

Session 4.3

Thyroid Cancer Risk from In Utero Exposure to Chernobyl Fallout

Maureen Hatch
U.S. National Cancer Institute
Washington, DC, USA

It is now widely accepted that Iodine-131 in Chernobyl fallout substantially increased the risk of thyroid cancer in individuals exposed in affected areas of Ukraine and Belarus as children or adolescents, with the largest increase seen among those at the youngest ages when the consumption of I-131 contaminated milk is highest, the small thyroid mass increases the absorbed dose, and rapid cell proliferation may raise the risk for carcinogenesis. Less data are available on the post-Chernobyl thyroid cancer risk to those exposed *in utero*, a group that may also be highly susceptible to the carcinogenic effects of radioiodine in view of their extremely small thyroid mass and high rate of cellular proliferation. The fetal thyroid becomes active at the end of the first trimester of pregnancy and begins to rapidly accumulate I-131 and other iodines from the maternal circulation via the placental iodine pump. Throughout gestation, uptake of I-131 by the fetal thyroid increases faster than thyroid mass, and by late gestation, fetal I-131 levels are many-fold higher than maternal levels.

To evaluate the risk of thyroid cancer that might result from prenatal exposure that may have occurred as a result of fallout from the Chernobyl accident, we initiated a study in northern Ukraine in collaboration with the Institute of Endocrinology and Metabolism in Kiev. We assembled a cohort of 2,582 mother-child pairs, in which the mother had been pregnant at the time of the Chernobyl accident on April 26, 1986 or the two months following when I-131 fallout was still present, and conducted a cross-sectional thyroid screening study of the offspring in 2003-2006, when they were between 16 and 19 years of age. We identified seven cases of thyroid cancer and one Hurthle cell neoplasm in this small cohort, and estimated a substantial excess risk of thyroid carcinoma (EOR/Gray=11.66) Given the sample size and the small number of cases, the estimate was not statistically significant (P=0.12). However, the magnitude of the observed risk approximately 20 years after the accident was striking. To pursue this issue, we are

currently conducting a similar study of an *in utero* cohort in exposed regions of Belarus, where an earlier screening study by Japanese investigators has suggested an elevated the risk for screening-detected thyroid cancer in prenatally-exposed children of school age. In my presentation, I will summarize the findings to date – both for thyroid cancer risk and, where data are available, for risk of non-thyroid cancer as well – and argue the need for further research on those exposed prenatally to radioactive fallout from nuclear accidents.