



# **Adolescent and Young Adult Cancer in New Jersey – 1979-2006**

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## INTRODUCTION

Cancer is primarily a disease of aging; as we age, the likelihood of contracting cancer increases. Although not as rare as in children (ages 0-14), cancer in adolescents and young adults (ages 15-29) is relatively uncommon, representing about two percent of all cancers.<sup>1</sup> Different types of cancer occur in adolescents and young adults than in children and older adults. The most common cancers in adolescents and young adults are lymphoma, testis, thyroid and melanoma of the skin, in contrast to leukemia, brain and other central nervous system, lymphoma and neuroblastoma in children and skin, prostate, breast, lung, and colorectal in all adults.<sup>1,2</sup>

This report is the first from the Cancer Epidemiology Services, New Jersey Department of Health and Senior Services, to focus on cancer among adolescents and young adults in New Jersey. It includes detailed cancer incidence and mortality data for 1979 through 2006 on adolescents and young adults 15 to 29 years of age who resided in New Jersey at the time of diagnosis and/or death. Survival rates for adolescents and young adults diagnosed with cancer from 1979 to 2001 also are shown in the report. The incidence, mortality and survival data are presented by the major types of cancer, sex, age group and year of diagnosis. Also included are comparisons of New Jersey with U.S. adolescent and young adult cancer incidence, mortality, and survival rates and trends over time. Background and risk factor information for the most common adolescent and young adult cancers is presented as well.

Additional New Jersey cancer incidence, prevalence, risk, mortality, and survival data are available from the Cancer Epidemiology Services office (609-588-3500) or on our website, <http://www.state.nj.us/health/ces/index.shtml>, including:

- *Cancer Incidence and Mortality in New Jersey 2002-2006;*
- *Childhood Cancer in New Jersey 1979-2005;*
- *Area Socioeconomic Variations in Cancer Incidence and Stage at Diagnosis in New Jersey, 1996-2002;*
- *Cancer Prevalence in New Jersey on January 1, 2003;*
- *Probability of Developing Cancer for Selected Age Groups by Sex, 2001-2003 (New Jersey and U.S.);*
- *Cancer Survival in New Jersey, 1979-1997;*
- *Cancer Incidence Rates in New Jersey's Ten Most Populated Municipalities, 1998-2002;* and
- *Trends in Cancer Incidence and Mortality in New Jersey, 1979-2002.*

Our interactive cancer data mapping application provides statewide and county-level cancer incidence and mortality data by cancer type, gender, race, and ethnicity for the most recent five years of data, currently 2002-2006. Similar data are available for cancer mortality. Additionally, statewide age-specific incidence and mortality data may be obtained from this site. The interactive cancer data mapping application can be found at <http://nj.gov/health/ces/cancer-rates.shtml>. This application is updated annually.

Additional New Jersey and U.S. cancer data and information can be found on the following websites:

- New Jersey Department of Health and Senior Services at <http://www.state.nj.us/health/ces/cci.shtml>;
- Surveillance, Epidemiology and End Results Program (SEER) Cancer Statistics at <http://surveillance.cancer.gov/statistics/>;
- Cancer Control P.L.A.N.E.T. at <http://cancercontrolplanet.cancer.gov/> and
- North American Association of Central Cancer Registries' (NAACCR) *Cancer in North America 2000-2005* at [http://www.naacr.org/index.asp?Col\\_SectionKey=11&Col\\_ContentID=50](http://www.naacr.org/index.asp?Col_SectionKey=11&Col_ContentID=50).

## SUMMARY

### New Jersey Incidence

Between 1979 and 2006, over 18,000 adolescents and young adults (ages 15-29) in New Jersey were diagnosed with cancer. The average annual age-adjusted cancer incidence rate was about 38 cases per 100,000 adolescents and young adults. The most common cancer types were lymphoma, testis, thyroid and melanoma of the skin with average annual age-adjusted incidence rates of 8.5, 7.6, 3.7, and 2.9, respectively. Cancer incidence increased about 20% between 1979 and 2006. The types of cancer that increased the most were thyroid (300%), skin melanoma (200%) and female breast (17%). Testis cancer and brain and other nervous system cancer incidence rates increased slightly. Cervical cancer rates decreased by over a third, lymphoma rates decreased slightly, and leukemia rates remained the same.

Among adolescents and young adults, the female average annual age-adjusted cancer incidence rate for 1979-2006 was slightly greater than the male rate (39 cases versus 36 cases per 100,000). However, in the two younger age groups (15-19, 20-24), the male rate was slightly higher than the female rate. The major cancer types contributing to the overall sex difference were thyroid, with the female rate over four times greater than the male rate, and melanoma of the skin with the female rate over 50% higher than the male rate. Males had higher rates of lymphoma, leukemia, and brain and other nervous system cancer than females. These sex differences in the major cancer types generally applied to all three five-year age groups within the larger group of adolescents and young adults. The remaining major cancer types were male only (testis) or female only (cervical, breast).

The age-specific average annual cancer incidence rate increased greatly with each subsequently older age group (15-19, 20-24, 25-29) overall and for lymphoma, testis, thyroid, melanoma of the skin, cervical, and female breast cancers. The youngest age group had the highest rate of leukemia. For brain cancer, the two younger age groups had similar rates which were lower than the oldest age group's rate.

### New Jersey Mortality

There were 3,114 cancer deaths among New Jersey adolescents and young adults (15-29) during 1979-2005. Cancer mortality rates for New Jersey adolescents and young adults were quite low throughout 1979 to 2005; the average annual age-adjusted cancer mortality rate was fewer than 7 deaths per 100,000. Leukemia and lymphoma resulted in the highest average annual age-adjusted mortality rates (1.5 and 1.4 deaths per 100,000, respectively). Of the remaining major cancer types, brain and other nervous system, testis, female breast, cervical, and skin melanoma had rates lower than one death per 100,000, and the thyroid cancer death rate was too low to report. Despite the increase in incidence, mortality declined between 1979 and 2005 by about a third. The major decreases were in brain and other nervous system cancer (64%), lymphoma (50%), skin



melanoma (28%) and leukemia (21%). It was not possible to measure mortality trends over time for testis, thyroid, female breast, and cervical cancer due to the very low numbers of deaths.

In contrast to their lower cancer incidence rate, adolescent and young adult male's average annual age-adjusted cancer mortality rate was higher than the female rate during the period 1979-2005 (7.5 vs. 5.7 deaths per 100,000); this applied to each age group (15-19, 20-24, 25-29). Adolescent and young adult males in each age group also had a higher average age-adjusted cancer mortality rate than females for lymphoma, skin melanoma, leukemia, and brain and other nervous system cancer. The remaining major cancer types were male only (testis), female only (cervical, breast) or had mortality too low to report (thyroid).

The average annual age-adjusted mortality rate increased among both sexes (where applicable) in each subsequently older five-year age group for all cancers combined and most of the major cancer types – lymphoma, testis, skin melanoma, cervical, brain and other nervous system, and breast. The leukemia mortality rate followed this pattern for males, but for females the mortality rate was highest in the youngest age group.

### **New Jersey Survival**

The five-year relative survival rate was about 75 percent among New Jersey adolescents and young adults (ages 15-29) diagnosed with cancer in 1979-2001. The female adolescent and young adult survival rate was higher than the male rate – 80 percent versus 71 percent. The female survival rate also was higher than the male rate in each five-year age group (15-19, 20-24, 25-29), and the middle age group had the highest survival rate compared to the other age groups.

The major types of cancer with the highest five-year relative survival rates among adolescents and young adults were thyroid (99%), testis (92%), skin melanoma (87.5%), cervical (84%), and lymphoma (78%). Female breast cancer (73%), brain and other nervous system cancer (65%) and leukemia (46%) had the lowest survival rates. The female survival rates were higher than the male survival rates for all the major types of cancer except brain and other nervous system, although this comparison could not be made with testis cancer, cervical cancer and female breast cancer. The five-year age group with the highest and lowest survival rates varied with the type of cancer.

### **New Jersey Compared to the U.S.**

The U.S. average annual age-adjusted cancer incidence rate for 1979-2005 was slightly lower than New Jersey's rate for 1979-2006: 36 cases per 100,000 adolescents and young adults (15-29). While U.S. rates were lower than New Jersey rates for many of the major cancer types; i.e., lymphoma, leukemia, cervical, and female breast, New Jersey's incidence rates were the same as the U.S. incidence rates for brain and other nervous system cancer and skin melanoma and lower for testis and thyroid cancer. In general,

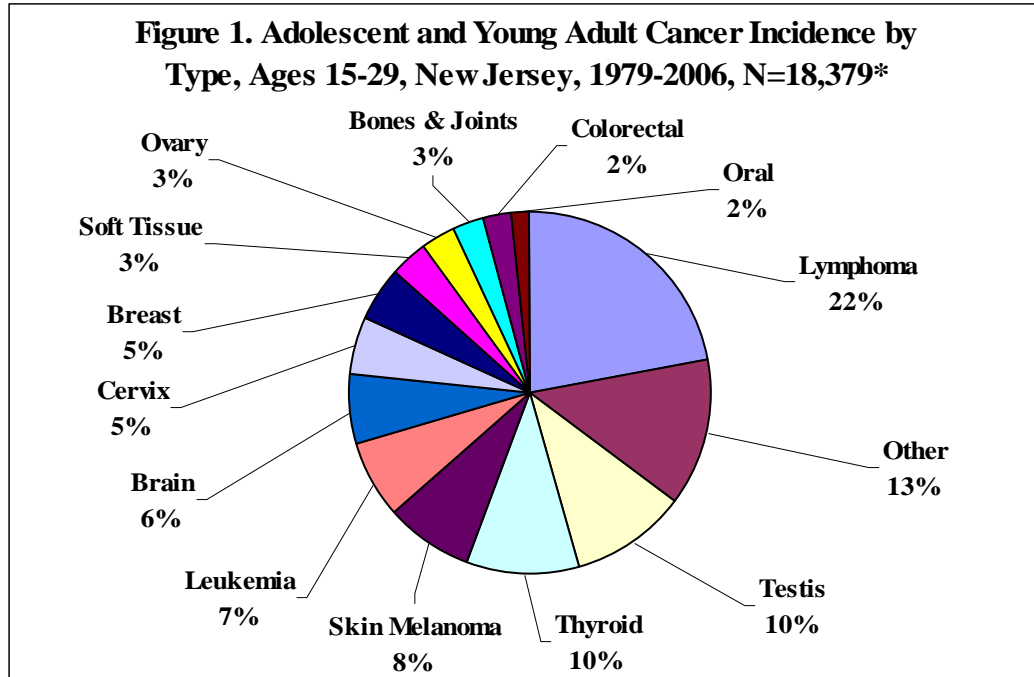
cancer rates that were higher in New Jersey than the U.S. were higher in each sex and five-year age group.

New Jersey adolescents and young adults also had a higher average annual age-adjusted cancer mortality rate for 1979-2005 than U.S. adolescents and young adults (6.6 versus 6.0 cases per 100,000). However, the New Jersey mortality rates were higher than the U.S. rates for only two major cancer types – lymphoma and leukemia. New Jersey rates were about the same as U.S. rates for testis cancer, skin melanoma and cervical cancer and lower than U.S. rates for brain and other nervous system cancer and female breast cancer. Thyroid cancer mortality was too low to report.

The New Jersey adolescent and young adult cancer five-year relative survival rate of 75% was lower than the U.S. rate of 78%. This held true for most of the major cancer types; however, the New Jersey leukemia and female breast cancer survival rates were slightly higher than the U.S. rates.

**ALL CANCERS COMBINED**

**Cancer Incidence Distribution by Type in New Jersey**



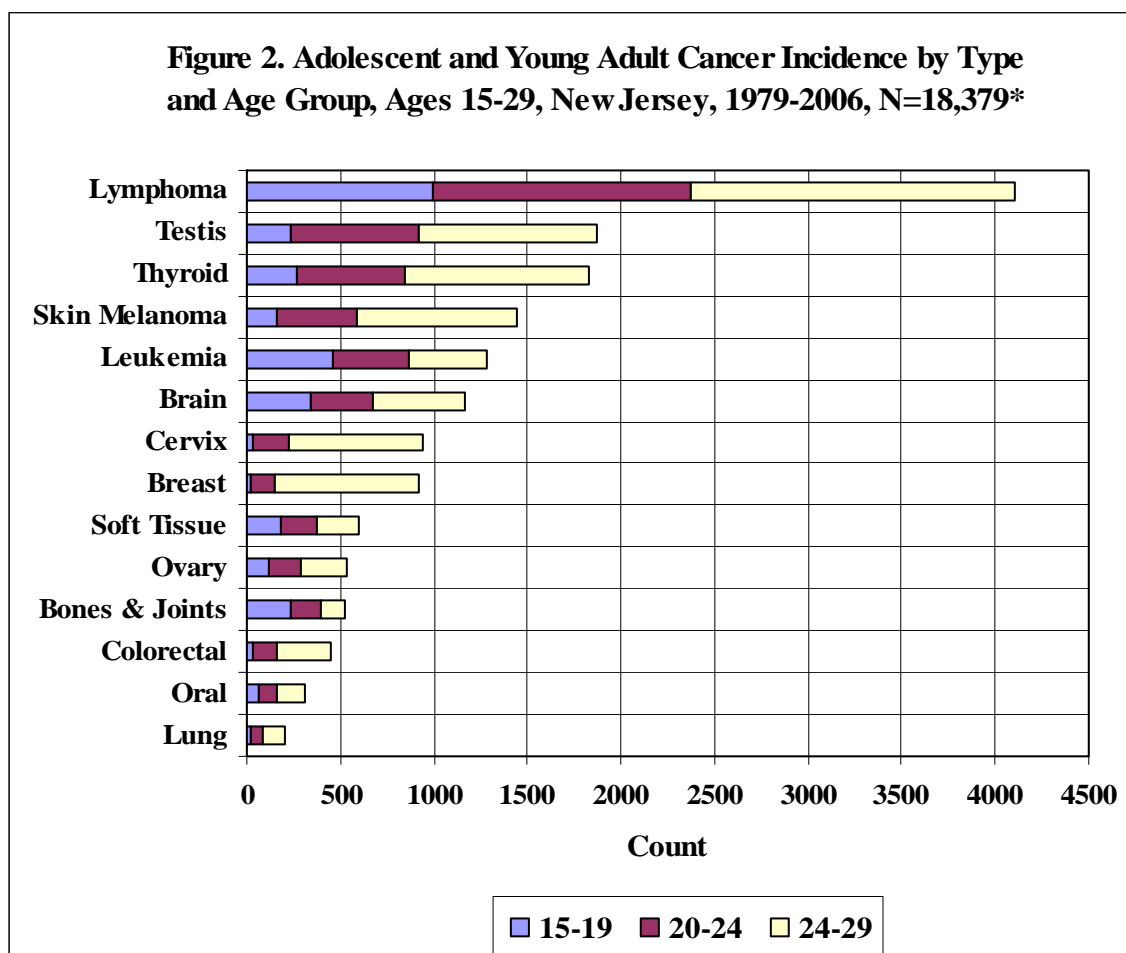
\*Only invasive cases are included except bladder cancer *in situ* is included. Percentages may not add to 100 due to rounding.

Data source: New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services.

- In New Jersey from 1979 through 2006, 18,379 cases of cancer were diagnosed among adolescents and young adults 15-29 years of age. The number of new cases each year ranged from 558 to 726 with an average of 658.
- The most common types of cancer were lymphoma (22%), testis (10%) and thyroid (10%).

See Table A1 in Appendix A for detailed data.

**Cancer Incidence Distribution by Type and Age Group in New Jersey**



\*Only invasive cases are included. Data source: New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services.

- There were 3,472 cases of cancer diagnosed among New Jersey adolescents 15-19 years of age in 1979-2006; the most common were lymphoma (29%), leukemia (13%) and brain and other nervous system (10%).
- Similar to adolescents, the most common cancer among the 5,537 cases diagnosed in young adults 20-24 years of age in 1979-2006 was lymphoma (25%); however, testis (12%) and thyroid (10%) were the next two most common cancers.
- The three most common cancers of the 9,370 diagnosed among young adults 25-29 years of age in 1979-2006 were the same as for young adults 20-24 years of age, but in different proportions; lymphoma represented 18%, thyroid 11% and testis 10%.

See Table A1 in Appendix A for detailed data.

## Cancer Incidence Rates by Sex and Age in New Jersey and the U.S.

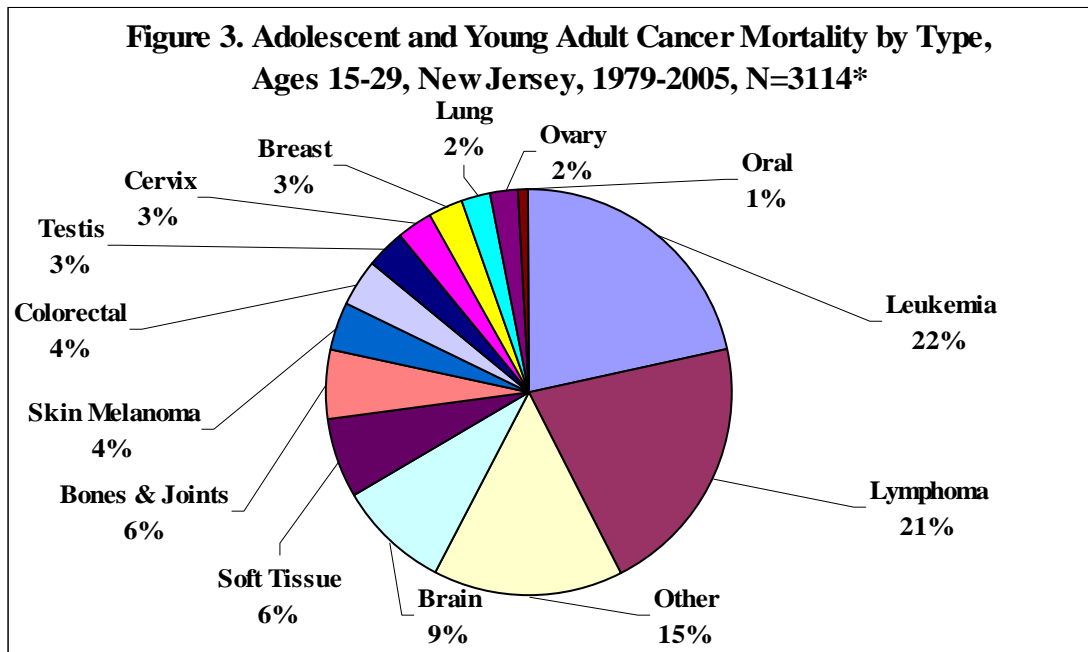
ICD-O-3 Category	New Jersey, 1979-2006			U.S., 1979-2005		
	15-19 n=3,472	20-24 n=5,537	25-29 n=9,370	15-19	20-24	25-29
All Cancers	22.1	35.8	57.0	20.3	33.7	54.6
Male	23.0	36.0	50.8	21.2	33.1	50.0
Female	21.1	35.5	63.2	19.4	34.3	59.3

\*Only invasive cases are included except bladder cancer *in situ* is included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- The New Jersey (1979-2006) and U.S. (1979-2005) adolescent and young adult average annual age-adjusted cancer incidence rates were 37.7 and 35.6 cases per 100,000, respectively (data not shown in Table 1).
- The New Jersey adolescent and young adult cancer incidence rates were higher than the analogous U.S. rates for each sex and age group.
- Male adolescent and young adult cancer incidence rates were higher than the female rates in the two youngest age groups in New Jersey and the youngest age group in the U.S.; however, the female rates were higher than the male rates in the older age groups.
- The adolescent and young adult cancer incidence rates increased greatly with each successively older five-year age group, more than doubling in the oldest age group compared to the youngest for each sex in New Jersey and the U.S.

