Prostate Cancer in Ohio, 2001~2005

Ohio Cancer Incidence Surveillance System

This Report on Prostate Cancer Contains:

- Incidence and Mortality Rates in Ohio and the US
- Incidence and Mortality Rates by Age Group and Race
- Maps of Incidence Rates by County
- Trends in Incidence, Mortality and Stage at Diagnosis
- Survival Probability by Stage at Diagnosis
- Grade (Cell Differentiation) by Age Group and Race

- Risk Factors
- Anatomy of the Prostate
- Signs and Symptoms
- Clinical Trials
- Sources of Data and Additional Information

Prostate Cancer Incidence and Mortality

Cancers of the prostate made up 13.7 percent of the incident (newly diagnosed) cancers reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2001 to 2005 (Table 1). The average annual age-adjusted prostate cancer incidence rate during this time period was 145.7 cases per 100,000 males, or an average of 7,706 cases per year (N). The 2001-2005 average annual age-adjusted U.S. (SEER[2]) incidence rate of 169.4 cases per 100,000 males was 16 percent greater than the rate for Ohio. However, completeness of reporting for prostate cancer in Ohio is estimated to be only 86 percent for 2001-2005, which is less than the national standard of 95 percent for complete case ascertainment. Therefore, the prostate cancer incidence rates presented in this report may underestimate the true prostate cancer burden in Ohio. The Ohio mortality rate of 27.8 deaths per 100,000 males in 2001-2005 was 2 percent higher than the U.S. (NCHS[3]) age-adjusted prostate cancer mortality rate of 27.2 deaths per 100,000 males.

Table 1: Leading Sites/Types of Cancer: Average Annual Number (N), Percent (%) and Age-adjusted Rates of Invasive Cancer Cases and Cancer Deaths in Ohio with Comparison to the US (SEER and NCHS), 2001-2005[1,2,3]

Incidence	N	%	Ohio Rate	U.S. Rate	Mortality	N	%	Ohio Rate	U.S. Rate
All Sites/Types	56,415		465.1	467.4	All Sites/Types	24,845		203.3	189.8
Lung and Bronchus	9,127	16.2%	75.0	63.9	Lung and Bronchus	7,354	29.6%	60.3	54.1
Breast (Female)*	8,063	14.3%	121.9	126.1	Colon and Rectum	2,524	10.2%	20.6	18.8
Prostate*	**7,706**	**13.7%**	**145.7**	**169.4**	Breast (Female)*	1,900	7.6%	27.5	25.0
Colon and Rectum	6,456	11.4%	52.9	50.6	Pancreas	1,289	5.2%	10.5	10.6
Bladder	2,655	4.7%	21.7	21.2	**Prostate***	**1,262**	**5.1%**	**27.8**	**27.2**
Non-Hodgkin's Lymphoma	2,313	4.1%	19.1	19.5	Non-Hodgkin's Lymphoma	956	3.8%	7.8	7.3

[1] Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2008.
[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2008.
[3] NCHS: National Center for Health Statistics, 2008.
*The rates of breast (female) and prostate cancer are gender specific (i.e., the population denominator is females or males only).

Technical Notes:

- Prostate cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), code C619, excluding histology types 9590-9989. Prostate cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C610-C619.

- The 2001-2005 rates were calculated using vintage 2006 postcensal estimates for July 1, 2001-2005 (U.S. Census Bureau, 2007). Rates are direct age-adjusted to the U.S. 2000 standard population.

- N = Average number of cases per year rounded to the nearest integer.

# Prostate Cancer Cases and Incidence Rates by Age and Race

Table 2: Prostate Cancer: Average Annual Number of Cases (N), Incidence Rates per 100,000 Males and Cumulative Percentages (Cum%), by Age Group and Race in Ohio, 2001-2005

Age Group	White N	White Rate	White Cum%	Black N	Black Rate	Black Cum%	All Races N	All Races Rate	All Races Cum%
< 19	<1	*	0.0%	0	*	0.0%	<1	*	0.0%
20-24	<1	*	0.0%	0	*	0.0%	<1	*	0.0%
25-29	<1	*	0.0%	0	*	0.0%	<1	*	0.0%
30-34	0	*	0.0%	0	*	0.0%	0	*	0.0%
35-39	1	0.4	0.0%	<1	*	0.0%	2	0.5	0.0%
40-44	21	5.3	0.4%	7	14.6	0.8%	30	6.8	0.4%
45-49	90	23.4	1.9%	24	53.7	3.4%	127	29.2	2.1%
50-54	346	100.5	7.7%	77	212.0	12.0%	471	121.9	8.2%
55-59	655	236.7	18.6%	123	477.8	25.5%	866	282.1	19.4%
60-64	906	432.0	33.8%	150	786.7	42.1%	1,176	506.7	34.7%
65-69	1,114	664.0	52.5%	183	1,116.4	62.3%	1,451	778.4	53.5%
70-74	1,112	765.7	71.1%	163	1,201.9	80.3%	1,427	891.1	72.0%
75-79	938	779.2	86.8%	98	964.0	91.1%	1,173	892.7	87.2%
80-84	500	637.8	95.2%	48	799.2	96.4%	627	738.3	95.4%
85+	289	552.7	100.0%	32	824.6	100.0%	356	630.8	100.0%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.
* Rates may be unstable and are not presented when the case count for 2001-2005 is less than five (i.e., N<1).

