Letter Health Consultation

RAYMOND C. LAPERCHE ELEMENTARY SCHOOL:
COMMUNITY CONCERN ABOUT PEDIATRIC CANCER CASES

SMITHFIELD, PROVIDENCE COUNTY, RHODE ISLAND

Prepared by the
Rhode Island Department of Health

February 22, 2024

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Office of Community Health and Hazard Assessment
Atlanta, Georgia 30333

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Department of Health
Three Capitol Hill
Providence, RI 02908-5097
TTY: 711
www.health.ri.gov

February 22, 2024

LaPerche Elementary School Community
11 Limerock Road
Smithfield, RI, 02917

CC: Superintendent Dawn Bartz, Smithfield Public Schools
Principal Julie Dorsey, Raymond C. LaPerche Elementary School
Olutosin Ojugbele, M.D., RIDOH
Catherine Feeney, RIDOH
Bradley DeNardo, M.D., Hasbro Children's Hospital
Victoria Fruh, RIDOH
Nancy Sutton, RIDOH
C. Kelly Smith, RIDOH

Subject: Investigation of cancer cases among students enrolled at Raymond C. LaPerche Elementary School

Dear Smithfield Public School Department,

In April 2023, the Rhode Island Department of Health (RIDOH) received a request to examine what was suspected to be an unusual pattern of pediatric blood cancers at Raymond C. LaPerche Elementary School. The RIDOH Environmental Health Risk Assessment Program (EHRAP) has completed an examination of the available environmental data associated with this request. This letter describes the analysis conducted by RIDOH and our conclusions. Our findings suggest that the LaPerche Elementary School is not likely to be a source of chemical contaminants that can cause pediatric blood cancers. The observed number of pediatric cancer cases is not part of an unusual pattern.

EHRAP and its partners at the Rhode Island Cancer Registry (RICR) met with members of the Smithfield School Department and concerned parents in small groups and as part of a larger community meeting. Based upon their concerns, we conducted an analysis of the scientific literature, a review of available environmental data for the school property and the town of Smithfield, and an analysis of the RICR.

This evaluation was prepared as part of a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) as a letter health consultation. For additional information about ATSDR's process to evaluate risks from environmental contamination at specific sites, see ATSDR's Public Health Assessment Guidance Manual (2023).

Background:

The Raymond C. LaPerche Elementary School is located at 11 Limerock Road, Smithfield, Rhode Island. The school was built on the site of an orchard and occupies 39,400 square feet and is a single-story building.[1] A geotechnical assessment and environmental site assessment were completed in 2019 and 2020 for the site ahead of anticipated facility improvements.[1,2]

RIDOH was approached by an employee of the Smithfield Public School Department in April 2023 about a pattern of cancer cases at LaPerche Elementary School. The primary concern was a small (<5) number of students had been diagnosed with blood cancers in the same grade. After this initial contact, RIDOH met with parents of children at LaPerche who expressed concern about this situation.

Stakeholder Concerns:

A meeting with the Smithfield Public School Department was conducted on October 6, 2023, and a public meeting was held on November 30, 2023, to learn about the concerns of parents from LaPerche Elementary. The results of the EHRAP investigation were shared with parents, who had the opportunity to ask questions about the analysis. A Frequently Asked Questions document was provided at the meeting (attached here). The most relevant of the major stakeholder concerns are described here and are addressed directly.

Stakeholders were interested in how the rates of pediatric cancers in Smithfield compared to the rates in surrounding communities. The community cancer analysis that was performed for this investigation calculated a standardized incidence ratio (SIR) for each cancer type. The SIR compares the number of cancer cases from the population of interest (children in Smithfield) to a reference population. The standard reference population is the state. In this case, the number of pediatric cancer cases in Smithfield was compared to the number of pediatric cancer cases in the state. The population of the state is a more stable reference than any of the smaller communities surrounding Smithfield. A comparison between the rates of pediatric cancers in Smithfield and in neighboring communities is therefore unnecessary given the current analysis. See the Environmental Health Investigation section for more details on the community cancer analysis that was conducted.