See Tables A2 through A4 in Appendix A for detailed data.

**Cancer Mortality Distribution by Type in New Jersey**



\*Percentages may not add to 100 due to rounding.  
Data source: National Center for Health Statistics.

- In New Jersey from 1979 through 2005, there were 3,114 deaths from cancer among adolescents and young adults 15-29 years of age. The number of deaths each year ranged from 80 to 170 with an average of about 115 deaths per year.
- The most common types of cancer resulting in death were leukemia (22%), lymphoma (21%), and brain and other nervous system (9%).

See Table A5 in Appendix A for detailed data.

**Cancer Mortality Rates by Sex and Age in New Jersey and the U.S.**

<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=684</b>	<b>20-24 n=962</b>	<b>25-29 n=1,486</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>All Cancers</b>	<b>4.5</b>	<b>6.4</b>	<b>9.2</b>	<b>4.2</b>	<b>5.6</b>	<b>8.4</b>
Male	5.0	7.6	10.3	4.9	6.6	8.9
Female	4.0	5.2	8.2	3.4	4.6	7.9

\*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data source: National Center for Health Statistics.

- The average annual age-adjusted cancer mortality rate for adolescents and young adults (15-29 years of age) in 1979-2005 was 6.6 cases per 100,000 in New Jersey and 6.0 cases per 100,000 in the U.S. (data not shown in Table 2).
- Cancer mortality rates among adolescents and young adults were higher in New Jersey than the U.S. in each age group for both males and females.
- Among adolescents and young adults, male cancer mortality rates were higher than the female rates in each age group in New Jersey and the U.S.
- The cancer mortality rates were higher in each successively older five-year age group for males and females in New Jersey and the U.S.

See Tables A6 through A8 in Appendix A for detailed data.

## Cancer Survival Rates by Sex and Age in New Jersey and the U.S.

ICD-O-3 Category	New Jersey, 1979-2001			U.S., 1979-2001		
	15-19 n=2,556	20-24 n=4,042	25-29 n=7,142	15-19	20-24	25-29
All Cancers	75.3%	77.4%	74.2%	76.4%	79.9%	76.9%
Male	71.7%	73.4%	68.5%	72.1%	75.5%	70.1%
Female	79.6%	81.6%	78.9%	81.4%	84.2%	83.0%

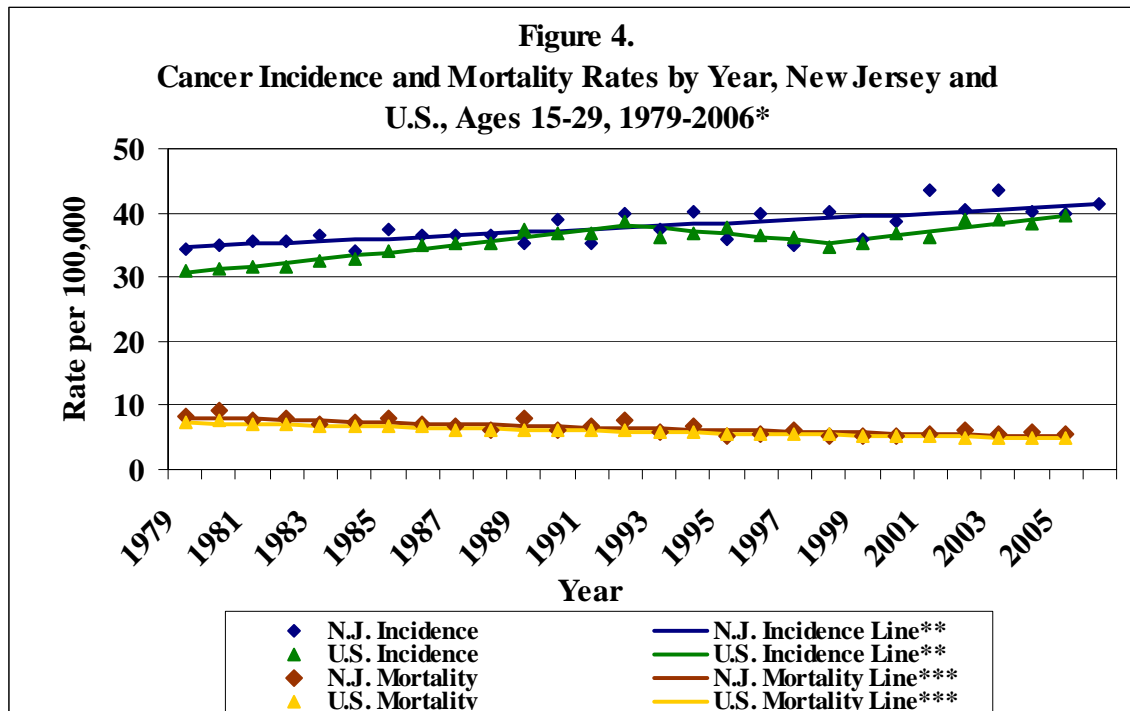
\*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- The relative five-year survival rates for cancer diagnosed among adolescents and young adults (15-29 years of age) in 1979-2001 were 75.3% in New Jersey and 77.7% in the U.S. (data not shown in Table 3).
- Survival was lower in New Jersey than in the U.S. for adolescents and young adult males and females in each age group.
- In both New Jersey and the U.S., the male survival rate was lower than the female survival rate in every age group.
- The survival rate was highest among 20 to 24 year-olds of each sex in New Jersey and the U.S.

See Table A9 in Appendix A for detailed data.



**Cancer Incidence and Mortality Time Trends in New Jersey and the U.S.**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

\*\*\*Statistically significant decrease in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute; mortality – National Center for Health Statistics.

- Adolescent and young adult cancer **incidence** rates increased about 20% in New Jersey between 1979 and 2006, while the rates increased about 27% in the U.S. between 1979 and 2005.
- The New Jersey adolescent and young adult cancer **incidence** rate was higher than the U.S. rate for most years.
- Despite the increase in incidence, the New Jersey and U.S. adolescent and young adult cancer **mortality** rates declined by about a third between 1979 and 2005.
- New Jersey and U.S. adolescent and young adult **mortality** rates were very similar in this time period.

See Tables A10 and A11 in Appendix A for the average percent changes in rates.

## LYMPHOMA

### Background and Risk Factors

- Lymphomas affect the white blood cells of the immune system and are characterized by abnormal growth of lymphocytes, the infection-fighting cells in the lymph nodes, spleen and thymus.<sup>3</sup>
- Lymphomas are the most commonly diagnosed cancer among adolescents and young adults (15-29) and include Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL).<sup>4</sup> NHL incidence progressively increases with age, while HL incidence peaks in young adults age 20-24 and again in older people age 75-80.<sup>4</sup>
- Five-year relative survival from lymphoma among adolescents and young adults has remained steady over the past three decades at nearly 80%, nearly 90% for HL and over 60% for NHL.<sup>4</sup>
- Higher socioeconomic status in childhood is associated with HL in young adults, leading to theories of an infectious cause for HL in this age group.<sup>4,5</sup> Conditions associated with higher socioeconomic status (e.g., low housing density, high maternal education, few older siblings) may help delay exposure to common childhood infections with a subsequent delay in maturation of cell immunity.<sup>4</sup> This relationship is reversed in the younger than 10 and older than 45 age groups; i.e., higher socioeconomic status decreases the risk of HL.
- Epstein Barr virus (EBV) infection in adolescence, with later development of infectious mononucleosis, may increase the risk of HL in adolescents and young adults.<sup>4</sup> Genetic susceptibility is a risk factor for HL in young adults.<sup>4,5</sup> Having relatives with HL increases the risk, and adults with HL are more likely to have children who develop HL in adolescence and young adulthood.<sup>4</sup> Other risk factors for HL are HIV infection, history of autoimmune disorder, a family history of cancer/hematopoietic disorders and Jewish ethnicity.<sup>4</sup>
- NHL also is associated with HIV infection, immunodeficiency syndromes, EBV and genetic susceptibility.<sup>4,5</sup> In addition, immunosuppressive therapies, *Helicobacter pylori* infection, and tobacco, chemical or other environmental exposures have been associated with NHL in adolescents and young adults.<sup>4</sup>

**Lymphoma Incidence Rates by Sex and Age in New Jersey and the U.S.**

ICD-O-3 Category	New Jersey, 1979-2006			U.S., 1979-2005		
	15-19 n=998	20-24 n=1377	25-29 n=1733	15-19	20-24	25-29
<b>Total Lymphoma</b>	<b>6.3</b>	<b>8.9</b>	<b>10.6</b>	<b>5.1</b>	<b>7.2</b>	<b>8.4</b>
Male	6.7	9.7	11.7	5.3	7.6	9.6
Female	6.0	8.1	9.4	4.8	6.8	7.1
<b>Hodgkin Lymphoma</b>	<b>4.3</b>	<b>6.4</b>	<b>6.4</b>	<b>3.5</b>	<b>5.0</b>	<b>4.9</b>
Male	4.0	6.5	6.3	3.3	5.0	5.1
Female	4.6	6.2	6.4	3.7	5.1	4.7
<b>Non-Hodgkin Lymphoma</b>	<b>2.0</b>	<b>2.5</b>	<b>4.2</b>	<b>1.6</b>	<b>2.2</b>	<b>3.5</b>
Male	2.7	3.1	5.3	2.0	2.6	4.6
Female	1.3	1.9	3.0	1.2	1.7	2.4

\*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- The average annual age-adjusted lymphoma incidence rate for 15 to 29 year-olds was 8.5 cases per 100,000 in New Jersey (1979-2006) and 6.8 cases per 100,000 in the U.S. (1979-2005) (data not shown in Table 4).
- Adolescent and young adult incidence rates for total lymphoma, Hodgkin lymphoma and non-Hodgkin lymphoma were higher in New Jersey than the U.S. in every sex and age group.
- In both New Jersey and the U.S., the total lymphoma and non-Hodgkin lymphoma male incidence rates were higher than the female incidence rates in every age group.
- For Hodgkin lymphoma, the female incidence rates were slightly higher than the male incidence rates in every age group except 20 to 24 year-olds in New Jersey and 25 to 29 year-olds in the U.S.
- Generally, incidence rates increased with each successively older five-year age group for total lymphoma, Hodgkin lymphoma and non-Hodgkin lymphoma among males and females in New Jersey and the U.S.

See Tables A2 through A4 in Appendix A for detailed data.

**Lymphoma Mortality Rates by Sex and Age in New Jersey and the U.S.**

ICD-9, 10 Category	New Jersey, 1979-2005			U.S., 1979-2005		
	15-19 n=104	20-24 n=216	25-29 n=325	15-19	20-24	25-29
<b>Total Lymphoma</b>	<b>0.7</b>	<b>1.4</b>	<b>2.0</b>	<b>0.5</b>	<b>1.0</b>	<b>1.4</b>
Male	0.9	1.7	2.8	0.7	1.2	1.7
Female	0.5	1.2	1.3	0.4	0.7	1.0
<b>Hodgkin Lymphoma</b>	<b>0.3</b>	<b>0.7</b>	<b>0.9</b>	<b>0.2</b>	<b>0.4</b>	<b>0.6</b>
Male	0.2	0.8	1.1	0.2	0.5	0.7
Female	0.3	0.6	0.7	0.2	0.4	0.5
<b>Non-Hodgkin Lymphoma</b>	<b>0.4</b>	<b>0.7</b>	<b>1.2</b>	<b>0.4</b>	<b>0.5</b>	<b>0.8</b>
Male	0.6	0.9	1.7	0.5	0.7	1.0
Female	0.2	0.6	0.6	0.2	0.4	0.5

\*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data source: National Center for Health Statistics.

- For 15 to 29 year-olds, the average annual age-adjusted lymphoma mortality rates were 1.4 cases and 0.9 cases per 100,000 in New Jersey and the U.S., respectively (data not shown in Table 5).
- Except for non-Hodgkin lymphoma in 15 to 19 year-old females, New Jersey males and females in every age group had higher rates of total lymphoma, Hodgkin lymphoma and non-Hodgkin lymphoma mortality than U.S. males and females.
- In every age group, New Jersey and U.S. males had higher lymphoma, Hodgkin lymphoma and non-Hodgkin lymphoma mortality than females, except for Hodgkin lymphoma mortality in adolescents 15-19.
- The mortality rates increased in each successively higher five-year age group for each type of lymphoma in New Jersey and U.S. males and females.

See Tables A6 through A8 in Appendix A for detailed data.

**Lymphoma Survival Rates by Sex and Age in New Jersey and the U.S.**

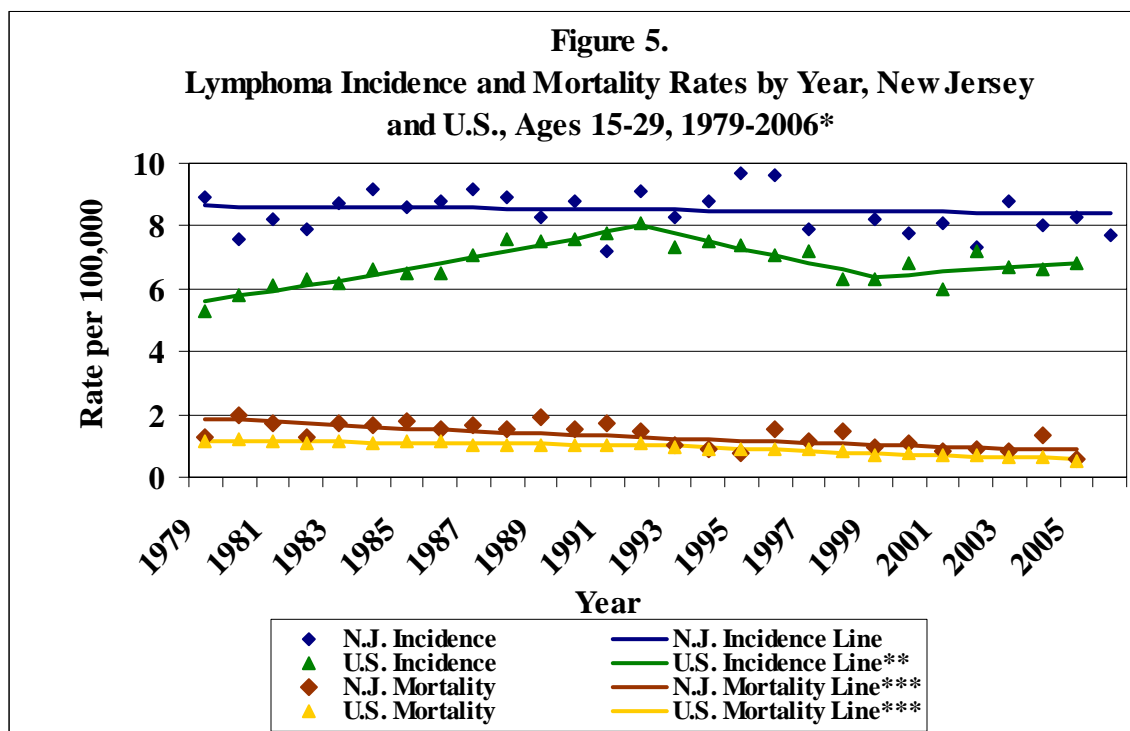
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=786</b>	<b>20-24 n=1070</b>	<b>25-29 n=1381</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Total Lymphoma</b>	<b>82.1%</b>	<b>79.9%</b>	<b>73.9%</b>	<b>84.9%</b>	<b>82.3%</b>	<b>76.6%</b>
Male	78.8%	75.9%	69.3%	82.3%	78.9%	70.9%
Female	86.0%	84.9%	79.5%	87.8%	86.2%	84.6%
<b>Hodgkin Lymphoma</b>	<b>89.2%</b>	<b>87.7%</b>	<b>86.1%</b>	<b>91.7%</b>	<b>90.5%</b>	<b>90.2%</b>
Male	88.3%	84.6%	85.5%	91.2%	88.8%	88.0%
Female	90.0%	91.3%	86.6%	92.2%	92.2%	92.8%
<b>Non-Hodgkin Lymphoma</b>	<b>66.8%</b>	<b>59.4%</b>	<b>55.1%</b>	<b>69.7%</b>	<b>63.5%</b>	<b>58.2%</b>
Male	63.9%	56.5%	49.8%	67.5%	60.4%	52.2%
Female	72.4%	64.2%	64.3%	73.7%	68.6%	69.5%

\*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates;.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- Lymphoma five-year relative survival rates among adolescents and young adults diagnosed in 1979-2001 in New Jersey and the U.S. were 77.8% and 80.5%, respectively (data not shown in Table 6).
- Survival from non-Hodgkin lymphoma was much lower than survival from Hodgkin lymphoma, which was quite high.
- Adolescent and young adult survival from lymphoma, Hodgkin lymphoma and non-Hodgkin lymphoma was lower in New Jersey compared to the U.S. for males and females in each age group.
- Male lymphoma survival was lower than female survival in all age groups in New Jersey and the U.S.
- Survival from lymphoma generally decreased for males and females with each subsequently older age group in New Jersey and the U.S. However, for Hodgkin lymphoma and non-Hodgkin lymphoma, the youngest five-year age group usually had the highest survival while the age group with the lowest survival varied between the two older five-year age groups.

See Table A9 in Appendix A for detailed data.

**Lymphoma Incidence and Mortality Time Trends in New Jersey and the U.S.**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

\*\*\*Statistically significant decrease in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute; mortality – National Center for Health Statistics.

- In New Jersey, the adolescent and young adult lymphoma **incidence** rate declined slightly between 1979 and 2006, while in the U.S. the incidence rate peaked in 1992, then declined but was over 25% greater in 2005 than in 1979.
- New Jersey adolescent and young adult lymphoma **incidence** rates were consistently greater than the U.S. incidence rates over this time period.
- Adolescent and young adult lymphoma **mortality** rates decreased over 50% in New Jersey and the U.S. between 1979 and 2005.
- The lymphoma **mortality** rate among New Jersey adolescents and young adults was slightly higher than the U.S. mortality rate each year, although less so in recent years.

See Tables A10 and A11 in Appendix A for the average percent changes in rates.

## TESTIS CANCER

### Background and Risk Factors

- Nearly all cancers of the male genital tract in adolescents and young adults are of the testis.<sup>6</sup> Most testicular cancers in adolescents and young adults originate from germ cells, both gonadal; i.e., testes, and non-gonadal.<sup>7</sup>
- Testis cancer is the most common cancer in adolescent and young adult males and the second most common cancer in all adolescents and young adults.<sup>6</sup> It is most commonly diagnosed between the ages of 15 and 44.<sup>8</sup> Survival has increased greatly since the 1970s for adolescents and young adults diagnosed with testicular cancer; currently the five-year survival rate is over 90%.<sup>6,8</sup>
- The causes of most testicular cancers are unknown.<sup>6</sup> Due to the early age that testicular cancer first appears and its rarity in older men, scientists believe that *in utero* and early-life exposures are related to testicular cancer.<sup>8</sup> The large increase in testicular cancer after puberty suggests that sex hormones, including testosterone and androgen, stimulate growth and progression of testicular tumors.<sup>8</sup>
- Cryptorchidism (undescended testis) is the primary known risk factor for testicular cancer in adolescents and young adults.<sup>6,8</sup> Possible risk factors for testicular cancer include hernia, trauma, family history of germ cell cancer and high maternal hormone levels during pregnancy.<sup>6,8</sup>

**Testis Cancer Incidence Rates by Age in New Jersey and the U.S., Males Only**

<b>Table 7.</b>						
<b>Adolescent and Young Adult Testis Cancer Incidence Rates by Age, Males Only*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2006</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=231</b>	<b>20-24 n=683</b>	<b>25-29 n=961</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Testis</b>	<b>2.9</b>	<b>8.8</b>	<b>11.7</b>	<b>3.1</b>	<b>8.8</b>	<b>12.4</b>
*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted. Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.						

