THE HUMAN GENOME PROJECT:

LEGAL, SOCIAL AND ETHICAL IMPLICATIONS

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Foreword

The concept of deciphering the Human Genome surfaced in the United States, already in the 1930's, upon the discoveries that color blindness and hemophilia are linked to chromosome X. The Human Genome Project (HGP) originated in the U.S. at the Department of Energy (DOE) meeting in Alta, Utah in December 1984, when the possible use of DNA analysis in detecting mutations among atomic bomb survivors was contemplated. This was then followed by the drive to map and sequence the entire Human Genome, which was advocated by several scientists including Robert Sinsheimer, Charles Delisi, Renato Dulbecco, to name a few.

The HGP was launched by the U.S. Government in 1988 under the supervision of NIH and DOE, and in 1990 was shaped in the form of a 15-year program designed to map and sequence the entire Human Genome and also that of several model organisms, at a yearly budget of $200 M totalling $3 B, to end in the year 2005.

Several other countries, headed by France, the UK and to a lesser extent Japan, have joined this effort. Parallel to this is an ongoing international collaboration of many other countries, including Israel. It also includes the contribution of several international organizations, such as HUGO (Human Genome Organization), the EC, and UNESCO, in dissemination of knowledge, information and support of scientific and technological activities. One of the eight major goals for the first 5-year period that was introduced to the American Congress in 1990 was the study of the legal, social and ethical issues pertinent to HGP.

Progress is right on schedule, especially with regard to human genetic and physical mapping: Genethon's genetic linkage map is near completion with 5,300 (CA) n-type markers developed and mapped; yeast artificial chromosome (YAC) based physical maps of many human chromosomes are in advanced stages; those of chromosomes 21 and Y are complete, and chromosomes 12, 22 and X are near completion.

To date, about 3% of the entire Human Genome has been sequenced, and of the 6,000 genes isolated and cloned about 5,000 have been mapped onto chromosomes. This effort in mapping is accompanied by a progressive improvement in sequencing techniques.

Unveiling the human genetic code will provide us with a vast body of information, not known before, that will increase our knowledge profoundly in the scientific and medical fields, opening new horizons in our understanding and evaluation of many different phenomena. It will be most beneficial for analyzing and comprehending various biological processes and mechanisms, and for preventing and curing diseases, particularly inherited disorders.

The scientific expectations from this project are enormous and so are the benefits, illuminating the dawn of a new era. However, at the same time, this knowledge, that could very possibly lead to the introduction of a genetic blueprint (i.d.) for each individual, entails a grave danger if unregulated and used unwisely. It will also generate numerous dilemmas, such as the right-to-know of the individual or his family with regard to a predictable disease; the responsibility of parents (knowingly carrying a disease gene) to their children; privacy protection through acts such as consent of testing and screening, and confidentiality of information; implementation of somatic and germ-line gene therapy while preventing germ-line treatment to enhance genetic characterizations. These and many others are well presented in this workshop.

We must realize that we have started to cross the threshold of this new era, and indeed we begin to witness the practice of genetic information in various places, including here; for instance, in the Israel Defense Forces, where a recruit is asked to provide the entire genetic history (inherited diseases) of his family.

The ethical, social and legal aspects of the HGP are discussed and evaluated nationally and internationally (e.g., the International Bioethical Committee of UNESCO). Thus, in the U.S. a proposal for a Genetic Privacy Act was introduced in December 1994 to the DOE-NIH joint ELSI

Working Group, and the State of California has passed laws protecting against discrimination by insurance companies and by employers on the basis of genetic information.

We are faced with new and yet unknown circumstances that undoubtedly will have a profound mark on every facet of society — insurance policies, employment, recruitment to public and private organizations (the military, government, etc.), and other social relations and functions. And, of course, there is the danger of eugenics. The impact of the HGP on society could reach beyond our imagination, and it may very well change society for the better, or for worse. Undoubtedly, the world will look different. Therefore, we in Israel, and the entire world as well, must prepare our society to challenge it from every aspect — legal, social and ethical.

To do so effectively, society, that is its members, must be exposed to the HGP, must be told directly what it entails and what its consequences are. The public has to be knowledgeable on this issue; ignorance is the most devastating folly.

At the same time, this issue must be confronted legally — by constituting laws, nationally and internationally, as means of guidelines and enforcement. This should be done with great caution and care in order that we can confront this new era well prepared.

The present workshop on *The Human Genome Project: Legal, Social and Ethical Implications,* organized by the Israel Academy of Sciences and Humanities and convened on July 5, 1995, assembling leading professionals in relevant fields from abroad and from Israel, has been designed to introduce and discuss these topics and their implications in Israel. We believe that this gathering will serve as the first step in a series of dialogues and acts aimed to prepare the Israeli people, by stimulating public awareness through dissemination of information (via the media and teaching), and its governing bodies, through laws, so that they may confront this new era in the most appropriate way.

MICHAEL FELDMAN YOSSI SEGAL

THE HUMAN GENOME PROJECT: LEGAL, SOCIAL AND ETHICAL IMPLICATIONS

JERUSALEM, JULY 5, 1995

Welcome and Greetings

PROFESSOR JOSHUA JORTNER

Mr. Chairman, Professor Feldman, Professor Shapira, distinguished guests. On behalf of the Israel Academy of Sciences, it is a privilege and honor to welcome the participants to this workshop on the Human Genome Project, pertaining to its legal, social and ethical implications.

The Israel Academy of Sciences is charged with the very important function of enhancing and promoting high quality scientific research in Israel. Science is international, both in scope and in intrinsic significance, and when we consider sciences in the broad sense we imply high quality international collaboration. Within this context, the involvement of the Israeli science community in the Human Genome Project has been planned and is being executed. It might be appropriate to dwell very briefly on the initiation and perpetuation of the Human Genome Project activity in Israel. It was the scientific community of biologists who initiated this project. My colleagues in the field of biology, headed by Professor Michael Feldman and Professor Alex Keynan, approached the Academy, pointing out that the two major components of the Human Genome Project — namely the broad scope of international activity and the intrinsic significance for biological research in the future — mandate the involvement of our science community.

The first step, naturally, was to set up a national committee, headed by Professor Michael Feldman. I would like to extend

to Professor Feldman and to Professor Alex Keynan sincere thanks and appreciation on behalf of the Academy and the entire scientific community for this activity. This was backed by international advisors, and we have had the privilege of hosting several of the leaders in this program. We are very grateful to Dr. Daniel Drell for coming to Israel and attending this meeting today.

On the basis of the local and international recommendations, the Academy formulated a multi-annual plan for research in this important area of the Human Genome Project. We wanted to focus on the unique aspects of the project, for example the utilization of computers for gathering information. However, a broad approach is required, and the activity was based on four components. The first step was to set up, within the framework of the Israel National Science Foundation and with strong input of the Academy, a research project to enhance the activity in this important field. The second was to establish a laboratory and an information center at Tel Aviv University and the Bio-Information Center at the Weizmann Institute, to be funded by the University Grants and Planning Committee. Again, the Academy was the catalyst of this activity. The third component refers to manpower and the encouragement of young scientists to get involved in this field and, accordingly, the Academy has established a post-doctorate program earmarked for this. The fourth component comprises specific symposia and workshops in this field which the Academy, under the auspices of the Bat Sheva de Rothschild Foundation, has initiated and organized.

I believe that this is the way to approach scientific planning on the national level. However, the Human Genome Project has wide-reaching further implications which precede the scientific activity. Modern science has to contribute to the norms and values of society. And the implications of the social, legal and ethical aspects of scientific research are extremely important. In this context one can distinguish, I believe, between the intrinsic and the extrinsic legal, ethical and social implications. The intrinsic implications pertain

to the scientific community itself and they are necessary to control the behavior of the research community. The extrinsic implications are perhaps even more important, and they pertain to the projection of the scientific activity on society, both on the national and the international level.

On behalf of the entire scientific community, I thank the National Committee that planned this very important workshop, which really focuses on the extrinsic impact of this vitally important field. The Human Genome Project has to be unique, and it is unique as far as the extrinsic implications are concerned. So thanks to the organizers, to Dr. Yossi Segal who has been active in all the organization, and to all the participants for coming to attend this important meeting.

Introduction: The International Background of the Human Genome Project

PROFESSOR MICHAEL FELDMAN

Some two thousand three hundred and forty years ago, a very dramatic event took place in Athens, Greece. One day Aristotle appeared at the gates of the academy and declared that he was resigning. Seventeen years old was Aristotle when he joined the academy, twenty years he spent there working, first under Plato, with Plato, and subsequently by himself. Why then did he resign? When Plato died Sposippus was appointed the head of the academy in Athens. Sposippus was a mathematician. A mathematician, Aristotle claimed, looks at the universe around him and sees a static universe, a frozen reality. "I, Aristotle, as a scholar of life processes, observe a dynamic reality. These two views are completely incompatible and therefore it's either Sposippus or myself. Since you elected him as the head, I am out." Indeed Aristotle looked at life phenomena as a dynamic set of processes. Science historians are amazed at the accuracy with which Aristotle described organs and living organisms, yet what actually interested him was something completely different from the mere descriptive aspect. Not having proper magnifying glasses, let alone a microscope, Aristotle made staggering observations on the gradual development of the chick embryo. These observations resulted in an unbelievable amount of data on the sequence of stages of chick embryogenesis, describing the brain development, the appearance of the heart, the eyes, etc. Yet what triggered his interest he formulated in a single sentence, which appeared in his *Generation of Animals,* and that was a straightforward question: Since stage B in a developing embryo follows stage A, and stage C follows stage B, does stage B develop because A has preceded it? And

stage C, does it develop because stage B has preceded it? Or do each of these stages develop completely autonomously, independent of each other? This question remained unanswered until about 90 years ago. Ninety years ago, Hans Spemann, in Germany, performed a dramatic experiment in which he showed that if cells in the amphibian gastrulae, which are located beneath the ectodermal cells that develop into the brain, are removed from the embryo, brain will not develop. When transplanted to another early gastrula they signalled brain development. These cells, which derive from the dorsal part of the blastopore, contain what Spemann called "the organizer" of embryonic development. This was a dramatic observation. The embryonic brain generated two eye cups. The eye cups thus generated induced in the ectoderm the formation of the lens. The lens induced a cornea. Thus, the question raised by Aristotle was answered: Each stage in the developing embryo is signalled by the stage that preceded it. Spemann wanted to identify the signal that made the ectodermal cells differentiate to brain. He could not. Neither could three generations of experimental embryologists, including the so-called molecular embryologists who have tried to isolate, purify and characterize the molecules of the primary organizer. Only two years ago, an exciting paper was published in which the "noggin" protein, which induces brain development, was isolated from frog embryonic cells. This protein might represent the natural signal of the primary organizer. The normal development of an organism is a function of a large number of genes, yet most of them are still unknown to us. The genes which signal the most dramatic morphogenetic events in embryogenesis are still unknown. We have, therefore, very good reason to hope that the decision to embark on the Human Genome Project may eventually lead us to identify and characterize those genes that are responsible for normal development.

There are about one hundred thousand genes within the human genome, which account for about 3 billion pairs of nucleotides. Distinguished American scientists decided seven years ago to embark on the Human Genome Project,

aimed at mapping the different genes on their chromosomal locations, cloning and sequencing each of them. For this program in the USA, 180 to 200 million dollars per year were allocated for fifteen years.

Initially the project was to focus on the structural aspect of these genes, and the functional implications were postponed to a later stage. This confinement, however, did not last for long and, subsequently, the functional aspects were practically included within the Human Genome Project. Hence we are facing a very exciting reality — a reality that attracts scientists, and genes which make news. Genes that make news are not necessarily genes that control normal development. These are genes which are associated with human disease. One of the first genes within the last few years that caught the news was a gene that seems to be associated with familial breast cancer. Namely, the Breast Cancer One Gene, located on chromosome 17, which controls the formation of breast cancer and in all probability also of ovarian cancer. A woman who has that mutated gene has an 85% probability of developing breast cancer. Chromosome 17, on which this gene is located, appears to be uniquely interesting because on that chromosome there are a number of additional genes associated with cancer, like the Her-2-Neu gene, like the p53 gene, and others. In Israel we have a particular interest in that particular chromosome, because the study of a number of genes on chromosome 17 was pioneered by investigators in Israel. With regard to the BRCA-1 gene that controls hereditary breast cancer — where a grandmother, her daughter and her granddaughter have a high probability of developing breast cancer — the obvious question is: once you identify the gene in a woman, what do you do with this information? What kind of preventive approach can be applied in families expressing the BRCA-1 gene? What kind of counselling should be given to women in such families? Quite a number of alternatives have been suggested, such as preventive mastectomy at young ages, or the practice of mammography and biopsies to detect the early stages of breast cancer and only then to apply a radical technique. Or,

as well, testing some chemotherapeutic drugs like tamoxifen which might have a preventive effect. This gene certainly caught the news. And ranging from the BRCA-1 gene to the gene of ataxia telangiectasia, which was recently identified and characterized by Yossi Shilo in Tel Aviv, there are a whole lot of genes that constitute exciting targets for the Human Genome Project.

I said there are genes that make news, but there are also news that seek genes. Such was the case in 1990 where a very distinguished president of the American University in Washington was found to have made obscene telephone calls from his office. That particular president was brought to investigation. What did his lawyers claim? Well, the very capable lawyers of Professor William Berenzin simply said that there are genetic factors that made the gentleman make these obscene telephone calls, and therefore it's not a matter of free will. He was forced to do what he did, therefore he cannot be blamed. In fact, he wasn't even brought to court, he was merely discharged from the university. Thus did genetics appear on the open stage, raising a very basic question: are there genes that prevent free will and free decisions, and if so what are these genes that compel people to behave in a brutal way? The question of genetic predisposition that precludes self-control is obviously a very important question. Another famous case in 1991 was of a gentleman who strangled his wife in New York and threw her from the 14th floor; in this case he was, of course, brought to court. And in the court, his lawyer applied the rather sophisticated method of positron emission tomography (PET scan) to demonstrate that the accused manifested a very defined brain impairment that might have a causal relationship to the criminal deed. The "obvious" question the lawyer raised was — could the killer be blamed? There is the interesting case of Baker vs. the State Bar of California, where Baker did things that shouldn't have been done with regard to his clients, and the Supreme Court of California charged him only with probation for the simple reason that his lawyer convinced the court that Baker's manipulation should

be attributed to his specific collection of genes. Well, the question of genes and criminality is certainly interesting, yet this complex reality raises a simplistic formulation: are we dealing with a deterministic situation, are we dealing with a deterministic genetic system? So long as one deals with the genotype itself, it invites a deterministic concept. Yet the moment one faces the phenotype — namely, the question of what makes these genes express themselves, and are there social stimuli for their activation or suppression — the deterministic arguments begin to weaken. And yet, certain gene products were recently claimed to be implicated with behavior, or rather misbehavior. The level of serotonin in the brain has been associated with aggression, and here we are talking about a very defined gene located on chromosome 11. More recently a group of Dutch scientists talked about a monoamine oxidase A gene that may be associated with violence and aggression.

We are, by far, on more firm ground once we move to genes that cause actual diseases. Huntington's disease and cystic fibrosis are diseases controlled by genes that were isolated, sequenced and characterized within the framework of the Human Genome Project and which seem already to pave some new ways to treatment, particularly with regard to cystic fibrosis.

The identification of genes determining the probability that a person will develop a specific disease makes the statistical information and its reference to the treatment of single individuals who possess such genes a crucial question. The predisposition to certain diseases invites problems, problems associated with discrimination for employment or promotion, with health insurance, with social stigmas.

We all possess the same genes. Out of a thousand nucleotides, 998 might be identical between two individuals. And yet these nucleotide differences, within the 3 billion nucleotides of an intact organism, create a fantastic level of diversity, of genetic heterogeneity, among people. The question of the human genome diversity has aroused great interest and much discussion. The entire human population

consists of about four hundred to five hundred different ethnic groups. Attempts to study genetic differences between distinct populations comprise, primarily, immortalization of blood cells by Epstein-Barr virus from individual donors, establishing lines, and investigating the repertoire of genes within such lines. Such studies may end up in genetic anthropology of human populations. We in Israel have great interest in such approaches, because the history of the Jews is replete with long series of displacements of populations, displacements that were associated with modifications in their genetic makeup. Tracing the genotype of the migrating Jewish populations may teach us exciting lessons about the history of the Jews. Yet, the human genome diversity project raises some definite ethical problems, particularly when we think about populations of the developing world. One of the first people who recognized the difficulty of approaching people within the developing world was Chaim Sheba, one of the pioneers in human population genetics in general and human Jewish population genetics in particular. Chaim Sheba warned us years ago, predicting that people might actually respond to us by saying: "You people of the West have stolen our gold and our diamonds and now you want to steal our genes". These are very delicate problems that deserve serious discussion.

Applying procedures for sampling blood from donors requires informed consent. What kind of information should be given to donors to elicit a consent? Should the "chief" of the tribe agree, or should every individual be required to agree? How about the commercial value of genes that may be found in such human populations? What actually are we going to do with regard to interpretation and misinterpretation of results associated with the analysis of genes of remote human populations? More scientific decisions have to be made before we embark internationally on the vast field of the diversity of the human genotypes. For example, how many individuals from each group are sufficient for obtaining a reliable picture? More importantly, what are the genetic markers that ought to be analyzed? We evidently aim at

testing the entire genome, yet what are the priorities? When we irnmortilize cells, aren't we modifing certain genes, and therefore shouldn't we incorporate additional types of cells, for example, hair cells, etc., which might perhaps represent the most stable genotypes. And what about confidentiality? Will confidentiality preclude warning individuals of genetic impairments?

Clearly, we face a wide spectrum of problems the moment we approach the genetic diversity of human societies. Many of them are related to human evolution. For example, sickle cell anemia — a disease that requires the two copies of the mutated hemoglobin genes in order to kill. One could think — since these people are dying as children, how come that, throughout evolution, the carriers did not kill the gene pool? Similar questions apply to malaria, considered to be the greatest killer throughout human history in Africa. In fact, we all emerged from Africa, we are all basically Africans. Yet, as M.C. King indicated, the genetic discrepancy between two Africans selected at random in Africa is significantly greater than the genetic differences between an African person and a western European one, for the very simple reason that the evolutionary history in Africa is so much longer than in the west. I have just briefly touched on some of the questions that should constitute the basis for this symposium.

On the eighth of April 1781, Mozart wrote a letter to his father. It was a very short letter, in fact it was only one sentence. He wrote: Dear father, I composed a sonata today for violin and piano; however, I was awfully tired today and therefore I wrote only the violin part of that sonata which I would like the violinist Brunetti to perform. Yet, if Mozart wrote only the violin part, how was the sonata played? In fact, the sonata was performed the next evening because Mozart himself played the piano. What we have done thus far with regard to the human genome is, we have just started to write the violin part of the sonata of the human genotypes. The entire piano part, the ELSI aspects, are still before us.

The U.S. Human Genome Project: Why "ELSI"

DR. DANIEL W. DRELL

It is an extraordinary honor and pleasure for me to be here to take part in this exciting and significant workshop. I want to begin by expressing my gratitude to Yossi Segal, Michael Feldman and their staffs for the invitation and for all the arrangements that you had to make to get me here. I've been to Israel several times before, I'm familiar with your science, and I'm very pleased, speaking both personally and officially, that for the last few years Israel has been a formal participant in the International Human Genome Project.

It's my passionate belief that the genome program and the information and the technologies it produces will have enormous impacts on medicine, health protection, risk assessment, environmental issues, biotechnology, and beyond those areas, biology in its broadest reach. Since the genome interacts with a large number of other areas of biology, genome research insights, the novel technologies, the infrastructures that will come from it, will all have major impacts on the way we approach science and in particular on the way we conduct biological research and its applications well into the future. Genome Project insights and technologies will be applied to genomes of many other organisms and will involve the scientific communities of many other countries. These consequences, as you are aware, have already begun, including collaborative efforts to sequence several model organisms and the construction of large-scale genetic maps.

Before anything else though, I want to praise you for holding this workshop. In so doing you're recognizing the importance of exploring early on some of the ethical, legal and social implications, which we in the United States abbreviate ELSI, that accompany modern genetics research. I certainly don't need, especially here, to recount some of the

horrors that misunderstandings, simple ignorance or malign evil have caused in the past. The U.S., on a much smaller scale, has experienced some unfortunate and lamentable consequences of the misuse by society of genetics, rooted in misunderstanding and (referred to by Michael a few minutes ago) an overemphasis on its implications. Signs exist (Michael noted some) that these misunderstandings still occur. The purpose of an ELSI program then is to try and avoid some of these misuses or abuses of scientific knowledge and, based on the lessons from the past, avert future problems before they arise.

It's important to note another thing. ELSI (I will call the broad program by its acronym) is an experiment. It hasn't been tried like this before. It is both ambitious and important, and it may model a new way to run a science program. The outcome of this experiment is not certain; it's not a given that it will work. However, if we can make it work then future science programs in many other areas may benefit.

To set some context I'm going to give a few facts about the human genome; Michael mentioned a couple of these points too. The genome is the genetic material in the nucleus of a typical human cell. Now, every nucleated cell, except sperm in men and ova in women, contains 46 bundles of genetic material called chromosomes. This is a diploid set of human chromosomes; 23 of these chromosomes are inherited from each parent. (We call one set of 23 the genome.) So a genome is 23 chromosomes, not the full set of 46. The chromosomes contain a linear, information-containing core substance called DNA, configured in the familiar double helix first described in 1953 by James Watson and Francis Crick. Each chromosome set, a genome, contains approximately 3 billion base pairs of DNA. The 3 billion base pairs are thought to code for somewhere between 70 and 90 thousand units of information called genes. Now don't take that number too religiously, it's a broad guess. It's these genes that determine the basic structural and metabolic constituents of the body. Now, as Michael noted, the average difference between your genome and mine is about one DNA base in every 500 to 1,000 bases,

or from 3 to 6 million out of the overall 3 billion. All the other base pairs in that sequence are the same. This is important. Of course it's a different 3 to 6 million in any one of you compared to any other of you. Presently, some 6,000 human genes (most associated with diseases) are known; about 5,000 of these have been roughly or specifically mapped onto chromosomes. These numbers are changing rapidly.

It will perhaps be helpful to illustrate the scale of the challenge of sequencing the human genome with these analogies. Now, just to print in typescript 3 billion letters would require about 200 telephone books. I looked at the Jerusalem telephone book last night. It has about 600 pages so I estimate that about 350 volumes of the Jerusalem telephone book would represent one person's genome. If imagined as a piece of string, the DNA of one human genome would stretch about a meter. Currently we know the sequence of perhaps 2.5 cm of it. That sequence, by the way, is from all across the entire genome, not just one bit of it. The longest continuous sequence that we have from the human, at the moment, is very roughly — this is true — about a quarter of a millimeter. So you can see the scale of the challenge.

The Department of Energy initiated its Human Genome Project in 1986 following a 40 year interest, from the beginnings of the old Atomic Energy Commission, in heritable mutations and a mandate to explore more sensitive methods for detecting genetic change and the effects of radiation and other energy-related technologies on human health. In 1987, after the decision of the National Institutes of Health to start its own genome research effort, a coordinated project was formally started. So we have two agencies involved now, the Department of Energy (DOE) and the National Institutes of Health (NIH). Given the magnitude of the task it was realized right from the start that to accomplish the project in an effective way would require new approaches and new technologies, specialized resources, computerized databases, as well as the close collaboration of various disparate scientific disciplines such as molecular biologists, engineers, physicists, chemists, and computer experts. The

focus on tools and infrastructure would also have important consequences, both to widen the impact of the project in areas of biology — such as genetic diseases, susceptibilities, diversity studies, and understanding biological function — and to widen the impact of the project in terms of the different communities of biologists who could use its technologies, insights and infrastructure.

One of James Watson's significant contributions to the beginnings of the genome project was the recognition that the knowledge to come from genome studies would have broader medical and societal implications, and that's the reason we're here today, to discuss those. This led to the establishment, both in the NIH program and in the DOE program, of subprograms devoted to ethical, legal and social implications. As I noted, the aims of the subprogram are to anticipate and address some of the implications for individuals and society, to address some of the issues arising from, and to stimulate public awareness and discussion about, the vast increases in personal genetic information that will come from the genome project. Finally, also, it is expected that ELSI work and studies will contribute to the identification and development of informed policy options that might be considered by government leaders, and society at large, in dealing with some of the problems that are identified.

It has been clear from the start that the potential uses of genetic information can go far beyond the simply medical. It is plausible that an employer who may use hazardous chemicals in an industrial process, or an insurer who may be asked to pay for medical treatments of diseases with genetic contributions, may wish to ascertain the genetic, so to speak, "profile" of individuals prior to making a decision to hire or to insure. In recognition of prospects such as these, as well as in response to Congressional concerns, Watson in 1988 announced he would devote a certain percentage of the NIH genome budget to ELSI studies. The DOE followed suit. Today we spend about 3% of our genome operating budget, which amounts to about 2 million dollars per year, on ELSI work. It also very quickly became apparent, in

fact right from the start, that there were a whole lot of ELSI issues. Among these are: fairness in the use of genetic information; the impact of knowledge of genetic variation on individuals, which can lead to problems with the way we see each other; stigmatization; ostracism; privacy and confidentiality, involving the ownership of information and limitations on its use by others; and genetic counseling when information is probabilistic and uncertain. A further problem is: what happens if you get this information from a fetus? This impacts reproductive decision making. Still another is: the introduction of new genetic information into routine medical use when practitioners, many of whom were trained years earlier, aren't ready to use the information. The relevance of past misuses of genetic information (among them forced sterilizations and eugenics); issues raised by commercialization of genetic information and technologies (e.g., patenting of DNA sequences, an issue that arose suddenly and was not expected to be as difficult as it has proved to be); and of great importance, education in genetics of the population at large and specific communities within it. Michael (Feldman) mentioned some of the court cases in which genetic information has been claimed to account for some of a given defendant's behavior. That's just one area, the judicial area, where education is desperately needed. An additional need is for policy options to be developed and studied so that they can contribute to the introduction of genetic research into society in ways that are minimally intrusive or dislocating. To this end the Department of Energy ELSI program has maintained close contact, coordination and support of something called the Joint ELSI Working Group, which attempts to coordinate ELSI policy development between the two programs. David Cox, who will speak this afternoon, is a member of that group.

