



Esophageal Cancer in Ohio, 2003-2007

This Report on Esophageal Cancer Contains:

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

Esophageal Cancer Incidence and Mortality

Cancers of the esophagus made up 1.2 percent of the incident (newly diagnosed) cancers reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2003 through 2007 (Table 1). The average annual age-adjusted esophageal cancer incidence rate during this time period was 5.6 cases per 100,000 persons, or an average of 696 cases per year (N). The 2003-2007 average annual age-adjusted U.S. (SEER²) incidence rate of 4.5 cases per 100,000 persons was 19.6 percent lower than the rate for Ohio. Estimated completeness of reporting for esophageal cancer in Ohio was 100 percent in 2003-2007. Therefore, the esophageal cancer incidence rates presented in this report likely represent the true burden in Ohio. The Ohio esophageal cancer mortality rate of 5.2 deaths per 100,000 persons in 2003-2007 was 18.2 percent greater than the U.S. (NCHS³) mortality rate (4.4 per 100,000 persons).

Table 1: Leading Sites/Types of Cancer and Esophageal 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), 2003-2007^{1,2,3}

Incidence	N	%	Ohio Rate	U.S. Rate	Mortality	N	%	Ohio Rate	U.S. Rate
All Sites/Types	58,136		470.0	461.1	All Sites/Types	24,917		199.6	183.8
Lung and Bronchus	9,295	16.0%	75.0	62.5	Lung and Bronchus	7,411	29.7%	59.7	52.5
Breast (Female)*	8,073	28.3%	119.9	122.9	Colon and Rectum	2,456	9.9%	19.6	17.6
Prostate*	7,961	26.9%	145.5	156.9	Breast (Female)*	1,875	7.5%	26.5	24.0
Colon and Rectum	6,370	11.0%	51.1	47.9	Pancreas	1,381	5.5%	11.1	10.7
Bladder	2,691	4.6%	21.6	21.1	Prostate*	1,232	4.9%	26.2	24.7
Non-Hodgkin's Lymphoma	2,380	4.1%	19.3	19.6	Non-Hodgkin's Lymphoma	921	3.7%	7.4	6.9
⋮					⋮				
Esophagus	696	1.2%	5.6	4.5	Esophagus	648	2.6%	5.2	4.4

[1] Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2010.

[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2010.

[3] NCHS: National Center for Health Statistics, 2010.

*The rates of breast (female) and prostate cancer are gender specific (i.e., the population denominator is females or males only).

Technical Notes:

- Esophageal cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), codes C150-C159, excluding histology types 9590-9989. Esophageal cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C150-C159.
- The 2003-2007 rates were calculated using vintage 2008 postcensal estimates for July 1, 2003-2007 (U.S. Census Bureau, 2009). Rates are direct age-adjusted to the U.S. 2000 standard population.
- N = Average number of cases per year rounded to the nearest integer.

Esophageal Cancer Incidence by Age, Gender and Race

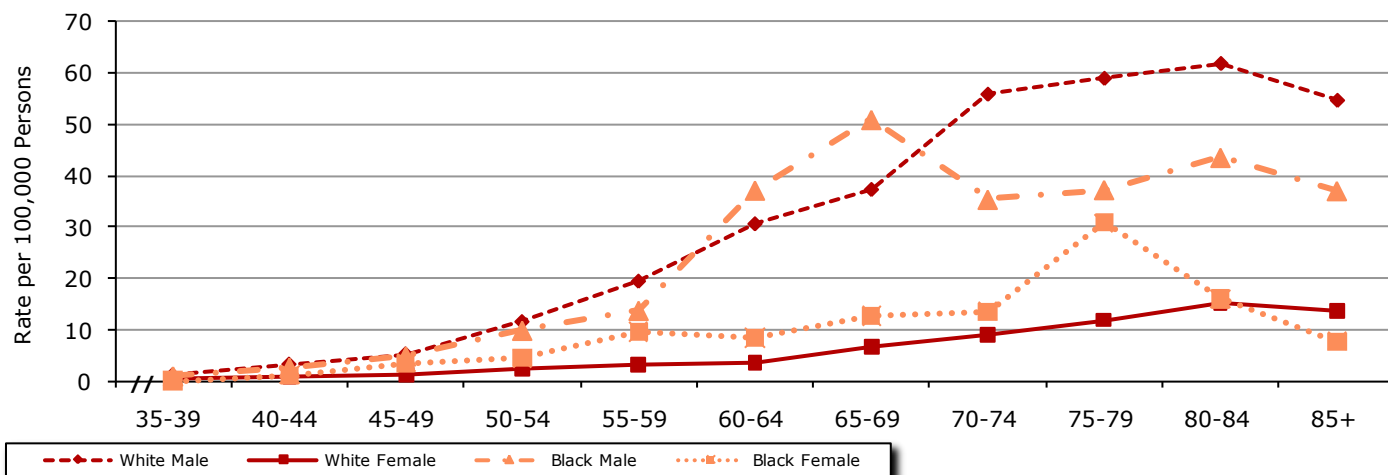
Table 2: Esophageal Cancer: Average Annual Number of Cases (N), Age-specific Incidence Rates per 100,000 Persons and Cumulative Percentages (Cum%), by Gender in Ohio, 2003-2007