- The average annual age-adjusted male testis cancer incidence rate for the entire age group 15-29 was 7.6 and 7.9 cases per 100,000 in New Jersey (1979-2006) and the U.S. (1979-2005), respectively (data not shown in Table 7).
- Adolescent and young adult male testis cancer incidence rates were slightly lower or the same in New Jersey as in the U.S. for every age group.
- The adolescent and young adult male testis cancer incidence rates increased greatly in each successively older five-year age group in New Jersey and the U.S.

See Table A3 in Appendix A for detailed data.



**Testis Cancer Mortality Rates by Age in New Jersey and the U.S., Males Only**

<b>Table 8.</b>						
<b>Adolescent and Young Adult Testis Cancer Mortality Rates by Age, Males Only*</b>						
<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=10</b>	<b>20-24 n=41</b>	<b>25-29 n=54</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Testis</b>	<b>0.1</b>	<b>0.5</b>	<b>0.7</b>	<b>0.1</b>	<b>0.4</b>	<b>0.6</b>
*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted. Data source: National Center for Health Statistics.						

- The annual average age-adjusted male testis cancer mortality rate for the entire age group 15-29 was 0.4 cases per 100,000 in both New Jersey and the U.S. for 1979-2005 (data not shown in Table 8).
- The adolescent and young adult testis cancer mortality rates were the same or slightly higher in New Jersey compared to the U.S. for every five-year age group, and were very low in both areas.
- The adolescent and young adult male testis cancer mortality rates increased substantially from the 15-19 age group to the 20-24 age group and increased less so between age groups 20-24 and 25-29.

See Tables A6 and A7 in Appendix A for detailed data.

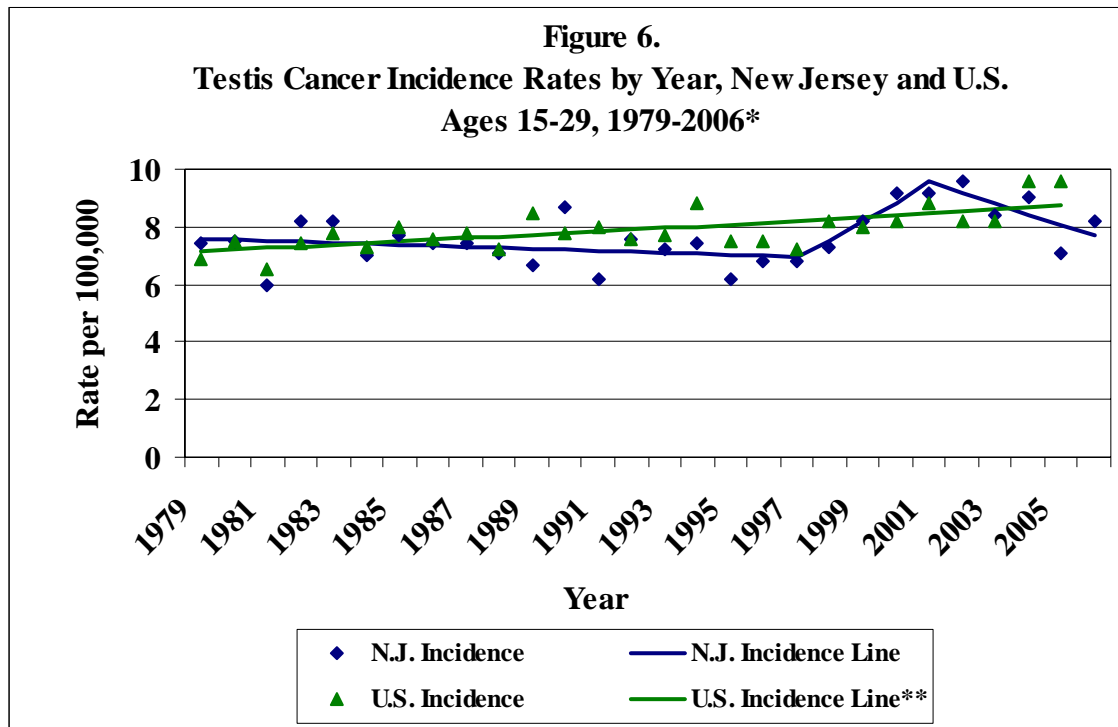
**Testis Cancer Survival Rates by Age in New Jersey and the U.S., Males Only**

<b>Table 9.</b>						
<b>Adolescent and Young Adult Testis Cancer Survival Rates by Age, Males Only*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=173</b>	<b>20-24 n=525</b>	<b>25-29 n=758</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Testis</b>	<b>89.8%</b>	<b>91.8%</b>	<b>92.7%</b>	<b>90.5%</b>	<b>92.9%</b>	<b>94.9%</b>
*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates. Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.						

- The five-year relative survival rate for adolescent and young adult testis cancer diagnosed in 1979-2001 in New Jersey was 92.0% and in the U.S. was 93.6% (data not shown in Table 9).
- Although over 90% (except in the New Jersey 15-19 age group), the testis cancer five-year relative survival rates were lower in New Jersey than in the U.S. in each age group.
- Testis cancer five-year relative survival improved in each subsequently older five-year age group in New Jersey and the U.S.

See Table A9 in Appendix A for detailed data.

**Testis Cancer Incidence Time Trends in New Jersey and the U.S., Males Only**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI’s Joinpoint statistical program. Mortality rates are not shown due to very small numbers.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute.

- The male testis cancer **incidence** rate among adolescents and young adults in New Jersey peaked in 2002 and then declined through 2006. In the U.S. the incidence rate for male testis cancer increased by nearly 40% between 1979 and 2005.
- New Jersey and the U.S. had similar **incidence** rates of adolescent and young adult male testis cancer; New Jersey’s rate was higher in some years and lower in other years than the U.S. rate.

See Table A10 in Appendix A for the average percent changes in rates.

## THYROID CANCER

### Background and Risk Factors

- Although thyroid cancer is rare in children under 15 years of age, it is one of the most common cancers in adolescents and young adults.<sup>9</sup> Among adolescents and young adults, thyroid cancer is much more common in females than males.<sup>9</sup>
- Most of the thyroid cancer cases in this age group are papillary (PTC) or follicular (FTC) carcinoma; most of the remaining cases are medullary carcinoma (MTC).<sup>9</sup>
- The five-year survival rate for thyroid cancer in adolescents and young adults is over 99%.<sup>9</sup>
- A major risk factor for PTC and FTC is radiation exposure of the thyroid gland.<sup>9</sup> Children are no longer treated with external ionizing radiation for benign conditions such as enlarged thymus, head lice or acne; however, currently children are treated with radiotherapy for cancer. Internal ionizing radiation exposure, such as to radioactive iodines from the Chernobyl disaster, also is a risk factor.<sup>9</sup>
- A family history of thyroid cancer and Carney complex, Cowden disease and familial adenomatous polyposis (Gardner syndrome) increase the risk of PTC and FTC.<sup>9</sup>
- Most cases of MTC in adolescents and young adults have a genetic basis involving one of three hereditary cancer syndromes (FMTC, MEN2A, MEN2B); non-heritable cases are rare but also may have a genetic basis.<sup>9</sup>

**Thyroid Cancer Incidence Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 10.</b>						
<b>Adolescent and Young Adult Thyroid Cancer Incidence Rates by Sex and Age*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2006</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=269</b>	<b>20-24 n=577</b>	<b>25-29 n=986</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Thyroid</b>	<b>1.7</b>	<b>3.7</b>	<b>6.0</b>	<b>1.6</b>	<b>4.0</b>	<b>6.0</b>
Male	0.6	1.4	2.2	0.5	1.2	2.2
Female	2.8	6.1	9.8	2.8	6.8	9.9

\*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- In New Jersey the average annual age-adjusted thyroid cancer incidence rate for the entire age group 15-29 was 3.7 cases per 100,000 in 1979-2006, while in the U.S. the analogous rate was 3.8 cases per 100,000 in 1979-2005 (data not shown in Table 10).
- Adolescent and young adult thyroid cancer incidence rates were about the same in New Jersey as in the U.S. for every sex and age group.
- The female thyroid cancer incidence rates were at least four times higher than the male incidence rates in every five-year age group in New Jersey and the U.S.
- Thyroid cancer incidence rates increased greatly with each successively older five-year age group, and were over three times greater in the oldest age group versus the youngest age group for both males and females in New Jersey and the U.S.

See Tables A2 through A4 in Appendix A for detailed data.

**Thyroid Cancer Mortality Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 11.</b>						
<b>Adolescent and Young Adult Thyroid Cancer Mortality Rates by Sex and Age*</b>						
<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n&lt;5</b>	<b>20-24 n&lt;5</b>	<b>25-29 n&lt;5</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Thyroid</b>	-	-	-	0.0	0.0	0.0
Male	-	-	-	0.0	0.0	0.0
Female	-	-	-	0.0	0.0	0.0

\*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
 - Counts and rates are suppressed when there were fewer than 5 cases to ensure confidentiality and statistical reliability.  
 Data source: National Center for Health Statistics.

- Mortality from thyroid cancer among adolescents and young adults was very low, the lowest of any cancer type, for both New Jersey and the U.S.
- Although six New Jersey adolescents and young adults died of thyroid cancer between 1979 and 2005, the average annual age-adjusted thyroid cancer mortality rate rounded to 0 cases per 100,000 (data not shown in Table 11).
- The U.S. adolescent and young adult average annual age-adjusted thyroid cancer mortality rate also rounded to 0 cases per 100,000 (data not shown in Table 11).

See Tables A6 through A8 in Appendix A for detailed data.

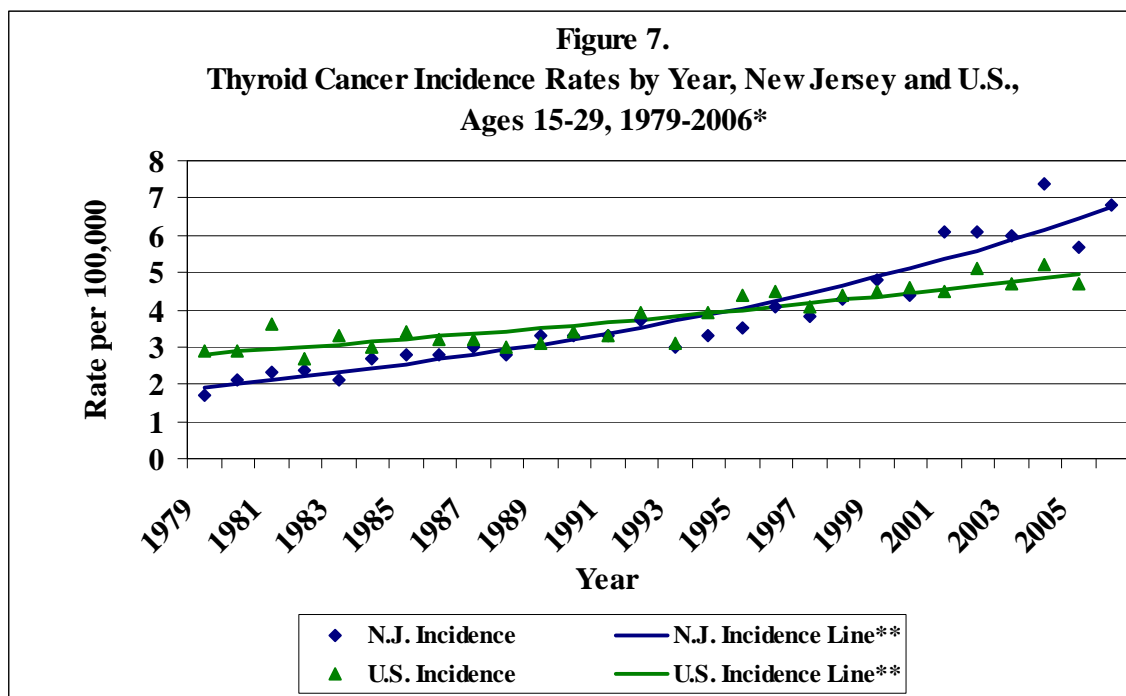
**Thyroid Cancer Survival Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 12.</b>						
<b>Adolescent and Young Adult Thyroid Cancer Survival Rates by Sex and Age*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=173</b>	<b>20-24 n=383</b>	<b>25-29 n=662</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Thyroid</b>	<b>99.0%</b>	<b>98.7%</b>	<b>99.4%</b>	<b>98.3%</b>	<b>99.4%</b>	<b>99.5%</b>
Male	96.7%	92.2%	97.6%	94.9%	98.6%	99.4%
Female	99.4%	100.0%	99.8%	99.1%	99.5%	99.6%
*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates. Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.						

- Five-year relative survival from thyroid cancer among adolescents and young adults diagnosed in New Jersey and the U.S. during 1979-2001 was very high, 99.1% and 99.4%, respectively (data not shown in Table 12).
- Thyroid cancer five-year relative survival rates for adolescents and young adults were similar in New Jersey and the U.S. in each five-year age group for both sexes.
- Male thyroid cancer five-year relative survival rates were lower than female rates in each adolescent and young adult five-year age group in New Jersey and the U.S.
- In New Jersey and the U.S., the thyroid cancer five-year relative survival rates were similar among the five-year age groups for each sex.

See Table A9 in Appendix A for detailed data.

### Thyroid Cancer Incidence Time Trends in New Jersey and the U.S.



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program. Mortality rates are not shown due to very small numbers.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute.

- Adolescent and young adult thyroid cancer **incidence** rates increased 300% in New Jersey between 1979 and 2006 and 62% in the U.S. between 1979 and 2005.
- New Jersey thyroid cancer **incidence** rates among adolescents and young adults were generally lower than the U.S. rates until 1998; after that the New Jersey rates became increasingly higher than the U.S. rates.

See Table A10 in Appendix A for the average percent changes in rates.



## MELANOMA OF THE SKIN

### Background and Risk Factors

- Melanoma usually refers to cancer of melanocytes, the cells that produce melanin pigment; melanoma of the skin is the most lethal type of skin cancer.<sup>10</sup>
- Melanoma of the skin is one of the most frequent cancers in adolescents and young adults and occurs most commonly on the trunk and legs.<sup>11</sup>
- White non-Hispanic adolescents and young adults have a far greater incidence of melanoma than any other race or ethnicity, which also is true for all other age groups.<sup>11</sup>
- Survival from skin melanoma among adolescents and young adults has improved over the last few decades and is currently over 90%.<sup>11</sup>
- The causes of skin melanoma in 15- to 29-year-old persons are not completely understood, although several risk factors have been identified.<sup>11</sup>
- Conditions associated with melanoma diagnosed by age 20 include xeroderma pigmentosum, neurocutaneous melanosis and immunosuppression.<sup>11</sup>
- Family history of melanoma; i.e., one or more first-degree relatives with melanoma, is a risk factor for melanoma; mutations in certain genes (CDKN2A, CDK4) account for 20-25% of these cases.<sup>11</sup>
- Sun (UV) exposure, especially intermittent exposure and sunburn in adolescence, is associated with melanoma of the skin.<sup>11</sup> Fair-skinned individuals are more susceptible. Although this is a major risk factor in the older age groups, sun exposure probably plays a smaller role in melanoma development among adolescents and young adults.<sup>11</sup>
- Increased numbers of benign melanocytic nevi are associated with melanoma.<sup>11</sup> Specifically, one Australian study found that the strongest risk factor associated with melanoma in 15-19 year olds was having 100 nevi greater than 2 mm in diameter. The presence of dysplastic or atypical nevi confers increased risk of melanoma.<sup>11</sup>

**Melanoma of the Skin Incidence Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 13.</b>						
<b>Adolescent and Young Adult Melanoma of the Skin Incidence Rates by Sex and Age*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2006</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=159</b>	<b>20-24 n=428</b>	<b>25-29 n=857</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Melanoma</b>	<b>1.0</b>	<b>2.8</b>	<b>5.2</b>	<b>1.5</b>	<b>4.1</b>	<b>7.3</b>
Male	0.8	2.0	4.2	1.2	2.9	5.2
Female	1.2	3.5	6.2	1.9	5.5	9.3

\*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- The average annual age-adjusted melanoma incidence rate for adolescents and young adults (15-29) was 2.9 cases per 100,000 in New Jersey in 1979-2006, and 4.2 cases per 100,000 in the U.S. in 1979-2005 (data not shown in Table 13).
- Melanoma of the skin incidence rates in New Jersey adolescents and young adults were lower for males and females in each age group than the analogous U.S. rates.
- The female melanoma of the skin incidence rate was higher than the male rate in each five-year age group for both New Jersey and the U.S.
- The incidence rates for melanoma of the skin doubled or nearly doubled in each successively older five-year age group for males and females in New Jersey and the U.S.

See Tables A2 through A4 in Appendix A for detailed data.

**Melanoma of the Skin Mortality Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 14.</b>						
<b>Adolescent and Young Adult Melanoma of the Skin Mortality Rates by Sex and Age*</b>						
<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=6</b>	<b>20-24 n=34</b>	<b>25-29 n=78</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Melanoma</b>	<b>0.0</b>	<b>0.2</b>	<b>0.5</b>	<b>0.1</b>	<b>0.2</b>	<b>0.5</b>
Male	-	0.3	0.5	0.1	0.2	0.6
Female	-	0.1	0.4	0.1	0.2	0.4
*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted. - Counts and rates are suppressed when there were fewer than 5 cases to ensure confidentiality and statistical reliability. Data source: National Center for Health Statistics.						

- Average annual age-adjusted mortality from melanoma of the skin among adolescents and young adults (15-29) in New Jersey and the U.S. was very low, with an average annual rate of 0.2 cases per 100,000 in 1979-2005 (data not shown in Table 14).
- Adolescent and young adult melanoma of the skin mortality rates in New Jersey and the U.S. were similar in each sex-age group.
- In New Jersey the adolescent and young adult melanoma of the skin mortality rates were higher among males than females in the two oldest five-year age groups, while in the U.S. the rates were the same for males and females in the two youngest five-year age groups and higher for males than females in the oldest five-year age group.
- Melanoma of the skin mortality rates increased with each successively higher five-year age group for male and female adolescents and young adults in New Jersey and the U.S.

See Tables A6 through A8 in Appendix A for detailed data.

