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Letter to the Editor

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Thyroid Carcinoma after the Chernobyl Accident: Diagnosis, Treatment and Overtreatment

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Letter to the Editor

On the basis of the linear no-threshold theory (LNT), Chernobyl accident (hereafter accident) was predicted to result in a considerable increase in radiation-induced cancer. In fact, there has been no cancer increase proven to be a consequence of the radiation exposure except for thyroid carcinoma in people exposed at a young age [1-3]. Appearance of radiogenic thyroid cancers after the accident is not denied, but their number has been overestimated due to the following mechanisms. Prior to the accident, the registered incidence of pediatric thyroid cancers was lower in the former Soviet Union (SU) than in other developed countries probably due to differences in diagnostic quality and coverage of the population by medical checkups [4,5]. The mass screening in contaminated territories after the accident detected not only small tumors but also advanced neglected cancers accumulated in the population, misclassified after the accident as aggressive radiogenic cancers. Besides, there was a pressure to be registered as Chernobyl victims to get access to benefits and health provisions [6]. There was no regular screening outside the contaminated areas, so that the cases brought from outside must have been averagely more advanced. Accordingly, the "first wave" thyroid cancers after the accident were on average larger and less differentiated than those detected later [7,8], as the pool of neglected cancers was gradually exhausted by the screening and reliability of the registration tended to improve with time. Admixture of old neglected cases explains the fact that Chernobyl-associated thyroid cancers "behaved in an aggressive fashion with poor clinical outcomes characterized by high frequency of extra-thyroidal extension, lymph node and distant metastases" etc. [9] The following citation is illustrative: "The tumors were randomly selected (successive cases) from the laboratories of Kiev and Valencia... [The cancers were] clearly more aggressive in the Ukrainian population in comparison with the Valencian cases" [10]. There is an explanation: more efficient cancer diagnostics in Western Europe. Further details and references are in [5,11].

The misclassification of neglected advanced cases as aggressive radiogenic cancers gave rise to the concept that supposedly radiogenic thyroid cancers, at least those from the "first wave" after the accident, were more aggressive than sporadic ones [8,12-15]. It had consequences for the practice: the surgical treatment of radiogenic thyroid carcinoma was recommended to be "more radical" [16]. After 1998-1999, the surgery in some institutions switched to a more aggressive approach [14,17]. The following was recommended for Chernobyl-related pediatric thyroid carcinoma: "Radical thyroid surgery including total thyroidectomy combined with neck dissection followed by radioiodine ablation" [18] or high-dose external radiotherapy (40 Gy) [19]. Some experts regarded subtotal thyroidectomy to be "oncologically not justified" and advocated total thyroidectomy with prophylactic neck dissection [16,20-22]. Lesser resections were regarded to be "only acceptable in exceptional cases of very small solitary intrathyroidal carcinomas without evidence of neck lymph node involvement on surgical revision" [17]. It was written in a recent instructive publication that bilateral neck dissection must be performed in all cases independently of the tumor size, histology and lymph node status [23]. This approach is at variance with a more conservative treatment of thyroid carcinoma applied also in the settings of the Fukushima Daiichi nuclear accident [24]. The articles [25,26] were misquoted by Demidchik and Kontratovich [22] advocating total thyroidectomy with bilateral neck dissection for all cases of pediatric thyroid cancer. The sources [27-29] were cited in support of the statement: "The most prevailing opinion calls for total thyroidectomy regardless of tumor size and histopathology" [17]. In fact, subtotal thyroidectomy was used or recommended in these articles, in some of them along with the total thyroidectomy [27-29]. Note that total thyroidectomy with neck dissection is associated with complications such as hypoparathyroidism and recurrent laryngeal nerve palsy [20,30-32]. Moreover, the majority of post-Chernobyl thyroid patients were young females potentially concerned with the cosmetic aspect.

Mechanisms of false-positivity have been discussed previously; among others, the misinterpretation of nuclear pleomorphism as a malignancy criterion of thyroid nodules was not unusual in the former SU of the 1990s due to the shortage of modern literature [33]. On the basis of contemporary morphological descriptions and images from the Russian-language literature on tumor pathology, in some cases no reliable differential diagnosis could be made; potentially misleading histological images from handbooks were reproduced in [11,34]. If a thyroid nodule is found by the screening, a fine needle aspiration biopsy (FNAB) is normally performed. Thyroid cytology is accompanied by some percentage of inconclusive results, when histological examination is indicated. In the former SU during the 1990s, this percentage was relatively high due to lacking experience with pediatric thyroid material, suboptimal quality of specimens, etc. [33] The surgical specimen was sent to a pathologist, who could be sometimes prone, after a complete removal of the nodule, to confirm malignancy even in case of uncertainty, which was not infrequent due to instable quality of specimens [11]. Frozen sections were sometimes used, being suboptimal for histological diagnostics of thyroid nodules. Radiophobia contributed to the overdiagnosis of cancer, which can be illustrated by the following citation: "Practically all nodular thyroid lesions, independently of their size, were regarded at that time in children as potentially malignant tumors, requiring an urgent surgical operation" [35]. Ultrasound devices were introduced into practice earlier than FNAB [4], which, considering the attitude to the thyroid nodules cited above, must have contributed to the overdiagnosis and overtreatment early in the 1990s. Furthermore, iodine deficiency on the contaminated territories and goiter associated with it [15] was a contributing factor because more thyroid abnormalities were found

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by the screening, providing more opportunities for the overdiagnosis of malignancy; more details are in [5,11]. In conclusion, among factors contributing to the persistence of suboptimal methods are lack of scientific discussion and insufficient use of the international literature [36].

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