Age Group	Males			Females			Total		
	N	Rate	Cum%	N	Rate	Cum%	N	Rate	Cum%
<5	0	*	0.0%	0	*	0.0%	0	*	0.0%
5-9	0	*	0.0%	0	*	0.0%	0	*	0.0%
10-14	0	*	0.0%	0	*	0.0%	0	*	0.0%
15-19	0	*	0.0%	0	*	0.0%	0	*	0.0%
20-24	0	*	0.0%	0	*	0.0%	0	*	0.0%
25-29	<1	*	0.1%	0	*	0.0%	<1	*	0.1%
30-34	1	0.3	0.4%	<1	*	0.1%	1	0.2	0.3%
35-39	4	1.0	1.1%	<1	*	0.7%	5	0.6	1.0%
40-44	13	3.0	3.5%	3	0.7	2.7%	16	1.8	3.3%
45-49	23	5.1	7.6%	6	1.4	7.0%	29	3.2	7.5%
50-54	45	11.4	15.9%	10	2.5	13.9%	56	6.8	15.5%
55-59	63	18.8	27.5%	13	3.8	22.9%	77	11.1	26.5%
60-64	77	31.1	41.5%	11	4.0	30.3%	88	16.9	39.1%
65-69	74	38.6	55.0%	16	7.3	41.3%	90	21.7	52.1%
70-74	85	54.3	70.5%	20	9.9	54.5%	104	29.5	67.1%
75-79	75	57.6	84.2%	25	13.7	71.6%	100	31.8	81.5%
80-84	54	61.1	94.0%	23	15.2	86.8%	76	32.2	92.4%
85+	33	53.7	100.0%	20	13.4	100.0%	53	25.3	100.0%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

* Rates may be unstable and are not presented when the case count for 2003-2007 is less than five (*i.e.*, N<1).

Figure 1: Esophageal Cancer: Age-specific Incidence Rates (Ages 35+) per 100,000 Persons, by Gender and Race in Ohio, 2003-2007