There was also a request for an analysis of all pediatric cancers, regardless of type, within the town of Smithfield. The SIR calculated here was determined specifically for pediatric blood cancers, which were the cancers of concern for this analysis. An analysis of all pediatric cancers would not be able to indicate a common exposure to a source of environmental contamination. The potential

relationship between environmental contamination and cancer development is unique for each type of cancer. Please see the Environmental Health Investigation section for more details on the cancer analysis that was performed.

Stakeholders were concerned that cancer cases might be clustered in a certain area of the town of Smithfield. A geospatial examination of the town examined the location of the homes of known and suspected pediatric blood cancer cases in Smithfield. The results of this analysis are presented in the *Environmental Health Data Review* section.

Radon was another topic discussed at the stakeholder meeting. Stakeholders were particularly concerned about radon exposure in homes. Radon emits ionizing radiation and is most closely associated with the development of lung cancer. Radon can, in large doses, lead to the development of blood cancer.[3] At low levels of exposure, the risk of developing blood cancer is small.[3] The development of blood cancer in the low dose/long exposure time scenario is not fully understood.[3] Environmental radon exposure in a building is typically a very small dose, meaning exposure would need to occur over a long period of time to increase the risk of developing blood cancer. Radon in the home or any building can be mitigated. Any stakeholder concerned about radon can visit the RIDOH website for more information. Refer to the *Environmental Health Data Review* section for more information about radon at LaPerche specifically.

During the community meeting with parents, stakeholders expressed concerns about the potential for asbestos to cause pediatric blood cancers. Exposure to asbestos is mainly from breathing in asbestos fibers, which can be spread when asbestos-containing materials, like insulation, are damaged or disturbed. Asbestos exposure is most closely associated with asbestosis, mesothelioma, and lung cancer.[4–6] There is no evidence to indicate that asbestos is related to blood cancers because asbestos fibers do not travel from the lungs to the blood stream.

Environmental Health Investigation:

EHRAP's evaluation had three parts: (1) a review of the scientific literature, (2) an environmental health data review, and (3) an analysis of Rhode Island Cancer Registry (RICR) data. The results of these analyses are described below. RIDOH's Public Health Information Reporting Policy does not allow discussion of the number of cancer cases and the specific diagnoses to protect patient confidentiality.

(1) Review of Relevant Scientific Literature

The scientific literature currently available for pediatric blood cancers indicates that the greatest risk factor is genetic.[3] In other words, development of pediatric blood cancer is mostly due to an inherited or random gene mutation. Gene mutations can happen randomly in a cell and are caused by alterations in DNA. Most of the time, our immune systems can effectively identify and rid our bodies of cells with gene mutations. When our bodies cannot get rid of these cells, they can sometimes develop into cancer.

The review of relevant scientific literature included an examination of the available evidence relating exposure to chemicals with pediatric blood cancers. This review showed that exposure to some chemicals can increase the risk of pediatric blood cancer. Maternal exposure to volatile organic compounds (VOCs) during pregnancy or during a child's early life can increase the risk of developing blood cancer during childhood.[9] VOCs are chemicals that are often found in paints, solvents, petroleum hydrocarbons, and cigarette smoke, all of which have been associated with increased risk of blood cancer development.[9,10] One example of a VOC is benzene. Benzene commonly enters the body through inhalation or through the consumption of contaminated food or water.[10–12] Smoking is also a major source of benzene exposure for both adults and children (secondhand smoke).[10,12,13] Benzene travels through the lining of the lungs or gastrointestinal tract to the bloodstream and, from there, into bone marrow.[11,12] The cells in your body interact with benzene to produce different compounds, called metabolites, which can damage DNA and cells leading to cancer formation.[11,12] Benzene can also cross the placenta, which means that exposure can begin during development in the womb.[12]

Exposure to pesticides can also lead to the development of pediatric blood cancers. The risk varies based on how and where a person is exposed and the type of pesticide applied.[14] Pesticides are a large class of chemicals with a variety of mechanisms leading to the development of cancer. Exposure to these chemicals before or shortly after birth can lead to changes in DNA that, in turn, lead to the development of blood cancer.[15] The greatest risk is from use of insecticide indoors at home.[14] Herbicide use outdoors at home was also associated with a slightly elevated risk of pediatric cancer.[14] The main route for childhood exposure to pesticides is incidental ingestion: when children touch surfaces treated with a pesticide and then put their hands in their mouths.[14]

