December 2006

Urinary Bladder Cancer in Ohio, 1999-2003

Ohio Cancer Incidence Surveillance System

This Report on Urinary Bladder Cancer Contains

- Incidence and Mortality Rates in Ohio and the US
- Incidence Rates by Gender and Race
- Incidence Rates by County of Residence
- Age-specific Incidence Rates by Gender
- Incidence Rates by Histology
- Stage at Diagnosis by Gender and Survival Probability
- Trends in Stage at Diagnosis, Incidence and Mortality
- Risk Factors
- Clinical Trials Information
- Sources of Data and Additional Information

Urinary Bladder Cancer Incidence and Mortality

Cancers of the urinary bladder made up 4.8 percent of incident (newly diagnosed) cancers reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 1999 to 2003 (Table 1). The average annual age-adjusted urinary bladder cancer incidence rate in Ohio from 1999 to 2003 was 22.1 cases per 100,000 residents, which was 5.7 percent greater than the average annual age-adjusted U.S. (SEER[1]) incidence rate for 2000-2003 (20.9 per 100,000). Reporting of urinary bladder cancers in Ohio is estimated to be 91 percent complete in 1999-2003, which is lower than the national standard of 95 percent. Therefore, urinary bladder cancer incidence may be underestimated in Ohio. The 1999-2003 Ohio age-adjusted mortality rate for urinary bladder cancer of 5.0 deaths per 100,000 residents was 16.3 percent greater than the 2000-2003 U.S. (NCHS[2]) mortality rate of 4.3 per 100,000 residents.

Table 1: Leading Sites/Types and Urinary Bladder Cancer: Average Annual Number (N), Percent and Age-adjusted Rates of Invasive Cancer Cases (including Urinary Bladder *in situ*) and Cancer Deaths in Ohio, 1999-2003, with Comparison to the US (SEER and NCHS), 2000-2003

Incidence	N	%	Ohio Rate	U.S. Rate
All Sites/Types	**55,813**		**471.3**	**471.0**
Lung and Bronchus	9,014	16.2%	75.3	64.8
Breast (Female)	8,235	14.8%	126.4	129.1
Prostate	7,887	14.1%	153.8	170.3
Colon and Rectum	6,625	11.9%	55.3	52.4
Urinary Bladder	**2,657**	**4.8%**	**22.1**	**20.9**
Non-Hodgkin's Lymphoma	2,265	4.1%	19.0	19.1
Melanoma of the Skin	1,756	3.1%	14.9	18.2
Corpus and Uterus, NOS	1,712	6.2%	26.2	23.3
Kidney and Renal Pelvis	1,500	2.7%	12.6	12.6

Mortality	N	%	Ohio Rate	U.S. Rate
All Sites/Types	**24,989**		**208.4**	**194.5**
Lung and Bronchus	7,339	29.4%	61.2	55.1
Colon and Rectum	2,652	10.6%	22.1	19.8
Breast (Female)	1,941	7.8%	28.5	25.8
Prostate	1,290	5.2%	29.3	28.5
Pancreas	1,236	4.9%	10.3	10.5
Non-Hodgkin's Lymphoma	1,038	4.2%	8.7	7.7
Leukemias	934	3.7%	7.8	7.5
Ovary	607	5.0%	8.9	8.9
Urinary Bladder	**605**	**2.4%**	**5.0**	**4.3**

Source: Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2006.
[1] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2006.
[2] NCHS: National Center for Health Statistics, 2005.

Technical Notes:

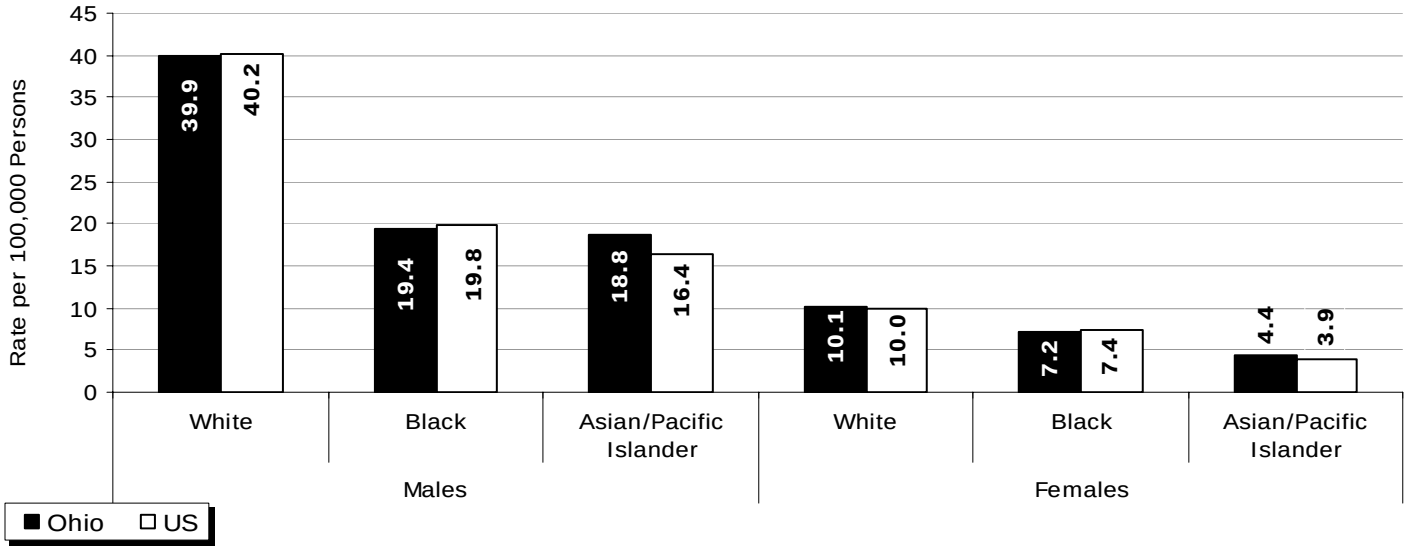
[1] Urinary bladder cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), codes C670-679, excluding histology types 9590-9989. Urinary bladder cancer deaths were defined as follows: International Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C670-C679.

