |
| Western Tidewater          | 59           | 99.3         | 58               | 41.9        | 14              | 10.1        |
| <b>VIRGINIA</b>            | <b>3,710</b> | <b>117.7</b> | <b>3,181</b>     | <b>41.7</b> | <b>1,092</b>    | <b>14.4</b> |

Note. Data exclude localized basal and squamous skin cell cancers and in situ carcinomas except urinary bladder. Rates are per 100,000 population and are age-adjusted to the 1970 U.S. standard population. See Appendix A for a table of counties and cities that make up each health district.

† Virginia residents diagnosed and treated in Tennessee are not included in these figures. See Appendix A for more information.

**Table 2. Stage at Diagnosis by Primary Site**

Number of Cases and Annual Age-adjusted Incidence Rate by Stage, 1994 and 1998, and Five-year Average Annual Percent Change in Rate (1994 -1998)

|                                | In situ |        | Localized |        | Regional |        | Distant |        |
|--------------------------------|---------|--------|-----------|--------|----------|--------|---------|--------|
|                                | Count   | Rate   | Count     | Rate   | Count    | Rate   | Count   | Rate   |
| <b>All Sites Combined</b>      |         |        |           |        |          |        |         |        |
| 1994 (N=25,491)                | 2,400   | 32.54  | 9,883     | 142.22 | 5,552    | 80.22  | 4,993   | 72.79  |
| 1998 (N=27,731)                | 2,643   | 34.37  | 11,426    | 154.24 | 6,129    | 81.83  | 4,813   | 65.19  |
| <i>Average Annual % Change</i> |         | 1.62   |           | 2.05   |          | 0.55   |         | (2.62) |
| <b>Female Breast</b>           |         |        |           |        |          |        |         |        |
| 1994 (N=4,140)                 | 542     | 14.40  | 2,179     | 56.48  | 1,063    | 28.06  | 187     | 4.89   |
| 1998 (N=5,048)                 | 776     | 19.53  | 2,660     | 65.00  | 1,207    | 29.22  | 187     | 4.54   |
| <i>Average Annual % Change</i> |         | 7.98   |           | 3.58   |          | 1.19   |         | (1.74) |
| <b>Cervix</b>                  |         |        |           |        |          |        |         |        |
| 1994 (N=1,210)                 | 930     | 23.37  | 147       | 3.61   | 94       | 2.40   | 29      | 0.69   |
| 1998 (N=1,019)                 | 736     | 18.22  | 175       | 4.16   | 72       | 1.68   | 20      | 0.52   |
| <i>Average Annual % Change</i> |         | (5.39) |           | 4.22   |          | (7.41) |         | (6.16) |
| <b>Colon and Rectum</b>        |         |        |           |        |          |        |         |        |
| 1994 (N=2,885)                 | 215     | 3.10   | 766       | 10.86  | 1,245    | 17.55  | 515     | 7.46   |
| 1998 (N=3,453)                 | 272     | 3.64   | 1,009     | 13.35  | 1,412    | 18.42  | 551     | 7.25   |
| <i>Average Annual % Change</i> |         | 4.62   |           | 5.85   |          | 1.33   |         | (0.49) |
| <b>Kidney and Renal Pelvis</b> |         |        |           |        |          |        |         |        |
| 1994 (N=513)                   | 8       | †      | 268       | 3.92   | 98       | 1.41   | 102     | 1.49   |
| 1998 (N=636)                   | 9       | †      | 371       | 5.07   | 116      | 1.58   | 112     | 1.53   |
| <i>Average Annual % Change</i> |         | †      |           | 8.21   |          | 3.03   |         | 1.72   |
| <b>Lung and Bronchus</b>       |         |        |           |        |          |        |         |        |
| 1994 (N=3,715)                 | 5       | †      | 732       | 10.72  | 1,065    | 15.87  | 1,630   | 24.20  |
| 1998 (N=3,748)                 | 1       | †      | 769       | 10.56  | 1,093    | 14.97  | 1,619   | 22.27  |
| <i>Average Annual % Change</i> |         | †      |           | (0.11) |          | (1.39) |         | (2.02) |

**Note.** Negative changes in rates are denoted by parentheses. Small changes in observed counts may result in inflated percentage increases or decreases. Unstaged cases are reflected in annual total counts but not in stage-specific figures. Rates are per 100,000 population and are age-adjusted to the 1970 U.S. standard population.

†Rates based on fewer than 10 cases are not reported because they are unreliable.

