



Liver & Intrahepatic Bile Duct Cancer In Ohio, 2000-2004

This Report on Liver & Intrahepatic Bile Duct 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
- Histology Information
- Stage at Diagnosis by Gender
- Survival Probability by Stage at Diagnosis
- Trends in Stage at Diagnosis, Incidence and Mortality
- Risk Factors
- Signs and Symptoms
- Clinical Trials Information
- Sources of Data and Additional Information

Liver & Intrahepatic Bile Duct Cancer Incidence and Mortality

Cancers of the liver and intrahepatic bile duct (IBD) made up approximately 1 percent of incident (newly diagnosed) cancers reported to the Ohio Cancer Incidence Surveillance System (OCISS) from 2000 to 2004 (Table 1). Liver and IBD cancers reported to the OCISS are primary cancers, meaning the cancer originated in liver or IBD tissue, as opposed to secondary or metastatic cancers of the liver, which originated in tissues from another part of the body. The average annual age-adjusted liver and IBD cancer incidence rate in Ohio from 2000 to 2004 was 4.1 cases per 100,000 residents, or an average of 498 cases per year (N). The average annual age-adjusted U.S. (SEER¹) incidence rate for this time period was 6.2 cases per 100,000, which was 51 percent greater than the rate for Ohio. Reporting of invasive liver and IBD cancer in Ohio was estimated to be only 77 percent complete in 2000-2004, which may partially explain the lower incidence rates in Ohio. However, completeness is estimated using Ohio mortality rates, and liver cancer is often erroneously coded as a cause of death when another primary cancer has metastasized to the liver. This over-inflation of liver cancer mortality results in an underestimate of completeness; although it is still possible not all liver and IBD cancers have been reported in Ohio. The 2000-2004 U.S. (NCHS²) average annual age-adjusted mortality rate for liver and IBD cancer of 4.9 deaths per 100,000 was 16.7 percent higher than the 2000-2004 Ohio mortality rate of 4.2 per 100,000.

Table 1: Leading Sites/Types and Liver & IBD 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), 2000-2004 ^{1,2,3}

Incidence	N	%	Ohio Rate	U.S. Rate	Mortality	N	%	Ohio Rate	U.S. Rate
All Sites/Types	55,880		464.8	470.1	All Sites/Types	24,894		205.4	192.7
Lung and Bronchus	9,028	16.2%	74.9	64.5	Lung and Bronchus	7,326	29.4%	60.6	54.7
Breast (Female)	8,118	14.5%	123.7	127.8	Colon and Rectum	2,577	10.4%	21.2	19.4
Prostate	7,778	13.9%	149.6	168.0	Breast (Female)	1,919	7.7%	27.9	25.5
Colon and Rectum	6,559	11.7%	54.2	51.6	Prostate	1,272	5.1%	28.3	27.9
Bladder	2,638	4.7%	21.8	21.1	Pancreas	1,266	5.1%	10.4	10.6
Non-Hodgkin's Lymphoma	2,276	4.1%	19.0	19.3	Non-Hodgkin's Lymphoma	998	4.0%	8.2	7.6
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Liver and IBD	498	0.9%	4.1	6.2	Liver and IBD	506	2.0%	4.2	4.9

Source: Ohio Cancer Incidence Surveillance System, Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2007.