[2] The 1999-2003 Ohio rates were calculated using the following populations: bridged-race intercensal estimates for July 1, 1999, (U.S. Census Bureau, 2004) and vintage 2004 postcensal estimates for July 1, 2000-2003, (U.S. Census Bureau, 2005). Rates were direct age-adjusted to the U.S. 2000 standard population.

[3] N = Average number of cases per year rounded to the nearest integer.

Urinary Bladder Cancer Incidence in Ohio Compared to the United States

Figure 1: Cancer of the Urinary Bladder: Average Annual Age-adjusted Incidence Rates per 100,000 Persons, by Gender and Race in Ohio, 1999-2003, with Comparison to the US (SEER), 2000-2003



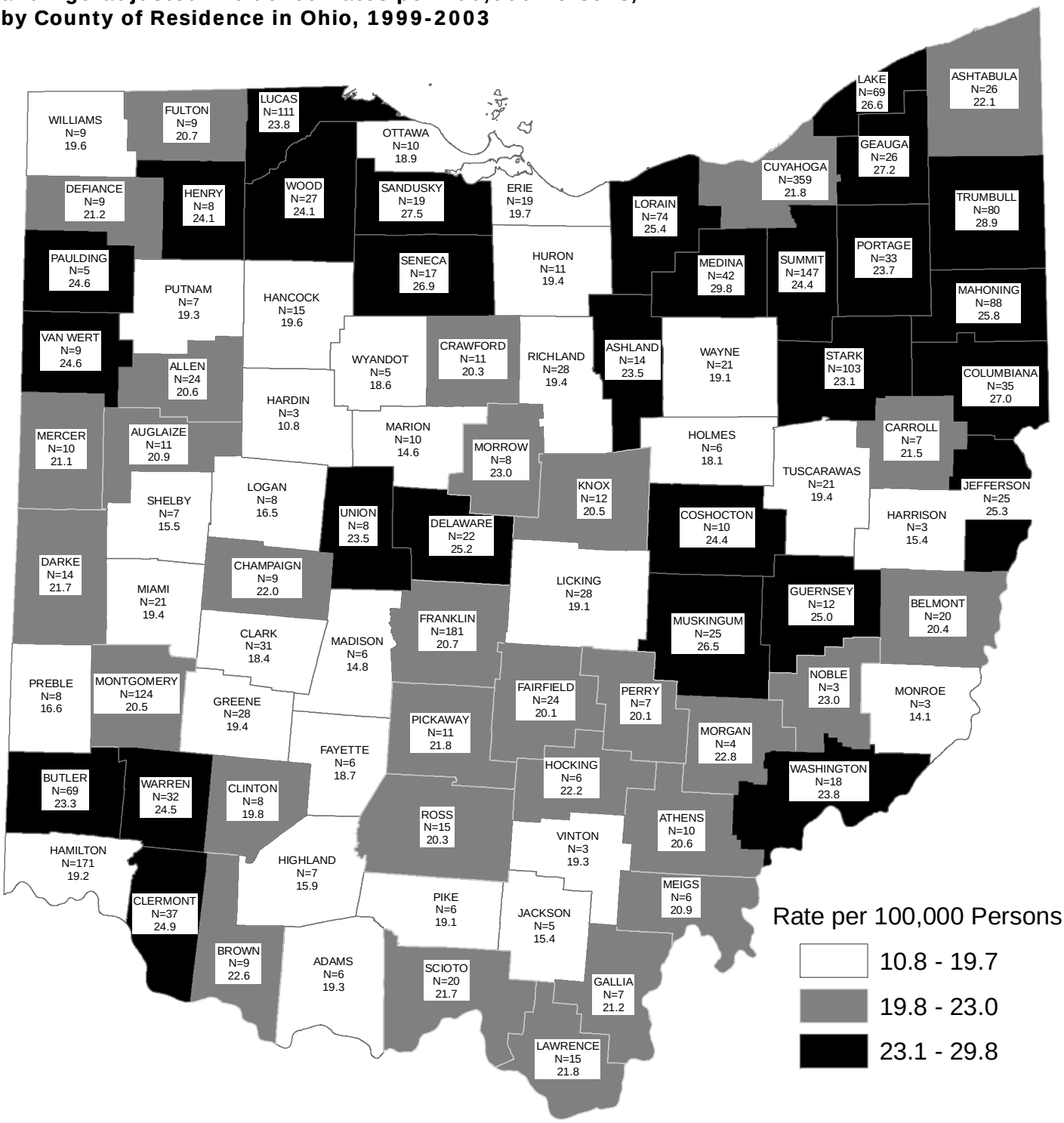
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006, and the Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2006.