Figure 1: Prostate Cancer: Age-specific Incidence Rates (Ages 45+) per 100,000 Males, by Race in Ohio, 2001-2005
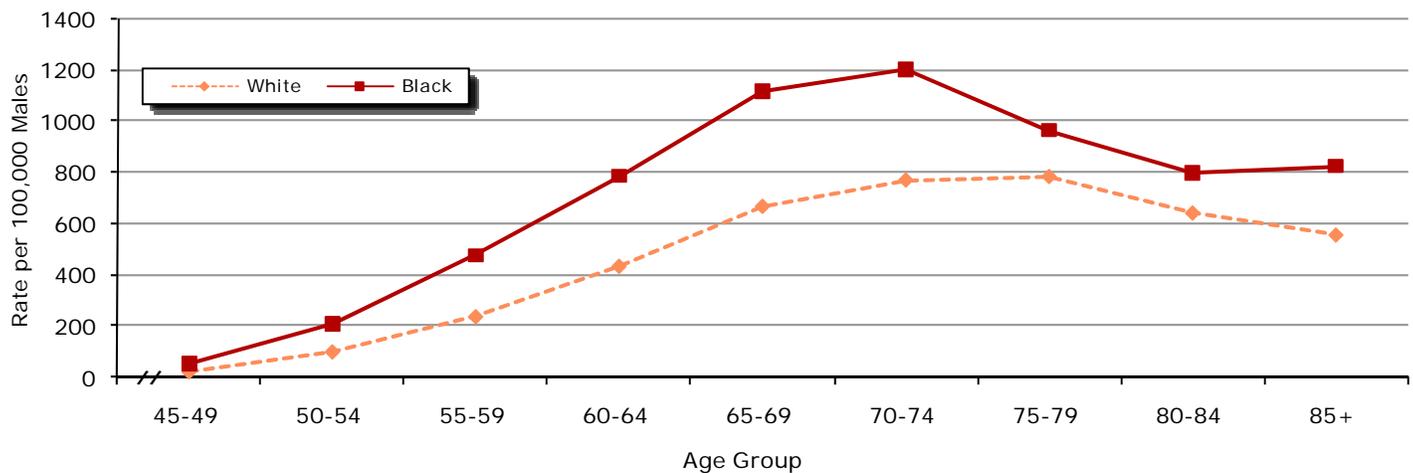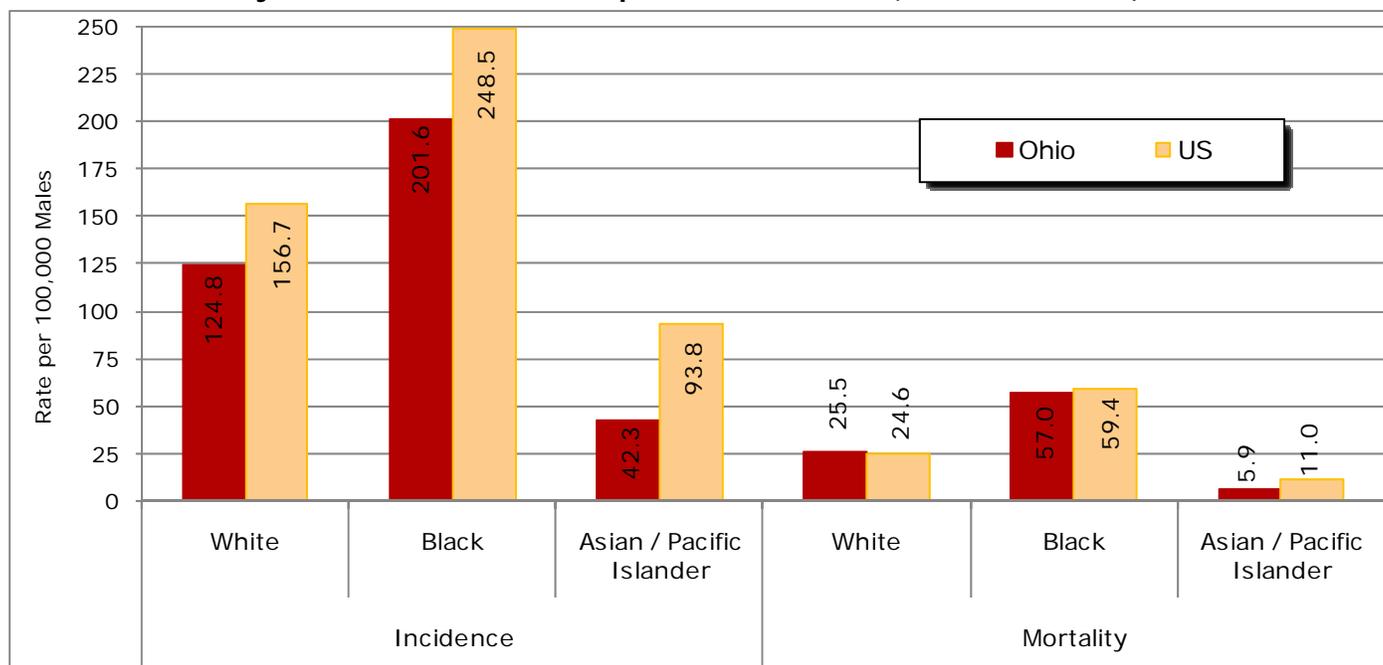