Among the plethora of potential ELSI issues — and I stress this list is far from exhaustive — the DOE-ELSI program has been concentrating mostly on those issues where impact can be more immediate. Among these are privacy and confidentiality of genetic information, workplace usage issues (this

can include screening for susceptibilities to environmental and workplace hazards), commercialization issues, and the education of various groups in the implications of genome research, especially those research findings that are relevant to conditions and characteristics resulting from the actions of multiple genes interacting with environmental influences. Which is to say most diseases. There aren't that many really simple diseases.

To that end the DOE-ELSI project has supported research in a number of areas. First, as I noted, is the privacy of genetic information, including the implications of large DNA-based data banks and data accumulations. One of our grantees came up with a genetic privacy act. This is a model for legislation that has been submitted in six state legislatures and the U.S. Senate; I will be leaving a copy here. In concert with the NIH program, we supported a study by our Institute of Medicine on the range of ELSI issues with recommendations for informed policies. This is an important study. It has not had quite the impact one might have wished, but it's a start in that direction. We're supporting a study on the implications of patenting DNA sequences for the commercialization of genome research, and the idea here is to test or to survey whether it in fact makes sense to patent. There are other ways of transferring technology — perhaps patenting is not the best one. We have supported the development of educational curricula for high school students. This first unit, produced a couple of years ago, has been distributed to 50,000 American high school biology teachers and used by close to 2 million high school students. I will be leaving that here too (three more on the way). We are supporting a pilot project based at the University of Washington in Seattle, in which high school students actually sequence short segments of human DNA themselves; these short sequences then become part of the entire project sequence database. So you do two things: one, you contribute a little bit of actual sequence to the database for the project. Two, you give some high school students a sense that they've made a significant contribution and get them more excited about science. We've supported

some public television documentaries about medicine and genetics, and some exhibits at science museums. I'd like to put in a word here about this: an awful lot of people go to science museums, it's a high impact kind of step to take. We've prepared a bibliography of ELSI literature, and more recently a supplement to it. The bibliography prepared in Los Alamos has more than 5,700 entries and continues to grow (NB: it is available online). We prepared early on a primer on molecular genetics. This has been distributed to over 32,000 people, and we can't keep it in print. Furthermore it's now online (http://www.ornl.gov/hgmis), and is accessible via the Internet. We have supported workshops for high school teachers, primary care physicians, genetic counselors, and public policy makers. We're working on a series of radio programs; and a particular favorite project of mine, if I'm allowed to have a favorite project, is the compilation of a desk book which will serve as a reference book for American judges. You don't have to have as litigious a society as America to know that a lot of these issues are going to end up in court. You need a cohort of knowledgeable judges to deal with those issues when they arrive. As you heard from Michael, there are a lot of preposterous claims made about what genetics means and doesn't mean.

Let me briefly touch upon a few of the activities of the ELSI program at the NIH, our partners in the U.S. effort and an important player. Their program has focused, I think naturally and appropriately, on clinical diseases. They've organized two groups of grantees, one centered on issues of cystic fibrosis testing and, more recently, another around issues associated with cancer testing. Their program, among other issues, addresses the introduction of new genetic tests into clinical practice as well as questions on fair use of genetic information. Interestingly, with regard to new genetic tests for cystic fibrosis, their studies are indicating that these tests are not as in demand as was expected. There are things people actively decide they don't want to know. The NIH program is also looking at issues surrounding informed consent. In the U.S., with our largely private health insurance

system, the use of genetic information by health insurance companies remains controversial, and they're looking at that as well.

The genome project, as you know, is explicitly international in scope and has attracted considerable interest in many countries as well as in the private sector. The active research programs in several countries, such as France and England, have already contributed significantly to genome research. ELSI issues as such have also stimulated interest and this leads to the question: what role can a country like Israel, with its strong scientific tradition and a unique history with regard to the misuse of genetics, play in ELSI? What is it you hope to accomplish with an ELSI program? That's a key question. Most importantly these are questions you must find answers to yourself. The U.S. programs reflect a commitment to try and avert undesirable consequences of genome research in the future, while at the same time reaping its benefits. The success of an ELSI program, you will discover, is hard to assess since you're trying to prevent things from happening. And the prevention of certain consequences becomes the metric rather than the achievement of certain goals. At the very least, through education programs, society should be prepared for a world in which there is greater and more accurate knowledge based on genome analyses. Within any genome project it is critically important to involve the genome research community as soon as possible in an ELSI effort, because it would be indeed unfortunate if ELSI came to be viewed as only politically expedient, and not actually contributory to the project as a whole. ELSI shouldn't be seen as taking resources away from the science but rather as contributing to it, as well as to society. And again I will congratulate you on holding a workshop like this to involve the scientists as well.

Here, I'm going to stick my neck out, because I believe that there are several principles that should guide an ELSI program and I'm going to offer them to you, again with the explicit understanding that your ELSI program has to be yours. The first, and I've just said this but I'm going to

say it again, is that at all times ELSI must be firmly rooted in the actual science. The potentials of genome research are considerable, from environmental manipulations, greater knowledge of our medical futures, to gene therapies. We're going to see those soon. Human biology, as you also know, is extraordinarily complex and the level of our understanding of it at the moment is still fairly rudimentary. A pioneer of gene therapy has noted that it's much easier to damage a complex mechanism with a small change than it is to enhance or improve a complex mechanism with a small fix. We all know that throwing a monkey wrench into a complex machine generally doesn't do it any good. It isn't necessary to concoct alarmist nightmares of secret human experimentation designed to produce supermen or superwomen, or (my favorite) recombinant DNA-engineered dinosaurs. The real problems are difficult enough. One way to do this, as you're doing, is to involve genome scientists in the ELSI effort right from the outset. I can't stress that too much. Close communications are essential so that ELSI researchers remain close to the actual science, and the scientists appreciate that it is in their best interest for the ELSI activities to take place and succeed.

Second, educational efforts, of which this workshop is one, are a constant imperative. Different groups may need different emphases in accordance with different interests. Thus, judges need education directed at the ways genetic information may enter court cases, while primary care physicians need education directed at helping them use available genetic information to categorize the symptoms of their patients and make appropriate referrals, while genetic counselors need education directed at making it easier for them to counsel patients who may know little about genetics until a disease strikes. Religious leaders will be challenged as well to wisely counsel their followers.

Third, issues of informed consent for participants in genetic research are constant and difficult. Genetics is shared familial information. The diagnosis of one person can have direct implications for family members as well. In no area

of medical research is it more important that patients and research participants understand what information and future predictive insights about them may emerge from such studies.

Fourth, there will always be a gap between the ability of physicians to diagnose a patient with a present (or future) genetic condition and the ability of physicians to offer treatments for it. I'm an optimist so I'm sure that this will change, but it's going to change at different rates for different conditions. I always like to mention that it is very sobering to realize that medicine has known, in molecular detail, almost in atomic detail, the origins of sickle cell disease since the early 1960's, yet treatments today are still largely the result of trial and error.

Fifth, multi-genic diseases, which is to say most diseases, are going to be a constant challenge. At the region responsible for cystic fibrosis, some 576 — that's at last count, it may be more now — mutations have been identified. It's a big gene. Seven are thought to account for most of the cases of cystic fibrosis that are seen clinically, and it is these seven that are most commonly tested for. However, negative tests for cystic fibrosis disease-associated alleles do not, I repeat, do not necessarily mean that a person does not have a risk for cystic fibrosis. It only means he or she doesn't have those seven alleles that were tested for. At the moment, it's not cost-effective to test for the other 570 plus. The recently discovered gene on chromosome 11 for ataxia telangiectasia, discovered by Dr. Yossi Shilo of Tel Aviv University, is going to be another case in point. It is thought that from one in 200 to one in 70 people may have one copy of a mutated ataxia gene, and that in the 50% of those who are women there is a much increased chance of getting breast cancer. We don't know yet how many mutant alleles there are at this gene. It too is a very large gene. How many mutations (I'm using the plural because I'm confident that there will be more than one) predispose to breast cancer and how many don't? What other influences, genetic or otherwise, plus one of these mutations is necessary to lead to breast cancer?

And here's the kicker: what do you tell someone who tests positive for one of these disease-associated alleles when you can only be, at best, vague about what it means for that particular patient?

Sixth, I noted earlier that 350 telephone books are required to print a genome. That's a somewhat unwieldy storage device, so obviously high performance computers will be absolutely essential for the storage, retrieval and interrogation of that information, as well as making it accessible for a variety of purposes. However, information is said to be data that makes a difference to someone. So issues of privacy and security involving the very same computers need to be addressed.

While the issues raised by modern genome research are among the most challenging we face, many are neither particularly novel, nor do they originate with the genome project. Issues of privacy of personal information, the manner and rate and the subject matter of appropriate technology transfer and commercialization, the way we as individuals or as a society deal with uncertainty, whether personal health risk or community risks from environmental agents, and the imperative for education in essentials of genome research, have all been around for other programs in the past and they're going to remain into the future. Many of these issues are supremely difficult because defensible perspectives and rights exist on both sides, and it is balance that needs to be found. At this point, I think it's important to say, scientists no longer occupy any special status and it's important to recognize that the decisions must be made by the broader society of which scientists are only a part. One should, of course, never stop asking the questions. Further research is always needed, as well as continued activities to promote public awareness and understanding, to serve the major imperative, which is to help define a wise policy for a future that will include more knowledge about ourselves as well as more advanced technologies for determining the implications of that knowledge. Thank you very much.

"Wrongful Life" Suits by Defective Newborns for Faulty Genetic Counseling

PROFESSOR AMOS SHAPIRA

Thank you. Ladies and Gentlemen, friends. As the only lawyer on the panel today, I made an early decision to be specific. In other words, instead of attempting a general survey of the various sociolegal issues involved in genetic screening, testing, counseling and therapy — an enterprise usually limited to posing questions and laying down over-broad propositions — I prefer to focus on one, hopefully interesting, dilemma which has baffled jurists and philosophers in many a legal system. This is the problem known as a "wrongful life" lawsuit brought by an impaired newborn against a genetic counselor for faulty genetic counseling. Namely, a "wrongful life" action is based on the alleged liability of a genetic counselor toward an impaired newborn who claims that he or she would not have been born at all had it not been for the counselor's negligence. Such negligence lies in the defendant's alleged failure in not preventing the child's conception or birth by ill advising the parents or by conducting improperly the relevant testing before conception or birth. Now, does a genetic counselor owe a duty of care to the plaintiff newborn when the latter is not yet born, or even conceived, when the defendant allegedly acted with professional negligence? The answer, in many legal systems including our own, is definitely yes. Exercising professional due care would mean enabling the parents to avoid conception or birth of a handicapped child by informing them appropriately about the risk. Having failed to do so, the genetic counselor may be regarded as professionally negligent under accepted malpractice tort standards. Imposing such a professional duty of care should not be condemned as an undue encouragement of abortion. To be sure, it may

in fact enhance the incidence of elective abortion, as health care providers, e.g., genetic counselors, will likely act with caution and not shy away from recommending abortion in many cases. Yet a genetic counselor will meet his professional obligation simply by duly informing the parents about the extent and likelihood of the risks involved, leaving to them the ultimate decision. The professional advice given must be reasonable under the circumstances and correspond to available contemporary scientific knowledge. Indeed, an unskillful, imprudent counsel not to conceive or to abort can itself be deemed negligent and constitute malpractice.

There is nothing unfair in holding genetic counselors liable to an impaired newborn for professional misconduct, that is, behavior that under the circumstances falls short of ordinarily required standards of due care. Professionals' acknowledgment that in performing their task they are subject to such normative standards of professional behavior is likely to prompt them to act with skill and caution, thus reducing the incidence of professional malpractice. This would certainly fall in line with the deterrence and prevention policy-goals of tort law. By the same token, widespread awareness by the general public that genetic counselors are accountable for negligent professional behavior is prone to promote public resort to genetic counseling, a practice that can be expected to advance the public health interest in curbing the heredity of genetic disorders. An additional argument in support of imposing the legal duty of professional due care on genetic counselors can be framed in terms of the damage-spreading policy-goal of negligence law. Health care professionals and organizations are generally considered more efficient damage-spreaders than individual patients. The former are better situated to insure themselves against professional liability and then spread the premium costs to the general public through a health-delivery insurance plan. This would be preferable to burdening a single family or some welfare agency with the enormous costs involved in having to deal with a genetic disease. Basic precepts, instincts if you wish, of justice and fairness seem to lend further support for holding

negligent professionals responsible for the consequences of their substandard tortious conduct. A wrongdoer ought not to escape liability toward the victim of his or her malpractice. Where injury can be linked to some negligent behavior the tortfeasor should bear the responsibility of making amends to the injured party.

The thorniest, most perplexing dilemmas relating to "wrongful life" lawsuits emerge in the realm of morality and logic. Under the principles of our tort law, it is only a breach of duty of due care which results in a legally recognized injury that can provide the injured party with a cause of action to sue the wrongdoer for compensation. Is the condition of impaired life, in a situation where healthy life has never been an option, to be regarded as a compensable damage? Even assuming that the genetic counselor acted negligently in conducting a test or in providing information to the would-be parents, should the child born be permitted to claim that the defective life thrust upon him constitutes a harm for which he deserves to be redressed? There are those who maintain that the endorsement of such a claim is tantamount to a normative affirmation that no life is preferable to life afflicted with disease. And such affirmation, so the argument runs, challenges head-on the cherished tenet of sanctity of human life and is bound to legitimize and promote both abortion and euthanasia. As for abortion, it is noteworthy that under Israeli law a gynecologist does not bear criminal responsibility for interrupting a woman's pregnancy if the procedure is performed at a recognized medical facility and approval has been given in advance by a committee of three, consisting of a medical practitioner specializing in obstetrics and gynecology, another qualified medical practitioner, and a social worker. This committee is authorized, after obtaining the pregnant woman's informed consent, to approve the interruption of pregnancy on each of several specified grounds, including a situation where "the child, if born, is likely to have a physical or a mental defect". The phraseology adopted by the Israeli legislature appears to reveal an unmistakably lenient policy on abortion for eugenic

reasons. The physical or mental defect justifying interruption of pregnancy need not necessarily be extensive or grievous. An ordinary, perhaps even a relatively minor, defect may suffice. Furthermore, the defect need only be "likely" as distinct from certain or probable. The term "likely" seems to denote a more reasonable possibility which may fall short of a near certainty or a high probability. The possible risk of such a defect may stem from a variety of causes such as an exposure of the pregnant woman to certain diseases, an exposure of the fetus to radiation, medications and other substances taken by the woman, and a known or even a merely suspected history of familial genetic defective traits with a likely hereditary effect. Legalized abortion is ordinarily indicative of society's value judgments, particularly its recognition of women's rights to autonomy, dignity, privacy, and bodily integrity. A dejure as well as defacto permissive stance on abortion for eugenic reasons actually provides a solid foundation for an impaired newborn's assertion that had it not been for the genetic counselor's negligence his parents might indeed have opted for legal abortion. The faulty genetic counseling deprived the parents of their legally recognized opportunity to interrupt a defective pregnancy. In this respect, legal recognition of the cause of action for "wrongful life" is rationally linked to the corresponding legal endorsement of parental authority to refrain from conceiving or giving birth to an impaired child.

Legal sanctioning of the "wrongful life" cause of action can also be related to the so-called Right to Die debate. One could argue that recognizing hampered life as a compensable harm, when healthy life was never an option, undermines traditional tenets of the sanctity of human life and blatantly devalues the social worth of the handicapped in our society. This, in turn, may lead to hazardous end-of-life decisions concerning medical treatment of the aging and the ailing, ranging all the way from withholding and withdrawing life support to all-out assisted suicide and active euthanasia. A comprehensive discussion of death and dying intricacies falls beyond the ambit of this short presentation. Suffice it

to note that compensating a defective newborn for negligent prenatal genetic diagnosis that prompted her parents not to refrain from conception or birth does hardly brand the suing infant's disabled life as worthless. It is precisely because the plaintiff's life deserves respect and compassion that proper pecuniary redress ought to be offered to her. Terminal treatment decisions entail a different matrix of values and concerns. The question of whether the dwindling life of an incurable patient burdened with unremitting suffering should be prolonged artificially raises issues which are quite different from those involved in deciding whether a hampered infant ought to be compensated for faulty prenatal diagnosis in circumstances where normal life was not an available alternative. To put it differently, while the concern for the sanctity of life is clearly engaged in the comparison of existing (if burdened) life to the termination thereof, it is hardly a self-evident issue where comparison between non-existence and impaired life is attempted.

As already noted, a legally recognized injury resulting from a breach of a duty of due care is a precondition to liability for negligence, entitling the injured party to compensation. Now, aside from allegedly detrimental repercussions on the morality of abortion and euthanasia, is it logical to argue that the defective life into which a child was born, when normal life was not at all possible, amounts to a compensable harm to the child born? After all, compensating the harmed plaintiff is designed to restore the injury to status quo ante, namely, to create through proper compensation the conditions which equal, as close as possible, the pre-injury situation. When a plaintiff asserts a preference for non-existence over hampered life, he is actually claiming that the gap between the two, between non-existence and defective life, is the damage suffered by him. Is a court of law capable of making such an assessment? By employing what logical yardsticks? Two justices of the Israeli Supreme Court, in a case decided some years ago, did not shirk from comparing non-existence to defective life. They were prepared to decree that in certain, admittedly rare and extreme, situations a

reasonable man could conclude that a person would indeed be better off not to be born at all than to live with a very serious impairment. In this opinion, the cause of action for "wrongful life" should and could be limited to exceptionally severe disabilities only. This limitation will minimize the alleged affront to the moral value of the sanctity of human life as well as reduce the potential influx of "wrongful life" lawsuits and, by the same token, lower the liability insurance costs of genetic counseling and treatment services. One major difficulty, however, inherent in this judicial position is the very necessity to distinguish between truly severe handicaps allowing the cause of action and less than grave defects not providing a right to sue. Blindness, for instance; how is it to be classified? Or deafness? Or being born missing a limb? Will the court invoke an objective criterion, asking itself whether a reasonable mother would be likely, in the circumstances of the case, to interrupt her pregnancy if properly apprised of the risk? Or will the court resort to a subjective test, basing its determination on the concrete testimony of the actual mother as to her putative decision had she been adequately informed? Or, possibly, the court may apply a medley of objective and subjective standards when called upon to assess the relative severity of various disabilities. Tough questions.

An alternative approach, preferred by two other justices of the Israeli Supreme Court, seeks to avoid the logical dilemma by sidestepping or leaping over it. In their view, legal responsibility for "wrongful life" can be established without comparing non-life with impaired life and without endorsing a right not to be born. Indeed, such a comparison is logically impossible. And there can be no right to non-existence. Judges are incapable of gauging the meaning of non-life and of evaluating its worth in comparison to hampered life. Also, the distinction between grave defects and less serious ones is difficult to make and, moreover, is bound to leave persons suffering from lesser yet substantial impairments without remedy. It is the opinion of these justices that the physician's liability toward the disabled

minor in a "wrongful life" situation rests on the plaintiff's right, once born alive, to life without defect brought about by professional malpractice. Consequently, the damage for which the negligent genetic expert is responsible does not lie in the actual granting of life, nor in the prevention of non-life but rather in the causing of impaired life. Thus the quantum of damage should be assessed by comparing the plaintiff's actual defective life to a hypothetical life without harm. The genetic counselor was negligent and caused a defective life, a damage for which he should be responsible. It is true that life without defect was factually impossible. But having acted carelessly, the defendant is now responsible for the creation of a defective life. The compensation awarded for this damage is not designed to restore the plaintiff's condition to that obtaining were it not for the defendant's faulty behavior, that is to say, non-life, but rather to redress the plaintiff for the impairment into which she was born. In other words, the fact of the matter is that the handicapped child is alive. She neither is entitled to, nor capable of, being restored to the pre-injury state of affairs, that is to say non-existence. She exists — impaired, suffering and needy, because the defendant behaved professionally negligent. It is true that initially the only alternative to disabled life was not to be born at all. But that alternative exists no more. By being born handicapped, in consequence of the defendant's malpractice, the plaintiff acquired a right to be redressed appropriately. The defendant's professional negligence yielded at once two results: the child's birth into life and his inevitably handicapped existence. Logically speaking, these two results are inescapably intertwined, yet they can be separated from one another conceptually. The living disabled child is suing not for being brought into life, but rather for the handicapped existence thrust upon him. There may be no legally protected interest in non-existence. Yet the law can and should provide an impaired newborn with a right to be compensated by a negligent genetic counselor for the damage inherent in her handicapped condition as compared with a normal life. One can still argue that the normal life versus defective life,

rather than the non-life versus defective life, comparison is logically flawed. But it presents a proposition that judges can understand and that allows for compensation based on judicially familiar differentiations between the rule and the exception, the normal and the abnormal. More precisely defined, the plaintiff's cause of action under this approach is one for diminished, rather than wrongful, life. Thank you.

DISCUSSION

Dr. Daniel Drell

I think we have the basis for a lively discussion here.

Professor Michel Ravel

Regarding the last presentation by Professor Shapira, this is a very interesting issue. Just a few weeks ago I was watching a Belgian program on TV, in which a scientist who was affected by a deforming disease — and she is actually working on the disease, trying to isolate the gene — made the following comment. "It's because my parents did not choose to have genetic counseling that I was born." Although she is only about one meter tall and has a terrible deformity, she said: "I would have missed a lot had I not have been born." So my question is the following. In your discussion you reach the point of comparing to be born with a defect to not to be born at all. But is it not rather the parents who should have complained? Is it not a situation where some parents can decide not to have counseling and other parents decide to have counseling? If parents decide to have counseling then they should have proper counseling. If the counselor makes a mistake then he should be liable to the parents. Would it not be legally more logical for the parents to sue than for the child to sue?

Professor Amos Shapira

In fact, in such cases the parents' lawsuit, the parents' cause of action, was recognized without major difficulties. The parents' lawsuit doesn't present the legal system with the intricate logical and moral dilemmas that the child's personal suit presents. In our system, as in the United States and Europe, the real dilemma is whether the child as such should also have a separate, individual cause of action of his or her own. Of course, there is the risk of overcompensation which should be taken care of. It would certainly be unfair

and unwise to impose on the genetic counselor, even if negligent, the burden of paying double compensation — once to the parents and then to the child. If one recognizes a wrongful life action by the child itself, then one should find ways and means to avoid over-compensation. Why should parents have a self-evident cause of action for the economic burdens thrust on them as a result of the birth of a defective child due to malpractice, while the child himself is deprived of a cause of action for his own suffering and damage? What if the parents die when the disabled child is two months old and has an expected life span of, say, eight years, necessitating special medical and other treatment? All this costs money. Who will pay for it (in the absence of a pervasive welfare support system)? So I think that on the whole the separate cause of action for wrongful life granted to the child himself, independently of the parents' possible suit, is socially justified.

Question
Even against the parents?

Professor Amos Shapira
Well, that's another possible complication that I didn't touch upon. One always confronts the slippery slope arguments. If we admit wrongful life actions against professionals, why not allow them against the parents themselves? And not necessarily for a genetic disorder only. What about suing my parents for giving birth to me, a Jew, in an environment that is not friendly to Jews? I don't have the time to go into that in any detail. Suffice it to note that genetic impairments clearly constitute compensable bodily damages under the customary social conventions manifested in the principles of tort law. A court upholding a wrongful life claim brought by a handicapped child will hardly be compelled by ethics, logic or social policy to treat likewise a short or dark-complexioned newborn plaintiff. And judicial affirmation of a wrongful life action against a geneticist will not inevitably result in endorsement of wrongful life suits lodged by children against

their parents. The former is firmly grounded in the traditional legal notion of professional negligence. The latter, however, is a fundamentally different matter. Imposing upon parents a duty of due care to prevent the conception or birth of a child would have to be based on a completely separate and new concept of a parental responsibility to spare potential offspring a life handicapped by sickness or encumbered by some social deprivation.

Professor John Harris

I found the whole morning very interesting, but naturally the specific arguments of the last speaker are more easy to address than the very elegant more general presentations. On the question of wrongful life, it seems to me that the whole basis of wrongful life is misconceived. The question you have to ask is: is life a net benefit to the individual born, or not? Is it worth having? If it's worth having, then that individual has not conceivably been wronged by being brought to birth. They've been harmed, yes, but wronged, no. If life is so terrible that the whole existence is a wrong, then they have been wronged. But that would be a very rare case. It seems to me then that the appropriate request is a request for euthanasia and the appropriate request should be brought against the state for not permitting the euthanasia, which is the only logical remedy for that individual. In other words, the wrong is not perpetrated by the counselors or by the parents, but by those who prevent the restoration of the only solution that will answer the issue, namely, remove the wrongful life. So if, as in most circumstances, life is a net benefit albeit with a disability or with a handicap, then there is no logic in wrongful life, there is no such thing as wrongful life. If life is, on the other hand, wrongful, then the best remedy is euthanasia and the appropriate defendant is the state for not permitting it.

