LETTERS

Human Cancer Research

Letters from Harry Rubin (11 Mar., p. 1170) and Philippe Shubik (17 June, p. 1226) have expressed the belief that recent advances in molecular biology have not led to a deepened understanding of the nature of malignancy. I would go one step further and say that some cancer research may actually have set back our understanding because the data produced are not relevant to the human disease. The pressures of decreasing research funds, intense competition, and furthering careers often make publishing more important than meaningfulness of data. Thus it is not surprising that long-term "normal" and "transformed" cell lines are favored systems for study, as data can be quickly obtained. The cells grow rapidly, producing large numbers in a short period.

A fundamental disadvantage of using long-term cultures of embyronic rodent fibroblasts, such as 3T3 or 10T½, as normal cells may be that the cells do not age and are very different from the cells in our body. The altered patterns of DNA methylation now being reported in immortal cells (*1*) may reflect the conversion to immortality. These immortal cell lines are used in assays to test the transforming activity of carcinogens and oncogenes because the cells lack variability and are considered to have moved through all but the last step in the progression from normal to malignant. Progression, however, suggests that the cells have acquired features of the malignant phenotype. If this is true, why are the cells used as normal controls? On the other hand, if these cultures are partially transformed, should they not exhibit a high degree of variability, since much recent work (*2*) indicates that variability or heterogeneity is a fundamental characteristic of the malignant phenotype.

Even human tumor cells are not immortal when taken from the patient and put in culture. Only after a period of adaptation and selection does an immortal clone sometimes arise from a primary cell culture. The relationship between these immortal tumor cell lines and the original tumor cells is in my opinion distant. To my knowledge, none of the human tumor cell lines derived from adenocarcinomas retain the glandular organization characteristic of adenocarcinomas or the normal cell types from which they arose. Furthermore, human tumors do not appear to exhibit the alteration of a cellular oncogene (*3*) that has been demonstrated in long-term carcinoma cell lines (*4*). Since a basic concept in biology is that structure and function are related, we can conclude that human tumor cell lines do not function like human tumors. Perhaps cancer researchers who experiment with long-term cultures should pause for the purpose of imaginative thought so that appropriate experimental systems for studying human cancer can be developed.

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References

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Potassium Iodide: Policy in New York

Earlier correspondence from Rosalyn S. Yalow (23 July 1982, p. 295; 19 Nov. 1982, p. 742) and Frank von Hippel (1 Oct. 1982, p. 6; 17 Dec. 1982, p. 1174) was concerned with the overall effectiveness of potassium iodide (KI) for blocking the thyroid glands of populations potentially exposed to radioiodine that might be released in a nuclear power plant accident. These letters referred to a statement on the subject approved by the Committee on Public Health of the New York Academy of Medicine on 2 March 1981 (*1*). Because the decision about whether to distribute KI to a large population distant from a power reactor site has public health implications, we are constrained to comment.

In early 1980, the Committee on Public Health decided to review a recommendation that originated within the New York City Department of Health for expenditure of roughly $13 million (approximately 10 percent of the total annual budget of the department) for the purchase of KI. At that time there was a widely held view that, in the event of an accident leading to the escape of radioactivity from the containment vessel of a nuclear power reactor, radioactive iodine would be a major health hazard because of its adverse effect on the thyroid.

We had been made aware by the health physicists on our expert panel that, of the approximately 64 megacuries of iodine-131 in the Three Mile Island (TMI)-2 reactor core, only about 15 curies (0.00002 percent of the total) had escaped from the containment vessel by an indirect pathway. More important, the first postaccident sampling performed about 24 hours after the damage to the reactor fuel indicated that only about 4300 curies were present in the air within the containment vessel despite the release of 22×10^6 curies from the damaged fuel to the reactor coolant water. Andrew Hull of Brookhaven National Laboratories, a member of our review panel, had discussed the implications of these observations at a meeting of the American Nuclear Society on 10 June 1980 (*2*). The subsequently published Electric Power Research Institute (EPRI) report (*3*) was referenced by us as another source. It reviewed previously unpublished operational factors in a reactor that serve to minimize escape of iodine to the environment. *The Report of the President's Commission on the Accident at Three Mile Island* (*4*) provided similar information on the release of radioactive iodine. Von Hippel incorrectly implies in his letter of 17 December that the Committee on Public Health "relied heavily on a statement by [EPRI] that very little radioactive iodine would be released in any future nuclear reactor accidents."

The Committee on Public Health was not alone in paying heed to the EPRI report. The Nuclear Regulatory Commission has stated that information from EPRI, including the report of Levenson and Rahn (*3*), together with a letter from three scientists from Oak Ridge National Laboratory and Los Alamos Scientific Laboratory, were key factors in the development of the review to which von Hippel refers and which was summarized in NUREG 0772 (*5*).

NUREG 0772 supports the conclusion that little of the released radioiodine from the fuel during an accident is likely to become airborne when the containment vessel is intact and water is present. However, the authors emphasize the low-probability, high-risk accident sequences in which there is a major release from the fuel during postulated meltdown and a subsequent rupture of the containment vessel. We do not deny the seriousness of such an accident, whatever the probability. However, we note the statement in NUREG 0772 that, in such an event, "it is important to emphasize that iodine is not the sole radionuclide of importance in nuclear accident analyses. . . . Radioactive iodine contributes roughly one-half of the dose resulting in early fatalities and illnesses, but only about five percent of the dose resulting in latent cancers" (*5*, p.