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.

Table 2 and Figure 1 show 2001-2005 age-specific incidence rates for prostate cancer by race. Nearly all prostate cancers were diagnosed among males 45 and older. Figure 3 shows blacks have a higher incidence rate, compared to whites, for each age group. Among blacks, prostate cancer incidence rates increased with advancing age group from 45-49 to 70-74, declined through the 75-79 and 80-84 age groups and then slightly increased among males 85 and older. Among whites, prostate cancer incidence rates increased with advancing age group from 45-49 to 75-79 and then declined among males 80 and older.

Prostate Cancer Incidence and Mortality Rates by Race in Ohio Compared to the United States

Figure 2: Prostate Cancer: Average Annual Age-adjusted Incidence and Mortality Rates per 100,000 Males, by Race in Ohio with Comparison to the US (SEER and NCHS), 2001-2005[1,2,3]

[1] Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2008.
[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2008.
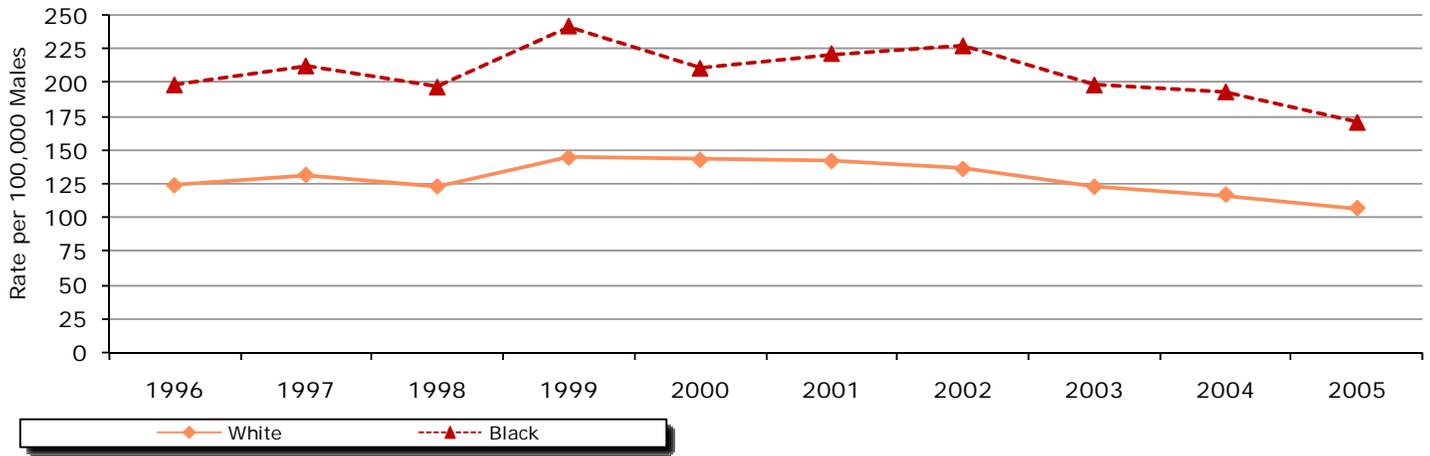[3] NCHS: National Center for Health Statistics, 2008.

Figure 2 shows that the 2001-2005 prostate cancer age-adjusted incidence rates for blacks were considerably higher than those of whites and Asian/Pacific Islanders in both Ohio and the United States. Race differences in prostate cancer incidence rates are not fully understood and are currently being studied. The prostate cancer incidence rates for each of the three race groups were greater in the United States compared to Ohio, and the incidence rate among Asian/Pacific Islanders in the United States was more than double that of Ohio. However, the lower prostate cancer incidence rates in Ohio may be due to low completeness of case reporting. Prostate cancer age-adjusted mortality rates for blacks were also considerably higher than those of whites and Asian/Pacific Islanders in both Ohio and the United States. The prostate cancer mortality rates for whites and blacks were similar for Ohio and the United States; however, for Asian/Pacific Islanders, the rate in the United States was nearly double that of Ohio.