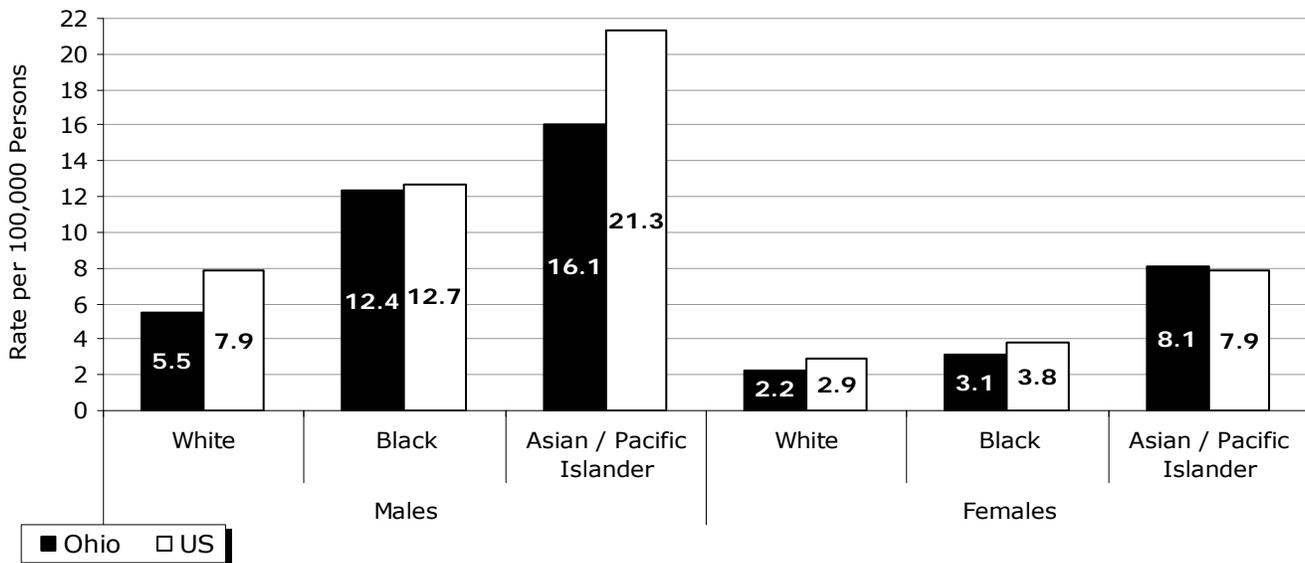
[1] SEER: Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2007.

[2] NCHS: National Center for Health Statistics, 2005.

[3] See Technical notes on page 10 for definitions and methodology.

Liver & IBD Cancer Incidence in Ohio Compared to the United States

Figure 1: Cancer of the Liver & IBD: Average Annual Age-adjusted Incidence Rates per 100,000 Persons, by Gender and Race in Ohio with Comparison to the US (SEER), 2000-2004



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007, and the Surveillance, Epidemiology and End Results Program, National Cancer Institute, 2007.

In Ohio from 2000 to 2004, an average of 333 males (67 percent) and 167 females (33 percent) were diagnosed with liver and IBD cancer. Figure 1 shows the liver and IBD cancer age-adjusted incidence rates among males were greater than those of females for each race group in both Ohio and the United States. The reason(s) for this difference may be related to gender differences in risk factors, such as alcohol abuse-related cirrhosis of the liver. In Ohio as well as the United States, the greatest liver and IBD cancer incidence rates were observed among Asian/Pacific Islanders (N = 11), followed by blacks (N = 78) then whites (N = 401). These disparities may be related to racial differences in risk factors, such as hepatitis B and C infections and exposure to aflatoxins. The Ohio liver and IBD cancer incidence rates were lower than the rates for the United States for all race/gender groups, with the exception of Asian/Pacific Islander females. It should be noted that the lower rates in Ohio may result from incomplete reporting. The greatest percent difference between Ohio and the United States was observed for white males, for whom the U.S. rate was 44 percent higher than the Ohio rate.

Liver & IBD Cancer Cases and Rates by County of Residence

Figure 2 presents 2000-2004 average annual age-adjusted liver and IBD cancer incidence rates by county of residence. County-specific liver and IBD cancer incidence rates in Ohio ranged from 1.7 to 7.2 per 100,000 residents. Some counties with the highest incidence rates were located in the central, southwestern and south-central portions of the state, although the geographic pattern is relatively sporadic. The following counties had the highest incidence rates for this time period (5.6 or more cases per 100,000 residents): Hocking (N = 2), Jackson (N = 2), Madison (N = 2), Noble (N = 1), Ottawa (N = 3), Paulding (N = 1) and Union (N = 2); although the average number of cases diagnosed in these counties each year is relatively small.