High doses of ionizing radiation are the most widely accepted environmental risk factor for blood cancers. Radiation can break or damage DNA strands, which can prevent cells from functioning normally.[16] Ionizing radiation can damage DNA directly or create chemicals that can damage DNA.[16] Natural sources of ionizing radiation come from soil (radon) or the sun (x-rays and gamma rays produced by solar flares). There are also man-made sources of radiation (release from atomic weapons, x-ray machines, and radiation therapy). The risk of developing blood cancer from exposure to radiation depends on the energy of the radiation, the type of radiation, whether the radioactive particle been ingested, inhaled, or remains outside the body, and the rate at which the body eliminates radioactive elements. The human body can usually repair the damage caused by low doses of radiation.[17] A dose of radiation would have to be extremely large (for example, a nuclear detonation) for pediatric blood cancer to develop.[3,18]

(2) Environmental Health Data Review

The environmental health data review had two elements: an evaluation of environmental data from LaPerche Elementary School and a geospatial analysis of the homes of the children with cancer, which were reported in the initial inquiry and confirmed in the 2011-2020 registry. A geospatial examination analyzes land use records from Environmental Protection Agency, Rhode Island

Department of Environmental Management, and Brown University to find any potential sources of environmental contamination.

Investigation at the School:

The review of data related to potential exposure at LaPerche Elementary School started with a consideration of potential routes of exposure. Routes of exposure are the mechanisms by which chemical contaminants make their way into human bodies. Businesses and individuals that have improperly disposed of contaminants by releasing them into the environment are tracked by several programs. RIDOH has access to geospatial information from the Rhode Island Department of Environmental Management, the Environmental Protection Agency, Department of Defense, Brown University, and the Rhode Island Geographic Information System. The analysis of this information showed that there are no records of potential sources of contamination near LaPerche. A comprehensive site history going back more than 90 years and an analysis of the businesses in the immediate area were examined to find any potential sources of contamination.

RIDOH requested Smithfield Public Schools' data related to testing for chemicals on the school property. RIDOH was provided with a geotechnical report and an environmental site assessment, both conducted by the firm GZA Geoenvironmental Inc.[1,2] The type of data in the geotechnical report is primarily used for new construction and is not relevant to an investigation of the potential health effects from exposure to chemicals. The environmental site assessment was conducted as part of recent construction improvements at the school. This report reviewed the site history (starting in the 1930s) and included a site inspection. The site history revealed the presence of an orchard on the premises in the 1930s. Pesticides could have been applied to the grounds when the site was an orchard, but there is no evidence of pesticide exposure currently. Some pesticides are associated with an increased risk of blood cancers given a long exposure duration (the amount of time the children spent at the school).[14] It is unlikely that pesticides at the school would cause these blood cancer cases because of the children's limited exposure duration. Also, given the amount of time that has passed since the land was used as an orchard, it is also very unlikely that much, if any, pesticide remains in the surface soil that children are likely to come into contact with. The environmental site assessment did not include sampling data for the presence of possible contaminants at the school.

RIDOH conducted a geospatial examination of the area around the school (a 1,500-foot radius) to assess health risks posed by any historic sources of potential contamination (such as former manufacturing and hazardous waste sites). Three manufacturing sites were identified within the 1,500-foot radius. These sites were more than 1,400 feet away, small, and only operational for a short time.[19] Based on this information, we concluded that these businesses were unlikely to have a significant environmental impact on the area. Our examination also indicated that historically there was a leaking underground storage tank near the school. This tank contained heating oil number 2 and was removed along with contaminated soil in 2021.[20] Petroleum hydrocarbons found in heating oil number 2 are composed of a mixture of compounds including VOCs (see *Review of Scientific Literature* for their relevance to blood cancers). Soil samples collected after removal of

the tank showed the total petroleum hydrocarbon concentrations were lower than the residential direct exposure criteria. This finding indicates that there is a low risk of health effects from the remaining contaminant levels currently onsite.