Prostate Cancer Cases and Incidence Rates by County of Residence

Figure 3 presents 2001-2005 average annual age-adjusted prostate cancer incidence rates by county of residence. As shown in Figure 3, county-specific prostate cancer incidence rates in Ohio ranged from 76.5 to 190.8 per 100,000 males. To illustrate the concept that disease patterns do not abruptly change at county boundaries, Figure 4 displays the pattern of incidence after the county rates are smoothed—a process in which rates are adjusted to consider the rates of neighboring geographical areas. Prostate cancer incidence rates exhibit moderate geographical variability across the state, with a tendency for higher rates around major urban areas as well as in the northeastern portion of the state.

Figure 3: Prostate Cancer: Average Annual Number of Cases (N) and Age-adjusted Incidence Rates per 100,000 Males, by County of Residence in Ohio, 2001-2005

WILLIAMS N=25 126.7

FULTON N = 27 139.8

LUCAS N = 287 146.8

LAKE N=151 128.1

ASHTABULA N = 84 160.9

OTTAWA N = 38 151.4

GEAUGA N = 72 151.1

DEFIANCE N=23 123.0

HENRY N=15 104.7

WOOD N=60 122.7

SANDUSKY N = 46 153.1

ERIE N=61 132.6

LORAIN N = 219 163.0

CUYAHOGA N = 1041 157.0

TRUMBULL N = 193 157.6

PAULDING N=12 123.9

PUTNAM N=20 124.0

HANCOCK N=42 129.7

SENECA N=37 132.1

HURON N=35 131.7

MEDINA N = 115 163.4

SUMMIT N = 382 146.8

PORTAGE N = 100 154.0

MAHONING N = 265 190.8

VAN WERT N=18 117.0

ALLEN N=69 133.2

HARDIN N=18 125.4

WYANDOT N=16 130.2

CRAWFORD N=32 129.3

RICHLAND N=92 139.3

ASHLAND N=30 114.9

WAYNE N=62 120.0

STARK N = 286 146.8

COLUMBIANA N = 91 156.9

MERCER N=24 119.5

AUGLAIZE N=26 112.7

MARION N=36 113.9

MORROW N=19 124.3

HOLMES N=12 78.4

CARROLL N=20 126.0

JEFFERSON N = 69 157.2

SHELBY N=25 118.8

LOGAN N = 37 161.1

UNION N=23 138.0

KNOX N = 39 143.1

COSHOCTON N=21 110.8

TUSCARAWAS N=62 131.9

HARRISON N=12 129.4

DARKE N = 43 155.6

MIAMI N = 73 148.8

CHAMPAIGN N=21 109.4

DELAWARE N = 77 161.0

LICKING N=95 137.9

GUERNSEY N=23 111.7

BELMONT N = 61 156.3

CLARK N=79 103.9

MADISON N=24 122.0

FRANKLIN N = 635 164.8

MUSKINGUM N=50 119.3

NOBLE N = 10 151.8

MONROE N=13 138.7

PREBLE N=22 98.7

MONTGOMERY N = 373 140.8

GREENE N=86 122.9

FAIRFIELD N = 84 146.7

PERRY N=21 134.6

MORGAN N=8 93.1

WASHINGTON N = 58 168.3

FAYETTE N=17 117.3

PICKAWAY N=32 131.4

HOCKING N = 24 154.5

ATHENS N = 32 146.7

BUTLER N = 198 141.3

WARREN N = 108 158.1

CLINTON N = 27 149.7

ROSS N=38 110.2

VINTON N = 9 153.2

HAMILTON N = 586 159.5

HIGHLAND N=26 129.0

PIKE N=10 76.5

JACKSON N=17 109.3

MEIGS N=11 93.9

CLERMONT N=95 129.4

BROWN N=25 120.8

ADAMS N=17 130.3

SCIOTO N=39 105.8

GALLIA N=20 117.1

LAWRENCE N=29 90.2

Rate per 100,000 Males

	76.5 - 119.3
	119.4 - 131.4
	131.5 - 151.1
	151.2 - 190.8

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.

- N = Average number of cases *per year* rounded to the nearest integer.

  N = Total cases in 2001-2005

  　　　5 years

- Each category represents approximately 25% of the 88 Ohio counties.

Figure 4: Prostate Cancer: Smoothed Pattern of Incidence, Based on Average Annual, Age-adjusted Incidence Rates per 100,000 Males, by County of Residence in Ohio, 2001-2005

Rate per 100,000 Males

- 83.5 - 122.1
- 122.2 - 132.7
- 132.8 - 147.7
- 147.8 - 184.1

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.

Prostate Cancer Incidence and Mortality Trends

Figure 5: Prostate Cancer: Trends in Average Annual Age-adjusted Incidence Rates per 100,000 Males, by Race in Ohio, 1996-2005

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.