Professor Amos Shapira

As suggested in my concluding remark, which does not of course terminate the debate, it might be useful to characterize

this kind of lawsuit not in terms of "wrongful" life but rather in terms of "diminished" life, thereby, perhaps, sidestepping some of the logical and moral misgivings. However, let's look at it for a moment from the point of view of the defendant, not of the plaintiff. We all accept it as self-evident that, say, a surgeon who acted negligently by forgetting to remove a swab from a patient's stomach be held liable for the damage caused, including suffering, medical costs, and reduced earning capacity of the victim. Now, if another physician, who is a genetic counselor, had admittedly acted negligently, why shouldn't he or she be held likewise liable under our customary malpractice standards? I don't see any difference whatsoever.

Professor John Harris

With all due respect, you missed the point. The point is that if the genetic counselor has not harmed the individual, his life is a benefit.

Question

Therefore there is no negligence.

Professor Amos Shapiro.

Well, this is indeed the crux of the matter — whether there was harm. Admittedly, there was negligent behavior by the geneticist. He or she acted without due care, imprudently, unprofessionally. The question remains whether the victim of negligence can sue for that. If there is no damage, and that's your point, then there is no cause for action even if we assume that the defendant behaved negligently. I dwelt on this dilemma in my presentation. I belong to those who believe that potent social policy grounds strongly support the proposition that the plaintiff's condition of impaired life may indeed by viewed as a compensable injury (whether the harm suffered is measured by pitting no-life against defective life or by comparing a hypothetical healthy life to a disabled life).

Dr. Moshe Zemer

In view of the moral and religious questions involved, did the Supreme Court judgment refer to the Talmudic argument between Beit Shammai and Beit Hillel, whether it were better that man not be created than he be created, and was there a recommendation for the use of Jewish law? Was this in the judgment?

Professor Amos Shapira

Yes. That particular phrase, *Tov lo shelo nolad mishenolad,* was cited. If my memory does not fail me, Justice Ben Porat mentions it. I don't recall that there is a pervasive discussion of Jewish Halachic law in this Supreme Court judgment. But there are references to the Halacha.

Professor Michael Silbermann

You gave an example of a handicapped child whose parents died after two years, and the special and extra expenses, and the medical treatment that he might be exposed to. This is not an issue in a normal country. Take Israel; if such a case arises, there is a law relating to it. This child is entitled to all medical treatment, including prostheses, remedial therapy, etc., therefore this is not a practical case at all.

Professor Amos Shapira

I don't wish to argue with you about that. Yet the story is far more complex. Of course, one could argue convincingly for a social security solution that guarantees the provision for all the needs of all impaired newborns. According to this view, the State should support handicapped children and ensure their welfare as part of a general social policy to support the needy out of the public purse. A general welfare solution would, of course, require public funding and special enabling legislation. Such a solution would depend upon community empathy for and solidarity with the needy, and a general commitment to provide them with a fair level of subsistence. It would be contingent upon the existence of a socioeconomic ethos and political culture of a welfare state that recognizes

the entitlement of its needy to public support. Are such sociopolitical requirements compatible with current realities in all or, indeed, many polities?

Human Genome Analysis: Personal and Public Responsibility for Health

PROFESSOR JOHN HARRIS

I'm John Harris from the United Kingdom and I'd like to say that I regard it as a great honor to have been invited here to attend this meeting, and so far I have been very stimulated and interested by what I've heard. I'm going to say a few words about personal and public responsibility for health in the light of the Human Genome Project.

We've seen, recently, increasingly persistent and overt attempts made at justifying the denial to some citizens of an equal claim for care by the community. These attempts range from the ad hoc decisions of particular medical practitioners in the United Kingdom (and maybe here) — for example, not to treat smokers — to decisions to mark certain patients' notes in hospitals "not for resuscitation" or not for "222" or "333" which in the UK is the code for the crash team. There was a notorious case recently very near to where I work in Manchester, where smokers were denied coronary artery bypass grafts in a local hospital. These attempts range from those very particular decisions to broad policy issues like, for example, the Oregon Experiment in the United States and the use of the notorious "QALY", the quality adjusted life-year as a method of allocating health resources. These attempts to justify various sorts of discrimination between claimants, or what amounts to the same thing as discrimination, namely, prioritization of such claimants, appeal to a number of crucial alleged differences among claimants. There have been three main principles advanced to justify such discrimination. They are: 'desert', 'life expectancy', and 'quality of life'. While we may assume that an individual's genetic constitution has no relevance to his or her personal deserving or merit, it does crucially bear upon questions of quantity and quality of life.

However, even something over which we have no control, our own genome, may give rise to questions of personal responsibility for health, and I'll come to those in just a moment.

What I want to do today is set up the skeleton of an argument. Now, I'm a philosopher and I'm going to concentrate on some specific arguments. I'm not going to lay out general questions for consideration but, rather like Professor Shapira, I'm going to concentrate on a specific issue and try and recommend some specific conclusions to you. Let us say that discrimination between claimants on each or any of the grounds is illegitimate. And having set out the skeleton of the argument, I shall attempt to put a little bit of flesh on it and justify its application only to the first category of discrimination I have identified, that of discrimination on the basis of our responsibility for our own adverse health state. Or perhaps on the basis of 'lifestyle', as it's sometimes now called. I'm going to assume that everyone in this room (I'm paying you a great compliment here, I hope you realize) accepts that no allocation of public resources should discriminate unfairly between rival claimants or groups of claimants, and that this happens when each person's claim to the equal concern, respect and protection of the community in which they live, of their own society, is not respected. This I'm going to call the principle of equality — that each person is entitled to the same concern, respect and protection of society as is accorded to any other member of that society. This interpretation of the equality principle may be controversial, but I'm not going to defend it any further today. This principle involves the idea that people's lives and their fundamental interests matter and are of equal importance, and that they must, in consequence, be given equal weight and be equally protected.

This principle has powerful intellectual appeal and intuitive force, and it's often of course enough to discredit a proposed measure simply by pointing out that it violates this principle. And when measures are said to be discriminatory or unfair, it is this principle, the principle of equality, that is

in play (I'm cutting large sections of the paper on which this presentation is based, you'll be pleased to note, so that we'll have plenty of time for discussion). It might be thought that one thing people are not responsible for is their own genetic constitution. Hence, genome analysis is quite irrelevant to the issue of personal and public responsibility for health. This would be a false assumption for two reasons. In the first place, many of the health problems revealed by genome analysis will not involve factors like the presence of single gene defects with relative inevitability of contracting disease. Rather, it will reveal a genetically linked susceptibility to disease. A susceptibility, moreover, that may be reduced by steps that are within the control of the individual. If I know, for example, that I have a genetic predisposition to heart disease, I may reduce the likelihood of a heart attack by trying to control other variables under my command, like exercise, diet, smoking and so on. If I fail to take such measures, then I may be regarded as responsible for my heart disease despite its genetic linkage. Secondly, where genetic screening either does or could take place prenatally (or maybe even preconceptually, if and when genome analysis can be done on the gametes and the gametes identified individually prior to conception), then parents may be thought responsible, as we heard at the end of the first part of the morning session, for permitting the birth of children with particular genetic constitutions. But since genome analysis will also reveal predictive data about quantity and quality of life, it will provide the information that will make discrimination on this basis possible.

Why then is it believed that if people are responsible for their own adverse health state, this somehow reduces their moral claims? There are two possible answers to this. The first relates adverse health state to life expectancy and suggests that people with reduced life expectancy, either through adverse health or through elapsed time (they're simply older), have reduced moral claims. The second suggests that people who are responsible for their adverse health state are either in some sense morally corrupt or have at best volunteered for

their injury. Perhaps therefore, according to the common law principle of volenti non fit injuria, they have no complaint that merits consideration.

I will deal briefly with life expectancy first. We can state a general argument against discrimination on the basis of life expectancy, or ageism as I prefer to call it. All of us who wish to go on living have something that each of us values, probably equally, although for each it is very different in character. For some a much richer prize than for others. And none of us, or very few of us, know its true extent. This thing, of course, is the rest of our lives. So long as we do not know the date of our deaths, then for each of us the rest of our lives is of indefinite duration. Whether we are seventeen or seventy, in perfect health or suffering from a terminal disease, we each have the rest of our lives to live. So long as we each wish to live out the rest of our lives, however long that turns out to be, then if we do not deserve to die we each suffer the same injustice if our wishes to go on living are deliberately frustrated and we are cut off prematurely. It is this outlook that explains why murder is always wrong, and wrong to the same degree. In other words, it's not worse to murder the young than the old in most people's estimation. When you rob someone of life, you take from them not only all they have but all they ever will have. It's a difference in degree so radical that it makes for a difference in the quality of the act. However, the wrong, as I want to suggest, consists of taking from them something that they want. That is why voluntary euthanasia is not wrong and murder is.

I hope that all the things I'm saying will be controversial enough to prompt some people to disagree with me. Those who believe in discriminating in favor of the young or against the old must believe that insofar as murder is an injustice, it is less of an injustice to murder the old than the young.

I want to look at one example of the injustice of this, which concentrates on life expectancy rather than on old age. Imagine twin sisters. One is disabled from birth, with a painful condition that is untreatable and leaves her chair-bound and with a reduced life expectancy. The other sister

is perfectly normal. By the time they reach their twenties the disabled sister has carved out for herself a life that she finds tolerable despite its short life expectancy, despite its pain and despite its immobility or relative immobility. Both of them are involved in a motor accident and require the same expensive treatment to restore them to the status quo ante. If resources are scarce, then views like life-year approaches, whether quality adjusted or not, which value life in proportion to the length of its expected continuance and the quality of that continuance, dictate that the healthy sister get priority. And this may mean that she will be the only one of the two to be treated. Having been born fortunate, her fortune will be further rewarded by what I've called ageism. Her sister, having been once unfortunate, has further misfortune heaped upon her when it comes to the allocation of resources for health care. This I've called the double jeopardy argument. Let's now look at the idea that people who are responsible for their own adverse health are somehow less deserving of our care and concern. There is certainly some strong intuitive appeal in this idea, and it also appeals to one strong strand of theorizing about justice. Let's assume that there are no knock-down arguments on either side as to whether or not it is just to allocate resources for health according to personal responsibility for health.

What I've done today is leave out a whole section of my text where I try to argue that it is, to a certain extent, unjust to discriminate against those who are to some degree responsible for their own adverse health state. But I think the arguments are, in any event, relatively evenly balanced. Take responsibility for one's own adverse health state. One consideration of some immediate intuitive force is the suggestion that when faced with the choice of treating a persistent smoker, say, and someone who has diligently attempted to protect their own health by avoiding smoking, it would be unfair to prefer the smoker. The argument behind this judgment may be that the smoker should not be rewarded for her recklessness, while the prudent individual is punished for her care of her own health. And a related thought may be

that it seems unfair that the non-smoker should be denied the benefit that, she has a reasonable expectation, would be the just reward of her virtuous lifestyle.

We should remember that it is not entirely true that a non-smoker who is given lower priority for treatment than a smoker has had the benefit of his or her virtue negated in some way. Non-smokers do get benefit from their virtue. They are less likely to need health care. They do have their fair deserved advantage over smokers. They have already been rewarded, personally and statistically, for their virtue. The question is should they be rewarded again by the public health care system? Does their virtue increase their entitlement to benefit from the public health care system? Then there is the suggestion that smokers should not be preferred to non-smokers, that such a preference would be unfair in that it rewarded virtue at the expense of vice. Again, no one is, I think, suggesting that smokers should be preferred to non-smokers, but should they have an equal chance? If they are given an equal chance of care and treatment, then of course sometimes smokers will get priority over non-smokers. It may be unfair in some cosmic sense that the virtuous suffer and the less virtuous prosper. But the question is: should we use public resources and even legislation to try to ensure that this doesn't happen, and if we do so are we in danger of effectively punishing people for their choice of lifestyle, and doing so in a way that not only violates principles of natural justice but which creates additional and gratuitous injustice?

It is sometimes said that giving a low priority in the allocation of resources for health care to smokers is justified, not as a punishment for them or a reward for the virtue of abstinence, but because to fail to do so would encourage dangerous and antisocial habits in the community and would not provide a much needed incentive to people to give up cigarettes. However, if the prospect of better health and a longer life on the one hand, and fear from premature death, or cancer, or heart disease on the other, does not act as an incentive, it is surely unlikely that the further fear of failure

to get priority in medical care will add much to the incentives and disincentives already in place. If the refusal to treat, or low positions on waiting lists are unlikely to have much impact on behavior, then discrimination against smokers in the allocation of health care resources will effectively function as a punishment and should be seen as such.

And this then raises a very large and important issue. I don't have space to do justice to it, but it is the question of the appropriateness of allowing doctors or the health care system to hand out punishments and rewards for behavior that is quite legal. If this is effectively a form of punishment, and insofar as it is, it would be punishment without a hearing or trial by individuals who are effectively judge, jury and executioner rolled into one. Not only is there a problem here of double jeopardy, of punishing some people twice for the same offense — once by their contracting a condition caused by smoking, and the second time for the refusal to treat them for that condition or for related conditions. There is also the insurmountable problem of natural justice. There are two fundamental principles of natural justice that would be breached in such a case, and indeed are breached whenever doctors refuse treatments on the basis of lifestyle, which they do frequently in my society and probably here too. The first is the principle that requires that no one be condemned unheard. The second requires that no one be a judge in his own case. Where a patient is refused treatment and the consequences are perhaps that he or she suffers or indeed dies prematurely for want of treatment that could have been provided, and where this happens unfairly, then, the patient has certainly been condemned. My suggestion is that where clinicians make these decisions, they are not only acting as judges in their own cause, but as judge, jury and executioner rolled into one for something that is not even a crime. In combination, I believe, these two principles provide a formidable objection to any attempt, whether intended or not, to use refusals to treat all low positions on waiting lists as a punishment for lifestyle. Or to use them in a way that

effectively operates as a punishment whether intended to function that way or not.

I'm far from convinced that people who take care of their own health should be rewarded more than their own efforts already reward them, while people who don't take care of their own health should be punished more than their own negligence already punished them. But I think the arguments are finally balanced here, and in the last five minutes of my presentation I want to turn to a different issue. I want to assume that you're completely unconvinced by what I've said and have decided that we ought, as a matter of public policy, to give priority to those who have healthy lifestyles, and low priority or discriminate against those who do not. What would it be like if we tried to do this? Suppose we tried, as a matter of public policy, to hold people responsible for their own adverse health state and distribute access to health care accordingly. What would it be like if we tried to do this? If care and protection on the one hand, or priority for treatment on the other, is to vary according to an individual's own responsibility for her own adverse health, few would merit protection or have anything but a low priority. It is, I suppose, a commonplace that from cream cakes to car racing, from smoking to obesity, almost all of us are guilty to some extent.

Today, the focus of people's concern about the injustice of rewarding those responsible for adverse health has centered almost exclusively, for psychological and social reasons that I won't go into further, on smoking and, interestingly, on those with HIV/AIDS. This is perhaps revealing but hardly surprising. Smoking is now unfashionable and is the focus of massive public health campaigns. Persons with HIV/AIDS have, as we know, been the victims of the most extraordinary malice and stigmatization. Indeed, it has not been uncommon to hear talk of a distinction between an "innocent" and a "guilty" AIDS, drawn between those who acquired HIV via a blood transfusion or some other medically administered process and those who acquired the virus through sexual activity or drug use. However, it's clear that any serious

list of people who have or share responsibility for their own adverse health state would have to include a high proportion of the entire population. And this can clearly be seen if I briefly rehearse the list of some of the antisocial behaviors that must be included in anything approaching a comprehensive attempt to catalogue appropriately responsible, or should we say, irresponsible citizens. I always find it rather bizarre when in our country, perhaps here too, terrorists claim responsibility for something. It always seems more appropriate for them to claim "irresponsibility" for something. Or those who indulge in risky sports and pastimes: squash (a favorite of mine), football, rugby, pot-holing, climbing, hang-gliding. Those who don't indulge in sports and thus become unfit or obese, those who have a less than optimal diet whether in the form of animal fats, hydrogenated fats, animal protein and so on, who eat too much or too little, all would have to be included. Then there are those who willfully or recklessly engage in risky or unhealthy types of employment, or who frequent dangerous or unhealthy workplaces. These will include first and foremost health care workers; we all know that hospitals are probably the most dangerous places of all to work in. And of course it would include fire officers, the police, armed services and so on, as well as the more mundane but hardly safe occupations or workplaces such as smoky or even noisy factories for example. Next we must consider those who willfully and perversely choose to be dwellers in industrial cities with their inherent risk of pollution, road accidents and violent crime. We know of course that certain geographic locations are also inherently unsafe. This might include such features as proximity to nuclear installations or naturally occurring radon, or the often dangerous distance of country dwellers from a major hospital. People who live in the north of the United Kingdom, where I live, are known to be at much greater risk to their health than, for example, those who live in the south of Italy, a place I aspire to live.

This brief survey of some of the ways in which people might reasonably be held responsible for their own adverse

health has revealed how extensive such responsibility might be. It has also revealed, to some extent, the scale of the difficulty there would be in assessing such things as the degree of responsibility that people have. How do you assess the extent to which someone's choice of pastime, job, domicile, sexual partner, and so on is either justified, defensible, fully informed and autonomous and so on. But even granting all this, and this is my final point, even if a metric for responsibility, a very complex metric for responsibility, could be devised (by some ingenious and aspiring economist, say) that would do justice to the different ways and circumstances in which people contribute to their own adverse health, would it be possible for us to implement it? If we are to distribute access to health care in the light of such responsibility, then health professionals and administrators need to have immediate access to all the relevant information, including, of course, the genome profile of each patient, and they need to have it immediately. To take just one example, in order to prioritize care justly, according to this metric of responsibility, the casualty officer in an accident or an emergency department in a hospital must know precisely the degree of responsibility for every casualty he or she sees. And she must know it the moment she sees them. If this were not possible, huge injustices would occur and reasonable questions would arise as to the legitimacy of making those — on whom information happened to be available — bear the whole brunt of our attempts to redistribute access to health care according to this particular conception of a meritocracy of health. And even if, per imposibile, such complete information could be made available, there remains the question of whether it would be desirable for other reasons, and this of course particularly applies to the information flowing from genome analysis. Would it be desirable for other reasons, which would include privacy and the dangers of abuse, to support such a comprehensive system for the gathering, monitoring, storage and retrieval of information.

I hope two conclusions have emerged. The first is the far from attractive proposal to hold people responsible for

their adverse health state, and to allocate health priorities according to that. The second is the pervasive nature of our responsibility for our own health, and the consequent likelihood of it proving impossible either to devise a metric for the allocation of such responsibility or to cope with the ethical as well as the practical problems of the information-gathering management and availability that would be required. For all these reasons I want to suggest to you that it is wrong, both in principle and in practice, to attempt to hold people responsible for their own adverse health state, and in particular to distribute access to health care on the basis of such things, which will include life expectancy and quality of life. Now, I haven't said enough in the 29 minutes that I've allowed myself to justify the arguments about life expectancy and ageism, but I'd be happy to answer any questions on that point.

Human Genome: A New Conception of Disease and Medicine, or a New Conception of Humanism

DR. RAM ISHAY

Ladies and Gentlemen, I want to congratulate the Israel Academy of Sciences and Humanities for this opportunity to meet together today to discuss the scientific and ethical aspects of the human genome. Until now we knew the Academy as the Academy of Sciences. But, in fact, we cannot disconnect science from humanities, and I am personally glad that scientists today are becoming more aware of ethical, social and political issues. A huge project like the Human Genome Project naturally gives rise to immense expectations and severe apprehensions. By enabling us to identify and characterize the genes involved in the main genetic diseases and in a predisposition to other diseases like diabetes, Alzheimer's, and types of cancer, the Human Genome Project will create a conceptual revolution in the understanding of health and disease.

The application of this information requires alertness to ethical rules as in all medical fields, particularly relating to privacy and confidentiality. The main issues are: the consent, the informed consent, of the person being screened; to whom to forward the information, who is permitted to receive the information, and under what circumstances. The best way to overcome these issues is by setting guidelines, educating the scientific, medical and lay communities, and debate at all levels. The public has to be informed of the various genetic options, and not to view scientists as playing God interfering with nature and the project as a technological imperialism with implications for genetic counseling and reproduction decisions.

Mapping of the human genome goes far beyond the scope of diagnosis and treatment of diseases. From the early stages

of the project, we witnessed attempts of non-medical agents to use the commercialization of genetic information to establish an "identity record" of every person and his or her fitness for insurance, employment, education, and military service. There is always a serious threat of discrimination, not only toward individuals but toward ethnic groups as well, and the identification of populations at risk as defective. In our era of rationing and setting priorities because of the scarcity of resources, the state could settle a selection by elimination, and thus reach *economic eugenics.*

We are nowadays worried by trends giving priorities to treat people according to their life expectancy and the quality of their life, and, I would now add, their lifestyle. The outcome is the avoidance of sophisticated and expensive treatment for the elderly, the poor and the disabled. This trend will become more significant if priority will be dictated not only by an existent disability, but also by a trait or predisposition. Not long ago, the ethics committee in a hospital in the north of the country discussed the justification to interrupt a pregnancy when a benign abnormality is detected in the fetus. It was then voiced that parents in the future might prefer to stop pregnancy if the child was to be affected by Alzheimer's 70 years hence or even if he stood the risk of becoming exceedingly obese. The policy of allocation of resources, which strengthens the political influence upon medical decisions, may widen such trends regarding individuals or ethnic groups.

In the coming years there will undoubtedly be attempts to use the genetic capital to explain differences between people not only regarding health or intelligence, but also economic, political and social success. The danger is in *determinism and reductionism,* with a tendency to identify genetic change with disease and to reduce medicine to molecular biology; and in the notion that the genetic structure predetermines the state and the behavior of a person. This notion is based on the concept that human differences are innate, nature rather than nurture. It also disregards the fact that men are fundamentally similar to each other. I would say that it is not

the differences themselves that instigate conflicts but rather our way of regarding them.

It is easy to succumb to prophetic extremes, and the question is whether we have the knowledge and the wisdom to apply the new techniques. Undoubtedly, we will turn back later to a more modest attitude and reinstate the genome to its proper place as one of the factors we have to take into account when trying to cope with our surrounding reality. It is important that our symposium today will lead to a multidisciplinary forum which will closely follow the progress of the project and detect in real time the dangers and the potential abuses, something like ELSI in the United States.

I would like to examine broader aspects of the project and the link between the genome and humanity and society. In the past, human diversity was not considered as having "scientific foundation". Today however, people think that we have found a scientific solution to inequality. The doctrine of inequality has been developed by many thinkers, starting with Plato. In the nineteenth century Gobineau, in his *Essai sur l'Inegalite des Races Humaines,* asserts that all men should recognize and conform to a natural hierarchy or order among races and persons. Jean Rostand, by contrast, thinks that there is no obligation to comply with nature and accept natural inequality; one can confront it, fight it, or ignore it. For the biologist, human differences are not viewed as qualities to be praised or condemned, but as facts for understanding and interpretation. Unfortunately, there are scientists who, like other men, succumb to the temptation to reinforce preconceived ideas and maintain that human personalities and even cultures are determined by heredity.

For a person in an inferior situation and who suffers because of it, to know that the cause of his situation lies in his disability and *to know that everyone knows it,* is not a consolation but a redoubling of bitterness that leads to prostration or crime.

Francis Galton, the father of Eugenics, believed that men who achieve eminence and those who are naturally capable are, to a large extent, identical. In fact, the dominant classes have been selected chiefly on the basis of predatory, rather that constructive behavior. Galton proposed altering reproductive behavior with the aim of reducing populations defined as affected, or increasing healthy populations considered to be superior bodily as well as mentally. At the International Congress of Eugenics in New York in 1932, a speaker declared: "There is no question that the sterilization law enforced through the US would result, in less than a hundred years, in eliminating at least 90% of crime, insanity, feeblemindedness, moronism and abnormal sexuality. Thus, within a century, our asylums, prisons and state hospitals would be largely emptied of their present victims of human woe and misery."

We know that the efficacy of "negative" programs is by no means as great as claimed. In fact, human beings are all alike and yet diversity is also responsible for progress of mankind. Since the dawn of humanity there have always been tall people and short ones, strong and weak, active and idle. The belief that differences between man and between races are inborn and unalterable is older than the view that they are formed by influences of environment and training. With regard to the vague and abstract notion of blood, biology has substituted the clear and concrete notion of chromosomes, but we cannot assume that they have any social or political conclusions.

We cannot change our heredity but we can choose our environment. Can humanity, which is a hundred thousand years old, last a long while more on earth? Would the degradation of one's genes become prejudicial to the extent of becoming fatal? We have come to accept the evolution of man as resulting from natural selection. However, in the short term, such a process is too slow to allow survival under rapidly changing environmental conditions.

The Human Genome Project will open new perspectives and will allow us to find solutions to many medical problems.

But it is Utopian to think that after these few years we are ready to patch up our genetic patrimony! The impact of new technology on society is important but not infinite, and when we try to forecast the image of the world we dream of the future based on the given situation. The discoveries related to the Human Genome Project can explain many things but surely not everything.

