
Letter

In a recent issue of Cancer Research, Yamamoto et al. (1) report on p53 gene mutations in urinary bladder epithelium of patients residing in more or less radiocontaminated areas in Ukraine who were treated for benign prostatic hyperplasia but did not have symptoms of bladder disease. The implication of the report is that these mutations are of radiogenic origin. Two central statements made in support of this interpretation are misleading. The first concerns the diagnosis “irradiation cystitis,” which cannot be correct, and the second is the statement that bladder carcinoma in Ukraine has increased greatly since the Chernobyl accident, which is not scientifically valid.

The article refers to 55 patients, 28 of which lived in areas with original cesium-137 contamination of $\geq 5 - 30$ Ci/km$^2$ (group I), 17 of which lived in Kiev city, which was only slightly contaminated (0.5–5 Ci/km$^2$, group II), and 10 of which were from noncontaminated areas (group III). According to the report, histological examination of the bladder showed severe dysplasia in 42 of 45 patients from groups I and II. Twenty-two of 45 patients showed areas of carcinoma in situ, and an invasive transitional cell carcinoma was found in one patient. No neoplastic changes were found in group III patients, although some inflammatory changes were seen.

Besides the dysplastic changes, it is also stated in the report that 42 of 45 patients in groups I and II had irradiation cystitis. This is a deterministic radiation effect seen in connection with radiotherapy and requires acute radiation doses of several Grays to the bladder. In a related article (2) referring to the same patients, the authors describe these changes as “dilated blood vessels, hemorrhage, angiomatoid vascular changes, and areas of sclerosis.” In connection with known, high, acute radiation exposure, such changes are compatible with radiation cystitis, but they are, of course, by no means pathognomonic of radiation exposure.

Radiation doses from cesium-137 at the time of the study can be calculated from the level of cesium in 1-day urine samples, reported in Ref. 2. The level in group I was between 0.8 and 28.9 Bq/liter (22-780 pCi/liter), and the level in group II was between 0.22 and 8.1 Bq/liter (6-220 pCi/liter). These levels are very credible and show the expected difference between the two areas. They correspond to a daily intake of less than 100 Bq (2.7 nCi) of cesium-137, even in the most exposed individual. The yearly dose to the urinary bladder from this maximal intake is 0.5 mGy absorbed dose or 0.5 millisievert equivalent dose to the bladder (3). This is comparable to the normal variation in natural background radiation. The contribution from other nuclides is negligible. The yearly dose from external radiation is of the same magnitude (4). In earlier years, the doses were higher, but radiation doses to the population never approached the threshold for deterministic effects (with a possible exception for the thyroid gland) even in the most contaminated areas, let alone in Kiev city. Under such circumstances, to label hemorrhagic cystitis in these patients as radiation induced is absurd.

In light of the low radiation doses received by the patients, the big difference in histological findings in groups I and II versus group III is surprising. The histopathologist was probably not blinded for group. However, if the difference is real, this leads the reader to question how the patients from the different areas were chosen. It is not stated whether all consecutive patients with the same diagnosis and treatment were enrolled, or whether some knowledge of macroscopic or microscopic findings may have influenced the choice. The possibility of bias at the moment of enrolling needs to be evaluated. Another possibility is a difference in smoking habits or occupational exposure to toxic chemicals. Neither is reported, except for a short notice that most of the patients were heavy smokers.

The authors also state that after the Chernobyl accident, in the years 1986–1996, the yearly incidence of urinary bladder cancers in Ukraine has increased gradually from 26.2 to 36.1 per 100,000. However, the development of population-based, computerized cancer registration in the Ukraine only began in the 1990s. Earlier data were collected for health planning purposes only and do not meet the quality criteria for use in scientific research (5). There appears to be a general increase in cancer incidence in Ukraine, but this could be observed well before the accident, and the time trend has not changed. Whereas an actual increase in some tumor types is possible, part of the increase is certainly due to increased ascertainment and better reporting. Even double registering and registering of unconfirmed cancer cases are possible. Actually, the cancer incidence in the most contaminated, strictly controlled areas is lower than in the whole of Ukraine. There is no evidence of increased overall cancer rates due to radiation (6, 7). The only exception is thyroid cancer in people exposed in childhood.

It is an all too common misconception among laymen that the population exposed to the Chernobyl fallout may suffer from deterministic radiation effects to different organs, or that they are at great risk of radiation-induced cancer. It is not in the best interest of the inhabitants that these misconceptions are underpinned by misleading scientific articles. As for the patients in this study, it is most unlikely that either the histological changes or the p53 mutations in their urinary bladder are connected in any way with radiation exposure.

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References

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