Figure 5 shows incidence rates of prostate cancer in Ohio according to year of diagnosis (1996 to 2005) by race. Incidence rates among blacks were greater than those for whites each year during the time period. From 1996 to 2005, prostate cancer incidence rates decreased approximately 14 percent among both blacks and whites; however, this decline may be due to incomplete reporting for more recent years.

Figure 6: Prostate Cancer: Trends in Average Annual Age-adjusted Mortality Rates per 100,000 Males, by Race in Ohio, 1996-2005
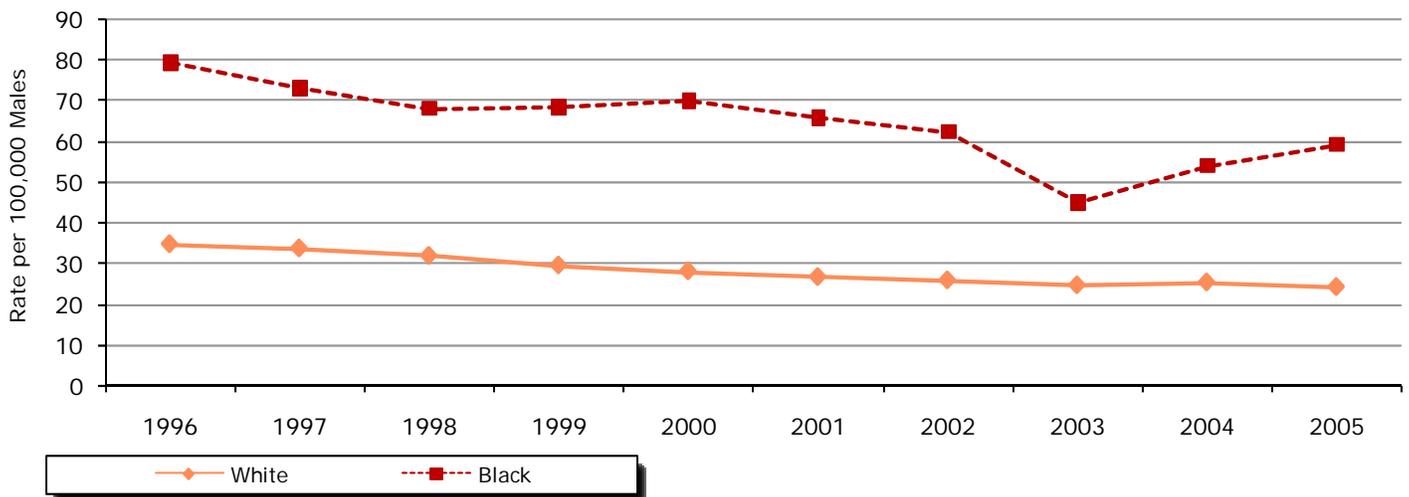
Source: Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2008.

Figure 6 shows trends in mortality rates of prostate cancer according to year of death (1996 to 2005) by race. With the exception of the year 2003, for each year of comparison, the rate for blacks was more than double that for whites. Comparing 1996 to 2005, the prostate cancer mortality rate decreased approximately 34 percent and 42 percent among blacks and whites, respectively.

Prostate Cancer Cases and Survival by Stage at Diagnosis

Figure 7: Prostate Cancer: Proportion of Cases (%) by Stage at Diagnosis and Age Group in Ohio, 2001-2005
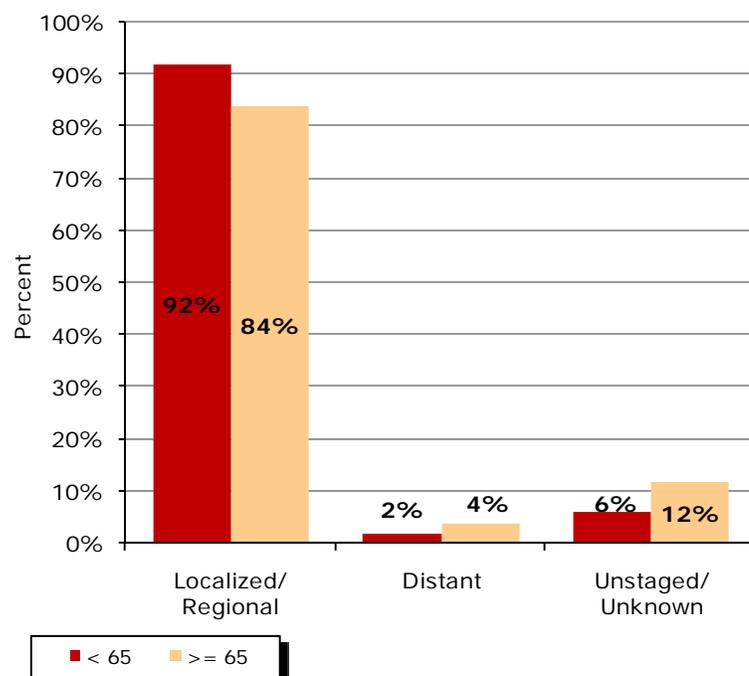
N = 7,709 cases per year

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.