The chance to improve the human potential depends much more upon *manipulation of the environment* to obtain the maximum benefit from the genetic potential, than manipulation of the genotype itself. Thank you.

Human Genome Mapping: Guideline with a Jewish Perspective

DR. MORDECHAI HALPERIN

I will begin with the title of my talk. *Jewish perspective* is elegant wording for Jewish law. And when one talks about law, one has to be precise and accurate.There are three principal issues that should be discussed: 1) Does Jewish law permit or prohibit the research on human genome mapping? 2) Having done the screening and possessing the mapping, the question remains: Who is the proprietor? Who owns the specific information received by public screening or by private mapping tests? 3) Under what conditions has a person an obligation to hand over data to an insurance company, to an employer, or to a spouse?

"HAPPY IS THE MAN THAT FEARETH ALWAYS"

The first question introduces us to a new world. All of us have already heard many lectures by brilliant speakers on the Human Genome Project, and we experienced different emotions, including fear. Sometimes it was expressed, sometimes it remained hidden. One may feel that the easiest solution is to withdraw, to keep away from such a frightening project. These fears might remind us of the statement by King Solomon, *"Ashrei adam mefached tamid"* — Happy is the man that feareth always (Proverbs 28:14), which could be interpreted as glorifying the person who is constantly afraid. But this is an incorrect interpretation. In fact, King Solomon meant to praise the person who is always cautious. When the fear is a motivation for more caution, when the fear brings one to check oneself and to make sure that one is not going to fall into a trap, to step on a hidden mine, or to slide down a slippery slope — then it should be praised. King Solomon did not mean that one should avoid taking responsibility or reaching a decision.

Another maxim by King Solomon: *"Ki berov chochma rov ka'as, veyosif da'at yosif mach'ov"* — For in much wisdom is much grief, and he that increaseth knowledge increaseth sorrow (Ecclesiastics 1:18) is very relevant to our subject. To better understand the veracity of this statement, a personal experience might be helpful. As a child I read in ancient Jewish sources that we live in *olam hasheker* — a world of lies and untruth. As a young man I felt uneasy with this concept. Almost everyone around seemed to me to be a truthful person. But when suddenly my eyes were opened and I saw that what our ancient Jewish sources taught is true; that our world is in fact full of untruthfulness — I was stunned. I was filled with sorrow and felt that I was no longer the same person. My immediate question was: is the grief a reason to avoid the knowledge that this world is not a world of truth?

This is just a personal example. But we all recognize that knowledge can be a cause of more sorrow, more grief. Does this mean that we should shun knowledge? As you know, a man in the final stages of Alzheimer's disease who no longer comprehends, once his physiologic needs are satisfied — food, oxygen, etc. — feels no fear, pain, or sorrow. Would we wish to be in such a peaceful state? The categorical answer is no. By no means should this grief be a reason to ban human knowledge. Therefore, the answer to our first question "Does Jewish Law permit or prohibit research on human genome mapping?" is apparent. There is no prohibition.

WHO IS THE PROPRIETOR?

The first issue was an emotional one; still its clarification was simple with hardly any complications. The second issue is more complex. Who is the proprietor of any specific information acquired by public screening or private tests? I shall consider first the extreme cases. This example is straightforward. Let us say I received a million dollars from my old aunt; I can do with it whatever I want, so I decide to pay the laboratory for my genome mapping. After paying for everything I want the results. Who is the owner of the data? Me, of course. I can do with it whatever I choose. We

shall see some exceptions in the discussion on the third issue. But in general there is no doubt. I am the sole proprietor of these medical data.

On the other hand, there are clear examples of cases in which such data are not mine. For example: at the Hebrew University-Hadassah Medical Center I saw a written announcement calling for volunteers to participate in an experimental trial. Each volunteer would be paid $100 for two hours of physical and blood tests which would take place after the signing of a legal document stating that he or she has no claims on the data of this research. I decided to enrol for the trial. My blood pressure was checked and samples of my blood were taken. Within a few weeks the tests were analyzed and provided many biological details about me, including the complete mapping of my genome. Here, of course, I am not the owner. The institution or the physician, depending upon their legal relationships, are the owners, the proprietors of these results. This is the other extreme example.

Other cases fall between the two extremes. One can hear claims like: "the government owes us", "the government has to take care of us". This could be true, because in democratic states the power of the government comes from the people. But in fact it is not so simple, and neither is it even so true. Let us take a practical situation. In our government there is a Ministry of Health. The Minister of Health, who is in good relations with the Prime Minister and the Minister of Finance, received a few million dollars to conduct a screening test of all Jerusalem citizens, without discrimination. No one was obliged, no one was coerced. Yet everyone came for the tests. Who is the owner of the data of these tests? This depends on the simple question:

WHAT ARE THE TERMS OF THE CONTRACT?

What are the terms of the legal agreement (written or unwritten) between the government and the individuals who gave their blood samples? These terms could be part of a written law or a written contract between the people and

their government. It could also be part of an unwritten contract, and it remains for the court to decide what the informal contract was. It is still quite simple. The idea is that the owner is the one who owns it according to the contract. It could be the patient, the government, the physician, or the institution. If we accept that the government is obligated to serve its citizens we come to the American way of thinking. In Russia, until not long ago, the rule was that the people has to serve its government. What is the situation in Israel? This is not so clear and it is still controversial today, but we believe that the American idea is going to win — namely that every person who is examined will have at least a partial ownership of his medical data. One has at least to be informed that such data exist, and one should be able to get the information on request. Of course, nobody can force a patient to get any information that he or she does not want. But if he wants it, he should have access to these data that can help him to organize his way of life.

For example, if I find out from my examination that smoking would not do me any harm, I can decide to start smoking. On the other hand, if I find that smoking cigarettes may cause me serious medical problems — heart, lungs, impotence, etc. — I will quit smoking immediately. This is a simple idea, a clear solution, provided it is clear who the owner of the data is and what the laws and the agreements are between us and our government or between us and the Ministry of Health. Under certain circumstances the owner or the proprietor of this information is not the patient, because of good or bad agreements. In such cases, information about a citizen remains with the Ministry of Health or at the Hadassah Hospital. This could affect the patient's life but he is not the proprietor of the information. One should still ask: does the hospital or the government have any obligation to hand over to the citizen the information concerning his or her medical data?

DON'T STAND BY WHEN YOUR FELLOW MAN IS IN DANGER

Let us assume that a private institution paid the money for the tests and owns the information. It is very probable that by paying a few thousand dollars the patient can obtain the results. But if he does not want to pay or does not have the money, then clearly the one who owns the information cannot be forced to hand it over to the patient. This is, however, not always true. There are three different situations. The first one is when human life is in danger and the relevant information could prolong or save a life. In such cases the Jewish law is very simple. *Lo ta'amod al dam re'echa* — don't stand by when your fellow man is in danger. This means that every one who is able to help has an obligation to hand over any information necessary to save a life.

THE LAW OF RESTORATION OF LOST PROPERTY

The second situation is when it is not a matter of life and death but simply the quality of life. In other words, knowledge of the facts can elevate the quality of one's life, which could also be translated into economic terms. Does the institute have any obligation to help one to save money or to raise one's quality of life? There is a very well-known, substantial rule in Jewish law that is related directly to such situations — the law of restoration of lost property. Let's say that I know that somebody has lost his wallet with a thousand dollars, and there is a way to return it to him or to inform the police and thus help him to retrieve his loss. According to Jewish law, it is quite simple: it is obligatory to do it. This rule is clear. But what if by doing so I am losing money? I am a working person, earning, say, fifteen dollars an hour, and if I waste time to take the wallet to the police station I will lose a few working hours. Do I have to be compensated for the lost time? Jewish law is clear on that. The Talmud writes: if a person will lose money by following the law of restoration of lost property, he can always ask for and receive compensation. He can receive the amount of money for wasting a few hours occupied in *Hashevat aveda*

(restoration of lost property) that an average person would receive for doing his regular work.

THE CONDITION FOR COSTLY COMPENSATION

A slightly more difficult situation might exist if the finder is not, say, a salaried worker. He is, perhaps, a lawyer who charges $300 an hour. Handling the lost property takes, let us say, more than four hours, which means a loss higher than one thousand dollars, which is the value of the lost wallet. Under such circumstances it does not pay the owner of the wallet to cover the losses of the finder for wasting the time needed for the restoration of the lost wallet.

On the other hand, if the value of the wallet is ten thousand dollars, it does pay the owner to compensate the finder. This case is exceptional, because the finder's loss is considerably higher than that of an average worker; most people do not earn $300 an hour. In such cases there are specific regulations in Jewish law. The finder can still adhere to his condition, but this has to be made in advance before a judicial forum, which has to agree to his request. He has to declare that he will take care to return the lost property, but under the condition of full compensation for his lost time. If he does not do so in advance he will receive only the amount of money that an average worker would receive for having to waste the time needed for the restoration of the lost property instead of doing his regular work. This is perfectly feasible, and we see it in another example that occurs commonly in our country. A car is stuck on the highway and the driver of a passing vehicle stops to help. The driver of the stuck car should be careful, because after the job is completed the requested charge for the uncalled service may be very costly, even though it was not requested beforehand. According to Jewish law the driver in trouble is not always obligated to pay the high sum of money that is requested. Though it might be dangerous not to pay, according to the law, if the first driver did not call the helper, who did not inform of his conditions beforehand, the driver is not obligated afterwards to pay the high charges.

As regulated by Maimonides, the commandment of restoration of lost property includes the obligation to help a person to stay healthy. According to this law, there is no principal difference between restoration of possessions and reparation of a body or of the health of the human being.[1] But it should be accomplished under the same rules of compensation as for restoration of lost possessions. Similarly, if the medical institution incurs expenses and loses money by granting the medical information, those expenses should be compensated. Therefore, handing over the requested medical data, which is a kind of restoration of property, could be conditioned by suitable compensation.

WHAT EXPENSES CAN BE INCLUDED IN THE COMPENSATION?

As stated above, a medical institution is allowed to charge for its expenses. What expenses should be included in the compensation? Today, anybody who has experience in any economic field knows that the expenses involved in obtaining the medical information cover not just the printing of the report and/or the price of the chemicals used for the tests. It costs a great deal of money to build the laboratory and to buy the equipment. Although most of these expenses were incurred long before the above medical test was taken, in many cases the institute will be allowed to take into account all these prior expenses. The society or its representatives can agree to take into consideration all the expenses necessary to allow a medical company to invest the money for the benefit of the public, as an investment to be covered by the fees paid by the patients.

PRIVACY VS. DECEPTION

The third issue deals with the conflict between the basic right of privacy and the prohibition of deception. Under what conditions is a person obligated to hand over data to an insurance company, to an employer, or to a spouse? There

1 The interesting Halachic question of whether a person is a full proprietor of his body or just a guardian is beyond the scope of this lecture. Nevertheless it does not change the above principle.

is a great difference between an insurance company and an employer. The insurance company can declare legally that it has two full different premiums: one for people who have undergone a screening test and possess the full medical information, and one for those who do not possess such information (as they did not do the screening test).[2]

The situation is different if somebody has the medical information but keeps it from the insurance company. Such behavior is clearly a deception. Why? If one knows that he is going to die within a week and he buys a life insurance policy without giving this information to the insurance company, it is a deception. Another example is the discrimination against smokers by insurance companies in the United States — people who smoke pay higher premiums for their life insurance. If a smoker cheats the insurance company by declaring that he does not smoke — it is of course a deception. Whenever a relationship between partners is based on the assumption that certain information is not available to any of them and it turns out that one of them had the information — it is a deception. This is always true in the case of insurance, but not necessarily in the case of employer-employee relations. Principally, one does not have any obligation to inform the employer about all his or her bad habits. For example, one is not obliged to admit that from time to time he or she gets very angry, and does not have to provide his employer with a full list of his bad habits. The employer can interview the employee or have his handwriting checked in order to obtain the information he needs. There are some exceptions to this rule, but this is beyond the scope of the present presentation.

When the subject is the relationship between partners we can conclude that, in general, according to the law forbidding deception, no one is allowed to withhold relevant information from a partner or a spouse, whenever the relationship

2 The statistical idea is similar to a common genetics issue. It is known that the incidence of Down's syndrome is age dependent. There are general age-dependent rates without knowing the results of an alpha-fetoprotein (αFP) examination, and more specific rates for women who did such a test and know the results.

between the partners is based on the assumption that such information is not available to any one of them. Thank you.

Comment
Concerning the list of bad habits, the employer will find out sooner or later.

Dr. M. Halperin
In most cases he will find out, but sometimes it can be too late, as you probably know.

Question
What is your opinion in case the employer requests the worker to undergo screening in order to find out if he or she has any genetic problems?

Dr. M. Halperin
He cannot force the employee to undergo the screening, but he can put it as a condition for the employment. Having the medical data will enable him to answer truthfully. Still, one is not obliged to give the information beforehand. When asked directly he has to tell the truth. He can say that he refuses to hand over the information or that he wants to keep it private. The employer can then decide whether or not to employ him.

DISCUSSION

Professor Baruch Modan

I'm not sure this is a question, it's more of a remark. And I would like to expand a couple of issues that have been raised. I think that to a certain extent we are beating around the bush. There is a shadow hovering above us and we don't know what to do with it. We will get information; information means power and this information is going to be abused, no question about it. The point is that we are already in the midst of this process. Take the example of Down syndrome. We provide free screening for all above a certain age. And I say this ambivalently because I am the person who was responsible for introducing prenatal screening in Israel. We decided that those children, those potential Down syndrome children, are not supposed to live because they wouldn't live as well as we think, they wouldn't enjoy life as well as we thought they should. And that's coming back to your point, Professor Shapira, I'm not sure we are right. Even if accepted by law in Israel, it is, I would say, a government-induced benefit to the public, at least to women over the age of 35. But this is not very different from what was practiced in a certain country on a much broader scheme during the Second World War (the eugenic laws: ed). The question is really, what is the limit? Today we may assume that somebody who is born with an IQ of 50 will not enjoy life; but tomorrow, with the improvement or the prolongation of life expectancy we may decide that 80 is the limit or 110 or 120, and the more information we accumulate with this sophisticated technology the more issues will be raised. I believe that now is the time we have to discuss what the limits are, how much information we really want, and how much we deserve.

Dr. Mordechai Halperin

I don't think that the real reason for that screening was for the benefit of the child.

Professor Baruch Modan

The benefit of society.

Dr. Mordechai Halperin

The benefit of the family and society; these are different ethical problems. Saying it's for the benefit of the child, I think, was used as an argument, but it's not true.

Dr. Ram Ishay

I have to tell Baruch Modan that this question is not only limited to the problem of the genome. I know the debate with all these questions of society versus individuals. And if you want to set limits according to the actual situation with this non-symmetric position between society and individuals, my first aim is to protect the individual. Later we will consider society because the interference and involvement of society are increasing all the time.

Dr. Carmel Shalev

Yes, obviously the information is power. I think that in contrast to previous technologies where the question also related to the use of knowledge and to who makes decisions about the use of this knowledge, what characterizes this knowledge is that it pertains to the individual. These thoughts of mine were triggered by two comments on termination of pregnancy. It sounded like we, and here I associate myself with the scientists, are second guessing or are beginning to second guess individual choices. The problem with individual choices is that we don't think they're very wise. Or we may think that they are morally wrong. Who is to decide whether this defect or that defect justifies a termination of pregnancy or a termination of life? But the point I want to make is that I believe that the decisions are going to be made by individuals, whether we like it or not. I don't think that any small group, however powerful, can control this information. We should really be working on education, on the morality of these kinds of decisions at the most individual levels.

Professor John Harris

If I may abuse the chairman's privileges, I'd like to comment on the last point or two. The first is in answer to the question: who decides? It seems to me it's always the same and it always is "all of us". I mean, it's the society who decides through its constitutional means, whatever those may be. My second point, very briefly, is that it's very important to be clear that it is not, it could not conceivably be, the defects that justify the termination of pregnancy. The termination of pregnancy is justified, if it is, by the moral status of the embryo or the fetus, being less vital or essential, rendering it vulnerable, in a way that adults are not. And what demonstrates the truth of this is that you are not permitted to terminate the life of a person however severe the defects are. The degree of defect is quite irrelevant to your entitlement to end their existence. So you're only entitled to end the existence of an embryo or a fetus, precisely because we have already taken the decision that its moral status is such that renders it vulnerable. Your reason may be the defect, but your justification is, I would suggest, the moral status of the embryo.

Professor Seymour Glick

Two brief questions and a comment. A question to Professor Harris on limiting age and quality of life as factors. I wonder how you would square that with the question of prognosis. When we perform an operation on somebody, we make a decision on the basis of whether the risk is worth X,Y, Z, and in that we take into consideration prognosis. If age is not a factor and quality of life is not a factor, why should prognosis be a factor? That's a question to you, sir. And the question to Rabbi Dr. Halperin is, do you have any information as to whether the mitzva of *Hashavat aveda* applies to an institution as well as to an individual? You acted as if the institution is obligated to do that. Is there such a thing? And my third comment is, I find it rather ironic that we're all talking about whether it's okay or whether it's bad for society to eliminate somebody with a minor defect, while we're living in a society

where it's perfectly acceptable to perform an abortion for convenience! This is completely not understandable to me and I wish somebody would clarify it.

Professor John Harris

In answer to your questions, I'll respond first since the first point was to me. A very good point about prognosis, and it does follow from the view I take on individual rights, that you're not entitled to discriminate on the basis of prognosis. If you and I are competitors for treatment and you have a good chance of good remission and I have a poor chance of poor remission, then in my view what we are each entitled to is our chance. And you do justice in your health care systems not by maximizing outcomes, because that, in my view, begs the question as to what the point of the health care system is. It is not to maximize the number of life years in a given society. It is to give each citizen his or her chance of the therapy that will benefit them, knowing that it will necessarily be different for each citizen.

Dr. Mordechai Halperin

The commandments relate always to people, to individuals. But it wouldn't make a great difference in this case, because any person who is involved with an institution which has the ability to pass a decision that will restore property has a commandment, has the obligation to do so. And another point: according to the English law, as I learned from a well-known advocate, a company is also allowed to take money and to give it to charity, so even by English law such a decision could be made.

Professor Amos Shapira

A question to Professor Harris concerning the hypothetical case you mentioned in the first part of your presentation about the two twin sisters, one ailing, one healthy, and a car accident. You rejected one possible way of deciding on priority. How would you solve the case? Now you are the decision maker; the two sisters are before you following the

car accident and you can treat just one of them. What do you do?

Professor John Harris

I toss a coin.

Professor Amos Shapira

You toss a coin?

Professor John Harris

Absolutely. The obligation is to decide in a way that shows no preference. So tossing a coin is such a method. Any other method that satisfies that criterion — that shows no preference — will do.

Professor Amos Shapira

Now a comment relating to the second part of your exciting presentation, if I may say so. In a way there was some good news there regarding the dilemma you posed. If in one way or another all of us are responsible for jeopardizing our health by living or working here or there, then the dilemma you posed, in fact, resolves itself. We are all restored to the threshold of equality, and therefore there is actually nothing to decide. Another comment triggered by Dr. Carmel Shalev's question: who decides? Well, who decides is always a relevant question of course, but quite often the more interesting and intriguing issue is not who decides but by what standards, by what yardsticks, assuming that we agree on the identity of the decision maker.

Question

This is not a question, it's really a comment. I agree with the crux of the argument, but I think that the principle you called double jeopardy can be motivated by two reasons, or there can be two grounds for that. One is fashion and the other is the principle of harming others. Fashion may create discrimination against others, for example single-parent families. It's unfashionable to be a single parent, discriminated against in

taxes, mortgages and so on. The second is harm to others, and this can justify discrimination. This therefore negates what you said about justice, that it's unjust to discriminate against smokers for example. The liberal countries, the democracies, do not pretend to be neutral regarding single parents. But what about harming others? An example is the passive smoker, the argument being that when you smoke you don't only harm yourself, but you harm others as well. Another example is drug addicts; the principal of double jeopardy is working there as well. People who take drugs constitute the first harm, and the country they live in discriminates against them. So again there is the overriding principle, the harm to others. What is your response to that?

Professor John Harris

We identified two principles, two sorts of underlying reasons. One is fashion. While I'm sure none of us would think that fashion constitutes a reason, it may be a powerful motivation in some, particularly the young (if that isn't an ageist remark, it is not one that anybody would wish to defend on moral grounds). So obviously there is a hidden premise which I would have articulated, namely that the basis for discrimination at least must have some moral force. The second one that you mentioned, harm to others, does have considerable moral force. In response to your question, I think that we can ban that part of smoking that harms others without banning the practice altogether. Secondly, the argument about smoking and harm to others is a complicated one because all the evidence shows that smokers are massive contributors to the economies of the countries that levy a tax on cigarettes, which is almost all countries. And in terms of their economic contribution, the drain on health resources by being ill is more than matched by their contribution to resources in tax terms. So it's a very moot point whether or not, overall, smokers harm or benefit others by their practice if you take all things into consideration. But your basic point is a good one, namely, that we have to distinguish morally relevant from morally irrelevant bases of discrimination.

Professor Moshe Wolman

I agree with the points made by the first two speakers. But to make one's decision more difficult, it's obvious to all of us that if we start with discrimination and awards we can produce groups of people where we are the ones who should be getting the awards and they, whoever the "they" are, should be discriminated against. However, there is a fitting historical fact from the beginning of World War One that I would like to mention. At that time there was a meeting in Cairo of the top atomic scientists, one of whom was a young man under thirty by the name of Mosley who discovered atomic numbers and was the great genius of the era. Taken up by a feeling of real patriotism he volunteered for the British Army, and a Turkish bullet killed him in Galipoli. So we lost. Therefore, in the decision that we should not give awards, we should not discriminate, I think it's the right decision. But it's not an easy decision.

Dr. Jocelyn-Yossi Hattab

Generally when discussing these issues, we very quickly introduce extreme cases and we avoid the mainstream. In the extreme we can find a claim such as life is a fatal genetic disease, easy to diagnose but very difficult to prevent. We have 6 billion cases at this moment. On the other extreme, as mentioned today, the most severely underdeveloped embryo can develop into an outstanding scientist. So there is a total freedom of evolvement. As Dr. Drell mentioned, a Nobel Prize winner in medical genetics a few years ago claimed that everything is 100% genetic and 100% environmental. We have to clearly differentiate between genetic information, give the information to parents, and they have to make the decision themselves. Counseling informs them of the risks and guides their decision — genetic prophylaxis, genetic preventive medicine. The point is: society, which has to take care of the genetic defects, is entitled to decide what cases it wants to treat. Let me draw a comparison: an insurance company agrees to pay for car repairs after an accident only if the driver is a licensed driver and the car has been

tested every year, as is done in Israel. Likewise, society can decide: you have to institute compulsory genetic screening before every birth or every pregnancy, and only those who have been screened can be treated because society takes the responsibility for it. I know that this is an extreme, but we have to think to what extreme we can go with these kind of claims. Regarding the relevance of the information you get from genetic screening, a very difficult case is the following. You're conducting a study, and during the genetic research you find that the father of the child or the children you are working with is not the real father and only the mother knows. Can you introduce it to the public domain? Who has to know this information? One presumes that the father is the legitimate father. What do you do in such a case? Perhaps Rabbi Dr. Halperin can allude to that?

Professor Natan Gadoth

Do we really think that we can keep the information that is gathered by gene screening to ourselves? Is it really guarded? If we really obey every ethical law, we take upon ourselves to secure the information. Let's take a scenario that is very common in this country. An individual is enrolled into the army. He knows that his family was screened for something, he doesn't know for what. The army, before enrolling him, hands him a questionnaire that asks: Has your family had anything? He answers: I don't know what, but they had some sort of screening. Now the next day we get a note, which by law we have to obey, to provide the information about the members of the family who don't have to go into the army. This is something that we should think about because there are other countries in the same situation.

Professor Michel Ravel

I would like to take argument with Professor Harris. You presented yourself as a philosopher, and therefore I would like to question your premise. And your premise is that one has to be virtuous in behavior, and that to have a healthy genome is also to be virtuous. I think this is a wrong

approach. I don't think we can speak about good genes and bad genes. We already heard this morning that some of the genes that cause diseases, such as sickle cell anemia and cystic fibrosis, protect against other diseases, such as malaria or cholera. So by the fact of defining someone with a healthy genome as virtuous, for instance someone who doesn't smoke (I don't know if not smoking is virtuous but let's assume it), you are making a statement that will lead to hygiene of the race because you are supposing a prototype which is perfect. I would like to quote a group of geneticists from Quebec who said: It is important to conceive man in his complexity and his originality, to recognize that all humans carry abnormal recessive genes and susceptibility to genes. No one can be qualified as genetically sane or genetically deficient. Our genetic heritage is imperfect. So if you accept this complexity and the impossibility of defining the perfect genome, I argue with your premise that you are virtuous if you have a correct genome. And if I may I would like to ask a question of Professor Ishay. You introduced the argument on abortion for Alzheimer's, for advanced age, or for obesity. The question I'm getting to is this — is any abortion performed for genetic purposes in eugenics, and what is the limit. And if it is, then what do you think is the best way to fight it? Education, making laws, or taking each case individually and deciding with the parents, as dictated by Halacha. What is your view on the limits of eugenics?