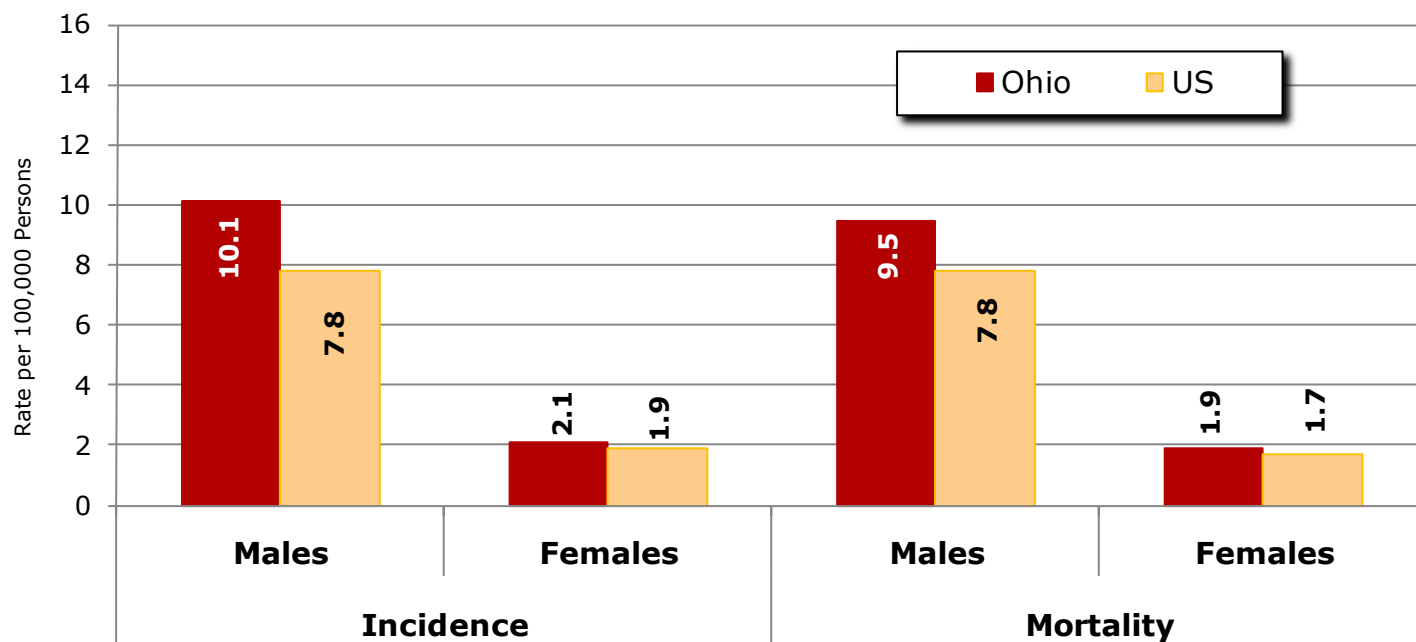


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

Table 2 and Figure 1 show 2003-2007 age-specific incidence rates for esophageal cancer by gender and race. The majority of these cancers were diagnosed among persons 35 and older. Age-specific incidence rates were greater among males, compared to females. As shown in Table 2, among both males and females, esophageal cancer incidence rates increased with advancing age group to 80-84 and then declined. White males had the highest incidence rates in all age groups, except ages 60-64 and 65-69, for which black males had the highest incidence rates. For most age groups, black females had higher incidence rates than white females.

Esophageal Cancer Incidence and Mortality Rates by Gender in Ohio Compared to the United States

Figure 2: Esophageal Cancer: Average Annual Age-adjusted Incidence and Mortality Rates per 100,000 Persons, by Gender in Ohio with Comparison to the US (SEER and NCHS), 2003-2007^{1,2,3}



[1] Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2010.

[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2010.

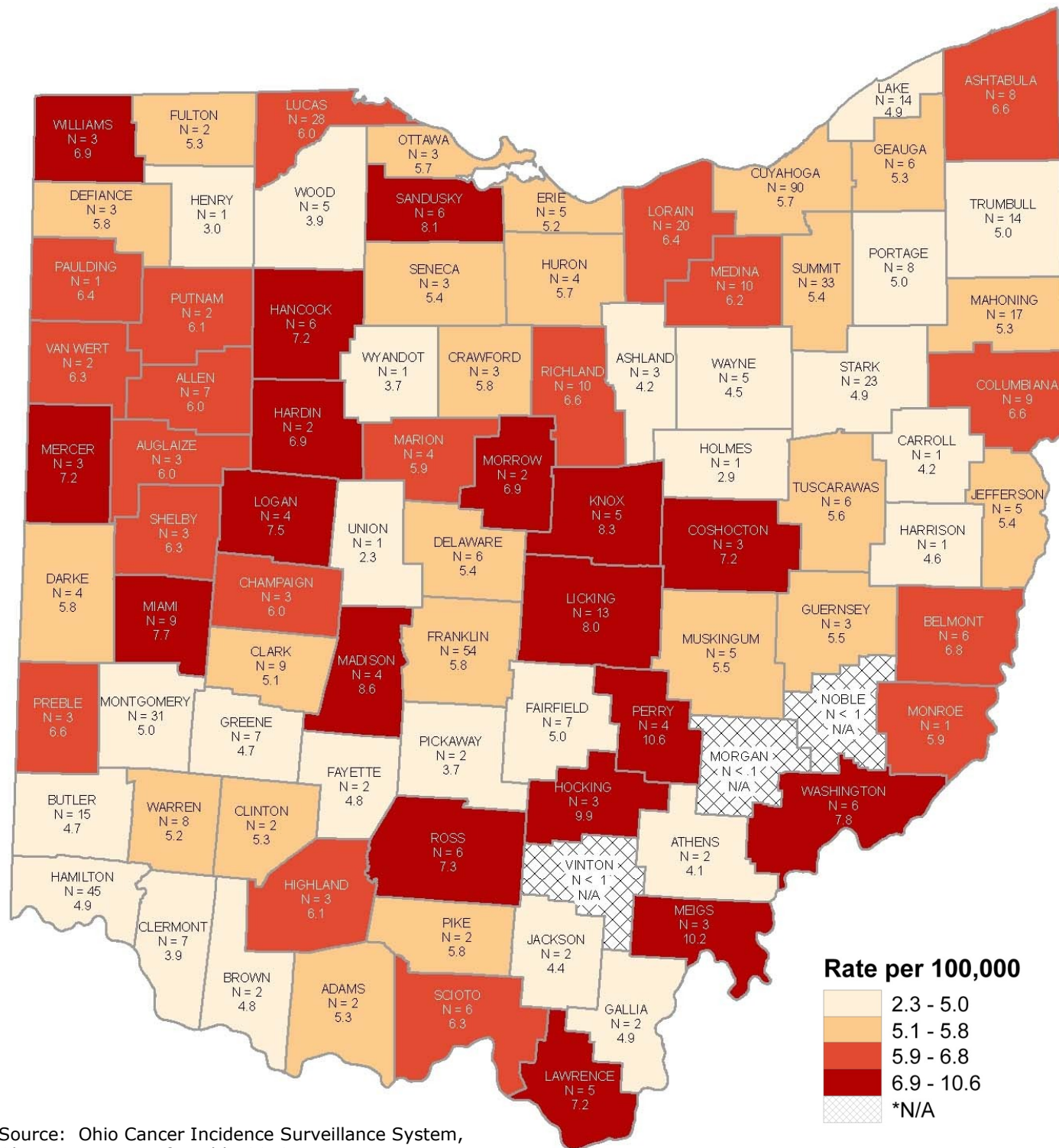
[3] NCHS: National Center for Health Statistics, 2010.

