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PROCEEDINGS
OF THE 6th EUROPEAN CONFERENCE OF NATIONAL ETHICS COMMITTEES (COMETH)

11-13 November 2001, Paphos, Cyprus

"Genetics and society: opportunities and threats"

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ACTES
DE LA 6ème CONFERENCE
DES COMITES NATIONAUX D'ETHIQUE (COMETH)

11-13 novembre 2001, Paphos, Chypre

« Génétique et société : opportunités et menaces »

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OPENING SESSION / SESSION D'OUVERTURE

Address by Mrs Rena Petridou, Senior Counsel, Office of the Attorney General, Cypriot Representative on the Steering Committee on Bioethics (CDBI) and Member of the CDBI Bureau

It is with great honour and pleasure that I welcome you today to the opening of the 6th Conference of National Ethics Committees of the member states of the Council of Europe.

The European Conference of National Ethics Committees (COMETH) was established in 1992 in Madrid where its first meeting took place. Its objective is to become an international forum for reflection and exchange of thoughts on moral, legal, medical, social and economic questions and dilemmas arising from progress in biotechnology and biomedicine. Over the years the Conference's significance in the area of bioethics has been increasingly acknowledged and established at a regional as well as at a European level. The Council of Europe recognizes the important contribution of the Conference and therefore endorses its aims and activities. It is a special honour for us that the Council of Europe and the Bureau of the Conference are organizing the 6th Conference in Cyprus, accepting the invitation extended by the Republic of Cyprus through the Law Office.

The theme of the Conference is of primary importance in the area of Bioethics: "*Genetics and Society: Opportunities and Threats*".
This is a topic, which is far from simple.

Everything that is going to be said during the conference from our distinguished speakers, the interventions, the views and observations that are going to be expressed, would be a source from which we could draw valuable information about the existing – and in many respects divergent – opinions on the problems caused by the rapid progress and evolution of genetical science. This specific knowledge is indispensable in order to make the correct choice for the right bio-ethical framework to be established and accepted by all the countries.

Consenting and accepting a number of principles in a uniform bioethical framework are a fundamental constituent for the adequate protection of human rights and human dignity from the practices of biomedicine.

The progress in the field of genetical research, the information attained by its application cannot be something that concerns only a single country in particular. It is something that concerns the whole world. The achievements of the genetical science go beyond the boundaries of each country and affect and influence the whole world.

The multiple dimensions in fields beyond the medical ones have resulted in changing the established rights and responsibilities concerning a broad spectrum of human activities.

Any such change creates new data, which create basic and critical questions. Questions that are very much related to the huge challenges faced by the society nowadays.

The advantages and opportunities for the human being provided by the rapid progress of Genetics are certainly a lot and invaluable.

However, could the opportunities for better health and better standards of living be turned into a threat for human rights and human dignity?

Are there any moral and legal limits in science? Must anything that is made possible according to the progress of Biology and Biotechnology be adopted and implemented without any limit and without any criteria? Could even these opportunities bring a change to the species of Homo Sapiens with his present characteristics and qualities?

In a framework of a European Public Discussion, the Conference has to give answers to these and many other questions. Answers that will lead to the useful application of Genetics, an application that will not be turned into a threat for human beings, but it will create a perspective for a better quality of life and health.

The Convention on Human Rights and Biomedicine of the Council of Europe provides for the promotion of such Public Debates on behalf of the States.

As a representative of the Republic of Cyprus in the Steering Committee on Bioethics of the Council of Europe, that drafted the above mentioned Convention, I feel deeply pleased because in a while the Acting President of the Republic will declare the opening of the deliberations of the Conference and seal in the most official way the implementation of the Convention on Human Rights and Biomedicine on behalf of the Republic of Cyprus.

I hope and wish every success to the deliberations of the Conference. I also wish all of our guests a pleasant stay in our island.

Address by Mr Alecos Markides, Attorney General of the Republic of Cyprus

The Law Office of the Republic of Cyprus is today justifiably proud because acting on behalf of the Republic is hosting the Sixth European Conference of National Ethics Committees which is organised by the Council of Europe.

The European Conference of National Ethics Committees was established in 1992 in Madrid. Following that, were the meetings in Stockholm in 1994, Paris in

1998, Oporto in 1999 and Strasbourg in 2001. The Conference goes on this year with the meeting which will be known in its history as the meeting in Paphos.

The topics of the Conference fall in that field of issues for which the most suitable characterisation is that they are very important and critical for the future of humanity.

Just a simple look at the titles of the topics that were discussed by the Conference proves the correctness of the aforementioned: "The ethical aspects of collective health choices", "Controversial ethical issues in the field of international biomedical research", and "Science: Communication and Society", show how much this Conference is concerned with major contemporary issues that humanity is facing.

The subject of this year's Conference is probably the most important of all the subjects discussed so far: "Genetics and Society: Opportunities and threats".

The heart of the matter lies on the one side in the natural confrontation as well in the need for a balanced conciliation with the inconceivable and unimaginably rapid technological progress in recent years that shows no signs of fatigue but on the contrary it shows a tendency of making more advances. On the other side there is a need to maintain the human dignity, to protect the human rights and to improve the quality of life.

Therefore the world is changing at a rapid pace which not even the imagination of a Julius Vern could ever comprehend. The advantages for the human species from the developments in the fields of Biology, Biotechnology and Medicine are enormous.

Nevertheless although it sounds strange, this enormous progress is accompanied by the danger lying in wait to undermine human rights and human dignity.

I do not intend to prolong on dilemmas we have already faced. Besides, this is a subject that will be analysed thoroughly in the framework of the conference. But I will go further to confirm our position that:

We need a national as well an international, clear and reliable legal system to solve emerging dilemmas in a balanced way.

By supporting the Conference of National Ethics Committees, the Council of Europe provides a forum for an exchange of views, a deep consideration and discussion of ethical issues serving in essence the progress, but mainly the fundamental values of dignity and the rights of human being, the Homo Sapiens.

It is exactly in the framework of these efforts that the European Convention on Human Rights and Biomedicine was established. This Convention has been in force for those countries that have ratified it since 1st December 1999. Added in the Convention was the important Protocol of Prohibiting Human Cloning.

The Cyprus Republic has already signed both the Convention and the Protocol, whereas the relevant ratification bills were submitted to the House of Representatives on 1/11/2001 and sent for examination to the House Committees on Human Rights and Legal Affairs. The Bill of Law on Bioethics 2001 (Establishment and Operation of the National Committee) is pending before the House of Representatives.

The Cyprus Republic which is represented for these issues by the Law Office will continue to follow the developments closely and also to contribute in a positive way to the continuing efforts of the Council of Europe for the drafting and adoption of other protocols and conventions on the protection of human rights and human dignity from all possible usage by contemporary biology and medicine. The creation of an indispensable bioethical framework in which biomedicine and biotechnology are to function within permitted limits constitutes a basic obligation for every democratic country and an imperative need.

The Cyprus Republic commitment for the protection of human rights as concerns the applications of biomedicine stems in a final analysis, in general terms, both from the constitutional provisions for the "fundamental freedoms and rights" and from its international obligations which inter alia include the European Convention on Human Rights and its Protocols as well as International Treaties (Economic, Social and Cultural Rights, Civic and Civil Rights) of the United Nations.

According to the Constitution of the Republic of Cyprus all international conventions and treaties, which have been ratified by law of the House of Parliament, have superior force over any other legislation of the Cyprus Republic.

In addition the Cyprus Republic as a member state of the United Nations has voted for the establishment by every member state of the Organization of an independent National Ethics Committee, which "will assess moral, social and humanitarian questions and problems created by biomedical research in human beings" and cooperate with the "International Bioethics Committee" of UNESCO.

Cyprus is at the crossroads of three Continents. As a member of the Council of Europe and of the United Nations we can and must play our own positive role in promoting cooperation needed among states for the correct enlightenment through public debates and the development of a political will for the setting of such a bioethical framework, which will steadily become the world charter of behaviour as far as the use of biomedicine and biotechnology for the sake of humanity is concerned.

Consequently I believe that the holding of this 6th European Conference of National Ethics Committees opens this way. For this reason I wish to express sincere thanks to the Council of Europe and the Standing Bureau of the European Conference for having accepted our invitation to organise this year's Conference in Cyprus.

I also wish to thank the President of the Republic, the Council of Ministers and the Minister of Finance who by their decision have approved the expenditure for the hosting of this Conference. I thank the Acting President of the Republic of Cyprus, the President of the House of Representatives, Mr Dimitrios Christofias, for having accepted to honour us with his presence today and declare the official opening of the

deliberations of the Conference. I finally thank the Cyprus Development Bank and the Bank of Cyprus for sponsoring the whole effort having realised the value and importance of the Conference.

Concluding, I wish all of the participants every success to the Conference. I wish also that our guests would have a pleasant stay in Cyprus. According to the ancient Greek wisdom business can be combined with pleasure.

Address by Mrs Nicole Questiaux, Chair of the Bureau of the European Conference of National Ethics Committee

Monsieur le Président de la République de Chypre, Président du Parlement,
Monsieur le Secrétaire Général Adjoint du Conseil de l'Europe,
Messieurs les Ministres,
Monsieur le Président de la Cour Suprême,
Mesdames et Messieurs les Présidents des Comités d'éthiques,
Mes chers collègues,

Dans un monde qui est parcouru à juste titre de peur et d'angoisse, le développement de nos comités d'éthiques et le ressort inattendu dans bien des pays depuis une vingtaine d'années, est à mes yeux un signe de confiance. Confiance dans la science, dans les progrès extraordinaires marqués par les sciences de la vie et symbolisés par le tout récent séquençage du génome. Confiance dans les capacités de l'esprit humain de maîtriser le mauvais usage de la science et les inquiétudes qu'elle suscite. Confiance dans le débat pluridisciplinaire, qui nous voit chacun progresser en appliquant aux questions difficiles, aux mêmes questions, les outils éprouvés de nos différentes disciplines, qui trop souvent ne se rencontrent pas dans un monde si occupé. Confiance dans un sentiment de solidarité entre les hommes dont nous voulons espérer que liés par une meilleure compréhension de ce qui les fait vivre, grandir, se reproduire, vont pouvoir se révéler capable de porter plus loin un idéal de progrès.

Face à la gravité de ces objectifs, notre conférence, qui se réunit aujourd'hui pour la 6ème fois, est un outil modeste, et je dois dire que nous sommes intimidés par l'honneur que nous a fait la République de Chypre en faisant assister à notre séance inaugurale, les plus hautes autorités de ce pays, qu'elle en soit remerciée.

En effet, nous sommes un réseau d'institutions ou d'organismes qui, dans tous nos différents pays, ne sont pas des organes de décision ni même des organes désignés démocratiquement. Nous sommes simplement des conseils. Nous associons des scientifiques, des chercheurs des sciences de la vie ou des philosophes, des juristes, des parlementaires, des représentants des différentes familles de pensées, des religions, dans un débat patient et passionné, au cas par cas, sur toutes les questions que nous posent la société devant le développement parfois chaotique des sciences de la vie. Débats patients et passionnés, comme vous pouvez le voir dans le dossier qui vous a été distribué et qui pour la première fois vous donne in extenso quelques grands avis de tous nos organismes et où vous voyez à la fois la difficulté des questions, la méthode et l'application de toutes nos différentes cultures aux mêmes questions. Nous n'avons pas d'autre structure que la volonté d'échanger dans des réunions périodiques, dont l'objectif est de nous rencontrer, et pour cela, nous avons

bénéficié du soutien déterminé du Conseil de l'Europe. En cela, nous sommes une expérience originale, car le Conseil de l'Europe, qu'il soit aussi remercié, a bien d'autres instruments pour faire avancer la bioéthique, instruments plus traditionnels, qui conduisent notamment par le biais de la négociation internationale à l'élaboration de grands instruments diplomatiques et à la création des institutions. Mais il lui a paru utile que, d'une façon informelle, dans ces réseaux qui sont tellement à la mode dans notre monde compliqué, puisse se réunir cette conférence uniquement, et ce bureau qui a l'air d'avoir un nom très solennel, a pour seul rôle d'organiser entre une réunion et une autre, nos deux journées. Nous croyons que ce propos modeste est approprié à la matière et nous sommes confortés lorsque, comme aujourd'hui, nous sommes accueillis dans l'un des pays qui montre si bien sa foi dans tous les instruments juridiques importants et qui pourtant a cru utile d'accueillir notre conférence.

Qu'allons-nous faire dans ces deux jours ?

Nous voulons d'abord dans notre journée scientifique, vous parler de génétique, sujet à la fois, avons nous dit, d'opportunité et de menace. L'enthousiasme qui a accompagné les récentes découvertes ne doit pas masquer l'extraordinaire perturbation que la nouvelle connaissance du gène provoque dans le monde, dans les esprits de nos contemporains. Tout le sentiment que nous avons de notre vie privée est en quelque sorte perturbée, car cette vie privée, nous allons devoir la partager avec nos ascendants et nos descendants d'une manière que nous ne comprenons pas bien, ou avec des populations qui, dans le passé, ont été communes dans l'émigration. Nous sommes d'autant plus perturbés que, très souvent, cette science nous donne un diagnostic sans encore nous donner la réponse. Elle fait de la prédiction mais avec un aléa, par conséquent notre société est troublée devant ces progrès.

Nous savons que le sujet vous intéresse beaucoup ici à Chypre, aussi aurons-nous à travers un canevas très général, marqué par des interventions de personnalités auxquelles nous sommes extrêmement reconnaissantes de s'être déplacées. Nous espérons initier dans nos séances et nos échanges un bouillonnement créateur, pour que quand nous serons rentrés chez nous, nous trouvions de meilleures réponses à toutes les questions posées par le développement de la génétique.

Quant à notre deuxième journée, elle sera, selon la tradition, consacrée au travail des comités. Mais nous voyons que nous commençons à avoir déjà un début d'histoire, et que la tradition s'enrichit, et cette année les orateurs au nom des différents comités, ne vont pas simplement parler en général de leur activité mais viennent chacun munis d'un avis auquel ils tiennent particulièrement et qu'ils vont ainsi soumettre à vos critiques et à vos discussions. Nous attendons beaucoup de cette confrontation de toutes nos expériences.

Voilà, Mesdames et Messieurs, j'attends avec un certain enthousiasme nos deux journées, devant cette mer dont le poète a dit qu'elle était couleur de vin et qui va, je crois, nous encourager à porter notre petite pierre aux progrès de l'humanité.

Address by Mr Frixos Savvides, Minister of Health of the Republic of Cyprus

I welcome the Sixth European Conference of National Ethics Committees of the member-states of the Council of Europe. It is our honour and pleasure that we are extending our hospitality to the prestigious and reputable personalities who have gathered in Cyprus for this Conference.

It is an undoubted fact that the progress in Genetics and Biotechnology has changed the history of contemporary medicine. Scientific achievements in the last 20 years have outweighed the history of medicine of the previous 2500 years and brought science fiction scenarios close to reality.

Our genetic identity has been decoded and as was expected this has changed not only our understanding of medicine but also influenced our therapeutic intervention. It is now proven that what are known as common illnesses such as cardiovascular complaints, cancer, diseases of wear and tear and aging are determined not only by environmental but also by genetical factors.

Molecular genetics now provides the possibility of detecting individuals who are at a higher genetic risk of developing certain diseases. Molecular genetics also offers the option of a presymptomatic diagnosis in several disorders. The new and much promising genetic experimental treatments are discussed not only at scientific conferences but also openly in the internet, a fact that has resulted in transforming the medical approach as a whole, the sense of treatment and the importance of prevention.

Progress is welcome when it aims at improving the health standard of humanity and at limiting sickness and disability. However, scientific experimentation should not remain uncontrolled in the name of progress. New genetic knowledge influences society as a whole since the proposed applications have moral, legal, social, philosophical, political and other dimensions. Cyprus although it is a small country has a big share in the burden of genetic heritage with various disorders. This burden of genetic and inheritable disorders has been more evident in public health with the improvement of the standard of living of the population and the decrease of infectious diseases.

The Cyprus society and our scientific community are open and friendly towards progress and scientific achievements in general. It is imperative, however, that we should focus our attention on the multiple dimension of progress in genetics and biotechnology.

Responding to the demands of the present times, the Ministry of Health and a number of other interested parties have proceeded with the drafting of the appropriate legislation for the establishment of our National Bioethics Committee and of the relevant local committees.

The completion of the Human Genome Project is a landmark of a new era in medicine and research. This new knowledge and the way of utilizing it will be mostly decisive for humanity as it has been shown by the recent history.