Liver & IBD Cancer Cases and Rates by Age at Diagnosis

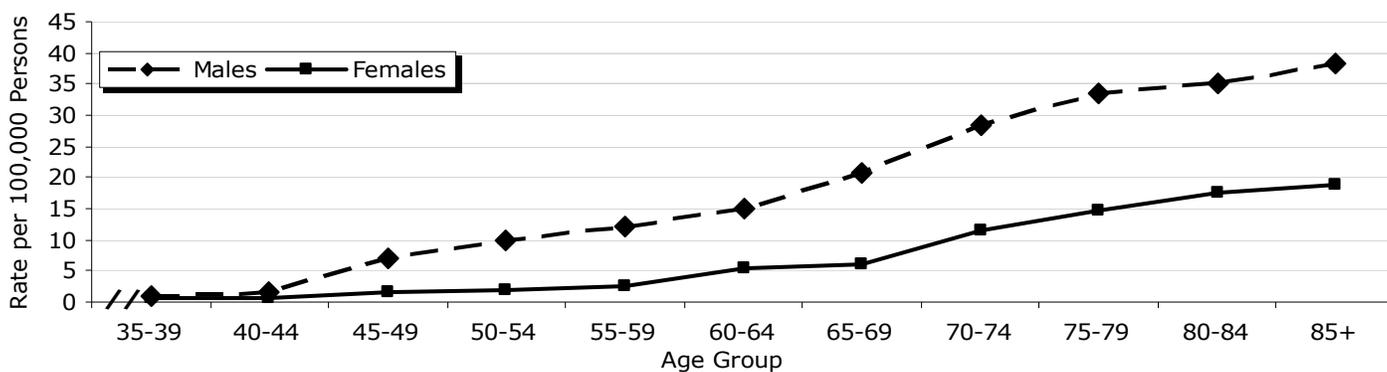
Table 2: Cancer of the Liver & IBD: Average Annual Number of Cases (N), Incidence Rates per 100,000 Persons and Cumulative Percentages (Cum%), by Age Group and Gender in Ohio, 2000-2004

Age Group	Males			Females			Total		
	N	Rate	Cum%	N	Rate	Cum%	N	Rate	Cum%
<1	1	1.6	0.4%	<1	*	0.4%	2	1.2	0.4%
1-4	1	0.5	0.8%	2	0.7	1.6%	3	0.6	1.0%
5-9	<1	*	0.8%	<1	*	1.7%	<1	*	1.1%
10-14	<1	*	1.1%	<1	*	1.9%	1	0.1	1.4%
15-19	<1	*	1.1%	<1	*	1.9%	<1	*	1.4%
20-24	<1	*	1.2%	<1	*	2.3%	<1	*	1.6%
25-29	<1	*	1.3%	<1	*	2.7%	1	0.1	1.8%
30-34	2	0.4	1.8%	<1	*	3.1%	2	0.3	2.2%
35-39	3	0.8	2.8%	2	0.6	4.6%	6	0.7	3.4%
40-44	8	1.7	5.1%	3	0.7	6.6%	11	1.2	5.6%
45-49	30	7.0	14.2%	8	1.7	11.2%	38	4.3	13.2%
50-54	37	9.8	25.4%	8	2.0	15.9%	45	5.8	22.2%
55-59	36	12.2	36.1%	9	2.7	21.1%	44	7.3	31.1%
60-64	34	15.1	46.4%	14	5.4	29.5%	48	10.0	40.8%
65-69	38	20.7	57.8%	13	6.0	37.3%	51	12.7	51.0%
70-74	45	28.3	71.3%	23	11.4	51.4%	68	18.8	64.7%
75-79	45	33.5	84.7%	28	14.7	68.6%	73	22.4	79.3%
80-84	30	35.1	93.6%	26	17.7	84.3%	56	24.1	90.5%
85+	21	38.4	100.0%	26	18.9	100.0%	47	24.5	100.0%

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007.

* Rates may be unstable and are not presented when the case count for 2000-2004 is less than five (i.e., N<5).

Figure 3: Cancer of the Liver & IBD: Age-specific Incidence Rates (Ages 35+) per 100,000 Persons, by Gender in Ohio, 2000-2004



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007.