Figure 1 shows the urinary bladder cancer age-adjusted incidence rates among males were greater than those of females for whites, blacks and Asian/Pacific Islanders. The gender difference in urinary bladder cancer incidence rates may be due to a greater prevalence of certain risk factors, such as smoking, among males. In both Ohio and the United States, a comparison of the data by race reveals whites had higher gender-specific urinary bladder cancer incidence rates compared to both blacks and Asian/Pacific Islanders. Among males in Ohio, the incidence rate for whites was more than double the rates of blacks and Asian/Pacific Islanders; while, among females in Ohio, the incidence rate for whites was about 40 percent greater than the rate for blacks and more than double the rate for Asian/Pacific Islanders. The Ohio urinary bladder cancer incidence rates were similar to the rates for the United States for whites and blacks; whereas the Ohio rates were greater than the United States for Asian/Pacific Islander males (14.6 percent) and females (12.8 percent).

Urinary Bladder Cancer Cases and Rates by County of Residence

Figure 2 presents 1999-2003 average annual age-adjusted urinary bladder cancer incidence rates by county of residence. Many counties with the highest incidence rates of urinary bladder cancer were located in the northeastern portion of the state, with smaller pockets of high incidence in the southwest and northwest areas. The following counties had the highest incidence rates for this time period (26.5 or more cases per 100,000 residents): Columbiana (N = 35), Geauga (N = 26), Lake (N = 69), Medina (N = 42), Muskingum (N = 25), Sandusky (N = 19), Seneca (N = 17) and Trumbull (N = 80).

Figure 2: Cancer of the Urinary Bladder: Average Annual Number of Cases (N) and Age-adjusted Incidence Rates per 100,000 Persons, by County of Residence in Ohio, 1999-2003



- *Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006.*
- N = Average number of cases *per year* rounded to the nearest integer.

  $N = \frac{\text{Total cases in 1999-2003}}{5 \text{ years}}$
- Each category represents approximately 33%, or 29, of the 88 Ohio counties.

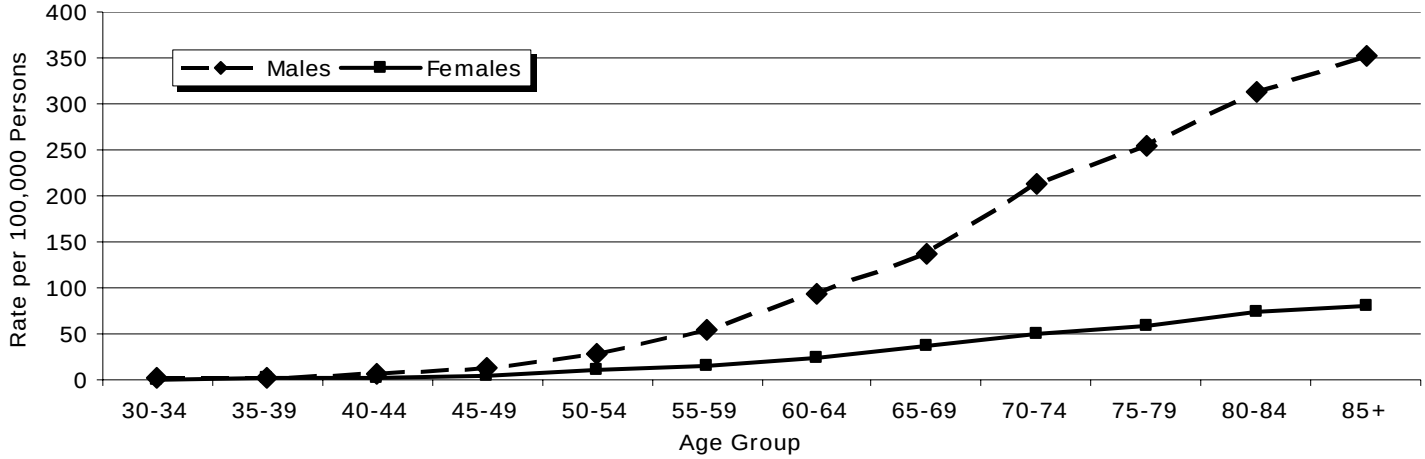
Urinary Bladder Cancer Cases and Rates by Age at Diagnosis