Therefore we are all called, the scientists, the politicians, the philosophers, the citizens and society, to be deeply concerned and sensitised in order to attain the best possible utilization of the knowledge and avoid malpractice.

Concluding, I welcome you once again to Cyprus and wish that the discussions and the conclusions of the conference will be spiritual food and guidance for the scientists and society as a whole.

Address by Mr Hans Christian Krüger, Deputy Secretary General of the Council of Europe

Mr President of the Parliament,
Minister of Health,
Attorney General,
Ladies and gentlemen,

It is a great honour and a pleasure for me to participate in this opening of the 6th European Conference of National Ethics Committee. I would first like to thank the Cypriot authorities for inviting us to this beautiful and historic town with its legendary significance. I would also like to thank the representatives of the national committees or similar bodies for attending this Conference– it is quite encouraging to see 36 committees or bodies represented here from the 43 Council of Europe member countries.

Carrying on from Madrid, Stockholm, Paris, Porto and Strasbourg, the Conference has convened here to discuss an important bioethical issue.

In bioethics, public debate is of great importance, especially at the European level. And in this context, the Conference of national ethics committees is the ideal forum, and I want to reiterate the Council of Europe's support for it. Pooling national experience and reflections gives us all a better grasp of the different standpoints, and helps to highlight common values.

As the National Ethics Committees concern themselves with the human implications of scientific and medical advances they are appropriate bridges between science and society. In this they perform a crucial role, and the Council of Europe very much encourages all member states to set up such committees. We welcome the news that legislation instituting a national ethics committee is shortly to be put before the Cypriot Parliament.

As part of its concern to strengthen national bodies of this kind, the Council of Europe has been developing a programme in central and eastern Europe, for several years now, to help set up national ethics committees and committees on research ethics.

But the role of the Council of Europe in Bioethics is broader than the support mentioned above. Indeed, the Council has been active since 1949 in protecting human rights, strengthening pluralist democracy and promoting cultural identity. In addition to these objectives, which assume major significance in the present unsettled international climate, the Council of Europe also sees it as its function to identify solutions to the main problems of the day. Of course, this task includes the problems posed by scientific and medical developments. And, in this respect, part of its work is to strike balances between different points of view and interests and draw up principles and legal instruments. This balancing role centres itself on the basic values which underpin the Council of Europe's activities, as set out, notably, in the European Convention on Human Rights and Fundamental Freedoms and, in the specific sphere of bioethics, the April 1997 Convention on Human Rights and Biomedicine. Its Article 2 states that: "The interests and welfare of the human being shall prevail over the sole interest of society or science".

This Convention is the only binding international instrument governing the new biomedical technologies. Thirty member states have signed this text, which is now in force in ten countries. Additional countries are planning to ratify it shortly, and we urge all our member States to do likewise so that there is coherence in Bioethics throughout Europe.

In addition to the Protocol already in force on the prohibition of cloning Human beings, other instruments on organ transplants [has been adopted] and biomedical research, for instance, are being finalised. Still others, namely on Human genetics and on the protection of the human Embryo and the Foetus, are currently being drafted and undergoing the process of debate I mentioned a moment ago.

Striking balances is not easy since cultural and social differences will cause disagreements. This is where efforts to establish common rules and principles become a real challenge in which all concerned, without renouncing their own values, must be capable of putting the collective endeavour first. For this is the only way of ensuring that biomedical advances, with all their potential for better health and better quality of life, do not begin to threaten human rights and human dignity.

In the Genetics field, where ethical questions raised by the use of genetic information are very sensitive, commons regulations are essential.

In regard to the current genetic developments, there are great hopes that preventive and curative treatments for genetic diseases will be developed. But there are also concerns that discrimination against a person on grounds of his or her genetic heritage may appear. These fears are substantiated also in the insurance and employment fields. In this regard, I would like to mention Article 12 of the Convention on Human Rights and Biomedicine which prohibits an insurance company or employer asking for genetic tests. Nevertheless, this article does not address the problem whether an insurance company or employer could request the results of an already performed genetic test.

The concerns do not only appear in this framework of insurance or employment since worries about genetic testing for public-health purposes also exist.

Indeed, as genetic testing becomes more common and an ever decreasing number of children are born with certain genetic diseases or anomalies such as down syndrome (Trisomie 21), concerns exit that people with these illnesses or anomalies will eventually be stigmatised.

A few years ago Cyprus introduced a genetic-screening programme for thalassemia the results of which have been highly successful. This country is, therefore, something of an illustration of the hopes of genetics and I am pleased that your assembly has accepted to also consider the possible concerns relating to these problems in this place.

Mr President of the Parliament,
Minister of Health,
Attorney General,
Ladies and gentlemen,

Allow me, once again, to thank the Cypriot authorities for acting as hosts not only to this Conference but also to our Steering Committee on Bioethics, which has the difficult but ground-breaking task of striking balances that will produce the key 21st-century legal standards.

As the Council of Europe's representative, and because promoting reflection on bioethics is part of the Council's daily work, I wish you a fruitful meeting. My sincere thanks go to the Chair of the Conference Mrs Nicole Questiaux, and to the conference bureau for their commitment. And many thanks to all of you for your contributions to what, I have no doubt, will be a most successful meeting.

Address by Mr Dimitrios Christofiaf, President of the Parliament of Cyprus

First of all I would like to welcome the 6th European Conference of the National Committees for Bioethics of the member countries of the Council of Europe. It is a pleasure and honour for Cyprus to host the meeting of distinguished scientists, people of culture as well as other personalities who are going to discuss topics of prime importance in our times such as moral, legal, philosophical, political, social and other dilemmas that result from the achievements of Genetics and applications in contemporary society.

Cyprus being at the crossroads of three continents symbolizes the meeting of civilizations and the pluralism that should characterize modern societies. The foundation of modern societies today and always should be the respect of human rights and human dignity. A basic element of these is the freedom of thought as well as the freedom of expression.

The Republic of Cyprus keeping to and implementing these principles has already signed the International conventions pertaining to related topics, such as the convention for the Protection of Human Rights and Human dignity with respect to the application of biology and medicine. Cyprus has also singed the additional Protocol

for the Prohibition of cloning of human beings. Furthermore, a bill for the establishment and functioning of the National Committee of Bioethics has already been submitted to the Cyprus House of Representatives. We hope that with its establishment the Committee will make possible the continuous observation, research and systematic examination, analysis and evaluation of the moral, ethical, social, humanitarian and legal subjects and problems. Subjects and problems that are related to scientific research, progress and the application of sciences like Biology, Medicine, Genetics, Biotechnology as well as for the medical care and human intervention in the biological process and the human genotype such as euthanasia, transplants, artificial fertilizations, bio-medical research and cloning.

The time that this conference is taking place and the global situation inescapably have led me to certain thoughts and comparisons that I would like to share with you.

We live at a time when science and technology have bridged the gap between reality and fantasy. Their level of development today allows for the solution of difficult problems faced by humanity and for the formulation of new prospects of development of the human civilization.

However, the unprecedented development in the fields of science and technology has not only led to the opening up of favourable prospects but it has also put humanity in front of many and painful stalemates. At a time when overproduction is the norm, a large part of the world goes hungry, the gap between the rich "North" and the poor "South" is widening, wars, terrorism in its many forms, epidemics, the great environmental problems and the danger for a nuclear or biological disaster are a shame for our civilization and put its future under threat.

In our time the matter of the rational exploitation and management of the achievements of science and technology is of great importance for the human civilization. Their rational exploitation demands the re-definition of targets and orientations in the political approaches and attitudes so that they can serve man and his noble goals, to serve the needs of social development and not expediencies and selfish interests.

The moral dilemmas of development and progress that man finds before him today are many and intractable. Among the dilemmas that humanity is called to examine and solve, those deriving from the implementation of Medicine and Biology and those of Bioethics hold a prominent position.

The study of moral dilemmas in Medicine has its own long history. It could be said that Bioethics is a science so ancient as the famous Hippocratic oath. The study of moral dilemmas about medicine starts in Ancient Greece about the 4th century B.C.

In the work of Hippocrates, the most distinguished doctor of antiquity and founder of the scientific medicine as opposed to religion and magic, the first moral rules defining the ethical and morally correct behaviour of doctors are written down. Very important is the aphorism that a doctor has to do the right thing but also not to cause any harm to the patient.

In the Hippocratic oath, which is the most ancient ethical code of the medical profession, the doctor's duty to do the right thing and not cause harm, to be discreet and keep the confidentiality of information, to respect the patient as well himself refraining from sexual and interpersonal relations with his patients inter alia, are carefully defined.

Similar texts, very often echoing the Hippocratic oath, can be found in other civilisations, as i.e. in ancient China and in India. The common idea is the urge to the doctor to put aside everything that is personal in view of the value of his patient's life. Ethics and moral principles 2000 years ago and more.

The revival of ethical rules and values was attempted many times as for example from Thomas Percival who co-wrote and published his code of Ethics in 1803 in Great Britain.

The course of humanity through the 20th Century multiplied the ethical dilemmas and made them more complicated as a result of progress in the fields of Medicine and Technology.

But the most tragic thing of all is the fact that despite the scientific and philosophical progress, the man of the 20th Century recorded two World Wars and used, in their duration, not only the physical violence he could avail himself but also the power of his mind and its science in the worst possible way. So, modern history recorded crimes against humanity so severe that they cannot be deleted and should never be forgotten. Modern man struck severe blows to science by using it to provoke genocides and nuclear destructions, racist segregations and Frankenstein types of experiments.

From then on, man was forced to put himself on trial for his crimes in Nuremberg and to draw a new code of Ethics.

It is obvious that we live in the new era of Genetics and biogenetics but it would also be useful as in every important period or event of man's course, to turn to History and draw wisdom, experiences and lessons, hoping to be protected from current and future mistakes and dangers.

Furthermore, it is also interesting to note that in ancient history, apart from the first reports on Bioethics we meet some meaning of Genetics, as in Mythology and particularly in the history of the birth of the Olympian Gods.

Marriages between relatives, births of children with serious defects, like the Cyclops, births through a process other than traditional sexual reproduction and many other phenomena remind us of contemporary defects with no adequate cure or the famous development of cloning and much else.

Illnesses, suffering and weaknesses, then as now more than 2000 later. In spite of the fact that a lot has changed and remarkable progress has been made in science, a lot of problems have still not been adequately solved and a lot of illnesses remain incurable.

Science, therefore, continues to have a duty towards today's global community. It should improve health care, bodily as well as mental, as much as possible and equally for all. It is imperative that the scientific community proceed with its research efforts wisely.

Acquiring the necessary awareness, society must aid the work of the scientific community, become a partner and share responsibility in the decision-making regarding dilemmas that are as serious as the following:

- Where are we headed? Where is scientific and technological progress leading us?
- Where does scientific progress stop and who defines the boundaries when they are needed?
- Do we want to be at the mercy of progress or do we want to be partners and walk with science on a good and moral path setting the limits where it is necessary to do so?

It is questions like these that today's Conference comes to deal with and we hope that the hosting of this Conference on the ancient city of Paphos will pass on to you the wisdom of antiquity and the scientific spirit of modern civilization so that you reach mature and useful conclusions.

With these words I declare the opening of the 6th European Conference of the National Committees on Bioethics.

Address by Mr Constantinos Deltas, Head, Department of Molecular Genetics, The Cyprus Institute of Neurology and Genetics

? r President, Ladies and Gentlemen,

Good morning and I would like to thank the organisers for giving me the opportunity, to share with you some of my personal views and perhaps the views of others on modern genetics. In a way, I was asked to give a talk on genetics, kind of an overview, and I guess I should try and be a little provocative so that I generate some action and some debate on modern issues on genetics and ethics around it. Of course the ethics are not specifically and only related to genetics, but we should all know by now that almost in every aspect of modern medicine there is an element of genetics, either small or large, and I don't think anyone can deny anymore that genetics is everywhere. **In fact, I tend to believe that if there is destiny in this world this is in genetics.** We can all change our fate depending on how we live our lives and what we do during our lives. But whatever we inherit, so far at least, is impossible to change it. **So, if there is destiny, it is the destiny of what we inherit in our genetic code.**

So, what is genetics? I think that everyone of us could have his or her own definition. My definition is inspired by Prof. Victor McKusick, who I guess everybody knows. So, genetics is the science that studies biodiversity. There should not be clinical or molecular genetics or molecular biology, should there not have been diversity among living organisms. Can you imagine looking at everyone of us with the same face, same body, and same way of thinking? There is biodiversity. And that's the beauty of life after all. We are all different, and this difference is within our DNA.

The environment changes us, but our capabilities to a great extent are written within our DNA. I could not be a geneticist if I would not show at least one pedigree. And I'm showing only one pedigree simply to emphasise that genetics deals also with inheritance or inheritability. What we inherit, is what our parents have inherited from their parents and so on and so forth. There is a saying in Cyprus, and perhaps in the whole Hellenic world, that children inherit from 7 generations. We all know that we don't only inherit from 7 generations, but we inherit characteristics from an innumerable number of generations – perhaps I have inherited something that somebody in the very distant history of Greeks, had written in his or her DNA. So whatever we have today as genetic characteristics is what we have all inherited over thousands and thousands of generations.

Speaking of genetics and reproduction – a very hot issue nowadays- I don't think anyone would disagree, with the following Thesis (and remember, whatever I say is not only what I think, but what I think other people might also think, and we can discuss it if you wish). **My Thesis is that everybody is entitled to a healthy baby**. However, we all know this is currently impossible. We all used to be squeezed within a male sperm (slide with the medieval concept of the embryo accommodated

within the sperm). This is a sperm, and you can see yourselves in there. That's how people in the distant past used to think human beings were created. We've gone a long way since then and I don't intend to make the non-geneticists in this room, geneticists, but very briefly, allow me to say that the history of genetics started with Charles Darwin who first spoke of natural selection and evolution.

Not too many people doubt evolution nowadays. The creationist approach is there, and we can accommodate it, or the other way around, within the creationist approach we accommodate natural selection and survival of the fittest. And of course after that was Gregor Mendel, who we agree and accept as the father of modern genetics, when he was doing his first experiments with peas. And of course James Watson and Francis Crick who first described the DNA double helix. If we were to place a landmark on modern genetics, it all started with the double helix. I would say that at the beginning was the word, or at the beginning was DNA. After that, during the past 50 or so years, there has been a tremendous explosion in understanding and achievements in genetics and molecular biology.

According to Victor McKusick again, the entries of genetic loci have experienced a geometrical increase during the past decade, and we are now close to 10,000 entries on the online Mendelian Inheritance in Man. And this is, I repeat, the Mendelian inheritance. And we all know that there is non-Mendelian inheritance as well.

About 13,000 entries are there – and about 10,000 established genetic sites whereas the human genes are about 35,000. Up until only a couple of years ago, we used to think there were close to 70,000 or 100,000 different genes in our human genetic code. We now know it is much less. In fact it was kind of interesting and peculiar when we discovered that we have only about double the number of genes that flies or worms have. We knew it; we perhaps didn't want to admit it – that we are the products of evolution of germs and flies. **It is not the number of genes that makes us humans, it is not the number of genes that makes us Homo sapiens sapiens, it is the regulation of those genes.** Obviously, you can imagine, with 30,000 or 35,000 genes, the interaction between those genes and the complex regulatory mechanisms are so astronomically enormous that we cannot even imagine. There is a long way to go before we can figure out and dissect these complex regulatory mechanisms.

I don't know when we will be able to tell "This is what makes us humans and not mice". But certainly, I believe there will come the day when we will be able to understand exactly what makes a cell become a mouse cell and another cell become a human cell.

Modern medical genetics deals with the individual before us, the individual asking for information, asking for help, either for reproductive purposes or for other purposes. Well! Everybody cares about this individual, for one reason or another: the doctor, the society, the employer, the parents, the church, the hospital, the insurers, the children. **First of all we should care about this individual in need.**

This is my mission in genetics.

"I believe that the sacred purpose of our work as geneticists is to make the link from the dramatic picture of the affected individual, who is the patient as a

human macro-entity, to the patient as a molecular, biological micro-entity. The next feat is the prevention or correction of the molecular malady".

And what I mean here is that speaking of genetics and heritable disorders, there is always a defect. There is a defect in the DNA, which was inherited by generation upon generation. For a great number of those genetic disorders we now know exactly what went wrong. Knowing what went wrong doesn't necessarily allow us at this point in time to correct it or to get around it, either by intervening with the development of the individual or by changing the life style. For some of them we can. So this is were I believe that our purpose as geneticists is to make the link between the individual, the patient, and the molecular biological defect.