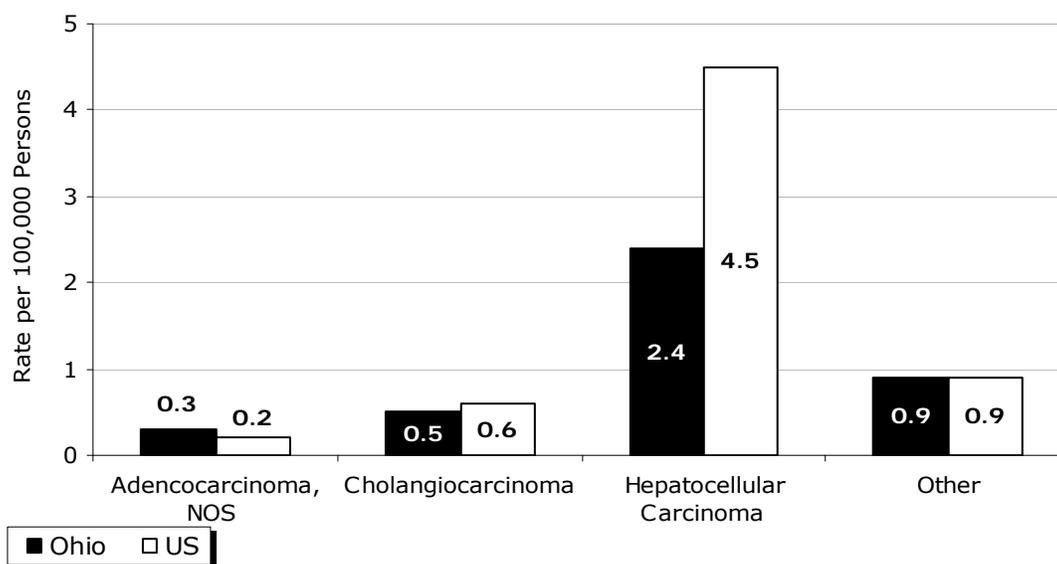
Table 2 and Figure 3 show age-specific incidence rates for liver and IBD cancer by gender. The median age at diagnosis of liver and IBD cancer occurred in the 65 to 69 years age group for males and in the 70 to 74 years age group for females. Among males and females, liver and IBD cancer incidence rates increased with advancing age group from ages 35 to 39 years to 85 years and older. The cumulative percentages in Table 2 indicate nearly half of liver and IBD cancers were diagnosed among persons ages 70 years and older.

Liver & IBD Cancer Histology

Histology refers to the cancer tissue or cell type. Most primary liver cancers begin in hepatocytes (liver cells). This type of cancer is called hepatocellular carcinoma or malignant hepatoma. The histology cholangiocarcinoma, which accounts for fewer cases of liver cancer, starts in the small tubes that carry bile to the gallbladder (called bile ducts). Both hepatocellular carcinomas and cholangiocarcinomas are adenocarcinomas (tumors arising in glandular tissue). An adenocarcinoma, not otherwise specified (NOS) of the liver or IBD is a cancer that cannot be described more specifically or placed into a refined histological type, such as hepatocellular carcinoma. Other histological types of liver and IBD cancer include hemangioendothelioma (originating in liver blood vessels) and sarcoma and angiosarcoma (both originating in connective tissue).

As shown in Figure 4, the age-adjusted incidence rates of adenocarcinoma NOS, cholangiocarcinoma and other liver and IBD cancer histologies in Ohio are similar to those of the United States. However, the rate of hepatocellular carcinoma in the United States is 88 percent greater than that in Ohio; this large difference may be due to incomplete reporting of hepatocellular carcinoma in Ohio.

Figure 4: Cancer of the Liver & IBD: Age-adjusted Incidence Rates per 100,000 Persons, by Histological Type in Ohio and the US, 2000-2004^{1, 2}



[1] Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007.

