

# GENE MAPS LEAD MEDICINE DOWN THE WRONG ROAD

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IN 1957, THE YEAR I ENTERED COLLEGE, the American Medical Association issued its *Principles of Medical Ethics*. Section 10 stated, “The honored ideals of the medical profession imply that the responsibility of the physician extends not only to the individual, but also to society . . . [with] the purpose of improving both the health and the well-being of the individual and the community.” Improving the health of the individual remains an honored ideal of the medical profession and one that has served as the guiding principle behind government funding of basic biomedical research. But improving the health of the entire community in our deeply individualistic society is an ideal more easily articulated than practiced, and the wave of enthusiasm for decoding the human genome is distancing medicine even further from its community responsibility.

Vaccination of a single person does virtually nothing to protect a neighbor from infection; a community effort to vaccinate its members can protect even the unvaccinated minority, as the disease will not gain a foothold. But when was the last time you saw your taxes used to give all children in your community free vaccines for any disease? Instead, millions of government dollars are poured into genomic research that is aimed primarily at defining genetic risk for disease—information that is useful but that does not prevent the emergence of the disease in the community. The most successful method for keeping the largest number of people healthy is to practice preventive medicine. But genomic research can

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give the idea of prevention two very different meanings, depending on how we define a healthy person.

If we define health functionally—you're healthy if you are free to work and think and play to the best of your born abilities—then preventive medicine, in the form of a vaccine for instance, aims to lower people's risk of developing a disease. If, on the other hand, we imagine that there is an ideal of human form and function to which we all must aspire, then preventive medicine can mean manipulating the genetic code to eliminate deviation from the ideal. But natural selection teaches us that there is no single ideal genome in any species.

This error led to the 20th century's pathological eugenics—the “weeding and seeding” of people by physical appearance or even by religion. But even in a country such as the United States, where such an extreme result is unlikely, the surge of interest in genetic medicine and its potential to achieve human “perfection” can easily lead us to forget that diversity is a major factor in human survival.

We are each part of the environment of a host of strangers, and this crowd is part of our own environment in turn. Disease, morbidity, and mortality are generated by a mix of environmental and genetic factors—as are many of the qualities that make us human. Our diversity—the differences among us—is proof that we are all products of ongoing mutational variation.

Among these variations—initially genetic mistakes chosen by natural selection—are the genes that assemble our brains in such a way that we are intrinsically social beings. Our DNA-encoded brains and bodies can develop conscious minds only by intensive social interaction. The few behaviors wired into our genes at birth are designed to maintain and thicken the bonds through which social interaction can proceed. These interactions cause the brain constantly to rewire itself. As you read this your brain is changing, and clearly there is no way that your genome could have encoded those changes. From birth on, our brains develop into minds by the imitation of other minds—those of our biological parents and others.

The biomedical model of a person as an autonomous object, which is at the root of genetic medicine, lacks a proper respect for these social interactions. It severs the patient from social context, and it devalues preventive social medicine to an afterthought or a charity. This denial of the reality of the social bond is an avoidable mistake of science. Prevention—always the less dramatic, less romantic sibling of medical practice—becomes an even more important alternative.

Let us look at the problem of cancer in this light. The absence of commitment to the well-being of the community is plainly visible in our country's budget for cancer research. Prevention is hardly mentioned. Instead, researchers seek genes associated with higher cancer risk on the premise that one day the information will provide better drugs to kill every last cell of the cancer tumor that inevitably will arise.

This agenda is woefully incomplete at best and absurd at worst. To discover precisely which chemicals will cause cancer when they enter the bloodstream,

and then to study the genetics of the liver proteins that detoxify them—instead of working to remove these chemicals from everyone's food, air and water—is to be willfully naïve about the cost-effectiveness of preventive medicine.

A cancer prevention agenda for basic research would begin with a planetary review of geographical differences in the incidence of various cancers. Governments and companies worldwide then would have the information to plan a strategy for the prevention of cancer: to detoxify the food, air, and water and to establish clear guidelines for behaviors that would, together with toxicity control, assure the lowest possible frequency of avoidable cancers.

At present, we search for populations at high risk for inherited cancers only to tell families what their fates will be. We spend relatively little time and money understanding the origins and consequences of the habits or the environmental factors that bring on the majority of fatal cancers and then reaching out to the entire population with help in avoiding these habits and toxins.

Contrary to what many genetic researchers seem to believe, a 1996 study by the Harvard School of Public Health found that only about 10 percent of people who had died of cancer were born with versions of genes that made the disease inevitable. About 70 percent of the lethal cancers were brought on by choices such as smoking, poor diet, and obesity, and most of the remaining 20 percent came from alcohol, workplace carcinogens, and infectious agents.

Smoking is optional, but eating, drinking, and breathing are not. The task of understanding why people act against their own best interest even after they learn how to act prudently is not part of today's agenda for cancer research, but it should be.

In the near future, cancers are likely to be dealt with by a slowly evolving combination of genetic, immunologic, and antibiotic interventions—all aimed at killing cancer cells in the body. But this will not protect the largest number of people. Neither stem-cell research, nor genomic decoding, nor any other line of basic research can justify neglecting the obligation of medicine to improve the health of the entire community as well as the individual.

To begin to integrate the genome initiative's success into a comprehensive program of public medicine, physicians, scientists and managers of health-care delivery systems all need to accept the central importance of human diversity.

They must commit themselves to helping to preserve it.