Of course I know that for those who are clinicians the patient is a patient as a whole – however, if there is a specific, determining genetic defect many times it's not enough to deal with the patient as a whole, we have to deal with the problem, and the problem may be in the genes. If it is in the genes, you have to do something about it. This is why modern genetic therapies, we hope, will find solutions to some of these problems - I hope to everyone of the problems.

So, we have to make decisions. If the centre of our attention is always the human being in need, then we cannot go wrong in decisions. Perhaps during this excellent conference we will have the opportunity to discuss things, and I am absolutely certain there will be different views from clinicians, from geneticists, from lawyers, from insurance people. We cannot agree on everything. But we should all agree on one thing – that the centre of our attention should be the individual human being.

Molecular tests: We have all heard of prenatal tests, for thalassaemia and cystic fibrosis and others; preimplantation diagnosis for fragile X and muscular dystrophy; presymptomatic diagnosis for polycystic kidneys and Huntington; carrier testing for hemochromatosis and phenylketonuria; or for disease confirmation such as for familial Mediterranean fever or trisomy-21. These are all reasons, and perhaps there are others, for which somebody asks for molecular testing, and this is one aspect that I decided to touch upon. I know you may have, in your views, other ways of dealing with genetics and transplantation, for example, but being a geneticist I thought I should touch upon these and say that, yes, trying to find an answer to our destiny (I repeat, destiny is written in our genes), we have to do molecular testing. And this is our very being, genetic defects.

We know that out of the 3 billion nucleotides we have in our genes, only a very small percentage, 3-4%, is expressed – well! What's the rest? Are there any molecular differences in there that we have to find, either by preimplantation or by presymptomatic molecular testing? Well! There might be. And I dare say that within that 97 or 98% of the so-called junk DNA, what is written in there perhaps contains our long molecular evolutionary history. Something that we have been discussing with Dr Serrão during the past 5 minutes and we tend to agree. If we could read that genetic code in the correct way, because it is a code, then we should be able to learn a lot about our long past evolutionary history.

Mode of inheritance: Let me reiterate that I don't tend to make geneticists of those who are not, but let me tell you there are 5 or 6 or maybe 10 different ways to inherit something. And then the big-big question is non-Mendelian inheritance. This is where things become difficult. If you inherit one defect and develop a disease, that is easy nowadays for every geneticist – it is supposed to be one simple test. You take some DNA, you do a molecular test in a test-tube, and if there is a mutation: you have a disease. If there is no mutation: you do not have this specific disease. However, the majority of molecular differences between us, is what we call polymorphisms. We know that we are all humans. We all belong to *Homo sapiens sapiens.* We all have about 3 billion nucleotides and we all have about the same genes. Rather, we ***do*** have the same genes. However, there are thousands and thousands of differences between you and me, or between you and the guy sitting next to you. Those differences, in their interaction with others, many times create diseases. It has not been easy so far to make the link from these differences to diseases like diabetes, osteoporosis, Alzheimer's, asthma, essential hypertension, schizophrenia, and many others. This is the challenge of the 21st century.

There are monogenic diseases, digenic and polygenic, as I have just said, and of course, there is environment. In genetic diseases, in addition to genes, environmental implication may also be involved. And we know that in many occasions a specific mutation results to a specific phenotype. In other cases the occurrence of two mutations gives also a specific phenotype. However, at other times, one or two mutations give a no specific phenotype.

What does this mean? It means that we don't know enough. We know that in addition to mutations there is environment. And what is environment? That is a very, very big thing. Environment is everything that is not genetic. It is nutrition, climate, smoking, alcohol, medication, drugs, radiation, stress, exercise and whatever you can think of that is not genetic.

We tend, as geneticists, as I said at the very beginning, to believe that everything is genetic, or for everything there is a genetic contribution. Well yes! But there is environment as well. And genetics has evolved within this environment which has been changing. And therefore the evolution of genetics is changing.

Disease risk: Something that we all in our lives as geneticists or others around us deal with. What is a genetic risk? Low risk vs high risk. What do low and high mean? If you tell somebody they have a 50% risk – that is high, or is it low? You tell somebody that he is at 25% risk to inherit or develop a disease. According to different people you may find that 25% is very high, for others it is low. Other times, it is not even possible to put a number, so you say it is higher. It is higher than the general population. Or it is lower than the general population. Even for professionals it doesn't help much.

We have to become educated, we have to learn how to deal with risks, we have to learn how to deal with what our genetic make-up predispose us for. And of course there are mutations and disease, where you get a phenotype. You inherit something; you get a phenotype - a serious or milder disease**. But, many times even if you do get a mutation, what you inherit is not the disease, but the predisposition.**

What's a predisposition? It is an increased risk for developing a symptom or group of symptoms. If you inherit a predisposition and symptoms occur, the frequency or percentages are immaterial. Let me explain myself. Often we test, for example, for deep vein thrombosis or for a cardio-vascular defect or for cancer. And we tell the patient or the potential patient s/he has inherited a predisposition to develop some symptoms – the predisposition is 2% or 10% or thereabout. If you inherit this predisposition it is possible that symptoms may never occur during a lifespan. Someone may live 80 or 90 years, and although he or she had inherited the predisposition, symptoms may never occur. However, if symptoms do occur, the percentages are immaterial: the symptoms are all yours. They will not happen only by 10 or 15%; it is all there. If a pregnancy has a high risk for trisomy 21 because of old age or other parameters, it can be expressed as a percentage, a probability, but if trisomy 21 occurs, it occurs 100%.

Everybody is predisposed to something. We have learnt that by now. Everybody is predisposed to something. You, somebody out there, are predisposed to heart disease. You are predisposed to cancer. You may be predisposed to diabetes, you may be predisposed to deep vein thrombosis or you are predisposed to recurrent pregnancy loss. I am predisposed to…….. Well! I don't want to know.

However, while it may be my right not to know, I may still have to be tested. This is a new challenge. This is a new way of administering genetics, because as we all know, in many cases it is impossible to offer genetic testing and counselling if you don't examine a whole family. And a whole family means the person asking the counselling or the testing, and of course his or her parents, uncles, aunts, grandparents, if they are available, or cousins, so that you can do a family tree and genetic analysis. Sometimes you may even need to examine their children. Well, there may be someone from the younger generation asking for testing and the first cousin doesn't want to know anything about it. However, it may be a very critical sample in order to reach a conclusion. Should that person be forced to give blood and participate in the testing? It is open to question. I say yes! If he doesn't want to know the results, let him not know the results, but if that result is going to help somebody downstream, why not do it? It is not going to be easy – that is where education again is needed.

Carrier testing: What monogenic conditions would you like to be tested for? Or what predisposing mutations would you like to be tested for? As I have said, we are all carriers of some mutations. Some of us develop some phenotype, some of us don't. But if we were to be tested for a specific one or more conditions – which ones would you choose?

Critical decision-modifying questions.

Is there a cure for the disease to be tested for?

Can I modify my lifestyle and avoid the disease?

These are very critical questions which, yes! Unavoidably are going to modify our decision to be tested for one or more mutations. But I still believe that there will be a day, that everyone of us will want to be tested for a battery of mutations. For a

battery of genetic defects, because there will be a way to intervene and avoid development of symptoms. Well! What monogenic conditions would you like to be tested for? Perhaps haemochromatosis, perhaps Familial hypercholesterolaemia, perhaps Factor V Leiden, and who knows what else.

I mentioned these three, not because I like them, but because I've seen the literature of others as well to be for it. Apparently, for some of these diseases, and perhaps for others of which I don't know, there is a reason to be tested for. Even though you know right now that you're absolutely healthy. But of course, as we all know, everybody is healthy until they become sick. You drive your car, and all of a sudden you experience a heart attack. Nothing before that could have given you any indication of this condition. But had you known you were a carrier of a mutation in the LDL receptor, you would have done something.

My genetic testing and others - question: Why should I be tested?

Probable answers:

Because I want to be, or because my son wants me to, or because my insurance company wants me to, or because my employer wants me to, or because my future employer wants me to.

What is the correct answer to this? Should everybody be tested because the insurance company wants it done?

Future prospects – you see, I'm not only trying to give answers, but to generate questions. Incredible as it may sound, some day, not in the too distant future, genetic testing for nearly all major genetic conditions will be a reality. And incredible as it may sound, in the next few decades genetic therapy and perhaps designer babies may be a reality. We should be prepared to discuss this regardless of whether we accept it or not.

Ethics – there is a place for ethics, of course. But let me say that ethics has not always been the same, and it's not always going to be the same. When there are ways, logical and radical ways for intervening, I think that everyone will agree that we should do something. Today's ethics try to deal with our inability to offer to every future parent a healthy baby. We may feel sympathy for less privileged human beings that have inherited a serious genetic defect. We cannot, and we should not feel responsible for the health or genetic status of not-conceived embryos. Let us not deal with imaginary problems. Let's deal with the problem at hand. It's a challenge at the very beginning of the 21st century to deal with these problems and with even more difficult that are coming before us.

Food for thought – we are the result of a long evolutionary process. This process is still in progress. However, up until just a few years ago, the process was **natural selection** with God's intervention. Currently, some aspects of evolution are far from natural – they are deeply influenced by human intervention and **human selection**. What do I mean by this? I mean that natural selection still plays a part. However, even among the present congregation, there may be people with diabetes, or people with heart problems, who would have not been among us, had there been no human intervention. **This is not a natural selection**. Giving insulin or experiencing bypass surgery keeps us alive. Fifty years ago, nobody would have done this: they would have died. Children, many children around us with thalassaemia, cystic

fibrosis and many other serious potentially lethal conditions would not be around us if it were only natural selection. **So, there is a place for human intervention.**

Food for thought – cloning. Cloning will be one fundamental means of introducing in the gene pool somatic mutations, which would have never found their way into life. Well! It is very obvious. Everyone of us at this point in life we have collected or accumulated a number of somatic mutations in our body cells. I utterly believe that – I've seen it in the laboratory. We accumulate mutations, and if you attempt cloning by using somatic cells, it is unavoidable to introduce some of these deleterious mutations in the gene pool and to generate human beings that have features and genetic characteristics, which normally would never have existed.

Let us think about it. Will any insurance company or any public health system agree to provide proper coverage to a cloned baby? In fact, should they? And of course there have been a lot of sayings, and debates and discussions about cloning. One main fear has been that by cloning people we will generate at will many Nazis or Hitlers or bad people, with or without brains, who are going to be the bad guys, going around killing people.

Well! Cloning was not the method of making the twin towers fall down. The terrorists did not use cloned people to do these evil things. And at the same time, Jesus Christ did not use cloned people to teach the world about **LOVE**. He did not use cloned fishermen to do this.

And I would like to say that, YES! DNA and our genetic code are our destiny. So if it is our destiny, what is left to be done at this point in time when it is impossible to change our genetic destiny, what is left to be done is education, education and only education. It is the only way to influence our genetic destiny.

Mrs Rena Petridou, the representative of Cyprus in the Steering Committee on Bioethics of the Council of Europe, said something in her opening speech yesterday, which I would like to comment upon. She said: "Are there any moral and legal limits in science?" Well! There should be. Definitely there should be. But science on it's own has no limits. I think it's going to be a grave mistake to think that science, as a science, as a subject, will ever have limits. Mrs Petridou said: "Must anything that is made possible according to the progress of biology and biotechnology be adopted and implemented without any limit or criteria?" No! Absolutely no! And she continued: "Could even these opportunities bring a change to the species of Homo sapiens, with his present characteristics and qualities?" Well, we know that Homo sapiens sapiens has not been the only human being on this planet. I know of at least two others – Homo erectus and Homo neanderthalis, who lived on this planet for millions of years and then they disappeared. I don't mean to say, and I don't think we are going to be the one and only human species on planet earth. I don't wish that this species would disappear. **But certainly, as we are still the objects of natural selection and human selection and evolution, there may be one or more human species in the distant future**.

I am showing Narcissus, this is a beautiful unique mosaic from Paphos that you may have the opportunity to see and visit. Narcissus was in love with himself; if it doesn't show well, I'm telling you that he admired the reflection of himself in the

water. He was very beautiful, and he fell in love with himself. Well! We have done a lot as geneticists. **The progress has been enormous, but let us not think that we have done everything. There is unimaginably a lot more to be done.**

Thank you very much.

Address by Professor Stefano Rodota, Professor of law, Chair of the Italian Authority on Privacy.

Thank you chairman. Ladies and gentleman, dear friends, what is happening in Europe? Of course, I cannot enter into every detail, and I would like only to draw your attention, and first all to try to **problematise** some current, very well-known discussion, and to draw your attention on three main trends and on one general question.

The trends – the search for common principles, the **Rohig** institutionalisation of bio-ethics discussion, which are the more critical points of this debate, looking at the possible future developments and at its individual and social challenges. The question is can we escape the so-called DNA mystique? So we can say that there are some important attempts to have common rules and to share the same values at European level. At the same time, the European bioethics agenda and discussions reflect cultural diversity, conflicting values, strong economic competition. In the first direction the search for common rules, the most important achievement, is at Article 3 of the Charter of Fundamental Rights of the European Union, proclaimed in Nice in December last year and where essential bioethics rights are fully recognised, starting with the general right of every person to healthy, physical and mental integrity. More specifically, the Article says that the free and informed consent of the interested person must be respected, and that what are prohibited are eugenics aimed at selecting persons, making the human body and its parts a source of profit, and the reproductive cloning of human beings.

I would like to insist on this last point, because I was a member of the Convention drafting the Charter, and I would like to say that reproductive cloning of human beings was **awarding chusan for making possible all other forms of using cloning techniques.** In order to understand correctly the specific rules, the general framework of the Charter must be conceded, looking especially at the fact that Article 1 states that, I quote, "human dignity is inviolable. It must be respected and protected.". So dignity becomes the founding principle of the **wool C**harter. It's true that the Charter still has formally no legal binding force, but its entering step by step into the ordinary world of many European institutional bodies.

A more analytical set of common rules, you know, can be found in the Council of Europe convention on human rights and biomedicine. But precisely this convention makes evident the main contradiction inside Europe in the field of bioethics. Look at the countries that have not signed the convention, especially Germany and the United Kingdom. Their decision not to sign has been motivated with quite opposite reasons for instance regarding embryo research: too restrictive for the United Kingdom, too open for Germany. So Europe appears to be deeply divided on the same issues we

can discover positions and attitudes going from a big liberal attitude, taking into account also the market logic and forms of total refusal grounded on ideological or religious reasons.

In some countries it means that Parliament prefers not to intervene, in others, on the contrary, the Parliamentary majority could try to impose its values also for matters where individual self-determination could be respected as a fundamental right of the person. Taking seriously into account this bioethical divide among countries, many independent bodies have been created at European level, also conceived as places where different or opposite points of view can seriously **confront themselves.** I would like to mention only the European Group of Science and New Technologies, appointed by the European Commission and that was published in 15 opinions dealing with very important issues like embryo and same cell research, cloning, patentability, prenatal diagnosis, human tissues, data banks, healthcare information and others. Another group particularly devoted to genetics has been created by the European Commissioner for research, **the scan**, and the European Parliament created in December 2000 a temporary committee on human genetics, the final report of which will be discussed and voted by the Parliament this month, dealing with very important issues like genetic testing and embryo research, patentability in the field of biotechnology. The existence of these bodies shows that there is in Europe a continuous process of institutionalisation of bioethics debate, as it is also shown by the fact that Germany joined the club of bioethics' committees precisely at the moment where the public debate on bioethics became highly controversial. Which ethics can produce this growing institutionalisation of bioethics? Of course it can reinforce the role of bioethics committees as an essential tool for a permanent and open debate on ethical issues inside the public opinion. But committees could also be perceived now as the place for building up a social consensus around some difficult and critical issues that could be difficult to reach through the legislative process only. Many cases make apparent the present difficulty to legislate in the field of genetics. Many countries do not legislate on genetic information and insurance, and accept a unilateral moratorium by insurance companies. Rules on stencils are postponed, waiting for the bioethics committees' opinions as happened in Germany, where the newborn ethics committee has firstly asked for an opinion on the subject. In France, in addition, the 94 bioethics laws fixed for 99, are still pending. Many questions arise from these examples. How we can select the fields where legislation is needed? And if we agree that legislative rules are needed in some fields, do we need analytical rules or may be it is better to have general principles that can be adapted to different situations by social bodies.