Professor Mia Horowitz

I think that all the points raised here were valid. But as a scientist involved in human genetic diseases and perhaps associated with the Human Genome Project, just a small bit of it, I think that one more point has to be raised. I think that the ethical problem associated with the Human Genome Project is the vast body of information that will be accumulated and will tell us not only about genetic diseases that influence fetuses or newborns from the first month of their life, but also about diseases that will appear at the age of 40 or 50, and also susceptibility to diseases like cancer and

heart diseases. I think that the question is, what do we do with all this information?

Dr. Mordechai Halperin

I don't think that we can withhold information even though we may attempt to. For example, I would like to find out in which hospital there is a higher risk of contamination after surgery. This information is available in a very well-guarded room in the Ministry of Health. As a patient, not as a physician, I have to undergo an operation and I want to know in which hospital I have a better chance, which hospital has better results. I don't have that information. This means that even though Dr. Carmel Shalev mentioned before that it's impossible to withhold information, sometimes we succeed. I believe that in a few years this will change. But for a limited period sometimes we do withhold, not always rightfully, but we do withhold information. And I don't think it should be so except in extreme cases, but we should never force the information on a person. Some people do not want information — I do not think we should force it on them.

Dr. Ram Ishay

Two comments, one is for Professor Glick and I think perhaps Dr. Carmel Shalev at the same time, and Professor Ravel, on the matter of abortion, the interruption of pregnancy. Professor Glick, I know exactly your opinion about abortion. I think that all of us agree that abortion today is the confession of a failure, failure to prevent conception in certain cases and perhaps failure to make the right diagnosis. And I am sure that in 50 years, perhaps more, we will not need to interrupt a pregnancy because we will make the right diagnosis at the time. But if we have no choice today but to interrupt pregnancy at a woman's request, it does not justify prevention of pregnancy, or sterilization, which lead to discrimination. So let's leave it for the future. The second comment refers to the ownership of information. I think that we have to define the kind of information that society needs for society itself and this kind of information we will give;

as for the information that belongs only to the person who has been screened, there is no reason to give this information to society in general. Professor Ravel, what I'd like to say about the interruption of pregnancy is that I have found that parents, more and more, want only a perfect child. And we have to decide if this is our position too, because it starts today with the status of health only but tomorrow it will be only the matter of a blond or a tall child, and we, as doctors, will not want to make the decision in these cases. So from the start we have to set limits and to know what kind of abnormality determines interruption of pregnancy.

Professor John Harris

I'd just like to correct one misapprehension I hope I didn't cause, that it is virtuous to have a healthy genome. I certainly didn't intend to say any such thing; if I did, I think it is an irony. On the other hand, I do think it is almost a necessary truth that one has an obligation to be virtuous; that is what obligations are, assuming you can identify what virtue is, which is no mean feat. The second observation, and I think this may raise more discussion, is whether there can be the right not to be told the truth about oneself. It seems to me that you the patient, or you the citizen, cannot have the right to silence me on the subject of truth even if it is a truth about you. Nor could you impose upon me, as a clinician let us say, the obligation to take decisions on your behalf that you are refusing to take yourself, because you are refusing the information that will be the basis of any relevant decision that you might take. It seems to me doubtful, therefore, whether there could be an obligation not to be told the truth. Rather the reverse. I think practitioners always have an obligation to tell patients the truth even if the patients don't want to know, for very good public policy reasons, otherwise it encourages megalomania in practitioners, something that we know doctors in particular are susceptible to. On that abusive note on the subject of doctors, I think we should break for lunch. I'd like to thank everybody for a very stimulating morning and I look forward to a very stimulating afternoon.

Implications of the Human Genome Project for Society: Individual Choices Versus Public Health

DR. DAVID R. COX

I'm David Cox, serving as the chairperson for this afternoon. It's always dangerous to have a nice lunch like that and come back in the afternoon for a session on ethics! Based on this morning I'm very optimistic that we'll have a continued lively discussion. There are three speakers this afternoon: myself, whom I'll talk about in a second, Professor Asa Kasher, and lastly Professor Yael Yishai. I'd like to tell you very briefly about myself because I think that knowing where people come from when they give talks on ethics and the genome project is important. I'm a pediatrician and a medical geneticist, but also a genome researcher, and depending on the crowd that I'm in I pick one or the other, and in this crowd I'm going to be agnostic and pick both. By being on both sides of this issue, by being a scientist as well as a physician, I've recently become a member of the ELSI working group that Dan Drell talked about earlier, which is a group sponsored by both the National Institutes of Health and the Department of Energy to deal with the ethical, legal and social issues of the Human Genome Project. And I'm one of two token scientists on that ELSI working group.

I'd like first to take a second to talk as scientist in terms of what I think are some pretty important points, in fact some mistakes that we've made in the United States which perhaps don't have to be recapitulated in Israel. What mistake do I mean? That of scientists themselves, since scientists are not being invested in the ethical, legal and social issues. Sure, scientists always say that they're interested in the ethical, legal and social issues but do they do more than just talk about it? The answer is no. Most geneticists in the United States working with scientists in the Genome Project

disassociate the social, ethical and legal issues from their scientific work. So I'd like to make a plea that it's impossible to disassociate the science from the social implications. I think that in this audience this is like a truism but I'll say it anyway.

I have five basic points that I think for scientists, with respect to their work in the genome and to all science as it relates to society, are worthwhile thinking about. The first is for scientists to acknowledge and address the social implications of our work, but more importantly not to feel that we can deal with those alone. We have to deal with it in the context of religious leaders, lawyers, sociologists, physiologists. And just because we're molecular biologists or genome scientists it doesn't mean that we're in the preview, even if we recognize the social implications of doing it by ourselves. The second point, which is particularly hard for me and my colleagues but which I keep reminding myself of, goes under the title of: don't get frustrated by the fact that no good deed goes unpunished. So realize that people aren't going to agree with what you say, and even though you think you're trying to help people out when you get slapped in the face, turn the other cheek — because it is worthwhile. The third point is, don't desegregate the science from the social issues. You can't separate them. I said that before, but I really think that we can't talk about the science and then the social issues, in the same way we can't talk about the social issues without the science. The fourth point is, just because there are no easy answers, don't despair. This is a corollary of no good deed goes unpunished. And the fifth and sixth points really have to do with the lay audience. I think scientists in the United States, and I can't really speak for Israel, always underestimate how sophisticated lay audiences are in terms of understanding technology. They are much more sophisticated than most scientists so don't lose track of that; at the same time don't trivialize lay audiences' concerns for the monster of science or the mythology of science in terms of the terrible things that can happen. It may seem that it's overblown to us scientifically, but it's certainly very real to

those people who have those views and, I will show you in a second, is probably well founded. So, those are six points for wearing my hat as a genome scientist that I feel very strongly about. I would say we've done a fairly crummy job in the United States, and based on the discussions here I think that perhaps this won't be recapitulated in Israel.

The first slide shows my hat as a member of the ELSI working group. I'm not going to list all of the people who are members of this working group but basically, as I pointed out, the majority of people aren't working genome scientists by any stretch of the imagination. And this particular working group, as Dan alluded to, is very complicated in its political structure. It reports to both a major committee of the Department of Energy and a major committee of the National Institutes of Health. This committee itself doesn't have any power to directly implement policy. But, as I will tell you later on, this is probably one of the major committees in the United States that right now is suggesting policy to our government. So even though they are not going to implement policies, a major role of this committee is to suggest what the policies should be. And what's the mission statement? Basically to anticipate the implications of mapping and sequencing the genome for individuals in society. So the key words here are: anticipate, and individuals in society. The main thrust of the rest of my talk is going to be this playoff between individuals and society with respect to genome information. And you'll see where I come down, and it's with individuals every time. The second part of the mission is to examine the consequences of mapping and sequencing the genome — the ethical, legal and social consequences. And I have something to say about what I think those main consequences are. The third is to stimulate public discussion of the issues. This goes with the idea that you have to involve more than just the scientists or more than just the professional people — it's a societal discussion. And fourth and most important is to develop policy options to assure that the information is used for the benefit of both the individual and society.

In contrast to some of the speakers this morning — some gave very specific talks, others gave very general talks — what I'm going to do is discuss very general issues but hopefully come up with very specific solutions. That oftentimes is a recipe for disaster, but we'll see what happens here. So in the context then of that mission statement for the ELSI working group, one of the first things one needs to do before one can address what the consequences of the genome project are going to be for individuals and society, is to say what the goals of the genome project are. And in terms of the U.S. genome project, these goals, from a purely scientific point of view, are pretty boring. And this is what they are: to physically isolate and order the human genome in its pieces, and that involves both genetic mapping as well as physical mapping (basically to lay the genome out so you know where you are because it's a big place); to identify all the genes in the human genome in their relative positions; to compare the structure of the human genome with other organisms so that we can learn about the biology from other model organisms as it applies to humans; and finally to develop new technologies, including ways to sequence large stretches of DNA and ultimately to sequence the entire genome. Now, in a nutshell, these are different stages of one thing, which is basically to come up with the sequence of the 3 billion base pairs of DNA, the nucleotide sequence. Many of my straight scientific colleagues ask me: how can this — figuring out the string of a-t-g's and c's in DNA — have any social, ethical or legal implications? Honest to God, that's what they say. What could those implications be? And not just having a list of them, but how do you prioritize them? So I'm going to prioritize them in three different ways. First, in a global sense — how does this information change how we view what it is to be human, or what it is to be normal or what it is to be diseased. So it's a very global issue, almost species issues. That's the first way to try and prioritize. The second way is to ask, what does this information mean for individuals and families. And the third prioritization is, what could the implications be for society. What I'd like to do first, since

the easiest thing to deal with is not the big global issues of what it means to be human or what it means to have disease, is to focus on what the issues are for individuals in society. The easiest issues for individuals and families is how the genome information relates to disease. Now, I'd be the first to admit that the selling of the Genome Project in the States has gone way overboard regarding disease, and not enough emphasis is placed on its merits purely in terms of basically understanding biology, as we heard earlier this morning. But certainly from the point of view of getting this funded in the United States and from the point of view of why most people are interested in it, is how the Human Genome Project is going to relate to human disease. So I'd like to spend a few minutes to lay out how genetics is going to even be applicable to medicine. And I think that it will raise a lot of the key issues that have to be dealt with here. Some of this we've seen already. We've got 3 billion base pairs of DNA, the critical point is that 99.8 to 99.9% of that DNA has exactly the same sequence in all individuals, if you didn't know that before you came here, you've heard it now four times so you're not going to forget it. And how is this information used in disease? It's used to classify disease based on genetic differences in affected individuals, rather than by clinical symptoms alone. So really what we're doing is taking advantage of this small fraction of individual differences in the DNA to reclassify how we define disease. And we're reclassifying people based on what their genomes look like, as opposed to what their clinical phenotypes look like. Why would one want to do this? Well, let me give an example, not of classifying disease on the basis of genetics, but regarding infectious disease.

Patients come with pneumonia and you know that they have congestion in their lungs and they all die. So you give penicillin and half the people are still alive. Pretty good. Half are dead, but half are still alive. So then you say, maybe I could do more science and figure out why the other half die, and your colleagues say no, you're doing good enough. But when you look at the bacteria that are

present in the lungs you find that some are gram-stained positive and some are negative, and in fact what you see is that penicillin cures those who have gram-stained positive but not gram-stained negative, and you develop another antibiotic and you keep 100% of the people alive. What you've done is divided pneumonia into two classes, right? Not based on just pneumonia, but based on knowledge of what the ideology was. And that's the same logic people are talking about with respect to using these genetic differences. Designing therapies for the groups of individuals who have a common genetic ideology for their disease.

This then is the logic of how the Human Genome Project can be applied to disease and how it can be used for individuals and their families. But herein I believe lies one of the greatest general ethical and social issues — what we call disease and how we view ourselves. It really involves the issue of determinism. Because what we're saying here is that it's the genetic differences that define the disease. And what that really means is that the genetic differences are predicting the disease. That's what's important, we'd all agree. So, is it in fact true that there are good genes and bad genes? We talked about this this morning. Is it in fact true that there's a genome that is a good genome and some genomes that are bad genomes? The answer to that is obviously not. But the whole paradigm by which we're using genetics to predict disease and to predict when people are going to be at risk is based on determinism. I don't see how we can get out of that. It's just a matter of extent, however. So genome scientists who believe that all diseases are going to be described by genetics are, I think, fooling themselves. I'll come back to it later. Why do I place so much emphasis on this business of determinism? Because I think that this is one of the single greatest dangers of information coming from the Human Genome Project — that we begin to think of ourselves as no longer having free will, but in fact having our whole life determined by what the nucleotide sequence of our DNA is. This is ludicrous. Nevertheless, in American society it's more and more accepted; look at any cover of TIME magazine or

Redbook or anything else. They say, well, what kind of harm can come from this type of determinism, this type of belief of changing our view of the disease (actually there is something that's a disease genome and a normal genome). I would argue that the greatest type of mischief that can come from this is in the form of eugenics. Because the basic principle of eugenics is based on determinism, based on the fact that if you knew that a certain genetic abnormality was causing a disease then that was the only thing that determined it. And what kind of trouble did we get into with determinism? The kind of trouble where it wasn't just genetic disease but it was all sorts of disorders such as slovenliness, propensity to crime, all sorts of things overextending what the determinism was. Even in the United States this is a very big issue; the United States, you know, the home of the brave and the land of the free. I'd like to read you a statement from the U.S. Supreme Court in 1927: "We've seen, more than once, that the public welfare may call upon its best citizens for their lives. It would be strange to call upon those who already sapped the strength of the state for these lesser sacrifices, often not felt to be such by those concerned, in order to prevent our being swamped by incompetence. It is better for all the world, if instead of waiting to execute degenerate offspring for crime or let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind." The determinism in the early part of the century in the United States resulted in laws that led to 50,000 sterilizations in the U.S. It resulted in laws that prevented people of different ethnic groups from marrying each other, and resulted in laws that reduced immigration into the United States by 90%. Is it possible that these kinds of things can happen in the future? Absolutely, because in most cases it's economically driven. In hard economic times attempts to figure out how to deal with scarce resources come back to using determinism to solve social problems. So, not to get completely off the point, I want to emphasize where I am in my talk, and where I am is looking at the major priorities for dealing with human genome information. It's looking at

how that information can change our views about what is normal and what is abnormal, what is disease and what is non-disease. And that determinism is a critical component of these basic principles of how we're applying genetics to medicine. But basically the vast majority of pieces of genetic information will not be so deterministic that we'll be able to use them in a way that we'll know definitively. It will be probabilistic. From the point of view of education, genetic determinism doesn't mean that human beings are determined by the sequence of bases in their DNA.

One of the major paradigms so far in using genetic information is this issue of positional cloning. What that essentially means from a scientific point of view is that you start with a family group that has a particular disease, in this case indicated by the white symbols, and by carrying out a genetic linkage analysis you can make an association of a particular region of the human genome and a particular variant in the human genome, with that particular phenotype. And then, because in these cases of so-called single gene disorders there is a very high correlation, a very high predictive value, it's possible to isolate that region of the chromosome, figure out what the gene is that's involved, and even go down to the individual base pair change that causes the disease. One change in the DNA, from an A to a T, is then very deterministic, isn't it, in terms of what can cause, and what can result in the disease. Ultimately what one wants to do is not simply to be able to diagnose these issues, but to be able to carry out functional studies to come up with treatments. And that's the main reason why people care about the genome information. But I emphasize this point to illustrate that for single gene disorders, although things are quite deterministic, for most complex diseases that's not the case. You'll have many genes that are involved, and no single gene is both necessary and sufficient. You may have some genes that are necessary but not sufficient.

As we come back to some of these points, a major issue with respect to using this genome information is how useful

is information if it's not deterministic, and how should society deal with that information.

Having discussed these global issues, that is, the issues of determinism and how we view humanness ourselves and how society has used that kind of information in the past in eugenic ways that aren't very pretty, how can we take some of these issues and break them into ethical principles to which we can then apply practical solutions? And this is a breakdown that I particularly like, it's one that's been used by a number of people, I think primarily by Dr. Knofers in Canada, to try and address some of the major ethical issues that come out of genome information. The first of these is autonomy or informed consent, the second is privacy or confidentiality; I'll just stick with these two right now. How do the issues with respect to genetic testing — we've already said for the individuals and families that's a major priority — how do these issues fall into the categories of genetic testing? Well I'd say the first really has to do with this issue of autonomy and informed consent. Right now, in the United States at least, and certainly all of these are very culturally determined approaches, but in the United States the way genetic information is supplied is in the context of a doctor-patient relationship. In that relationship the physician primarily isn't there to tell the individual what to do, but to provide the individual and the family with information in a way that the family can make individual decisions. Now, that's naive, because certainly in most cases the provider of the information is conveying his or her own ideas to the people. What then are some key principles with respect to informed consent? How do you inform people in a way that they will know what they're coming up against? I have one simple point to make about this in terms of the actual delivering of the information. I think that it's delivered in the context of the world view of the person that you're talking to. And if you deliver the information in a way that destroys that person's world view, you're not necessarily doing them any good. I'll give you two personal examples of that. One was at a clinic for migrant farm workers in Salinas,

California. These people were very intelligent but not very educated. So I went through the whole business of counseling about chromosomes and I told them all about chromosomes. They'd had a child with a chromosome abnormality, and when they walked out of the room the counselor said: How did it go? They said: well that Dr. Cox is a nice guy and we listened to all the chromosome stuff but it was a full moon when we had our baby and so we know what the problem was. The counselor said: well then this was a waste of your time, and they said: Oh, absolutely not, we'll be back for prenatal diagnosis. So, here are people who had their own world view of what the cause was, they didn't need me to tell them about the chromosomes but they were able to incorporate that information in a way that would change their lives next time.

Next story. A gentleman from San Francisco, a very educated man, had a severely retarded child. And what that man and his family were doing was moving that child's arms and legs in a technique of patterning 24 hours a day. He believed that by moving the arms and legs of that child, the child would become smart. In fact he would put flash cards up in front of the little girl's face and say: see she can multiply by ten digits. And I said: no, she can't. In fact, she has a chromosome abnormality. He said: no, no she doesn't, she's going to be fine. So I said: well, I'll prove it to you. So I took her chromosomes and I showed him the chromosomes and I said: look, here's the abnormality. He started to cry. Then he said: so now what am I supposed to do? I destroyed that man's world view. And he didn't have any way of using the genetic information in a way that could help his family.

So these two different examples show how one can provide the information and really give people informed consent about the kind of information they're about to have delivered to them. This leads to the next point: should people have the right not to know. I think the right not to know really has a lot to do with how they're going to use the information. There are many ways not to know. The issue of autonomy really means that individuals have the right to use this information

not because it is imposed upon them, but that they can use it themselves in the way that they best see fit.

Now, how are we going to actually see that that autonomy takes place? In the United States there's a very simple solution which hasn't been completely implemented yet, but I would like to tell you what the plan is. Dr. Drell mentioned this earlier — a genetic privacy act. The basic principles, two simple ones, are as follows: Genetic information has a history of being used by governments to harm individuals. It's a pretty strong statement but I think factually accurate. And the second principle is the premise that genetic information derived from DNA analysis is uniquely private and needs to be protected as a special category of private information.

This is controversial. Why should genetic information be any more special than other types of information? And I would argue three reasons why it should. First, because it's predictive in nature, but predictive over long periods of time, so that you can find out information and have your crystal ball about something that may happen 40 years from now. The second reason why I think genetic information is uniquely private is because it involves more than the individual who is involved. It involves the family and other generations of individuals. You say, well there are other things in medicine that do that, but I would say that genetics goes beyond the pale in terms of the kind of genetic information that would come from the genome. And the third thing that makes it a particularly special type of information, in terms of private information, is that it's very closely tied to reproduction and what one's reproductive decisions are. When people say that the Genome Project doesn't really have any unique or novel social, ethical or legal issues, I agree. But it is a unique type of private information, I would argue, that deserves a special type of protection. So George Eniss and his colleagues in the United States have drafted this genetics privacy act based on these premises. The basic premise is that a person whose DNA is analyzed, collected or stored is the owner.

Now, just as Rabbi Halperin told us, if you know up front what the contract is, you're in good shape. It could go either way but you need to define what the contract is. I will go a little further and say that I would like to have it go one way, and that is, have the individual be the owner. And this genetic privacy act, which is being submitted to various state legislatures, is in fact what's going to happen. Now, what are some of the basic principles of this privacy act? I won't go through the whole thing, but I think the principles are important in the sense that this is the mechanism by which I think we're going to assure autonomy. Because we're talking specifically about DNA information, and if no one has access to your DNA they're not going to be able to analyze it. So it's a very simple principle. You basically have to sign that it's okay for someone to take a sample from you or to look at your DNA.

There are two components to this. One is the rights of the person who has given the DNA. That person can authorize the collection, can determine the purposes for which the DNA is going to be analyzed, should have the right to know what can be expected, what kind of information can be expected out of it, can order destruction of the sample, can refuse permission for it to be used in research or commercial purposes, can give authority to another person to take care of this sample after his or her death, and has a right to inspect the records.

This is unbelievable. This basically gives all those rights to the individual. What about the person who collects the samples? The person who collects the samples, according to this law, has to give prior verbal information to the person from whom he takes the samples, and has to notify this person of their rights, has to have written authorization, and has to agree to restrict access to the DNA samples. So this is a pretty heavy-duty law. And what it does is it comes down very hard on the concept of individual rights to privacy of DNA information. Are there exceptions? I'll tell you the exceptions, because they've been a large part of the debate in the United States. What about research considerations,

what about people who want to do research on genetic information? The scientist researchers in the United States are going nuts over this. There's an easy answer to this — you disassociate any individual identifiers from the DNA samples if you want to use them for research. This law has a very different view of samples that have individual identifiers to them versus samples that just have a number and can't be taken back to an individual. It also makes an exception for epidemiology studies, that is, if you want to do correlations with a particular disease and a particular genotype, the epidemiologist is allowed to do these correlations but is not allowed to take the information and use it publicly in any way.

There are special exceptions for minors in that parents have to sign for minors, people under the age of 18, but the parents have to agree that they won't have access to that information from the minor. Regarding in vitro fertilization, it's the infertile couple who are going to be using the embryo for reproductive purposes, not the individuals who donated the egg or the sperm who have rights to receive the information. How is this going to be enforced? Through civil remedies. It's not criminal law, it's civil law. Now, I would argue, and a number of my colleagues argue, that this legal recourse is the single best way to make sure that people actually have autonomy with respect to their DNA samples. That's certainly very open for discussion, but that's my view.

Now, what about privacy and confidentiality, which is really quite a bit different from autonomy? I focused on using this law, which George Eniss calls the Genetic Privacy Act, really as a major mechanism to ensure autonomy. But in terms of ensuring privacy, there's another law in the United States that deals with this issue. What is this privacy? It's been brought up before but is worth repeating. We're talking about other individuals, other institutions having access to this information such as the military, insurance companies, and employers.

How is privacy dealt with in the United States? Basically there is no privacy. All the medical records are supposed to

be private, and patient-physician relationships are supposed to be private. As was pointed out earlier in one of the questions concerning access of genetic information through the military here in Israel, it's the same every place else. In the United States in particular, people are concerned about privacy in the workplace. One of the things that's going to really limit the ability of individuals to take advantage of genetic tests is the fact that they will be discriminated against in the workplace. And those issues with respect to employment include application procedures for employment, hiring, advancement, and being fired.

There is a legal recourse to this in the United States. There's a law called the Americans With Disabilities Act, of 1990, which much to my surprise was passed. What that law does is make it illegal to discriminate against people with disabilities in terms of employment. Who enforces this? A body called the Equal Employment Opportunities Commission. In fact, the issue of genetic discrimination was never firmly established with respect to the Americans With Disabilities Act, until April of this year when the commissioners said the following: that healthy people carrying abnormal genes are protected against employment discrimination. That was their interpretation of the law. Now, you might say this is foolhardy because we all have abnormal genes. But these commissioners were not stupid. They weren't rabbis, but they weren't stupid. And they said, true, but the definition of a qualified individual with a disability involves the following: the person has to have a genetic defect; it's necessary but not sufficient. The person has to be regarded by the employer as being disabled as a result of that genetic defect. And if the employer views the person as disabled because of the defect and then discriminates against him or her on the basis of that perception, that's against the law. This is fairly sophisticated. For the United States it's unbelievable. But what it actually does is give Americans protection against job discrimination based on their genetic makeup. This has not yet been tested in court, it doesn't address insurance issues, but in a major way it addresses privacy issues. So in both cases — with

respect to the issues of autonomy and privacy — we have laws that are still in their infancy. But they form a basis, a contract, up front in terms of how people know how this genetic information is being used.

Finally, we come to the issue of equity and quality, i.e., justice to protect the vulnerable. I think that really falls in many cases just in the same way as privacy and autonomy. Essentially, minors or people who are mentally incompetent are protected by the privacy law of George Eniss, because you cannot take their DNA samples without correct protection. Regarding equity, how does one allocate resources for genetics in trying to deal with disease when there are so many other ways that could be pursued using limited resources. Why not look, for example, at environmental factors? Furthermore, who is going to benefit from this information? In general, the people who stand to benefit the least are the people who need it the most. The people who are poor, the people who have the worst health. The issue of commercialism is also involved here. Is it right for companies to be able to patent this information and to make money from it in a way that it doesn't get given back to the public as a whole? And I would argue the following: we've passed the time of talking about whether genes are going to be patented. They are patented, they have been patented, they will be patented. That doesn't mean though that this information is going to be cloistered away someplace, because what the genome scientists around the world have done is flooded the market with the information so that no one is going to be able to make money from the genome information itself. What they're going to do is make money by coming up with therapies based on knowledge of that information. The only catch is, are those therapies going to be cheap enough to be incorporated into medicine so that everyone will have access to them? And I think that's the issue that we really need to focus on with respect to equity. At least in the United States, no tests are going to come on the market unless they're cheap, because our health care system can't deal with them. But I think in countries that do

have health care systems, in contrast to the United States, the question is how are those costs really being used.