Another important factor to consider in the environmental health investigation is exposure duration. Exposure duration is the length of time someone has contact with a chemical contaminant. As mentioned previously, some chemical contaminants can increase the risk for pediatric cancer. For the risk of cancer to be increased, there has to be a certain amount of contact time with the chemical. The exact time would depend on the dose and the contaminant. The exposure duration required for the development of pediatric cancer is not well defined. The available estimates are based on the development of cancer in adults. The uncertainty in the data for pediatric exposures prevents us from providing a conclusive exposure time that would result in increased risk for blood cancer development. Given the short period during which the children were enrolled in LaPerche and the timing of their diagnoses, it is unlikely that they spent enough time at the school to have been exposed to a chemical contaminant and develop blood cancer.

Water and radon testing data performed at the school were also reviewed by EHRAP. Water testing at the school measured for lead, which is not known to cause pediatric blood cancers. Levels of lead in the drinking water at LaPerche were below EPA action levels. Drinking water at LaPerche is supplied by Smithfield Water Supply Board and is regularly tested for other chemical contaminants. The 2021 and 2023 consumer confidence reports for Smithfield Water Supply Board indicate that contaminant levels in drinking water at the school are below levels expected to increase the risk of negative health effects.[25,26] Radon was also well below levels of concern at the school. Radon data collected at the school shows that levels are well below the EPA action criteria of 4.0 pCi/L. The maximum radon concentration detected at LaPerche was 0.6 pCi/L, so exposure is very low at the school.

<u>Investigation within Smithfield:</u>

A geospatial analysis of the homes of known and reported pediatric blood cancer cases in Smithfield was performed to identify any potential common sources of contamination in the area. The homes are not clustered around a common point of exposure. This means that environmental contamination at the home is not likely to be the cause of these cancer cases.

(3) Rhode Island Cancer Registry (RICR) Analysis

The RICR contains information about all primary cancers diagnosed among Rhode Island residents since 1995. The RICR tracks cancers occurring in Rhode Island residents, regardless of where they were diagnosed or treated. RIDOH reviewed RICR data with the goal of determining whether there was an abnormal number of childhood cases of blood cancers for individuals in Smithfield (census tracts of 126.01, 126.02, 127.01, 127.02).

Between 2011 and 2020, the number of reported cases of blood cancers in people aged 0–19 years old in Smithfield was consistent with the number of expected cases. The difference between

observed and expected cancer cases was not statistically significant, meaning that the difference was so small that it could have been the result of random chance. The diagnoses were also spread out over time. This investigation of Rhode Island historical pediatric cancer data did not indicate an elevated risk of blood cancers.

Public Health Implications:

Our analysis does not suggest that the school is a source of an environmental exposure that could be leading to pediatric blood cancers. There are several reasons for this (detailed in the Environmental Health Investigation section). First, it is unlikely that the children were enrolled in LaPerche for long enough to have had contact with a chemical contaminant at the school and develop cancer. Second, the available environmental health data do not suggest that LaPerche is located on or near a source of chemical contamination that could contribute to the risk of blood cancer. Contaminants in the environment have to come from somewhere, and the school is not located near any former manufacturing or hazardous waste sites. Finally, an analysis of the RICR indicates that the number of pediatric cancer cases in Smithfield were within the expected range. The number of pediatric cancer cases observed in Smithfield was not statistically different compared to the expected number of cancer cases calculated with the state cancer rate.

Limitations of Analysis:

The environmental health data review is limited in that no sampling data was collected at the school. RIDOH is not recommending sampling at this time (see Conclusions and Recommendations for more information).

It is also important to note that Rhode Island Cancer Registry data is always at least two years behind (the most recent, reliable data available to use at the time of this report ended in 2020). This is due to requirements from the Centers for Disease Control and Prevention (CDC) and local efforts to make sure that the records are complete (including out-of-state diagnoses). Even though recent cases are not reflected in the above analysis, shifting the 10-year time period of the analysis to include the more recent cases would result in earlier cases being excluded from the analysis.