Answering these questions is more and more important, because during the last 2 years the European debate has focused precisely on genetic issues. An impressive agenda of genetics issues has been concerted, which is reflected by the agenda of our countries. The main problems raised, and the main initiatives undertaken, could be referred to the following group of issues. The construction of the personality, the construction of the social relationships, the construction of economic relations. Looking at the first issue, it's noteworthy to mention that many countries are recognising the right to know his / her genetic offspring as a fundamental right of the person. That is a consequence of a long debate and reflection, but also of the so-called DNA mystique, reinforcing blood relationships giving more room to the use of paternity tests and all that could dramatically affect

established family relationships. It is also noteworthy to mention that in some cases the right to choose the sex of the child not only in the case already admitted by some legislation not to transmit some genetic disease is admitted also when many children of the same sex were conceived by the same couple, choice replaces chance. The perspective balance between sex being a sufficient ethical justification, all we are entering the realm of a growing individual autonomy, made possible by scientific innovation, and could consequently pre-implantation diagnosis made freely accessible by all.

The access to genetic data of other people for making possible individual choice can be illustrated by a case submitted to the Italian data protection commission by a lady asking for her father's genetic data. I would like to remember that under Recommendation of the Council of Europe (97) 5 genetic data are those data that irrespective of their tie concern "hereditary characteristics of an individual" or concern the pattern of inheritance of such characteristics within a related group of individuals. So, based on this concept, in 1999 the Italian Data Protection Commission granted the lady the authorisation to access her father's genetic data, against the latest will. The lady had applied for access to the data in order to take a reproductive decision by assessing the risks of the transmission of a genetic disease which had affected her father. The application was granted on the ground that the lady's right to health, meaning bodily and mental health in accordance with the WHO definition was to override her father's right to privacy. However, this conclusion could only be reached on account of the peculiar nature of genetic data which are transmitted from one generation to the other and therefore represent a common heritage for different individuals. It means that genetic data cannot be considered under the unique control of the individual but as part of the common heritage of the group. So this group constitutes a new legal entity including, for instance, the gamete donors and the anonymous parents in countries where anonymity is permitted in case of adoption, or of legitimate refusal of the mother to be indicated as such as the moment of birth. But which must be the rules for accessing and making xxx genetic data inside this group? Moreover, this case, as with all cases of treatment of genetic data of being a sample by databanks show how bioethics in data protection are more and more connected. Protecting privacy is becoming a crucial issue in this field. One of the elements to be taken into account for the ethic evaluation of some personal treatment or personal data treatment. At the same time the principle of dignity, founding principle in the charter as already recalled, must be taken into account when the creation of new genetic data banks is proposed. As it happens, for instance, every time an alarm for sexual offences is raised, all the aim to fight against terrorism is alleged as is happening today. A confirmation of this general problem and the importance of genetics and data protection convergence has been given a few days ago by the meeting of the German data protection commissioners, whose final document asked for new specific and analytical rules for improving and making effective the genetic self-determination right. In this more general perspective, the right questions according to the title of a UK human genetic committee document could be: whose hands on your genes? It means, for instance, under what conditions do genetic data of the WHO community could be sold for genetical research. It is what happened in Iceland, it is now happening Estonia, in **Tong Islands** in some isolated Italian communities. Second, under what conditions can genetic material be patented – this point is at the centre of a large debate, and an opinion of the Group on Ethics and New Technologies is expect and the xxx dealing with the problem of stem

cells, and as you know, at the beginning of October, the European Court of Justice dismissed the application of the Netherlands, supported by Italy and Norway, against the European Directive on legal protection of biotechnological inventions. So, bioethics and genetics are not only connected with information technology and data protection, they are more and more influenced by the market logic. It has been made apparent by the debate on embryo research, stem cells, therapeutic cloning is now the largest discussion in Europe. I do not like to make a reference here to the human cloning debate has been reopened by some declaration of an Italian doctor without any significant scientific evidence. But the other debate on embryo stem cells, cloning, therapeutic cloning truly affects the perspective of the research. It cannot be reduced to a clash between a business oriented attitude an ideological and religious refusal. It needs distinction and an analytic and realistic attitude.

……or not approach, related to the creation of embryos for research. In this perspective also the gender problem can be raised as an opinion of the group on ethics and new technologies pointed out, looking to the risk to exploit women for having xxx for improving this kind of research. At the same time, very well known issues must be reconsidered, after the last achievement of the genetic research. First, the latest legal status of genetic data. Are they different from all other personal data? Can they be classified amongst sensitive data according to the European Directive of 1995, on data protection, and according to the provision of many European national legislation, can the right not to know become a source of personal and collective responsibility, as some scholars have pointed out? Second, the intervention of germinal line for avoiding the transmission of genetics disease. How can the genetic field play a role in this field, can we draw a line between individual sound, eugenics on a massive scale, and the socially bad eugenics – must we ensure the quality in the access to genetics engineering for humans, otherwise the social stigmatisation of people with genetic defects will increase dramatically. Third, the social use of genetic data in a forensic perspective – are we socially aware of the risks more evident are the first results of the mapping of human genoma of transferring some clinic, highly probabilistic data in a purely social context, where they could gain a dangerous objectivity that can ground discrimination.

There is still the frequent problem of the access to genetic data by insurance, insurers and employees, which will be discussed in detail in today's later session. I would like only to go back to the Council of Europe convention on bio-medicine it not only provides against any form of discrimination against persons on grounds of xxx-genetic heritage, it also provides that genetically predictive tests may be performed only with the consent of the interested individual, subject to an appropriate genetic counselling, and mainly only for health purposes or for scientific research linked to health purposes. That means that in countries having ratified this convention, genetic tests cannot be performed on behalf or for the initiative of insurers and employees, and more general speaking for purely economic interest. Among the values treated, is there also that one of a two speed Europe between countries where the convention is applicable and others where it is not. Could it for instance be xxx the insurance market, would individuals looking for the countries where legislation is much more protective of their genetic rights. This xxx point, and I am concluding, reflects a more general issue. What can happen if some fundamental rights are protected in different ways, mainly in the countries of the European Union, where persons freedom of circulation is fully recognised. Will a general tourism of rights arise? We have

known the abortion tourists, we can face procreative tourists, if some states adopt a prohibitionist attitude. The mobility of persons will be also influenced or determined by the search of the basic place to have their own rights best protected. This issue is crucial. It deals with the limits of legislation and the way each of us can develop his / her personality in a full autonomous way. This point is very important – also in a broader context, because, as you know, some scholars say that after the 19th Century as the century political freedom and the 20th century of social freedom, the new century will be the one of the true and complete moral freedom. Call it the final freedom. Thank you for your attention.

Address by Professor Bartha Knoppers, Professor of Law, Faculty of Law, University of Montreal

I was asked to speak to you today about genetic discrimination in insurance and employment, particularly as concerns American and Canadian practices. I will begin my presentation by describing some current practices and the results of a recent survey that puts into question alleged genetic discrimination of the last decade. Then I will describe to you the difference between Canadian and USA practices, followed by current concerns for genetic discrimination in insurance and employment, and spend most of my time on current North American approaches in Canada and the US and finally, propose conclusions.

Insurers in Canada and the United States do not currently require applicants to undergo genetic testing. It is not a requirement to take a genetic test. But they do rely, and have always relied, on actuarial information and health questionnaires which could include questions, and have always included questions, related to family health and previous genetic tests. A recent study demonstrates that genetic discrimination in the United States and Canada exists, but it is rare. And where it exists, it is largely in the eye of the beholder.

In a survey done by Dorothy Wertz among health professionals, primary care physicians and the public in Canada and the United States, some reported "that because of a genetic or inherited disability or disease they, or a family member, had been denied or let go from a job, or had been refused life insurance. When asked to give details of their refusals, however, almost all described situations that are characteristic of broad, general employment practices, or general insurance practices. They were apparently objecting to what they perceived as unfair insurance practices in general, rather than practices specific to genetics. ”

I’ll come back to this issue of perception at the end talk, but I think it’s very important because people often point to the dangers of genetic testing or participating in genetic research, because of the North American market system and the alleged discrimination that exists, which this study shows not to be true.

Now, in the United States you have an option to be self-insured, also in Canada, but in terms of health insurance, Canada has a universal healthcare system. For the rest, in terms of other options available to employees or insurance applicants, the choices are pretty well the same.

So here we have, one continent, two situations. In Canada, universal healthcare system is based on solidarity – the idea that by contributing to the whole, there will be greater equity and justice for all citizens. In contrast, there are 43 million Americans who are uninsured or uninsurable in terms of health insurance. Most Americans subscribe to what are called HMOs. HMO stands for health management organisations. And this is interesting, because a recent study showed the following. Eighty per cent of Americans belong to health management organisations, mainly through contributing through their employers. You have a double effect here – your employer, in the United States, also provides you with health insurance. You can see how intimately linked questions of access are in this area.

Car manufacturers in the United States spend more on healthcare than on buying steel. In 1995, General Motors, the largest purchaser spent 3.6 billion on healthcare for 1.6 million people. Big employers shop around to find cheap HMOs and form partnerships with them to make healthcare delivery more efficient. For their part, HMOs look for employers with healthy workforce, and restrict the kind and extent of services that they are ready to offer. This is fine if you are not pregnant, not old or not chronically ill. In the end it is an insurance contract, not a physician, who may decide what tests are ordered and when a referral is made, and what treatments are offered.

I'd like also to mention that we have been very slow in Canada in integrating genetic tests into our universal healthcare system. One, because we're not sure of their efficiency in terms of scientific validity, but also because in a universal healthcare system, as you know, important choices have to be made in the allocation of resources. And when you're dealing in our society with a phenomenon gentrification that is, where the population group aged 80 – 90 is increasing at a faster rate than a population under 25, you can see why the widespread integration of genetic tests would have a tremendous implication on costs if you are also mandated to provide genetic counselling.

So genetic discrimination is still relatively irrelevant for Canadian health insurance, compared to American health insurance, where it could play an important role.

Now, in the absence of any specific prohibitions or laws or moratoria, genetic information is currently subject to the same confidentiality rules as other health information. And we know that with the "consent" of the person concerned, employers and insurers already have access to healthcare data. It is a condition for the contract.

So what is this tool – how accurately, (leaving the monogenic mendellian diseases aside with their 1 in 2, 1 in 4 pattern), will genetic tests predict future health conditions? There are also economic, environmental and sociocultural factors that come into play. What will be the impact on treatment? What will be the cost of integrating them into healthcare? Should they be permitted, we will hear a lot about that today and perhaps most importantly, how accurate will actuarial data be if combined with genetic information? I would defy any insurer, national or international, to be able to demonstrate scientifically in a professional way that the

current actuarial tables used to legitimately discriminate amongst applicants are scientifically up-to-date. How will they integrate the probabilistic nature on the role of genetic factors in common, complex diseases. All right, what is happening in North America?

Turning to North America, there are currently three models. The first is the privacy protection model, under the HIPAA this stands for the Health Insurance Portability and Accountability Act. There are also other privacy rules in the United States and there is the Personal Information Protection and Electronic Documents Act in Canada. This model requires authorisations from individuals for access to any record. It covers personal data in a very broad encompassing definition. Its principle concern is for electronic transfer because there are modern pieces of legislation which try to limit the types of disclosures that can be made without personal consent. This broad model encompasses medical information as well, since it is not excluded. For example, the Canadian Personal Information Protection and Electronic Documents Act was a document largely written by Industry Canada for commercial activities which unbeknownst to most includes health data. Why? Because it covers commercial activities and as we know more and more research, genetic research today in particular and medical research are increasingly sponsored by private/public partnerships. The very fact of having a commercial sponsor somewhere automatically brings this act into play. There is little concern in this type of legislation for a public health exception, that is for access without consent for epidemiology studies. HIPAA however does make an exception for consent as a requirement for public health monitoring, something that the Canadian Act to date does not.

The second model is a prohibitive one. Under the HIPPA, the main prohibitions are against excluding health insurance for pre-existing conditions. In other words, saying that when you signed on you were already at risk so we will not cover you because it was already there when you got your insurance. Such exclusions for pre-existing conditions are going to be limited under this Act as well as eligibility for other kinds of coverage.

The third approach is that of the Canadian Privacy Commission. It suggests that the definition of disability in human rights legislation should cover predisposition to being disabled and thus there would be a prohibition against any discrimination based on predisposition.

Now, my preferred model, if you want a transparent and honest approach is the last one, only I would not call it a disability model, I would call it a Human Rights model. This model has been in force since 1990 under the Americans with Disabilities Act (the "ADA"). In 1995, the Equal Employment Opportunities Commission (the "EEOC") interpreted The Americans with Disabilities Act to say that it included asymptomatic carriers. So already, in 1995, we have a recognition "the walking ill", those are known to be at actual or future risk but without symptoms. Discrimination would be prohibited under The Americans with Disabilities Act.

An illustration of this occurred in 2001 when the Equal Employment Opportunities Commission settled its case against a railway company. The Commission had taken an injunction against a railway company who was performing genetic testing on employees claiming for work related injuries (e.g. Carpal Tunnel

Syndrome). The employees were not aware of this testing. The EEOC took an injunction against the railway since it maintained that testing people in certain positions where they would be at greater risk for getting this Syndrome or finding out if they were going to get it, would be prohibited under the ADA. Not only is there a prohibition against discrimination for those already affected but also it is prohibited to regard or perceive people as being disabled because they are "at-risk", or, "susceptible" or "predisposed".

Similarly, in Canada there is a recent Supreme Court of Canada case from Quebec. It involved three cases that went to the Supreme Court together. The first involved people who had anomalies of the spinal column but they were fine, they could work. X-rays showed that they were potentially at risk and dismissed. The other cases as well, the claimants could perform the required tasks but testing revealed different actual or potential anomalies. The Court held that a handicap may be real or perceived and a person may have no limitations in everyday activities other than those created by prejudice and stereotypes. Thus, the actions of the employer contravened anti-discrimination legislation.

Under this approach then, courts would have to consider not only biomedical conditions of an individual but also the circumstances in which this distinction is made. The emphasis would be on the effects of the distinction, the exclusion, the preference, rather than the precise cause or origin.

Instead of creating an exhaustive definition of handicap or disability, it seems more appropriate to create a series of guidelines that will facilitate interpretation. These guidelines would allow the courts to develop notions of handicap or disability consistent with advances in biomedecine and technology and not based on social perceptions. What is a disability may or may not be a disability tomorrow and an overly narrow definition would not serve the purpose of human rights legislation. So generally, legislation or moratoria whether in Canada or the United States has two purposes: prevent unfair and abusive use of genetic information and encourage genetic testing and participation in research.

As we increasingly become familiar with and used to genetic information, could discrimination be lessened? Will we all be equally or at least equivalent in our genetic risk? It is very idealistic but it could happen. Maybe it will happen, and maybe one day those actuarial tables will be based on sound data. In the meantime, most countries with universal health care systems who are increasingly restricting their budgets are going to find a likelihood of a 2-tier approach emerging because people will be looking for additional health insurance to cover these new risks. So finally, a ban or limitation of access to genetic information could become too cumbersome a solution. Most importantly, we cannot define what is a genetic test. With the advances in proteomics for instance, most genetic tests are now protein or biochemical tests. Furthermore, genetic tests may be predictive but so is blood pressure, or cholesterol levels. What makes genetic information different?

There is a very long list of solutions proposed specific to insurance. The first is to offer insurance for certain amounts with no information on genetic testing. I will argue that this should be a sine qua non in that all modern societies should have a minimum of health, or, life or disability insurance with no questions asked.

Obviously, health insurance is available in Canada. The second is the idea of "genetic" insurance for an approved list of genetic conditions. Our speaker from the United Kingdom will talk about the problems they have had with lists of conditions or exclusion of particular diseases from insurance coverage. Why does this bother me? Well, because the whole notion that somehow having a genetic condition is different from other medical conditions that are part of the human condition in and of itself can only further contribute to stigmatisation and thus discrimination. If you cannot use certain genetic results, people who are found to be free of risk, yet come from "at risk" families, cannot give that information to insurers either. They cannot even profit from the fact that they are genetically "not at risk" when they come from "at risk" families. Furthermore, the whole notion that we can decide what is beyond insurance and so definitive that we can make lists of what is serious or not has implications well beyond insurance and employment (e.g. abortion) and I think is very hazardous indeed. All of these notions of what is serious are also culturally and often socially and economically defined or influenced.

