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Biotechnology & Cancer Control
An Interview with John R. Seffrin and Harmon Eyre


John R. Seffrin


Harmon Eyre

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Harmon Eyre, MD, is Executive Vice President and Chief Medical Officer of the American Cancer Society.

IKSM: Dr. Eyre, recent announcements and prognostications might lead one to believe that cures for almost everything are just around the corner? What aspects of cancer control do you expect will eventually be most impacted by genomics, proteomics, etc. and when do you think these impacts are likely to emerge?

Eyre: My view of the future of cancer control is based on the continuation of molecular understanding of the carcinogenesis process. That is the key to the intervention steps to eventually eliminate cancer as a major public health problem. A complete understanding of carcinogenesis could result in characterization of each person genetically to determine their individual risk profile and specific interventions, both behavioral and chemoprevention, to minimize the risk of developing cancer. Additionally, the understanding would lead to molecular detection of the carcinogenesis process and the possibility to intervene much earlier than we now do with anatomic detection. This would open the door to specific interventions that could block progression of carcinogesis in each individual. Finally, as the development of new agents progresses, the various therapeutic interventions for established cancer will become much more specific and less toxic.

Clearly, this all will take time. I view the most rapid progress occurring in therapeutic advances which we are beginning to see now with MOAB, STI 571, and others as examples. The pace of discovery of these agents will greatly accelerate as genetic and protein targets are identified. We will probably see dozens to hundreds of new agents introduced in cancer therapy within the next 10 years. The next area of advance will likely be in molecular detection. Some markers are in clinical trial now for colon cancer**,** bladder cancer and others. They will have to undergo careful evaluation to see that they are good enough to put into routine use, but they can be available in the next 5–10 years. Finally, the projection of time for prevention is extremely hard to guess. This is because if we stick to the cancer endpoint instead of using intermediate markers to evaluate the outcomes each trial can take decades and before we could make substantial progress, this could be 40–60 years away. I hope this later projection is extremely wrong.

IKSM: What are the respective roles of the primary stakeholders and investors in this future, including government, industry, academia, nonprofits like ACS and, of course, the public? Will the timescale you suggest be affected by the roles the stakeholders are willing and able to play?

Eyre: If we cannot move beyond business as usual, there will certainly be unnecessary delays. The biggest problem, in this regard, is the relationship between government-funded academic research and the transfer of research results to industry that will pursue applied research to bring potential innovations to market. This raises issues of patents, intellectual property in general, and who benefits. Expediently dealing with such issues will require modernizing business practices, particularly in government. There is very little being invested today to improve this transfer process, which results in a primary bottleneck.

IKSM: Dr. Seffrin, how much does the payoff of biotechnology depend upon collaboration among types of institutions — public, for profit, nonprofit, etc. — both within the U.S. and internationally? Will new types of collaboration be needed? How might such collaboration relate to the American Cancer Society's goals?

Seffrin: Increased collaboration and cooperation among organizations and institutions throughout the world will be critical to the success of these efforts.

During the past few years, the American Cancer Society has established several ambitious cancer-control goals for our nation. By the year 2015, we hope to see a 50% reduction in the overall age-adjusted cancer mortality rate, a 25% reduction in the overall age-adjusted cancer incidence rate, and measurable improvement in quality of life for all cancer patients. To achieve these broad goals, we have set primary goals for major cancers and cancer risk factors and for factors that impact quality of life. We have also adopted a number of "enabling goals" to assist us in achieving success, such as lowering the number of youth who smoke, increasing the number of women who have mammograms and Pap tests, etc.

It is clear to us that our efforts alone will not be sufficient to achieve these goals. We must work closely with organizations in the private, nonprofit and governmental sectors in order to make inroads with the right population groups, to leverage government funds, to set the appropriate public health policy, and to seize every opportunity to implement effective cancer interventions at every level.