The stage at diagnosis of prostate cancer is an important determinant of survival. In the localized stage, the tumor is confined to the prostate. In the regional stage, the tumor has spread to surrounding tissues. In the distant stage, the malignancy has spread through the blood or lymphatic system to other organs. The 2001-2005 Ohio data presented in Figure 7 reveal that the percentage of prostate cancers diagnosed localized/regional stage was 92 percent among males less than 65 and 84 percent among males 65 and older. Four percent of males 65 and older were diagnosed distant stage, while only two percent of those under 65 were diagnosed distant stage. Similarly, males 65 and older were twice as likely to be reported unstaged/unknown stage (12 percent) compared to males less than 65 (6 percent).

Table 3 shows the U.S. (SEER) five-year survival probability for prostate cancer diagnosed in 1996-2004 was 98.9 percent for all stages combined. Five-year survival probabilities were 100 percent for those diagnosed localized/regional stage and only 31.7 percent for distant-stage tumors. Five-year survival probabilities for all stages combined were higher for whites (99.5 percent), compared to blacks (95.4 percent).

At this time, there are insufficient data to recommend for or against prostate cancer screening. Tests to detect prostate cancer include digital rectal exam (DRE), during which a health care professional feels the prostate for lumps or abnormalities, and the prostate-specific antigen (PSA) test, which measures the level of PSA in blood. Individuals should discuss the pros and cons of prostate cancer screening with their health care provider.

Table 3: Prostate Cancer: Five-year Survival Probability (%) by Stage at Diagnosis in the US (SEER), 1996-2004

| Stage	Overall Five-year Survival Probability (%)
All Stages	98.9%
Localized/Regional	100.0%
Distant	31.7%

Source: *SEER Cancer Statistics Review 1975-2005*, National Cancer Institute, 2008.

Did You Know?

In 2005, there were approximately 2.1 million men alive in the United States with a history of prostate cancer. One in six men (15.8 percent) born today will be diagnosed with prostate cancer during their lifetime, and 8.0 percent of men will develop prostate cancer between their 50th and 70th birthdays.

Prostate Cancer Stage at Diagnosis Trends

Figure 8: Prostate Cancer: Trends in the Proportion of Cases (%) by Stage at Diagnosis in Ohio, 1996-2005
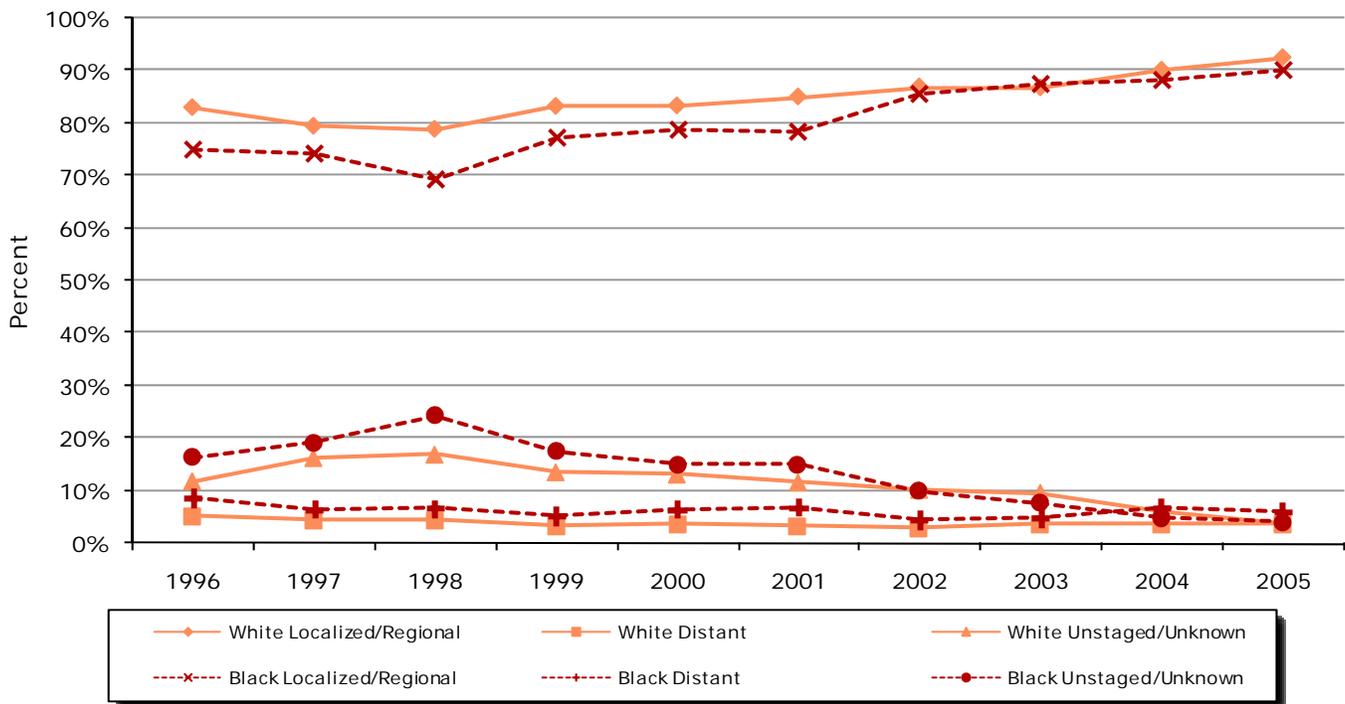
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.