What I would propose in conclusion is first of all improving the protection for medical data, (which I take to include genetic data) generally. For now we can consider it sensitive data. I think that like with psychiatry, or cancer 50 years ago, we are going the same route. We have to normalise. We have to integrate genetics into medicine. We have to destigmatise genetic information and not promote genetic specific legislation. Particularly, even though employment and insurance are private contracts, we should not allow insurers and employers automatic access to the whole medical file even where the applicant "consents". We should put the burden of truth on insurers and employers to say what information they need and most of all why they need it and scientifically demonstrate why it is important for them to have it. Finally, we should simply add to human rights legislation or interpretive guidelines, the notion of discrimination as including the perception thereof. Thus, you cannot discriminate based on age, based on sex, based on sexual orientation, based on nationality, based on civil status and mental or physical disability and so on but neither based on the perception of any of these characteristics. By putting "the perception thereof" at the end of that whole list, we will not only serve to cover the broad range of stereotypic prejudices found in respect of genetic diseases but to all the other items in the list, civil status, sexual orientation, age and so on. In other words, genetics could be a catalyst for greater social change by adding perception to human rights legislation. In conclusion, in the many approaches of moratoria, legislation, and human rights, we need to look internationally and see what has worked and what has not. If the object of an insurance contract is really a wager on your own disability or your own health or your own life expectancy, which is what it is, it is a "toss of the coin" between insurers and the applicant. Suppose you loose the wager and you become disabled or you die? The object of that contract is to put your dependents in the same place they would have been had you not been disabled or had you not died. In other words, it relieves society from the burden of taking care of those dependents. In the absence of insurance, the State carries the burden. So, if a minimum of insurance, or if employment then are the entry doors, the avenue to other social, economic goods such as loans, cars and homes and are generally beneficial to society. Access to equitable and just insurance and employment is no longer a privilege but a basic human right.

Thank you.

Address by Judit Sandor, Associate professor of law and political science, Central European University, Budapest, Hungary

Genetic Information: From Knowledge to Risk

Introduction[1]

In order to familiarize myself with insurance perspectives, during the last two months I spent many hours with interviewing lawyers, doctors and actuaries of various insurance companies.[2] The first astonishing element of this research was the revelation that the classical dichotomy of health and disease plays significantly different role in the private-insurance framework than in the field of medical law. Here health is a commercial good, almost in the sense of property that belongs to the insured. In private insurance legal problems of disclose are not related to the issues of informed consent, since here disclosure of medical information means information provided by the client for risk-assessment. Even the direction of information transfer is different from the one in the medical realms since before entering the contract the client is supposed to disclose her full medical profile for the insurance companies. For me who studied information and health care data primarily in the medical setting it was surprising that in the insurance sector health information was considered as a commercial asset much before the establishment of informed consent. Though logically first sufficient information on health condition should be available for someone before he/she can provide this information in an insurance contract. In societies, such as Hungary, where doctors started to provide information to their patient only very recently, this discrepancy may lead sometimes to absurd situations since health care information are taken for granted in the insurance sector. I wonder how citizens who have never had a chance to receive accurate and comprehensive information about their health and disease could fill in the questionnaires necessary for the contract. In the case of family history, answering some questions that are requested from the client even require serious genetic knowledge, etc, when the insurance company inquire whether the client knows about the presence of any hereditary disease in the family.

It was also surprising to me that physicians who work for life insurance companies usually examine clients more thoroughly than doctors in the "curative field" in the occasion of a usual medial check-up. In addition to that, all the questions and examinations that are conducted as a part of risk assessment look very invasive in

[1] I would like to acknowledge the assistance of my graduate law student, Ildiko Takacs, who actively participated in organizing et interviews with insurance companies

[2] Interviews have been made with lawyers, physicians and actuaries of the OTP -Grancia Biztosító Rt, Winterthur Biztosító Rt, MEBIT Elso Magyar-Amerikai Biztosító Rt, AHICO, ARGOS, Zürich Biztosító Rt, Generali-Providencia, Nationale Nederlanden Magyarorszagi Biztosito Rt., K& H Életbiztosító Rt., Allianz Hungaria Biztostosító Rt.

terms of privacy. Blood sugar level tests, measuring blood pressure are all important health indicators and all have an enormous impact on the life of the insured. Nevertheless, several doctors with whom I made interviews cited numerous cases in which merely the insurance oriented examination itself had an advantageous effect on the individual' s life style. For instance, if the blood sugar level test showed anomalies, the client could first undergo some treatment and once the blood sugar level had been normalized he/ she could initiate another evaluation. Based on this new risk-assessment he could get a better deal from the insurance company and he had been motivated to improve his/her health conditions. This improving element of the insurance stimulus, however, is missing in the case of the genetic test since there is nothing or very little that can be done in case of a positive test result.

Another morally relevant distinction between the general health insurance and the private life insurance is that life insurance, contrary to health insurance, is not regarded as a basic human need. Though it is not always just a pure commercial arrangement. In some cases in which the life insured is the only revenue earner of a family it has also an important added value. If it serves the only substitution for the loss income in the family someone might argue that this form of insurance has significant social utility as well.

Principle of non-discrimination

There is a problematic notion that is often regarded, I believe mistakenly, as identical in health care and in insurance, is the concept of *non-discrimination*. Originally, this legal concept was attached to specific violations of human rights, recently it gained some independence and due to the so-called *Drittwirkung* effect[3] it is not any longer exclusively interpreted only in the relations between the state and individual. Even though, this concept has been largely expanded, one has to note that life insurance was always based on some forms of selection, even including such selections that would be regarded as discriminatory if they were used as basis for the access to health care.

The problem with extending the non-discrimination principle into the realm of private insurance rests not on the fact that is private but on the selective characteristics of insurance.[4] For private insurance it is essential that the risk that an individual claims is independent of the risk that any other individual claims. The insured event must not be certain to occur, or it must be uncertainty as to its timing, the probability of claim must be known or estimable, the purchaser must not be able to conceal

[3] The full term is *Drittwirkung der Grundrechte*. This German term concerns the so-called third-party or horizontal effect of human rights obligations. It reflects the idea that the state is responsible not only for seeing that it does not commit any violations itself, but it also has the obligation to take steps to ensure that private individuals do not commit acts harmful to the human rights of others

[4] When a life insurance company writes an insurance policy, it agrees to pay a specified sum of money to the insured's beneficiary at the time the insured individual dies. The life insurance company assumes, in exchange for premium income, a risk of loss for each life insurance policy it issues. A life insurance company can enter into a reinsurance contract with another insurance company and thereby reduce the risk of loss associated with a particular group of policies. In such a contract, the reinsurer agrees to either assume or to indemnify the primary insurer for a specified portion of any loss arising out of the einsured policies in exchange for a portion of the premium income earned on such

relevant information from the insurer, and the purchaser must not be able to manipulate the probability of claiming. There is another element of *actuarial assessment*. Actuaries always base their estimates on some risk with a more or less degree of uncertainty. Refusal or a higher premium based on the genetic test in case of a single gene disorder would provide different messages for the client than a same decision based on for instance on high blood pressure. The client usually witness the bad consequences of high blood-pressure and it might be emphasized even by the disadvantageous decision of the insurance company, nevertheless the client-patient might do something about it. In case of future condition the client will be notified about a condition that he was not aware of. Moreover, he suffers discrimination before the condition would have even occurred. This is a new element since most of the condition that would be regarded as a potential basis for discrimination in the health services and basis for selection in the life insurance would be present conditions and not future circumstances. With other words estimations for the future are based on the present conditions and not based on the certain future circumstances.

The mere reference to discrimination as a basis for refusal of the application of genetic test, in my opinion, would be unsatisfactory since some form of discrimination belongs to the normal operation of insurance. Age, sex, marital status and health all play a crucial role in the assessment of the risk in the domain of insurance. The standard that the risk factors should be previously and generally set has also just a limited use in the insurance where a personal risk assessment is done before each contract.

Only national (compulsory) health insurance is based on the principle of solidarity while private life insurance is based on the notion of fair assessment of certain risks. Consequently medical data serves fundamentally different purposes even in the realm of pre-genetics in the medical-curative and the commercial-insurance model. These conceptual differences are often overlooked in the current debates on the non-medical use of genetic data.

By exploring the legal principles implied in the two aeries further, the following additional distinctions could be made between the two regimes: Insurance is based on the *actuarial justice* and *fairness.* Health care services in a national health care system are based on the *principle of non-discrimination* and *equal access.* Insurance covers a risk before the facts while health care system copes with risks once they occurred. National health care systems are usually based on the principle of *solidarity* while commercial insurance is based on the principle of *mutuality.* Solidarity-based insurance takes no cognizance of the different levels of risks that individuals bring to the pool. Moreover premiums are based on the ability to pay. Mutuality-based insurance, on contrary, differentiates premiums on the assessment of the risk each individual is held to bring to the pool.

From these differences one can safely conclude that there has been only very little communication between the drafters of the human rights-spirited health care law and the architects of commercial law. Genomics law, as part of the health care law, nevertheless now provides challenges to this isolation, in at least two distinct domains: in the field of patentibility and in the field of non-medical access to genetic information. Studying thoughtfully these legal norms, it can be observed that the concepts of dignity, principles of non-discrimination and non-commercialization of

the human body are deeply rooted concepts in both national and international medical laws. Thus it is a little surprising that how little effort has been made to observe the application of these principles in the non-medical field, such as, for instance, the use of health information by the pharmaceutical industry.

Duality of legal norms

Problems resulting from the separate development of the medical and non-medical domain could have been noticed in the pre-genetic area, as well, however with the appearance of genetics, these problems started to matter. Maybe it is because since its birth, genetics have always received more attention due to its eugenic past and its broad impact on our social perception on humankind. “Harmonization” of these legal norms by now seems to be inevitable since (e.g.) the principle of non-discrimination can not be respected if it applies only in the domain of biomedical research but not in the field of access to insurance and employment. Similarly, the issue of the non-commercialization of human body and body parts cannot be separated from the questions whether certain genetic invention can be patented or not. Duality of legal norms, in the field of health care law and in the field of commercial law is problematic since it may create a devaluation of the human rights-based principles in general. Consequently it seems to be desirable to make--at least--some cross-references of medical law in other related segments of law.

An example for the duality between human rights spirited norms and the commercial law can be observed e.g. if in Article 1 of the '*Universal Declaration on the Human Genome and Human Rights"* is compared with the relevant *EU directive.* In the *Universal Declaration* human genome has been described as a symbol of the " fundamental unity of all members of the human family, as well as the recognition of their inherent dignity and diversity". This principle may not be in full harmony with the 98/44 European directive on the legal protection of biotechnological inventions.[5] Nevertheless according to some interpretation, the notion of "common heritage" may not exclude some commercial use of genetic knowledge. If it is the case, then it were desirable to work out a legally consistent status of genetic material that can be applicable both in the context of human rights, as well as, in the commercial law.

Genetic information

Genetic information is a complex notion, biologically, culturally and legally. It includes DNA and chromosome analysis, and certain clinical tests, as well as traditional sources of genetic information, such as family history. Ethical considerations have developed around genetic information partly because genetic anomalies have special characteristics. Some of these characteristics are regarded as irreversible and more or less objective conditions. The threat of developing symptoms affects the individual's life, especially in case of late-onset diseases. Furthermore, genetic anomalies may be inherited by the offspring, affecting the afflicted individual's carrier and his or her spouse's chances of having a healthy child. In terms of causality one may make a distinction between genetic information such as genetic

[5] Article 5 (2) " An element isolated from the human body or otherwise produced by means of technical process, including the sequence or partial sequence of a gene, may constitute a patentable invention, even if the structure of that element is identical to that of natural element."

tests for monogenic recessive or dominant conditions where degrees of risk are high and between the genetic information that can be derived from testing as susceptibility data. In this latter case genetic information is not only an indicator of an individual's current state of health; it is also an indicator of that individual's likely future health. For medical conditions controlled by a single gene (such as Huntington's disease), the indication can be precise. For medical conditions that involve a more complex combination of genes or environmental factors (such as heart disease), the indication might involve only an increased probability that a future medical problem may arise.

Another relevant distinction should be made between physical samples taken from the individual and the genetic information derived from these samples. If the insurers may take account of the existing genetic test results it can be done only when their reliability and relevance to the insurance product has been established.

We do not have yet a coherent analysis on the legal status of various kinds of genetic information.[6] Nor do we know how relevant is when people neglect to inform their insurer about medical problems or conceal health information about them. Even if the genetic information is available, whether it has the same relevance in the non-medical use as in the biomedical research is not clear. Fear of discrimination already exits and it may discourage individuals at risk from undergoing medically indicated genetic testing. As a consequence non-medical use of genetic information may significantly effect the medical use of such information.

The informational exposure in the field of genetic information may reduce in the future the uncertainty about certain future event relevant to various kinds of insurance. Genetic information may provide a more accurate assessment of certain future events, such as having a heart attack, suffering from a cancer or dying within a certain time period.

Traditional family history

It is often believed that life insurance companies do not ask for genetic data in their standard questionnaires. If family history is understood as a form of genetic data then this statement is not correct. Some insurance companies have already argued that using genetic information to predict certain risks would be no more than an extension of their current practice. Insurance companies already analyze family medical history, they are using life-style information, like smoking habits, sport activities, etc.

From the findings of the empirical research two significantly different models could have been identified. One group of insurance companies uses family health care data only to assess the family environment of the insured while other insurance companies treat family history not only as mere life style information but also as a basis for information to predict the occurrence of certain hereditary conditions.

Since the analysis of the traditional family history is very vague in the sense of its predictability there are some case when the genetic test may serve the interest of the insured in case a genetic test result may allow the insurance industry to offer

[6] For instance the U.S. Genetic Privacy Act created an individual property rights in genetic information

standard rates where without the genetic test other factors, e.g. family history would have led to an additional loading for the insured.

Actuarial fairness and the predictive value of the genetic test

While the questions on traditional family history have been tailored according to the needs of the insurance companies, it is not the case with the exiting genetic tests. Genetic test may reveal a condition that is not relevant for the purposes of the particular insurance. Positive predictive value can be understood as likelihood that a person with a positive result will develop the condition. Negative predictive value indicates likelihood that a person with negative result will not ever develop the condition.

In order to be useful for insurance purposes, a genetic test should be associated with significant health effects relevant to the particular life/ health insurance. It is not clear what would happen with those fragments of the genetic data that are not relevant for insurance purposes although they are part of the genetic test. ".. the predictive potential of genetic mapping is limited by the fact that scientists do not yet fully understand the interplay of an individual's genetic make-up with the environment in which the individual lives. Furthermore, while there are genetic traits controlled by a single dominant gene, such as Huntington's disease, or by a pair of recessive alleles of a gene, such as Sickle-Cell disease, Thalassemia or Tay Sachs disease, other conditions are under the control of multiple genes." [7]

In terms of the applicability of genetic test one should make a distinction between the single gene early onset diseases, the single gene late on-set diseases and the multifactorial diseases.

In case of single gene disorders the links between the relevant genetic test results are well established (e.g. Tay Sachs disease, cystic fibrosis, haemophilia.) Still most of these conditions are manifested in early. Even more valuable in terms of predictive value, the so-called late-onset diseases, such as Huntington 's chorea and some forms hereditary breast cancer.

These types of tests, though, effecting only very little portion of the patients are very valuable for insurance companies, nevertheless from the aspects of the disability discrimination create a new category: the group of the "healthy ill".

These are the conditions where genetic test results are very weekly linked to some disorders. In these cases genetic information does not provide accurate basis for actuarially significant predictions.

[7] John Balint, (1998), Issues of Privacy and Confidentiality in the New Genetics in: in: Albany Law Journal of Science & Technology, 1998 9 Alb. L.J. Sci. & Tech. 27

Duty to co-operate and the duty to disclosure

At the moment insurance companies do not require individuals to undergo genetic testing. Consequently the principle issue at the moment is limited to the question: what should happen if the client has already have his/her genetic test? Does he have to inform the insurance company about the results?

One of the major legal problems here is that life insurance contract has to be honestly fulfilled by both parties. If the subscriber knows she is at risk of some serious illness and she hides it from the insurance company, it is a fraud. Insurance contracts are described as contract of *uberrimae fides*[8]. Failure to disclose any relevant information may result in the contract being declared void.

This characteristics of commercial life insurance is distinct from the mandatory health insurance models where non-disclosure does not exclude any patient from medical treatment. Only in cases of medical malpractice disputes it might bear some relevance.