Conclusions and Recommendations:

The Rhode Island Department of Health understands the concerns of parents and families when it comes to seemingly unusual rates of pediatric disease. The pattern of cancer cases observed at LaPerche was unusual, but our investigation has not led to any cause for concern from an environmental health perspective. With regards to the concern over LaPerche Elementary, EHRAP drew the following conclusions from our investigation:

1. Environmental contamination is **not** likely to be causing the cancer cases.
2. LaPerche Elementary is **not** a likely source of contaminants that could lead to pediatric blood cancers.

3. The homes of children diagnosed with cancer in Smithfield are **not** clustered around a source of contamination that could be causing cancer.
4. The observed number of pediatric cancer cases at LaPerche Elementary and in Smithfield indicates that these cases are **not** part of an unusual pattern.

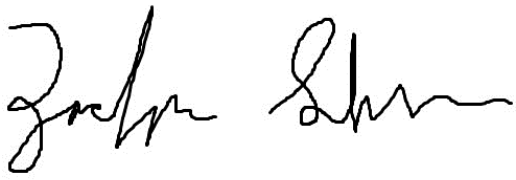
The scientific literature and environmental health information available to RIDOH for this analysis indicates that Raymond C. LaPerche Elementary School is not a likely source of chemical exposure leading to pediatric blood cancer. Additionally, RIDOH did not identify an abnormally high number of cases of blood cancer amongst children living in Smithfield. Our investigation indicates that there is minimal risk of pediatric blood cancers being caused by environmental exposures to chemicals in the school and the town of Smithfield.

EHRAP recommends:

1. The RICR should continue to monitor the rate of cancer in Smithfield for the next four years.
2. Any new environmental data discovered by the school should be supplied to RIDOH for review.

If there are any questions or concerns about potential environmental exposures at LaPerche, please reach out at: zachary.shepard@health.ri.gov. RIDOH is available as a resource to concerned parents, caregivers, and community members.

Sincerely,



Zachary Shepard, PhD
Environmental Health Risk Assessment Toxicologist
Rhode Island Department of Health

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Authors

Zachary Shepard, PhD
Environmental Health Risk Assessment Toxicologist
Rhode Island Department of Health

Reviewers

Caroline Hoffman, MPH
Senior Public Health Promotion Specialist
Rhode Island Department of Health

Victoria Fruh, PhD
Rhode Island Cancer Registry Program Manager
Rhode Island Department of Health

C. Kelly Smith
Comprehensive Cancer Control Program Manager
Rhode Island Department of Health

Nancy Sutton, MS, RD
Center for Chronic Care & Disease Chief
Rhode Island Department of Health

Michael Byrns, PhD
Principal Environmental Health Risk Assessment Toxicologist
Rhode Island Department of Health

Melissa Orpen-Tuz
Assistant Health Program Administrator
Rhode Island Department of Health

Robert Sucsy
Epidemiologist
Rhode Island Department of Health

Frequently Asked Questions (FAQs) About Cancer

1. What is cancer? What causes cancer?

Cancer occurs when cells in the body grow and divide very quickly. Cells are the building blocks making up your body. Normally, a cell grows when your body needs it and then dies when it is not useful. Cancerous cells grow even though your body doesn't need them.

Cancers are caused by a complex process in which changes in genes within the cells of the body develop over time. Numerous factors may contribute to this process, including random genetic events during the cell's life cycle in the body, genetic risk, and/or exposure to chemicals or environmental conditions that could cause cancers.

Most cancers take time to develop over the course of greater than 10 years. For example, lymphoma takes 2-10 years to develop, and leukemia takes 1.5 to 35 years to develop, based on the Centers for Disease Control and Prevention (CDC) *Minimum Latency & Types or Categories of Cancer* Report from 2012.

In children, cancer also may take a long time to develop, with certain cancers beginning to develop in early infancy or before a child is even born. The length of time for cancer development can depend on age, genetic factors, and in the case of potential environmental carcinogens (cancer-causing substances), the intensity of a potential exposure.

Gene mutations can also happen randomly during a cell's life cycle. As our bodies produce millions of cells to replace other cells that have reached the end of their natural lives, occasionally some of the genetic content of a new cell might mutate or change. Most times, our immune systems work effectively to identify and rid our bodies of these cells, but sometimes the mutations develop into cancer cells. A gene mutation can be part of many biological processes that collectively result in cancer.

