

Ocular Melanoma in Ohio, 2011-2015

Incidence

Ocular melanoma (OM) is a rare cancer of melanocytes (cells that produce the pigment melanin) found in the eye. An average of 112 cases of OM were diagnosed annually in Ohio during 2011-2015 according to data from the Ohio Cancer Incidence Surveillance System (OCISS), the central cancer registry for the state of Ohio (Table 1). The average annual age-adjusted incidence rate for OM in Ohio during this time period was 0.83 per 100,000, which was 36 percent higher than the national incidence rate of 0.61 per 100,000. The incidence rate among males diagnosed with OM (0.94 per 100,000) was higher than the rate among females (0.75 per 100,000), and the incidence rate was 16 times higher among whites (0.93 per 100,000) compared to blacks (0.06 per 100,000) in Ohio in 2011-2015.

OM is the second most common type of melanoma after cutaneous (skin), representing about 5 percent of all melanomas according to the Ocular Melanoma Foundation. OM can grow and spread to other parts of the body in a process called metastasis. The liver is the most common site of metastasis in OM. Up to 50 percent of OM patients will develop metastatic disease within 15 years of the original diagnosis. Currently, there is no cure for metastatic OM.

Key Findings and Populations at High Risk

- An average of 112 cases of ocular melanoma (OM) were diagnosed each year in Ohio in 2011-2015.
- The OM incidence rate in Ohio was 0.83 per 100,000, which was 36 percent higher than the national rate of 0.61 per 100,000 in 2011-2015.
- OM occurs more often in males than in females.
- Whites have much higher incidence rates of OM than blacks in Ohio and the United States.
- OM was most frequently diagnosed among Ohioans ages 55 to 64 in 2011-2015.
- Trends in OM incidence rates remained stable nationally; Ohio incidence rates were variable, trending upward after 2010.
- In Ohio, there was no clear geographic pattern of OM incidence by county in 1996-2015.
- Most OM cases (78.0 percent) were diagnosed at the local stage in Ohio in 2011-2015.
- Choroidal melanoma was the most common subtype (73.6 percent of all OMs) in Ohio in 2011-2015.

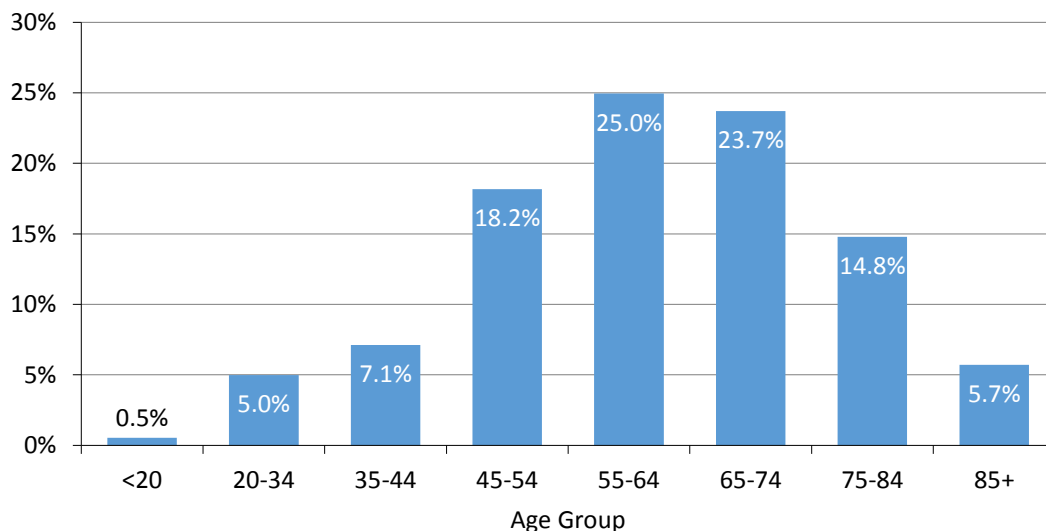
Table 1. Average Annual Number and Age-adjusted Incidence Rates of OM Cases per 100,000 Persons by Sex and Race, Ohio and the United States, 2011-2015

		OM Incidence		
		Ohio Cases	Ohio Rate	U.S. Rate
Total		112	0.83	0.61
Sex	Male	60	0.94	0.69
	Female	53	0.75	0.54
Race	White	110	0.93	0.74
	Black	1	0.06	0.07

Sources: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018; Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute, 2018. U.S. OM incidence rates were based on the SEER 18 regions (Nov 2017 submission), calculated using SEER*Stat software version 8.3.5.