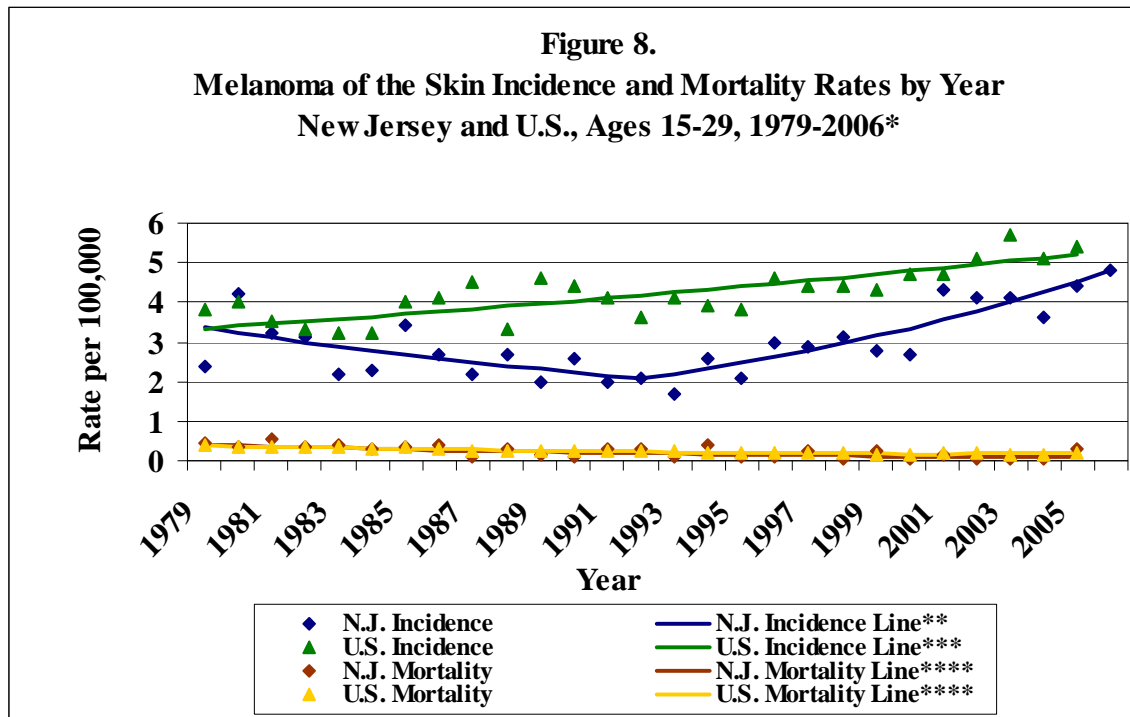
**Melanoma of the Skin Survival Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 15.</b>						
<b>Adolescent and Young Adult Melanoma of the Skin Survival Rates by Sex and Age*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=97</b>	<b>20-24 n=272</b>	<b>25-29 n=587</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Melanoma</b>	<b>91.8%</b>	<b>89.2%</b>	<b>86.1%</b>	<b>93.2%</b>	<b>92.8%</b>	<b>92.8%</b>
Male	87.5%	79.4%	81.4%	91.4%	86.4%	88.3%
Female	96.0%	95.6%	89.3%	94.4%	96.3%	95.7%
*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates. Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.						

- Five-year relative survival rates for melanoma diagnosed in 1979-2001 among adolescents and young adults were high, 87.5% in New Jersey and 92.8% in the U.S. (data not shown in Table 15).
- New Jersey melanoma five-year relative survival rates were lower than the U.S. rates among adolescent and young adult males and females in every five-year age group, except the survival rate among females 15-19 was higher in New Jersey than in the U.S.
- Adolescent and young adult males had lower melanoma five-year relative survival rates than females in every five-year age group in New Jersey and the U.S.
- The five-year relative survival rate decreased with each subsequently older five-year age group in New Jersey and the U.S. This held true for females in New Jersey, but not for U.S. females or males.

See Table A9 in Appendix A for detailed data.

**Melanoma of the Skin Incidence and Mortality Time Trends in New Jersey and the U.S.**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI’s Joinpoint statistical program.

\*\*Statistically significant decrease in rates, then increase in rates over time, p<0.05.

\*\*\*Statistically significant increase in rates over time, p<0.05.

\*\*\*\*Statistically significant decrease in rates over time, p<0.05

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute; mortality – National Center for Health Statistics.

- In New Jersey the **incidence** rate for melanoma of the skin among adolescents and young adults declined between 1979 and 1993, then increased through 2006; overall the incidence rate doubled between 1979 and 2006. The U.S. incidence rate increased about 42% between 1979 and 2005.
- The adolescent and young adult melanoma **incidence** rates generally were lower in New Jersey than in the U.S., but in recent years became closer to the U.S. rates.
- Although the incidence rates increased, the melanoma **mortality** rates for adolescents and young adults decreased among adolescents and young adults in New Jersey and the U.S. from 1979 to 2005 by about 28% and 45%, respectively.
- The New Jersey and U.S. adolescent and young adult melanoma **mortality** rates were very similar during this time period.

See Tables A10 and A11 in Appendix A for the average percent changes in rates.

## LEUKEMIA

### Background and Risk Factors

- Leukemias are cancers of the blood-forming organs and are divided into acute and chronic types. They are further classified according to the type of cancer cells involved – lymphoid, myeloid or biphenotypic (both lymphoid and myeloid).<sup>12</sup>
- Leukemia is one of the most common cancers in adolescents and young adults, accounting for over five percent of all cancers in persons 15-29 years of age.<sup>13</sup> The two largest categories of leukemia in adolescents and young adults are acute lymphocytic leukemia (ALL), a cancer of the white blood cells, and acute myeloid leukemia (AML, formerly referred to as acute non-lymphocytic leukemia).<sup>13</sup>
- Among adolescents and young adults, the incidence of ALL steadily decreases with age while the incidence of AML increases with age, reflecting the transition between childhood cancer incidence and cancer incidence in older adulthood.<sup>13</sup>
- The five-year relative survival for leukemia has improved, although more so among adolescents than young adults.<sup>13</sup>
- Little is known about risk factors for leukemia in adolescents and young adults. Inherited conditions associated with ALL include Down syndrome, neurofibromatosis type I, Schwachman syndrome, Bloom syndrome, and ataxia telangiectasia.<sup>13</sup> Inherited conditions related to AML include Down syndrome, neurofibromatosis, Schwachman syndrome, Bloom syndrome, familial monosomy 7, Kostmann granulocytopenia, and Fanconi anemia.<sup>13</sup> These conditions relate to a very small percentage of the cases.
- Ionizing radiation exposure in utero (diagnostic) or postnatal (therapeutic) raises the risk of ALL in adolescents and young adults.<sup>13</sup> Chemotherapeutic agents (alkylating agents, topoisomerase II inhibitors) are risk factors for AML.<sup>13</sup>

**Leukemia Incidence Rates by Sex and Age in New Jersey and the U.S.**

ICD-O-3 Category	New Jersey, 1979-2006			U.S., 1979-2005		
	15-19 n=456	20-24 n=409	25-29 n=422	15-19	20-24	25-29
<b>Leukemia</b>	<b>2.9</b>	<b>2.6</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.3</b>
Male	3.5	3.0	3.1	2.9	2.5	2.6
Female	2.3	2.3	2.0	1.9	1.8	1.9
<b>Acute Lymphocytic (ALL)</b>	<b>1.4</b>	<b>0.8</b>	<b>0.6</b>	<b>1.3</b>	<b>0.7</b>	<b>0.5</b>
Male	1.8	0.9	0.8	1.7	0.9	0.7
Female	1.1	0.6	0.4	0.8	0.5	0.4
<b>Acute Myeloid (AML)**</b>	<b>0.8</b>	<b>1.1</b>	<b>1.0</b>	<b>0.8</b>	<b>0.9</b>	<b>0.9</b>
Male	0.8	1.1	1.1	0.8	0.9	1.0
Female	0.7	1.0	0.9	0.7	0.8	0.9

\*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
\*\*Formerly referred to as acute non-lymphocytic leukemia.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- The New Jersey average annual age-adjusted leukemia incidence rate for adolescents and young adults (15-29) was 2.7 cases per 100,000 in 1979-2006 and the U.S. rate was 2.3 cases per 100,000 in 1979-2005 (data not shown in Table 16).
- New Jersey adolescent and young adult leukemia, acute lymphocytic leukemia and acute myeloid leukemia incidence rates in every five-year age group were higher than or the same as the U.S. rates.
- In New Jersey and the U.S., the male adolescent and young adult leukemia and acute lymphocytic leukemia incidence rates in every age group were about a third higher than the female rates. The acute myeloid leukemia incidence rates were slightly higher for males than for females.
- New Jersey and U.S. adolescent and young adult leukemia incidence rates generally decreased between age groups 15-19 and 20-24. The incidence rates for acute myeloid leukemia, however, increased between age groups 15-19 and 20-24. Acute lymphocytic leukemia (ALL) rates generally decreased with each successively older five-year age group.

See Tables A2 through A4 in Appendix A for detailed data.

**Leukemia Mortality Rates by Sex and Age in New Jersey and the U.S.**

ICD-9, 10 Category	New Jersey, 1979-2005			U.S., 1979-2005		
	15-19 n=220	20-24 n=217	25-29 n=240	15-19	20-24	25-29
<b>Leukemia</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	<b>1.3</b>	<b>1.3</b>	<b>1.3</b>
Male	1.6	1.8	2.1	1.6	1.6	1.6
Female	1.3	1.1	1.0	1.0	1.0	1.1
<b>Acute Lymphocytic (ALL)</b>	<b>0.5</b>	<b>0.5</b>	<b>0.4</b>	<b>0.6</b>	<b>0.5</b>	<b>0.3</b>
Male	0.6	0.7	0.5	0.7	0.6	0.4
Female	0.5	0.4	0.2	0.4	0.3	0.2
<b>Acute Myeloid (AML)**</b>	<b>0.4</b>	<b>0.5</b>	<b>0.6</b>	<b>0.4</b>	<b>0.4</b>	<b>0.5</b>
Male	0.5	0.5	0.8	0.4	0.5	0.5
Female	0.4	0.5	0.4	0.3	0.4	0.5

\*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
\*\*Formerly referred to as acute non-lymphocytic leukemia.  
Data source: National Center for Health Statistics.

- The average annual age-adjusted leukemia mortality rate in 1979-2005 among New Jersey and U.S. adolescents and young adults (15-29) was 1.5 and 1.3 cases per 100,000, respectively (data not shown in Table 17).
- Adolescent and young adult leukemia, acute lymphocytic leukemia and acute myeloid leukemia mortality rates in New Jersey were the same, higher or slightly lower than in the U.S., depending on the sex-age group.
- New Jersey and U.S. male mortality rates for leukemia, acute lymphocytic leukemia and acute myeloid leukemia were higher than female mortality rates in all five-year age groups, except for acute myeloid leukemia in the New Jersey 20-24 age group and the U.S. 25-29 age group.
- Although the mortality rates for leukemia were the same in each age group for both New Jersey and the U.S., in each successively higher five-year age group the rates increased for New Jersey males, decreased for New Jersey females, remained the same for U.S. males, and increased slightly for U.S. females.
- Acute lymphocytic leukemia mortality rates decreased with each successively older five-year age group of males and females in New Jersey and the U.S. except in New Jersey males. Acute myeloid leukemia mortality rates remained the same or increased slightly in each successively older age group except for New Jersey females.

See Tables A6 through A8 in Appendix A for detailed data.



## Leukemia Survival Rates by Sex and Age in New Jersey and the U.S.

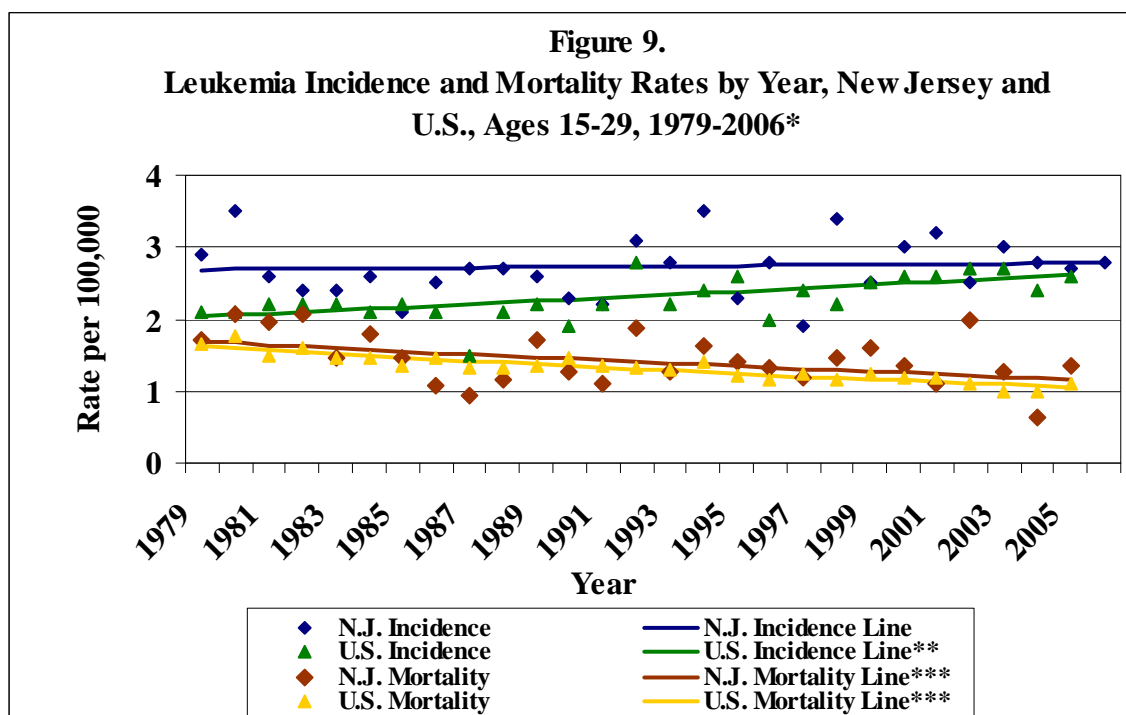
ICD-O-3 Category	New Jersey, 1979-2001			U.S., 1979-2001		
	15-19 n=328	20-24 n=288	25-29 n=341	15-19	20-24	25-29
<b>Leukemia</b>	<b>52.9%</b>	<b>40.6%</b>	<b>42.6%</b>	<b>46.4%</b>	<b>42.3%</b>	<b>43.9%</b>
Male	50.8%	34.4%	33.6%	44.6%	40.3%	43.3%
Female	56.4%	48.9%	55.2%	49.2%	45.2%	44.7%
<b>Acute Lymphocytic (ALL)</b>	<b>63.8%</b>	<b>45.8%</b>	<b>42.1%</b>	<b>52.6%</b>	<b>43.0%</b>	<b>37.4%</b>
Male	62.7%	41.5%	30.3%	51.0%	42.3%	37.7%
Female	65.7%	51.6%	66.8%	56.0%	44.4%	37.1%
<b>Acute Myeloid (AML)**</b>	<b>39.1%</b>	<b>35.2%</b>	<b>36.3%</b>	<b>37.1%</b>	<b>40.2%</b>	<b>42.2%</b>
Male	35.1%	29.8%	28.6%	31.3%	37.6%	40.3%
Female	44.8%	41.3%	43.4%	43.4%	43.3%	44.4%

\*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates.  
\*\*Formerly referred to as acute non-lymphocytic leukemia.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- Leukemia five-year relative survival rates among adolescents and young adults diagnosed in 1979-2001 were low, 45.6% in New Jersey and 44.3% in the U.S. (data not shown in Table 18).
- Adolescent and young adult leukemia, acute lymphocytic leukemia and acute myeloid leukemia five-year relative survival rates varied between New Jersey and the U.S. depending on the sex and five-year age group.
- Male five-year relative survival for leukemia, acute lymphocytic leukemia and acute myeloid leukemia was lower than female relative survival in each five-year age group, except in the U.S. 25-29 age group male survival was slightly higher than female survival.
- Generally the youngest age group had the highest survival from leukemia, lymphocytic leukemia and myeloid leukemia, except that in the U.S. acute myeloid leukemia rates were highest in the oldest age group.

See Table A9 in Appendix A for detailed data.

## Leukemia Incidence and Mortality Time Trends in New Jersey and the U.S.



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

\*\*\*Statistically significant decrease in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute; mortality – National Center for Health Statistics.

- The New Jersey leukemia **incidence** rate among adolescents and young adults remained steady throughout 1979 to 2006, while the U.S. rate increased over 20% from 1979 to 2005.
- New Jersey adolescent and young adult leukemia **incidence** rates were higher than the U.S. rates in these years, although the U.S. rates became increasingly closer to New Jersey rates.
- Between 1979 and 2005, adolescent and young adult leukemia **mortality** rates declined in New Jersey and the U.S. by 21% and 33%, respectively.
- New Jersey leukemia **mortality** rates for adolescents and young adults were similar over the years with New Jersey's rates lower in some years and higher in other years than the U.S. rates.

See Tables A10 and A11 in Appendix A for the average percent changes in rates.

## **BRAIN AND OTHER NERVOUS SYSTEM CANCER**

### **Background and Risk Factors**

- The central nervous system (CNS) is made up of the brain and spinal cord.<sup>14</sup>
- Cancers of the CNS are among the most common cancers of adolescents and young adults, accounting for about six percent of the cases, whereas CNS cancers represented a much larger percentage of childhood cancer.<sup>15</sup>
- The five-year relative survival from CNS cancers in adolescents and young adults has improved over the past few decades to nearly 70 percent.<sup>15</sup>
- A few known risk factors for CNS cancers explain only a small proportion of these cancers in adolescents and young adults.<sup>15</sup>
- Rare inherited conditions – neurofibromatosis types I and II, tuberous sclerosis types I and II, von Hippel-Lindau syndrome, Li-Fraumeni syndrome, nevoid basal cell syndrome, Turcot’s syndrome – are associated with CNS cancers.<sup>15</sup>
- Ionizing radiation to the head for treatment of leukemia, brain tumors or other tumors of the head results in an increased risk of CNS cancer.<sup>15</sup> This risk factor and the inherited conditions listed above account for only a small percentage of CNS cancers in adolescents and young adults.<sup>15</sup>

**Brain and Other Nervous System Cancer Incidence Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 19.</b>						
<b>Adolescent and Young Adult Brain and Other Nervous System Cancer Incidence Rates by Sex and Age*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2006</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=345</b>	<b>20-24 n=332</b>	<b>25-29 n=484</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Brain &amp; Other Nervous System</b>	<b>2.2</b>	<b>2.1</b>	<b>2.9</b>	<b>2.0</b>	<b>2.3</b>	<b>2.9</b>
Male	2.3	2.5	3.3	2.4	2.6	3.1
Female	2.0	1.8	2.6	1.7	1.9	2.7
*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.						
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.						

- In New Jersey (for 1979-2006) and the U.S. (for 1979-2005), the adolescent and young adult (15-29) average annual age-adjusted brain and other nervous system cancer incidence rates were the same, 2.4 cases per 100,000 (data not shown in Table 19).
- The New Jersey and U.S. adolescent and young adult brain and other nervous system cancer incidence rates were similar for each sex and five-year age group.
- For each five-year age group in New Jersey and the U.S., the male adolescent and young adult brain and other nervous system cancer incidence rates were greater than the female rates.
- The adolescent and young adult brain and other nervous system cancer incidence rates increased in each successively older five-year age group for males and females in New Jersey and the U.S., except that in New Jersey the rate among females 20-24 was lower than the rate among females 15-19.

See Tables A2 through A4 in Appendix A for detailed data.