Figure 8 shows the distribution of stage at diagnosis of prostate cancer by race and year of diagnosis from 1996 to 2005. From 1996 through 2001, compared to blacks, a greater proportion of whites were diagnosed localized/regional stage, while this proportion was similar among blacks and whites from 2002 through 2005. The proportions of cases diagnosed at localized/regional stage increased among both whites and blacks from 1996 to 2005, while the proportions diagnosed distant stage and unstaged/ unknown stage decreased among both whites and blacks during the time period.

Prostate Cancer By Grade

Table 4: Prostate Cancer: Percent Distribution by Grade (Cell Differentiation), Age Group and Race in Ohio with Comparison to the US (SEER), 2001-2005[1,2]

	White		Black	
	Ohio	US	Ohio	US
Age < 65				
Well differentiated; Grade I	3%	2%	2%	2%
Moderately differentiated; Grade II	63%	67%	62%	62%
Poorly differentiated; Grade III	29%	28%	30%	32%
Undifferentiated; anaplastic; Grade IV	<1%	<1%	<1%	<1%
Unknown	5%	3%	6%	4%
Age ≥ 65				
Well differentiated; Grade I	3%	2%	3%	2%
Moderately differentiated; Grade II	55%	58%	51%	53%
Poorly differentiated; Grade III	32%	32%	35%	35%
Undifferentiated; anaplastic; Grade IV	<1%	<1%	<1%	<1%
Unknown	10%	7%	11%	9%

[1] Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2008.
[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2008.

Table 4 shows the distribution of prostate cancer in Ohio and the United States by grade, age group and race. Grade is used to describe how abnormal or aggressive the prostate cancer cells appear and is of benefit in predicting potential responses to treatment and prognosis. The least abnormal and least aggressive tumors have cells that are well differentiated (Grade 1) or moderately differentiated (Grade 2), meaning the cells have maintained usual characteristics of prostate cells. The most abnormal and most aggressive tumors are described as being poorly differentiated (Grade 3) or undifferentiated (Grade 4). In 2001-2005, the majority of males in Ohio and the United States were diagnosed with tumors that were moderately differentiated (Grade 2) or poorly differentiated (Grade 3), regardless of age group or race. The grade distribution was not found to differ considerably by age group, race or geographic area (Ohio compared to the United States) during this time period.

Did You Know?

Treatment options for prostate cancer vary depending on age, stage of the cancer and medical history, and should be discussed with a health care provider. Treatments include: surgery, radiation, radioactive seed implants and hormone therapy for early-stage tumors; and hormone therapy, chemotherapy and radiation for late-stage tumors. Careful observation without immediate treatment (watchful waiting) may be appropriate for older individuals with less aggressive tumors.

Risk Factors for Prostate Cancer

- **Age** — Prostate cancer risk increases with age. Seventy percent of prostate cancers occur among males over 65 years of age. Prostate cancer is rare in males under 50 years of age.

- **Race** — In the United States, black males have a higher risk of prostate cancer, compared to white males, and Asian and American Indian males have a lower risk than white males. Black males are more likely to be diagnosed late stage and have a greater risk of death from prostate cancer.

- **Nationality** — Prostate cancer incidence rates are greater among males in North America, northwestern Europe, Australia and the Caribbean Islands and are lowest in Asia, Africa and South and Central America.

- **Family History** — Men with a first-degree relative (father or brother) who has had prostate cancer are at greater risk, especially if the affected relative was young at the time of diagnosis.

- **Exercise** — High levels of physical activity have been found to reduce risk of diagnosis with advanced-stage prostate cancer, particularly in older men.

- **Diet** — A diet high in fat (especially from red meat and dairy products) and/or a diet low in fruits and vegetables may increase risk of prostate cancer.

- **Genes** — Inherited mutations in several genes (such as BRCA1 and BRCA2) have been shown to increase prostate cancer risk; however, these genes account for only a small proportion of prostate cancers.

