

NEWBORN HYPOTHYROIDISM NEAR THE INDIAN POINT NUCLEAR PLANT

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Background – Hypothyroidism and Radiation Exposure.

Hypothyroidism is a disorder of the thyroid gland marked by low levels of thyroid hormone (thyroxine) and high levels of Thyroid Stimulating Hormone (TSH).

For years, scientists have established a causal relationship between radiation exposure and hypothyroidism. In particular, radioactive iodine (which seeks out the thyroid gland, and destroys cells) is linked with the disease.

Residents of the Marshall Islands were exposed to high levels of fallout from atomic bomb tests during the 1950s. Subsequent studies documented a number of Marshallese children with hypothyroidism, also known as cretinism. Because there was no treatment for the disease at the time, and because thyroid hormone is critical to physical and mental growth, these children often were dwarfs suffering from mental retardation.

Low doses of radioactive iodine have also been linked with in high hypothyroidism rates. In the nine months after the Three Mile Island accident in 1979, there were 9 cases of the disease among Pennsylvania newborns. Eight (8) of the 9 were babies born to the east (downwind) of the Three Mile Island plant.

Screening Newborns for Hypothyroidism, and Rising Rates.

Hypothyroidism can be controlled by proper administration of thyroid hormone to the patient. Because of the vital role played by the thyroid gland in physical and mental development of the young, newborns have been screened for the disease for many years. The practice became widespread in the late 1970s with the invention of a technique that only requires drawing a single drop of blood from the baby's heel.

All 50 U.S. states now have mandatory newborn screening programs for a variety of disorders, including hypothyroidism. National rates have been rising during the past several decades. One recent medical journal article documented a 73% rise in the U.S. rate from 1987 to 2002. (1) This trend is parallel to the sharp increase in the U.S. thyroid cancer (all ages) rate, which rose 155% from 1980 to 2006. It is unclear whether the increase in newborn hypothyroidism is due to better detection or other factors.

Hypothyroidism in Newborns Near Indian Point.

In New York State, mandatory screening for newborn hypothyroidism began in 1978. An article by administrators of the program showed that the state rate rose 138% from 1978 and 2005 (1).

Because U.S. atomic bomb tests above the ground ceased in 1963, and all tests ceased in 1992, the only current source of environmental radioactive iodine is emissions from

nuclear power plants. The oldest and largest plant in New York State is Indian Point. One reactor at the site ran from 1962-1974, while the other two started in 1973 and 1976.

According to official records maintained by the U.S. Nuclear Regulatory Commission, Indian Point emitted the 5th highest amount of airborne radioactive iodine of all U.S. nuclear plants from 1970-1993. The Indian Point total of 17.5 curies exceeds the official total of 14.2 released during the Three Mile Island accident in 1979. (2)

Four New York counties flank Indian Point, and nearly all residents of these counties live within 20 miles of Indian Point. The New York State Newborn Screening Program provided numbers of newborn hypothyroidism cases for each of these counties for each year between 1997 and 2007. Table 1 presents rates of newborn hypothyroidism for these counties compared to the United States.

Table 1
Newborn Hypothyroidism Rates
Counties Closest to Indian Point vs. U.S.
1997-2007

| <u>Area</u> | <u>1997-2007</u> | | <u>Cases/ 100,000</u> | <u>% vs. U.S.</u> |
|-----------------------|------------------|--------------------|---------------------------|-------------------|
| | <u>Cases</u> | <u>Live Births</u> | | |
| Orange County | 33 | 54,908 | 60.10 | + 40.7 |
| Putnam County | 9 | 12,577 | 71.56 | + 67.5 |
| Rockland County | 45 | 49,001 | 91.83 | + 115.0* |
| Westchester County | 121 | 136,632 | 88.55 | + 107.3* |
| 4 COUNTIES, 1997-2007 | 208 | 253,118 | 82.18 | + 92.4* |
| 4 COUNTIES, 2005-2007 | 73 | 68,019 | 107.32 | + 151.2* |
| U.S., 2001-2005 | 8569 | 20,060,577 | 42.72 | ----- |

* Significantly different from the U.S. at p<.05

Sources: National Newborn Screening and Genetics Resource Center, www2.uthscsa.edu/nnis (national cases). Missing Kentucky 2001 data, Alabama 2003 data, Tennessee 2005 data. New York State Department of Health Newborn Screening Program (local cases). U.S. Centers for Disease Control and Prevention, <http://wonder.cdc.gov> (live births). Cases represent confirmed cases of primary hypothyroidism in newborns.

Results show that **the 1997-2007 four-county newborn hypothyroidism rate was 92.4% greater, or nearly double, the U.S. rate**, based on 208 confirmed cases in the 11-year period. Each county's rate exceeds the national rate, and both Rockland and Westchester rates were more than double the U.S.. The highest rates are in the most recent years; the 2005-2007 local rate was 151.4% above the U.S.

Conclusions.

Rates of newborn hypothyroidism in counties closest to the Indian Point nuclear plant are roughly double the U.S. rate. While many factors may account for this pattern, none are obvious. The fact that Indian Point has released more radioactive iodine into the air than most U.S. nuclear plants suggests that these releases may represent one causal factor.

Results are consistent with the recent journal article showing the local rate of thyroid cancer is 66% greater than the U.S. rate. (3) Exposure to radioactive iodine raises risk of both thyroid cancer and hypothyroidism.

As the U.S. Nuclear Regulatory Commission considers a proposal to extend the Indian Point licenses for 20 years, it is important that information such as local rates of newborn hypothyroidism be made available to the public and to decision makers.

1. Katherine B. Harris and Kenneth A. Pass. Increase in congenital hypothyroidism in New York State and in the United States. *Molecular Genetics and Metabolism*, Volume 94, Issue 1, May 2008, p. 140.

2. J. Tichler, K. Doty, and K. Lucadamo. Radioactive Materials Released from Nuclear Power Plants, 1993 Report. NUREG/CR-2907. Upton NY: Brookhaven National Laboratory, 1995. Nuclear plants with highest 1970-1993 airborne emissions of Iodine-131 and particulates are Dresden IL (97.22 curies), Oyster Creek NJ (77.05), Millstone CT (32.80), Quad Cities IL (26.95), and Indian Point NY (17.50).

3. Joseph J. Mangano. Geographic Variations in U.S. Thyroid Cancer Incidence and a Cluster Near Nuclear Reactors in New Jersey, New York, and Pennsylvania. *International Journal of Health Services*, Volume 39, Issue 4, October 2009, pp. 643-661.