Table 2: Cancer of the Urinary Bladder: Average Annual Number of Cases (N), Incidence Rates per 100,000 Persons and Cumulative Percentages (Cum%), by Age Group and Gender in Ohio, 1999-2003

	Males			Females			Total		
Age Group	N	Rate	Cum%	N	Rate	Cum%	N	Rate	Cum%
<1	<1	*	0.0%	<1	*	0.0%	<1	*	0.0%
1-4	<1	*	0.0%	<1	*	0.0%	<1	*	0.0%
5-9	<1	*	0.0%	<1	*	0.0%	<1	*	0.0%
10-14	<1	*	0.0%	<1	*	0.1%	<1	*	0.0%
15-19	<1	*	0.0%	<1	*	0.1%	<1	*	0.0%
20-24	2	0.4	0.1%	<1	*	0.1%	2	0.3	0.1%
25-29	2	0.6	0.2%	1	0.4	0.3%	4	0.5	0.2%
30-34	5	1.2	0.4%	3	0.9	0.8%	8	1.0	0.5%
35-39	11	2.7	1.0%	5	1.2	1.6%	17	2.0	1.2%
40-44	34	7.4	2.7%	12	2.7	3.4%	46	5.0	2.9%
45-49	57	13.5	5.7%	23	5.3	6.7%	80	9.4	5.9%
50-54	104	28.0	11.0%	38	9.8	12.1%	142	18.7	11.3%
55-59	154	54.9	18.8%	46	15.4	18.7%	201	34.5	18.8%
60-64	209	94.4	29.5%	58	23.3	26.9%	267	56.8	28.9%
65-69	251	137.4	42.4%	82	37.5	38.5%	333	83.1	41.4%
70-74	348	213.7	60.1%	105	49.7	53.4%	452	121.2	58.4%
75-79	336	254.1	77.3%	114	58.7	69.6%	450	137.9	75.4%
80-84	256	312.9	90.4%	106	73.7	84.6%	362	160.7	89.0%
85+	185	353.2	99.8%	108	80.6	100.0%	293	157.2	100.0%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006.
** Rates may be unstable and are not presented when the case count for 1999-2003 is less than five (i.e., N<1).*

Figure 3: Cancer of the Urinary Bladder: Age-specific Incidence Rates (Ages 30+) per 100,000 Persons, by Gender in Ohio, 1999-2003

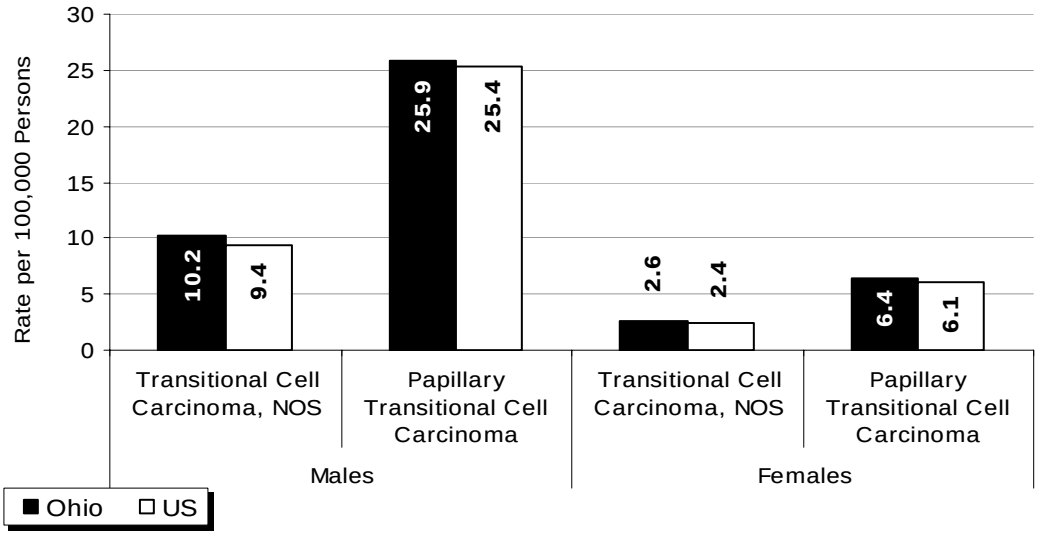


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006.

Table 2 and Figure 3 show age-specific incidence rates for urinary bladder cancer by gender. The median age at diagnosis of urinary bladder cancer occurred in the 70 to 74 years age group for both males and females. Urinary bladder cancer incidence rates increased with advancing age group (for ages 30 and older) among both males and females, and the rate of increase by age group was greater for males compared to females. The cumulative percentages in Table 2 indicate about 94 percent of urinary bladder cancers were diagnosed among persons ages 50 years and older.