Figure 9: Prostate Anatomy: Location of the Prostate and Comparison of a Normal Prostate to Prostate Cancer

The following figures show the location of the prostate in the male reproductive tract and the difference between a normal prostate and prostate cancer.
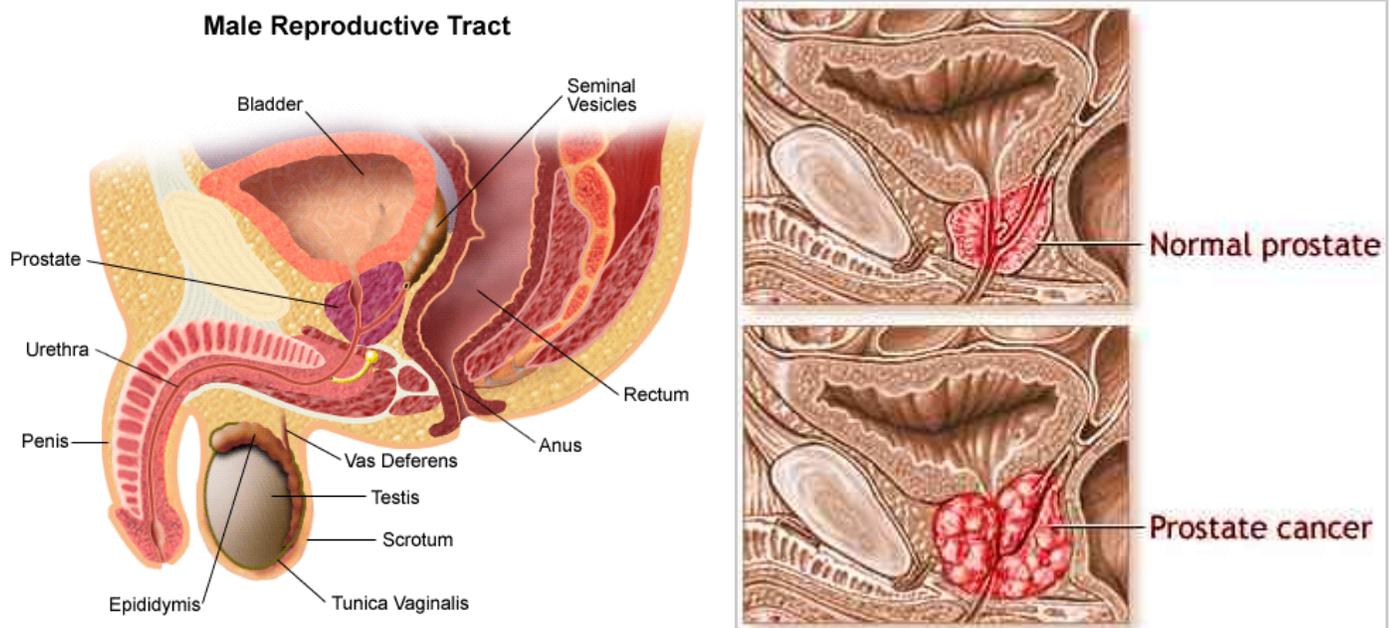
Prostate Cancer Signs and Symptoms

Early signs and symptoms of prostate cancer can include urinary problems; however, urinary symptoms are much more commonly caused by benign prostate problems such as an enlarged prostate (benign prostatic hyperplasia) or prostate infections. Less than 5 percent of cases of prostate cancer have urinary problems as the initial symptom. When urinary signs and symptoms do occur, they can include difficulty in urinating and starting and stopping urine flow, and decreased force in the stream of urine.

Cancer in the prostate or the area around the prostate can cause blood in urine or semen. Some men may have difficulty having an erection (impotence). Prostate cancer that has spread to the lymph nodes in the pelvis may cause swelling in the legs or discomfort in the pelvic area. Advanced prostate cancer that has spread to the bones can cause bone pain and fractures and compression of the spine.

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 prostate cancer, please talk with your health care provider 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—Arthur G. James Cancer Hospital and Richard J. Solove Research Institute:**
  http://www.jamesline.com/trials

- **The Cleveland Clinic:**
  http://myclevelandclinic.org/cancer/clinical_trials/default.aspx

- **Case Western Reserve University Comprehensive Cancer Center:**
  http://cancer.case.edu/sharedresources/clinicaltrials

- **University of Cincinnati:**
  http://uccancercenter.uc.edu/research/clinicaltrials

- **Toledo Community Hospital Oncology Program:**
  http://www.tchop.com

- **Dayton Clinical Oncology Program:**
  http://www.med.wright.edu/dcop

- **Columbus Community Clinical Oncology Program:**
  http://www.columbusccop.org

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/prostate

- **American Cancer Society:**
  http://www.cancer.org/docroot/CRI/CRI_2_3x.asp?dt=36

Ohio Cancer Incidence Surveillance System (OCISS)

Ohio Department of Health

and

The Ohio State University Comprehensive Cancer Center — Arthur G. James Cancer Hospital and Richard J. Solove Research Institute

---

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