Figure 2 shows that the 2003-2007 age-adjusted esophageal cancer incidence rates for males were more than four times the rates for females in both Ohio and the United States. Gender differences in esophageal cancer incidence rates are likely the result of differences in risk factors, such as tobacco and alcohol use. The incidence rate for males was 29.5 percent higher in Ohio, compared to the US, and the incidence rate for females was 10.5 percent higher in Ohio. Similar to incidence, esophageal cancer mortality rates were more than four times higher for males than females in both Ohio and the United States. The mortality rate among males in Ohio was 21.8 percent higher than the rate for the United States, and the rate among females was 11.8 percent higher in Ohio.

Esophageal Cancer Cases and Incidence Rates by County of Residence

Figure 3 presents 2003-2007 average annual age-adjusted esophageal cancer incidence rates by county of residence. As shown in Figure 3, county-specific esophageal cancer incidence rates in Ohio ranged from 2.3 to 10.6 per 100,000 persons. 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 statistical method in which rates are adjusted to consider the rates of neighboring geographical areas. Esophageal cancer incidence rates are shown to be higher in more rural areas of the state.

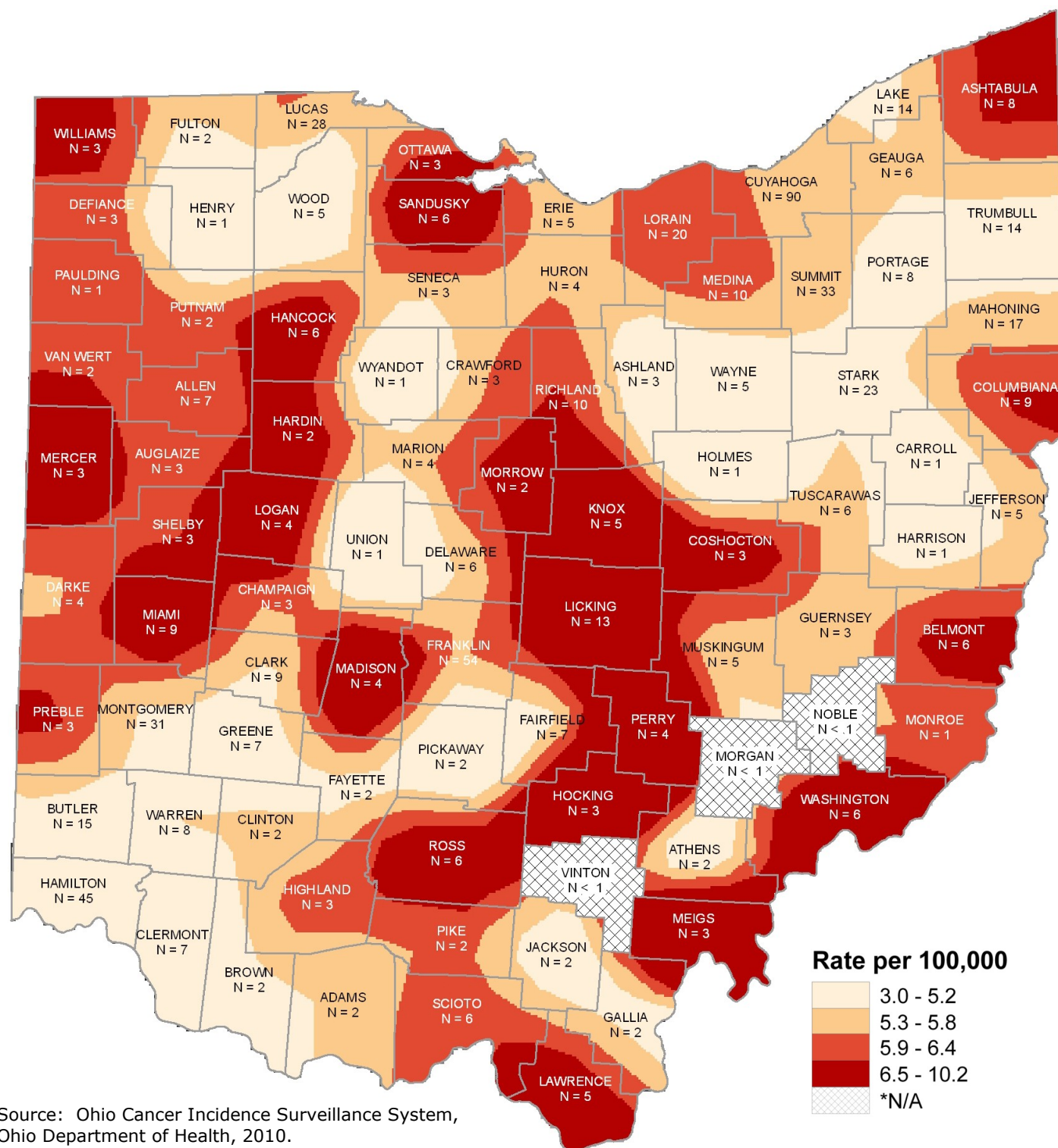
Figure 3: Esophageal Cancer: Average Annual Number of Cases (N) and Age-adjusted Incidence Rates per 100,000 Persons, by County of Residence in Ohio, 2003-2007