Urinary Bladder Cancer By Histology

Figure 4: Cancer of the Urinary Bladder: Average Annual Age-adjusted Incidence Rates per 100,000 Persons, by Gender and Histological Subgroup in Ohio, 1999-2003, with Comparison to the US (SEER), 2000-2003



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006, and the Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2006.

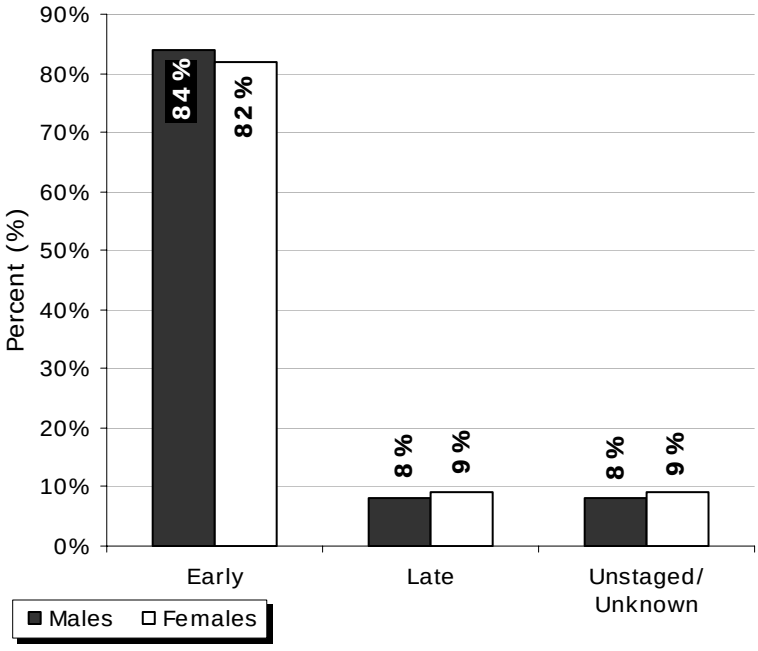
Histology refers to the cancer tissue or cell type. For urinary bladder cancer, we examined the two most common histological subgroups that make up more than 90 percent of all histologies. These are transitional cell carcinoma, not otherwise specified (NOS) and papillary transitional cell carcinoma. The diagnosis of transitional cell carcinoma, NOS is given when there is too little information to provide a more specific diagnosis. Transitional cell carcinomas occur in the innermost lining of the bladder wall and they are sometimes difficult to distinguish from kidney and renal pelvis cancer. When papillary structures are affected, the tumor is called papillary transitional cell carcinoma. Papillary tumors are attached by stalks and have a wart-like appearance. Individuals diagnosed with papillary transitional cell carcinomas have a better prognosis than those diagnosed with non-papillary urinary bladder cancers. Additional histological subgroups represented among urinary bladder cases included: carcinoma *in situ*, NOS; small cell carcinoma, NOS; papillary carcinoma *in situ*; squamous cell carcinoma *in situ*, NOS; and adenocarcinoma *in situ*, NOS.

Figure 4 shows age-adjusted incidence rates for urinary bladder cancer in Ohio and the United States for the two most common histological subgroups by gender. For both males and females, incidence rates of transitional cell carcinoma, NOS of the urinary bladder are less than half those of papillary transitional cell carcinoma of the urinary bladder. For each histological subgroup, incidence rates for males are more than three times greater than those of females. The incidence rates of transitional cell carcinoma, NOS among males and females are 8.5 and 8.3 percent greater, respectively, in Ohio compared to the United States. The incidence rates of papillary transitional cell carcinoma among males and females are 2.0 and 4.9 percent greater, respectively, in Ohio compared to the United States.

Technical Note: Transitional cell carcinoma, NOS cancer cases were defined as ICD-O-3 histology code 8120-8123; Papillary transitional cell carcinoma cancer cases were defined as ICD-O-3 histology code 8130 and 8131.

Urinary Bladder Cancer Cases and Survival by Stage at Diagnosis

Figure 5: Cancer of the Urinary Bladder: Proportion of Cases (%) by Stage at Diagnosis and Gender in Ohio, 1999-2003



N = 2,657 cases per year

The stage at diagnosis of urinary bladder cancer is an important determinant of survival. For *in situ* cancers, the tumor has not invaded or penetrated surrounding tissue. It should be noted urinary bladder cancer is the only cancer for which *in situ* tumors are included with invasive tumors when calculating incidence rates. In the localized stage, the tumor is confined to the organ in which it originated. In the regional stage, the tumor has spread to surrounding tissues. In the distant stage, the malignancy has spread, or metastasized, to other organs. The 1999-2003 Ohio data presented in Figure 5 reveal 84 percent of urinary bladder cancers among males were diagnosed at *in situ* or localized (early) stages, which is slightly greater than the 82 percent of females diagnosed at earlier stages. Eight percent of males and 9 percent of females were diagnosed at later (regional and distant) stages. The percentage of urinary bladder cancer cases reported unstaged/unknown stage was less than 10 percent for both genders.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006.