**Brain and Other Nervous System Cancer Mortality Rates by Sex and Age in New Jersey and the U.S.**

<b>Table 20.</b>						
<b>Adolescent and Young Adult Brain and Other Nervous System Cancer Mortality Rates by Sex and Age*</b>						
<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=82</b>	<b>20-24 n=83</b>	<b>25-29 n=114</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Brain &amp; Other Nervous System</b>	<b>0.5</b>	<b>0.6</b>	<b>0.7</b>	<b>0.6</b>	<b>0.6</b>	<b>0.9</b>
Male	0.6	0.6	0.8	0.7	0.7	1.1
Female	0.5	0.5	0.6	0.5	0.5	0.7

\*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.  
Data source: National Center for Health Statistics.

- In 1979-2005, the average annual age-adjusted brain and other nervous system cancer mortality rate for adolescents and young adults (15-29) was slightly lower in New Jersey than the U.S., 0.6 versus 0.7 cases per 100,000 (data not shown in Table 20).
- The mortality rates for brain and other nervous system cancers in adolescents and young adults were the same or slightly lower in New Jersey compared to the U.S. for males and females in each five-year age group.
- The adolescent and young adult male brain and other nervous system cancer mortality rates were greater than the female rates in every five-year age group in New Jersey and the U.S.
- The brain and other nervous system cancer mortality rates were the same in the two younger five-year age groups, and rose in the oldest five-year age group for male and female adolescents and young adults in New Jersey and U.S.

See Tables A6 through A8 in Appendix A for detailed data.

**Brain and Other Nervous System Cancer Survival Rates by Sex and Age in New Jersey and the U.S.**

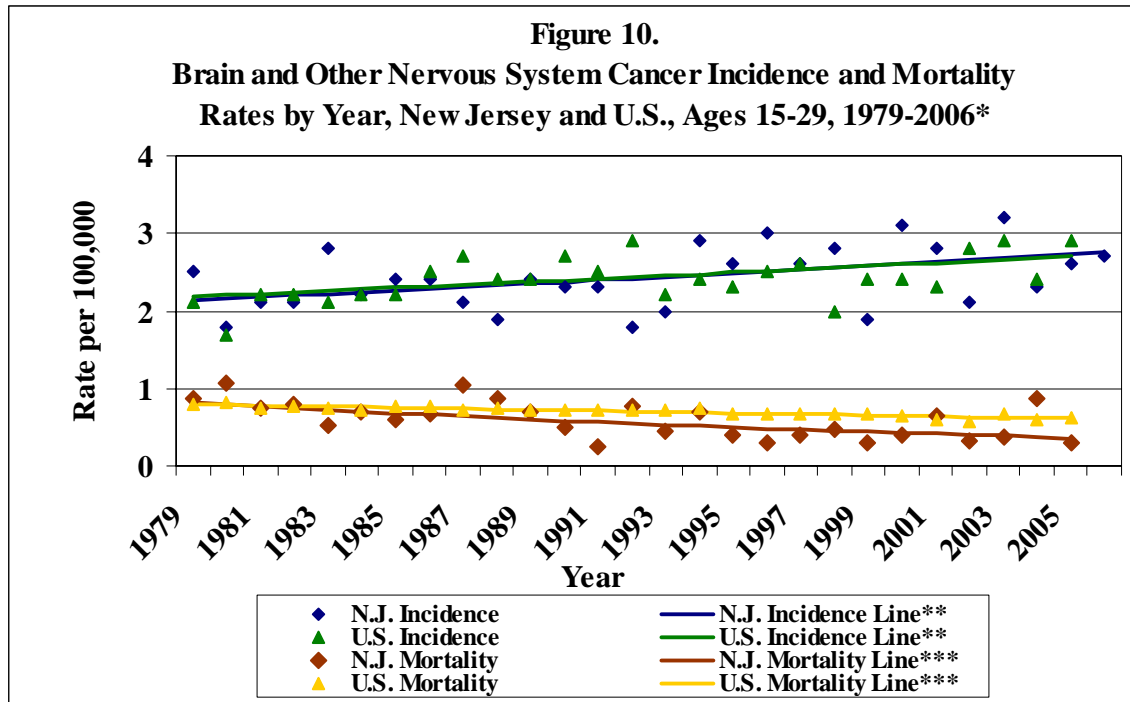
<b>Table 21. Adolescent and Young Adult Brain and Other Nervous System Cancer Survival Rates by Sex and Age*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=211</b>	<b>20-24 n=226</b>	<b>25-29 n=349</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Brain &amp; Other Nervous System</b>	<b>69.4%</b>	<b>65.2%</b>	<b>62.3%</b>	<b>73.9%</b>	<b>67.2%</b>	<b>59.4%</b>
Male	69.1%	67.0%	65.5%	71.1%	66.8%	56.0%
Female	70.0%	62.4%	58.1%	77.7%	67.7%	63.7%

\*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates.  
Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.

- Five-year relative survival rates for adolescent and young adult brain cancer diagnosed in 1979-2001 were 65.0% in New Jersey and 65.7% in the U.S., respectively (data not shown in Table 21).
- New Jersey brain cancer five-year relative survival rates for adolescents and young adult males and females were lower than the U.S. rates, except that New Jersey males 20-24 and 25-29 had higher survival than U.S. males.
- Males had lower brain cancer survival rates than females except New Jersey males 20-24 and 25-29, unlike other cancer types.
- Brain cancer survival rates decreased with each subsequently older five-year age group for males and females in New Jersey and the U.S.

See Table A9 in Appendix A for detailed data.

**Brain and Other Nervous System Cancer Incidence and Mortality Time Trends in New Jersey and the U.S.**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

\*\*\*Statistically significant decrease in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute; mortality – National Center for Health Statistics.

- New Jersey and U.S. brain cancer **incidence** rates for adolescents and young adults increased about 10% (1979-2006) and 38% (1979-2005), respectively.
- **Incidence** rates for brain cancer in adolescents and young adults in New Jersey were higher in some years than the U.S. rates, but lower in other years.
- Despite the increase in incidence rates, the adolescent and young adult brain cancer **mortality** rates decreased from 1979 to 2005, by about 64% in New Jersey and 21% in the U.S.
- In general, New Jersey brain cancer **mortality** rates for adolescents and young adults were increasingly lower than the U.S. rates.

See Tables A10 and A11 in Appendix A for the average percent changes in rates.

## CERVICAL CANCER

### Background and Risk Factors

- Cervical cancer is the most common cancer of the genital tract in adolescent and young adult women (AYA).<sup>16</sup>
- The five-year survival rate for cervical cancer in AYA has not improved in the past few decades.<sup>16</sup>
- Virtually all cervical cancers are caused by infection with human papillomaviruses transmitted through sexual contact, although additional co-factors are necessary.<sup>16,17</sup> Co-factors for cervical cancer include sexual activity at an early age, multiple sexual partners, sexually transmitted disease, having many children, smoking, long-term oral contraceptive use, co-infection with other infectious agents, and probably diet.<sup>16,17</sup> Male circumcision may reduce the risk of cervical cancer in female partners.<sup>16</sup>
- In addition to routine pap smears to detect pre-invasive cervical cancer, the human papillomavirus (HPV) vaccine is highly effective in preventing four types of HPV which cause up to 70% of all cervical cancers.



**Cervical Cancer Incidence Rates by Age in New Jersey and the U.S., Females Only**

<b>Table 22.</b>						
<b>Adolescent and Young Adult Cervical Cancer Incidence Rates by Age Females Only*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2006</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=29</b>	<b>20-24 n=199</b>	<b>25-29 n=710</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Cervix</b>	<b>0.4</b>	<b>2.6</b>	<b>8.6</b>	<b>0.3</b>	<b>2.1</b>	<b>7.3</b>
<p>*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted.                      Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.</p>						

- The average annual age-adjusted cervical cancer incidence rate among New Jersey female adolescents and young adults (15-29) in 1979-2006 was 3.7 cases per 100,000, higher than the analogous rate of 3.1 in the U.S. in 1979-2005 (data not shown in Table 22).
- The adolescent and young adult female cervical cancer incidence rates were higher in New Jersey than in the U.S. for every five-year age group.
- The cervical cancer incidence rates among female adolescents and young adults increased greatly in each successively older five-year age group in both New Jersey and the U.S.

See Table A4 in Appendix A for detailed data.

**Cervical Cancer Mortality Rates by Age in New Jersey and the U.S., Females Only**

<b>Table 23.</b>						
<b>Adolescent and Young Adult Cervical Cancer Mortality Rates by Age Females Only*</b>						
<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n&lt;5</b>	<b>20-24 n=10</b>	<b>25-29 n=75</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Cervix</b>	-	<b>0.1</b>	<b>0.9</b>	<b>0.0</b>	<b>0.2</b>	<b>0.8</b>
*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted. - Counts and rates are suppressed when there were fewer than 5 cases to ensure confidentiality and statistical reliability. Data source: National Center for Health Statistics.						

- Among adolescent and young adult females (15-29), the average annual age-adjusted cervical cancer mortality rates in New Jersey and the U.S. were the same in 1979-2005, 0.3 cases per 100,000 (data not shown in Table 23).
- Among females, the 20-24 age group cervical cancer mortality rate was lower in New Jersey than in the U.S., while the 25-29 age group cervical cancer mortality rate was higher in New Jersey than in the U.S.
- The cervical cancer mortality rate was much higher in the oldest five-year age group (25-29) than in the younger five-year age groups in New Jersey and the U.S.

See Table A8 in Appendix A for detailed data.

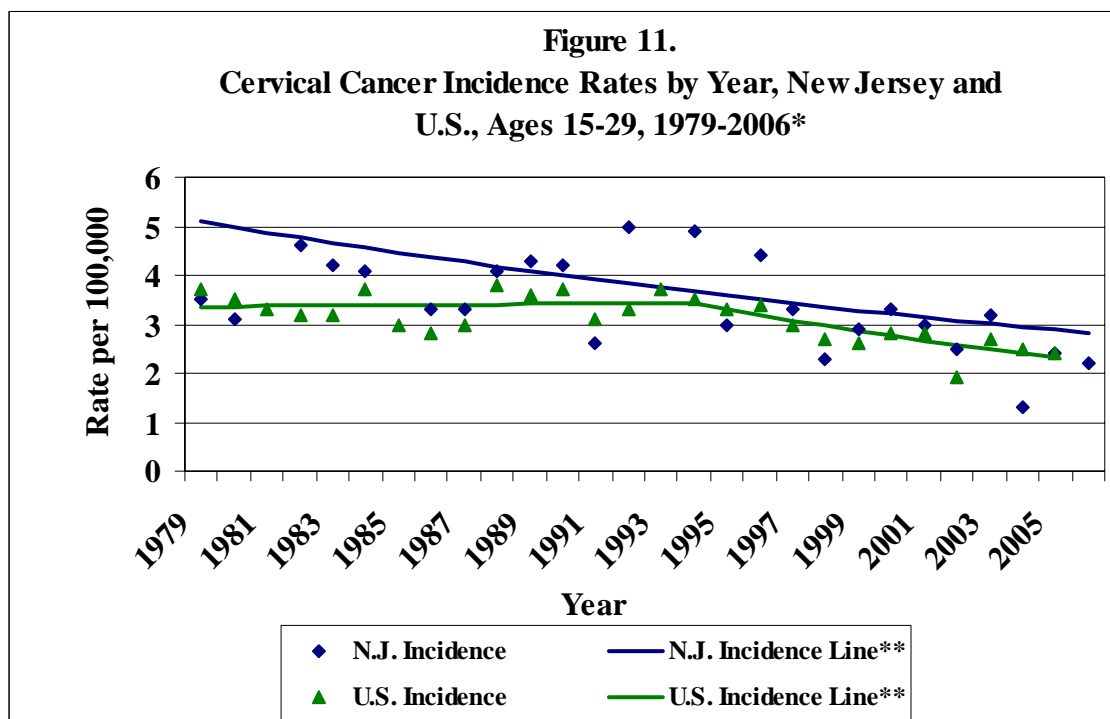
## Cervical Cancer Survival Rates by Age in New Jersey and the U.S., Females Only

<b>Table 24.</b>						
<b>Adolescent and Young Adult Cervical Cancer Survival Rates by Age Females Only*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=25</b>	<b>20-24 n=148</b>	<b>25-29 n=575</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Cervix</b>	<b>92.1%</b>	<b>92.1%</b>	<b>81.7%</b>	<b>86.3%</b>	<b>87.0%</b>	<b>86.6%</b>
<p>*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates. Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.</p>						

- The five-year relative survival rate for adolescent and young adult cervical cancer diagnosed in 1979-2001 was 84.1% in New Jersey and 86.7% in the U.S. (data not shown in Table 24).
- In the two youngest five-year age groups, New Jersey adolescent and young adult cervical cancer survival was higher than survival in the U.S.
- Cervical cancer survival was lowest in the oldest five-year age group.

See Table A9 in Appendix A for detailed data.

**Cervical Cancer Incidence Time Trends in New Jersey and the U.S., Females Only**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program. Mortality rates are not shown due to very small numbers.

\*\*Statistically significant decrease in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute.

- Cervical cancer **incidence** rates among adolescents and young adults declined by over a third in New Jersey between 1979 and 2006 and in the U.S. between 1979 and 2005.
- New Jersey adolescent and young adult cervical cancer **incidence** rates were higher than the U.S. rates throughout this time period.

See Table A10 in Appendix A for the average percent changes in rates.

## FEMALE BREAST CANCER

### Background and Risk Factors

- Breast cancer in adolescents and young adults is rare; fewer than 0.1 percent of breast cancers occur in women younger than 30.<sup>18</sup> Excluding skin cancer, breast cancer is the most common cancer among women of all ages combined.<sup>19</sup>
- Black adolescent and young adult women have higher rates of breast cancer than white adolescent and young women; the relationship is reversed for women age 45 and older.<sup>18</sup>
- At every age, white women have lower mortality and higher survival from breast cancer than black women.<sup>18</sup>
- Survival from breast cancer has improved over time, although women 15-29 years of age continue to have lower survival rates than older women.<sup>18</sup> The lower survival of women 15-29 years of age may be due to more aggressive cancers and detection at a more advanced stage.<sup>18</sup>
- Breast cancer in adolescent and young adult women has not been well studied and most of the information about the causes of breast cancer is from studies of older women.<sup>18</sup> Risk factors for women in general include older age, inherited genetic mutations in the BRCA1 and BRCA2 genes, personal or family history of breast cancer, high breast tissue density, confirmed hyperplasia, and high-dose radiation to the chest (usually therapeutic).<sup>19</sup> Adolescent and young adult survivors of Hodgkin lymphoma are at risk of developing breast cancer, related to the quantity and location of radiation therapy.<sup>18</sup>
- Other factors related to female breast cancer in general are menstrual periods that start early in life and/or end late in life, never having children, recent use of oral contraceptives, and having a first child after age 30.<sup>19</sup>
- Many of the above risk factors, e.g., menstrual history, reproductive history, oral contraceptive use, are believed to relate to the total “dose” of the estrogen hormone to the breast.<sup>20</sup> Estrogen increases cell division in the breast which increases the likelihood of random genetic errors leading to cancer.<sup>20</sup>
- Some modifiable risk factors for female breast cancer are being overweight after menopause, use of postmenopausal hormone therapy, physical inactivity, and consumption of one or more alcoholic beverages a day.<sup>19</sup> Breastfeeding, moderate or vigorous physical activity and maintaining a healthy body weight lower the risk of breast cancer. Although some of these factors do not apply to breast cancer in adolescent and young women, developing a healthy lifestyle young in life will lead to a healthier lifestyle and reduced risk of breast cancer and other diseases later in life.

**Breast Cancer Incidence Rates by Age in New Jersey and the U.S., Females Only**

<b>Table 25.</b>						
<b>Adolescent and Young Adult Breast Cancer Incidence Rates by Age Females Only*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2006</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n=17</b>	<b>20-24 n=130</b>	<b>25-29 n=771</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Breast</b>	<b>0.2</b>	<b>1.7</b>	<b>9.4</b>	<b>0.1</b>	<b>1.3</b>	<b>8.0</b>
*Only invasive cases are included. Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted. Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.						

- The average annual age-adjusted breast cancer incidence rate among New Jersey adolescent and young adult females was 3.6 cases per 100,000 in 1979-2006, higher than the rate of 3.0 in the U.S. in 1979-2005 (data not shown in Table 25).
- Female adolescent and young adult breast cancer incidence rates were higher in New Jersey than in the U.S. in each five-year age group.
- In each successively older five-year age group, the female adolescent and young adult breast cancer rates increased greatly for both New Jersey and the U.S.

See Tables A2 and A4 in Appendix A for detailed data.

**Breast Cancer Mortality Rates by Age in New Jersey and the U.S., Females Only**

<b>Table 26.</b>						
<b>Adolescent and Young Adult Breast Cancer Mortality Rates by Age Females Only*</b>						
<b>ICD-9, 10 Category</b>	<b>New Jersey, 1979-2005</b>			<b>U.S., 1979-2005</b>		
	<b>15-19 n&lt;5</b>	<b>20-24 n=9</b>	<b>25-29 n=72</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Breast</b>	<b>-</b>	<b>0.1</b>	<b>0.9</b>	<b>0.0</b>	<b>0.1</b>	<b>1.1</b>
*Average annual rates. Rates are number of cases per 100,000 and are not age-adjusted. - Counts and rates are suppressed when there were fewer than 5 cases to ensure confidentiality and statistical reliability. Data source: National Center for Health Statistics.						

- In New Jersey and the U.S., the adolescent and young adult (15-29) female average annual age-adjusted breast cancer mortality rates in 1979-2005 were 0.3 and 0.4, respectively (data not shown in Table 26).
- Breast cancer mortality rates among New Jersey adolescent and young adult females of every five-year age group were the same or lower than the U.S. rates.
- For New Jersey and the U.S., adolescent and young adult female breast cancer mortality rates increased greatly with each subsequently older five-year age group.

See Tables A6 and A8 in Appendix A for detailed data.