**Table 2 (continued). Stage at Diagnosis by Primary Site**

Number of Cases and Annual Age-adjusted Incidence Rate by Stage, 1994 and 1998, and Five-year Average Annual Percent Change in Rate (1994-1998)

|                                | In situ |        | Localized |        | Regional |        | Distant |        |
|--------------------------------|---------|--------|-----------|--------|----------|--------|---------|--------|
|                                | Count   | Rate   | Count     | Rate   | Count    | Rate   | Count   | Rate   |
| <b>Melanoma of the Skin</b>    |         |        |           |        |          |        |         |        |
| 1994 (N=922)                   | 224     | 3.06   | 473       | 6.47   | 23       | 0.31   | 31      | 0.44   |
| 1998 (N=1,120)                 | 294     | 3.77   | 600       | 7.91   | 60       | 0.79   | 44      | 0.59   |
| <i>Average Annual % Change</i> |         | 5.89   |           | 5.16   |          | 29.28  |         | 11.61  |
| <b>Non-Hodgkin's Lymphoma</b>  |         |        |           |        |          |        |         |        |
| 1994 (N=799)                   | 0       | 0.00   | 233       | 3.27   | 152      | 2.13   | 332     | 4.76   |
| 1998 (N=904)                   | 0       | 0.00   | 297       | 3.86   | 147      | 1.99   | 321     | 4.30   |
| <i>Average Annual % Change</i> |         | 0.00   |           | 4.67   |          | (1.19) |         | (2.15) |
| <b>Oral Cavity and Pharynx</b> |         |        |           |        |          |        |         |        |
| 1994 (N=652)                   | 16      | 0.24   | 233       | 3.35   | 286      | 4.27   | 72      | 1.08   |
| 1998 (N=709)                   | 13      | 0.18   | 253       | 3.43   | 336      | 4.55   | 61      | 0.82   |
| <i>Average Annual % Change</i> |         | 2.20   |           | 0.60   |          | 1.89   |         | (3.26) |
| <b>Prostate</b>                |         |        |           |        |          |        |         |        |
| 1994 (N=3,625)                 | 8       | †      | 2,288     | 78.53  | 446      | 15.47  | 266     | 9.24   |
| 1998 (N=3,713)                 | 3       | †      | 2,565     | 81.45  | 407      | 13.03  | 189     | 5.97   |
| <i>Average Annual % Change</i> |         | †      |           | 0.95   |          | (3.80) |         | (9.64) |
| <b>Urinary Bladder</b>         |         |        |           |        |          |        |         |        |
| 1994 (N=979)                   | 282     | 4.05   | 497       | 7.14   | 84       | 1.18   | 27      | 0.41   |
| 1998 (N=1,092)                 | 350     | 4.60   | 530       | 7.01   | 108      | 1.43   | 29      | 0.38   |
| <i>Average Annual % Change</i> |         | 3.53   |           | 0.94   |          | 4.97   |         | 2.32   |
| <b>Uterus</b>                  |         |        |           |        |          |        |         |        |
| 1994 (N=709)                   | 24      | 0.65   | 508       | 13.69  | 80       | 1.98   | 69      | 1.79   |
| 1998 (N=712)                   | 21      | 0.54   | 480       | 12.15  | 103      | 2.55   | 52      | 1.25   |
| <i>Average Annual % Change</i> |         | (2.53) |           | (2.86) |          | 7.53   |         | (7.15) |

**Note.** Negative changes in rates are denoted by parentheses. Small changes in observed counts may result in inflated percentage increases or decreases. Unstaged cases are reflected in annual total counts but not in stage-specific figures. Rates are per 100,000 population and are age-adjusted to the 1970 U.S. standard population.

†Rates based on fewer than 10 cases are not reported because they are unreliable.



# Section V

## Appendices



## Appendix A: Technical Notes

These data reflect a conservative account of cancer in Virginia for several reasons. Residents sometimes travel out-of-state for diagnosis and treatment. Data on cancer in Virginia residents diagnosed or treated in the neighboring states of Kentucky, Maryland, West Virginia, North Carolina, or the District of Columbia are collected from the central registries in those states through legal interstate data exchange agreements. Virginia recently completed a similar agreement with Tennessee, but figures for 1998 incidence were not available yet, thus Virginia residents diagnosed and treated in Tennessee are not included in these data. Further, some patients may have been missed by the routine casefinding methods used in the reporting facilities. These factors combined lead to biases in the cases that are reported. Underreporting of cancer occurs to varying degrees in different areas of the state; for example, counts may be more accurate in urbanized areas simply because case ascertainment is more complete. Similarly, case reporting may be more complete for certain racial groups, cancer sites, or diagnosis stages.