Further legal problems may arise in relation to *group life insurance***.** Companies offer this type of life insurance to their employees world-wide. The problem with this type of insurance is that it may undermine the very basic data protection concern to isolate the different uses of health care and from each other. Let us take the example that the company decides to insure its 40 employees. However, after the medical risks have been assessed, only 36 employers are accepted by the insurance companies. As a consequence, even if the insurance company does not disclose the acquired health care data for the workplace, still from the mere fact of refusal, the employer could guess the risks. And in the future this piece of information may also be used for non-insurance and for non-medical purposes, for instance in the labor law decision of which employee's contract can be renewed.

Specific legal solutions

On the European level the basic legal document that provides some answer to this question is the Oviedo "*Convention for the Protection of Human Rights and Dignity of the Human being with Regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine*" .

Chapter IV of the Convention provides some basic legal norms concerning the human genome, though the notion and the scope of discrimination is not yet defined in the context of genetics under Article 11 *"Any form of discrimination against a person on grounds of his or her genetic heritage is prohibited."*
Here it is important to note that hereditary conditions are already taken into account in life insurance.

Article 12 is even more specific in dealing with predictive tests: *"Tests which are predictive of genetic diseases or which serve either to identify the subject as a carrier of*

[8] Tony McGleenan, Insurance, Genetics and the Law in: Tony McGleenan, Urban Wiesing, Francois Ewald (1999) Genetics and Insurance, BIOS, Scientific Publisher , Oxford

a gene responsible for a disease or to detect a genetic predisposition or susceptibility to a disease may be performed only for health purposes or for scientific research linked to health purposes, and subject to appropriate genetic counselling."

It is clear from the Explanatory Report that the Convention covers all medical and biological applications concerning human beings, including preventive, diagnostic, therapeutic, and research applications. According to the Explanatory Report genetic testing consists of medical examinations aimed at detecting or ruling out the presence of hereditary illnesses or predisposition to such illnesses in a person by directly or indirectly analyzing their genetic heritage (chromosomes, genes).

CONCLUSIONS

We have seen that most of the available genetic information is not yet applicable to the insurance industry and many of the tests are not relevant at all for insurance purposes. On the other hand, extensive family histories and all sorts of medical information have already been used so far, including the conditions that may exclude some individuals from life insurance, such as epilepsy, AIDS, occurrence of multiple suicide within the family etc. However, legally speaking, there are some remarkable differences between the two types of data:

First, traditional family history is based on the mere statement of the occurrence of certain grievous diseases in the family. The disclosure is made by the insured. Under the European data protection regime it is also problematic but one should see that the practice adopted much before the data protection developed in Europe.

Second, in case of genetic data, a direct access of the non-insured third parties within the family is created. If this is the situation, then still why is that many people still feel that access to genetic information by commercial insurance companies is problematic?

According to *Adorno*[9] the problem with the genetic test is that the individual becomes transparent due to these tests. Well, this statement may be just as true with using many of the traditional health and life-style information. In order to make a contract these information had to be disclosed, all of them very sensitive and all of them belong to that category of information that is subject to medical secrecy and confidentiality.

According to Marie-Isabelle Malauzat, the problem with using predictive genetic test for life insurance is that it discriminates between persons on the basis of future handicap.[10]

Legally speaking, genetic data should not be exclusively considered as a kind of health care data, since it indicates not only a wide array of health related

[9] Roberto Adorno (1997) ' La bioétique et la dignité de la personne' Press Universitaires de France pp 94

[10] Marie-Isabelle Malauzat (2000), Le droit face aux pouvoirs des données génétiques, Presses Universitaires d' Aix-Marseille, Faculté de Droit et de Science Politique, 2000, pp. 312.

information but also as a means for personal identification. This complex characteristic of genetic data requires a specially designed confidentiality regulation. Moreover, not only potential unlawful accesses should be eliminated but also the individuals' own access rights should be reaffirmed. The health care institution or the research staff can easily process genetic data. Therefore the individual should have a right to know that the test is going to be made but nevertheless he may refuse to know the test results--in other words he "has a right not to know".

David Heyd[11] has pointed out correctly that unlike a traditional medical test, genetic test and screening may affect others besides the tested patients. Once someone decides to inquire about his or her genetic make-up, it will ultimately influence other family members in their life style, reproductive and family planning, health insurance status and decisions etc.

Genetic health has become an element in the public perception of health, since people would like to avoid having children with serious or fatal illnesses. Secondly, in order to have a better chance to have a healthy child, pre-implantation diagnosis is often suggested by doctors. Genetic diseases have special characteristics. They require different ethical considerations than what non-genetic disease require. First of all, these diseases are regarded as irreversible and more or less objective conditions. The threat of developing symptoms affects the individual's life, especially in case of late-onset diseases. Genetic anomalies may be inherited by the offspring, affecting the afflicted individual's carrier and his or her spouse's chances of having a healthy child.

"Genetic destiny" of one family member may effect severely the other members. And this may profoundly reshape the individualist concept of informed consent. Genetic information is not only an indicator of an individual's current state of health; it is also an indicator of that individual's likely future health. For medical conditions controlled by a single gene (such as Huntington's disease), the indication can be precise. For medical conditions that involve a more complex combination of genes or environmental factors (such as heart disease), the indication might involve only an increased probability that a future medical problem may arise.

Though society, as a whole, may take an interest in genetic information and therefore controlling genetic defects that would, otherwise, be passed on to future generations, it would appear to be a desirable goal that individual privacy was respected. In my opinion medical and non-medical use of genetic information should be clearly separated from one-another. While it seems that in many cases it is important to prevent family members from unnecessary suffering from uncertainties and enable them to prevent certain tragic health consequences non medical use of genetic information even among family members could be at least as detrimental as to provide access to information to other third parties.

As we have seen the attitude towards using genetic test insurance is very much related to the distinction between various kinds of insurance. General health insurance is regarded as a necessary and fundamental right based service that should

[11] David Heyd (1992) " Genethics, Moral Issues in the Creation of People" University of California Press, Berkeley,

not be linked with the genetic make-up of the insured. The principle of non-discrimination and principle of solidarity are regarded in Europe as basic pillars of this system. The evaluation of life insurance is not unanimous. Regardless of the use of genetic information it is not based on solidarity and it is often described as insurance for the elite. This characteristics, however, is not justified if one looks and such mortgage system that requires from the client to make a life insurance as a condition to obtain bank loans.

General health insurance, in my opinion, should not use genetic tests for the exclusion from the health insurance or for setting higher rates. In case of mutuality based private insurance there should be reasonable actuarial evidence publicly available as a precondition of any use of genetic test results. Even so further ethical assessment would become necessary in order to respond to specific problems of genetic tests:

- genetic data may affect other family members.
- genetic data may not be anonymized in the traditional way.
- genetic data could be used potentially for wider purposes than the insurance

As it follows data protection norms should include specific provisions on some forms of genetic data.

As we have seen actuarial assessment is a very different procedure than the medical research in which genetic test that were invented. In order to explore the relevance and the causal links with a relevant insurance further research has to be conducted.

Though biomedical law and insurance law developed independently it is still important to provide a coherent legal response to the questions that genetics has raised. In order to provide a consistent answer for the use of genetic data and genetic test different of the two legal domains should be carefully analyzed. Furthermore "Europeanization" of the insurance market urges an international perspective when assessing the use of genetic information.

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SOME THOUGHTS ARISING FROM THE SWISS GOVERNMENT BILL

Introduction

During the 1990s Western society was swept by concern about and fascination for genetics as knowledge expanded, owing chiefly to the mapping of the human genome. What was fascinating was the prospect that hitherto incurable diseases might be prevented or cured, and even that the ageing process might be brought under control. The most frequently voiced concern was that humans' genetic make-up might be used to justify discrimination: since individuals did not choose their genome but inherited a random genome combination from their parents, it was obviously unacceptable that choices might be made on the basis of this genetic lottery.

Right across Europe this concern inspired countless declarations, reports, ethical guidelines, recommendations, resolutions, conventions and laws drawn up *inter alia* by professional associations, ethics committees, international organisations and national parliaments. Such texts provide a dual response to public fears concerning genetics: they take the symbolically important but practically ineffectual step of reaffirming basic values and they impose a number of prohibitions. For example, most of them refer to the primacy of respect for human dignity[12], assert the principle of non-discrimination with express mention of individual genetic characteristics[13] and

[12] For example, paragraphs 1 and 3 of the European Parliament's motion of 29 August 2001 for a resolution on the social, legal, ethical and economic implications of human genetics; Article 2 of the European Convention on Human Rights and Biomedicine of 4 April 1997, which refers to the "*primacy of the human being […] over the sole interest of society or science*"; Articles 1 and 2 of the 1997 UNESCO Universal Declaration on the Human Genome and Human Rights; and Section 1 paragraph 2 of the Swiss bill on human genetic analysis of September 1998. In addition, Article 1 of the European Union's Charter of Fundamental Rights of December 2000 declares that "*human dignity is inviolable. It must be respected and protected*".

[13] For example, paragraph 16 of the European Parliament's motion of 29 August 2001 for a resolution on the social, legal, ethical and economic implications of human genetics, which refers to Article 21 of the European Union's Charter of Fundamental Rights of December 2000 prohibiting "*any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features […]*"; Article 11 of the European Convention on Human Rights and Biomedicine of 4 April 1997, according to which "*any form of discrimination against a person on grounds of his or her genetic heritage is prohibited*"; Article 6 of the 1997 UNESCO Universal Declaration on the Human Genome and Human Rights, which states that "*no one shall be subjected to discrimination based on genetic characteristics […]*"; and Section 2 of the Swiss bill on human genetic analysis of September 1998, according to which "*any form of discrimination against a person on grounds of his or her genetic heritage is prohibited*".

stress that medical and genetic data must remain confidential[14]. Several propose a ban in principle on the use of genetic testing in connection with employment[15] and private insurance[16].

Genetics: a branch of medicine

While the primacy of human rights can never be stressed enough, it is important nonetheless to examine the appropriateness of placing strict but limited prohibitions on genetic tests or data. Such is the aim of this paper, which will briefly consider three questions.

1. Is it justifiable to treat genetic tests differently from other medical tests and genetic information differently from other medical data?
2. What aims should be pursued in connection with employment?
3. How can these aims best be achieved?

The wave of legislative reaction in the 1990s focused on genetics because it was a new field and one which brought certain problems, especially that of discrimination, sharply into prominence. Accordingly, there was a tendency to forget that advances in genetics did no more than highlight problems of medicine and law which had already existed for quite some time. Rather than being tackled as an issue in itself which stood apart from other branches of medicine, genetics should really have been approached as the paradigm for a far larger problem[17]. We believe that it is

[14] For example, paragraph 16 of the European Parliament's motion of 29 August 2001 for a resolution on the social, legal, ethical and economic implications of human genetics, which refers to Article 8 of the European Union's Charter of Fundamental Rights of December 2000, according to which "*everyone has the right to the protection of personal data concerning him or her*"; Article 10 of the European Convention on Human Rights and Biomedicine of 4 April 1997, which declares that "*everyone has the right to respect for private life in relation to information about his or her health. Everyone is entitled to know any information collected about his or her health. However, the wishes of individuals not to be so informed shall be observed*"; Article 7 of the 1997 UNESCO Universal Declaration on the Human Genome and Human Rights, according to which "*genetic data associated with an identifiable person […] must be held confidential*"; and Section 5 of the Swiss bill on human genetic analysis of September 1998, which states that "*genetic data are protected […]*".

[15] For example, paragraphs 24 *et seq*. of the European Parliament's motion of 29 August 2001 for a resolution on the social, legal, ethical and economic implications of human genetics; indirectly, Article 12 of the European Convention on Human Rights and Biomedicine of 4 April 1997, which declares that genetic tests may be performed *"only for health purposes or for scientific research linked to health purposes*"; and Section 18 of the Swiss bill on human genetic analysis of September 1998, according to which *"at recruitment or in the course of professional evaluation, no employer or medical examiner acting for an employer may require presymptomatic testing or use any results of presymptomatic testing already carried out for medical purposes"*.

[16] For example, paragraph 23 of the European Parliament's motion of 29 August 2001 for a resolution on the social, legal, ethical and economic implications of human genetics; indirectly, Article 12 of the European Convention on Human Rights and Biomedicine of 4 April 1997, which declares that genetic tests may be performed *"only for health purposes or for scientific research linked to health purposes*"; and Section 22 of the Swiss bill on human genetic analysis of September 1998, according to which *"no insurance provider may require a candidate for insurance to submit to presymptomatic testing prior to the establishment of an insurance report*".

[17] In this connection, a genetics researcher proposed in 1938 (long before the structure of DNA was discovered in 1953) that workers be sorted *"according to their susceptibility to occupational hazards*"

inconsistent to single out genetics from the rest of medicine; to do so is to acknowledge differences which exist only in many people's imaginations. In what ways is a genetic fingerprint more sensitive than an actual fingerprint? In what ways is direct genetic testing different from analysis of its immediate product (protein) or any other medical test? In what ways do genetic data differ from medical data? What is the difference between a genetic test result and that of family anamnesis?

That being said, it must be borne in mind that two characteristics of genetic information qualify it as sensitive medical data. Firstly, genetic information on an individual also extends to his or her close blood relations; and secondly, genetic information is frequently predictive. However, in most cases this predictive value can only be expressed as a statistical probability which is of little relevance to the individual in question[18].

GENETICS AND EMPLOYMENT

As regards the use of genetics in the context of employment, we feel that three priorities must be pursued:

- there must be equal opportunities in terms of access to employment. These days, being in work is one of the keys to a person's social integration[19], and often it is also an economic necessity.

- hygiene and safety must be guaranteed in the workplace in order to protect workers' health. Since employees are not always free to accept or reject work which is damaging to their own health[20], it is essential that employers be required, under State supervision, to take the necessary health precautions in the workplace.

- steps must be taken to ensure that activities which are potentially hazardous for third parties or for the community are performed by individuals whose skills and state of health do not present an unnecessary public risk.

Genetic testing in the employment context must be seen in the light of these three priorities, which it will naturally be difficult to combine. It is essential that any proposed solution take account of the need for strict data protection measures.

(International Labour Office, "Workers' privacy", part III: "Testing in the workplace", *Conditions of Work Digest*, Geneva, vol. 12, 2/1993, p. 57). Biochemical testing (to identify proteins rather than focus on genes) began in the 1960s, especially in North America (*idem*, p. 59 *et seq*).

[18] The European Parliament's motion for a resolution of 29 August 2001 stresses that "*the emphasis on predictivity*" has been removed, especially since it was found that humans have far fewer genes than was previously thought, and concludes that "*the possibility of using genetic data to assess people's prospects should be restricted to the utmost degree*".

[19] This point was made in a working paper prepared by Sandrine Sabatier for the CDBI Working Party on Human Genetics (Council of Europe, DIR/JUR (97) 13 bis, 27 October 1997, p. 26).

[20] This is acknowledged in paragraph 26 of the European Parliament's motion for a resolution of 29 August 2001, which states: "*as is well known, an unemployed person is willing to accept any conditions simply in order to work; consent in such a case would be not so much an expression of freedom as stem from a material constraint*".

Equal opportunities must be safeguarded by prohibiting employers from requiring presymptomatic genetic testing or the results of such testing from applicants for a job or existing employees. The sole criterion should be a person's current aptitude to perform the necessary duties. Consideration must also be given to work-related insurance in order to avoid indirect discrimination (a refusal to provide insurance may affect job status).

Where there may be advantages to be gained from performing certain genetic tests to prevent illness and accidents in the workplace, the opportunity must be provided, in the context of occupational medicine, for tests which have proved reliable and appropriate. However, so that the commendable aim of prevention does not result in discrimination at recruitment or in the working environment, it is essential to ensure that the results of such genetic tests remain confidential. Furthermore, hygiene in the workplace must in no circumstances be supplanted by employee health checks[21]. In other words, test results must be communicated to employees but not to employers, who have no right to know whether a worker is fit or unfit for the post in question.

Where performing certain genetic tests may also bring advantages in terms of protection for third parties and the general public from hazardous activities, here too there must be an opportunity, in the context of occupational medicine, to carry out proven reliable and appropriate tests as a final resort. In this case too, employees must be given assurances of confidentiality.

The proposals set out in Sections 18 to 21 of the federal bill on human genetic analysis (see appendix in French only) are an attempt to apply these three priorities in practice. They will be the subject of a brief explanatory presentation.