**Breast Cancer Survival Rates by Age in New Jersey and the U.S., Females Only**

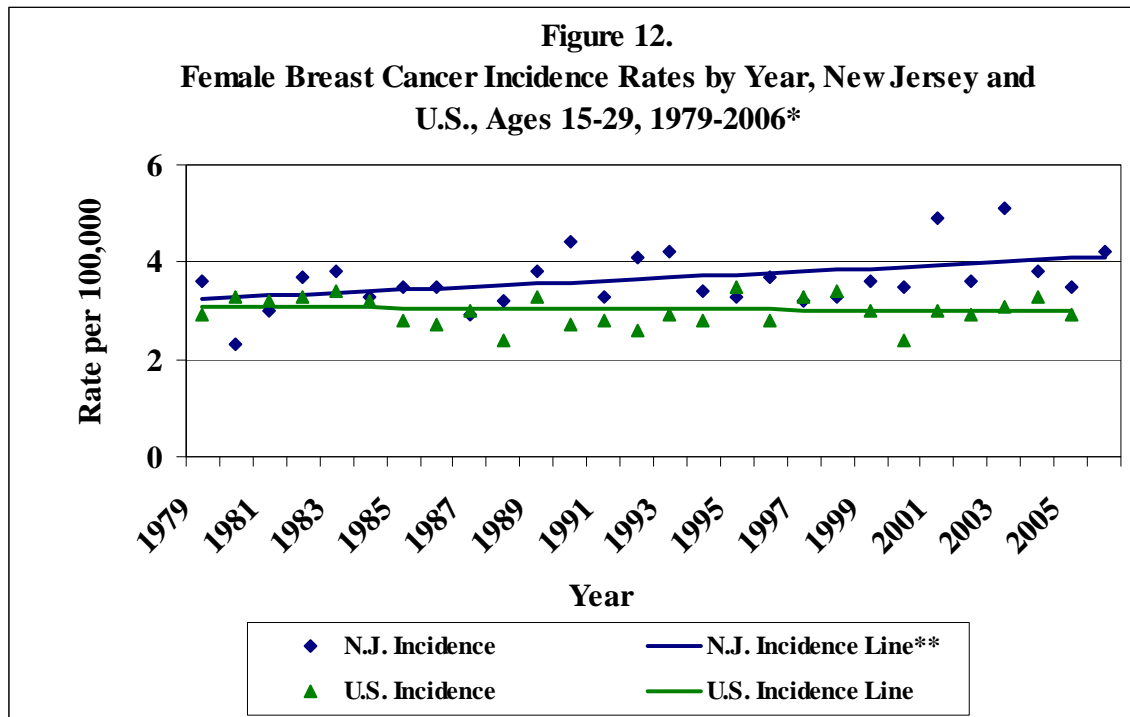
<b>Table 27.</b>						
<b>Adolescent and Young Adult Breast Cancer Survival Rates by Age Females Only*</b>						
<b>ICD-O-3 Category</b>	<b>New Jersey, 1979-2001</b>			<b>U.S., 1979-2001</b>		
	<b>15-19 n=8</b>	<b>20-24 n=101</b>	<b>25-29 n=596</b>	<b>15-19</b>	<b>20-24</b>	<b>25-29</b>
<b>Breast</b>	<b>-</b>	<b>83.4%</b>	<b>70.8%</b>	<b>81.5%</b>	<b>74.7%</b>	<b>72.0%</b>
<p>*Only invasive cases diagnosed in 1979-2001 are included. See the Technical Notes for additional information on the five-year relative survival rates.                      -The survival rate was suppressed due to a count less than 16.                      Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.</p>						

- Breast cancer five-year relative survival among adolescents and young adults diagnosed in 1979-2001 was 73.0% in New Jersey and 72.4% in the U.S. (data not shown in Table 27).
- New Jersey breast cancer survival was higher than U.S. survival in the 20-24 age group, but lower than U.S. survival in the 25-29 age group.
- Breast cancer survival declined in the older five-year age groups in New Jersey and the U.S.

See Table A9 in Appendix A for detailed data.



**Breast Cancer Incidence Time Trends in New Jersey and the U.S., Females Only**



\*Rates are number of cases per 100,000 and are age-adjusted to the 2000 Population Standard. The regression lines were calculated using NCI's Joinpoint statistical program. Mortality rates are not shown due to very small numbers.

\*\*Statistically significant increase in rates over time,  $p < 0.05$ .

Data sources: New Jersey incidence – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. incidence – SEER Program, National Cancer Institute.

- Adolescent and young adult breast cancer **incidence** rates increased about 17% in New Jersey between 1979 and 2006, while U.S. incidence rates held steady between 1979 and 2005.
- New Jersey **incidence** rates for adolescent and young adult breast cancer became increasingly higher than the U.S. incidence rates over these years.

See Table A10 in Appendix A for the average percent changes in rates.

## TECHNICAL NOTES

### New Jersey State Cancer Registry (NJSCR)

#### NJSCR Overview

The objectives of the New Jersey State Cancer Registry (NJSCR) are to:

- monitor cancer trends in New Jersey;
- promote scientific research;
- respond to New Jersey residents about cancer concerns;
- educate the public;
- provide information for planning and evaluating cancer prevention and control activities; and
- share and compare cancer data with other states and the nation.

The NJSCR is a population-based cancer incidence registry that serves the entire state of New Jersey, which has a population of over 8.7 million people. The NJSCR was established by legislation (NJSA 26:2-104 et. seq.) and includes all cases of cancer diagnosed in New Jersey residents since October 1, 1978. New Jersey regulations (NJAC 8:57A) require the reporting of all newly diagnosed cancer cases to the NJSCR within three months of hospital discharge or six months of diagnosis, whichever is sooner. Reports are filed by hospitals, diagnosing physicians, dentists, and independent clinical laboratories. Every hospital in New Jersey reports cancer cases electronically. In addition, reporting agreements are maintained with Delaware, Florida, Maryland, New York, North Carolina and Pennsylvania so that New Jersey residents diagnosed with cancer outside the state can be identified. Legislation passed in 1996 strengthened the NJSCR by requiring electronic reporting, requiring abstracting by certified tumor registrars (CTRs) and establishing penalties for late or incomplete reporting.

All primary invasive and *in situ* neoplasms are reportable to the NJSCR, except cervical cancer *in situ* diagnosed after 1994 and certain carcinomas of the skin. Benign brain/central nervous system (CNS) tumors have been collected since 2004, as required by the federal Benign Brain Tumor Cancer Registries Act signed in October 2002. The information collected by the NJSCR on each cancer includes basic patient identifiers, demographic characteristics of the patient, medical information on each cancer diagnosis such as the anatomic site, histologic type and stage of disease, first course of treatment and vital status (alive or deceased) determined annually. For deceased cases, the underlying cause of death is also included. The primary site, behavior, grade, and histology of each cancer are coded according to the *International Classification of Diseases for Oncology (ICD-O)*, 2<sup>nd</sup> edition<sup>21</sup> for cancers diagnosed through 2000 and the 3<sup>rd</sup> edition<sup>22</sup> for cancers diagnosed after 2000.

The NJSCR follows the data standards promulgated by the North American Association of Central Cancer Registries (NAACCR), including the use of the Surveillance,

Epidemiology, and End Results (SEER) multiple primary rules. An individual may develop more than one cancer. Following the SEER multiple primary rules, patients could therefore be counted more than once if they were diagnosed with two or more primary cancers.

The NJSCR is a member of NAACCR, an organization that sets standards for cancer registries, facilitates data exchange and publishes cancer data. The NJSCR has been a participant of the National Program of Cancer Registries (NPCR) sponsored by the Centers for Disease Control and Prevention (CDC) since it began in 1994 and is one of the National Cancer Institute's (NCI) SEER expansion registries.

### **NJSCR Data Quality**

NAACCR has awarded the Gold Standard, the highest standard possible, to the NJSCR for the quality of the 1995 through 2006 data. The NJSCR has consistently achieved the highest level of certification for its data since the inception of this award. The criteria used to judge the quality of the data are completeness of cancer case ascertainment, completeness of certain information on the cancer cases, percent of death certificate only cases, percent of duplicate cases, passing an editing program, and timeliness.

Completeness of reporting to the NJSCR was estimated by comparing New Jersey and U.S. incidence to mortality ratios for whites standardized for age, gender, and cancer site. The data used to generate these ratios were the cancer incidence rates for all SEER registries combined. Using these standard formulae, it is possible for the estimation of completeness to be greater than 100 percent. For the NJSCR 2006 data, the completeness of case reporting was estimated as 108 percent at the time this report was prepared.

While our estimates of completeness are very high, some cases of cancer among New Jersey residents who were diagnosed and/or treated in out-of-state facilities may not yet have been reported to the NJSCR by other state registries. This should be considered in interpreting the data for the more recent years. However, these relatively few cases will not significantly affect the cancer rates, nor alter the overall trends presented in this report.

Other 2006 cancer incidence data quality indicators that were measured include:

- percent death-certificate-only cases, 1.4 percent;
- percent of unresolved duplicates, less than 0.1 percent;
- percent of cases with unknown race, 1.7 percent;
- percent of cases with unknown county, 0.05 percent;
- number of cases with unknown age, 4; and
- number of cases with unknown gender, 1.

It also should be noted that the 2006 incidence counts presented here are expected to increase by the time all data are complete, and, therefore, are considered preliminary. Another limitation that could affect New Jersey cancer incidence data is the recent federal restriction on the submission of cancer cases from Veteran's Health Administration (VA) hospitals to cancer registries. The NJSCR received 0.6 percent of the total cases from VA hospitals for the years 2004 and earlier. Since then the NJSCR received only 0.3% of the total cases from VA hospitals for 2005 and no cases for 2006. The impact of missing VA hospital cases in New Jersey could result in underestimates of cancer incidence rates for 2005 and 2006.

The NJSCR continues to work toward improving the quality and number of its reporting sources. Over the past few years, significant improvements have been realized in this regard. For example, some of these improvements have resulted in better reporting of skin cancers such as melanoma. One of the most significant improvements has been the implementation of electronic pathology laboratory reporting (E-path) from a national pathology laboratory and several hospital-based laboratories. The ultimate goal is to enable E-path laboratory reporting from every laboratory that serves New Jersey. E-path reporting has improved the timeliness and completeness of cancer reporting, especially for non-hospitalized cases.

In order to minimize the number of cases with an unknown county of residence, the NJSCR runs all addresses through a standardization and geocoding process as described below. For this report, cases for which the county of residence at diagnosis is unknown have been excluded. This change was made so that NJSCR methods are in accordance with the standard procedures used by SEER. The effect of this change on the incidence rates is very small. For example, the total number of adolescent and young adult cancer cases with an unknown county in 1979-2006 was 44 (0.2%).

### **Geocoding**

The NJSCR geocodes the residential address at the time of cancer diagnosis for each case. To ensure accuracy of address information, follow-up with physicians and hospitals to verify address data is conducted prior to the geocoding process. The geocoding process involves matching the cases' addresses to a street level reference map containing geographic coordinates (latitude and longitude). The NJSCR employs both automated and interactive geocoding. The automated geocoding is done through the New Jersey Office of Information Technology Services (NJOITS). The NJOITS geocoding system uses Integrity software and the most recent street boundary file provided by Tele Atlas. The NJSCR has attempted to geocode all cancer cases beginning with the 1979 cases and updates the registry on a monthly basis. Interactive geocoding is performed by NJSCR trained staff and is used to manually examine and review cases that could not be geocoded through the automated process. Staff persons also use the Tele Atlas boundary file for the interactive process.

## Data Sources and Specifications for This Report

### Data Sources

New Jersey cancer incidence data were taken from the December 2008 analytic file of the NJSCR. U.S. cancer incidence data, obtained from the SEER Program, are from nine registries in the U.S. that cover about ten percent of the U.S. population.<sup>23</sup> At the time of the preparation of this report, year 2006 U.S. incidence data were not yet available. Because SEER does not include all the U.S. states, the total SEER cases would not be meaningful and therefore were not presented in this report.

New Jersey and U.S. cancer mortality data were obtained from the SEER Program.<sup>24</sup> Underlying mortality data were from the National Center for Health Statistics (NCHS). At the time of the preparation of this report, year 2006 mortality data were not yet available.

The 1979-2006 population data used in this report for the incidence and mortality rates are estimates from the NCHS based on U.S. Census Bureau data, which were downloaded from NCI SEER's website (NCI SEER Program release November 19, 2008), <http://www.seer.cancer.gov/popdata/download.html>.

### Data Specifications

Cases were limited to adolescents and young adults whose age at diagnosis was 15 to 29. The age at diagnosis in the NJSCR was derived from the date of birth and the date of diagnosis information in the medical records. Out-of-state residents and cases whose residence in New Jersey at the time of diagnosis could not be confirmed (unknown county) were excluded from the New Jersey incidence rates and counts, as were persons of unknown age and/or gender. All invasive cancers and bladder cancer *in situ* were included in the incidence data. The ICD-O-3 coding system<sup>22</sup> was used for cancer incidence data. A complete listing of the ICD-O-3 site codes is at [http://seer.cancer.gov/siterecode/icdo3\\_d01272003/](http://seer.cancer.gov/siterecode/icdo3_d01272003/).

Beginning with the year 1999, coding and classification for cause of death has been in accordance with the 10<sup>th</sup> edition of the World Health Organization's *International Classification of Diseases (ICD-10)*. From 1979-1998, cause of death coding was based on the 9<sup>th</sup> edition (*ICD-9*). Changes in classification detail, coding rules, and classification code numbers with the new version have caused some discontinuities in trends for cancer deaths. Although these discontinuities vary, research has found that using ICD-10 assigns approximately 0.7 percent more deaths to the category of cancer than does ICD-9, which may slightly increase some site-specific age-specific mortality rates for 1999 and later. A listing of the ICD-9 and ICD-10 codes is at [http://seer.cancer.gov/codrecode/1969+\\_d03252004/index.html](http://seer.cancer.gov/codrecode/1969+_d03252004/index.html). Cancer sites in mortality data were grouped according to the revised SEER Cause of Death Recode 1969+

(9/17/04). Detailed information can be found on the SEER website <http://seer.cancer.gov/codrecode/>.

The population estimates represent a modification of the Vintage 2007 annual time series of July 1 county population estimates by age, sex, race and Hispanic origin produced by the U.S. Census Bureau's Population Estimates program (<http://www.census.gov/popest/counties/asrh>) in collaboration with the NCHS and with support from the NCI through an interagency agreement. The Vintage 2007 postcensal population estimates were produced after implementation of several methodologic changes by the Census Bureau. The net impact of the various methodologic changes is a downward shift of the Vintage 2007 postcensal population estimates compared to those from the Vintage 2006 series. A downward shift in the net international migration estimates accounts for most of the change in the Vintage 2007 estimates.

Furthermore, 2000 population estimates used to calculate rates for the years 1991 through 1999 for previous reports have been found to differ from the actual 2000 census counts, especially the specific race estimates. Therefore, the 1991-1999 intercensal population estimates were revised by the Census Bureau by distributing the difference between the original post-1990 census estimates of the 2000 population and the actual April 1, 2000 census. The new population estimates affected primarily smaller populations such as race subgroups.

## Calculation of Rates

### Age-Adjusted Rates and the Year 2000 Standard

The U.S. Department of Health and Human Services requires that health data be age-adjusted using the U.S. year 2000 population as the standard, beginning with the 1999 reporting year. Age-adjustment to the year 2000 population as the standard was first used in one of our earlier annual reports, *Cancer Incidence and Mortality in New Jersey 1996-2000*, issued in December 2002. Prior to the release of 1999 data, various federal and state agencies calculated disease rates using different U.S. population standards, including the 1940 and 1970 U.S. standard populations.

Calculations using the 2000 U.S. population as the standard do not indicate a change in cancer incidence or occurrence, only a different representation of the rates of reported cancer. Using the 2000 U.S. population as the standard produces age-standardized cancer rates that appear to be about 20% higher than previously reported.

For this report, the 2000 U.S. Standard Population (19 age groups-Census P25-1130) was used for age-adjustment instead of the 2000 U.S. Standard Million (19 age groups). This has been standard practice for all NCI SEER reports with incidence or mortality data for 2002 or later. The 2000 U.S. Standard Population was created for use with single year of age population data. Differences in the age-adjusted rates using the 2000 U.S. Standard

Million and the new 2000 U.S. Standard Population are minimal. For further details, see SEER’s website at [http://seer.cancer.gov/stdpopulations/single\\_age.html](http://seer.cancer.gov/stdpopulations/single_age.html).

**Rate Calculation Formulas**

A cancer incidence rate is defined as the number of new cases of cancer diagnosed during a specified time period in a specified population. Cancer rates are most commonly expressed as cases per 100,000 population. Cancer occurs at different rates in different age groups, and population subgroups defined by sex and race have different age distributions. Therefore, before a valid comparison can be made between rates, it is necessary to standardize the rates to the age distribution of a standard population. In this report, the 2000 U.S. Standard Population (19 age groups-Census P25-1130) was used. Records that were missing gender, age, or race were not included in the rates presented in this report. Since the number of records so affected was very small, the rates were virtually unaffected by the non-inclusion of these records.

The first step in the age-standardization procedure is to determine the age-specific rates. For each age group for a given time interval (within each race-sex group, for the entire state), the following formula is applied:

$$r_a = \frac{n_a}{t \times P_a}$$

where:

- r<sub>a</sub> = the age-specific rate for age group a;
- n<sub>a</sub> = the number of events (cancer diagnoses) in the age group during the time interval;
- t = the length of the time interval (in years); and
- P<sub>a</sub> = average size of the population in the age group during the time interval (mid-year population or average of mid-year population sizes).

In order to determine the age-adjusted rate, a weighted average of the age-specific rates is calculated, using the age distribution of the standard population to derive the age-specific weighting factors.<sup>25</sup> This is the technique of direct standardization, which uses the following formula:

$$R = \frac{\sum_{a=1}^n r_a \times Std. P_a}{\sum_{a=1}^n Std. P_a}$$

where:

- R = the age-adjusted rate;
- r<sub>a</sub> = the age-specific rate for age group a; and
- Std.P<sub>a</sub> = the size of the standard population in each age group a.



While age standardization facilitates the comparison of rates among different populations, there can be important age-specific differences in disease occurrence, which are not apparent in comparisons of the age-adjusted rates.<sup>26</sup>

Analogous definitions and calculations apply for the cancer mortality rates. All the counts and rates were tabulated using SEER\*Stat Version 6.4.4, a statistical software package distributed by the NCI available at <http://www.seer.cancer.gov/seerstat/>.

## Other Statistical Methods

### Five-Year Relative Survival Rate

The relative survival rate is the ratio of the observed survival rate to the expected survival rate for a given group of patients; in this report the “given group of patients” is the New Jersey or U.S. individuals diagnosed with cancer between 1979 and 2001. The expected survival rate is based on mortality rates for the entire population, taking into account the age, sex, race and year of diagnosis of the patients. The relative survival rate is an estimate of the probability that a patient will not die of the diagnosed cancer within a given number of years and is expressed as a percentage, e.g. 80%. The “given number of years” for this report is five years, hence the five-year relative survival rate. The expected survival rates were for the U.S. population and are included in the SEER\*Stat survival session that was used to generate the five-year relative survival rates.

In order to calculate valid estimates of survival, the vital status (alive or deceased) must be known for a large percentage of the cancer patients in the registry. For New Jersey the vital status was known (follow-up) for 87% of the adolescents and young adults (15-29) for at least five years after diagnosis in 1979-2001. The follow-up percentage ranged from 94% for leukemia to 76% for cervical cancer.

### Joinpoint Regression Modeling for Time Trends in Rates

Joinpoint software from NCI<sup>27</sup> was used to determine if any significant changes in annual incidence and mortality rate trends occurred in New Jersey and the U.S. from 1979 to 2005 (1979-2006 for New Jersey incidence data). The Joinpoint software uses regression modeling to analyze trend data (e.g. annual cancer incidence rates) by identifying points (joinpoints) where the rate of change significantly changes and by providing the estimated annual percent change (APC) for each line segment between joinpoints. It fits the simplest joinpoint model to the data, such that if one more joinpoint is added it does not statistically significantly improve the model.

For this report, the simplest regression models were used to determine time trends in New Jersey and U.S. incidence and mortality and to compare New Jersey with the U.S. The APCs and their 95 percent confidence intervals from the simplest joinpoint models were



used to determine if the annual rates significantly increased or decreased during the time period 1979-2005 (1979-2006 for New Jersey incidence data). Additional statistical details on joinpoint regression may be found in an article by Kim, et al.<sup>28</sup>

The APC is calculated by first fitting a regression line to the natural logarithms of the rates [ $\ln(r)$ ] using calendar year ( $x$ ) as a regressor variable. For this report the method of weighted least squares was used to calculate the regression equation. If  $\ln(r) = mx + b$  is the resulting regression equation (with slope  $m$ ), then the  $APC = 100(e^m - 1)$ . A positive APC corresponds to an increasing trend and a negative APC to a decreasing trend. To determine the statistical significance of the APC, the null hypothesis that  $APC = 0$  is tested, which is equivalent to testing the hypothesis that  $m = 0$ . A t-test is used and the null hypothesis is rejected at  $p < 0.05$ . The APC was not calculated if the rate was 0 for more than one year within the time period.