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

- N = Average number of cases *per year* rounded to the nearest integer (= Total cases in 2003-2007 ÷ 5 years).
- Each category represents approximately 25% of the 88 Ohio counties.
- N/A = Not Applicable. Rates may be unstable and are not presented when the case count for 2003-2007 is less than five (i.e., N<1).

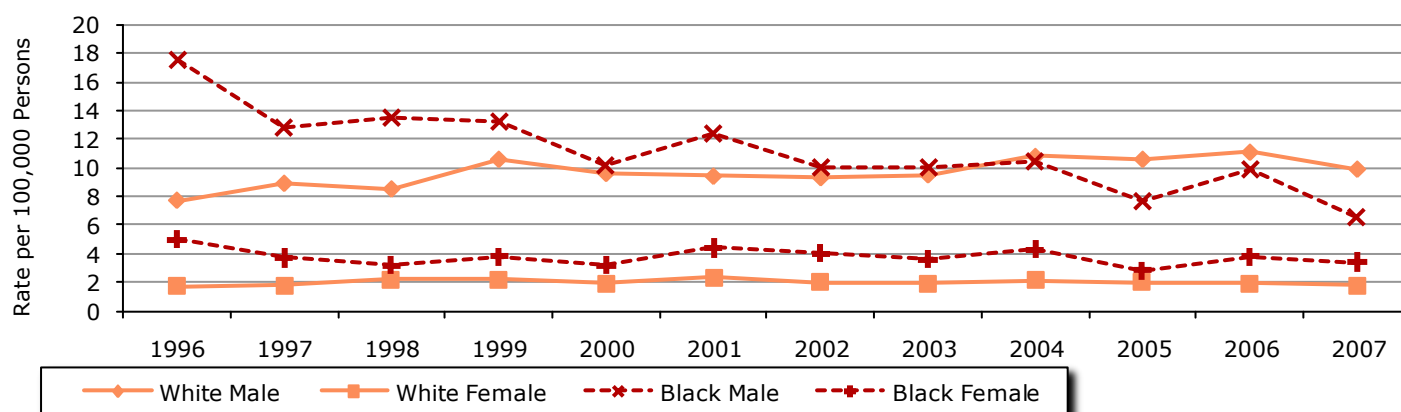
Figure 4: Esophageal Cancer: Smoothed Pattern of Incidence, Based on Average Annual, Age-adjusted Incidence Rates per 100,000 Persons, by County of Residence in Ohio, 2003-2007



- N = Average number of cases *per year* rounded to the nearest integer (= Total cases in 2003-2007 ÷ 5 years).
- Each category represents approximately 25% of the 88 Ohio counties.
- N/A = Not Applicable. Rates may be unstable and are not presented when the case count for 2003-2007 is less than five (i.e., N<1).

Esophageal Cancer Incidence and Mortality Trends

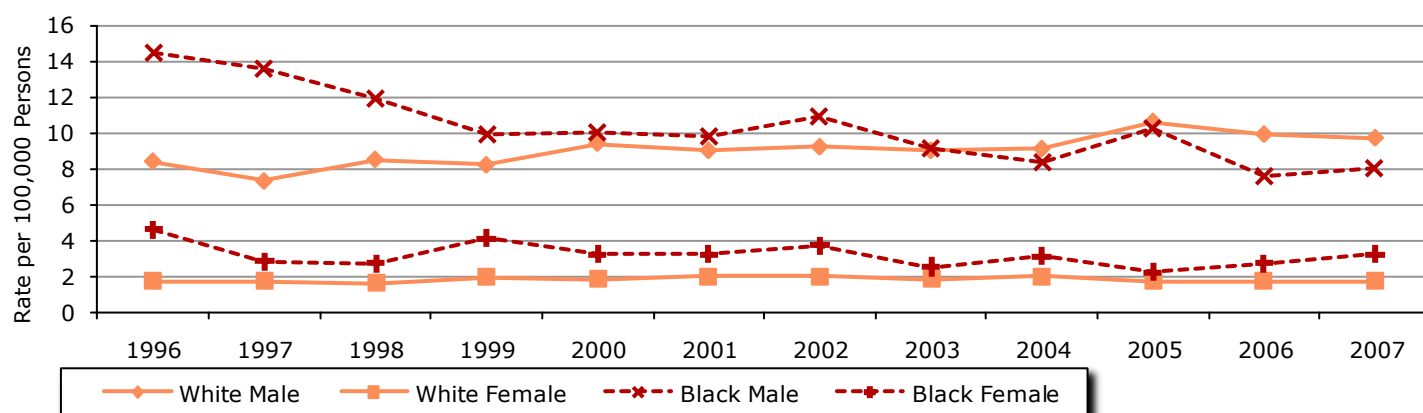
Figure 5: Esophageal Cancer: Trends in Average Annual Age-adjusted Incidence Rates per 100,000 Persons, by Gender and Race in Ohio, 1996-2007