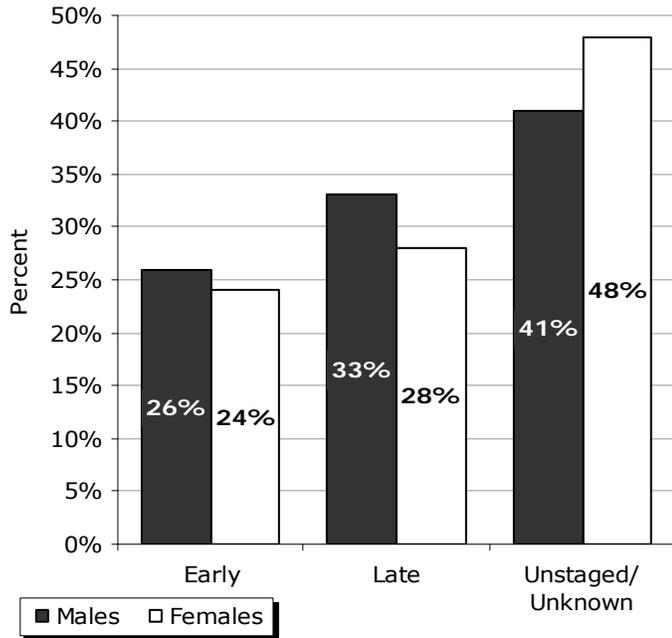
[2] See technical notes on page 10 for ICD-O-3 codes for each histological type.

Did You Know?

In the past 30 years, the age-adjusted incidence rate of liver and IBD cancer has more than doubled in the United States, from 2.6 per 100,000 persons in 1975 to 6.1 per 100,000 persons in 2004.

Liver & IBD Cancer Cases and Survival by Stage at Diagnosis

Figure 5: Cancer of the Liver & IBD: Proportion of Cases (%) by Stage at Diagnosis and Gender in Ohio, 2000-2004



N = 499 cases per year

Note: <1% of cases were diagnosed *in situ*.

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007.

The stage at diagnosis of liver and IBD cancer is an important determinant of survival. For *in situ* cancers, the tumor has not invaded or penetrated surrounding tissue. 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. In 2000-2004, only one person in Ohio was diagnosed with *in situ* liver and IBD cancer. The 2000-2004 Ohio data presented in Figure 5 reveal 26 percent of liver and IBD cancers among males were diagnosed at the localized (early) stage, which is greater than the 24 percent of females diagnosed early stage. Males also had a higher percentage (33 percent) of later (regional and distant) stage diagnoses compared to females (28 percent). This can be explained by the higher percentage of liver and IBD cancer cases reported unstaged/unknown stage among females (48 percent) compared to males (41 percent). There is no known reason(s) accounting for these gender differences in stage at diagnosis.

Table 3 shows the U.S. (SEER) five-year survival probability for liver and IBD cancer diagnosed in 1996-2003 was 10.8 percent for all stages combined. Five-year survival probabilities were 22.3 percent at the localized stage, 7.3 percent at the regional stage and only 2.8 percent for distant-stage tumors. Five-year survival probability for all stages combined was higher for whites (10.4 percent) and Asian/Pacific Islanders (10.2 percent) compared to blacks (7.0 percent), and was slightly greater for females (11.7 percent) compared to males (10.4 percent).

At present, there is no known screening test for use in detecting liver and IBD cancers at earlier stages.

Table 3: Cancer of the Liver & IBD: Five-year Survival Probability (%) by Stage at Diagnosis in the US (SEER), 1996-2003

Stage	Overall Five-year Survival Probability (%)
All Stages	10.8%
Localized	22.3%
Regional	7.3%
Distant	2.8%