The American Cancer Society has an extensive database of organizations with which we collaborate. At least 250 groups are detailed in our database — ranging from CDC and NCI to 100 Black Men and The Governors' Spouses' Association. We are continuing to expand these collaborative relationships to ensure that our cancer control efforts have the broadest possible reach and impact. In addition, a growing number of these organizations are involved with biotechnology efforts, and we expect this trend to continue.

We are also looking to the National Dialogue Against Cancer, a nationwide forum for cancer organizations from all sectors, for opportunities where biotechnology can be the common focus in collaborative efforts between the cancer community and leading pharmaceutical firms. One common interest here is to increase the number of patients enrolled in clinical trials. That will benefit both the drug companies and the patient.

Internationally, the Society is looking for new ways to collaborate with organizations committed to cancer control. One good example is the Society's effort to export some of its successful public health programs to underdeveloped sister organizations in emerging regions around the world and to help these struggling groups build their capacity to serve. In return, we gain cultural insights into large immigrant populations that have immigrated to the States. The simple fact is that here in the US, we have exceeded 50% survival rates for many of the most common cancers, while most of the develop-

ing world has about a 30% survival rate. This figure would be even lower if these populations lived into their 70's as do we.

Another target of international collaboration is assisting countries with populations that have a large number of easily treatable cancers (e.g., cervical) and focusing intensively on these cancer sites. We work with that nation's government and its cancer NGOs to enable simple but effective treatments that are appropriate for that region's infrastructure, as opposed to multitudinous cancer messages and campaigns that are seen so frequently in the West. In all these efforts, there is great promise for new and effective interventions based on emerging biotechnologies.

IKSM: The ways in which different countries address healthcare vary widely in terms of the relative emphasis on the public and private sectors. Dr. Seffrin, does this factor affect how innovations possibly emanating from biotechnology may emerge, or not emerge?

Seffrin: Indeed, some voluntary cancer groups abroad perform certain functions because their government does not or will not do it. Dr. Gordon McVie, Director General of the Cancer Research Campaign from the United Kingdom, recently told members of the National Dialogue on Cancer that the funding of cancer research in England by government versus the voluntary sector is in inverse proportion to our experience here in the States. The British government only funds a small percent of all cancer research in the UK, with the lion's share underwritten by charities. Of course, here in the States, the NCI and other government branches out fund the ACS and other charities 100 to one. In both developed and developing nations, NGOs occupy very different niches. Some fund research, others promote screening or provide aftercare. For example, an NGO may provide cervical screening for the nation, and do so very effectively, because the government has given over that responsibility, perhaps with some inducements, or because it cannot or will not do so on its own. We see many examples of this in Latin America.

Obviously, the amount of resources put into research by NGOs, government agencies and private companies has a direct impact on the emergence of new biotechnologies. Equally important is the delivery of interventions and treatments once they have been developed. And, of course, to be most effective all these efforts must be carefully coordinated.

IKSM: To what extent do both of you feel that variations in how different countries address ethical concerns and legal issues will affect the time scale for seeing disease control benefits from biotechnology?

Eyre: Ethical considerations are of fundamental importance. Protection of confidentiality and prohibition of discrimination raise essential ethical questions. Genetic design and redesign are laden with ethical issues. We have to be careful to not let science get too far ahead of our abilities to address ethical questions.

Legal issues will also clearly be a factor and slow things down. Patentability, ownership, and so on will be part of this. Should we allow, for instance, companies to patent normal human genes? Whether ownership will accelerate or retard discovery and innovation is a central issue in the debate on this question. This is even more an issue for proteomics than genomics.

Seffrin: Such concerns and issues certainly can and will affect the development of new biotechnologies. For instance, differences in perceptions of individual rights and religious beliefs and practices will certainly affect the progress of certain types of cancer research, particularly biotechnology research. At the same time, these differences may provide opportunities for us to discuss the global burden of disease. Organizations like the American Cancer Society can provide forums for such dia-

log. In fact, we recently hosted a forum of Chief Health Officers and Chief Legal Officers from developing countries where a number of key issues such as this were discussed. There are, of course, many similar initiatives by organizations such as the World Health Organization. At this point, we have only begun to explore how best to foster such dialogs. The key is focusing on common concerns rather than cultural differences and identifying the best vehicles to communicate about cancer control and prevention.