Incidence by Age Group

Figure 1. Percentage of OM Cases by Age Group, Ohio, 2011-2015



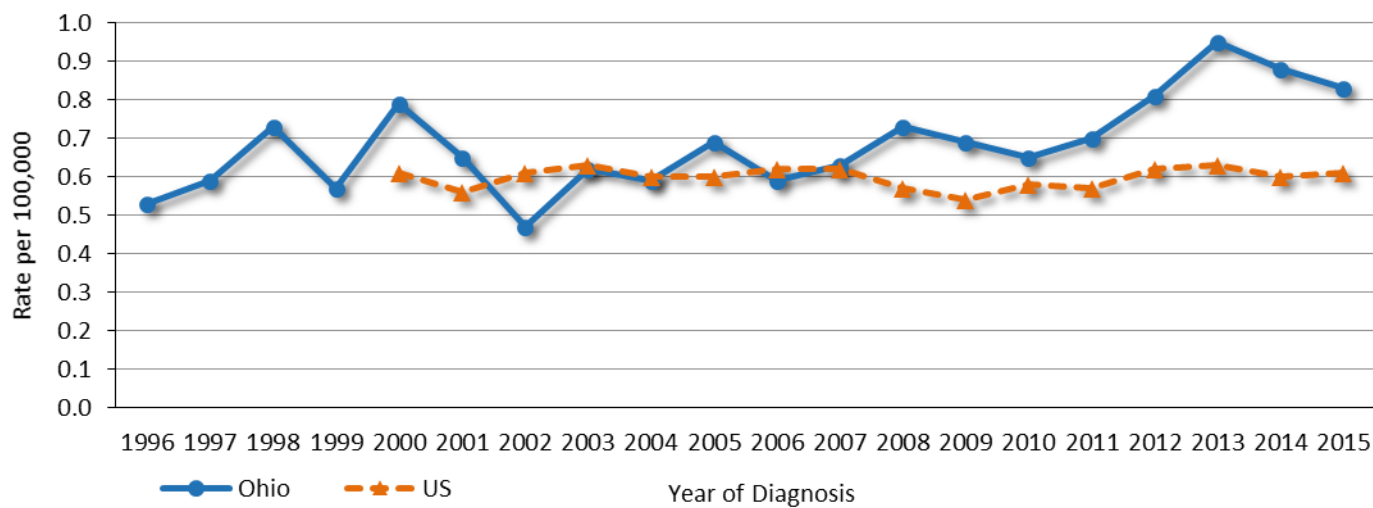
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018.

In Ohio in 2011-2015, OM was most frequently diagnosed among people between the ages of 55 and 64 (25.0 percent), followed by those ages 65 to 74 (23.7 percent) (Figure 1).

Trends in Incidence

Figure 2 shows incidence rates of OM according to year of diagnosis in Ohio (1996-2015) and the United States (2000-2015). OM incidence rates remained stable in the United States from 2000 to 2015. In Ohio, incidence rates were variable from 1996 through 2010 and then increased through 2013.

Figure 2. Trends in Age-adjusted OM Incidence Rates per 100,000 Persons by Sex, Ohio, 1996-2015

