Study: High incidence of brain and other nervous system cancer identified in two mining counties, 2001-2015

Frequently Asked Questions

What did this study find?

This study found that the diagnosis of brain cancer among Deer Lodge and Silver Bow County residents were elevated among two age groups, ages 0 to 4 and 30 to 34, compared to Montana and the U.S. In total, there were 58 Deer Lodge and Silver Bow County residents diagnosed with brain and other central nervous system (CNS) cancer over a 15-year time period (2001-2015). There were five children (aged 0 to 4) and six young adults (aged 30 to 34) diagnosed with brain cancer from 2001-2015. Researchers found that no other age group had elevated rates of brain cancer during this time period and that the overall rate of brain cancer in these two counties was the same as Montana and the U.S.

Does exposure to heavy metals in Deer Lodge and Silver Bow Counties cause brain cancer?

The bottom line is we do not know the cause of these brain cancers. The researchers had no information about risk factors for brain cancer or exposure to heavy metals for the patients included in this study. This type of study does not allow one to conclude what the cause of these cancers were because we do not have that type of information.

DPHHS urges residents to interpret these study results with caution because there are several major limitations to the study.

- First, the study was not designed to show that exposure to heavy metals causes brain cancer. This was an observational study, called an ecological study, that found a higher incidence of brain cancer in two age groups was associated with living in a county with a superfund designation. Researchers found that no other age group had elevated rates of brain cancer during this time period and found that the overall rate of brain cancer was the same as Montana and the U.S.
- Second, the study did not measure whether individual patients were exposed to heavy metals. The study was only able to measure that patients were living in Deer Lodge or Silver Bow counties at the time of their cancer diagnosis. The study also did not measure how long patients lived in Deer Lodge or Silver Bow county before their cancer diagnosis. We only know that they lived there at the time of their diagnosis.
- Third, the cause or causes of brain cancer are not well understood. According to the American Cancer Society, most brain cancers are not linked with any known risk factors and have no obvious cause.[1,2] But there are few factors that can raise the risk of brain tumors

[1] https://www.cancer.org/cancer/brain-spinal-cord-tumors-children/causes-risks-prevention/what-causes.html
[2] https://www.cancer.org/cancer/brain-spinal-cord-tumors-adults/causes-risks-prevention/what-causes.html

such as radiation exposure (most often from radiation treatment to treat some other condition) or family history.

- Forth, there is little evidence in the scientific literature that exposure to the heavy metals found in Butte and Anaconda cause brain cancer.
    - The authoritative sources that classify carcinogens have not found brain cancer to be associated with nearly all the heavy metals in Butte and Anaconda. DPHHS considers the authoritative sources to be the International Agency for Research on Cancer, CDC's Agency for Toxic Substances and Disease Registry, and the Environmental Protection Agency. Each of these organizations periodically review the state of the science and classify chemicals and toxins as to their potential to cause cancer in humans.
    - The one exception is lead (Pb). Inorganic lead is classified as a probable human carcinogen.[3] There is some evidence that very large exposures to lead (Pb) may cause glioma, a type of brain cancer.[4] This evidence comes from animal studies and studies of workers (occupational studies). Lead exposures in these studies were at very high levels; much greater than exposures in communities or what is documented in environmental data in Butte and Anaconda.
- Heavy metal exposure is not associated with all types of brain cancer. This study examined "brain and other central nervous system cancers," which is a large category of 12 different types of brain cancer.

What is DPHHS doing to investigate brain cancers among young children and young adults?

DPHHS takes all reports of high cancer rates and calls for public health action seriously. DPHHS is also coordinating with partners such as Butte-Silver Bow Health Department, Montana Department of Environmental Quality, and the Agency for Toxic Substances and Disease Registry to review environmental and public health data.

DPHHS has investigated these cases further based on the data our agency receives via the Montana Central Tumor Registry and reportable elevated blood lead. We found:

- In the two age groups (ages 0-4 and 30-34 years), eight out of 11 cases were gliomas. But this is not necessarily unusual. Gliomas are the most common type of brain tumor. Statewide about 93% of primary brain tumors are glioma, in SB/DL about 82% of brain tumors are glioma.
- DPHHS investigated the specific types of brain cancers in these two age groups (ages 0-4 and 30-34 years). It is unlikely that exposure to heavy metals, specifically lead or arsenic, were the cause of the pediatric brain and other CNS cancers. There were also no unusual characteristics of the young adult cases that might point toward an environmental cause of all the cases.
- None of the patients in the two age groups (ages 0-4 and 30-34 years) have been reported to DPHHS with elevated blood lead.

[3] https://monographs.iarc.fr/wp-content/uploads/2018/06/mono87.pdf
[4] https://www.atsdr.cdc.gov/toxprofiles/tp13-c2.pdf

What causes brain cancer?