IKSM: To what extent do the American Cancer Society's very ambitious national goals for 2015 — in terms of prevention, detection, and treatment of cancer, as well as quality of life for patients — depend on biotechnology's potential benefits vs. other medical, social, and economic factors?

Eyre: We performed a scientific analysis of risk factors and trends, projecting their impacts on the 2015 objectives. We concluded that 60% of the mortality goals and 80% of the incidence goals could be achieved with application of current knowledge and practices. New discoveries are needed to fill the gaps and achieve 100% success. In fact, achieving the 60% and 80% assumes substantial behavioral changes on the part of the public. Thus, the promises of biotechnology are an important part of achieving the 2015 goals, but only part.

IKSM: The emphasis on behavioral changes suggests that cancer can be viewed, in part at least, as a public health problem, the most notable example being the use of tobacco. What portion of the Society's 2015 goals can be achieved by realistic assumptions about the impact of public health initiatives? How would such assumptions vary for different segments of the U.S. population and different countries?

Seffrin: Cancer is not partly a public health problem — it is *largely* a public health problem. I would label as "public health" most, if not all, initiatives and activities that occur prior to people being diagnosed with a medical problem, in this case, cancer. Obviously, this definition extends well beyond simple hygiene. In fact, some would also label as "public health" all of medical practice. I believe that as much as 80–90% of the Society's 2015 goals can be achieved by classic public health initiatives. This leaves 10–20% of the goals to be achieved via scientific discovery, often enabled by technology. In the past, discovery was viewed as a good bet. Now, as evidenced by the tremendous progress of recent years, discovery is viewed as a sure bet.

The ultimate public health concern has to be prevention. Biotechnology can help in this area as well. Getting everybody to quit smoking will be a difficult, perhaps Herculean task. But what is so exciting about the potential that biotechnology holds is that it can provide the understanding and the means to prevent people from starting smoking. Early screening and detection of cancers is a public health problem where biotechnology can contribute by devising inexpensive, less invasive means for screening. The end game of such public health initiatives is to reduce the tumor burden on the public, which causes great suffering and limits human potential.

Reduction of cancer is also a public policy issue. While we know much of what is knowable about cancer, the delivery infrastructure often keeps us from exploiting this knowledge. A key case in point is the Hammond-Horn Study, which was the first large prospective cohort study funded by the American Cancer Society in 1952, that clearly demonstrated the correlation of smoking with lung cancer in men. That study set the metabolic foundation for two major studies that followed, Cancer Prevention Study I (CPS I) and Cancer Prevention Study II (CPS II), which each involved one million men and women. While these studies examined a wide range of potential exposures that may be associated with cancer, early contributions from them involved tobacco research. For instance, the increase in lung cancer risk among male and female smokers in CPS II, compared to smokers in CPS I, was high-

lighted in a 1989 U.S. Surgeon General's Report.

Yet, in spite of all that research has revealed about tobacco and lung cancer, we still do not have a federal policy for tobacco control. In fact, we did not even consider such a policy until the mid-1990's, almost four decades after initially gaining this knowledge. This issue is even more difficult to address in developing countries that do not have the resources to stave off the tobacco companies.

Of course, tobacco control is not the only instance of flawed public policy. Lack of access to healthcare is another serious impediment to disease control and prevention.

There is also a general lack of integration of systems perspectives in the U.S. and perhaps around the world. What is needed is a whole system view rather than myriad reductionist perspectives. Public health, discovery, and public policy all have important roles in this whole system view.

IKSM: Beyond scientific discovery, public health, and public policy, there is also technology, both for clinical practice and for doing science. What do you see as the respective roles of science and technology in the eventual impacts of biotechnology on disease control?

