

**FOLLOW-UP INVESTIGATION OF ACUTE MYELOID LEUKEMIA  
IN THE AREA OF MAHOPAC, ZIP CODES 10541, 10542, 10579, AND 10512  
PUTNAM COUNTY, NEW YORK, 2010-2011**

**Background and Introduction**

This study is a follow-up to an investigation of acute myeloid leukemia (AML) and other blood cancers that was released in September 2013. The original investigation began in November 2010 when a resident of the hamlet of Mahopac in Putnam County contacted the Cancer Surveillance Program and reported what he believed to be an unusual number of people who were diagnosed with AML in his neighborhood. These people all lived in the same small neighborhood in the northwest part of ZIP Code 10541, and were diagnosed with AML in 2009 and 2010. A study of AML, and other blood cancers (leukemia, lymphoma, and multiple myeloma), in people residing in ZIP Codes 10541 (Mahopac), 10579 (Putnam Valley), 10512 (Carmel) and point ZIP Code 10542 (Mahopac Falls) was conducted for the time period 2000-2009. It did not confirm any unusual patterns of AML in the Mahopac area other than the unusual number of cases originally reported by the resident. Although cancer data for 2010 were not official at the time of the original investigation, data for that year were examined separately and showed that the residents of the study area who were diagnosed with AML in that year were younger than what is typically seen. Due to this finding it was decided that the investigation would be updated when cancer data for 2010 and 2011 became official. This occurred in March 2014 and this report is an update to the original investigation.

**AML and other blood cancers in the Mahopac study area**

**Methods**

The source of information on people who were diagnosed with AML, or other blood cancers, in the Mahopac area was the New York State Cancer Registry. The Cancer Registry contains information on all cases of cancer diagnosed or treated in New York State, as mandated by law. At the time this follow-up began, cancer incidence data were considered official through 2011, meaning that reports for this year and previous years were essentially complete and data had passed all quality assurance checks. Cancer Registry records were searched for people living in the four ZIP Codes who were diagnosed with AML, as well as other blood cancers, in 2010 and 2011.

The number of blood cancers that would be expected in the study area was calculated by applying cancer incidence rates by age and sex for a reference area to the estimated population of the study area by age and sex. The reference area selected for this investigation was New York State, exclusive of New York City. The population of the study area for 2010-2011 was estimated using data from the United States Census for 2010. The Poisson model was used to determine the probability that chance alone could explain an increase or decrease in the observed number of cancer cases compared to the expected number<sup>1</sup>. If the probability of observing an excess or deficit was 0.025 or less for any of

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<sup>1</sup> Molina EC. Poisson's Exponential Binomial Limit. Huntington, NY: Robert E. Krieger Co., 1973.

the blood cancer sites examined, the result was considered to be statistically significant. Non-significant excesses or deficits were considered to represent random variations in observed patterns of disease.

## Findings

A search of Cancer Registry records identified a total of 55 blood cancers among residents of the study area during 2010 and 2011. A total of 66 blood cancers was expected based on the population size and age and sex distribution of the study area, a difference that is not statistically significant. Expected numbers for specific types of blood cancers (Hodgkin lymphoma, non-Hodgkin lymphoma, multiple myeloma, acute lymphocytic leukemia, chronic lymphocytic leukemia, acute myeloid leukemia, chronic myeloid leukemia, and all other leukemia) were also examined. There was a total of 12 people who were diagnosed with AML in the study area and a total of six cases of AML was expected, a difference that is not statistically significant ( $p=0.0269$ ). None of the specific types of blood cancers had a statistically significant excess or deficit among males and females combined. There was a statistically significant deficit in the number of females who were diagnosed with non-Hodgkin lymphoma (fewer than six cases observed, 13 cases expected). No other cancer site showed a statistically significant excess or deficit when males and females were examined separately.

In the investigation that was released in September 2013 when cancer data for 2010 were not yet official, the residents of the study area who were diagnosed with AML in 2010 tended to be younger than what is typically seen. Data for 2010 are now official and that finding still holds. Most of the residents diagnosed in 2010 were younger than 45 years of age at diagnosis while the typical age at diagnosis for AML is 66 years of age. When data for 2011 were examined, the trend did not continue; most of the people diagnosed with AML in 2011 were older than the age when AML is typically diagnosed.

The street address for each individual diagnosed with AML in 2010 or 2011 was plotted on a map of the study area. None of those individuals resided in the neighborhood of concern other than those who were originally reported by the requestor of the study.

## Discussion

Leukemias are cancers of the cells in the bone marrow that give rise to the various types of blood cells. The leukemias can be classified according to the course of the disease (acute, meaning the leukemia can grow quickly, or chronic, persisting for a long time), and the type of blood cell affected (lymphocytic or non-lymphocytic). Acute myeloid leukemia, or AML, is a cancer of the bone marrow but it can also move into the blood or spread to other parts of the body. AML most commonly affects older adults and is uncommon in persons younger than 45 years of age<sup>2</sup>. The average age at diagnosis is generally about 66 years. AML is slightly more common among men than among women.

The only proven lifestyle-related risk factor for AML is smoking. Other risk factors that may increase one's chance of being diagnosed with AML include: long-term exposure to certain chemicals such as benzene, treatment with certain cancer chemotherapy drugs, exposure to radiation, certain blood disorders such as chronic myeloproliferative disorders (polycythemia vera, essential

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<sup>2</sup> American Cancer Society. (February 2014). Leukemia - Acute Myeloid (Myelogenous). From the American Cancer Society website: <http://www.cancer.org>.

thrombocytopenia, and idiopathic myelofibrosis), congenital syndromes such as Down syndrome, and family history of AML<sup>2</sup>.

## **Summary**

This follow-up study was conducted because a previous investigation found that the residents of the study area who were diagnosed with AML in 2010 tended to be younger than what is typically seen. The findings of the follow-up study do not show a continuing trend. In 2011, most of the residents of the study area who were diagnosed with AML were older than the age when AML is typically diagnosed.

There was a total of twelve people diagnosed with AML in the study area in 2010 and 2011 and a total of six cases was expected, a difference that is not statistically significant. When the street address at the time of diagnosis for each individual diagnosed with AML during 2010 and 2011 was plotted on a map of the study area none of those individuals resided in the neighborhood of concern other than those who were originally reported by the requestor of the study.

Blood cancers were also examined as a whole as well as individually. None of the specific types of blood cancers had a statistically significant excess or deficit among males and females combined. There was only a statistically significant deficit in the number of females diagnosed with non-Hodgkin lymphoma when males and females were examined separately.

Based on the above findings no further investigation is warranted.