Table 3 shows the U.S. (SEER) five-year survival probability for urinary bladder cancer in 1996-2002 was 80.8 percent for all stages combined. Five-year survival probabilities were 93.7 percent at the localized stage, 46.0 percent at the regional stage and only 6.2 percent for distant-stage tumors. Five-year survival probability for all stages combined was higher for whites (81.8 percent) compared to blacks (63.7 percent) and was greater for males (82.8 percent) compared to females (75.4 percent).

At present, there is no screening test for use in detecting urinary bladder cancers at earlier stages. If you have any symptoms of urinary bladder cancer such as blood in the urine, pain or burning during urination, or a change in bladder habits (e.g. having to urinate more often), talk to your doctor.

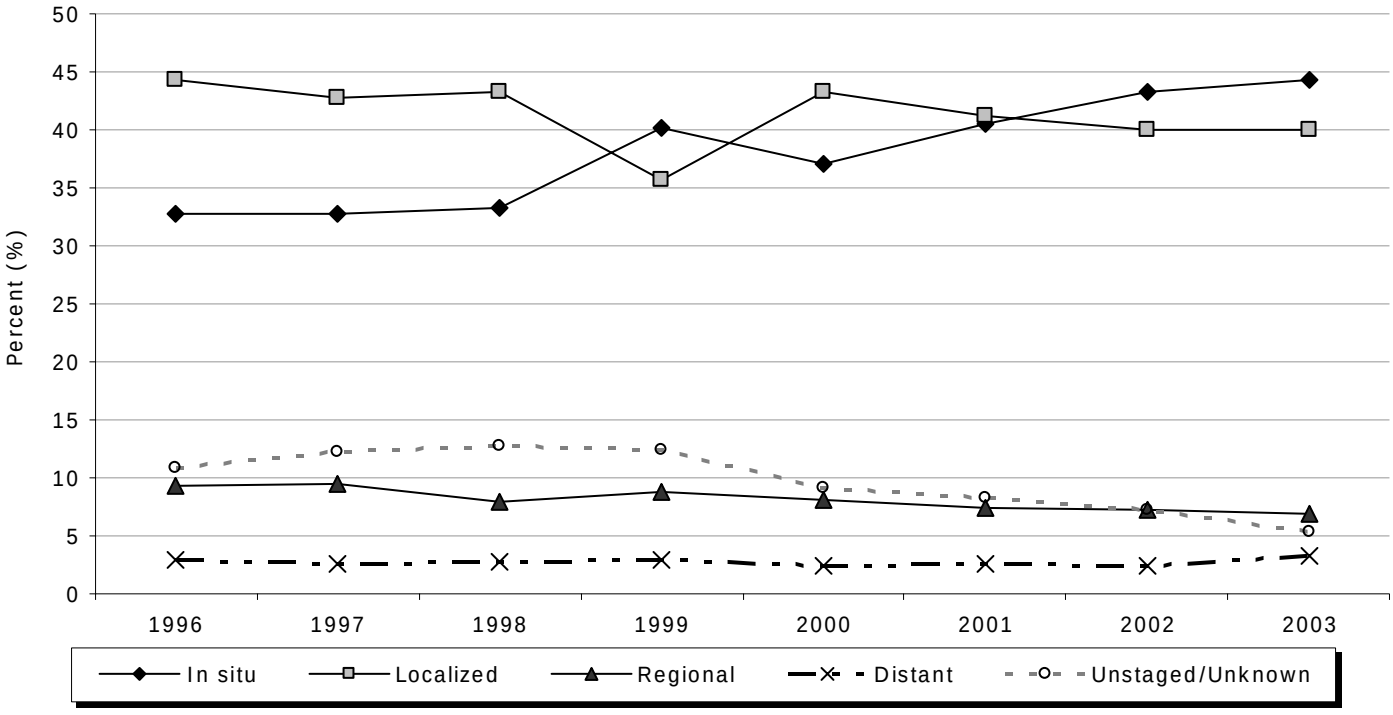
Table 3: Cancer of the Urinary Bladder: Five-year Survival Probability (%) by Stage at Diagnosis in the US (SEER), 1996-2002

Stage	Overall Five-year Survival Probability (%)
All Stages	80.8%
Localized	93.7%
Regional	46.0%
Distant	6.2%

Source: SEER Cancer Statistics Review 1975-2003, National Cancer Institute, 2006.

Urinary Bladder Cancer Stage at Diagnosis Trends

Figure 6: Cancer of the Urinary Bladder:
Trends in the Proportion of Cases (%) by Stage at Diagnosis in Ohio, 1996-2003



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006.

