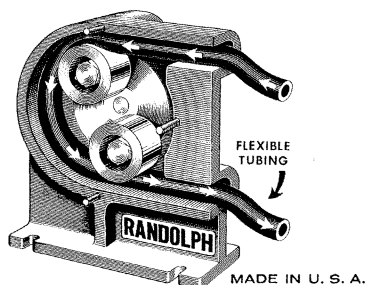


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30 to 40 percent of the output of the extramural contract program of NCI's Division of Cancer Cause and Prevention for 5 percent or less of their budget.

Our personal contributions to the area began in the late 1940's. Certainly Smith must be familiar with the review article in *Cancer Research* (4) urging that carcinogenicity testing be made part of chronic toxicity testing. One of us (P.S.) can justifiably claim a major role in urging, via the National Advisory Cancer Council and the National Cancer Advisory Board (NCAB), that more funds be allotted to investigate environmental carcinogenesis. We also had a major role in training many of those now engaged in this field, including Saffiotti, Lijinsky, Tomatis, Della Porta, Mirvish, Toth, Montesano, Cabral, Keefer, Rappaport, and Magee.

The real reasons for the blunders Smith assigns to NCI are not likely to be discovered through audits by GAO, HEW, and so forth. The problems are a reflection of the present state of the sciences that underwrite this program. Individual bioassays pose separate scientific problems and, more crucial, there is a need for new approaches and a careful evaluation of procedures.

The developments during the present decade have been much more complex than they appear from Smith's oversimplified article. Debates have been held at the NCAB; discussions have taken place during congressional hearings; new legislation has been enacted. Great confusion has been engendered about the role of NCI and that of the regulatory agencies. Implications of responsibility have been made where none have existed, and roles have been entirely misunderstood.

If *Science* is to represent the scientific community, any discussion of carcinogen testing should surely include the scientific merits of such a procedure. Nowhere does Smith even ask whether routine testing should be done at all. Finally, a distinction should be made between an academic cancer institute such as Eppley and a commercial testing facility.

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References

1. W. Lijinsky, P. Shubik, *Science* **145**, 53 (1964).
2. M. Rustia, P. Shubik, *J. Natl. Cancer Inst.* **48**, 721 (1972).
3. S. Mirvish, L. Wallcave, M. Eagen, P. Shubik, *Science* **177**, 65 (1972).
4. P. Shubik, J. Sice, *Cancer Res.* **16**, 728 (1956).

Risks and Public Policy

The Three Mile Island nuclear reactor accident has dramatized not only the role of nuclear power but that of other complex, science-based technologies in our society. It is important, therefore, to draw the maximum lesson from the accident, and the President, Congress, the Nuclear Regulatory Commission (NRC), and the nuclear industry have announced investigations in order to do just that. As a result, a lowering of the risk to the public from nuclear power reactors is to be expected.

Looking beyond nuclear power to the general issue of risks/benefits to the public from applying complex technologies, there appears to be one conclusion from Three Mile Island that can be made already: Accurate multidisciplinary assessments of any highly complex technology cannot be guaranteed until after a period of trial and error. The unavoidable risks during that period should therefore be countered with extra, defense-in-depth safety measures.

In the case of the Three Mile Island accident, the most noteworthy fact, in my opinion, is not that material and human malfunctioning apparently were encountered along with bureaucratic and organizational inefficiencies (although the NRC should be commended for its choice of procedure of cooling down the reactor), but that the reactor got into a potentially dangerous failure mode that had not been foreseen. This failure mode was (i) unanticipated; (ii) metastable; and (iii) potentially dangerous to the public.

To an impartial observer, before the accident the NRC would appear to have done all that it could reasonably be expected to have done to learn the potential failure modes of operating light water nuclear reactors. It had available the \$1-million-plus Rasmussen study, an independent evaluation of it by a special group of the American Physical Society, several evaluations by special interest groups, and a recent additional review of the Rasmussen study that was sponsored by the NRC itself. In none of these studies was the NRC led to believe that a large bubble of hydrogen would form inside a reactor vessel.

The general public may well wonder if this is the best it can expect from the scientific community. The answer, of course, is, No. Scientists can pay more attention to the discipline of risk assessment; they can recommend designs incorporating more monitoring instrumentation and defense-in-depth safety measures designed to avoid a broader spectrum of failure modes. Also, a wider

group of scientists, both as regards discipline and professional affiliation, can become involved in risk assessment, which can then be isolated from some of the pressures of special interests.

Whereas the occurrence of a Three Mile Island syndrome in the highly developed field of nuclear technology may appear surprising to some, analogous phenomena are almost taken for granted by economists and political scientists. In their struggle, they appear to be more concerned with the theory and practice of decision-making under conditions of uncertainty than with actually trying to reduce the uncertainty that influences their decisions. At a given time, it may not be possible to remove *all* existing uncertainty, but a minimization of it can always be attempted and a corresponding technological solution outlined. The accuracy and objectivity with which the risk assessment of a complex technology can be carried out ought to be emphasized in the political process of its evaluation.

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Dysmenorrhea Treatment

The Research News article "Dysmenorrhea: basic research leads to a rational therapy" (13 July, p. 175) seems to describe precisely the type of approach to health problems that we all seek but seldom find. The enthusiasm for such a rare occurrence may have, however, led to an overly optimistic and potentially dangerous conclusion. If indeed dysmenorrhea is caused by overproduction of prostaglandins E and F_{2α}, perhaps, before putting 30 to 50 percent of women of childbearing age on the rational therapy to depress their synthesis, we should consider two points. The most important is that it is possible that such a widespread "biochemical abnormality" may have a functional role that we do not yet understand. A related point is that the article appears to advocate additional drug therapy for a very large segment of the population. Experience should have taught us by now that simple solutions, especially when applied on a large scale, are likely to lead to unexpected and unpleasant consequences even when the solution is based on rational and elegant research.

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