The final point I want to discuss is quality, or the accuracy of the resources. And in this case the quality doesn't just refer to those people doing the test accurately or correctly. It's a much more subtle point. When does a test have merit or validity to be applied to your patients or to the general community? And I would come back to the issue of prediction. We're going to have many situations where individuals may have a twofold, threefold increased risk of having a particular disease, but you'll have lots of people with a particular genetic trait who don't have the disease, and lots of people with the disease who don't have the trait. How useful is that information from a predictive point of view? Useless. It's not useful at all, it has very limited predictive value. On the other hand, you're going to have genetic traits like Huntington's disease, where you have the mutation and you know the person is going to get Huntington's disease. You don't know when, it could be at age 30 or 50, but you know that if the person lives long enough he or she will get Huntington's disease. That's a very predictive piece of information.

So my argument with regard to quality is that it is incumbent upon genome scientists and others delivering these tests to make it clear to the public when tests have predictive value and when they don't. As for the limited resources, we have to focus only on those types of genetics that have high predictive value, an important factor for employing genetics in the medical paradigm that I laid out. Unfortunately, for genetics that's going to be the minority of genetic changes.

But now we come back to the point at which I began — namely determinism. Genetics does not determine who we are as human beings. It's a little life raft in an ocean, that gives us a little bit of security and in some cases helps us figure out who we are a little bit better. So with regard to ethical issues and genetics, I think there are many, although most of them can be put into these five areas. The way to actually deal with them, to have an impact and to live up to

the mission of the ELSI working group is through legislation, not because we believe that laws solve all problems, but we believe that without establishing the contract first it will be a mess. And there are two specific types of laws, one of which is an act — the Americans With Disabilities Act — and the other that we're pushing very hard for is individual state ratification of the privacy acts, which we believe will be a start for having our society deal with this information.

I hope that from these things that we've learned in the United States, Israel will be able to take the parts that are most applicable to this nation and reap the benefits of the Human Genome Project for the society. Thank you.

Distribution of Genetic Information: Moral Considerations

PROFESSOR ASA KASHER

My starting point is a certain problem within this vast area of the human genome. I'd like to use this problem in order to shed light on a whole area. The problem I'm interested in is one mentioned by some of my colleagues and friends present here. And that is, how to use information of a certain type, namely the predisposition to develop a disease within decades. Generally speaking, we obtain information from genetic tests based on the knowledge that there is a certain likelihood that an individual will develop a certain disease within twenty, thirty, forty years. The core question is how to control that type of information. One of the methods philosophers use to shed light on a problem is by exposing the assumptions that lurk behind our practice. So what I'm going to do in the first part of my brief paper is to look at the ordinary model of informed consent.

Informed consent is a model for controlling information in some way. What I'd like to show are eight parameters whose values are set in a particular way when we think in terms of the model of informed consent, and then to show that each of these parameters is given another type of value when we look not at ordinary situations requiring informed consent, but at control of genetic information. This is a completely different situation. Therefore, the whole idea of a contract between a patient and the physician within which we organize the ideas of controlling information by means of something like ordinary informed consent is not going to be applicable, and we need some other way for handling things in a moral way.

Let me talk briefly about those eight parameters, some of which were actually mentioned by the previous speaker. First of all the information itself, the nature of the information

itself. When I suffer from some medical problem and I'm examined by my physician and he sends me to the lab, then what the lab finds are certain, let's call them biochemical, properties of myself which cause or are correlated with a certain medical problem. So the information is about a certain property I now have. Secondly, the gathering of that information, the lab test, is a result of the medical context. I suffer from something, I ask for help, for medical help, and in order to be provided with the appropriate help I have to undergo some tests that will help my physician find the right treatment. So there is the context of treating a person suffering from a certain problem. This is the second parameter, and it is the reason for gathering that type of information. Thirdly, which is related to the second parameter, the immediate goal of gathering this information is to make decisions concerning immediate treatment. My physician needs that type of information in order to provide himself and myself with the means for making decisions regarding immediate treatment. If the results of the tests are "a" then the treatments possible are "x, y"; if the results are "b" then the treatments possible are "u, v", and we have to make a decision, the physician and myself, with regard to the immediate treatment. This is a very goal-directed type of process and there is a certain imminent reason for trying to get the information. Fourthly, understanding the information. When we look at the ordinary situation of tests done on a blood sample under ordinary circumstances, it is the medical staff, the physician and others who have vast knowledge concerning the biochemical properties of this sample. They know enough to make decisions regarding proper treatment under ordinary circumstances. Usually, the patient does not have the same amount of knowledge, but he or she is in a position to obtain a proper explanation from the physician, an explanation that would enable him or her to make decisions, immediate decisions regarding the treatment. That's the core idea of informed consent. The fifth parameter is the breadth of information, which has just been mentioned. The information in an ordinary case of testing

blood samples pertains to the patient himself and only to that patient. This is so obvious that we hardly need mention it, but in a minute I'll stress the difference between the value of this parameter and the value set under different conditions. The sixth point is the depth of this information, and this is also something that has been mentioned in the previous lecture. Let's say that a blood sample is taken under normal circumstances and is used for certain tests. There is a certain battery of tests that the blood sample is going to undergo, and nothing more is going to be done under normal conditions with this blood sample. The seventh parameter has to do with ownership. I'm not happy with the term ownership; I don't want to impose on our way of thinking the idea of property, of information being a property. The moment you use the word property you insert into your way of thinking the whole stuff that comes with the idea of ownership and property, disputes concerning property, and the way those disputes are resolved — I don't like it. I don't like to be committed to this kind of assumption. So let's call it property but with a grain of salt for the time being. Ownership, as we know under normal circumstances, resides with the patient; it is information about the patient and the patient owns it, while it is under the custody, so to speak, under the confidential custody of the treating physician. Usually it is this kind of property that is of no interest to strangers. My car could be of some interest to strangers, actually as it happens most Israeli cars are of interest to strangers. However, the information concerning my blood, the biochemical properties of my blood, is of no interest outside the context of my being treated by this physician. The last parameter I'd like to mention is the interest shown by the person himself or herself in that kind of information. There is a presumption that this person is interested in the biochemical properties of his or her own blood in this context of being treated for a certain problem. Because one suffers from a certain problem, one is interested in having that type of information, interested in knowing enough about that type of information, being knowledgeable enough to be able

to make the proper decisions concerning immediate future treatment by the physician.

Now if you look at these eight parameters, each and every one of them is being dealt with one way when we suffer from a simple medical problem and are being treated by a physician. But they are set in a completely different way when it is considered that we have genetic information concerning a predisposition for developing a certain disease within decades.

Let's look again at that list of parameters. The information itself. Whereas in an ordinary clinical situation it is information about the present biochemical properties of myself, now it's not a present problem. Philosophically speaking, a predisposition is a present predisposition but not a present problem — whereas under normal medical conditions there is a present problem. A genetic predisposition for developing a disease is not a present problem, it is a possible future problem. Not even a future problem, a possible future problem. So the nature of information itself is completely different. Secondly, gathering that information. This is not done within the context of treatment, where a person suffering from a particular problem, with medical symptoms, difficulty or duress, requires medication or some other treatment. It is another type of context that involves general screening or whatever. Thirdly, the goal for which this information is being gathered is not imminent decision making on the part of the physician, because the physician has nothing to offer. When a physician knows that a person has a predisposition to develop breast cancer within thirty years, then what? Nothing. What kind of advice is the physician going to give under such conditions? There is no real intelligent advice that a physician can give. So it's not the context of decision making, of medical decision making. Usually the physician won't give you, won't be able to give you any real advice. It's not the context of a person making a decision concerning his or her own immediate future, decisions of a medical nature. It's not opting for one kind of treatment rather than another. However, it is a context of making decisions, not concerning

treatment but concerning one's way of life. We know that people being informed about such predispositions could change their lifestyle, could make crucial personal decisions about issues, such as whether one is going to marry or not, whether one is going to bear children or not, whether one is going to wait and bear children later or bear children as soon as possible, whether one is going to opt for one kind of education or not, whether one is going to try to make an attempt at mastering a certain profession or not. Those are crucial decisions, major decisions in a person's life; however they are not of a medical nature and therefore decisions made under these conditions are of a completely different nature. Fourthly, understanding the information. Previously we spoke in terms of informed consent where the physician knows a lot and the person, the patient, is in a position to understand some of it — at least to the extent required for making certain decisions with regard to chances, by-products, dangers and so on. Here it's something else. Here it's information of a probabilistic nature where the interpretation of the data is highly problematic. For example, what exactly does it mean that there is a 25% chance of developing breast cancer within thirty years? We cannot act on the assumption that everyone has a certain interpretation of this statement, and that everyone understands it and understands it in the same way. All the more so since we know that there is a quite general inclination to misinterpret probabilities. Two people who grew up here in Israel, psychologists Tversky and Kahneman, spent a lifetime showing us very convincingly that people make quite awkward decisions when they are given probabilistic data. We cannot really trust ourselves or our crude intuitions concerning probabilities, so understanding the data given is problematic. Fifthly, the breadth of information, which was already mentioned. This pertains to a person, but since it's genetic information of a certain kind it pertains to one's descendants too. It could pertain to other people as well, and therefore this is information of a completely different nature. The sixth point, also mentioned before, is the depth of

the information. You can obtain more and more information from a certain blood sample if you are doing that type of testing with those samples. And the seventh point, what I called ownership or property. Since it is information that pertains to other people as well, and is information of a genetic nature, then strangers are very much interested in it. Strangers in a broad sense, not only family members who share something with your genetic profile, but perhaps your employer or the person who is about to issue you an insurance policy; these are interested strangers. This too is of a completely different nature. Strangers have a strong interest in data about yourself. Finally, and perhaps one of the most important differences, is the extent to which the person who undergoes a test is interested in the information. It is not at all appropriate to act on the presumption that a person is interested in that type of knowledge. Although one may presume that there are grounds for making a presumption (namely that the person is interested in the biochemical properties, in certain consequences of the biomedical properties), when a person suffers and requires treatment or medication there is no such presumption regarding what persons would like to know about predispositions to develop medical problems within decades. Let us imagine that there are different types of persons; let's call them the "c" type and the "d" type, "c" for conspicuity and "d" for denial, as well as intermediate types. With regard to the "d" types, I can imagine some persons who are interested in maintaining a way of life which includes a lot of denial. One can assume that there are persons who, having been given that type of information, will act as if they had not, to the utmost extent. Let's call it a denial personality. And then there might be another type of personality; let's call it the conspicuity personality, where a person is going to give serious consideration related to this predisposition a conspicuous place in his or her life. The moment I know that I will develop, or that there is some chance of developing, a certain major disease within thirty or forty years, I will change my lifestyle and act accordingly. So those are two types of personalities, and indeed everyone

can invent some sort of mixture of those two types, as well as intermediate types. Therefore there cannot be a general presumption. But if a person is going to delve into it and look for the presumptions, i.e., look for what people are going to tell one about his or her interesting information, perhaps I'm wrong. Perhaps there is a presumption, perhaps most of the people are "d" type people, or perhaps "c" type people, or some combination of them. My working hypothesis, however, is that there is no presumption, no general presumption.

Therefore, what one needs, given those major parameters, given the differences in each and every one of them when we look at an ordinary contract, a physician-patient contract with informed consent on one hand and the information concerning predisposition to develop a major disease on the other, something else is required. We cannot simply apply all the ideas to which we have been accustomed to this utterly new, utterly different type of situation.

Before I offer you some hints as to a possible way of developing another model that could be applied to such situations, I want to stress that people do not understand the meaning of the information when they are exposed to such genetic knowledge about themselves. What we need is a huge database that would tell us something about human beings, something about ourselves in general. How do we understand that type of knowledge, and what are we inclined to do with it? These are things that, as far as I can tell, we don't know, and we need that basic knowledge in order to develop a responsible policy that could be taken to be morally decent and socially viable. The basic principles that I'd like to apply to this kind of a situation involve three distinctions.

First of all, there is an obvious distinction; but there is so much confusion when people use those two little words — morality and values — that I'd like to draw a sharp distinction between them. There is a broad area for which I prefer the term morality, which pertains to fair resolution of conflicts. We strive for some universal application of

universal principles and those are principles for resolving conflicts in a fair way. On the other hand there is the area of personal values, community values, religious values, or whatever scale of values one is interested in. World views is a term that has been mentioned here but this is something else. These are two different sources of decisions, these are two different kinds of assumptions from which to draw conclusions. What I mean is a morally decent solution for the conflicts that arise when we have situations of this kind. I'm interested in fair resolution of conflicts. Indeed I cannot tell you anything about what fairness amounts to, I can just tell you that the philosopher John Rawls portrays in his books my ideal of fairness. The second simple assumption I'd like to make relates to who is a moral person. Who can be a party to moral conflicts? And here too, I am just giving you a certain conclusion without the whole argument. What I'd like to say is that from the 26th week of pregnancy on, the developing fetus is a moral person and is on par with any other moral person: it should be given rights and it should be defended, and so on and so forth. But this is a long story that I'm not going to go into. From second zero to the 26th week there is a slope, and let's call it the slope of respect for human morality, for moral human life, for a moral person, whatever you'd prefer to call it. There is a slope, which means that the closer you are to the end of the slope, to the upper end of the slope, the reasons you need for interfering or destroying, for killing, are stronger. Even if you claim that the fetus is not a moral person, it is however entitled to some kind of respect, and the more advanced the gestation — the more respect one should show. However, and this is a major issue, there is no one single slope, no one morally defensible slope. Different people, different world views, different scales of values, would draw that kind of slope from week 26 to second zero to a fertilized egg in different ways. If you take the extreme example of Catholicism, there is no slope at all. There it's something else. However, if you look at other denominations, at other world views, you do see a slope but there are different ways of drawing it. Therefore

when decisions are made concerning what happens during this period, one has to take into account not only moral considerations but also value considerations of a certain kind.

Finally, with regard to the simple principles we have to make different arrangements. There are the organized democratic arrangements of establishing basic human rights, protecting them with a constitutional framework, a constitution, the Supreme Court, things like that. And this is indeed a very strong way of protecting moral principles, but it is not enough. And this is just organized justice. What we need is not only organized justice on the level of the society as a whole, on the level of the state, but also local arrangements within the framework of smaller institutions such as a medical center. Relationships between a patient and a physician take place not only within the framework of the state but also within the framework of another kind of contract, and this type of contract should also be a just contract. We can reach various conclusions when we start with these seemingly simple principles. I'd like to briefly answer some of those questions and then stress two major revolutions that are going to occur if some of the assumptions I have made are correct. The more obvious conclusion is that the information should be accessible to the person. Information about myself should be freely accessible to me without any type of constraint or restriction. However, since we do not know what people want to know we cannot just throw it at them. Some people really do not want to know, and we have to take this into account. So the whole idea, the whole arrangement of physician-patient or physician-person flow of information, should be recreated as it's a completely different type of situation. This is one point. The second point, and also relatively simple, relates to the family. Since the information is relevant to other members of the family, it is more complicated than we are used to. This is a family problem that should be discussed in a way that takes the idea of family seriously. I'd like to make a provocative remark, you can argue against it later, and that is: we usually do not

take the notion of family seriously. We often apply to it first and foremost the idea of a contract. In my book a family is not a set of mutual promises, mutual resolutions of conflicts; a family is something else and whatever one thinks about a family, the idea of giving information within the framework of a family requires an articulate conception of a family. You don't have to accept my concept of a family but you have to realize that you do apply a certain concept of a family.

Finally, we come to the two more revolutionary consequences. These are related to the role that the physicians or the people with medical expertise will play. Usually, in our daily life, and looking at it from my point of view as a possible patient, the physician and persons with medical expertise are the same. This is a seemingly obvious observation, however it has far-reaching implications. Given the possibility that human beings may have different attitudes towards information regarding a predisposition to develop a certain major disease, and given that some of them are going to ask for certain kinds of information, some of them may ask for certain kinds of treatment. If a certain treatment could be requested by a person who has been given information concerning such a predisposition, the physician is then going to find him or herself in the following situation: I'm asked to do something not because there is a certain danger to a person's life, not because it's going to improve the health of the person who requested it, but because it will help that person maintain his or her own lifestyle. This is a completely different situation; it's not an ordinary medical situation, it's more like providing services that require medical expertise. Like abortion of certain kinds. This is something that you have to think about in terms of the values of medicine. If you look at medicine as a profession, a profession defined in terms of certain values, this means a significant change in the values of the profession. They are so significant that perhaps one should start thinking in terms of two different professions. One profession is devoted to saving human lives and this encompasses another set of values. And since these are services that do require certain medical expertise, do require

certain knowledge, they are provided within the framework of people having certain values. This means that we may approach, perhaps we are approaching, a situation where physicians or people with medical expertise will identify themselves as having a certain profile of values. They will say: this is what I'm interested in doing, this is what I'm willing to do, this is beyond the red line of my activities which rest on my medical expertise. Another person who provides people with that type of service will have a different profile. So different persons, today they're physicians but in the future they may be of another profession, the "other profession" let's call it; the people of the other profession will identify themselves by different value profiles, and the patients or persons asking for such services will also identify themselves by such profiles. So people are not going to look for the best physician, they will look for the best match; first of all for the best match between their own profile and the other profession member profile, and then within that group where there is a match they will look for the best, for the one with the best expertise.

It is likely that we will have to confront this completely different situation, because we will have new kinds of information, information of a genetic nature. Thank you.

The Political Implications of Genetic Screening: State vs. Science

PROFESSOR YAEL YISHAI

Good afternoon ladies and gentleman. One advantage of being the last speaker is that I'm becoming a virtuous person. In Hebrew, *tzadik melachto na'aset al yedei acherim* means a virtuous person is he or she whose job is done by others. Some of the things I'm going to speak about were already discussed during this very interesting workshop. I am grateful to the organizing committee for having invited me to take part in this workshop, but I have to admit that once I started thinking about the subject under consideration I was somewhat frustrated, even perplexed. Why? Because I realized the inherent contradiction in the title of my profession —Political Science. I intend to discuss the dilemma of science versus state, or science versus politics, the solutions provided to this dilemma and the opinions regarding these solutions. I'll try to be as brief as possible, and will start by presenting the dilemma.

Politics and science operate in two separate spheres. Politics is a process of allocation, of determining who gets what, when and how. Science is a process of inquiry, of an ongoing search for evidence and knowledge. Politics, furthermore, makes decisions by which others are bound, with coercion its expression and domination its aim. Science suffices with offering findings based on tentative conclusions; it is not deterministic, but is based on voluntary free activity. An open society is an essential condition for scientific research. Science and politics differ with regard to their aims. The former is preoccupied with the search for truth, the latter with the yearning for power.

The quest for knowledge is often for its own sake, whereas the pursuit of power serves as the means for a mixed bag of

aims including, among others, fame and the pursuit of social justice. Yet the involvement of the state, the major instrument for political activity in scientific projects such as genetic screening, has been constantly growing. State interference with scientific projects has been controversial primarily because science, at least in democratic societies, is presumably apolitical, both in form and content, as the choice of subjects for investigation, selection of personnel, and accountability have been left to internal regulation through the mechanism of cooperation and peer review. State interference in scientific projects thus may pose a threat to the claim for the autonomy of science, its self-legitimization and self-sanctification.

A major factor contributing to the controversy over government involvement in scientific endeavors, particularly in the area of biotechnology, is the inability or unwillingness to define the boundaries of the political. What do we mean by political? Is the state authorized to peek into our bedrooms? Is it authorized to tell us when, where and how many children to have? In many cases the answer is positive but the dilemma is great as we all heard this morning. What are the forms of state involvement?

In actuality, the state response to genetic screening can take any one or any combination of five forms: evasion, prohibition, regulation, encouragement, and compulsion. Likewise, government intervention can occur at any point from the earliest stages of research to the application of specific techniques. Let's look at each individually.

Evasion occurs when scientific endeavors are defined as operating outside the boundaries of politics. The notion that professional scientific administration should not be subject to political control has been widespread among liberal countries, particularly in the United States. In fact, scientific agencies are legally required to be divorced from politics in the restricted but important sense of being nonpartisan and professional. The passage from the political to the technical turns decisions over to self-regulating professionals and delegates decision making to the scientific community.

Prohibition occurs when the government actively outlaws certain types of genetic research and application. The 1974 Massachusetts moratorium on fetal research is an example of this form of state control which aims to prohibit reproductive research in which human embryos are destroyed. Although many have called for the imposition of governmental prohibition on genetic engineering, it is widely assumed that this is highly unlikely that a democratic government will permanently ban specific areas of genetic screening in the near future.

Regulation is a far more probable government option. Safety regulations, research priorities, and proper procedures — until recently viewed as matters for self-regulation by the scientific community — are increasingly coming under the purview of a variety of public institutions and state agencies. Despite scientists' complaints of cumbersome and unnecessary bureaucratic impediments to research, regulation will probably increase as these technologies become more available and opposition groups mobilize, calling for government surveillance of scientific affairs.

Encouraging scientific activity in genetic research is done through use of discretionary financial and administrative measures intended to facilitate specific projects. Because continued public funding is crucial to the expansion of biomedical research, the government could, through increased funding, make current technologies available to all citizens who want to use it. And you don't have to be an avowed Marxist to believe in the power of money. I'm not sure what the exact translation in English would be for *ba'al hame'a hu ba'al hade'a* — perhaps, those who provide the funds have the final opinion.

A final form of government involvement in scientific projects most feared by the opponents of political imposition is compulsory genetic screening. The mandatory sickle cell screening already discussed, enacted in some American states in the seventies, and obligatory PKU testing are examples of decisive state involvement leaving no leeway for

individual freedom. This intrusion is not confined to totalitarian regimes, but is evident, though partially, in democracies as well.

Now let's look at the division of opinion on state involvement in genetic screening. Opinions on the forms and scope of state involvement in genetic screening are divided between opponents and proponents. The former carry the banner of scientific autonomy, those who favor state involvement do so for two contrasting purposes. First, to protect the individual and to bolster scientific research. Those arguing on behalf of privacy fear the power of science. Those demanding state support wish to enhance its influence on public life.

THE STATE AS AN OUTSIDER

The first opinion regards the state as an outsider. The proponents of this approach postulate that scientists are the best guardians of the most profound human assets guided by the rigid rules of scientific investigation. They are both qualified and eligible to trace the origins of humanity and to reveal genetic divergence among the human species. In commitment to the Helsinki Regulation it is guaranteed that groups or individuals will not take part in this project unless they first give their fully informed consent. Allocation of data will be in line with scientific principles. As scientific knowledge and technology run far ahead of public understanding the state should stay away from research projects and yield its authority to the scientific community. Furthermore, the extent to which scientific projects may be affected by the state form the center plank of political debate. According to John Stewart Mill, the sole end for which mankind is warranted, individually and collectively, to interfere with the liberty of any member of a civilized community against his or her will is to prevent harm to others. His or her own good, either physical or moral, is not a sufficient warrant. The Human Genome Project was designed in order to gain further insights into human origins of evolution, migration and reproductive patterns. These goals fall within what has

been labeled as self-regarding and are therefore beyond the bounds of state interference.

THE STATE AS A GUARDIAN OF SCIENCE

Scientists are not just another social group. They are the carriers of human progress. Their activity therefore should not only be condoned but actively encouraged. According to this approach, state authorities should encourage scientific endeavors by allocating the funds necessary for their conduct, and they should occasionally mandate the population to cooperate with scientists in their research activities. These rules apply neatly to the Human Genome Project, which holds great promise for humanity. The results of the Project are bound to benefit individuals who may be at risk of having a genetically damaged child. Informed choice, so it was suggested, increases the individual autonomy rather than curbing it. Genetic screening may also serve the interest of the community, for example by reducing the number of defective births or fostering the rational allocation of health care resources. The Human Genome Project was in fact seen as the biologist's equivalent of the Apollo moonlanding program of the sixties. Yet a major obstacle to its progress was budgetary constraint. Many within the scientific community have faulted the federal government in the U.S. for not granting enough funds to research. Reportedly, the inclination of politicians to be detached from scientific activity could cause serious problems for the course of the Genome Project.

THE STATE AS A GUARDIAN OF INDIVIDUAL RIGHTS

The justification of state involvement in favor of the people against the scientists in the form of regulation or even prohibition rests on two arguments. First, scientists are patronizing. Second, scientists are violating human rights. You know the difference between God and the physician — God doesn't think that He is a physician. And that pertains to the first part of the argument. The Human Genome Project, so it was suggested, patronizes the subject of research. Reportedly, the project administration does not allow those directly involved

in the study, namely individuals donating blood, to participate in determining the representative population. The lack of participatory procedures has been a source of concern for groups and individuals involved in other aspects of science policy. Recent reports on the evolution of the project reveal the frustration of target research populations regarding its design. For example, the Onondaga Council of Chiefs protested the fact that the project had progressed without discussion or consent of the indigenous nations and peoples it affects. The World Council of Indigenous Peoples has also rallied against some aspects of the project. It was perceived that collecting DNA samples from hundreds of indigenous populations in order to create a database would benefit the scientific community but not the people donating their blood. The state was requested to protect the people from scientific intrusion into their lives. Human beings were allegedly used as specimens in research they had little knowledge about or interest in. For them, informed consent had little meaning as the significance of the project was far beyond their grasp. A major problem for those advocating participatory practices is how to communicate scientific information by means of what was termed by Nelkin "a public interest science".