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

Figure 5 shows incidence rates of esophageal cancer in Ohio according to year of diagnosis (1996 through 2007) by gender and race. Incidence rates among black males were higher than those of white males during earlier years (1996 to 1999) and were lower during later years (2005 to 2007). For each year, black females had greater incidence rates than white females. From 1996 through 2007, the incidence rate among black males decreased 44.8 percent, and the incidence rate among white males increased 15.5 percent. For white females the incidence rate was unchanged during this time period and, for black females, the incidence rate decreased 30.4 percent.

Figure 6: Esophageal Cancer: Trends in Average Annual Age-adjusted Mortality Rates per 100,000 Persons, by Gender and Race in Ohio, 1996-2007

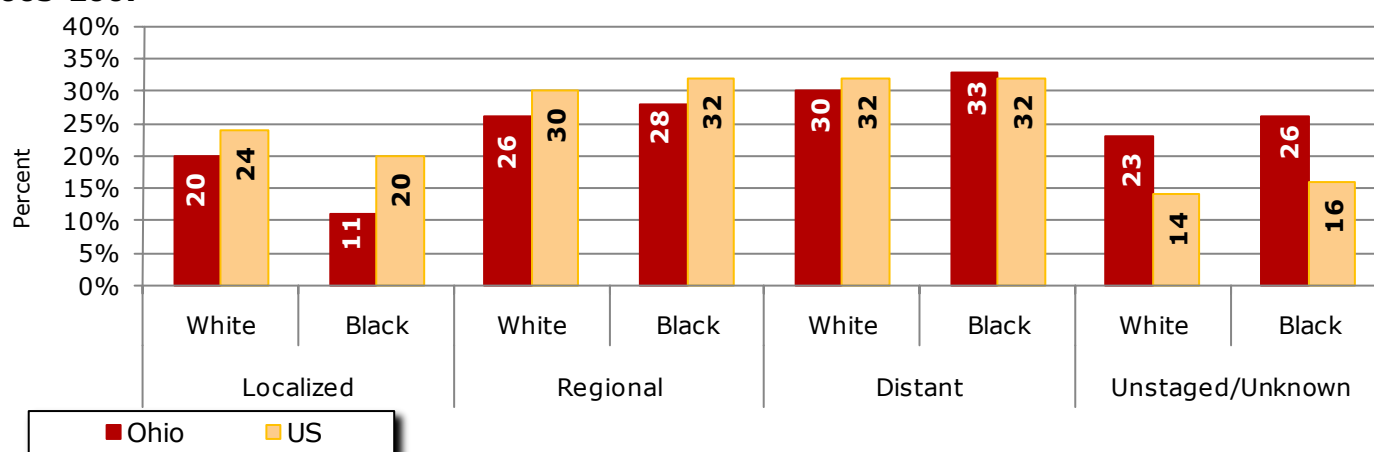


Source: Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2010.

Figure 6 shows trends in mortality rates of esophageal cancer by year of diagnosis (1996 to 2007), gender and race. Mortality rates for both black and white males were much higher than those of black and white females. Prior to 2003, black males had the highest mortality rates each year of any gender/race category; after 2003, white males had the highest mortality rates. Similar to incidence, black females had higher mortality rates than white females for each year.

Esophageal Cancer by Stage at Diagnosis

Figure 7: Esophageal Cancer: Proportion of Cases (%) by Stage at Diagnosis and Race in Ohio, 2003-2007^{1,2,3}



