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Cervical and Uterine Cancer and Exposure to Ionizing Radiation

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Cervical and Uterine Cancer and Exposure to Ionizing Radiation

Summary: Moderate evidence has been recorded of a possible connection between cervical and uterine cancers and exposure to ionizing radiation. This evidence is based upon studies of nuclear workers and others exposed to ionizing radiation. The National Research Council's has not determined whether the uterus is sensitive to ionizing radiation. Cervical and uterine cancers are not designated as "specified" cancers under the Energy Employees Occupational Illness Compensation Program Act. Historically, cervical cancer incidence and mortality have been low in Los Alamos County and high in Rio Arriba County among New Mexico counties. Incidence means new cases of cancer, while mortality means deaths due to cancer. For uterine cancer, incidence has been moderate, while mortality has been very low in Los Alamos County. In Rio Arriba County, uterine cancer incidence has been moderately low, while mortality has been moderately high. These rates suggest that more needs to be done in Rio Arriba County to detect and treat cervical and uterine cancer early.

What are Cervical and Uterine Cancers?

The uterus (also known as the womb), is a hollow, pear-shaped organ that is part of a woman's reproductive system. The cervix is the lower, narrow part of the uterus. Uterine cancer is the most common reproductive cancer among women, accounting for six percent of all cancers in women in this country. Each year, about 15,000 women in the United States learn that they have cancer of the cervix. Fibroid tumors and endometriosis are conditions of the uterus that are not cancerous. (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 cervical and uterine cancer among people exposed to ionizing radiation.

The results of these studies found increases and possible increases in cervical and uterine 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 included 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 cervical and uterine cancer were observed with higher doses in some studies.

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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.

- In studies performed to date, there is no reported evidence of increased rates of cervical or uterine cancer in LANL employees.

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 uterine and cervical cancer and workplace exposures among nuclear workers in other parts of the United States.

- **United Nuclear, Connecticut:** Increased incidence of cervical cancer was observed in a study of 594 women employed for at least six months between 1956 and 1978, and followed through 1979.[39] *

Studies of Other Nuclear Workers World-Wide

Below are studies of nuclear workers outside of the United States that looked at uterine and cervical cancer in connection with radiation exposures.

- **Nuclear Workers in Three Countries (United States, United Kingdom (U.K.), Canada):** A possible increase in uterine cancer deaths was observed with increasing doses of external radiation, assuming a 10 year latent period, in a study of 13,928 women employed before 1982.[40] +

- **Three Nuclear Workforces in the U.K.:** Increased deaths due to uterine cancer were observed in a study of 413 women who were "ever monitored" for radionuclides like Zn-65, Fe-59, Co-60 and Cr-51.[29] *

- **Atomic Energy Establishment of the U.K.:** Increased uterine cancer deaths were found in a study of 1,785 women with recorded radiation exposures who were employed between 1946 and 1979, and followed through 1986.[6] * The rate of uterine cancer increased with the amount of whole body exposure. *+ The biggest risk was for employees who were monitored for any internally-deposited radionuclide. * Most of the cases were cancer of the corpus uterus.

- **Obninsk (IPPE), Russia**: Increased incidence of uterine cancer was found in a study of 2,202 females who were hired before 1981 and still employed between 1991 and 1997.[7] *

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 uterine and cervical cancer among those who have been

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exposed to ionizing radiation. Most other research has been conducted of people exposed to atomic bombs.

- **Atomic Bomb Survivors:** Possible increasing deaths due to uterine cancer in a study of 86,572 A-bomb survivors.[8 +]

Other Research and Policy Findings

Is the Uterus Sensitive to Radiation?

- **Unresolved.** According to the National Research Council's BEIR V Committee, the question of radiation exposure and uterine cancer is not resolved.[9]

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.

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

- **No.** Neither uterine nor cervical cancers are "specified" cancers under the EEOICPA 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.

What Are Other Risk Factors for Uterine and Cervical Cancer?

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 cervical and for uterine cancer .

Cervical cancer:

- **Smoking.** The risk of cervical cancer may be increased by smoking[10] in combination with other risk factors.[41] Smoking is considered a contributory cause.[42]
- **Certain viruses.** Women who have human papillomaviruses (HPV) have a higher-than-average risk of developing cervical cancer.
- **The drug DES.** Women whose mothers were given the drug *diethylstilbestrol* (DES) during pregnancy to prevent miscarriage also are at increased risk of cervical cancer.

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Uterine cancer:

- **Estrogen.** Women who use the hormone estrogen without progesterone have an increased risk of uterine cancer. Long-term use and large doses of estrogen seem to increase this risk.
- **Obesity and related conditions**. High levels of estrogen may be the reason that obese women have an increased risk of developing uterine cancer. The risk of this disease is also higher in women with diabetes or high blood pressure.
- **The drug Tamoxifen.** Women taking the drug Tamoxifen to prevent or treat breast cancer have an increased risk of uterine cancer.
- **Colorectal cancer**. Women who have had an inherited form of colorectal cancer have a higher risk of developing uterine cancer than other women.

These factors may add to any risk due to workplace exposure to ionizing radiation. White women are more likely than African-American women to get uterine cancer.

Rates of Cervical and Uterine Cancer In Exposed Counties

Los Alamos County

There have been low rates reported in Los Alamos County for cervical cancer incidence and mortality. Rates of uterine cancer incidence fell in the middle of New Mexico county rates.

- Los Alamos County ranked 26th lowest in cervical cancer incidence and very low in mortality from 1970 to 1996,[33] and
- Ranked 17th lowest in uterine cancer incidence and very low in mortality from 1970 to 1996 of the 33 counties in New Mexico. [33]
- In recent years, about 2 new cases of cervical or uterine cancer have been diagnosed each year in Los Alamos County.[13, 14]

Rio Arriba County

Rates of cervical cancer reported in Rio Arriba County have been high for cervical cancer incidence and very high for mortality. Rates for uterine cancer incidence was low while cancer mortality was in the middle of New Mexico counties. These numbers suggest that more needs to be done in Rio Arriba County to detect and treat cervical and uterine cancer early.

- Rio Arriba County ranked 8th highest in cervical cancer incidence from 1970 to 1996 [33]
- Rio Arriba County ranked 3rd highest in cervical cancer mortality from 1970 to 1996[33]
- Rio Arriba County ranked 24th in uterine cancer incidence from 1970 to 1996,[33] and
- Rio Arriba County ranked 13th in uterine cancer mortality from 1970 to 1996 of the 33 counties in New Mexico. [33]

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