A genetic predisposition means that some people are born with an increased risk for the development of cancer ("it runs in the family"). It does not mean that they will definitely develop cancer. People with genetic predisposition may have higher risks of developing some types of cancer than those who do not. It often means that they will need to be screened for those types of cancer more frequently.

Environmental exposures (smoking cigarettes; viral infections; environmental toxins like lead; liver damage, etc.) can contribute to cancer development.

2. Why do some people get cancer and not others?

Cancers are caused by changes in the way cells grow and divide. Several factors contribute to why some people get cancer and others do not. People get cancer depending on whether their DNA is affected in a way that causes cells to grow and divide uncontrollably. This can happen due to a genetic predisposition

(family history) and failure of the body's natural mechanisms to control DNA changes. The cells in your body have some threshold for preventing uncontrollable division and growth leading to cancer development. There are some natural mechanisms or checkpoints in place to prevent cancer. Individuals who end up developing cancer have a relatively lower threshold compared to those who do not. Environmental hazards may also contribute to changes in DNA in some cancers.

3. How are cancer investigations within communities conducted?

Cancer investigations conducted in Rhode Island include (1) a review of the available environmental data, (2) a review of the scientific literature about the potential for cancers to occur from exposures to chemicals in the environment, and (3) an analysis of the Rhode Island Cancer Registry (RICR) data. These investigations are conducted by the Rhode Island Department of Health (RIDOH), sometimes with assistance from the Rhode Island Department of Environmental Management and other partners as needed. Many of these investigations come from inquiries made by concerned citizens or other community stakeholders.

4. What factors are important in determining whether the pattern of cancer is unusual?

Cancer is a common disease that impacts about a third of the population over the life course. Each type of cancer is its own disease. A suspected pattern of cancer in your area is more likely to need investigation if many rare cancers are diagnosed, or if a specific type of cancer is observed in an unusual number of people within an age group that is not commonly diagnosed with this type of cancer. RIDOH reviews Rhode Island Cancer Registry data to determine whether patterns of cancer are unusual.

5. What are community cancer analyses?

Community cancer analyses follow Centers for Disease Control and Prevention (CDC) guidelines and investigate whether unusual rates of cancer are found in a specific area. Cancer analyses examine the number of cancer cases observed over a 10-year period. The number of observed cases is then compared to what would be expected if the community had the same cancer experience as the state as a whole, represented by the state's cancer rate. The cancer analyses assess whether differences exist between the number of observed cases and the number of expected cases in a community.

6. How does the Rhode Island Cancer Registry (RICR) collect information on new diagnoses of cancer in Rhode Island?

All hospitals are required to report cancer cases to RICR. Other facilities such as laboratories, radiation facilities, and oncology facilities offices report to RICR, when information is available. RICR data is not complete until about two-and-a-half years after cases are diagnosed because it takes out-of-state reporting facilities longer to submit case data. This data is then sent to the CDC to be analyzed and checked.

7. What can I do to lower my risks of cancer?

- **Get screened.** Early detection of cancer by screening can save lives. You may be screened for certain types of cancer (breast, cervical, colorectal, and lung, if you qualify) at recommended time periods. Your healthcare professional can advise you about whether and when to be screened. If certain types of cancer run in your family, you may use the RIDOH family health history tool (health.ri.gov/publications/toolkits/Family-History-Tool.pdf) to document it. Then, discuss your risks with your healthcare professional. You may be eligible for genetic counseling and genetic testing—or your family history might change the timing and frequency of your cancer screening tests.
- **Test your home for radon**. Visit health.ri.gov/healthrisks/poisoning/radon to learn more.
- **Quit smoking**, or do not start. Avoid places with second-hand smoke.
- **Follow guidelines about low to moderate alcohol consumption**. A growing amount of research links alcohol consumption to higher cancer risks. Better yet, do not drink alcoholic beverages at all.
- **Talk with your healthcare professional** about other ways to reduce your cancer risks, such as maintaining a healthy diet, getting enough physical activity, and protecting your skin from the sun.