Second, the availability of genetic data may pose a significant threat to privacy. This was widely discussed this morning. The genetic make-up of every individual can be described as flawed, in that each carries recessive genes that may emerge at some stage. Yet one might prefer to remain in ignorance of this, and certainly one may prefer that nobody else be privy to this intimate information, especially if it may be used in a manner that may result in personal disadvantages, particularly regarding employment. Most feared is the impact of genetic screening on insurance policies. The ability, or not, to obtain health care insurance will entirely dominate health care. Life expectancy and well-being, the evidence of certain predispositions to certain conditions, could be used by insurance companies. Other groups also have a strong interest in the genetic map of people in their domain. To name a few — the Ministry of Transportation, immigration

authorities, adoption agencies, creditors, organ transplant registries, professional sports teams, sexual partners, the military, marriage counselors — and this is not an exhaustive list. And all these may have reasons for wanting access to diagnostic information. Some countries have already attempted to tackle this problem. The Netherlands, for example, has a moratorium agreed between government and the insurance industry over disclosure of genetic information. Individuals thus ask for state protection against revealing their deepest secrets and providing unlimited access to genetic data. Only the state can protect the individual against powerful scientific institutions that may readily abuse the knowledge at their disposal. The question is not whether genetic investigation should be carried out, but under what controls is it acceptable, given the vulnerability of individuals. The state is expected to safeguard them against powerful institutions.

In conclusion, the political implications of the Human Genome Project focus on the role of the state versus society, more specifically, on the relative autonomy of the scientific community from political shackles. The view that state and science should be totally separated is a theoretically valid option which is hardly practical. If it is widely accepted that the state should be involved in scientific projects, particularly in those of considerable magnitude such as the Human Genome Project, then the question remains open as to the direction of involvement. Members of the scientific community propagate supportive involvement by the state in terms of financial aid and binding decrees. Most relevant, however, is the quest for protective involvement by the state, defending individuals against what may turn out to be abuse of scientific knowledge. Thank you.

DISCUSSION

Dr. David Cox

No one can say we don't have interesting viewpoints this afternoon. The session is now open for discussion.

Professor John Harris

I address Prof. Asa Kasher. I must say, after listening to all the eight points I began to think about what we do in medicine. I would say that if I test a person's serum cholesterol and do a screening, or if I make a diagnosis of a premalignant condition or a diagnosis of a hemoglobinopathy — and I can probably find another twenty or thirty conditions — almost every one of those evaluations is exactly the same as we do for genetic screening. There's no immediate application, the significance is for the future. It's a question of probability, and I'm not too good at it like most of the physicians. It has implications for the family. Almost every one of the things that you listed as new in the field of genetics is already taking place right now in medicine, and I would suggest that screening really just expands somewhat, perhaps quantitatively, but not qualitatively, what we're doing now.

Professor Asa Kasher

The question is not what you're doing as a physician, but rather that there is a different rationale behind a certain form of arrangement, and the ideas behind the format of arranging things in terms of a contract that has the ingredient of informed consent. What you're saying is that not only data concerning genetic predisposition constitute a case of using a model outside its natural vicinity, but there are some other conditions under which it is being applied and they are inappropriate to the same extent.

Professor John Harris

I'd just like to make a very brief observation about informed consent and privacy. We mustn't forget that informed consent got into medical ethics via English Common Law. Informed consent is what makes an assault benign. You can't lay your hands on patients without getting their consent, otherwise it is an assault. It's important to remember that, because it has very important implications for tests that don't require the laying on of hands. For example, it's not clear how a visual inspection of a patient yields a diagnosis. If I'm a skilled clinician I can look at somebody and tell you what they've got in some circumstances. It's not clear how informed consent applies to the communication of that diagnosis more broadly. The problem with genome analysis is that it's very likely that all future diagnosis can be made on the basis of a single cell biopsy collected not by an invasive procedure which requires consent like taking blood, but via a noninvasive procedure, maybe taking the saliva off a drinking glass in a works canteen in the lunch hour. That shows that informed consent is not going to be a way of protecting the privacy of genetic information. So I'm very skeptical about George Eniss's idea of leaving it to civil litigation to protect this information. We're not going to stop people getting information, the only thing we can hope to do is to stop them using it. And to stop them using it we require criminal law and not civil law, because many people will not be able to afford civil litigation to protect their innocence and their interests. For example, if you're interested in the genome profile of a public figure you skulk around their dustbin or you skulk around the restroom and you get some saliva from him. How you can protect the use of that information via the civil law is beyond me.

Dr. David Cox

I'll just make a quick comment to that. It's certainly true that if people want to get around civil laws they can do it, but the number of times that people are going to try to collect saliva from dustbins to get people's DNA is, I think, while an important philosophical point, not a terribly

practical one, because most people will get their samples taken in a more medical type of situation. So I take your point philosophically but not practically.

Dr. Gershon Grunfeld

I can't resist asking Professor Kasher to go back to the points raised by Professor Glick. And I think you're missing something basic: I think what is wrong with your assumption is that medicine starts with acute care and ends with chronic care. An inseparable part of what medicine does and how medicine is taught is the treating or taking care of healthy people. Healthy people go to physicians and should continue to visit their physicians to stay healthy, and when you view medicine that way at least five of the characteristics, five of those big differences that you pointed out, just fall away and probably with the other three there's no real difference. So can you say a few words about that: what is the big difference between sharing genetic information and sharing other kinds of medical information.

Professor Asa Kasher

The point you have made is similar to the point that Prof. Shimon Glick made earlier and my answer would be exactly the same. The fact is that there is already a mixture of goals and a mixture of means and a mixture of practices, and there are two different professions under the title physician. There are two different goals and two different practices, and under some conditions there could be a clash of interests between those two. One of them is that of improving health and saving life, period. Then in order to save lives, in order to improve human health, you need information. That information could be put to use under different conditions, under additional conditions. It could even be put to use under conditions where you will kill people, not save their lives but inflict harm on them if you are interested only in using that type of information. The fact that medical information is being used does not render the use medical, part and parcel of the medical profession. The fact that people come for a check-up,

that people come to get some advice or some knowledge of a genetic nature, does not mean that this is a real practicing of the profession with its particular sets of values and goals.

Professor Baruch Modan

I'll try to help you out, not so much from altruism but to make my second major point. I think that when you measure the cholesterol level or most of the other baseline tests, you do it mostly for an immediate purpose. Unless you do it in a study you won't find out whether the cholesterol-lowering drugs are effective in lowering the risk for future heart attacks for instance. Whereas in genetic engineering, with the genetic information we are taking now, we are collecting information of something we don't know how we will use. And I think one of the supports for the difference is that in most western countries, and I think to a certain extent in our country too, when you want to test somebody for AIDS you don't consider it in the same way you would if you were taking a blood sample for cholesterol. All the times I used to take blood there was no problem in taking blood for both of those tests; you didn't have to get special consent for that. But the point I wanted to come to is really informed consent. I think that this is becoming a sacred cow which in many cases becomes meaningless. Because of the strong interrelationship between patient and physician very rarely will the patient not give you informed consent, and if he or she won't, or if they hesitate, the physician usually has the means of persuasion and then the informed consent becomes meaningless. To take it to extremes, if we are talking about elderly people they usually won't understand you. And to take the point even more extreme, the fetus does not give you consent for abortion. So I think that at a certain point we exaggerate with regard to informed consent, and sometimes it really hampers medical research. The most vivid example is our attempt to study the effect of certain conditions among drivers in fatal accidents. For instance, we evaluated drivers with epilepsy, diabetes, hypertension, and so on, in a regular formal case study. It took us about three years to carry out

the study because we tried to interview either the surviving drivers or their relatives. The only way I could get the information from the police and from the Health Ministry was by getting informed consent from either the drivers or the survivors (who were involved with certain procedures in court related to the questions of insurance and so on), whether they were driving after drinking, what their driving habits were, their drinking habits, their smoking habits, etc. We are just finishing the study now, and by bypassing the informed consent, I, as a result of that, may go to jail. But the results are startling, and I think there should be certain guidelines as to where and how you can get information without asking for informed consent, which is meaningless anyway.

Dr. David Cox

I have a comment with respect to that. At least in the United States, and I won't speak for Israel, but in the United States people better get used to it. The arguments you made were very powerfully made by people who (I'm a researcher remember so I understand how difficult these things are) used inmates for very interesting scientific research with no informed consent. Right now in the United States that's viewed as quite unacceptable. I would say that our patterns for informed consent, at least in the States, are really going to change as a result of this genetic information. There's no question about it.

Question

In what direction?

Dr. David Cox

In the direction of having people sign informed consent more frequently, and particularly when samples are taken from their person. I quite agree with you that it's difficult in some cases to make people understand. You don't provide people with a descriptive molecular biology to have it be informed consent, but rather in the context of their world

view. For people who take care of lots of patients this is going to be a great pain, but in the United States at least, it's going to happen.

Question

I would like to ask you, Dr. Cox, about a question that is related but has not been directly mentioned. As someone who is involved in genome studies here in Israel, like many colleagues here we work a lot with large kindreds, many of them consisting of consanguineous families. Our aim at the beginning is to assign the location of the gene and hopefully identify it, and during this research we obviously encounter many carriers among the affected (near or not so near) individuals in the kindreds. These people did not come to us, they did not inquire whether or not they are affected, they don't even know what carriers are, they often don't even have a family physician. My question to the ELSI working group is, do you consider it is our—the researchers' — obligation to inform the carriers of the disease? It is particularly important in these groups because they are most likely going to marry a first cousin. They are small inbred communities, and many know beforehand who is allotted to them as a marriage partner. Is it the obligation of the researchers to inform them that they are carriers and that they shouldn't marry a cousin?

Dr. David Cox

Yes. The ELSI working group has definitely considered this. I think that you said that they are carriers and that therefore they shouldn't have children. But it is one thing to inform them and another to tell them what to do. In fact this has been debated hotly over the last year. Where people stand on this has to do with the contract between the researchers and the patients. If you're using patients where you have identifiers associated with them, you know the specific patient. In the case of pedigree studies then the general consensus is that there is a contract between the researchers and the patients to provide the patients with that information. And again that contract gets laid up front before any DNA is sampled

from a person, which is basically telling them what the possible outcomes might be when they make their material available. It's very time consuming in terms of the informed consent issue. I think with large pedigrees this is the thorniest problem, because by virtue of the fact that you need the pedigree information you can't really have anonymous samples. I mean, you can identify people based on their position in the pedigree. I think that where it's leading right now is very different from where it's been in the past, namely that the researcher did not have any obligation to provide information back to the families. That's the direction, although there's not a firm consensus about that now. In the Eniss bill it's clearly laid out in the contract that's signed that in those situations it's the duty of the researchers to provide the information back to the families. Certainly, that's why it is important, though if people don't want the information up front they should not be part of the study. Therefore, including such information in a study is part of the difficulty, and it means that the researcher has to take time to spend with the individual. Is the tradeoff worth it? And this is really the question confronting the issue of informed consent. Is the tradeoff worth it in terms of the time you have to spend to explain to people who may never understand and who may not care, versus the scientific good. And I think that we either just pay lip service to individual autonomy or we actually live by it. As for genetic information, I think that genetic information is unique in certain aspects and we can't just pay lip service to autonomy.

Question

I believe that the research mentioned earlier is the one that has been placed before us for our approval. It's going to be discussed by the Institutional Ethics Committee of a Newborn at the Hebrew University that I happen to be a member of. I want to make sure that I understood you. According to George Eniss's model there is a compulsion on the part of the team to divulge relevant information, once there is information, to the subject, and if the subject doesn't

want to have the information he or she should be excluded from the group of the research from the outset.

Dr. David Cox

Yes, or what can happen, and this is what's complicated about the pedigree information, is that they can say that their sample can be used in the diagnosis for the studies but they don't want the information. So that's an option also.

Question

In other words they can say they don't want to have it and then they may participate.

Dr. David Cox

Yes. I think that the critical point here, rather than saying whether Eniss was right or wrong or whether any particular point is right or wrong and it happens over and over again, is that the people you're studying are engaged in what these rules are. Engaged, so that they play a role in writing the rules and have a choice in saying what they want out of this as well. For instance, in the case of your families, if they say: "listen, we agree to do this but we don't want to be bothered with any of this information", then that has to be considered. These are my personal views. I think that this can't be done without putting the people who you are studying in the context of the issue. They have to be involved in the decision making. And that's complicated, because what it involves is having them understand what these issues are, which are not always so straightforward.

Question

What about minors in such cases?

Dr. David Cox

In the case of minors the ELSI working group follows the same sort of views that George Eniss does, which is that minors don't get sampled unless the information will be used directly to improve their health at that particular time, while they are minors.

Question
What about umbilical cord blood?

Dr. David Cox
It depends on the reason why one is sampling cord blood. But if you're sampling cord blood for genetic screening, by these criteria it's not acceptable.

GENERAL DISCUSSION

Pofessor Michael Silbermann

We have reached our final session which will be open to a very informal discussion and I would like to make some comments concerning what we have heard this morning and afternoon, and accordingly will raise some questions to the panel seated around the table. One of the topics that was raised early in the morning related to the human diversity project and I assume that Professor Feldman and others would like to comment about it later on. An issue that repeatedly came up related to the question of who owns "information", and Professor Kasher argued as to whether we should refer to it as owned property. I think that this is a very important issue and we would like to hear more about it. A major issue relates to the problem of interrelationship or mutual relationship between the individual and society, and I hope to spend some time on that question. An additional topic concerns the informed consent, which relates to a very important practical problem. In the Ministry of Health today, we handle hundreds and hundreds of research proposals, and many of the physicians in this country are not aware of the fact that they have to submit a Helsinki Committee approval for their project when they plan to involve human beings in projects. Such projects are being considered in the category of human experimentation. There are others who ask: if we are only looking at the patient or are filling out questionnaires and thereby obtaining personal information, do we also need the approval of a Helsinki Committee? I believe that the answer is yes. However, a Helsinki approval can be obtained only by a person who possesses an M.D. degree and works within the framework of a hospital. That is the law in Israel. So, people who are working, let's say, in the department of physiology in the University of Tel Aviv are not eligible to apply for a Helsinki Committee approval. The universities have a University Ethics Committee but this is

not accepted with regard to humanities according to Israel's law, so we cannot accept a University Ethics Committee approval as the legal document in order to approve projects that involve human trials.

Question
But do they need your approval?

Professor Michael Silbermann
Yes, they need our scientific approval. And, by the way, if you submit a manuscript today you usually have to add the approval of that committee to your manuscript, otherwise the Editor will send the manuscript back to you. Ethics committees are therefore an issue, and I'm going to propose to change the current legislation whereby the university ethics committees would be accepted if noninvasive procedures are involved. And let's see how it will work. Today, we discussed legal and ethical aspects with regard to scientific activities, but we should not forget that we are working together with public figures who are the law and policy-making people, as well as with economists; and economics plays an enormous role regarding what we can plan and evaluate. After all, it is the politicians who decide the priorities and the amounts of resources that are available. Last month at a meeting organized by the European Union Ministers of Science, it was made very clear that those who make decisions on what kind of research will be carried out and the magnitude of resources allocated for them are the politicians. No misunderstanding about that. Of course, as Professor Ishay indicated before, scientists are free in terms of academic freedom; yet that is not what actually goes on in the universities or in the hospitals. I want to give you some figures that I heard just last night. A survey in France last year revealed that about 80% of the health budget goes to people during the 10 last days of their lives. They are all in intensive care units, which require a lot of money. And the question that arises is again an ethical one. Should we spend 80% of our budget on this subpopulation?

Comment
It's political not ethical.

Professor Michael Silberman
Politico-ethical.

Comment
The last 10 days?

Professor Michael Silbermann
Ten days of their life. Now concerning late-onset diseases such as various types of cancer, diabetes, Alzheimer's, arthritis and, most important, mental disorders, these of course constitute a complex situation. It's not a single gene that is involved but a complexity of genes, and of course the environment. This is a very, very sensitive issue and I don't think that we at this point can make any real decision. This leads me to the question of the right to silence the truth, and I would like the audience to pay attention to that. Now, regarding the question of predisposition and the probability that it might affect the style of life. And this is to Professor Kasher: let's say a doctor tells a patient that she might develop cancer one day and recommends that she undergo mammography every other year. Of course she becomes aware, otherwise she would neglect to do the mammography. In Israel today, mammography is free; every woman can get a mammography without paying for it, but only 30% of women do. So I think there are also some positive aspects to the awareness that something might develop. And the same is true for men and cancer of the colon. If a man knows that he might develop colon cancer, or because in the family there is a history of this disease, he might go and have a stool test or occult blood test every other year. Clearly, it's not black and white, but there are also some positive aspects. Now, concerning the issue of a parallel kind of profession to the traditional physician that we have been accustomed to, I think it's also a matter of responsibility. I doubt whether we can have one person who will recommend and suggest, and

another person who will operate and take all the responsibility and risks concerning the treatment. This we should also discuss. My final comment concerns the "moral fetus"; I don't understand exactly what you mean by moral fetus, and why did you pick the 26th week of gestation? Why not the 24th or the 30th? And the whole question of the slope of respect. So I wish first to ask Dr. Rotem to give us some of his comments because we are talking after all about humans. Dr. Rotem is the Editor-in-Chief of *Harefuah,* a biweekly Hebrew medical journal that is widely read in Israel, and he would like to share with us some of his ideas and opinions relating to the issues discussed today.

Professor Ya'acov Rotem

Thank you. I have no comments only some remarks. I'm not a philosopher, not a biochemist, not an epidemiologist, but a pediatrician. Now let me go down from the Olympus of the distinguished lectures to the hot, rocky and sandy ground of medical reality. In the early sixties I came across a German book *Medicine auf Abwegen* — The Deviation of Medicine, *Einbruch der Technik in die Heilkunst*—The Invasion of Technology into Medicine. This idea was very strange to me, and it was also at the beginning of the era of the computer. Medicine cannot exist without a computer, but a computer should serve medicine. I strongly believe that we are sometimes drunk from technology, but we tend to forget this. An Israeli doctor who I know very well wrote: "Let us not forget that the computer didn't invent the man. The man invented the computer". And this is a very important point. The computer, with all its staggering contributions, is a means, a way, to help the patient. At that time I also came across an article by an Australian doctor, John Bostok, and I picked up one sentence that captivated me and I quote: "It is impossible to put every idea and emotion under the microscope". And an English physician Douglas Hubble, who added in another article: "Too much science and too little humanity". I'd like to tell you a very short story about an English doctor, Michael Kelly. He wrote to his friend in

Iowa, William Bean, a distinguished humanist and a very unusual person, and told him that he is writing an article about the forgotten man in medicine. Bean, on the way to London to read this article, was bothered. What did he mean, this Michael Kelly, about the forgotten man in medicine; perhaps he's referring to an outstanding doctor, a genius inventor. "And how astonished and surprised I was", wrote Bean, "when I heard from him that the forgotten man in medicine is the patient". We in *Harefuah,* the Journal of the Israel Medical Association, put aside the "case reports" some years ago and now we publish only "patient reports". We have no "cases". This concept of cases is very much in use among doctors and it bothers me. The trend for research is a wonderful trend. It reminds me of the words of a politician in Poland who reached the highest position one could reach. He was Prime Minister then, but in his youth he was a socialist. This occurs very often. And as a socialist he fought for the rights of the *milchemet ha'ma'amadot* (class struggle). He taught, "...to say I am against the class struggle is to say I am against the rain, against the snow, against the elements of nature". And therefore I pay tribute and give credit to research, to technology, but let us not forget that these are merely means and ways to serve the patient. It reminds me of the work of Bertolt Brecht. A character in one of his dramas asks: what are the best of the surgeons without patients? This is a fact and we forget it; unfortunately we forget it. Professor McNair Scott, a friend of mine from Philadelphia, told me that after he'd delivered a clinical lecture to a class he was asked by a disappointed student: what about the rats? An academic secretary at the Hebrew University wrote once about medical students: "they sit all day in the laboratory, they see and talk and think about mice and rats and don't see a patient". And therefore in answer to the question: what do we intend to do with that knowledge, I say that with our knowledge we are to do everything possible for the benefit of the patient. Without the patient there is no medicine. Research cannot be done without people, it should serve them. A renowned Hebrew

poet, Shlonsky, wrote: "Oh Lord, thy world is like Sodom as long as a single child is crying" (I thought this could be a good motto for some association for battered children). We live unfortunately in a time of dehumanization of medicine. There's no doubt about it. I didn't invent it, I heard it 40 years ago from Dr. Kulchar, a psychiatrist. I'm reminded of Martin Luther King's famous speech "I have a dream", one of the most moving speeches I ever heard. My dream is to change one letter: instead of Dehumanization of medicine, Rehumanization of medicine. This is our goal and for that we are doctors, that is what we studied for. And finally, about twenty years ago a famous gastroenterologist, Dr. Doniach, came here to give a lecture, and I was quite perplexed to hear her talking about somebody, and stressing that he is a "specialist of gastric acidity". A specialist of gastric acidity? Not a specialist of a patient, of such a patient or another, of heart, of lungs, but a specialist of gastric acidity! This is the danger when we worship research and technology, despite their tremendous value.

Dr. Ram Ishay

I work in harmony with Dr. Ya'acov Rotem and generally we agree about almost everything. But I don't agree with what you said now. There are people who oppose the Human Genome Project as they oppose any progress and look with nostalgia to the past and think that technology, as you said now, is the enemy of humanity. Because I know that you have read so many books on the history of medicine, I can tell you that the same remarks were made when Laennec discovered the stethoscope; people said that the technology, this new technology, would affect the direct contact between doctor and patient, and that this new technology is the enemy of humanity. There is no antagonism between technology and humanity. Technology is only a tool, it depends upon who uses it. By the same token we could oppose progress. We are not against progress, and as I said this morning, science cannot solve everything but science has achieved many, many good things for humanity. I don't see any contradiction

between technology and humanity, and I hope, and that's the reason for this symposium today, that we will find a way with which scientists will use ethics, that people who generally deal with ethics will know more about science, and that together we will find a way to use technology together with humanity.

Professor Amos Shapira

I would like, with your permission, to come back to some of the underlying themes of our discussions today and make a few brief comments. First of all I emerge quite convinced, not for the first time, that it is quite problematic and unproductive to deal with the grand issues that we have tried to tackle — individualism and communitarism, the private citizen and the state, allocation of decision-making powers and responsibilities — in the abstract and with disregard for the kind of society we are talking about. In other words, these issues are by definition culture-specific and culture-dependent. These are value-oriented questions that must be discussed in the context of a given sociopolitical culture, of a given constitutional order. Take for instance the United States. For many Americans, small government traditionally has been the ideal. Such a political perception inevitably affects one's viewpoint on the allocation of responsibilities and powers between the individual and the government with regard to appropriate modes of control. By way of contrast, in Germany, which is traditionally rule-oriented, and perhaps to a certain extent Israel, which represents a mixture of unadulterated individualism and governmental interventionism, a different overall normative orientation is bound to shape differently concrete positions on some of the issues that we were discussing. On the premise that we all agree that, in the context of the Genome Project, we must pay attention to the ethical and social ramifications with regard to privacy, confidentiality, patient rights and human rights in general, the question of proper control mechanisms comes to the fore. And I think that at the end of the day we will end up in our respective societies with a certain

mix of the three traditional regulatory modalities that we have known all along, namely the doctor-patient relationship (incorpating the concept of informed consent), some kind of professional control (ethics committees, institutional or peer review boards and the like), and some external state regulatory apparatus invoking the criminal law, administrative licensing procedures and the like. The proper mix of the three — the researcher-subject, the profession, and the state — will be determined by a kind of constitutional regime, of a political-social ethos that we are dealing with.

Finally, let me inform you that although Israel now has a law enacted by our Knesset regulating animal experimentation research, we do not have a statute enacted by our parliament dealing with the protection of human subjects in research. We do have a set of regulations, mentioned by Professor Silbermann, that address some aspects of the problem area. These regulations, which are in the nature of secondary legislation, relate only to hospitals. I think that this is quite telling. With regard to the proper allocation of responsibility between the university ethics committees (or Helsinki Committees as we call them) and hospital committees operating under these regulations, we at Tel Aviv University sometimes face a situation of duplicate review. Often, medical researchers, whose project has been approved by a hospital committee, claim that they therefore do not need authorization by the ethics committee of the university.

Comment

There is no such a thing as a Helsinki Commitee of the university.

Professor Amos Shapira

Well, at Tel Aviv University we call it a Helsinki Committee, but it's just a metaphor. It is an institutional review board that is not required by law, to be sure. But then the law doesn't require a university to have a president. This does not mean that the presidency of a university is "illegal" in any sense; it

is not mandated by law but it exists as a university institution within the internal rules and regulations of the university.

Professor Michael Silbermann

I would like to make things clear. The local Helsinki Committee in each hospital is only the first step; thereafter, the proposal goes to the National Helsinki Committee at the Ministry of Health. I don't believe that that is enough. I would propose a super-ethics committee, national, which would deal with topics such as those that we have discussed this morning.