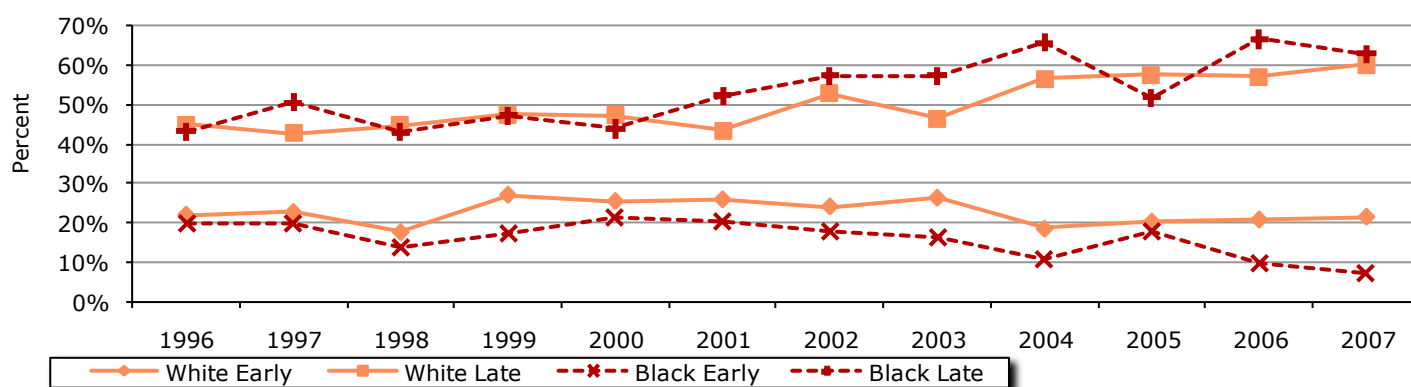
[1] Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

[2] Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2010.

[3] Two percent of esophageal cancers were diagnosed *in situ* for both whites and blacks in Ohio.

The stage at diagnosis of esophageal cancer is an important determinant of survival. In the localized stage, the tumor is confined to the esophagus. In the regional stage, the tumor has spread to surrounding tissues or lymph nodes, and in the distant stage the malignancy has spread through the blood or lymphatic system to other organs. In Ohio, a lower proportion of whites and blacks were diagnosed localized and regional stage, compared to the United States; however, a greater proportion of whites and blacks in Ohio were diagnosed unstaged/unknown stage. In both Ohio and the United States, the proportion of esophageal cancers diagnosed localized stage was higher among whites, compared to blacks, while blacks were more likely to be diagnosed regional and unstaged/unknown stage.

Figure 8: Esophageal Cancer: Trends in the Proportion of Cases (%) by Stage at Diagnosis and Race in Ohio, 1996-2007



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

Figure 8 shows the distribution of early (local) and late (regional or distant) stage at diagnosis of esophageal cancer by year of diagnosis and race. For both whites and blacks, there was an increase in the proportion of late-stage diagnoses over this time period. For whites, there was no difference in the proportion diagnosed early stage from 1996 to 2007; however, for blacks, the proportion decreased considerably. The increasing proportion of late stage esophageal cancer diagnoses in Ohio may be due to more cases being staged (i.e., fewer cases are being reported unstaged/unknown stage).

Esophageal Cancer Survival Probability

Table 3: Esophageal Cancer: Five-year Survival Probability (%) by Stage at Diagnosis, Gender and Race in the US (SEER), 1999-2006

Five-year Survival Probability (%)					
Stage	Overall	White Male	White Female	Black Male	Black Female
All Stages	17.0%	17.7%	18.2%	10.2%	13.8%
Localized	37.4%	40.9%	33.8%	20.3%	23.8%
Regional	18.8%	19.4%	21.6%	10.1%	17.8%
Distant	3.2%	3.2%	3.8%	1.5%	4.1%
Unstaged/Unknown Stage	12.1%	11.2%	11.9%	15.4%	11.1%

Source: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2010.

Table 3 shows that the U.S. (SEER) five-year esophageal cancer survival probability for all races and genders combined was only 17.0 percent for all stages combined. White females had the greatest five-year survival probability for all stages combined (18.2 percent), followed closely by white males (17.7 percent). Black females (13.8 percent) and black males (10.2 percent) had considerably lower survival probabilities for all stages combined. Survival probability decreased with advancing stage at diagnosis. Those diagnosed at the localized stage had the highest survival probability (37.4 percent), while those diagnosed at the regional (18.8 percent) and distant (3.2 percent) stages had lower survival probabilities.

Table 4: Esophageal Cancer: Five-year Survival Probability (%) by Age at Diagnosis (< 65 and ≥ 65), Gender and Race in the US (SEER), 1999-2006

Five-year Survival Probability (%)					
Stage	Overall	White Male	White Female	Black Male	Black Female
< 65 Years	19.2%	20.0%	23.8%	11.3%	15.9%
≥ 65 Years	14.9%	15.4%	15.5%	8.5%	11.3%

Source: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2010.

Table 4 shows that the U.S. (SEER) five-year survival probability for all stages combined was higher for persons younger than 65 (19.2 percent), compared to those 65 and older (14.9 percent). This age disparity was also observed for whites and blacks of both genders. This breakdown shows that black males and females had lower survival than both white males and females in both age groups. Younger white females (less than 65) had the highest survival probability of all age/gender/race combinations (23.8 percent) and older black males (65 and older) had the lowest survival probability (8.5 percent).

