



## Hodgkin's Disease and Exposure to Ionizing Radiation

**Summary:** Little evidence has been recorded of a possible connection between Hodgkin's disease and exposure to ionizing radiation. However, there is evidence from studies conducted at Los Alamos National Laboratory and other nuclear sites that suggests an increased likelihood of developing Hodgkin's disease for workers who have been exposed to ionizing radiation. The National Research Council's BEIR V committee did not address the issue of radiation-induced Hodgkin's disease. Hodgkin's disease is not a "specified" cancer under the EEOICPA. Historically, Hodgkin's disease incidence ranked among the lowest in the state for Los Alamos County but among the highest in the state for Rio Arriba County. Hodgkin's disease mortality ranked among the highest reported in the state for both counties. Incidence means new cases of cancer, while mortality means deaths due to cancer.

### ***What Is Hodgkin's Disease?***

Hodgkin's disease is one of a group of cancers called lymphomas. Lymphoma is a general term for cancers that develop in the lymphatic system. The lymphatic system is part of the body's immune system. It helps the body fight disease and infection. Hodgkin's disease, an uncommon lymphoma, accounts for less than 1 percent of all cases of cancer in this country. Other cancers of the lymphatic system are called non-Hodgkin's lymphomas. Because lymphatic tissue is present in many parts of the body, Hodgkin's disease can start almost anywhere. (National Cancer Institute)

### **Findings of Human Health Research Studies**

Human health research studies compare the patterns of disease among groups of people with different amounts of exposure to a suspected risk factor. Below are results reported from such studies of Hodgkin's disease among people exposed to ionizing radiation.

The results of these studies found a mix of increased and possible increases in Hodgkin's disease among certain groups of exposed workers and no connection found among atomic bomb survivors. Statistically significant is a term used to mean that the connection between the health outcome and the exposure was strong enough that it was unlikely to be due to chance. An asterisk (\*) was placed by statistically significant findings. Two of these studies found rates of Hodgkin's disease to increase with increasing personal exposure to radiation. The research included an incidence study, which looked at new cases of cancer. Incidence studies can track health more quickly and accurately than mortality studies of deaths due to cancer.

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\* Findings were statistically significant (strong evidence)

+ Evidence of a dose-response relationship (strongest evidence)



## **Studies of Los Alamos National Laboratory (LANL) Workers**

Research conducted of LANL workers provides the most direct evidence about possible relationships between a health problem and workplace exposures at LANL.

- **Mortality Study up to 1991:** Increasing rates of deaths due to Hodgkin’s disease with increasing doses of external radiation in a study of 15,727 men employed between 1943 and 1977, followed through 1991 (assuming either a 2- or 10-year latent period).<sup>21 \*+</sup>

This study presents strong evidence that was unlikely to be due to chance (was statistically significant). Supporting the evidence of a relationship, a pattern, called a dose-response trend was seen where the proportion of workers who died Hodgkin’s disease increased among those who received higher exposures. Further adding to the strength of this study is that it is based on direct personal measurements of exposure. A weakness of the study may be that mortality is not as good a measure of Hodgkin’s disease as incidence.

## **Studies of Other Nuclear Workers in U.S.**

The next most relevant evidence comes from studies done on workers in similar occupations facing the same types of exposures. Below are studies that observed Hodgkin’s disease in possible connection with certain exposures among nuclear workers in the United States.

