THYROID CARCINOMA IN CHILDREN AND ADOLESCENTS RESULTING FROM THE CHERNOBYL ACCIDENT: POSSIBLE CAUSES OF THE INCIDENCE INCREASE OVERESTIMATION

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Souhrn

Vzestup incidence tyreoidálního karcinomu dětí a dospívajících v důsledku havárie v jaderné elektrárně Černobyl: možné příčiny nadhodnocení

Významné zvýšení incidence karcinomů štítné žlázy dětí a dospívajících v důsledku havárie v jaderné elektrárně Černobyl je považováno za prokázané. Data o dramatickém vzestupu s počátkem v roce 1990 jsou však pro patology obeznámené s dobovou diagnostickou praxí zpochybnitelná. Riziková populace byla po havárii podrobena lékařskému vyšetřování a ultrazvukovému screeningu štítné žlázy. Vysoká onkologická ostražitost mohla spolu s omezenými technickými možnostmi a zastaralým vybavením histologických laboratoří přispět k falešně pozitivním závěrům. Diagnostická punkce štítné žlázy tenkou jehlou je doprovázena relativně vysokým podílem nejistých závěrů, kde je indikována histologická verifikace. Ke zhodnocení nukleárních kritérií papilárního tyreoidálního karcinomu (matnicová jádra, intranukleární inkluze atd.) je nezbytná vysoká kvalita histologických řezů. Posouzení kritérií malignity folikulárního tyreoidálního karcinomu jako jsou kapsulární a vaskulární invaze také vyžaduje četné kvalitní řezy. Odpovídajícího počtu a kvality histologických řezů tehdy často nebylo dosahováno, zejména bylo-li použito zalévaní do celoidinu. K nárůstu incidence mohly přispět rovněž latentní karcinomy a vysoce diferencované nádory s nejistým maligním potenciálem odhalené při screeningu.

Klíčová slova: tyreoidální karcinom – nádory dětského věku – černobylská havárie – radiační patologie

Summary

Thyroid Carcinoma in Children and Adolescents Resulting from the Chernobyl Accident: Possible Causes of the Incidence Increase Overestimation

The Chernobyl accident in the nuclear power plant on 26th April 1986 was followed by numerous publications overestimating the medical consequences of the disaster. In the publications, interpretations of spontaneous diseases as radiation-induced, indication of radioactivity or dose levels without confrontation with the natural radiation background, or conclusions about incidence increase without comparison with the increase tendencies in larger regions or the whole country, can be found. Improved diagnostics after the Chernobyl accident is not always taken into account. The high figures could have been caused in some cases by non-random material selection or inadequate morphological assessment of biopsy specimens. The application of the linear-no-threshold theory to the inhabitants of contaminated areas contributed to an overestimation of medical consequences of the Chernobyl accident as well. The incidence increase of thyroid carcinoma in children and adolescents started in 1990, four years after the accident. High tumor expectancy after the accident, in the circumstances of limited technical possibilities and outdated equipment of histological laboratories, contributed to a higher number of registered cases. The quality of specimens necessary for the assessment of nuclear criteria of papillary carcinoma was not always achieved at that time. The incidence increase of thyroid carcinoma can, at least in part, be explained by improved detection of thyroid nodules with occasional false-positive conclusions about malignancy. Besides, latent carcinomas and well-differentiated thyroid tumors of uncertain malignant potential, diagnosed as malignancies, could have additionally contributed to the high figures.

Key words: thyroid carcinoma – pediatric cancer – Chernobyl accident – radiation pathology

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Thyroid carcinoma (TC) in children and adolescents is the only type of malignancy, significant increase of which in consequence of Chernobyl accident (CA) is regarded to be proven (3,7,21,29). Reaction of scientific community to the reports on its drastic increase, started 4 years after the CA, was skeptical: it had been assumed that radiation from ^{131}I is less carcinogenic to the thyroid than external radiation, and that a latent period for thyroid carcinoma after an exposure should be around 10 years. There was also uncertainty about accuracy of the diagnoses (30). High incidence and the short induction period were designated as unusual in the UNSCEAR 2000 report, where it is also stated that the number of thyroid cancers in children and adolescents exposed to radiation is considerably higher than expected on the basis of previous knowledge. It is assumed that other factors may be influencing the risk (29). Improved diagnostics, registration and reporting were named among factors that could have contributed to the increased cancer incidence after the CA (7). It is also noteworthy that exposures to ^{131}I from medical procedures have not demonstrated convincing evidence of an increased thyroid cancer risk (13).

Previously, we reviewed several publications overestimating radiation-induced abnormalities after CA (14-17). This article is based on experience of histopathological practice in the former Soviet Union (22) visiting cytological and histopathological laboratories, and interviewing physicians in the northern regions of Ukraine. Besides, information from Russian-language professional literature can shed more light on the issue. All quotations below are verbatim translations.

The following figures can give an estimate of the incidence