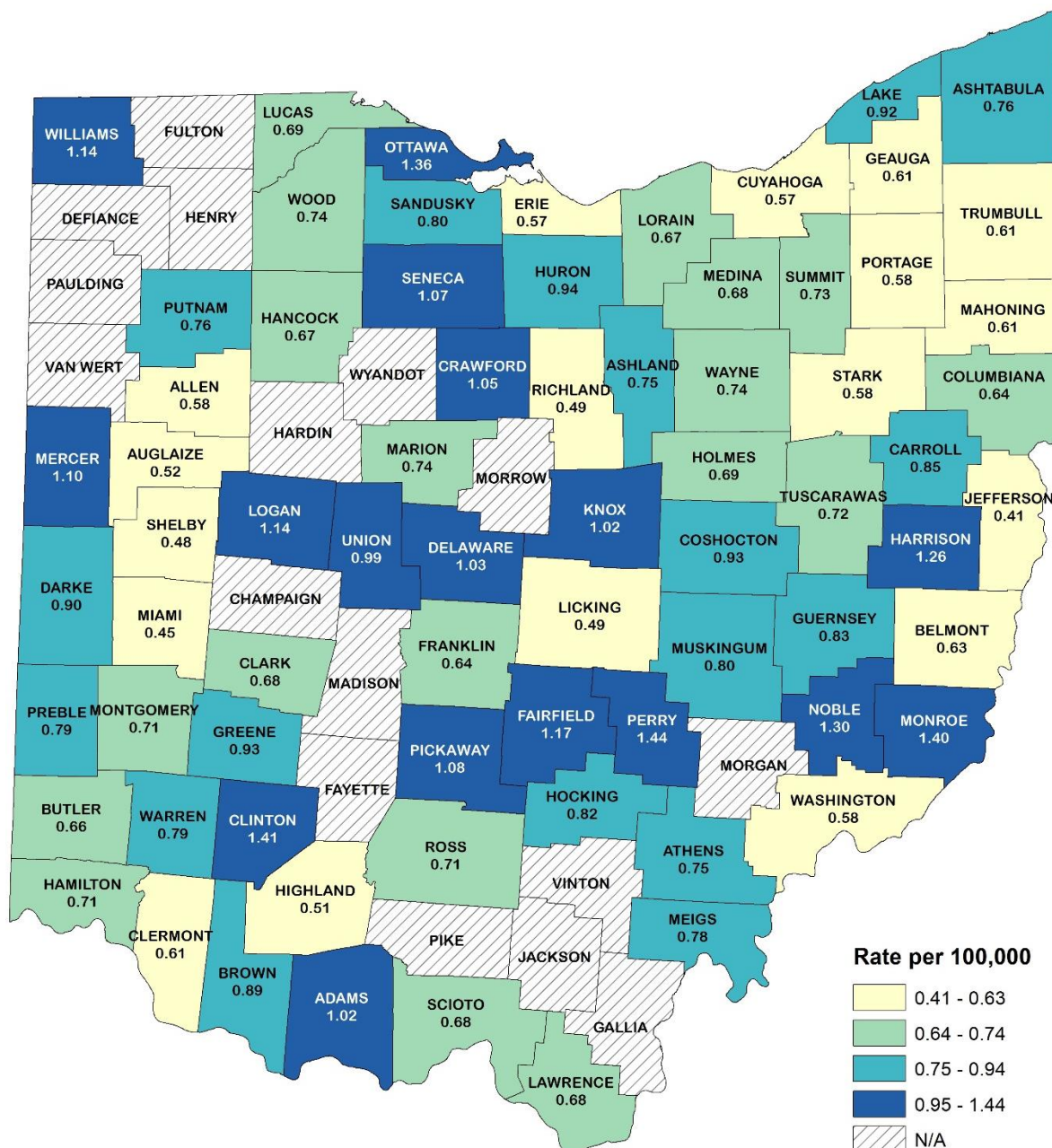


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018; Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute, 2018. SEER data are from the SEER 18 regions for cases diagnosed in 2000-2015 (Nov 2017 submission), calculated using SEER*Stat software version 8.3.5.

Incidence by County

Figure 3 shows 1996-2015 average annual age-adjusted OM incidence rates by county of residence. Because OM is rare, 20 years of data were combined to calculate county-level incidence rates; however, these rates may still be unstable due to small case counts and should be interpreted with caution. County-specific OM incidence rates in Ohio ranged from 0.41 to 1.44 per 100,000 persons, compared with Ohio's rate of 0.69 per 100,000 during 1996-2015. There was no clear geographic pattern of OM incidence rates by county in Ohio.

Figure 3. Average Annual Age-adjusted OM Incidence Rates per 100,000 Persons by County of Residence, Ohio, 1996-2015

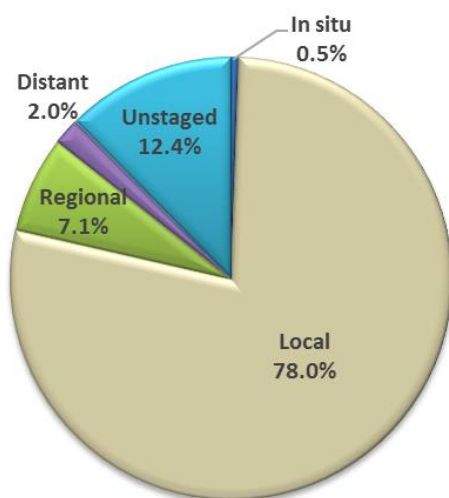


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018.