- **Fernald, Ohio:** Possible increase in deaths due to Hodgkin’s disease in a study of 4,014 uranium processing workers employed between 1951 and 1989, followed through 1989.<sup>1</sup>
- **Hanford, Washington:** Increasing rates of death from Hodgkin’s disease with increasing doses of external radiation in a study of 44,100 workers employed between 1944 and 1978, followed through 1986.<sup>49 \*+</sup> However, the researchers who conducted the study did not think it was due to radiation exposure.
- **Portsmouth, Ohio:** Possible increase in deaths due to Hodgkin’s disease in a study of 8,887 workers employed between 1954 and 1991.<sup>18</sup>
- **Oak Ridge:** Possible increase in deaths due to Hodgkin’s disease in a study of 8,375 males employed for at least 30 days between 1943 and 1972, followed through 1977.<sup>50</sup>
- **Combined Hanford, Oak Ridge and Rocky Flats:** Increasing rates of death from Hodgkin’s disease with increasing doses of external radiation in a study of 45,000 workers employed for at least six months.<sup>48 \*+</sup>

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+ Evidence of a dose-response relationship (strongest evidence)



### **Studies of Other Nuclear Workers World-Wide**

Below are studies of nuclear workers outside of the United States that looked at Hodgkin's disease in connection with radiation exposures.

- **Sellafield, England:** Possible increased incidence of Hodgkin's disease in plutonium workers when compared to other radiation workers.<sup>3</sup>

### **Studies of Other Ionizing Radiation Exposures**

Studies among other groups of people who were not nuclear workers can also be significant as evidence of possible increases in Hodgkin's Disease among those who have been exposed to ionizing radiation. Most other research has been conducted of people exposed to atomic bombs.

- **Atomic bomb Survivors:** In studies performed to date, there is no reported evidence of increased rates of Hodgkin's disease among A-bomb survivors.

### **Other Research and Policy Findings**

The National Research Council advises the U.S. government on scientific matters. Their Committee on Biological Effects of Exposure to Ionizing Radiations (BEIR) V reviewed sensitivity of parts of the body to radiation. Their findings are based mostly on studies of cancer among atomic bomb survivors, as well as on some of the available information on the biology of the body, animal studies, and other evidence. The greatest risk is at high exposure levels.

The National Research Council's BEIR V committee did not address the issue of radiation-induced Hodgkin's disease.<sup>9</sup>

### ***Is Hodgkin's Disease a "Specified" Cancer Under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA)?***

- **No.** Hodgkin's disease is not a "specified" cancer under the EEOIC Act consideration of Special Exposure Cohorts

Policy makers have identified certain types of cancer among energy employees at nuclear facilities, including those employed at Los Alamos National Laboratory, as being potentially related to occupational exposures under the EEOICPA.

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+ Evidence of a dose-response relationship (strongest evidence)



### **What Are Other Risk Factors Associated with Hodgkin's Disease?**

In considering the cancer risk from exposure to ionizing radiation at work, it is important to understand other risk factors. The following is a list of other possible risk factors for Hodgkin's Disease.

- Brothers and sisters of those with Hodgkin's disease have a higher-than-average chance of developing this disease.
- Epstein-Barr virus is an infectious agent that may be associated with an increased chance of getting Hodgkin's disease.

These factors may add to any risk due to workplace exposure to ionizing radiation. Hodgkin's disease occurs most often in people between 15 and 34 and in people over the age of 55. It is more common in men than in women. It is important to note that smoking is not related to Hodgkin's disease.

### **Rates of Hodgkin's Disease in Exposed Counties**

#### **Los Alamos County**

There have been low rates of Hodgkin's disease incidence reported in Los Alamos County and high rates of Hodgkin's disease mortality.

- Ranked 25th in incidence of Hodgkin's disease and
- Ranked 6<sup>th</sup> highest in mortality among the 33 counties in New Mexico from 1970 to 1996.
- In recent years, about one case occurred every five years.<sup>13, 14</sup>

#### **Rio Arriba County**

There have been very high rates of Hodgkin's disease reported in Rio Arriba County for both cancer incidence and mortality.

- Ranked second highest in incidence of Hodgkin's disease and
- Ranked first highest in mortality among the 33 counties in New Mexico from 1970 to 1996.<sup>33</sup>

Taken together, these statistics for Los Alamos and Rio Arriba counties indicate that more needs to be done to detect and treat these cancers early.

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+ Evidence of a dose-response relationship (strongest evidence)