Figure 6 shows the distribution of stage at diagnosis of urinary bladder cancer according to year of diagnosis from 1996 to 2003. The proportions of urinary bladder cancer cases diagnosed at the regional and distant stages were relatively similar for each year; whereas the proportion diagnosed at the *in situ* stage increased from 32.7 percent in 1996 to 44.3 percent in 2003. This was accompanied by a decrease in the proportion of urinary bladder cancers with a localized or an unstaged/unknown stage at diagnosis during this time period.

Did You Know?

Tobacco smoking increases urinary bladder cancer risk twofold; this risk decreases with smoking cessation.

Urinary Bladder Cancer Incidence and Mortality Trends

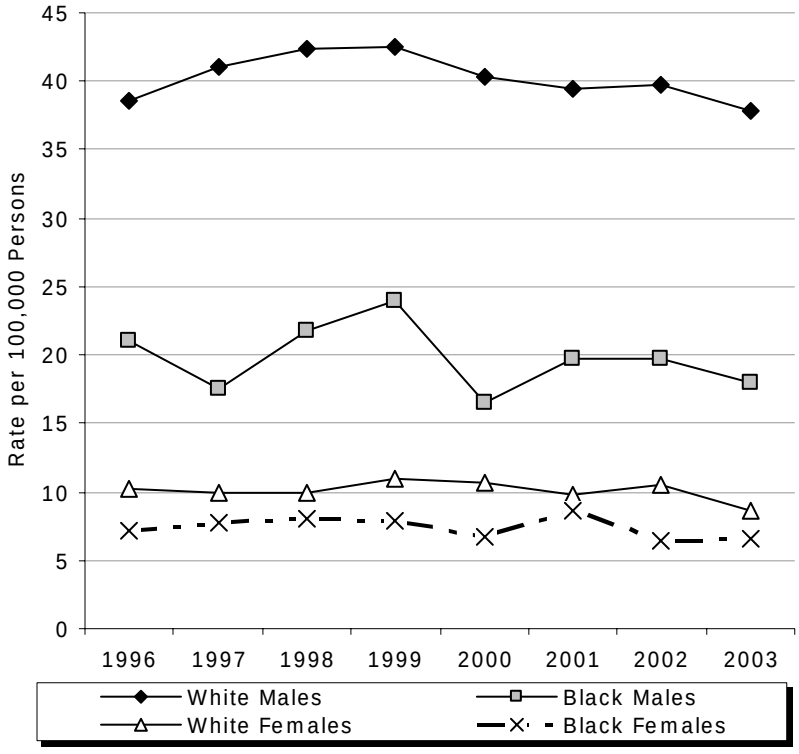


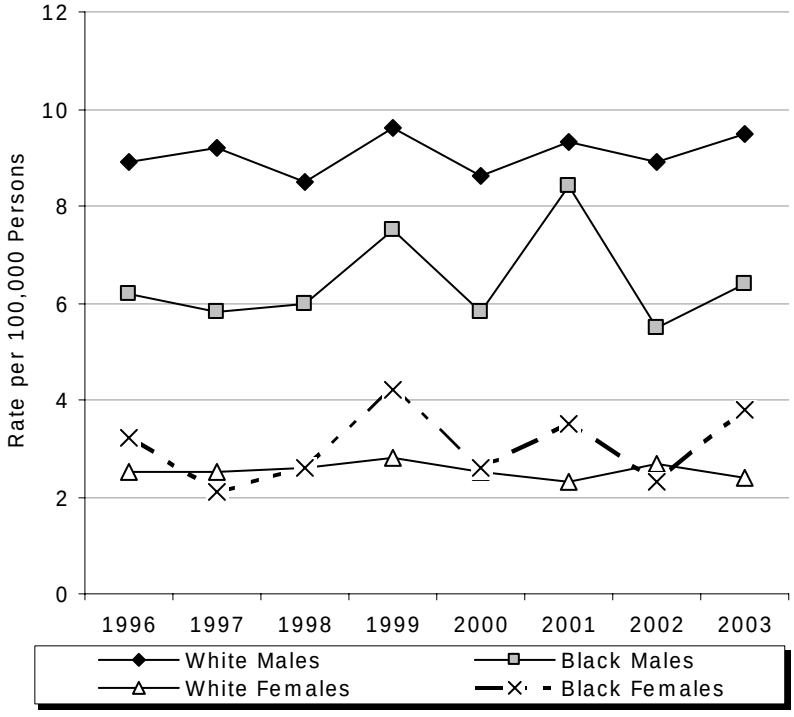
Figure 7: Cancer of the Urinary Bladder: Trends in Average Annual Age-adjusted Incidence Rates per 100,000 Persons, by Gender and Race in Ohio, 1996-2003

Figure 7 shows incidence rates of urinary bladder cancer in Ohio according to year of diagnosis by race/gender group. Urinary bladder cancer incidence rates remained relatively stable from 1996 to 2003 for white males, white females and black females. In contrast, incidence rates among black males were highly variable over time but showed an overall decline of 27.9 percent from 1996 to 2003.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2006.