According to the American Cancer Society, most brain cancers are not linked with any known risk factors and have no obvious cause. But there are few factors that can raise the risk of brain tumors such as radiation exposure (most often from radiation treatment to treat some other condition) or certain genetic conditions that can be inherited.

Gliomas, a common type of brain cancer, are associated with lead exposure based on scientific evidence in animal and occupational studies. The occupational studies establish that gliomas in adults may be associated with high-levels of lead exposure in a workplace setting. Exposures to dangerous metals or chemicals are much higher in a workplace setting than in a community setting. We do not know if lead exposure in a community setting can cause brain cancer.

How can I decrease my risk for brain cancer?

Unfortunately, there are no specific actions an individual may take to decrease their risk of brain cancer. Unlike breast cancer or colorectal cancer, there are no screening tests to detect and treat brain cancer early.

Am I at risk for developing brain cancer because I currently live or used to live in these counties?

Environmental risk factors for developing brain cancer are quite uncertain. For this reason, it is not possible to predict a person's individual risk for developing brain cancer that is directly attributable to environmental factors in these counties.

How does DPHHS get cancer data?

The Montana Central Tumor Registry (MCTR) was established by state law in 1979. It required that all hospitals and laboratories that provide medical services related to a reportable tumor must provide all medical and personal information as specified in rules of the department. The MCTR also gets reports from other state registries when Montana residents get treatment or diagnostic care for a reportable tumor in another state. The MCTR is part of a national cancer surveillance system with data standards that are followed by all cancer registries in the United States. This allows for the data to be compared between states and combined to calculate national cancer statistics.

The Montana Central Tumor Registry is utilized by the State and its partners to monitor the occurrence of cancer incidence and mortality, to aid in research studies to reduce cancer morbidity and mortality, to focus cancer control activities, and to address public questions and concerns regarding cancer. For example, it can tell us whether there is a higher than expected

number of cancer cases in a community, based on the experience of comparable communities or groups of people. However, it cannot tell us, by itself, whether a particular hazard or cancer-causing agent is causing these cancers.

How can I protect myself and my family from heavy metal exposure?

DL and SB county residents can take the following steps to protect themselves from heavy metal exposure:

- Eat a healthy diet
  - Eat iron-rich foods. Normal iron levels protect the body from lead. Good sources of iron are lean meats, fortified cereals, and dried fruits.
  - Eat calcium-rich foods. Calcium reduces lead absorption. Good sources of calcium are green leafy vegetables, milk, and cheese.
  - Eat foods rich in vitamin C. Vitamin C helps the body absorb iron better and may also help with getting rid of lead. Good sources of vitamin C are oranges, grapefruit, strawberries, melons, tomatoes, potatoes and peppers[5].
  - Eat regularly. Children with empty stomachs absorb more lead. Provide children four to six small meals during the day.
- Properly prepare garden produce
  - Keep preparation surfaces clean.
  - Wash produce to remove soil.
  - Throw away the outer leaves of leafy vegetables and peel root crops to remove the skin and any residual soil.
- Children and pregnant women should be routinely screened for potential lead exposure.
  - All children in Montana should be routinely assessed for their risk to lead exposure following the American Academy of Pediatrics (AAP) guidelines.[6,7] Lead testing is covered by Montana Medicaid, Healthy Montana Kids, and available for Women Infant and Children (WIC) clients.
  - Pregnant women or women planning to get pregnant should be tested for lead following the American College of Obstetrics and Gynecology.
- Keep things clean
  - Keep your home clean and dust-free. This will cut down on the amount of contamination present in the home environment.
  - Wash hands and toys frequently to help prevent spreading germs and cut down on colds.
  - Keep painted surfaces in good condition and clean around painted areas where friction can generate dust, such as around doors windows and drawers.
- Understand and identify potential sources
  - Identify and limit exposure to products that may contain lead. These may include toys, cosmetics, crafts and other items.

[5] https://www.eatright.org/health/wellness/preventing-illness/how-to-fight-lead-exposure-with-nutrition
[6] https://www.aap.org/en-us/Documents/periodicity_schedule.pdf
[7] https://pediatrics.aappublications.org/content/138/1/e20161493

- If buying a home built before 1978, find out if it contains lead-based paint. A seller must disclose any known lead-based hazards.

- Don't create unnecessary exposures
  - Practice safe do-it-yourself renovations. Read and follow guidance in the EPA pamphlet *Renovate Right*.
- Participate in home and yard clean-up available to Anaconda and Butte residents because some yards and attics remain contaminated.
  - Butte residents: contact Butte-Silver Bow's Residential Metals Abatement Program to have your home tested for lead and arsenic (406-497-5040)
  - Anaconda residents: participate in the Superfund Community Soils Operable Unit clean-up programs.
- If you are still concerned about heavy metal exposure, talk to your healthcare provider to be tested.