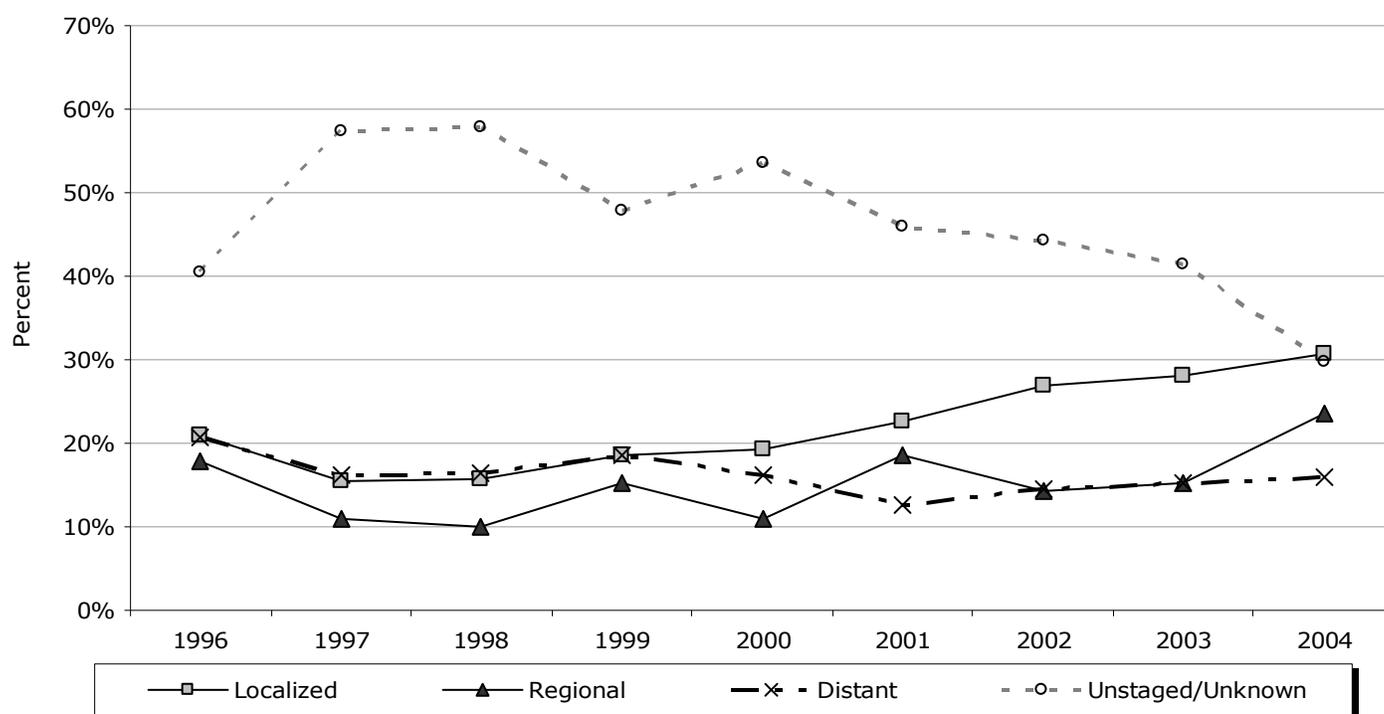
Source: SEER Cancer Statistics Review 1975-2004, National Cancer Institute, 2007.

Did You Know?

Incidence rates of liver and IBD cancer in Southeast Asia, where chronic infections of hepatitis B and C viruses are more common, are three to four times those in North America and Western Europe. In addition, in the United States, incidence rates among Asian/Pacific Islanders are much greater than those of whites and blacks.

Liver & IBD Cancer Stage at Diagnosis Trends

Figure 6: Cancer of the Liver & IBD: Trends in the Proportion of Cases (%) by Stage at Diagnosis in Ohio, 1996-2004

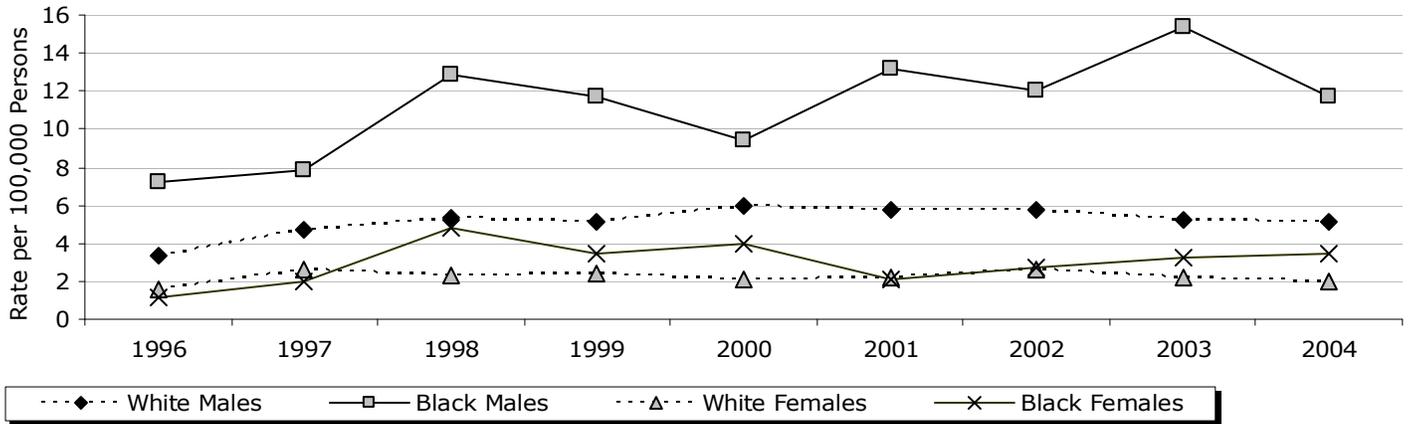


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007.