### **Suppression of Rates and Counts Less Than Five**

The annual rates for relatively uncommon cancers, such as adolescent and young adult cancers, tend to fluctuate substantially from year to year because of small numbers of cases. Rates generated from small numbers should be interpreted with caution. For this report, incidence and mortality rates based on counts fewer than five and survival rates based on counts fewer than 16 were suppressed to ensure confidentiality and a greater level of statistical reliability. The suppressed cases, however, are included in the counts and rates for larger categories.

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## GLOSSARY

### Clinical Terms

- Cancer:** A group of more than 100 diseases characterized by uncontrolled growth and spread of abnormal cells.
- Carcinogen:** Any substance that causes cancer or helps cancer to develop.
- Carcinoma:** Cancer of the epithelial cells that cover or line the internal organs, body surface, internal cavities and form glands.
- Diagnosis:** Identifying a disease by its signs, symptoms, and laboratory findings; usually the earlier a diagnosis of cancer is made, the better the chance for cure.
- Histology:** Microscopic identification of cells and tissue.
- Malignant:** Rapidly growing cells with the ability to invade and spread.
- Metastasis:** The spread of cancer cells to distant areas of the body through the lymph system or bloodstream.
- Primary site:** The site in the body where the cancer began; usually cancer is named after the organ in which it started, e.g. breast cancer. It is possible to have more than one primary cancer or multiple primaries at the same time.
- Risk factor:** Anything that increases a person's chance of getting a disease such as cancer.
- Tumor or Neoplasm:** An abnormal growth of tissue; benign (not cancer) or malignant (cancer).

### Epidemiological Terms

- Epidemiology:** The study of patterns of the occurrence of disease in human populations and the factors that influence these patterns.
- Incidence:** The number of newly diagnosed cases of disease occurring in a specific population during a specific time period.

**Incidence rate (or crude incidence rate):**

The number of newly diagnosed cases of disease in a specific population during a specific time period per “x” number of people. Usually the time period is one year and the “x” number of people is 100,000.

- **Age-specific incidence rate:**

The number of newly diagnosed cases of a disease in a specific age group in a specific population over a specific time period per “x” number of people in the specific age group. Usually five-year age groups (0-4, 5-9, 10-14, etc.) are used. The time period is usually one year and the “x” number of people is 100,000.

- **Age-standardization (or age-adjustment):**

The statistical adjustment of crude rates for differences in age distributions in order to compare rates in different populations. There are two types of standardization, direct and indirect.

**APPENDIX A - TABLES**

**Table A1: Adolescent and Young Adult Cancer Incidence Cases and Percent Distribution by Type of Cancer and Age Group, New Jersey, 1979-2006\***

ICD-O-3 Category	Age Group							
	15-29		15-19		20-24		25-29	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
<b>All Cancers</b>	<b>18,379</b>	<b>100%</b>	<b>3,472</b>	<b>100%</b>	<b>5,537</b>	<b>100%</b>	<b>9,370</b>	<b>100%</b>
Oral Cavity and Pharynx	306	1.7%	60	1.7%	96	1.7%	150	1.6%
Digestive System	831	4.5%	74	2.1%	245	4.4%	512	5.5%
Colon and Rectum	453	2.5%	34	1.0%	123	2.2%	296	3.2%
Respiratory System	338	1.8%	56	1.6%	104	1.9%	178	1.9%
Lung and Bronchus	206	1.1%	24	0.7%	60	1.1%	122	1.3%
Bones and Joints	529	2.9%	234	6.7%	159	2.9%	136	1.5%
Soft Tissue including Heart	599	3.3%	179	5.2%	193	3.5%	227	2.4%
Skin excluding Basal and Squamous	1,612	8.8%	193	5.6%	482	8.7%	937	10.0%
Melanoma of the Skin	1,444	7.9%	159	4.6%	428	7.7%	857	9.1%
Breast	924	5.0%	17	0.5%	132	2.4%	775	8.3%
Female Genital System	1,754	9.5%	179	5.2%	435	7.9%	1,140	12.2%
Cervix Uteri	938	5.1%	29	0.8%	199	3.6%	710	7.6%
Ovary	539	2.9%	116	3.3%	174	3.1%	249	2.7%
Male Genital System	1,894	10.3%	239	6.9%	689	12.4%	966	10.3%
Testis	1,875	10.2%	231	6.7%	683	12.3%	961	10.3%
Urinary System	403	2.2%	56	1.6%	127	2.3%	220	2.3%
Brain and Other Nervous System	1,161	6.3%	345	9.9%	332	6.0%	484	5.2%
Brain	1,055	5.7%	301	8.7%	301	5.4%	453	4.8%
Endocrine System	1,993	10.8%	322	9.3%	622	11.2%	1,049	11.2%
Thyroid	1,832	10.0%	269	7.7%	577	10.4%	986	10.5%
Lymphoma	4,108	22.4%	998	28.7%	1,377	24.9%	1,733	18.5%
Hodgkin Lymphoma	2,707	14.7%	678	19.5%	983	17.8%	1,046	11.2%
Non-Hodgkin Lymphoma	1,401	7.6%	320	9.2%	394	7.1%	687	7.3%
Leukemia	1,287	7.0%	456	13.1%	409	7.4%	422	4.5%
Acute Lymphocytic Leukemia	439	2.4%	227	6.5%	119	2.1%	93	1.0%
Acute Myeloid Leukemia	449	2.4%	119	3.4%	164	3.0%	166	1.8%

\*Only invasive cases are included except bladder cancer *in situ* is included in All Cancers and Urinary System cancers. The numbers and percents of the specific cancer types do not add to the number of All Cancers and 100 percent due to non-inclusion of other and miscellaneous types of cancer. Percents are rounded to the nearest tenth. Data source: New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services.



**Table A2: Adolescent and Young Adult Cancer Incidence Cases and Rates by Type of Cancer and Age Group, New Jersey and the U.S.\***

ICD-O-3 Category	New Jersey 1979-2006								U.S. 1979-2005			
	15-19		20-24		25-29		15-29		15-19	20-24	25-29	15-29
	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Rate	Rate	Rate
<b>All Cancers</b>	<b>22.1</b>	<b>3,472</b>	<b>35.8</b>	<b>5,537</b>	<b>57.0</b>	<b>9,370</b>	<b>37.7</b>	<b>18,379</b>	<b>20.3</b>	<b>33.7</b>	<b>54.6</b>	<b>35.6</b>
Oral Cavity and Pharynx	0.4	60	0.6	96	0.9	150	0.6	306	0.5	0.6	1.1	0.7
Digestive System	0.5	74	1.6	245	3.1	512	1.7	831	0.5	1.3	2.7	1.4
Colon and Rectum	0.2	34	0.8	123	1.8	296	0.9	453	0.2	0.7	1.5	0.8
Respiratory System	0.4	56	0.7	104	1.1	178	0.7	338	0.3	0.6	0.8	0.6
Lung and Bronchus	0.2	24	0.4	60	0.7	122	0.4	206	0.1	0.2	0.5	0.3
Bones and Joints	1.5	234	1.0	159	0.8	136	1.1	529	1.5	0.8	0.6	1.0
Soft Tissue including Heart	1.1	179	1.2	193	1.4	227	1.3	599	1.0	1.1	1.2	1.1
Skin excluding Basal and Squamous	1.2	193	3.1	482	5.7	937	3.3	1,612	1.7	4.6	8.0	4.7
Melanoma of the Skin	1.0	159	2.8	428	5.2	857	2.9	1,444	1.5	4.1	7.3	4.2
Breast	0.1	17	0.9	132	4.7	775	1.8	924	0.1	0.6	4.0	1.5
Urinary System	0.4	56	0.8	127	1.3	220	0.8	403	0.3	0.6	1.1	0.6
Brain and Other Nervous System	2.2	345	2.1	332	2.9	484	2.4	1,161	2.0	2.3	2.9	2.4
Brain	1.9	301	1.9	301	2.8	453	2.2	1,055	1.9	2.1	2.7	2.2
Endocrine System	2.0	322	4.0	622	6.4	1,049	4.1	1,993	1.9	4.2	6.2	4.0
Thyroid	1.7	269	3.7	577	6.0	986	3.7	1,832	1.6	4.0	6.0	3.8
Lymphoma	6.3	998	8.9	1,377	10.6	1,733	8.5	4,108	5.1	7.2	8.4	6.8
Hodgkin Lymphoma	4.3	678	6.4	983	6.4	1,046	5.6	2,707	3.5	5.0	4.9	4.4
Non-Hodgkin Lymphoma	2.0	320	2.5	394	4.2	687	2.9	1,401	1.6	2.2	3.5	2.4
Leukemia	2.9	456	2.6	409	2.6	422	2.7	1,287	2.4	2.2	2.3	2.3
Acute Lymphocytic Leukemia	1.4	227	0.8	119	0.6	93	0.9	439	1.3	0.7	0.5	0.9
Acute Myeloid Leukemia	0.8	119	1.1	164	1.0	166	0.9	449	0.8	0.9	0.9	0.9

\*Only invasive cases are included except bladder cancer *in situ* is included in All Cancers and Urinary System cancers. The numbers of the specific cancer types do not add to the number of All Cancers due to non-inclusion of other and miscellaneous types of cancer. Male or female only cancers are not included in this table, but are in Tables A3 and A4, respectively. Average annual rates. All rates are number of cases per 100,000 and for the 15-29 age group are age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130) standard. Rates are rounded to the nearest tenth.

Data sources: New Jersey - New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. - SEER Program, National Cancer Institute.

**Table A3: Adolescent and Young Adult Cancer Incidence Cases and Rates by Type of Cancer and Age Group, New Jersey and the U.S., Males\***

ICD-O-3 Category	New Jersey 1979-2006								U.S. 1979-2005			
	15-19		20-24		25-29		15-29		15-19	20-24	25-29	15-29
	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Rate	Rate	Rate
<b>All Cancers</b>	<b>23.0</b>	<b>1,855</b>	<b>36.0</b>	<b>2,808</b>	<b>50.8</b>	<b>4,161</b>	<b>36.1</b>	<b>8,824</b>	<b>21.2</b>	<b>33.1</b>	<b>50.0</b>	<b>34.2</b>
Oral Cavity and Pharynx	0.4	36	0.6	43	0.9	73	0.6	152	0.4	0.6	1.1	0.7
Digestive System	0.5	38	1.7	131	3.3	274	1.8	443	0.5	1.3	2.8	1.5
Colon and Rectum	0.2	18	0.7	55	2.0	160	0.9	233	0.2	0.7	1.6	0.8
Respiratory System	0.4	35	0.8	63	1.2	102	0.8	200	0.4	0.7	0.9	0.7
Lung and Bronchus	0.1	12	0.4	28	0.8	63	0.4	103	0.1	0.2	0.4	0.2
Bones and Joints	1.8	149	1.2	97	0.9	75	1.4	321	2.0	1.0	0.7	1.2
Soft Tissue including Heart	1.4	110	1.5	114	1.4	114	1.4	338	1.1	1.2	1.3	1.2
Skin excluding Basal and Squamous	1.1	88	2.4	186	4.6	380	2.6	654	1.4	3.3	5.9	3.4
Melanoma of the Skin	0.8	68	2.0	156	4.2	347	2.3	571	1.2	2.9	5.2	3.0
Breast	-	-	-	-	-	-	-	6	0.0	-	0.0	0.0
Male Genital System	3.0	239	8.8	689	11.8	966	7.7	1,894	3.2	8.8	12.5	8.0
Testis	2.9	231	8.8	683	11.7	961	7.6	1,875	3.1	8.8	12.4	7.9
Urinary System	0.3	27	0.9	72	1.7	139	1.0	238	0.3	0.7	1.3	0.7
Brain and Other Nervous System	2.3	188	2.5	197	3.3	270	2.7	655	2.4	2.6	3.1	2.7
Brain	2.0	163	2.3	176	3.1	252	2.4	591	2.2	2.4	2.9	2.5
Endocrine System	1.0	84	1.7	132	2.5	207	1.7	423	0.9	1.5	2.4	1.6
Thyroid	0.6	51	1.4	107	2.2	178	1.4	336	0.5	1.2	2.2	1.3
Lymphoma	6.7	540	9.7	755	11.7	955	9.3	2,250	5.3	7.6	9.6	7.4
Hodgkin Lymphoma	4.0	323	6.5	510	6.3	518	5.6	1,351	3.3	5.0	5.1	4.4
Non-Hodgkin Lymphoma	2.7	217	3.1	245	5.3	437	3.7	899	2.0	2.6	4.6	3.0
Leukemia	3.5	281	3.0	234	3.1	255	3.2	770	2.9	2.5	2.6	2.7
Acute Lymphocytic Leukemia	1.8	145	0.9	74	0.8	64	1.2	283	1.7	0.9	0.7	1.1
Acute Myeloid Leukemia	0.8	64	1.1	86	1.1	89	1.0	239	0.8	0.9	1.0	0.9

\*Only invasive cases are included except bladder cancer *in situ* is included in All Cancers and Urinary System cancers. The numbers of the specific cancer types do not add to the number of All Cancers due to non-inclusion of other and miscellaneous types of cancer. Female only cancers are not included in this table but are included in Table A4. Average annual rates. All rates are number of cases per 100,000 and for the 15-29 age group are age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130) standard. Rates are rounded to the nearest tenth.

-Counts and rates are suppressed when there are fewer than five cases to ensure confidentiality and statistical reliability.

Data sources: New Jersey - New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. - SEER Program, National Cancer Institute.

**Table A4: Adolescent and Young Adult Cancer Incidence Cases and Rates by Type of Cancer and Age Group, New Jersey and the U.S., Females\***

ICD-O-3 Category	New Jersey 1979-2006								U.S. 1979-2005			
	15-19		20-24		25-29		15-29		15-19	20-24	25-29	15-29
	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Rate	Rate	Rate
<b>All Cancers</b>	<b>21.1</b>	<b>1,617</b>	<b>35.5</b>	<b>2,729</b>	<b>63.2</b>	<b>5,209</b>	<b>39.2</b>	<b>9,555</b>	<b>19.4</b>	<b>34.3</b>	<b>59.3</b>	<b>36.9</b>
Oral Cavity and Pharynx	0.3	24	0.7	53	0.9	77	0.6	154	0.5	0.7	1.1	0.7
Digestive System	0.5	36	1.5	114	2.9	238	1.6	388	0.5	1.2	2.5	1.3
Colon and Rectum	0.2	16	0.9	68	1.7	136	0.9	220	0.2	0.6	1.5	0.7
Respiratory System	0.3	21	0.5	41	0.9	76	0.6	138	0.2	0.4	0.7	0.5
Lung and Bronchus	0.2	12	0.4	32	0.7	59	0.4	103	0.1	0.3	0.6	0.3
Bones and Joints	1.1	85	0.8	62	0.7	61	0.9	208	1.1	0.7	0.5	0.8
Soft Tissue including Heart	0.9	69	1.0	79	1.4	113	1.1	261	1.0	1.0	1.1	1.0
Skin excluding Basal and Squamous	1.4	105	3.9	296	6.8	557	3.9	958	2.1	6.0	10.1	5.9
Melanoma of the Skin	1.2	91	3.5	272	6.2	510	3.5	873	1.9	5.5	9.3	5.4
Breast	0.2	17	1.7	130	9.4	771	3.6	918	0.1	1.3	8.0	3.0
Female Genital System	2.3	179	5.7	435	13.8	1,140	7.1	1,754	2.2	4.7	11.7	6.0
Cervix Uteri	0.4	29	2.6	199	8.6	710	3.7	938	0.3	2.1	7.3	3.1
Ovary	1.5	116	2.3	174	3.0	249	2.2	539	1.5	1.9	2.5	2.0
Urinary System	0.4	29	0.7	55	1.0	81	0.7	165	0.3	0.4	1.0	0.6
Brain and Other Nervous System	2.0	157	1.8	135	2.6	214	2.1	506	1.7	1.9	2.7	2.1
Brain	1.8	138	1.6	125	2.4	201	1.9	464	1.5	1.8	2.5	1.9
Endocrine System	3.1	238	6.4	490	10.2	842	6.4	1,570	2.9	6.9	10.1	6.5
Thyroid	2.8	218	6.1	470	9.8	808	6.1	1,496	2.8	6.8	9.9	6.4
Lymphoma	6.0	458	8.1	622	9.4	778	7.8	1,858	4.8	6.8	7.1	6.2
Hodgkin Lymphoma	4.6	355	6.2	473	6.4	528	5.7	1,356	3.7	5.1	4.7	4.5
Non-Hodgkin Lymphoma	1.3	103	1.9	149	3.0	250	2.1	502	1.2	1.7	2.4	1.7
Leukemia	2.3	175	2.3	175	2.0	167	2.2	517	1.9	1.8	1.9	1.9
Acute Lymphocytic Leukemia	1.1	82	0.6	45	0.4	29	0.7	156	0.8	0.5	0.4	0.6
Acute Myeloid Leukemia	0.7	55	1.0	78	0.9	77	0.9	210	0.7	0.8	0.9	0.8

\*Only invasive cases are included except bladder cancer *in situ* is included in All Cancers and Urinary System cancers. The numbers of the specific cancer types do not add to the number of All Cancers due to non-inclusion of other and miscellaneous types of cancer. Male only cancers are not included in this table but are included in Table A3. Average annual rates. All rates are number of cases per 100,000 and for the 15-29 age group are age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130) standard. Rates are rounded to the nearest tenth.

Data sources: New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. SEER Program, National Cancer Institute.

**Table A5: Adolescent and Young Adult Cancer Deaths and Percent Distribution by Type of Cancer and Age Group, New Jersey, 1979-2005\***

ICD 9, 10 Category	Age Group							
	15-29		15-19		20-24		25-29	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
<b>All Cancers</b>	<b>3,114</b>	<b>100%</b>	<b>684</b>	<b>100%</b>	<b>962</b>	<b>100%</b>	<b>1,468</b>	<b>100%</b>
Oral Cavity and Pharynx	29	0.9%	8	1.2%	5	0.5%	16	1.1%
Digestive System	259	8.3%	20	2.9%	81	8.4%	158	10.8%
Colon and Rectum	114	3.7%	10	1.5%	30	3.1%	74	5.0%
Respiratory System	88	2.8%	12	1.8%	27	2.8%	49	3.3%
Lung and Bronchus	70	2.2%	8	1.2%	19	2.0%	43	2.9%
Bones and Joints	173	5.6%	85	12.4%	55	5.7%	33	2.2%
Soft Tissue including Heart	199	6.4%	52	7.6%	76	7.9%	71	4.8%
Skin excluding Basal and Squamous	137	4.4%	8	1.2%	39	4.1%	90	6.1%
Melanoma of the Skin	118	3.8%	6	0.9%	34	3.5%	78	5.3%
Breast	83	2.7%	-	-	9	0.9%	73	5.0%
Female Genital System	176	5.7%	19	2.8%	37	3.8%	120	8.2%
Cervix Uteri	86	2.8%	-	-	10	1.0%	75	5.1%
Ovary	66	2.1%	17	2.5%	17	1.8%	32	2.2%
Male Genital System	109	3.5%	11	1.6%	43	4.5%	55	3.7%
Testis	105	3.4%	10	1.5%	41	4.3%	54	3.7%
Urinary System	53	1.7%	9	1.3%	16	1.7%	28	1.9%
Brain and Other Nervous System	279	9.0%	82	12.0%	83	8.6%	114	7.8%
Endocrine System	46	1.5%	17	2.5%	11	1.1%	18	1.2%
Thyroid	6	0.2%	-	-	-	-	-	-
Lymphoma	645	20.7%	104	15.2%	216	22.5%	325	22.1%
Hodgkin Lymphoma	286	9.2%	39	5.7%	107	11.1%	140	9.5%
Non-Hodgkin Lymphoma	359	11.5%	65	9.5%	109	11.3%	185	12.6%
Leukemia	677	21.7%	220	32.2%	217	22.6%	240	16.3%
Acute Lymphocytic Leukemia	219	7.0%	82	12.0%	81	8.4%	56	3.8%
Acute Myeloid Leukemia	229	7.4%	65	9.5%	70	7.3%	94	6.4%

\*The numbers and percents of the specific cancer types do not add to the number of All Cancers and 100 percent due to non-inclusion of other and miscellaneous types of cancer.