Conclusion

From the European Parliament's motion for a resolution of 29 August 2001[22]: *"the spread of genetic tests will increasingly fuel the momentum of the shift towards a form of social organisation strongly characterised by genetic classification and control criteria"*. This will entail *"the risk of new forms of discrimination, raising problems relating to privacy, the confidentiality of data, and informed consent"*.

While the risk of discrimination is nothing new, it has increased in significance. It must be taken into account through the drafting of legal rules to protect workers from discrimination while allowing them to benefit from medical advances.

[21] In this connection, paragraph 24 of the European Parliament's motion for a resolution of 29 August 2001 provides that *"the indications deducible from genetic data cannot replace policies on the working environment or the more general safety requirements to be met when hazardous activities are performed"*.

[22] Letters T and U of the preliminary considerations.

Allocution du Prof. Olivier Guillod, Directeur de l'Institut de droit de la santé, Université de Neuchâtel

REFLEXIONS A PARTIR DU PROJET DE LOI SUISSE

Introduction

Dans les années quatre-vingt-dix, la génétique a suscité dans les sociétés occidentales une vague d'inquiétude et de fascination au fur et à mesure que se développaient les connaissances, notamment grâce à la cartographie du génome humain. La fascination provenait de la perspective de prévenir ou de guérir des maladies jusque-là incurables, voire de maîtriser le vieillissement. L'inquiétude la plus souvent exprimée était celle de discriminations fondées sur la constitution génétique d'une personne : comme on ne choisit pas son génome, mais on hérite une combinaison fortuite des génomes parentaux, toute sélection sur la base de cette loterie génétique semblait inadmissible.

De cette inquiétude sont nés à travers toute l'Europe d'innombrables déclarations, rapports, directives éthiques, recommandations, résolutions, conventions et textes de lois élaborés notamment par des organismes professionnels, des comités d'éthique, des organisations internationales et des législateurs nationaux. Ces textes répondent de deux manières aux craintes de la population vis-à-vis de la génétique : par la réaffirmation, symboliquement importante mais pratiquement de faible portée, de valeurs fondamentales, et par l'imposition d'une série d'interdictions. Ainsi, la plupart de ces documents rappellent la primauté du respect de la dignité humaine[23], affirment le principe de non-discrimination, en mentionnant expressément les caractéristiques génétiques individuelles[24], et insistent sur la confidentialité des données médicales ou génétiques[25]. Plusieurs textes postulent une interdiction de principe de recourir à des

[23] On ne mentionnera ici que les § 1 et 3 de la proposition de résolution du Parlement européen sur les incidences sociales, juridiques, éthiques et économiques de la génétique humaine, du 29 août 2001 ; l'article 2 de la Convention européenne sur les droits de l'Homme et la biomédecine, du 4 avril 1997 parlant de la « *primauté de l'être humain (...) sur le seul intérêt de la société ou de la science* » ; les articles 1 et 2 de la Déclaration universelle sur le génome humain et les droits de l'Homme de l'UNESCO, de 1997 ; l'article 1 alinéa 2 du projet de loi suisse sur l'analyse génétique humaine, de septembre 1998. On rappellera en outre que l'article 1 de la Charte des droits fondamentaux de l'Union européenne, de décembre 2000 affirme que « *la dignité humaine est inviolable. Elle doit être respectée et protégée* » ;

[24] Par exemple le § 16 de la proposition de résolution du Parlement européen sur les incidences sociales, juridiques, éthiques et économiques de la génétique humaine, du 29 août 2001, qui rappelle l'article 21 de la Charte des droits fondamentaux de l'Union européenne, de décembre 2000, interdisant « *toute discrimination fondée notamment sur le sexe, la race, la couleur, les origines ethniques ou sociales, les caractéristiques génétiques (...)* » ; l'article 11 de la Convention européenne sur les droits de l'Homme et la biomédecine, du 4 avril 1997 disant que « *toute forme de discrimination à l'encontre d'une personne en raison de son patrimoine génétique est interdite* » ; l'article 6 de la Déclaration universelle sur le génome humain et les droits de l'Homme de l'UNESCO, de 1997 affirmant que « *nul ne doit faire l'objet de discriminations fondées sur ses caractéristiques génétiques(...)* » ; l'article 2 du projet de loi suisse sur l'analyse génétique humaine, de septembre 1998, prévoyant que « *toute forme de discrimination à l'encontre d'une personne en raison de son patrimoine génétique est interdite* ».

[25] Par exemple le § 16 de la proposition de résolution du Parlement européen sur les incidences sociales, juridiques, éthiques et économiques de la génétique humaine, du 29 août 2001, qui rappelle l'article 8 de la Charte des droits fondamentaux de l'Union européenne, de décembre 2000, affirmant que « *toute personne a droit à la protection des données à caractère personnel la*

tests génétiques dans le cadre de l'emploi[26] et des assurances privées[27]

Génétique : une partie de la médecine

S'il n'est jamais inutile de répéter la primauté des droits de l'Homme, il faut en revanche s'interroger sur l'opportunité de décréter des interdictions péremptoires mais limitées aux tests génétiques ou aux données génétiques. C'est l'objet de cette contribution, qui explorera brièvement trois questions :

1. Est-il défendable de traiter les tests génétiques différemment d'autres tests médicaux et les informations génétiques différemment d'autres informations médicales ?

2. Quels objectifs doit-on poursuivre dans le domaine de l'emploi ?

3. Quel est le meilleur moyen d'atteindre ces objectifs ?

Les réactions législatives des années 1990 se sont focalisées sur la génétique parce que c'était un champ nouveau qui posait avec acuité des problèmes, notamment de discrimination. Ce faisant, on a eu tendance à oublier que les progrès de la génétique ne constituaient qu'un révélateur pour des problèmes déjà anciens posés au droit par la médecine.

C'est donc en tant qu'illustration archétypique d'une problématique plus vaste que la génétique aurait dû être traitée, et non pas comme un phénomène en soi, isolé du reste

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concernant » ; l'article 10 de la Convention européenne sur les droits de l'Homme et la biomédecine, du 4 avril 1997 disant que «*Toute personne a droit au respect de sa vie privée s'agissant des informations relatives à sa santé. Toute personne a le droit de connaître toute information recueillie sur sa santé. Cependant, la volonté d'une personne de ne pas être informée doit être respectée* » ; l'article 7 de la Déclaration universelle sur le génome humain et les droits de l'Homme de l'UNESCO, de 1997 prévoyant que « *la confidentialité des données génétiques associées à une personne identifiable (...) doit être protégée (...)* » ; l'article 5 du projet de loi suisse sur l'analyse génétique humaine, de septembre 1998, rappelant que « *les données génétiques sont protégées (...)* ».

[26] Par exemple les § 24ss de la proposition de résolution du Parlement européen sur les incidences sociales, juridiques, éthiques et économiques de la génétique humaine, du 29 août 2001 ; l'article 12 de la Convention européenne sur les droits de l'Homme et la biomédecine, du 4 avril 1997, de manière indirecte en disant que les tests génétiques ne peuvent être entrepris « *qu'à des fins médicales ou de recherche médicale* » ; l'article 18 du projet de loi suisse sur l'analyse génétique humaine, de septembre 1998, affirmant que « *un employeur ou son médecin-conseil ne peuvent, lors de l'engagement ou durant les rapports de travail, ni exiger une analyse présymptomatique ni utiliser les résultats d'analyses présymptomatiques déjà effectuées à des fins médicales* » ;

[27] Par exemple le § 23 de la proposition de résolution du Parlement européen sur les incidences sociales, juridiques, éthiques et économiques de la génétique humaine, du 29 août 2001 ; l'article 12 de la Convention européenne sur les droits de l'Homme et la biomédecine, du 4 avril 1997 de manière indirecte en disant que les tests génétiques ne peuvent être entrepris « *qu'à des fins médicales ou de recherche médicale* » ; l'article 22 du projet de loi suisse sur l'analyse génétique humaine, de septembre 1998, affirmant que « *une institution d'assurance ne peut exiger préalablement à l'établissement d'un rapport d'assurance qu'un preneur d'assurance se soumette à une analyse présymptomatique (...)* ».

de la médecine[28]. Singulariser la génétique au sein de la médecine manque, à mon avis, de cohérence et conduit à différencier ce qui n'est différent que dans les représentations fantasmatiques de bien des gens. En quoi une empreinte génétique est-elle plus sensible qu'une empreinte digitale ? En quoi une analyse directe du gène est-elle différente d'une analyse de son produit immédiat (la protéine) ou d'une autre analyse médicale ? En quoi une donnée génétique se distingue-t-elle d'une donnée médicale ? Qu'est-ce qui sépare le résultat d'un test génétique et le résultat d'une anamnèse familiale ?

Cela dit, il faut garder à l'esprit deux caractéristiques des données génétiques qui en font des données médicales sensibles : d'une part, les données génétiques renseignent sur la personne mais aussi sur ses proches parents ; d'autre part, les informations génétiques ont souvent une nature prédictive. Cette valeur prédictive n'est toutefois, dans la plupart des cas, exprimable qu'en probabilités statistiques qui n'ont guère de signification pour le cas individuel[29].

Génétique et emploi

S'agissant de l'utilisation de la génétique dans le cadre du travail, il me paraît que trois objectifs prioritaires doivent être poursuivis :

- assurer l'égalité des chances dans l'accès à une activité professionnelle. Avoir un travail constitue en effet de nos jours l'un des principaux facteurs d'intégration sociale de la personne[30] de même que, souvent, une nécessité économique.

- garantir la salubrité et la sécurité des places de travail afin de protéger la santé des travailleurs. Un travailleur n'étant pas toujours libre d'accepter ou non un poste de travail nuisible à sa propre santé[31], il est impératif d'exiger des employeurs, sous le contrôle de l'Etat, qu'ils prennent les mesures nécessaires d'assainissement des places de travail.

- veiller à ce que des activités potentiellement dangereuses pour les tiers ou pour la collectivité soient exercées par des personnes dont les capacités et l'état de santé ne

[28] Par exemple, un généticien proposa en 1938, soit bien avant la découverte de l'ADN (en 1953), de "*sorting out workers according to their susceptibility to occupational hazards*": International Labour Office, Workers' privacy, part III: Testing in the workplace, *Conditions of Work Digest*, Genève, vol. 12, 2/1993, p. 57. Dès les années 1960, des tests biochimiques (pour identifier des protéines et non directement des gènes) ont été pratiqués, notamment en Amérique du nord : voir idem, p. 59ss.

[29] Le projet de résolution du Parlement européen, du 29 août 2001, souligne que « *l'enthousiasme sur la prédictivité* » est retombé, notamment quand on a découvert que l'être humain avait bien moins de gènes que ce que l'on avait supputé, et en déduit qu'il faut « *restreindre au maximum la possibilité de recourir aux données génétiques pour les évaluations prospectives des individus* ».

[30] Comme le soulignait le document de travail préparé par Sandrine Sabatier (Conseil de l'Europe, DIR/JUR (97) 13 Bis, 27 octobre 1997) pour le Groupe de travail sur la génétique humaine du CDBI, p. 26.

[31] Ainsi que le note le § 26 du projet de résolution du Parlement européen, du 29 août 2001, qui déclare « *qu'en période de chômage, la propension à accepter n'importe quel emploi est bien connue, le consentement étant moins la manifestation d'une liberté que l'effet d'une gêne matérielle* ».

font pas courir de risques excessifs à la population. C'est à la lumière de ces trois objectifs que doit être apprécié le recours à des tests génétiques dans le cadre de l'emploi. Ces objectifs ne sont bien sûr pas aisés à concilier. Toute esquisse de solution passe nécessairement par des mesures strictes de protection des données.

Afin d'assurer l'égalité des chances, il faut interdire aux employeurs d'exiger un test génétique présymptomatique ou le résultat d'un tel test de candidats à l'emploi ou de travailleurs. Seule l'aptitude actuelle d'une personne à accomplir les tâches prévues doit être prise en considération. Il faut prendre en compte aussi les assurances liées à l'emploi afin d'éviter des discriminations indirectes (refus d'assurance se répercutant sur la relation de travail).

Afin de bénéficier des éventuels apports de certains tests génétiques en matière de prévention des maladies et des accidents professionnels, il faut laisser la possibilité, dans le cadre de la médecine du travail, de pratiquer des tests qui ont démontré leur fiabilité et leur pertinence. Toutefois, pour éviter que l'objectif louable de prévention ne se traduise par une discrimination à l'embauche ou en cours d'emploi, il faut garantir la confidentialité des résultats de tels tests génétiques. Il faut en outre clairement affirmer que l'assainissement des places de travail ne doit en aucun cas être remplacé par l'assainissement des travailleurs[32]. En d'autres termes, le résultat du test doit être communiqué au travailleur mais pas à l'employeur, qui n'a que le droit de savoir si un travailleur est apte ou non à occuper le poste concerné.

Afin de profiter de possibles contributions de certains tests génétiques en matière de protection des tiers et de la collectivité contre des activités dangereuses, il faut également laisser la possibilité, dans le cadre de la médecine du travail, de pratiquer en dernier recours des tests qui ont démontré leur fiabilité et leur pertinence. Des garanties analogues de confidentialité doivent ici aussi être données aux travailleurs. Les propositions figurant dans le projet de loi fédérale sur l'analyse génétique humaine (articles 18 à 21 ; cf. annexe) tentent de concrétiser ces trois idées. Elles seront brièvement présentées et commentées.

Conclusion

Comme le relève le projet de résolution du Parlement européen du 29 août 2001[33], « *la généralisation des tests génétiques se traduira de plus en plus par une organisation sociale fortement empreinte de critères génétiques de classification et de contrôle* », ce qui « *implique le risque de nouvelles formes de discrimination qui soulèvent des problèmes liés au respect de la vie privée, à la confidentialité des données et au consentement éclairé de l'intéressé* ».

[32] Dans ce sens, le § 24 du projet de résolution du Parlement européen, du 29 août 2001, qui déclare que « *les indications qui découlent des données génétiques ne peuvent remplacer les politiques concernant l'environnement sur le lieu de travail ou les conditions plus générales de sécurité dans lesquelles doivent se dérouler des activités à risque* ».

[33] Lettre T des considérants préliminaires.

Le risque de discrimination n'est pas nouveau, mais il est accru. Il convient d'en tenir compte dans l'élaboration de normes juridiques destinées à protéger les travailleurs contre les discriminations tout en leur permettant de bénéficier des progrès médicaux.

Address by Ms Helena Kääriänen, Member of the professional and public Committee of the European Society of Human Genetics (Finland)

Thank you Mr Chairman.

Two days ago, when I left Helsinki, Finland, where I live, there had just been, the night before, the first snowfall of this year so the whole world was covered with about this much snow. It was very white and very cold, very beautiful also, but you can imagine that I was very happy to come here to enjoy the Mediterranean sun for a few days before the real winter comes. As I was introduced, I am a clinical geneticist coming from Helsinki but actually I was invited here in another role which I have had in the public and professional policy committee of the European society of human genetics. In that committee we have during the last about three years formulated as a European biotech programme recommendations for four in our opinion important issues in genetics and they are: genetic screening; genetic information and testing in insurance and employment; genetic databases and genetic services. The method we used to formulate these guidelines was that we first did a lot of work for preparing background documents for each of these four topics and those documents were something like 50-60 pages. They are now on the web page if you want to see them. For those documents, we collected all existing legislation on these issues and practices and guidelines from all European countries and also elsewhere and when these were ready, we invited some 50 or 60 experts from different European countries to a two-day workshop where we discussed, there were four workshops, for each of the topics, where we discussed these topics and afterwards we formulated the guidelines. They are actually meant to be professional guidelines for the members of the European society so they start from the geneticists point of view. At present, the two first ones are already officially endorsed by the society but the two last ones are still waiting for the society meeting to be endorsed but all four recommendations are on the web page. When we started with genetic information and testing in insurance and employment, we had first a lot of thought about what is genetic information and this has been touched upon many times today also. We thought it does not make sense that information is treated differently in, for instance, legislation or some recommendations like this depending on the method of how you got the information so it could not only be gene tests but it must be genetic information in a wider sense. So we defined genetic information in a little bit this way, I have shortened it for this overhead, firstly it is information that derives from the variation between people that exist really in their chromosomes or DNA and this can be measured with a chromosome test or a DNA test. But as well, we can get genetic information that infers to that such a genetic variation exists or rather would exist in the genes if we had methods to test it there for instance. We can get such information from the clinical diagnosis of the individual or their relatives and family history, from many very different clinical studies like imaging, taking biopsies, biochemistry and so on. So this is the wider meaning of genetic information. Now I am going to the possibilities of genetic tests, before really going to the recommendations I am going to the possibilities of genetic tests in employment but there all the time you have to

remember that similar results can be achieved by some of these other methods also, not only genetic tests always. But you can first divide, using genetics in employment, into two categories and the first one is that you can use genetics when you are choosing employees and that can be called pre-employment testing and the other one is that you can use genetics when you are monitoring possible work-related gene changes, mutations which I think is part of occupational health care and I do not discuss it any more here because I think there are no real problems in that part. Pre-employment genetic testing again can be thought in two different ways, you can have tests or other genetic methods to try to simply to predict the health in general of the future worker or the other thing is that you can try to reveal possible very specific work related risks, for instance, there could be a chemical used in the factory that some people have a genetic predisposition to get cancer of that chemical and others will not so that would be a specific work related risk and I talk first about the first part and then about the later part.

