inducing cancer, due to possibly undetected agents arising in the degenerative processes that usually seem to occur in long-cultured tissues. The trouble is that, with our present methods, it would take a lifetime to be absolutely sure. Accordingly, it seems appropriate to propose a new national policy. We must consider the idea of avoiding exposure of the *entire* population to *any* new viral material so derived, except in the event of an overwhelming emergency.

Therefore, until we better understand the situation vis-a-vis the possible viral etiology of delayed degenerative disease, universal inoculation by a vaccine derived from continuous culture of cells from a single individual source, organ, or even species, should be prohibited. The public can be protected by use of separately derived preparations in distinct geographic areas.

The same policy might be considered in connection with material derived by different routes from the same viral source. One might even consider such reservations in connection with any particular method of preparation.

For each method involving a single source, or kind of source, there is a certain risk of disaster for all those inoculated. From the public health point of view, we must regard a 1/1000 risk of universal disaster as worse than a 1/1000 risk of individual disaster. This should be considered against the fact that one does obtain greater assurance from the more massive testing possible with a single uniformly derived preparation. As the number of vaccines grows, the chance of a serious error must also increase; we can expect to accumulate soon a large selection of vaccines and other preparations for many diseases, some of relatively small importance to the general public health picture. Rather than risk universal disaster from any one of these, we would do better not to "put all our eggs in one basket"; a more rational approach would be to divide the population into a great latin square experiment.

One must recognize that it is not yet within our means to say that any product is perfectly safe. The problem is serious enough for those drugs which are likely to reach a large percentage of the population. It is critical for those agents like vaccines which are intended to reach everyone—as in the case of atmospheric radiation, the ubiquitous food additives and others—and one must have extreme standards. Although inconvenient and expensive, alternatives such as regional use of different agents must be considered. Whatever the results of short-term safety studies, these matters always remain experimental on some level, as does evolution itself.

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Radiation Exposure Records

Title 10, part 20, of the Code of Federal Regulations includes the following rule (section 20.404): "Each licensee shall furnish to the former employee a report of the former employee's exposure to radiation as shown in records maintained by the licensee." There are many other references to records of exposure that have been given important legal status not only in the regulations of the Atomic Energy Commission but in most of the regulations which the various states have adopted or are in the process of adopting. It was only after considerable debate during the process of transferring regulatory responsibilities from the federal government to the city of New York that the city health department prevailed upon the AEC to allow it to require that such personnel-monitoring records be given to "so called" overexposed employees *only* if the Commissioner of Health were to decide that the action is appropriate.

It should be obvious to the initiated that the radiation-dose figure given by a number read from a film densitometer represents only one item of data among many that can be of value to an expert in estimating the exposure. The exposure itself usually cannot be expressed in simple terms. An estimate of exposure represents an attempt to express the degree to which different parts of the body have been exposed to ionizing radiation in terms of the recommended limits for the various critical organs. Whether or not the monitoring device was worn properly, exactly where it was worn, the movement of the wearer with respect to the radiation source or sources with which he worked, the extent of local shielding (particularly with respect to the location of the monitoring device), and the type and energy of the radiation or mixture of radiations to which the wearer was exposed all enter into the determination, by experts, of the extent to which various body organs of the person under consideration were exposed to radiation. Most of these additional data *cannot* be determined by examining the film.

The health physicist would do well to acquaint himself with the experience of the medical profession under somewhat similar circumstances. There have been many legal efforts in which unqualified persons, such as lawyers, have sought to obtain and use isolated clinical data for the purpose of establishing the existence of a physical illness or injury. A medical x-ray film has been found by the courts on many occasions not to be admissible as a record of a patient's physical condition, but it is a part of the clinical data that help a properly trained person (a radiologist) determine the condition of the patient. Most attempts in court to obtain posession of an x-ray film from the radiologist have failed. Films from personal dosimeters and the related records should be treated similarly. If any record is needed, it should be in the form of an opinion or report by a person qualified to evaluate the complete exposure history of the person involved.

Careful and regular recording and summation of the estimated radiation received by a piece of photographic film and entering of the total on an individual's personal record for all time, as representing the extent to which his various critical organs have been exposed to radiation, should *not* be required. Such records have been given an exalted importance to which their doubtful validity does not entitle them. The admission of such records in litigation could result—and has, in the opinion of many experts, resulted—in a miscarriage of justice.

The professional health physicist should defend aggressively the position that the radiation exposure of an individual is a result to be determined by experts on the basis of a study of all the available data. It cannot, in most cases, be reasonably represented by a number read from a film badge or other instrument carried by the person in question.

It is not my intent to discourage monitoring by film badges or other devices. Such programs are of unquestionable value when they are conducted with discrimination. Film badges should be recognized for what they are—a useful tool in the hands of a radiation specialist, not a substitute for a specialist, even when in the hands of a good technician.

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