N/A: Rate not calculated when the case count for 1996-2015 is less than five.

Stage at Diagnosis

Figure 4. Proportion of OM Cases (%) by Stage at Diagnosis, Ohio, 2011-2015

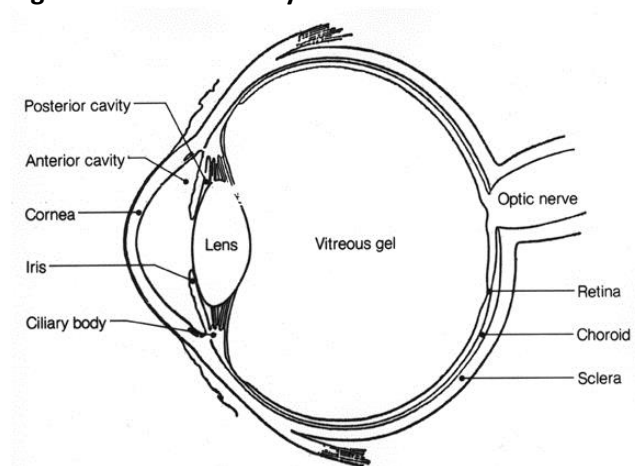


Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018.

Cancer stage at diagnosis, which refers to the extent or spread of a cancer in the body, is used to select appropriate treatment and is an important determinant of survival. If cancer cells are present only in the layer of cells where they developed and have not spread, the stage is *in situ*. If cancer cells have penetrated beyond the original layer of tissue, the cancer has become invasive and is categorized as local, regional or distant based on the extent of spread. In Ohio, most (78.0 percent) OM cases were diagnosed at the local stage in 2011-2015 (Figure 4). When the cancer is confined to the eye (local stage), the five-year relative survival probability is about 80 percent. If OM has spread to distant parts of the body, the five-year relative survival probability is about 15 percent.

Types of Ocular Melanoma

Figure 5. Parts of the Eye



Source: National Cancer Institute

Types of OM include uveal melanoma, conjunctival melanoma and other OMs in other parts of the eye (e.g., the retina), as well as overlapping and unspecified ocular subsites.

The uvea is the middle layer of the wall of the eye and has three main parts: the choroid (the tissue layer filled with blood vessels between the sclera and the retina), the ciliary body (the ring of muscle tissue that changes the size of the pupil and the shape of the lens) and the iris (the colored part of the eye) (Figure 5).

The conjunctiva (not labeled) is the membrane that lines the inner surface of the eyelid and also covers the front part of the eye.

Table 2. Average Annual Number and Proportion (%) of OM Cases by Type, Ohio, 2011-2015

Type (Site code)	Cases	Percent
Uveal melanoma (C69.3, C69.4)	93	83.1%
Choroidal melanoma (C69.3)	83	73.6%
Iris and ciliary body melanoma (C69.4)	11	9.5%
Conjunctival melanoma (C69.0)	5	4.5%
Other ocular melanoma	14	12.5%

Uveal melanoma is the most common type of OM and includes choroidal melanoma (73.6 percent) and iris and ciliary body melanoma (9.5 percent), based on invasive OM cases in Ohio in 2011-2015 (Table 2). Conjunctival melanoma, another type of OM, was less common (4.5 percent).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018.

Risk Factors and Populations at High Risk

Anything that increases your risk of getting a disease is called a risk factor. Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer. Risk factors for OM include:

- Having a fair complexion, which includes the following:
 - Fair skin that freckles and burns easily, does not tan or tans poorly.
 - Blue, green or other light-colored eyes.
- Older age.
- Being white.

Signs and Symptoms

OM may not cause early signs or symptoms. It is sometimes found during a regular eye exam when the doctor dilates the pupil and looks into the eye. Signs and symptoms may be caused by OM or by other conditions. Check with your doctor if you have any of the following:

- Blurred vision or other changes in vision.
- Floaters (spots that drift in your field of vision) or flashes of light.
- A dark spot on the iris.
- A change in the size or shape of the pupil.
- A change in the position of the eyeball in the eye socket.

Any of these signs/symptoms may be caused by cancer or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.