### Health Districts

Cancer incidence statistics by health district indicate patterns of occurrence across Virginia. **However, observed excess cancer incidence in various areas can occur due to chance, genetic risk factors, or behavior-related risk factors, rather than environmental causes.** Virginia is made up of 95 counties and 40 independent cities, which are grouped into 35 health districts by the Virginia Department of Health. The composition of the health districts is listed below:

| Health District    | City/County  |
|--------------------|--|
| Alexandria         | City of Alexandria   |
| Alleghany          | Alleghany, Botetourt, Craig, and Roanoke Counties<br>Cities of Clifton Forge, Covington, and Salem   |
| Arlington          | Arlington County   |
| Central Shenandoah | Augusta, Bath, Highland, Rockbridge,<br>and Rockingham Counties<br>Cities of Buena Vista, Harrisonburg, Lexington,<br>Staunton, and Waynesboro |
| Central Virginia   | Amherst, Appomattox, Bedford,<br>and Campbell Counties<br>Cities of Bedford and Lynchburg  |
| Chesapeake         | City of Chesapeake   |
| Chesterfield       | Chesterfield and Powhatan Counties<br>City of Colonial Heights   |
| Crater             | Dinwiddie, Greensville, Prince George,<br>Surry, Sussex Counties<br>Cities of Emporia, Hopewell, and Petersburg                                |

| Health District       | City/County   |
|-----------------------|---|
| Cumberland Plateau    | Buchanan, Dickenson, Russell, and Tazewell Counties   |
| Eastern Shore         | Accomack and Northampton Counties   |
| Fairfax               | Fairfax County<br>Cities of Fairfax and Falls Church  |
| Hampton               | City of Hampton   |
| Hanover               | Charles City, Goochland, Hanover, and<br>New Kent Counties  |
| Henrico               | Henrico County  |
| Lenowisco             | Lee, Scott, and Wise Counties<br>City of Norton   |
| Lord Fairfax          | Clarke, Frederick, Page, Shenandoah,<br>and Warren Counties<br>City of Winchester   |
| Loudoun               | Loudoun County  |
| Mount Rogers          | Bland, Carroll, Grayson, Smyth, Washington, and<br>Wythe Counties<br>Cities of Bristol and Galax  |
| New River             | Floyd, Giles, Montgomery, and Pulaski Counties<br>City of Radford   |
| Norfolk               | City of Norfolk   |
| Peninsula             | James City and York Counties<br>Cities of Newport News, Poquoson, and Williamsburg  |
| Piedmont              | Amelia, Buckingham, Charlotte, Cumberland,<br>Lunenburg, Nottoway, and Prince Edward Counties   |
| Pittsylvania/Danville | Pittsylvania County<br>City of Danville   |
| Portsmouth            | City of Portsmouth  |
| Prince William        | Prince William County<br>Cities of Manassas and Manassas Park   |
| Rappahannock          | Caroline, King George, Spotsylvania, and<br>Stafford Counties<br>City of Fredericksburg   |
| Rappahannock/Rapidan  | Culpeper, Fauquier, Madison, Orange, and<br>Rappahannock Counties   |
| Richmond City         | City of Richmond  |
| Roanoke City          | City of Roanoke   |
| Southside             | Brunswick, Halifax, and Mecklenburg Counties  |
| Thomas Jefferson      | Albemarle, Fluvanna, Greene, Louisa, and<br>Nelson Counties<br>City of Charlottesville  |
| Three Rivers          | Essex, Gloucester, King and Queen, King William,<br>Lancaster, Mathews, Middlesex, Northumberland,<br>Richmond, and Westmoreland Counties |
| Virginia Beach        | City of Virginia Beach  |
| West Piedmont         | Franklin, Henry, and Patrick Counties<br>City of Martinsville   |
| Western Tidewater     | Isle of Wight and Southampton Counties<br>Cities of Franklin and Suffolk  |