Eyre: Thinking retrospectively, science would not be where it is today without technology enabling it. Recent developments in genomics provide vivid evidence of this. Technology will unequivocally play the same role going forward. The development of STI 571, that I mentioned earlier, illustrates this. The design of this drug involved selecting a tumor cell specific enzyme as the target and selecting the best drug to block it. In the future this will be done by computer model. For example, we will be able to predict the enzymes resulting from genetic changes and then target drugs based on the specific nature of these changes.

IKSM: Are there any ways in which biotechnology and its potential impacts interact with public health initiatives? Is any leverage possible?

Seffrin: Biotechnology will find better, more accurate, and less invasive ways to do what we do now. Biotechnology will allow us to identify and treat people at risk, from primary prevention to surgery. Screening for colorectal cancer, via colonoscopies, is a good example of where technology can help. Screening methods that are much less expensive and invasive than colonoscopies, could change the whole financial equation for screening. This would make it possible to dramatically improve survival rates for colorectal cancer in the U.S., and perhaps get global survival rates to where they are in the U.S. The combination of the science and the technology associated with biotechnology will enable more pervasive and effective public health initiatives.

IKSM: Dr. Seffrin and Dr. Eyre, we greatly appreciate your perspectives and insights into the possible impacts on disease control of the exciting trends in biotechnology, including the various complicating factors that will affect the extent and timing of these impacts. Thank you.

BIOSKETCHES

John R. Seffrin, PhD, is the Chief Executive Officer of the world's largest voluntary health organization devoted to fighting cancer — the American Cancer Society. He is also a Trustee of the Society's Foundation and incoming president of the International Union Against Cancer (UICC). As a 20-year ACS volunteer, Dr. Seffrin has served the Society at its local, state, and national levels. He chaired the Society's Indiana Division Board of Directors and was Chairman of the ACS National Board from 1989 to 1991. Prior to being named the American Cancer Society's top staff executive in 1992, Dr. Seffrin was Professor of Health Education and Chairman of the Department of Applied Health Science at Indiana University. Dr. Seffrin has served on the boards and commit-

tees of a number of public service and governmental agencies, including the Advisory Committee to Congress on Tobacco Policy and Public Health, co-chaired by Dr. C. Everett Koop and Dr. David Kessler, and the US Surgeon General's Advisory Committee on Smoking and Health. In addition, he recently completed a four-year term on the Advisory Committee to the Director of the US Centers for Disease Control and Prevention. Dr. Seffrin currently serves on the boards of Independent Sector, the largest membership organization representing nonprofit organizations in America, the National Center for Tobacco-Free Kids, the National Health Council, Partnership for Prevention and Research!America, and he was appointed in 1997 to the National Cancer Policy Board, which was established by the National Academy of Sciences to advise our country on policy issues regarding cancer research and control.

Harmon Eyre, MD, is Executive Vice President and Chief Medical Officer of the American Cancer Society. He oversees the research program and medical scientific activities of the Society. Dr. Eyre has a career-long interest in health education and research promoting the goals of cancer prevention, early detection and quality treatment. As an American Cancer Society volunteer for over 22 years and National President from 1987–1988, he has been instrumental in developing the Society's priorities for the 1990s, including efforts to prevent smoking, improve diet, detect cancer at the earliest stage, and provide the critical support cancer patients need. Since joining the Society's national office in 1993, Dr. Eyre has guided efforts to reorganize the national headquarters, refocus the research program, enhance the Society's advocacy capacity, and concentrate community cancer control efforts in areas where they will be most effective. This work follows a successful academic career as a medical oncologist at the University of Utah, where he served as Associate Chairman of Internal Medicine and Deputy Director of the Utah Cancer Center. Dr Eyre has received degrees and postgraduate training from Utah State University, the University of Utah, Johns Hopkins Hospital, and the National Cancer Institute. He has been recognized for his service to numerous professional societies, government groups, and voluntary health agencies in the United States and abroad, including the American Society of Clinical Oncology, the American Association for Cancer Research, the American College of Physicians, the American College of Surgeons, the National Action Plan on Breast Cancer, the American Stop Smoking Intervention Study, the Division of Cancer Prevention and Control, the Centers for Disease Control and the President's Cancer Panel.