-Counts and percents are suppressed when there are fewer than five cases to ensure confidentiality and statistical reliability.

Data source: Underlying mortality data were provided by the National Center for Health Statistics.

**Table A6: Adolescent and Young Adult Cancer Mortality Cases and Rates by Type of Cancer and Age Group, New Jersey and the U.S. , 1979-2005\***

ICD 9, 10 Category	New Jersey								U.S.			
	15-19		20-24		25-29		15-29		15-19	20-24	25-29	15-29
	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Rate	Rate	Rate
<b>All Cancers</b>	<b>4.5</b>	<b>684</b>	<b>6.4</b>	<b>962</b>	<b>9.2</b>	<b>1,468</b>	<b>6.6</b>	<b>3,114</b>	<b>4.2</b>	<b>5.6</b>	<b>8.4</b>	<b>6.0</b>
Oral Cavity and Pharynx	0.1	8	0.0	5	0.1	16	0.1	29	0.0	0.1	0.1	0.1
Digestive System	0.1	20	0.5	81	1.0	158	0.5	259	0.2	0.4	1.0	0.5
Colon and Rectum	0.1	10	0.2	30	0.5	74	0.2	114	0.1	0.2	0.5	0.2
Respiratory System	0.1	12	0.2	27	0.3	49	0.2	88	0.1	0.1	0.3	0.2
Lung and Bronchus	0.1	8	0.1	19	0.3	43	0.1	70	0.0	0.1	0.2	0.1
Bones and Joints	0.6	85	0.4	55	0.2	33	0.4	173	0.6	0.4	0.2	0.4
Soft Tissue including Heart	0.3	52	0.5	76	0.4	71	0.4	199	0.3	0.4	0.4	0.4
Skin excluding Basal and Squamous	0.1	8	0.3	39	0.6	90	0.3	137	0.1	0.2	0.6	0.3
Melanoma of the Skin	0.0	6	0.2	34	0.5	78	0.2	118	0.1	0.2	0.5	0.2
Breast	-	-	0.1	9	0.5	73	0.2	83	0.0	0.1	0.5	0.2
Urinary System	0.1	9	0.1	16	0.2	28	0.1	53	0.1	0.1	0.1	0.1
Brain and Other Nervous System	0.5	82	0.6	83	0.7	114	0.6	279	0.6	0.6	0.9	0.7
Endocrine System	0.1	17	0.1	11	0.1	18	0.1	46	0.1	0.1	0.1	0.1
Thyroid	-	-	-	-	-	-	0.0	6	0.0	0.0	0.0	0.0
Lymphoma	0.7	104	1.4	216	2.0	325	1.4	645	0.5	1.0	1.4	0.9
Hodgkin Lymphoma	0.3	39	0.7	107	0.9	140	0.6	286	0.2	0.4	0.6	0.4
Non-Hodgkin Lymphoma	0.4	65	0.7	109	1.2	185	0.8	359	0.4	0.5	0.8	0.6
Leukemia	1.5	220	1.5	217	1.5	240	1.5	677	1.3	1.3	1.3	1.3
Acute Lymphocytic Leukemia	0.5	82	0.5	81	0.4	56	0.5	219	0.6	0.5	0.3	0.5
Acute Myeloid Leukemia	0.4	65	0.5	70	0.6	94	0.5	229	0.4	0.4	0.5	0.4

\*The numbers of the specific cancer types do not add to the number of All Cancers due to non-inclusion of other and miscellaneous types of cancer. Male or female only cancers are not included in this table, but are in Tables A7 and A8, respectively. Average annual rates. All rates are number of deaths per 100,000 and for the 15-29 age group are age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130) standard. Rates are rounded to the nearest tenth.

-Counts and rates are suppressed when there are fewer than five cases to ensure confidentiality and statistical reliability.

Data source: Underlying mortality data were provided by the National Center for Health Statistics.

**Table A7: Adolescent and Young Adult Cancer Mortality Cases and Rates by Type of Cancer and Age Group, New Jersey and the U.S., 1979-2005, Males\***

ICD 9, 10 Category	New Jersey								U.S.			
	15-19		20-24		25-29		15-29		15-19	20-24	25-29	15-29
	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Rate	Rate	Rate
<b>All Cancers</b>	<b>5.0</b>	<b>390</b>	<b>7.6</b>	<b>575</b>	<b>10.3</b>	<b>816</b>	<b>7.5</b>	<b>1,781</b>	<b>4.9</b>	<b>6.6</b>	<b>8.9</b>	<b>6.7</b>
Oral Cavity and Pharynx	0.1	6	-	-	-	-	0.1	13	0.1	0.1	0.1	0.1
Digestive System	0.1	8	0.6	43	1.2	96	0.6	147	0.2	0.5	1.1	0.6
Colon and Rectum	0.1	5	0.2	14	0.6	49	0.3	68	0.1	0.2	0.5	0.3
Respiratory System	0.1	5	0.2	15	0.4	32	0.2	52	0.1	0.2	0.3	0.2
Lung and Bronchus	-	-	0.1	10	0.4	28	0.2	40	0.0	0.1	0.3	0.1
Bones and Joints	0.7	53	0.5	38	0.2	19	0.5	110	0.7	0.6	0.3	0.5
Soft Tissue including Heart	0.4	29	0.7	50	0.5	41	0.5	120	0.4	0.5	0.5	0.4
Skin excluding Basal and Squamous	0.1	5	0.4	30	0.7	53	0.4	88	0.1	0.3	0.7	0.3
Melanoma of the Skin	-	-	0.3	26	0.5	43	0.3	73	0.1	0.2	0.6	0.3
Breast	-	-	-	-	-	-	-	-	0.0	-	0.0	0.0
Male Genital System	0.1	11	0.6	43	0.7	55	0.5	109	0.1	0.5	0.6	0.4
Testis	0.1	10	0.5	41	0.7	54	0.4	105	0.1	0.4	0.6	0.4
Urinary System	-	-	0.1	9	0.2	18	0.1	29	0.0	0.1	0.1	0.1
Brain and Other Nervous System	0.6	48	0.6	45	0.8	64	0.7	157	0.7	0.7	1.1	0.8
Endocrine System	0.1	11	0.1	5	0.1	11	0.1	27	0.1	0.1	0.1	0.1
Thyroid	-	-	-	-	-	-	0.0	5	0.0	0.0	0.0	0.0
Lymphoma	0.9	67	1.7	127	2.8	222	1.7	416	0.7	1.2	1.7	1.2
Hodgkin Lymphoma	0.2	18	0.8	60	1.1	88	0.7	166	0.2	0.5	0.7	0.4
Non-Hodgkin Lymphoma	0.6	49	0.9	67	1.7	134	1.1	250	0.5	0.7	1.0	0.7
Leukemia	1.6	124	1.8	138	2.1	164	1.8	426	1.6	1.6	1.6	1.6
Acute Lymphocytic Leukemia	0.6	43	0.7	54	0.5	42	0.6	139	0.7	0.6	0.4	0.6
Acute Myeloid Leukemia	0.5	37	0.5	36	0.8	61	0.6	134	0.4	0.5	0.5	0.5

\*The numbers of the specific cancer types do not add to the number of All Cancers due to non-inclusion of other and miscellaneous types of cancer. Female only cancers are not included in this table, but are in Table A8. Average annual rates. All rates are number of deaths per 100,000 and for the 15-29 age group are age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130) standard. Rates are rounded to the nearest tenth.

-Counts and rates are suppressed when there are fewer than five cases to ensure confidentiality and statistical reliability.

Data source: Underlying mortality data were provided by the National Center for Health Statistics.

**Table A8: Adolescent and Young Adult Cancer Mortality Cases and Rates by Type of Cancer and Age Group, New Jersey and the U.S., 1979-2005, Females\***

ICD 9, 10 Category	New Jersey								U.S.			
	15-19		20-24		25-29		15-29		15-19	20-24	25-29	15-29
	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Rate	Rate	Rate
<b>All Cancers</b>	<b>4.0</b>	<b>294</b>	<b>5.2</b>	<b>387</b>	<b>8.2</b>	<b>652</b>	<b>5.7</b>	<b>1,333</b>	<b>3.4</b>	<b>4.6</b>	<b>7.9</b>	<b>5.2</b>
Oral Cavity and Pharynx	-	-	-	-	0.2	12	0.1	16	0.0	0.1	0.1	0.1
Digestive System	0.2	12	0.5	38	0.8	62	0.5	112	0.2	0.4	0.8	0.5
Colon and Rectum	0.1	5	0.2	16	0.3	25	0.2	46	0.1	0.2	0.4	0.2
Respiratory System	0.1	7	0.2	12	0.2	17	0.2	36	0.0	0.1	0.2	0.1
Lung and Bronchus	0.1	6	0.1	9	0.2	15	0.1	30	0.0	0.1	0.2	0.1
Bones and Joints	0.4	32	0.2	17	0.2	14	0.3	63	0.4	0.3	0.2	0.3
Soft Tissue including Heart	0.3	23	0.4	26	0.4	30	0.3	79	0.3	0.3	0.4	0.3
Skin excluding Basal and Squamous	-	-	0.1	9	0.5	37	0.2	49	0.1	0.2	0.4	0.2
Melanoma of the Skin	-	-	0.1	8	0.4	35	0.2	45	0.1	0.2	0.4	0.2
Breast	-	-	0.1	9	0.9	72	0.3	82	0.0	0.1	1.1	0.4
Female Genital System	0.3	19	0.5	37	1.5	120	0.7	176	0.2	0.4	1.3	0.6
Cervix Uteri	-	-	0.1	10	0.9	75	0.3	86	0.0	0.2	0.8	0.3
Ovary	0.2	17	0.2	17	0.4	32	0.3	66	0.1	0.2	0.3	0.2
Urinary System	0.1	7	0.1	7	0.1	10	0.1	24	0.1	0.1	0.1	0.1
Brain and Other Nervous System	0.5	34	0.5	38	0.6	50	0.5	122	0.5	0.5	0.7	0.6
Endocrine System	0.1	6	0.1	6	0.1	7	0.1	19	0.1	0.1	0.1	0.1
Thyroid	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0
Lymphoma	0.5	37	1.2	89	1.3	103	1.0	229	0.4	0.7	1.0	0.7
Hodgkin Lymphoma	0.3	21	0.6	47	0.7	52	0.5	120	0.2	0.4	0.5	0.3
Non-Hodgkin Lymphoma	0.2	16	0.6	42	0.6	51	0.5	109	0.2	0.4	0.5	0.4
Leukemia	1.3	96	1.1	79	1.3	76	1.1	251	1.0	1.0	1.1	1.0
Acute Lymphocytic Leukemia	0.5	39	0.4	27	0.2	14	0.4	80	0.4	0.3	0.2	0.3
Acute Myeloid Leukemia	0.4	28	0.5	34	0.4	33	0.4	95	0.3	0.4	0.5	0.4

\*The numbers of the specific cancer types do not add to the number of All Cancers due to non-inclusion of other and miscellaneous types of cancer. Male only cancers are not included in this table, but are in Table A7. Average annual rates. All rates are number of deaths per 100,000 and for the 15-29 age group are age-adjusted to the 2000 U.S. Standard Population (19 age groups - Census P25-1130) standard. Rates are rounded to the nearest tenth.

-Counts and rates are suppressed when there are fewer than five cases to ensure confidentiality and statistical reliability.

Data source: Underlying mortality data were provided by the National Center for Health Statistics.

**Table A9: Adolescent and Young Adult Five-Year Relative Survival Rates by Type of Cancer, Sex and Age Group for Cancers Diagnosed in 1979-2001, New Jersey and the U.S.\***

ICD-O-3 Category	Sex	New Jersey				U.S.			
		15-19	20-24	25-29	15-29	15-19	20-24	25-29	15-29
All Cancers	Total	75.3%	77.4%	74.2%	75.3%	76.4%	79.9%	76.9%	77.7%
	Male	71.7%	73.4%	68.5%	70.7%	72.1%	75.5%	70.1%	72.1%
	Female	79.6%	81.6%	78.9%	79.8%	81.4%	84.2%	83.0%	83.1%
Melanoma of the Skin	Total	91.8%	89.2%	86.1%	87.5%	93.2%	92.8%	92.8%	92.8%
	Male	87.5%	79.4%	81.4%	81.6%	91.4%	86.4%	88.3%	88.1%
	Female	96.0%	95.6%	89.3%	91.8%	94.4%	96.3%	95.7%	95.7%
Breast	Female	-	83.4%	70.8%	73.0%	81.5%	74.7%	72.0%	72.4%
Cervix Uteri	Female	92.1%	92.1%	81.7%	84.1%	86.3%	87.0%	86.6%	86.7%
Testis	Male	89.8%	91.8%	92.7%	92.0%	90.5%	92.9%	94.9%	93.6%
Brain	Total	69.4%	65.2%	62.3%	65.0%	73.9%	67.2%	59.4%	65.7%
	Male	69.1%	67.0%	65.5%	66.9%	71.1%	66.8%	56.0%	63.5%
	Female	70.0%	62.4%	58.1%	62.5%	77.7%	67.7%	63.7%	68.6%
Thyroid	Total	99.0%	98.7%	99.4%	99.1%	98.3%	99.4%	99.5%	99.4%
	Male	96.7%	92.2%	97.6%	95.9%	94.9%	98.6%	99.4%	98.7%
	Female	99.4%	100.0%	99.8%	99.9%	99.1%	99.5%	99.6%	99.5%
Lymphoma	Total	82.1%	79.9%	73.9%	77.80%	84.9%	82.3%	76.6%	80.5%
	Male	78.8%	75.9%	69.3%	73.70%	82.3%	78.9%	70.9%	76.0%
	Female	86.0%	84.9%	79.5%	82.90%	87.8%	86.2%	84.6%	86.0%
Hodgkin Lymphoma	Total	89.2%	87.7%	86.1%	87.4%	91.7%	90.5%	90.2%	90.7%
	Male	88.3%	84.6%	85.5%	85.8%	91.2%	88.8%	88.0%	89.0%
	Female	90.0%	91.3%	86.6%	89.1%	92.2%	92.2%	92.8%	92.4%
Non-Hodgkin Lymphoma	Total	66.8%	59.4%	55.1%	58.9%	69.7%	63.5%	58.2%	62.0%
	Male	63.9%	56.5%	49.8%	54.9%	67.5%	60.4%	52.2%	57.6%
	Female	72.4%	64.2%	64.3%	66.0%	73.7%	68.6%	69.5%	70.1%
Leukemia	Total	52.9%	40.6%	42.6%	45.6%	46.4%	42.3%	43.9%	44.3%
	Male	50.8%	34.4%	33.6%	40.0%	44.6%	40.3%	43.3%	42.8%
	Female	56.4%	48.9%	55.2%	53.7%	49.2%	45.2%	44.7%	46.4%
Acute Lymphocytic Leukemia	Total	63.8%	45.8%	42.1%	54.3%	52.6%	43.0%	37.4%	46.6%
	Male	62.7%	41.5%	30.3%	49.8%	51.0%	42.3%	37.7%	45.9%
	Female	65.7%	51.6%	66.8%	62.2%	56.0%	44.4%	37.1%	48.2%
Acute Myeloid Leukemia	Total	39.1%	35.2%	36.3%	36.7%	37.1%	40.2%	42.2%	40.1%
	Male	35.1%	29.8%	28.6%	30.9%	31.3%	37.6%	40.3%	37.0%
	Female	44.8%	41.3%	43.4%	43.1%	43.4%	43.3%	44.4%	43.8%

\*Only invasive cases diagnosed in 1979-2001 are included except bladder cancer *in situ* is included in All Cancers. See the Technical Notes for additional information on the five-year relative survival rates.

-The survival rate was suppressed due to a count of fewer than 16 cases.

Data sources: New Jersey – New Jersey State Cancer Registry, New Jersey Department of Health and Senior Services; U.S. – SEER Program, National Cancer Institute.



**Table A10: Adolescent and Young Adult Cancer Incidence Time Trends by Type of Cancer, Ages 15-29, New Jersey (1979-2006) and the U.S. (1979-2005)**

ICD-O-3 Category	New Jersey, 1979-2006		U.S., 1979-2005	
	Years	APC (%)	Years	APC (%)
<b>All Cancer</b>	<b>1979-2006</b>	<b>0.65*</b>	<b>1979-1992</b>	<b>1.68*</b>
			<b>1992-1998</b>	<b>-1.24</b>
			<b>1998-2005</b>	<b>1.67*</b>
Lymphoma	1979-2006	-0.11**	1979-1992	2.79*
			1992-1999	-3.21**
			1999-2005	1.04
Testis	1979-1997	-0.50	1979-2005	0.77*
	1997-2001	8.37		
	2001-2006	-4.26		
Thyroid	1979-2006	1.74*	1979-2005	2.22*
Melanoma	1979-1992	-3.64**	1979-2005	1.72*
	1992-2006	6.19*		
Leukemia	1979-2006	0.14	1979-2005	0.93*
Brain & Other Nervous System	1979-2006	0.96*	1979-2005	0.82*
Cervical	1979-2006	-2.16**	1979-1994	0.15
			1994-2005	-3.54**
Female Breast	1979-2006	0.87*	1979-2005	0.11

APC - Annual percentage change in the age-adjusted incidence rates. The APCs were calculated for the line segments in joinpoint regression models using the National Cancer Institute's Joinpoint software.

\*The APC represents a statistically significant increase over the time period ( $p < 0.05$  from a t-test).

\*\*The APC represents a statistically significant decrease over the time period ( $p < 0.05$  from a t-test).

**Table A11: Adolescent and Young Adult Cancer Mortality Time Trends by Type of Cancer, Ages 15-29, New Jersey and the U.S., 1979-2005**

ICD 9, 10 Category	New Jersey, 1979-2005		U.S., 1979-2005	
	Years	APC (%)	Years	APC (%)
<b>All Cancer</b>	<b>1979-2005</b>	<b>-1.72*</b>	<b>1979-2005</b>	<b>-1.57*</b>
Lymphoma	1979-2005	-2.94*	1979-1992	-0.88*
			1992-2005	-4.34*
Melanoma	1979-2005	-6.08*	1979-2000	-3.77*
			2000-2005	2.40
Leukemia	1979-2005	-1.41*	1979-2005	-1.63*
Brain & Other Nervous System	1979-2005	-3.09*	1979-2005	-1.00*

APC - Annual percentage change in the age-adjusted incidence rates. The APCs were calculated for the line segments in joinpoint regression models using the National Cancer Institute's Joinpoint software.

\*The APC represents a statistically significant decrease over the time period ( $p < 0.05$  from a t-test).