Early Detection

Tests that examine the eye are used to help detect and diagnose OM. These may include:

- Physical exam and history.
 - Eye exam with dilated pupil, including the following types of eye exams:
 - Ophthalmoscopy (An exam of the inside of the back of the eye using a small magnifying lens and a light).
 - Slit-lamp biomicroscopy (An exam of the inside of the eye using a strong beam of light and a microscope).
 - Gonioscopy (An exam of the front part of the eye between the cornea and iris to check for blockages).
 - Ultrasound exam of the eye (Creates a picture of the inside of the eye called a sonogram).
 - High-resolution ultrasound biomicroscopy (Makes a more detailed picture of the eye than a regular ultrasound).
 - Transillumination of the globe and iris (An exam of the iris, cornea, lens and ciliary body with a light placed on either the upper or lower lid).
 - Fluorescein angiography (A procedure to look at blood vessels and the flow of blood inside the eye using an orange fluorescent dye).
 - Indocyanine green angiography (A procedure to look at blood vessels in the choroid layer of the eye using a green dye).
 - Ocular coherence tomography (An imaging test that uses light waves to take cross-section pictures of the eye).
-

Technical Notes

Age-Adjusted Rate: A summary rate that is a weighted average of age-specific rates, where the weights represent the age distribution of a standard population (direct adjustment). The incidence and mortality rates presented in this report were standardized to the age distribution of the 2000 U.S. Standard Population. Under the direct method, the population was first divided into 19 five-year age groups, i.e., <1, 1-4, 5-9, 10-14, 15-19...85+, and the age-specific rate was calculated for each age group. Each age-specific rate was then multiplied by the standard population proportion for the respective age group.

Average Annual Number: The number of cases or deaths diagnosed per year, on average, for the time period of interest (e.g., 2011-2015). Average annual numbers are calculated by summing the number of cases or deaths for a given time period, dividing by the number of years that comprise the time period and rounding to the nearest whole number.

Census Data: The 1996-2015 rates were calculated using population estimates from the U.S. Census Bureau and National Center for Health Statistics. Population data were compiled from bridged-race intercensal population estimates for July 1, 1990-July 1, 1999; revised bridged-race intercensal population estimates for July 1, 2000-July 1, 2004 (released 10/26/2012); revised bridged-race intercensal population estimates for July 1, 2005-July 1, 2009 (released 6/26/2014) and vintage 2016 bridged-race postcensal population estimates for July 1, 2010-July 1, 2016 (released 6/26/2017).

Incidence: The number of cases diagnosed during a specified time period (e.g., 2011-2015). OM cases were defined by the International Classification of Diseases for Oncology, Third Edition (ICD-O-3), and categorized by site codes C690-C699 and histology codes 8720-8790 in accordance with the Surveillance, Epidemiology and End Results (SEER) Program of the National Cancer Institute. U.S. OM incidence data were obtained from the SEER 18 regions (Nov 2017 submission), calculated using SEER*Stat software version 8.3.5.

Invasive Cancer: A malignant tumor that has infiltrated the organ in which the tumor originated. Invasive cancers consist of those diagnosed at the local, regional, distant and unstaged/missing stages. Only invasive cancers were included in the calculation of incidence rates in this document.

Rate: The number of cases or deaths per unit of population (e.g., per 100,000 persons) during a specified time period (e.g., 2011-2015). Rates may be unstable and are not presented when the count is less than five.

Relative Survival: The percentage of people who are alive at a designated time period (usually five years) after a cancer diagnosis divided by the percentage expected to be alive in the absence of cancer based on normal life expectancy.

Stage at Diagnosis: The degree to which a tumor has spread from its site of origin at the time of diagnosis. Cancer stage is often related to survival and is used to select appropriate treatment. Patients with early stage disease often have better long-term survival, and detecting cancers at an early stage may lead to a reduction in mortality. The stages of cancer, in the order of increasing spread, are *in situ*, local, regional and distant. *In situ* and localized tumors are referred to as early stage tumors, and regional and distant tumors are termed late stage. Cancers diagnosed at the local, regional, distant and unstaged/missing stages are categorized as invasive.

in situ—Noninvasive cancer that has not penetrated surrounding tissue.

Local—A malignant tumor confined entirely to the organ of origin.

Regional—A malignant tumor that has extended beyond the organ of origin directly into surrounding organs or tissues or into regional lymph nodes.

Distant—A malignant tumor that has spread to parts of the body (distant organs, tissues and/or lymph nodes) remote from the primary tumor.

