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Neonatal TSH and maternal TCDD exposure in Seveso

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Background and hypothesis. We evaluated neonatal thyroid function in a large population of women highly-exposed to 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD), a persistent and widespread environmental contaminant with established toxic effects including neonatal primary hypothyroidism in animal models.

Methodology. 25 years after the Seveso, Italy accident of 1976, we conducted a population-based study on children born to the 1772 fertile-age women of the contaminated zones (A and B), and 1772 age-matched women from the surrounding non-contaminated area (reference). Neonatal blood thyroid-stimulating hormone (b-TSH) was measured at a single laboratory.

Results. Mean b-TSH neonatal levels were 1.16 $\mu\text{U}/\text{ml}$ (95%CI: 1.09-1.22) in the reference population, 1.61 $\mu\text{U}/\text{ml}$ (95%CI: 1.50-1.72) in zone B, and 1.96 $\mu\text{U}/\text{ml}$ (95%CI: 1.52-2.51) in zone A (p -trend<0.001). Newborns from zone A and zone B had OR=6.6 (95%CI: 2.6-16.7; p <0.001) and OR=2.6 (95%CI: 1.4-5.2; p =0.005) respectively for the presence of b-TSH \geq 5 $\mu\text{U}/\text{ml}$, compared with the reference.

An inverse relationship between b-TSH and time from the accident was found among siblings born from zone A (-1.01 $\mu\text{U}/\text{ml}/\text{year}$) and zone B mothers (-0.16 $\mu\text{U}/\text{ml}/\text{year}$). Siblings from the reference zone did not show a decrease (interaction test for zones p =0.004).

Adjustment by gender, birth-weight and maternal age did not change the results. GEE models were used to handle potential correlation of b-TSH levels among siblings.

Implications: Our findings indicate that maternal exposure to environmental contaminants such as TCDD produces effects on neonatal thyroid function that may occur far apart in time from the initial exposure.