

CHILDREN IN UTERO EXPOSED BY THE CHERNOBYL ACCIDENT: DIFFERENCES AND ASSOCIATIONS BETWEEN RADIATION DOSE, THYROID HORMONE, AND IQ LEVELS

S.A. Igumnov¹, V. Drozdovitch²

¹Institute of Psychology, Belarusian State Pedagogical University named after M.Tank, Minsk, Belarus

²Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH, DHHS, Bethesda, Maryland, United States

There is a scarcity of studies that explore effects of prenatal (in utero) radiation exposure on human health and well-being. To understand mechanisms of possible negative effects, we followed a Belarussian cohort including 250 persons exposed in utero to radiation from the Chernobyl accident in 1986 (a group with higher exposure) and of a control group of 250 persons matched on age and sex born in areas with little or no contamination (a group with less exposure). Previous analyses showed a significant difference in IQ (Intellectual quotient) between the two groups at age 7 years, but not later. We used the data from this cohort to further explore the possible relationship between dose, thyroid hormones levels and IQ.

The dataset included information on estimated in utero radiation dose, gestation week at the time of the accident; thyroid hormones T3 (triiodothyronine) and T4 (thyroxine) levels and general IQ at three points of time (longitudinal): *t1*: 6-7 years old; *t2*: 11-12 years old and *t3*: 15-16 years old. Descriptive and inference (regression) analyses were used to explore the dynamic of changes through time and associations between main variables adjusted by sex at the three time points.

Significant differences in levels of T3 (not of T4) and thyroid dose were observed between the in utero exposed and control groups in general with lower values in the latter; and in IQ at *t1* (6-7 years old) with higher values in the control group, as per bivariate chi-square tests performed. Both verbal and non-verbal IQ were significantly higher in the control group at *t1*. Results of regression models performed in both groups separately showed that T4 was not significantly associated with IQ in both groups. In the exposed in utero group, thyroid dose T3 showed statistically significant inverse relationships with IQ at *t3* (15-16 years old) which was more pronounced in the non-verbal parts of it.

Conclusions

Our analysis suggests a reverse association between IQ and dose in the in utero exposed group. Further in-depth analyses are underway to better characterize these associations, considering possible confounding factors.

Information about the authors:

Igumnov Sergey A. – MD, PhD, Professor (SPIN-code: 1607-8697; ResearcherID: E-7975-2018; ORCID iD: 0000-0003-3582-9751; Scopus Author ID: 6602771038). Place of work and position: Institute of Psychology, Belarusian State Pedagogical University named after M.Tank, Minsk, Belarus

Address: 18, Sovetskaya str., Minsk, Belarus, e-mail: sa.igumnov@gmail.com

Drozdovitch Vladimir – Place of work and position: Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH, DHHS, Bethesda, Maryland, United States

Authors' contributions:

S.A. *Igumnov*: writing the text of the manuscript;

V. Drozdovitch: development of research design, writing the text of the manuscript.

Financing: The study was performed without external funding.

Conflict of interest: The authors declare no conflict of interest.