Figure 6 shows the distribution of stage at diagnosis of liver and IBD cancer according to year of diagnosis from 1996 to 2004. The proportion of cases diagnosed at the distant stage decreased from 21 percent in 1996 to 16 percent in 2004; whereas the proportion diagnosed at the localized stage increased from 21 percent in 1996 to 31 percent in 2004, and the proportion diagnosed at the regional stage increased from 18 percent in 1996 to 24 percent in 2004. These changes were accompanied by a decrease in the proportion of cases with an unstaged/unknown stage at diagnosis during this time period (41 percent in 1996 to 30 percent in 2004).

Liver & IBD Cancer Incidence and Mortality Trends

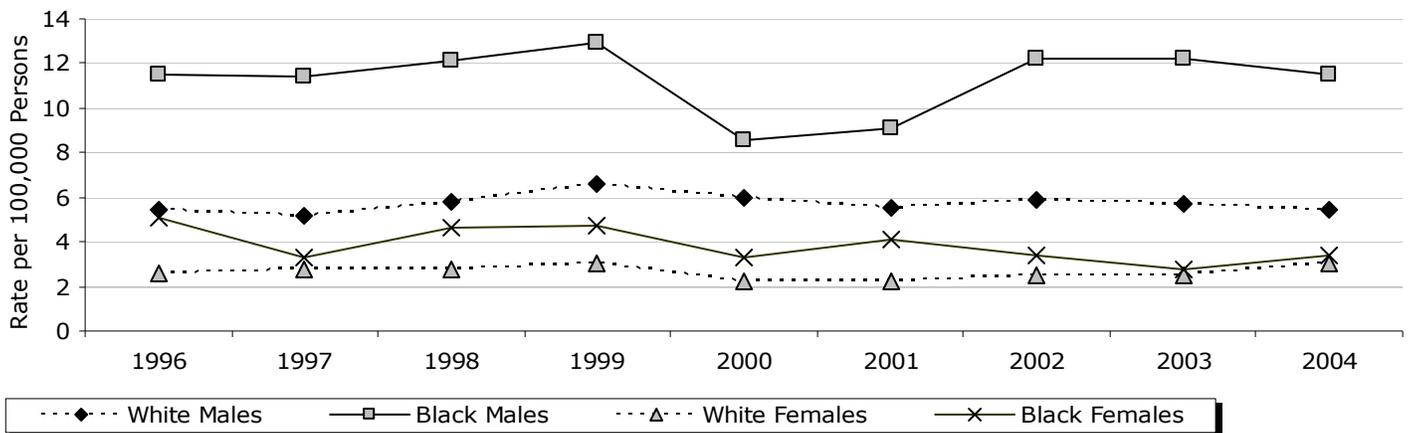
Figure 7: Cancer of the Liver & IBD: Trends in Average Annual Age-adjusted Incidence Rates per 100,000 Persons, by Gender and Race in Ohio, 1996-2004



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2007.

Figure 7 shows incidence rates of liver and IBD cancer according to year of diagnosis by race/gender group. From 1996 to 2004, there were increases in liver and IBD cancer incidence rates among white and black males and black females, while the increase among white females was slight. The greatest increase in liver and IBD cancer incidence rates was observed for black females, as the rate in 2004 was more than double the rate in 1996. Compared to the rates in 1996, the rate among black males was 63 percent greater in 2004, and the rates among white males and females were 55 and 25 percent greater, respectively.

Figure 8: Cancer of the Liver & IBD: Trends in Average Annual Age-adjusted Mortality Rates per 100,000 Persons, by Gender and Race in Ohio, 1996-2004



Source: Chronic Disease and Behavioral Epidemiology Section and the Vital Statistics Program, Ohio Department of Health, 2007.

