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Epilogue

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Epilogue

by Kari Hemminki, MD[1]

HEMMINKI K. Epilogue. *Scand J Work Environ Health* 1992;18 Suppl 1:116—7. In contrast to the pro-health attitude and its advancement in the 1980s, the 1990s show a growing individualism that may lead to the withdrawal from pro-health and pro-environmental policies. There is also a growing shortage of independent experts and a trend towards attacks on animal cancer bioassays. However mechanistic studies unraveling the genes and proteins underlying cancer are likely to flourish and molecular markers are likely to be applied in epidemiologic studies in the emerging field of molecular epidemiology. In addition molecular biologists are suggesting new forms of cancer therapy, directed towards blocking oncogenes or their protein products and enhancing the body's own defense mechanisms.

Key terms: animal bioassays, cancer research, epidemiology, genotoxicity tests.

The presentations in this supplement reflect well the important health issues that will emerge in the 2000s, the most important macrochanges being the climatic warming and ozone depletion, both of which were heavily debated in the early 1980s, but were largely agreed upon towards the end of the decade.

In general the 1980s was a pro-health decade in the industrialized world. Extensive environmental programs were executed, and many sources of pollution, such as industry, traffic, energy production, and waste disposal, were reduced by technical means. The technical successes are continuously being challenged however by increasing volume and output, the most ominous being the increase in the release of carbon dioxide, the product of complete combustion, harmless to humans but contributing to global warming. It is not easily foreseen how carbon dioxide output can be reduced. Furthermore, advance technologies are largely applicable only in the rich industrialized world. The ecological disaster witnessed in Eastern Europe may be the feared future of the developing countries.

The concerns about the environment and the health effects on humans have been expressed collectively as increasing support to "green" movements and political parties in many industrialized countries. The World Health Organization formulated the program "Health for All by the Year 2000," which entailed all the main health issues, including the environmental threats. For the main polluters there has been genuine interest in finding alternative technologies, which have been used even in sales promotion. Yet some industries organized institutions, such as the Ethylene Oxide Industry Council and the Formaldehyde Institute, to negate the health effects of the products involved.

In the early 1990s growing individualism may lead to withdrawal from the pro-health and pro-environment policies augmented in the 1980s. Typically, pressures against international organizations, such as the International Agency for Research in Cancer, have been growing.

Another issue is the apparent difficulty in finding independent experts. As an example, the expert panel of the Environmental Protection Agency in the United States, considering the health effects of passive smoking, consisted of six members, of a total of 16, with links to the tobacco industry's Center for Indoor Air Research. The degradation of the ethics of scientists has been an alarming tendency for a longer period of time.

In cancer research the past decade has witnessed rapid progress. Short-term genotoxicity tests have matured and have been validated. In general, a combination of genotoxicity tests reasonably predicts the carcinogenicity of certain classes of chemicals. Animal bioassays have been perfected and extensively applied. Short-term tests and animal bioassays are still the only means of assessing the possible carcinogenicity of chemicals before marketing. Cancer epidemiology and data analyses have been extensively developed, but, in spite of large investments in epidemiology, few new carcinogens have been revealed during the 1980s. Society is still ignorant of the causes of cancer of many major organs.

Recently there have been heavy attacks against animal cancer bioassays and the use of maximal tolerated doses in such tests. Some of the arguments used are nonscientific, such as too many compounds are found positive. The motives of these attacks are not easily understood because no alternative to the premarket testing of chemicals is offered. Furthermore, it is common knowledge that all known carcinogens demonstrated epidemiologically have also been positive in ex-

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perimental animals and even the target organs have frequently been the same. All of this undermining is taking place at a time when the general public is highly suspicious about the cancer risks of chemicals and is willing to pay for a guarantee of safety. The questionable scientific bases presented and the appeal to lay media appear to be an effort to weaken the regulatory practices with respect to carcinogens and to instigate unjust mistrust in cancer research intended for the prevention of exposure of the general public to carcinogens.

It is unlikely that epidemiology will reveal many new carcinogens in the 1990s. Yet it is possible that the role of diet in cancer will be more soundly established. Mechanistic studies unraveling the genes and proteins underlying cancer are likely to flourish in the future. Molecular markers are likely to be applied in epidemiologic studies in the emerging field of molecular epidemiology. This development may provide powerful tools for cancer prevention and eventually replace traditional epidemiologic studies. Molecular biologists are suggesting new forms of cancer therapy, directed towards blocking oncogenes or their protein products and enhancing the body's own defense mechanisms. No doubt the present decade will be as equally exciting in cancer research as was the preceding one.