Unstaged/Missing—Insufficient information is available to determine the stage or extent of the disease at diagnosis.

Table 3. Total Number of Invasive OM Cases and Age-adjusted Incidence Rates per 100,000 Persons by County of Residence, Ohio, 1996-2015

	Cases	Rate		Cases	Rate
Adams	6	1.02	Licking	17	0.49
Allen	14	0.58	Logan	12	1.14
Ashland	9	0.75	Lorain	45	0.67
Ashtabula	17	0.76	Lucas	63	0.69
Athens	9	0.75	Madison	4	*
Auglaize	5	0.52	Mahoning	39	0.61
Belmont	10	0.63	Marion	11	0.74
Brown	8	0.89	Medina	25	0.68
Butler	45	0.66	Meigs	5	0.78
Carroll	5	0.85	Mercer	10	1.10
Champaign	4	*	Miami	11	0.45
Clark	22	0.68	Monroe	5	1.40
Clermont	22	0.61	Montgomery	85	0.71
Clinton	12	1.41	Morgan	3	*
Columbiana	17	0.64	Morrow	3	*
Coshocton	7	0.93	Muskingum	15	0.80
Crawford	11	1.05	Noble	5	1.30
Cuyahoga	173	0.57	Ottawa	14	1.36
Darke	12	0.90	Paulding	4	*
Defiance	2	*	Perry	11	1.44
Delaware	29	1.03	Pickaway	12	1.08
Erie	11	0.57	Pike	3	*
Fairfield	32	1.17	Portage	18	0.58
Fayette	2	*	Preble	7	0.79
Franklin	127	0.64	Putnam	6	0.76
Fulton	3	*	Richland	14	0.49
Gallia	4	*	Ross	12	0.71
Geauga	14	0.61	Sandusky	11	0.80
Greene	30	0.93	Scioto	12	0.68
Guernsey	8	0.83	Seneca	13	1.07
Hamilton	122	0.71	Shelby	5	0.48
Hancock	10	0.67	Stark	52	0.58
Hardin	3	*	Summit	89	0.73
Harrison	5	1.26	Trumbull	33	0.61
Henry	1	*	Tuscarawas	17	0.72
Highland	5	0.51	Union	10	0.99
Hocking	5	0.82	Van Wert	3	*
Holmes	5	0.69	Vinton	3	*
Huron	12	0.94	Warren	29	0.79
Jackson	4	*	Washington	9	0.58
Jefferson	7	0.41	Wayne	19	0.74
Knox	14	1.02	Williams	10	1.14
Lake	50	0.92	Wood	18	0.74
Lawrence	10	0.68	Wyandot	3	*

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2018.

*Rate not presented when the count for 1996-2015 is less than five.

Sources of Data and Additional Information

Ohio Cancer Incidence Surveillance System:

http://www.odh.ohio.gov/health/cancer/ocisshs/ci_surv1.aspx

National Cancer Institute:

<https://www.cancer.gov/types/eye/patient/about-intraocular-melanoma-pdq>

American Cancer Society:

<https://www.cancer.org/cancer/eye-cancer/about.html>

Ocular Melanoma Foundation:

<http://www.ocularmelanoma.org/disease.htm>

To address comments and information requests:

Ohio Cancer Incidence Surveillance System (OCISS)
Ohio Department of Health
246 North High Street
Columbus, OH 43215
Phone: (614) 752-2689
Fax: (614) 644-8028
E-mail: ociss@odh.ohio.gov

Acknowledgements

The following individuals contributed to this report:

John Kollman, M.S.; Holly L. Sobotka, M.S.
Ohio Department of Health

Sincere appreciation to the OCISS, cancer registrars, medical records technicians and other health professionals who improve the collection and quality of cancer data in Ohio.

Suggested Citation

Ocular Melanoma in Ohio, 2011-2015. Ohio Cancer Incidence Surveillance System, Ohio Department of Health, November 2018.

This report is public information. Reproduction and copying of this report for cancer prevention and control, education and program planning are greatly encouraged. Citation of source, however, is appreciated.



The OCISS is supported in part by the State of Ohio and the Centers for Disease Control and Prevention (CDC), National Program of Cancer Registries, cooperative agreement number NU58DP006284. The contents are the sole responsibility of the authors and do not necessarily represent the official views of the CDC.