Dr. Rafael Cohen-Almagor

I have two comments on issues that I don't think were adequately tackled during the day. One concerns, again, the issue of informed consent but from another angle, if I may. And this touches upon the angle of culture. Culture versus autonomy or culture versus informed consent. When I speak about culture I mean the entire framework of mind, of ideology, conception of the good, religion, ideology, the entire framework. I can envisage a situation where culture can come at the expense of autonomy. For example, a patient comes to the hospital and says: I don't want to know anything, let a rabbi decide; or the Amish or Jehova Witnesses say: let a priest decide, or let my community decide. How do you deal with that? Does culture override informed consent and autonomy or should we always put our priorities on informed consent? That's the first issue. The second issue touches upon the truth — discovering the truth, telling the truth and so on. Professor Yael Yishai, I think, mentioned the champion of truth telling, John Stewart Mill. In his major work on liberty John Stewart Mill explicitly said: in some circumstances you should not discover the truth. He said so, and he's the champion of the truth. So from that we can infer that a physician treating a cancer patient, for example, acknowledges her situation and knows or presumes after discussion with the family that if he would tell her the truth then it will only make death quicker and he won't alarm

the patient. In that circumstance, according to Mill, we can infer he would say: do not reveal the truth to her, eliminate the truth. Dr. Cox told us about predictions deriving from the human genome. In terms of the example that he gave of a patient who we can discern that in let's say twenty years time will be afflicted with some major disease, I want to submit the following: the physician should never predict such things. Unless the patient wants it. To put it even more coldly, I would say the only difference between a fortune teller and a physician is probability. Both of them are not prophets, with all due respect. So it has to be on the volition of the patient or the person concerned; the physician should not try to tell what's going to be in another five years, one year, or twenty years. It is beyond the scope of the physician. And the same applies even when it comes to the future of a child. For example, a physician can predict that parents are going to deliver a child with Down syndrome. But you can see, you can feel the parent's intense desire to have a child. They've tried for fifteen years without success to bring a child into the world, failed, and now there's a chance. With all due respect, who's the physician to decide the future of this family? If they want the child so desperately, they should have a child even if it would be afflicted with Down syndrome. What I'm saying is that when you think about the truth, when to say the truth, don't play the role of God and don't play the role of a prophet. I don't think physicians are either.

Professor Michael Silbermann

Before letting Professor Harris answer, I wish to comment that I did not get the impression that a consensus has been established with regard to the issue whether the physician decides. I think that a physician has to explain and sometimes maybe even recommend. I'm not sure, but the decision is made solely by the parents, the future mother and the future father.

Professor John Harris

I'd like to say something about the first question on the cultural conflicts. I find this a very difficult issue, but if you just take the first two phrases you offered — let the rabbi decide or let the community decide — I think one's first instinct is to say, well this may be an example of delegated or proxy consent. And there is no reason not to allow competent people to delegate consent when we allow people, in anticipation of not being competent, to delegate consent. However, I think there's a very real issue here, and the analogy that comes to my mind is slavery. Why every society has set its face against slavery is intimately connected with the irreversibility of slavery, so that even the idea of voluntarily selling yourself into slavery is anathema. Now, if you delegate a decision to someone else, without knowing the nature of the decision that you're delegating, the consequences may be irreversible. The rabbi decides that we won't treat, the consequence is that the patient dies. The rabbi decides we won't treat infertility, and the consequence is no possibility of children. Where you delegate an irreversible decision, not knowing the nature of that decision, it seems to me very analogous to voluntarily selling yourself into slavery. Perhaps we should not allow that on cultural grounds. There's the further difficult issue of knowing what pressures there are within a community that lead somebody, perhaps in a relatively public context, to say that they're delegating their decision to a community leader. So while I think superficially it's attractive to contemplate that on the analogy of a proxy consent, I think ultimately that it is unattractive. My own view would be that people can't deny themselves the opportunity of making a decision unless they know the nature of the decision that they are passing on. And, of course, if they know the nature of that decision then already they are making the decision, and I think that is an inescapable fate of humanity.

Professor Michael Silbermann

Professor Harris, this is a fact of life. Many patients will say: let me first consult my rabbi or my priest. And what the

rabbi says is taken very seriously into consideration. The same goes for a priest, or in the Islamic world, an imam.

Professor John Harris

That's acceptable. You can consult who you like. It's when you say, I don't want to know, ask the rabbi, which is what I took to be the point.

Dr. David Cox

I'd actually like to address both points. The point dealing with culture I don't accept, although this is a difficult issue. I don't believe that these issues necessarily go across cultures. I think that cultures can be very different in terms of the feeling about autonomy or privacy. And I'll give you a living example today, of not a small culture, the Chinese culture. Right now in China, forced sterilization is practised on people who are mentally retarded. In China today, government laws on the books are being implemented that people identified as carriers of genetic disease are forcibly sterilized. A statement is being considered by the European Society of Human Genetics and in conjunction with the American Society of Human Genetics about how reprehensible that is. I think that these people have to get a grip because the Chinese aren't going to care what a bunch of people in America or Northern Europe think. On the other hand, if there are Chinese geneticists who strongly feel that this isn't right then one can support them. But I think as difficult as it may be, cultures are not the same, and different cultures won't necessarily share the same ethical views. I think there are some common things across humanity, but the issues of autonomy and privacy aren't two of them. With respect to the issue of playing God, I think, unfortunately, it's not going to be the physician who will be the person playing God. The physician is going to be dragged along behind the wagon by the people who want to make predictions on the basis of these tests. That's the difficulty. And the real difficulty — and this is where the physician really needs to be the counterweight on that wagon — is saying when

there's information that can actually be used validly in terms of prediction. I really believe that in most cases it's not going to be the physician beating the bushes for people to give information to, it's going to be the other way around, at least that's the way it is in the United States. And how physicians are going to deal with that problem is a much more imminent question than the other way. My opinion is the following with respect to genetic testing, and this isn't regulated in the United States in any way: there must be a standard of ethics, which means how predictable does a test have to be in terms of its determinism before it's allowed to be put on the market commercially. Right now, a variety of companies in the U.S. put out blurbs, full-page ads in the Wall Street Journal, saying we're ready to accept your samples to test if you have cancer right now. But they don't have a clue about what that information means for the patient now. My personal view and the view of ELSI is that that's not ethical. On the other hand, if you have actual information about predictability my personal view is that it's not ethical to withhold that from people who come to you and ask you about it. So what do we do in between? In between, it's going to depend very strongly on a real doctor-patient relationship, where the physician explains to the patient that we don't have very much information right now, it's not very predictable right now. But in the context of the patient still wanting that information I'd be willing to offer it because I'm not in the position of playing God with a patient.

Professor Asa Kasher

I think that culture has been overemphasized in this discussion, both with respect to the last question and to the first remark of Amos Shapira. We really would not be happy about the situation if a comment like the final one made by Dr. Cox couldn't be made. His remark took the form of: it's not ethical. This is fine with me. However, if we follow the culture-dependence track then this remark would not be possible. One should say this is not ethical Chinese style or this is not ethical Israeli style, or this is not ethical Guinea

style or whatever. However, it is much more complex. There are two different layers in every arrangement that claims to have some connection to morality. One is a layer that is universal, and on top of it there are some cultural corrections or additions or corruptions. Let's take a non-medical expression, say freedom of expression. We support freedom of expression, but what does it mean? We do not indulge in looking into the cultural views of freedom of expression Saudi Arabia style. We are not interested in what they think about freedom of expression. I'm interested in what they *do* about freedom of expression, and if there is freedom of expression to a certain extent there — fine, according to those universal standards; if there isn't — too bad. I mean, there is room for improvement in their regime. Now, the borders of certain basic rights should be, could and perhaps should be, determined in a way that is more culturally dependent. If you look at freedom of expression United States style, Israel style, Germany style, each of them draws the line somewhere else, and one can justify it by the nature of society, by the nature of past traumas, by the nature of all kinds of dangers that lurk behind the bushes if freedom of expression is being extended. Expressing anti-Semitic views in a demonstration in Skokie, Chicago, is fine, but in the United States it's out of the question; in Germany, you can find something similar, in Israel it's not like in Germany, it's more like the United States. There is a basic level of some universal standard that we would like, that has to do with basic human rights, with basic human autonomy, with all kinds of things that every democracy is involved with in principle. Then there are all kinds of additions that are somehow dependent on the society. But when returning to problems within medical ethics we cannot just ask ourselves what are the standards of a certain community and then say, okay, if these are the standards of the community they comply with ethics in our community. Those may be as it happens the standards of our community, but they could be contra-ethical, they could be quite unethical, they could be a target for waging a war. As for who makes a decision, continuing the line

of argument of Professor Harris, I think there is a way of putting it symbolically. The physician knows the patient and gets answers from the patient and gets consent from the patient. If the patient is not sure what to do, it is his right to consult whoever he wishes before making decisions. However, I'm not interested in your community, in your rabbi, in the vague notion of society that hovers above our heads. I'm interested in you, the patient, and I need your consent on a certain form of decision, and you give me your consent. Which means that you the doctor, you the scientist, must act in a morally proper way when you get the right information from the person. However, this scientist or physician could be referring, when he makes his decisions, to a community that has some kind of norms that he is not going to check.

Professor Amos Shapira

This is not exactly a rebuttal but a qualification. In my opinion, everything is culture-dependent.

Professor Asa Kasher

Is that culture-dependent?

Professor Amos Shapira

Of course it is. Everything is culture-dependent; however, in many cases the differences are likely to be merely differences of degree. When we use the term culture we tend to invoke it as a shorthand formula meaning western-democratic-liberal culture. Of course, when we deal with issues of medical ethics in Jerusalem, Israel, this is indeed the common denominator of all of us sitting around this table. In that respect we do share a broad cultural basis, even though there are still differences of nuance, and sometimes even differences of values among us. Admitttedly, for us the notion of culture broadly stated means liberal-western-democratic. For a different perspective we need not go to China. Take a country that lies not too far from our shores, Cyprus. A European

country. Note the debate about thalassemia. I attended a couple of international conferences where Cyprus was severely admonished for its practices in that regard. Notable Cypriot geneticists stood up to defend their social culture of Cyprus, which in their view supported that kind of research. Their position was almost unanimously, and somewhat viciously, deprecated by all other European ethicists. So let me repeat: our ethical positions are culture-dependent.

Professor Michael Feldman

About playing God. One day Leonardo da Vinci started a new painting. He took a large, absolutely white canvas. He was seated next to the canvas when a friend of his entered his studio, his atelier. He approached Leonardo and said: "Leonardo, what actually are you going to paint"?And Leonardo said: "As a matter of fact I was planning to paint God". "Trying to paint God?" asked his friend: "but nobody knows what God looks like!" To which Leonardo responded: "By the time I finish the painting everyone will know what God looks like". It so happens that that particular painting was never finished, in fact it was hardly started. So we do not know how God looks. As a matter of fact we hardly know, genetically, how different human populations look. And since we do not know how different human populations look, we do not know how different populations of different ethnic groups of Jewish populations look. However, we do know that if we shall postpone inquiring about it, these populations in fact will be extinct. And the question is, should we study them or shouldn't we? This question actually was not an original question originating in this country. A few years ago, a group of distinguished scientists raised interest in extending the Human Genome Project to an additional parallel project, I say parallel — parallel in terms of funds — namely, the Human Genome Diversity Project. They claimed that on this planet there are about four or five hundred different kinds of populations that face termination of their existence as unique isolated populations. So why don't we study their genotype? I say genotype, namely the sequence of

nucleotides, which is culture-independent. Maybe the selection to a certain extent was culture-associated, but basically you can say that this is culturally independent. Therefore when a lawyer says everything is culture-dependent I say he is wrong. In that case, when a group of scientists in America had suggested studying isolated populations, namely to try to preserve the genetic material and try to see to what extent one can learn something from the differences in sequence of genes, etc., another group of scientists claimed that that's a very dangerous kind of thing, and the whole project in fact elicited an interesting controversy. The controversy had two components. Some people said in fact that it cannot be done properly. Not that it cannot be done, but that it cannot be done properly. Number two, other people said, well it can be done in a satisfactory way but the information that we might gain may have a rather unpleasant kind of impact with regard to quite a number of cultural concepts. For example, if indeed we want to know the origin of certain populations, i. e., the genetic evolution of certain populations, once you discover what that origin is, it might contradict cultural concepts that these populations had, which may actually lead to a spiritual incompatibility. In the meantime, we established the center here at Tel Aviv University, led by Professor Batsheva Bonne-Tamir, and we thought that we should pursue its progess. I know that some other colleagues elsewhere thought that we should be aware of the dangers, limitations, etc. Perhaps Batsheva can tell us briefly what is actually being done.

Professor Batsheva Bonne-Tamir

Although you said that the center was developed only three or four years ago by some leading genome researchers, I believe that Israeli geneticists have been involved for the last thirty years. It started in the fifties when the large migrant groups came to Israel, and it was the physicians who were aware of the prevalence of different diseases among the different immigrant groups, G6PD and so forth.

Comment

There was an effort to establish government support for the Human Genome Diversity Project in the United States.

Professor Batsheva Bonne-Tamir

Here the situation obviously has changed. During the years HLA was developed in workshops together with simple classical markers. Most of the geneticists at the beginning were interested in the similarity and differences between the genetic groups, between the ethnic groups: are they more Jewish; are they like the populations in which they were embedded? With time a lot of data had been collected, and when the Human Genome Project and the Genome Diversity Project were established many geneticists abroad thought that Israel is indeed an ideal place for this study. Also there is a great deal of genealogical and historical data on each such migrant community; there are large inbred groups in which linkage analysis can be used easily for identification. There has been much progress; for example, mapping the gene for Wilson's disease, for ataxia, and many others. One of the most interesting discoveries in the last few years is the differences in mutations in the same diseases. Not only in cystic fibrosis; we have now found that in Wilson's disease almost each ethnic community has its own different mutations, and this is obviously a very important medical application. People who give genetic counseling obviously have to know the specific mutation that afflicts a certain ethnic community. And indeed at Tel Aviv University we have just begun to establish what we call the National Laboratory for Genetics of the Israeli population, where we grow cell lines from representatives of each ethnic community. We constantly get phone calls from scientists and physicians all over the country asking if we can provide them with samples from Yemenite Jews, from Ethiopian Jews. They have just found a mutation in Alzheimer's disease or in cardiovascular connections which is similar, say, between Moroccans and Persians and they are very keen to continue their research on the specific mutations. As I said, we have just begun and we hope it will flourish.

It is different in some ways from the repositories that were planned abroad. But I'm really curious to hear what your working group says or about what the ethical principles are in the Genome Diversity Project.

Professor John Harris

It's not surprising that people are very worried about culture, but I was genuinely shocked by what David Cox said, that one cannot criticize compulsory sterilization in China, from the outside. I'd like to know what the difference is between, say, compulsory sterilization in China in principle and compulsory sterilization in Nazi Germany. The point is that cultures are not static, cultures are not given at any particular moment in time. And whatever might lead to moral change from the inside could also, in principle, lead to moral change from the outside. So there is no difference in principle between the criticism of one's own culture from within and that same criticism voiced from without. And the other point I wanted to make is that whatever cultural relativism is — and I actually think that cultural relativism isn't coherent but, be that as it may — part of having one's own morality, part of what it is to have a morality yourself is to think that it matters what happens to other people. So no person with morality can act with indifference to what they see going on in another culture. Whether or not cultural relativism is true, nobody can treat it as if it were true because anybody in possession of morality must criticize immoral practices that they see somewhere else.

Dr. David Cox

This is a very important point. And it's the context in which one does it. You can do it in the context that this is what you believe and then other people can tell you to go to hell and that this is what you should be doing. And I make that distinction very clearly. I will have no problem telling the people who write the laws in China that they're not moral, but I have a big problem telling them that they should do it the way I do it. And I think that's an important distinction.

It doesn't mean abrogating one's own moral values, but in terms of feeling that you have to force someone to accept those values, that's a different issue. From the point of view of the Diversity Project, it's a very complicated issue but I will give an oversimplistic answer. And the oversimplistic answer is, that if the people who are being sampled are participants in the process, that's the overridingly important principle. If the people who are being sampled have no idea what's going on and have no relationship to the project and no interest in it, and in fact if the whole idea of sampling their DNA to study it with respect to others is anathema to their culture, then there's a real problem. On the other hand, they don't have to have a deep understanding of molecular genetics to have some feeling that their case could serve for understanding about people's migrations and how one culture is related to another. They can assent to that without having a deep understanding of it. I think that right now the real opponents of the Human Diversity Project around the world are mostly opponents because of that issue, namely that the people being sampled aren't involved in the process. I think for populations with which you've built decades of relationships, as in your case, that's not an issue. But its a different story going to a variety of remote cultures and tribes throughout the world, the geneticist flying in by helicopter, and sampling blood. That's a whole different issue.

Dr. Daniel Drell

I largely agree with what David Cox said. The acute form of the problem again is the geneticist who flies in with a helicopter, makes a private negotiation with the headman, whoever that is, or headwoman, or chief. Gets the blood that he or she is seeking and then flies out and that's the last encounter with that tribe. Another concern that has been raised in some quarters, which probably only came about in the last few years after an attempt to patent some partial genetic information in the United States, was that one might learn some commercially valuable information from a study of this sort and then ownership questions come up. Again,

I'm largely in agreement with Dr. David Cox that if the researchers think about these issues up front, deal with them openly, and conclude with appropriate documentation that they have dealt with them and have the consent of the people being sampled, then that sounds acceptable to me.

Question
Consent to what?

Dr. Daniel Drell
Consent to the use of those samples.

Professor Michael Silbermann
Dr. Cox, has the diversity program, the Human Diversity Project, been approved in the United States? Can I get the money from the NIH for such a thing?

Dr. David Cox
No. Actually, there may be individual grants that will be approved, but as a program, as a national program, no. It has not been approved today in the context of a national program.

Question
Was it proposed?

Dr. David Cox
It has absolutely been proposed. It's been debated in Congress, in congressional hearings, but it hasn't been approved for whatever reason. And I must tell you that I think there are very complex political issues going on in the United States that I don't understand.

Professor Asa Kasher
Just one sentence about the genetic diversity and, if you allow me, one sentence about culture. The political problems are often problems of allocation of resources. Having performed this huge project, are we to give those life scientists another

lot of money for performing another huge project, which does not pertain to the Tel Aviv University project, where the main ethical problems would be: is it done properly, are the means appropriate? I think that's easy to answer, but can you control the dangers, given that your project has resulted in certain findings? And there are dangers concerning the exploitation of those findings for enhancing cultural prejudices. Can you control that? I think this could also be answered in a satisfactory way and I don't see ethical problems on this kind of level. When you compare it to the United States' formal decision not to spend money on it, it's on a different level. With regard to culture, you can look at it this way: what are the foundations of your arguments? The very first assumptions are those in terms of: this is the way we live, we are Chinese or Jews or Arabs or Americans or whatever, or is your claim based on at least a seemingly universal conception of, say, justice or fairness or morality or human autonomy or something else. If you're willing to move along this line of argument, when you look for the very first assumptions — if you're willing to get deeper than this, as the way we are — then it means not everything is culture-dependent.

Professor Seymour Glick

Just a word on truth and culture. I think those like myself who came from the United States to Israel learned to respect some of the other cultures regarding telling the truth to patients. There was a very moving article in the *Journal of the American Medical Association* by an Italian oncologist who had spent time at the Sloan Kettering Institute and had learned about telling the truth to every patient, and then he went back to Sicily and tried to apply it. Now that just doesn't work. Your comment about the patient who doesn't know what he's denying himself is not true because he's seen other patients. I think that it is really almost a form of cultural imperialism to deny that particular aspect. I think that it's actually an affront to the autonomy of the patient not to let him decide what he wants to decide. I just went through this with a

patient last week, an elderly Ethiopian man who would not decide; he wanted a conference with all his sons and they would take a vote and that would be the decision. He would not have anything to do with anybody else, he didn't want to hear any arguments, but he said: bring all my sons in. We had to gather them from all over Israel, they met, and by democratic process they decided whether he should have a pacemaker. That was it. And I think you have to learn to respect that. Now, I would like to throw a little bombshell at you also. You quoted John Stewart Mill and slavery. It's a very famous point that you can't use your freedom to abrogate your freedom. You imply that slavery is a permanent thing. It happens not to be permanent, you can get out of slavery. On the other hand, you talked earlier this morning about active euthanasia. Now if there's anything you can't get out of it is euthanasia. So how can you square that particular comment about forbidding slavery permanently with euthanasia and John Stewart Mill?

Dr. Daniel Drell

Cultural differences. My office funded a public television documentary some years ago that included some footage of a doctor in Japan not informing his patient that she had breast cancer but rather informing the patient's family in a way that basically involved dumping the surgically removed breast on the table in front of the family members. You'll find some awfully different cultural practices out there, and I can only tell you my own personal reaction was of sheer repugnance to that, but that's their country.

Professor Ariella Oppenheim

We have all talked about, and we all agree about informed consent, about privacy, about informing the patients in the Diversity Project, the ethnic groups, the individuals, about research, etc. We put a lot of effort and money into sequencing genes. We scientists can hardly follow up the information. How do we expect other people to understand what we are going to do with the information? What is their property,

what are their rights of ownership? To put this all in one sentence, what do we do about education so that in perhaps five or ten years from now the individual will be better equipped to deal with these questions?

Dr. Ram Ishay

I'd just like to say that we have many things to say about the relativism, the ethics and the dangers, but I'm sure we will not have a *minyan* to finish this session so I just want to tell you what I think has to be the outcome of this symposium. I think that after having heard today all the discussions and especially what Dr. Cox told us we need, I appeal to our Ministry of Health to establish a working group like ELSI in the States. And, with this working group, we will answer your question and every question. We will follow the progress of the Human Genome Project in Israel and we will try to finally find a way of bringing science and ethics together.

Professor Michael Silbermann

Dr. Ishay can inform you that we have already started to do that.

Question

I want to be educated. Batsheva and Michael, correct me if I am wrong. I read the file only superficially so far. I have a few days to prepare, but if I remember correctly, the design of your diversity research project is something as follows: you will collect specimens of genetic data, whatever you call it, from various ethnic groups in the country and create and establish a sort of bank (maybe the term bank is not appropriate), a sort of a repository of DNA sequences, or whatever the correct scientific term is. And then physicians, investigators, researchers, institutions all over the country will be able to refer to you, to apply to you next year, two years from now, five years from now, twenty years from now, and loan or buy or get from us, from the Tel Aviv University bank, specimens on which they will do their own researches,

whatever they may be in the future. Is this design description correct, and if it is I would like to hear our American and English guests' advice or comments on that.

Comment
I suggest we postpone it to the next symposium.

Professor Michael Silbermann
Thank you very much to all the participants and we'll meet next time in the Academy. Thank you very much.

List of Participants

Shlomo Alexander	Rehovot
Boaz Avron	Rehovot
Gideon Bach	Jerusalem
Hedva Baram	Jerusalem
Batsheva Bonne-Tamir	Tel Aviv
Yehoshua Ben-Meir	Jerusalem
Felix Bergmann	Jerusalem
Anat Blumenfeld	Jerusalem
Leah Boehm	Jerusalem
Zvi Borochowitz	Haifa
Natan Brand	Ramat Gan
Avishay Braverman	Beer Sheva
Rafael Carel	Tel Aviv
Howard Cedar	Jerusalem
Rafi Cohen-Almagor	Jerusalem
Nadine Cohen	Haifa
David R. Cox	Stanford, USA
Yair Degani	Jerusalem
Eran Dolev	Tel Aviv
Daniel W. Drell	Washington, DC
Shirra Dunevich	Tel Aviv
Aryeh Dvoretzky	Rehovot
Shlomo Eckstein	Ramat Gan
Yaron Ezrahi	Jerusalem
Michael Feldman	Rehovot
Natan Gadoth	Tel Aviv
Eva Gak	Ramat Gan
Ephraim Gazit	Ramat Gan
Ruth Gershoni-Baruch	Haifa
Seymour Glick	Beer Sheva
Boleslaw Goldman	Ramat Gan
Yoram Gruner	Rehovot
Gershon B. Grunfeld	Haifa
Hanoch Gutfreund	Jerusalem

Mordechai Halperin	Jerusalem
John Harris	Manchester, UK
Jocelyn-Yossi Hattab	Jerusalem
Max Herzberg	Rehovot
Mia Horowitz	Tel Aviv
Hanna Ish-Hurvitz	Tel Aviv
Itzhack Ish-Hurvitz	Tel Aviv
Ram Ishay	Tel Aviv
Avi Israeli	Jerusalem
Dov Israeli	Tel Aviv
Joshua Jortner	Jerusalem
Asa Kasher	Tel Aviv
Shaul Katz	Jerusalem
Hannah Kedar	Jerusalem
Batsheva Kerem	Jerusalem
Meir Kogman	Tel Aviv
Yehuda Koren	Press
Abraham Korol	Haifa
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Ethan Rubinstein	Ramat Gan
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Michael Schimel	Jerusalem
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Emanuel Sharon	Tel Aviv
Joshua Shemer	Tel Aviv
Yossi Shiloh	Tel Aviv
Menachem Shlesinger	Ashkelon
Yehuda Shoenfeld	Ramat Gan
Michael Silbermann	Jerusalem
Ophra Spira	Jerusalem
Eliezer Tal	Jerusalem
Lea Wapner	Ramat Gan
Yael Weiler	Jerusalem
Ben-Zion Weiner	Jerusalem
Yaakov Weiner	Jerusalem
Eliyahu Wielunsky	Petah Tikva
Moshe Wolman	Ramat Gan
Avraham Yassour	Haifa
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Meir Zadok	Jerusalem
Moshe Zemer	Tel Aviv
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