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Ovarian Cancer and Exposure to Ionizing Radiation

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Ovarian Cancer and Exposure to Ionizing Radiation

Summary*:* There has been moderately strong evidence recorded of a possible connection between ovarian cancer and exposure to ionizing radiation. This possible connection is supported by evidence from studies conducted at Los Alamos National Laboratory and other studies of nuclear workers at other sites who have been exposed to ionizing radiation. The National Research Council's has determined that there is evidence among atomic bomb survivors of ovarian cancer in connection with exposure to ionizing radiation. Ovarian cancers are designated as "specified" cancers under the Energy Employees Occupational Illness Compensation Program Act. Historically, pancreatic cancer incidence and mortality have been very high for Los Alamos County. Incidence and mortality in Rio Arriba County is in the middle of New Mexico county rates.

What is Ovarian Cancer?

A cancerous tumor that begins in a woman's ovaries is called ovarian cancer. There are several types of ovarian cancer. Ovarian cancer that begins on the surface of the ovary (epithelial carcinoma) is the most common type. Ovarian cysts and tumors that are not cancerous can also commonly form on the ovaries. (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 ovarian cancer among people exposed to ionizing radiation.

These studies found increases and possible increases in ovarian cancer among certain groups of exposed individuals, in some cases followed over time. 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. The research did not include incidence studies, which look at new cases of cancer. These can track health more quickly and accurately than mortality studies of deaths due to cancer. Adding to the strength of the findings is that increasing rates of ovarian cancer were observed with higher doses in some studies.

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.

- **Female Lab Employees Study:** An increase in ovarian cancer deaths was found in women who were monitored for external radiation while employed at the Lab from 1943

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* *Findings were statistically significant (strong evidence)*

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

to 1981. Based on four cases, three of which had cumulative radiation doses less than 1 rem (a measure of radiation dose).[36]

Studies of Other Nuclear Workers in the United States

The next most relevant evidence comes from studies of workers in similar occupations with the same types of exposures. Listed below are studies that looked at pancreatic cancer and workplace exposures among nuclear workers in other parts of the United States.

- **Hanford, Washington:** Increasing rates of deaths due to ovarian cancer were found with increasing doses of external radiation in 12,600 women who were employed from 1944 through 1978, and then followed through 1981 (This study assumed a 10 year latent period between time of exposure and diagnosis of the disease). [52 +]

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- **3 Nuclear Workers in the U.K.:** Increasing rates of ovarian cancer deaths were found with increasing length of time since 3,366 women were first monitored for radiation (including plutonium),[*] and then followed through 1988. But findings were based on only two cases. [29]

Studies of Other Nuclear Workers in the United States

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 ovarian cancer in possible connection with certain exposures among nuclear workers in the United States.

- **Atomic Bomb Survivors:** Increasing ovarian cancer deaths were found with increasing doses of radiation in a study of 86,572 A-bomb survivors. [8 *+]

Other Research and Policy Findings

Is the Ovary Sensitive to Radiation?

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

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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.

According to the National Research Council's BEIR V committee, the Atomic bomb studies provide the strongest evidence that radiation exposure causes ovarian cancer. [9]

Is Ovarian Cancer a "Specified" Cancer Under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA)?

- **Yes.** Ovarian cancer is a "specified" cancer under the EEOICPA consideration of Special Exposure Cohorts (except if cirrhosis or hepatitis B is indicated).

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.

What Are Other Risk Factors for Ovarian Cancer?

In considering the risks of occupational exposure to ionizing radiation leading to ovarian cancer, it is important to understand other risk factors. Below is a list of other possible risk factors for ovarian cancer.

- **Relatives** (mother, daughter, sister) of a woman who has had ovarian cancer are at increased risk of developing this type of cancer themselves. A family or personal history of breast or colon cancer is also associated with an increased risk of developing ovarian cancer.
- **Childbearing.** Women who have never had children are more likely to develop ovarian cancer than women who have had children.
- **Fertility drugs.** Drugs that cause a woman to ovulate may slightly increase a woman's chance of developing ovarian cancer. Researchers are studying this possible connection.
- **Talc.** Some studies suggest that women who have used talc in the genital area for many years may be at increased risk of developing ovarian cancer.
- **Hormone replacement therapy (HRT).** Some evidence suggests that women who use HRT after menopause may have a slightly increased risk of developing ovarian cancer.

These factors may add to any risk due to workplace exposure to ionizing radiation. The likelihood of developing ovarian cancer increases as a woman gets older. Ovarian cancer has not been found to be related to smoking.

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Rates of Ovarian Cancer In Exposed Counties

Los Alamos County

Rates of ovarian cancer incidence and mortality were very high in Los Alamos County. Los Alamos County:

- Ranked second highest among the 33 counties in New Mexico in ovarian cancer incidence and mortality from 1970 to 1996. [33]
- In recent years, one to two cases have occurred annually. [13, 14]
- In the mid-1980's the rate in the county was elevated, [35] particularly in Census Tract #1 (North and Barranca Mesas). [75] Factors discussed by the Steering Committee for the state's epidemiology study were: the low birth rate and pregnancies later in life (childbearing protects against ovarian cancer); random variability; and the introduction of improved diagnostic technology (ultrasound) in 1985. [32]

Rio Arriba County

Rates of ovarian cancer were moderate in Rio Arriba County. Rio Arriba County:

- Ranked 22nd in incidence and
- Ranked 18th in mortality among the 33 counties in New Mexico from 1970 to 1996. [33]

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