Esophageal Cancer By Histology

Table 6: Esophageal Cancer: Average Annual Number (N) and Percent Distribution by Histology in Ohio with Comparison to the US (SEER), 2003-2007^{1,2,3}

Histology (ICD-O-3 codes)	Ohio		US
	N	Percent	Percent
Epidermoid carcinoma (8051-8131)	168	24.1%	35.8%
Squamous cell carcinoma (8070-8078, 8083-8084)	168	24.1%	35.7%
Adenocarcinoma (8050, 8140-8147, 8160-8162, 8180-8221, 8250-8507, 8514, 8520-8551, 8560, 8570-8574, 8576, 8940-8941)	459	66.0%	57.8%
Other specific carcinomas (8012-8015, 8030-8046, 8150-8155, 8170-8175, 8230-8249, 8508, 8510-8513, 8561-8562, 8575, 8580-8671)	9	1.4%	1.7%
Unspecified, Carcinoma, NOS (8010-8011, 8020-8022)	33	4.8%	3.9%
Other specific types (8680-8713, 8720-8790, 8800-8921, 8930-8936, 8950-9030, 9040-9044, 9060-9110, 9120-9136, 9150-9252, 9260-9365, 9370-9373, 9380-9539, 9540-9582,)	1	0.1%	0.3%
Unspecified (8000-8005)	25	3.6%	0.6%

[1] Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2010.

[2] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2010.

[3] Histology types were defined using the International Classification of Diseases for Oncology, Third Edition (ICD-O-3).

Table 6 shows the distribution of esophageal cancer in Ohio and the United States by histologic grouping. The most common histologic grouping in Ohio and the United States was adenocarcinoma, followed by epidermoid carcinoma (specifically, squamous cell carcinoma). In Ohio, compared to the United States, there was a higher proportion of adenocarcinoma; unspecified carcinoma, NOS; and unspecified; whereas, the United States had a higher proportion of epidermoid carcinoma; other specific carcinomas; and other specific types.

Did You Know?

The combination of tobacco smoking and alcohol consumption has been shown to increase the risk of esophageal cancer much more than either factor alone.

Esophageal Cancer Risk Factors

- **Age** — Esophageal cancer risk increases with advancing age, peaking around 70 to 80 years of age.
- **Gender** — Esophageal cancer rates are around three times greater among males, compared to females.
- **Tobacco Smoking** — Smoking increases risk.
- **Alcohol** — Heavy alcohol consumption increases risk, especially among users of tobacco products. The combination of tobacco use and alcohol consumption is shown to have a greater effect than either factor alone.
- **Obesity** — Being overweight or obese increases risk.
- **Hot Liquids** — Regular intake of very hot liquids increases risk.
- **Lye Ingestion** — Children who ingest lye are at greater risk of developing esophageal cancer as adults.
- **Diseases/Conditions** — Several diseases/conditions increase risk.
 - **Barrett's esophagus** — a condition associated with long-term reflux of stomach fluids into the lower esophagus
 - **Long-standing gastroesophageal reflux disease**
 - **Helicobacter pylori infection** — a condition that may lead to gastric atrophy (destruction), which increases risk
 - **Achalasia** — a disease in which the lower esophageal sphincter does not relax properly to allow food/liquid to pass into the stomach
 - **Tylosis** — a rare, genetic disease that causes excess skin growth on the palms of the hands and soles of the feet
 - **Esophageal webs** — abnormal protrusions of tissue into the esophagus that can interfere with swallowing
- **Diet** — Diets high in cruciferous vegetables (e.g. cabbage, broccoli) and yellow and green vegetables decrease risk.
- **Aspirin/NSAIDs** — Aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs) decrease risk.

Esophageal Cancer Signs and Symptoms

Although there are usually no early signs of esophageal cancer, a number of symptoms may appear as the cancer grows:

- Difficult/painful swallowing;
- Weight loss;
- Pain in the throat, back, shoulder blades or behind the breastbone;
- Hoarseness, chronic cough and coughing blood; and
- Vomiting

It is possible that one or more of these signs and symptoms may be the result of other health problems. If you have any of these symptoms, you should consult with your health care provider.

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 esophageal cancer, please talk with your health care provider or visit one of the following websites:

- **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://cancer.osu.edu/patientsandvisitors/Pages/index.aspx>
- **The Cleveland Clinic:**
http://my.clevelandclinic.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/clinical/default.asp>
- **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/dis/ociss/ci_surv1.aspx
 - **National Cancer Institute:**
<http://www.cancer.gov/cancertopics/types/esophageal>
 - **American Cancer Society:**
<http://www.cancer.org/cancer/esophaguscancer/index>
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Ohio Cancer Incidence Surveillance System (OCISS)

Ohio Department of Health

and

**The Ohio State University Comprehensive Cancer Center —
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