

ANALYSIS OF POTENTIAL CANCER CLUSTER SELINGROVE PENNSYLVANIA

PAUL C CHROSTOWSKI, PH.D., QEP, FRSH
MARCH 6, 2007

I am an environmental health scientist with over 30 years experience in evaluating the potential impact of environmental chemicals on human health. I have an M.S. in environmental science with environmental health and environmental chemistry specializations from Drexel University in addition to a Ph.D. in environmental engineering and science from Drexel. I am a registered Qualified Environmental Professional (QEP) and a Fellow of the Royal Society of Health (FRSH). Currently I am affiliated with an environmental health practice located near Washington, DC. Susquehanna University has asked me to review published press reports and other information concerning the existence of a potential cancer cluster in Selingsrove, PA associated with exposure to toxic environmental chemicals that was the focus of a report in the March 4 2007 *Patriot-News*.

Scientific methods for determining if exposure to a chemical has caused a health problem were proposed by the British epidemiologist Sir Austin Bradford Hill in the 1960s and have since been adopted by public health scientists and independent investigators. In order to use these methods at Selingsrove, we need to ask a series of questions about the events that have been reported in the *Patriot-News*. First, we need to determine if there is a defined disease that could be caused by toxic chemicals. Second, we need to determine what toxic chemicals exist. Third, we need to determine if the people with the disease have been exposed to the chemicals at levels sufficiently high to cause an effect.

The press report identified four cases of cancer-related death associated with students who either lived at or visited the apartment complex known as the "warehouse" in addition to another apparently unrelated cancer death in a student. Cancer is not the definition of a disease or health effect but is a broad class of diseases that can have many manifestations. Each of these students had contracted different types of cancer – osteosarcoma (bone cancer), adrenal cancer, melanoma, colon cancer and testicular cancer. While this is certainly tragic, especially in young people, the diversity of cancers suggests that there is not a common cause. There are many causes of cancer including chemical exposure, radiation, nutritional factors, occupational factors, smoking, socio-economic factors, sexual and reproductive behavior, and genetics. All of the cancers diagnosed in these students have causes other than exposure to toxic chemicals. For example, the association between exposure to sunlight and melanoma is well known; genetics, trauma and radiation exposure have been associated with bone cancers. All of the cancers that were reported have been observed in this age group elsewhere in the United States. Some of them are quite common in this age group. For example, 45.8% of all testicular cancer, 16.4% of bone/joint cancer, and 8.5% of melanoma has historically occurred in the 20-34 year old age group.

There is little information about the existence of toxic chemicals in the nearby environment. The *Patriot-News* identified benzene associated with a previously remediated underground tank leak and a chemical known as benzo(a)pyrene. Benzene has been associated with human cancer, particularly some forms of leukemia, however, the scientific literature has not identified benzene as a causative agent for any of the

cancers contracted by the students. Benzo(a)pyrene has been identified as a carcinogen in laboratory animals for stomach, skin, and possibly lung cancers; none of these are cancers contracted by the students. Also, the level of benzo(a)pyrene found of 1.24 mg/kg is a common amount in urban areas, usually resulting from vehicular traffic, home heating, or use of wood preservatives. Thus, there is no information to suggest the presence of any chemicals that potentially could have caused the students' cancers.

There is no evidence that any of the students who contracted cancer were exposed to any potentially toxic chemical at levels sufficient to have an effect. Exposure is defined as contact with the chemical agent, whether by ingestion, by inhalation, or by dermal contact. If exposure has not occurred, it is not possible for a potentially toxic agent to cause a health problem. There are several ways in which exposure may be demonstrated. Typically exposure is demonstrated through chemical measurements in the air, food, water or other medium that a potentially exposed person could contact. In other cases, exposure is demonstrated by taking measurements from the individual who feels that they have been exposed. Blood tests for lead exposure are an example of this type of test. In rare cases where exposure measurements are not available, estimates of exposure may be made through the application of complex mathematical models, although this technique is uncertain at best. Mere proximity to a hazardous substance is not evidence that exposure has or may occur.

A few additional points should be kept in mind when evaluating the potential of chemicals to cause cancer. First, in cases where causation has been demonstrated, the duration of exposure has been long, often many years. Second, many cancers have a latency period which is the time between exposure and the onset of the disease. Exposure to ionizing radiation may result in bone cancer twenty years after the exposure has stopped. Finally, it must be recognized that disease clusters occur all the time. The Agency for Toxic Substances and Disease Registry notes that "from a statistical perspective, it is almost inevitable that some schools, church groups, friendship circles, and neighborhoods will be associated with clusters of chronic diseases. When first noticed, such clusters are often regarded as resulting from some specific, predictable process, rather than as events with independent causes that happened to have occurred by chance in one particular place."

In conclusion, I have seen no evidence at this time to suggest that exposure to environmental chemicals has caused the cancers that were the subject of the *Patriot-News* report. There is no common disease state, no toxic chemicals at hazardous levels have been identified and there is no data to show that anyone has been exposed to chemicals at toxic levels. These cases of cancer, tragic as they may be, are most likely the result of random chance rather than a common causative factor. I concur with the position taken by Susquehanna University, The Pennsylvania State Department of Health, and the Pennsylvania Department of Environmental Protection that additional environmental and community health studies will be useful in reconfirming that these cancers are not due to exposure to toxic environmental chemicals.