Figure 8: Cancer of the Urinary Bladder: Trends in Average Annual Age-adjusted Mortality Rates per 100,000 Persons, by Gender and Race in Ohio, 1996-2003

Figure 8 shows trends in mortality rates of urinary bladder cancer according to year of death (1996-2003) by race/gender group. There does not appear to be a meaningful change in urinary bladder cancer mortality rates for white females, as the mortality rate in 1996 is nearly identical to that in 2003. However, between 1996 and 2003, there has been a slight increase in urinary bladder cancer mortality rates among white males and among both black males and females (although the rates did not increase consistently during the time period).



Source: Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2006.

Risk Factors for Urinary Bladder Cancer

- **Gender** – Urinary bladder cancer is far more common in males compared to females.
- **Race and Ethnicity** – Whites are about twice as likely to develop urinary bladder cancer compared to African Americans and Hispanics; whereas Asians have the lowest risk.
- **Age** – Urinary bladder cancer risk increases with age. More than 70 percent of people diagnosed with urinary bladder cancer are older than 65 years.
- **Tobacco Smoking** – Tobacco smoking increases urinary bladder cancer risk twofold.
- **Occupational Exposures** – Exposure to aromatic amines (e.g. benzidine and beta-naphthylamine, sometimes used in dye industries) and exposures related to rubber, leather, textile and paint industries increase risk. Hairdressers, machinists, printers and truck drivers are also at greater risk.
- **Chronic Bladder Inflammation** – Inflammation caused by urinary infections and kidney and bladder stones has been associated with increased risk, although these conditions may not cause urinary bladder cancer.
- **Schistosomiasis** – Schistosomiasis, a rare infection with a parasitic worm called *Schistosoma hematobium*, increases risk.
- **Personal History of Bladder Cancer** – A previous diagnosis of urinary bladder cancer increases risk.
- **Urinary Bladder Birth Defects** – Birth defects such as exstrophy, a rare condition in which the skin, muscle and connective tissue in front of the bladder fail to close completely leading to chronic infections, increase risk.
- **Genetic Mutations** – Some mutations, such as that which can occur in the retinoblastoma gene, which can also causes development of cancer of the eye as an infant, increase risk.
- **Chemotherapy and Radiation Therapy** – High doses of some chemotherapeutic drugs (such as cyclophosphamide [Cytoxan] and ifosfamide [Ifex]) and radiation treatment to the pelvis increase risk.
- **Arsenic** – Consumption of arsenic, sometimes found in drinking water, increases risk.
- **Low Fluid Consumption** – Consuming too little fluid increases risk.
- **Diet** – Low dietary intake of vitamin E, selenium and probably fruits increases risk.

Clinical Trials Information

Clinical trials test many types of treatments including new drugs, surgical procedures, radiation therapy and combinations of these. The goal of conducting clinical trials is to find better ways to treat cancer. To obtain information concerning clinical trials for urinary bladder cancer, please talk with your doctor or visit one of the following Web sites:

- **National Cancer Institute:**
  http://www.cancer.gov/clinicaltrials
- **American Cancer Society:**
  http://www.cancer.org/docroot/ETO/ETO_6.asp?sitearea=ETO
- **The Ohio State University Comprehensive Cancer Center—James Cancer Hospital and Solove Research Institute:**
  http://www.jamesline.com/trials
- **The Cleveland Clinic:**
  http://cms.clevelandclinic.org/cancer/body.cfm?id=68&oTopID=68
- **Case Western Reserve University Comprehensive Cancer Center:**
  http://henge.case.edu/sip/SIPControlServlet
- **University of Cincinnati:**
  http://uccancercenter.uc.edu/research/clinicaltrials

Sources of Data and Additional Information

- **Ohio Cancer Incidence Surveillance System:**
  http://www.odh.ohio.gov/ODHPrograms/svio/ci_surv/ci_surv1.aspx
- **National Cancer Institute:**
  http://www.cancer.gov/cancertopics/types/bladder
- **American Cancer Society:**
  http://www.cancer.org/docroot/lrn/lrn_0.asp

The Ohio Cancer Incidence Surveillance System (OCISS)

Ohio Department of Health

and

The Ohio State University Comprehensive Cancer Center — James Cancer Hospital and Solove Research Institute

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To address comments and information requests:

Ohio Cancer Incidence Surveillance System
Ohio Department of Health
246 North High Street
Columbus, OH 43215

Phone: (614) 752-2689
Fax: (614) 644-1909
E-mail: ociss@odh.ohio.gov

The OCISS is supported in part by the State of Ohio and the Centers for Disease Control and Prevention, National Program of Cancer Registries.