## Appendix B: SEER Definition of Site Categories

| Site Categories                  | ICD-O-2 Codes*  | ICD-9 Codes   |
|----------------------------------|---|---|
| Oral Cavity and Pharynx          | C00.0 - C14.8   | 140.0 - 145.6<br>145.8 - 145.9<br>146.0 - 149.9                   |
| Esophagus                        | C15.0 - C15.9   | 150.0 - 150.9   |
| Stomach                          | C16.0 - C16.9   | 151.0 - 151.9   |
| Colon and Rectum                 | C18.0 - C18.9,<br>C19.9, C20.9,<br>C21.0 - C21.8  | 153.0 - 153.9,<br>154.0 - 154.1,<br>159.0                         |
| Liver and Intrahepatic Bile Duct | C22.0 - C22.1   | 155.0 - 155.2   |
| Pancreas                         | C25.0 - C25.9   | 157.0 - 157.9   |
| Larynx                           | C32.0 - C32.9   | 161.0 - 161.9   |
| Lung and Bronchus                | C34.0 - C34.9   | 162.2 - 162.9   |
| Melanoma of the Skin             | C44.0 - C44.9<br>(histologies 8720-8790 only)   | 172.0 - 172.9   |
| Female Breast                    | C50.0 - C50.9   | 174.0 - 174.9   |
| Cervix                           | C53.0 - C53.9   | 180.0 - 180.9   |
| Uterus                           | C54.0 - C54.9,<br>C55.9   | 179._,<br>182.0 - 182.1,<br>182.8                                 |
| Ovary                            | C56.9   | 183.0   |
| Prostate                         | C61.9   | 185._   |
| Testis                           | C62.0 - C62.9   | 186.0 - 186.9   |
| Urinary Bladder                  | C67.0 - C67.9   | 188.0 - 188.9   |
| Kidney and Renal Pelvis          | C64.9, C65.9  | 189.0 - 189.1   |
| Brain and Other Nervous System   | C70.0 - C70.9,<br>C71.0 - C71.9,<br>C72.0 - C72.9,  | 191.0 - 191.9<br>192.0 - 192.3,<br>192.8 - 192.9                  |
| Thyroid                          | C73.9   | 193._   |
| Hodgkin's Lymphoma               | Histologies 9650-9667   | 201.0 - 201.9   |
| Non-Hodgkin's Lymphoma           | Histologies 9590-9595, 9670-9717  | 200.0 - 200.8,<br>202.0 - 202.2,<br>202.8 - 202.9                 |
| Multiple Myeloma                 | Histologies 9731-9732   | 203.0,<br>203.2 - 203.8   |
| Leukemia                         | Histologies 9800-9804, 9820-9827,<br>9830-9831, 9840-9842, 9850,<br>9860-9864, 9866-9868, 9870- 9874,<br>9880, 9890-9894, 9900, 9910, 9930-9941 | 202.4, 203.1,<br>204.0 - 207.2,<br>207.8 - 207.9<br>208.0 - 208.9 |

\*Except where noted or otherwise specified, each grouping excludes histologic types 9590-9989.

**Appendix C: U.S. Standard Population, 1970**

| Age Group (years) | Count     |
|-------------------|-----------|
| 0 to 4            | 84,416    |
| 5 to 9            | 98,204    |
| 10 to 14          | 102,304   |
| 15 to 19          | 93,845    |
| 20 to 24          | 80,561    |
| 25 to 29          | 66,320    |
| 30 to 34          | 56,249    |
| 35 to 39          | 54,656    |
| 40 to 44          | 58,958    |
| 45 to 49          | 59,622    |
| 50 to 54          | 54,643    |
| 54 to 59          | 49,077    |
| 60 to 64          | 42,403    |
| 65 to 69          | 34,406    |
| 70 to 74          | 26,789    |
| 75 to 79          | 18,871    |
| 80 to 84          | 11,241    |
| 85 plus           | 7,435     |
| TOTAL             | 1,000,000 |

Note. The U.S. standard population, 1970, is used for the age-adjustment of observed age-specific incidence rates and does not represent an actual population estimate.

**Appendix D:  
Virginia Population, 1998, By Race and Sex**

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| Race      | Male      | Female    |
|-----------|-----------|-----------|
| All Races | 3,316,766 | 3,474,579 |
| White     | 2,538,666 | 2,624,226 |
| Black     | 652,187   | 710,429   |
| Other     | 125,913   | 139,924   |

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*Note.* Population estimates are from the U.S. Census Bureau (release date September 15, 1999). Annual race-, sex-, and age-specific population estimates for each locality were summed to produce population estimates for the state and health district. These figures were used as population-at-risk figures in the denominator in calculation of age-specific and age-adjusted incidence rates.

**Appendix E:  
Publications and Journal Articles using Virginia Cancer Registry Data**

**Publications:**

*Cancer Incidence in Virginia, 1997*  
*Cancer Incidence in Virginia, 1995-1996*  
*Cancer Incidence in Virginia, 1990-1994*  
*Prostate Cancer in Virginia, 1970-1997*  
*Laryngeal Cancer in Virginia, 1970-1996*  
*Melanoma in Virginia, 1970-1996*

**Articles:**

**1999**

Desch CE, Penberthy LT, Hillner BE, McDonald MK, Smith TJ, Pozez AL, Retchin SM. A Sociodemographic and Economic Comparison of Breast Reconstruction, Mastectomy, and Conservative Surgery. *Surgery*. 125(4):441-7;1999.