Figure 8 shows trends in mortality rates of liver and IBD cancer according to year of death (1996-2004) by race/gender group. Mortality rates among white and black males are greater than those of their female counterparts. In general, mortality rates of liver and IBD cancer have not increased as greatly as incidence rates. There does not appear to be a consistent increase or decrease in liver and IBD cancer mortality rates for males or females during the time period.

Risk Factors for Liver & IBD Cancer

- **Age** — In the United States, liver cancer occurs more often in people over age 60 than in younger people.
- **Gender** — Hepatocellular carcinoma is much more common in males than in females, and much of this excess is likely due to differences in health behaviors that affect other risk factors for liver cancer (e.g. alcohol abuse).
- **Family History** — People who have family members with liver cancer may have greater risk.
- **Chronic Hepatitis B or C Virus Infection** — Chronic (long-term) infection with hepatitis B or C virus is the most common liver cancer risk factor. These viruses can be passed from person to person through blood (such as by sharing needles) or sexual contact.
- **Cirrhosis** — Cirrhosis is a disease in which liver cells become damaged and are replaced by scar tissue. The primary causes of cirrhosis are alcohol abuse, chronic hepatitis B or C infection, certain inherited metabolic diseases (described below) and some types of autoimmune diseases.
- **Inherited Metabolic Diseases** — Diseases such as hemochromatosis (a disease in which too much iron is absorbed from food) increase liver cancer risk. Other rare diseases that increase the risk of liver cancer include tyrosinemia, alpha1-antitrypsin deficiency, porphyria cutanea tarda, glycogen storage diseases and Wilson's disease.
- **Diabetes** — Diabetes increases risk of liver cancer, usually in patients who have other risk factors such as heavy alcohol consumption and/or chronic hepatitis.
- **Obesity** — Obesity increases the risk of fatty liver disease and cirrhosis, resulting in increased risk for liver cancer.
- **Aflatoxins** — Aflatoxins, made by a fungus that contaminates peanuts, wheat, soybeans, ground nuts, corn and rice, greatly increase liver cancer risk.
- **Vinyl Chloride and Thorium Dioxide (Thorotrast)** — Exposure to vinyl chloride, a regulated chemical used in making some plastics, increases risk of some types of liver cancer. Thorotrast, a chemical used in the past in conjunction with certain X-ray tests, increases liver cancer risk.
- **Anabolic Steroids** — Long-term anabolic steroid use slightly increases risk of liver cancer.
- **Arsenic** — Chronic exposure to drinking water contaminated with naturally occurring arsenic increases the risk of some types of liver cancer.
- **Conditions and Diseases Increasing IBD Cancer Risk** — The following conditions and diseases increase risk of bile duct cancer: chronic inflammation of the bile duct; ulcerative colitis (involving inflammation of the large intestine); stones in the bile duct; polycystic liver disease; choledochal cysts; congenital dilation of the IBD (also known as Caroli syndrome); and cirrhosis. In addition, in Asian countries, infection by liver flukes (food- or water-borne parasites that invade the bile duct) is a major cause of bile duct cancer.

Liver & IBD Cancer Signs and Symptoms

Many people with early-stage liver and IBD cancer have no signs or symptoms. When symptoms are present in early or late stages, they include weight loss, persistent stomach pain, jaundice, lack of an appetite, fever and fatigue. These liver cancer symptoms may be caused by other conditions and diseases. It is important to see your doctor if you have any or these symptoms.

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 liver and IBD 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
- **Comprehensive Cancer Center at The Ohio State University/The Arthur G. James Cancer Hospital and Richard J. 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>
- **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/liver>
- **American Cancer Society:**
http://www.cancer.org/docroot/lrn/lrn_0.asp

Technical Notes

- [1] Liver & IBD cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), codes C220-C221, excluding histology types 9590-9989. Histological subgroups were defined as follows: Adenocarcinoma, NOS histology type 8140, Cholangiocarcinoma histology type 8160 and Hepatocellular carcinoma histology types 8170-8175. Liver and IBD cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C220-C229.
 - [2] The 2000-2004 Ohio rates were calculated using the following populations: vintage 2005 postcensal estimates for July 1, 2000-2004 (U.S. Census Bureau, 2006). 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.
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