Josephson GD, and Wohl D. Malignant Tumors of the Head and Neck in Children. *Current Opinion in Otolaryngology & Head and Neck Surgery*. 7(2):61-67;1999.

Whitehurst MM, Aldenderfer PH, Yanovich S, Strelkauskas AJ. Clinical Analysis of the Novel Breast Cancer Serum Assay BT1. *Anticancer Research*. 19(2A):1331-5;1999.

**1998**

Hillner BE, McDonald MK, Desch CE, Smith TJ, Penberthy LT, Retchin SM. A Comparison of Patterns of Care of Non-small Cell Lung Carcinoma Patients in a Younger and Medigap Commercially Insured Cohort. *Cancer*. 83(9):1930-7;1998.

Hillner BE, McDonald MK, Desch CE, Smith TJ, Penberthy LT, Maddox P, Retchin SM. Costs of Care Associated with Non-small Cell Lung Cancer in a Commercially Insured Cohort. *Journal of Clinical Oncology*. 16(4):1420-4;1998.

Newschaffer CJ, Bush TL, Penberthy LE, Bellantoni M, Helzlsour K, Diener-West M. Does Comorbidity Interact with Cancer? An Epidemiologic Analysis of Mortality in a Cohort of Elderly Breast Cancer Patients. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*. 53(5):M372-8;1998.

Woolard CD. The Detection and Treatment of Early Stage Breast Cancer, Virginia, 1986-1995. *Virginia Epidemiology Bulletin*. 98(12):1-5; 1998.

**1997**

Hillner BE, McDonald MK, Penberthy L, Desch CE, Smith TJ, Maddox P, Glasheen WP, Retchin SM. Measuring Standards of Care for Early Breast Cancer in an Insured Population. *Journal of Clinical Oncology*. 15(4):1401-8;1997.

**Appendix E (continued):  
Publications and Journal Articles using Virginia Cancer Registry Data**

McClish DK, Penberthy L, Whittemore M, Newschaffer C, Woolard D, Desch CE, Retchin S. Ability of Medicare Claims Data and Cancer Registries to Identify Cancer Cases and Treatment. *American Journal of Epidemiology*. 145(3):227-33; 1997.

Newschaffer CJ, Bush TL, Penberthy LT. Comorbidity Measurement in Elderly Female Breast Cancer Patients with Administrative and Medical Records Data. *Journal of Clinical Epidemiology*. 50(6):725-33;1997.

**1996**

Desch CE, Penberthy L, Newschaffer CJ, Hillner BE, Whittemore M, McClish D, Smith TJ, Retchin SM. Factors that Determine the Treatment for Local and Regional Prostate Cancer. *Medical Care*. 34(2):152-62;1996.

Hillner BE, et al. Development of a Quality of Care Scorecard for Early Breast Cancer in an Insured Population. *Proceedings of the Annual Meeting of the American Society of Clinical Oncologists*. 15:A157; 1996.

Hillner BE, Penberthy L, Desch CE, McDonald MK, Smith TJ, Retchin SM. Variation in Staging and Treatment of Local and Regional Breast Cancer in the Elderly. *Breast Cancer Research and Treatment*. 40(1):75-86; 1996.

Newschaffer CJ, Penberthy L, Desch CE, Retchin SM, Whittemore M. The Effect of Age and Comorbidity in the Treatment of Elderly Women with Nonmetastatic Breast Cancer. *Archives of Internal Medicine*. 156(1):85-90;1996.

**1995**

Smith TJ, Penberthy L, Desch CE, Whittemore M, Newschaffer C, Hillner BE, McClish D, Retchin SM. Differences in Initial Treatment Patterns and Outcomes of Lung Cancer in the Elderly. *Lung Cancer*. 13(3):235-52; 1995.

**Other:**

*Virginia Cancer Registry data are also included in the following regional and national data publications:*

American Cancer Society. *Mid-Atlantic Division Cancer Facts and Figures 2000*.

American Cancer Society. *Mid-Atlantic Division Cancer Facts and Figures 2001*.

Chen VW, Howe HL, Wu XC, Hotes JL, Correa CN (eds). *Cancer in North America, 1993-1997. Volume One: Incidence*. Springfield, IL: North American Association of Central Cancer Registries, April 2000.