When trying to find out by genetic tests or genetic information the future health of the applicant, the situations can be divided into two categories, the Mendelian, usually dominant, usually late onset disorders and the common multifactorial disorders and they are very different in this context. The Mendelian disorders, in them you can use what could be called pre-symptomatic testing and those tests are very accurate, if you have a mutated gene you will get the disease with practically 100% certainty, so you just make the diagnosis with the gene test before the symptoms come and such diseases, I think Huntingdon's disease which is the most famous example, but there are some other ten diseases, CADACIL, spinocerebellar ataxias and other diseases very similar where you get symptoms usually around 30-40-50 years and they are progressive neurological diseases and in practice, these are the diseases where you have pre-symptomatic tests. We heard by Dr Deltas this morning that there will be gene tests for all major Mendelian disorders in the coming years and that is most likely true but in practice many of them will be difficult to use because there will be different mutations in each family so it needs a lot of development in the technologies before we can predict all Mendelian disorders but the other group, the common multifactorial diseases is totally different. There you have a genetic predisposition that is usually or we think it is usually caused by probably several genes or several polymorphisms in the genes and then environmental factors and those together in a very complicated way cause the disease. There the molecular geneticists are trying to develop predictive tests that will predict the likelihood of getting such a disease but those tests will, as far as I understand, never tell who will get the disease and who will not but they will just tell that you have a little bit higher likelihood than average and you have a little bit lower likelihood than average. At present, we are not even at that point yet. The illnesses of that group that could be interesting in the workplace are for instance mental illnesses and skeletal illnesses like back problems which are big problems in occupational health care. So, would it make sense to use such test in pre-employment? If we first talk about the rare Mendelian diseases, in my opinion it would not make sense because those diseases are so extremely rare. However, what might make sense would be to ask of family history and then you can find some individuals among the applicants for whom you could do gene tests but that I think we would call genetic discrimination and most of us would find it unacceptable. But there could probably be exceptions, the previous speaker mentioned some exceptions that I will come back to when I come to the recommendations of the European society. When talking about the common diseases, there really are no suitable tests

today and I personally feel that it is very unlikely that there will be tests that will have high predictive value for common diseases, ever or test batteries. Well, at least for not so long a time that when we are doing our recommendations and thinking about our laws, we do not have to think about that problem probably yet. The only exception is hereditary cancers which fall between the Mendelian diseases and the common diseases. They are much more common than the rare Mendelian ones and on the other hand the predictive tests that we have there have rather good predictive value even though they are not 100% sure. Now I will show you two pedigrees to prove why I do not believe that there will be very good tests for common diseases. Well, this is a classical dominant pedigree, you all remember it from your school books and these are grandparents, these are children and grandchildren but they are all adults in this picture and the black ones are affected, let's say with Huntington's disease, which is classical dominant disorder. So she had a mutation which caused Huntington's disease, according to Mendel's laws she had the probability of giving the mutation to, with a 50% chance, each time she had children and then when those who got the mutation had children, they had each time 50% probability of giving the gene to the offspring and this creates very bad looking pedigrees where you can, with one look, see that this is very hereditary or at least very familiar. Can I have the next pedigree, the common diseases, in the pedigrees never look like that, they could at most look like this but even this is a very bad pedigree to be a common disease, the common diseases are often totally sporadic or rather sporadic but if this would be a pedigree of a common disease, lets say rheumatoid arthritis, so she had a mutation or some mutations that caused the rheumatoid arthritis, so she should have given the mutation, with 50% risk, to all her offspring, but only one is affected. And again, of all the offspring of that one, none is affected. So that shows that whatever gene is going there, it doesn't have a very strong capacity of causing a disease and for that reason I do not believe that even when we combine different genes and different environmental factors we will have very good predictive tests for common diseases or very accurate. Finally, a few words about the work related risks that are specific to employment when compared with insurance. These tests, if there would be such tests in everyday use, they could benefit both the employer and the employee. So in that way, many of us would find them acceptable but of course there could be some misuse and one misuse that often mentioned on these occasions is that the employer could think that if I choose only the ones who are not susceptible to that chemical then I do not have to care for the environment of my factory, for instance. Or if it would be the only workplace in the area then the employee might want to take the risk anyway rather than be unemployed because of this. And then there is the problem of counselling, because when you take such a test and then you say to the applicant that we do not take you because you have a specific gene, and because of that gene you are not suitable for our job, so it will confuse him, so we would have to explain what jobs are good for him and what are not and we would also have to take the family into consideration because he has brothers who are probably working in the same field and so on. In Finland, very recently, all possible genetic tests were forbidden in the occupational setting so we do not even have to discuss this thing, even though I would see that there might be some benefits in such tests as well. Now I go to the European Society's recommendations. When we were discussing these issues together with the insurance issues, we all agreed that there are lots of problems in the insurance but actually in the case of employment there are no real applications for today and so somehow the question was not even as interesting as the insurance because the problems were not so realistic, but we concluded that usually it is not acceptable to be

excluded from employment because of genetic information no matter with what method you got the genetic information, however, we were quite sure that there are situations where the safety of clients or members of the public could be put at risk if this would be followed, so there could be exceptions and the exception that was mentioned was pilots for instance, but I could also think of for instance leaders of the world, so that if there would be a family history of let's say Huntington's disease or another disease causing dementia in one of the important Presidents or Prime Ministers of today, so do we not all think that it would be good to have them tested before they make their decisions of starting a war for instance. Can I have the next one? Then we thought that for the specific work related hazards, there should be some possibility for genetic testing because that might protect the health of the employee and that could probably be done not at the pre-employment level but later and we thought that the minimum might be that the test would be available and the employee could take the test voluntarily and there would be an informed consent process and things like that. But even then it might be that it is not totally voluntary if it happens in the workplace or in the setting of occupational healthcare and so we thought that there probably should be a totally new regulatory model or organisatory model explored which could be for instance that there is a laboratory which is government owned and a sort of public laboratory which is outside all the workplaces and all the employees would be told that this test might be useful for their health and you could go to that laboratory and you could get your result and explanation of the result there and you could do whatever you wanted to and also it should be so that the cost of the test should be paid from a pool so that the employer would never know whether any of their employees ever went there so this is an idea that should be explored probably. In general, we thought that behind, in spite of what happens in the world of insurances and employment, there should be a sort of solidarity based social security system that would make it sure that if discrimination is done in some exceptional situation because of genetic make-up or health in general, then the person would have some coverage somewhere else anyway. Can I have the last one? Well, with these recommendations, which I really recommend that you would read from the web-page, I of course know that there are a lot of other recommendations and conventions and laws that we in Europe are following and have to follow, and we felt very strongly when we were writing the recommendations that they have the same spirit as the bioethical convention of the Council of Europe only that they are a bit more precise. So, thank you for your interest.

Address by Dr Violetta Christophidou Anastasiadou, Head of Clinical Genetics Department, Archbishop Hospital and Cyprus Institue of Neurology and Genetics

Good afternoon everybody, I am honoured by the organisers' invitation to address this conference.

I guess that most of you expected me to talk about the Thalassemia Management and Prevention Programme here in Cyprus, actually, I will not do so as I am not the expert in this disorder, the expert is Dr Michalis Angastiniotis, who until recently was my boss. The other reason why I will not talk about the Thalassemia prevention programme is that I belong to that generation who has watched friends, cousins or schoolmates suffering and dying of this condition. When I returned to Cyprus as a qualified physician I found the Thalassemia management and prevention programme had been enforced within our public health services. So I can either address this issue as a physician, not working with these patients, or as a possible carrier of the trait, or the "stigma", as we call Thalassemia trait here and in Greece.

I would like to begin by making a short introduction on Thalassemia and Cyprus. Thalassemia, or in fact the hemoglobinopathies as a whole, are actually the most common monogenic disorders on our planet. It appears that the carrier rate is somewhere around 6% and the expected birth rate is something like 300 000 children per year according to Dr Michalis Angastiniotis. The worldwide distribution is shown on the map on your right and Cyprus is a very small island in the Eastern Mediterranean. The frequency of Thalassemia in Cyprus is high rendering this hemoglobinopathy a very serious burden on our health system. I will try to illustrate what I have learned through this programme about genetics and its implementation in public health.

It is important that when viewing the human genome not to forget the people this represents. I would like people to see me as an entity and I want my genes, my phenotype, my insurance rights, my employment and everything else about me to be viewed as a whole. We should therefore treat others as we expect to be treated ourselves.

Genetics is a relatively new science and it has not been taught for many years in medical schools. While genetics is the science of the human variation, medical genetics has become the science of human genetic variation in relation to health and disease, and genetic medicine, which is what we are really addressing, today is the massive flow of genetic information into everyday medicine and the change of practice of care for our patients based on this. Today, we are addressing the geneticisation of medicine that is inevitable since we have to face the challenge that almost all or more likely *all* diseases have a genetic component. Genetics is no longer the exotic speciality of the lonely elite of clinical geneticists but it is an issue that all

physicians and also public health providers and policy makers need to address. With the geneticisation of medicine which, as everything in life, has both a positive and a negative dimension, we arrive to how genetics is implemented in public health, in other words public health genetics. Public health policy is a puzzle, it combines the strategies, plans and action of a nation for controlling and optimising the social uses of medical knowledge and resources. Public health genetics is the integration of the advances in genetics and technology into effective and ethical public health action to promote health and to prevent disease and disability; this is according to Melissa Austin's presentation on the issue of genetics for health professional education. Why do we have to address genetics and public health as public health genetics? Because, all diseases are both genetic and environmental, because public health action must acknowledge ethical, legal, psycho-social and policy issues and because public health programmes and action must address cross cultural issues as we are no longer living in isolated societies or in single cultured or homogeneous cultured societies. From my perspective, genetics and public health have three major categories: genetic services, community genetics and policies in genetics. Within genetic services I would like to include the clinics, genetic counselling, diagnostics, laboratories and whatever else is offered, normally in a hospital setting. Community genetics then is the action and services provided within a community or population and the policies in genetics include the infrastructure of specific programmes and legislations on which every nation and every policy-maker should move and address. Genetic services, aim to help people with a genetic disadvantage to live and reproduce as normally as possible. Medical genetic services are offered to individuals or families who have been referred to the clinic either because of a diagnosis or because there was a question addressing a diagnosis. The people who are using these services are those who have been privileged culturally, academically or socially to have access to this knowledge of genetics and genetic services and request this service. This implies that there is a very large part of a particular population that are discriminated against because these people are most probably in need of the clinical genetic services and they are not aware of it. Medical genetic services alone, in my opinion, are not enough, we need to combine these services with community genetics and not choose one over the other. What is most important is that we need to implement medical genetic services into primary health care and give emphasis on the communities. I would like to add that the history of community genetics actually started from the role of the hemoglobinopathies at "the birth" of genetic disorders and health policy. I doubt that at the time people recognised that the hemoglobinopathies should be addressed as genetics. The role of WHO was very important in initiating this perception of community genetics. The first person to use it was Bernadette Model, if my memory serves me well.

Community genetics brings genetic services to the community and includes activities that enable earlier identification of people at risk of developing a disease due to a genetic predisposition. It also targets education regarding individuals' right to access this knowledge and their right to use this information to make free informed decisions. Therefore community genetics enables us to reduce the number of people who would like to know that they are at an increased risk of developing a genetic disorder and who did not know that this was possible before the application of this service. Community genetics is applied to different communities, when I use the word communities I mean geographical distribution, areas, nations, cities, who may or may not be religious or culturally homogeneous. This means that we are actually

addressing groups of people; not only populations and societies but groups of people who might be disadvantaged due to a genetic disorder themselves, like the community of the deaf. In such cases community genetic services involve several activities like genetic screening and appropriate related counselling, preconception and prenatal consultation, epidemiological studies which normally result in registries of genetic disorders and congenital anomalies, public education on genetics and related social and ethical issues. Some examples of applied community genetics are the programmes for the prevention of congenital anomalies due to nutritional deficiencies, exposures or other environmental factors.

I would like to now address screening. Screening can be an application of community or of national programmes, and it includes newborn, prenatal, preconception, and screening for other preventable disorders. I believe that the most important aspect of screening programmes is that genetic counselling is and has to be mandatory, at whatever cost. Prerequisites for screening are usually serious conditions with a definitive laboratory diagnosis, a good knowledge of the natural history of the disease and we should have ethical options available. There are many ethical dilemmas posed by these programmes.

Moving on to policies: Public health authorities have to address policies in genetics, including national and/or community health promotion programmes, education and legislation. I must not forget to mention that if we are addressing programmes in practice, then policy makers need to identify the major needs of the population, think of strategies and approaches, make a plan of action, implement this action, evaluate the implementation, and then come back and re-evaluate in some years and readjust as things are changing with time. Public health authorities must not forget the responsibility of making services easily accessible to all individuals who require this service by increasing the availability of services in primary health care, in hospitals, in institutions, in academics. There is a responsibility for quality assessment and there is a major responsibility for research resources, so this is an issue that public policy makers have to consider as well.

Genetic epidemiology is involved in national and community studies and in the build up of registries. Registries are an important tool in the prevention of congenital malformations. This enables us to address issues that we do not often think of as genetic, such as nutritional deficiencies, maternal infections, maternal diseases and exposures.

Another very important subject is education. Education is not only addressed to lay people, consumers and general public but also to health providers, as many health providers working in different areas of the health services are not really aware of the impact and of the limitations of genetics. We must not forget that education today utilises several types of media, such as readable magazines, internet and a lot of other resources. It is therefore important that we are very aware of what information and how correct the information we provide is.

The education issues we are going to teach ourselves about genetics, ourselves the physicians and the policy makers, include a number of issues except medical genetics, not only genetic epidemiology but also statistical genetics and bioinformatics and also ecogenetics which is the relation of genetics with the environment and also

pathobiology. We must not forget that the new knowledge about pharmacogenetics and research which are probably the most important developments of genetics in our days. We also should ensure that in educating health providers we must not forget subjects such as social and behavioural sciences, anthropology, bioethics, law and public policy.

We must move towards knowledge because ignorance = fear, so access to genetic education and knowledge can help to change the mentality not only of the public, not only of the health professionals but also of the policy makers.

Other policy issues must address screening and testing, genetic susceptibility, assisted reproduction, research infrastructure and resources, gene therapy and cloning. I am looking at these not because I want some policy maker to come and put an end to every debate but because I think that policy makers have to offer protection to the public, to the scientists, to anybody who is at risk from the misuse of genetics. Genetics in public health interfaces with ethical, legal, psychosocial, policy and legislation issues like privacy of genetic information, banking of genetic samples and so on.

There are a number of possible risks such as discrimination based on genetic identity and the perception of prevention. Prevention does not mean guidance nor directive genetic counselling nor eugenic approach to prevention programmes. The perception of cost effectiveness and genetic discrimination could be brought about by the implementation of services against the free informed choice. So public health has responsibilities towards society and the individual, like, prevention in management not just prevention.

Prevention and management, research, policy development, education, quality assurance and legislation are the public health responsibilities to create the conditions for equal access to knowledge, equal access to morally acceptable options and the ability of making the free informed choice.

We request a multidisciplinary approach and a partnership approach as everybody has to take the responsibility and so we are talking about the geneticisation of medicine which influences and will further influence the perception and implementation of public health policies. What we really need is to look with the genetic lens at medicine and health promotion and we need people with the mentality and ethos to share the benefits of the new genetics.

Thank you.

Address by Professor André Boué, Professor in Medical Genetics, former member of the French National Ethics Advisory Committee

In the last thirty or so years, there has been a spectacular increase in the rate of knowledge acquisition in the field of genetics. However, if we consider the medical applications of this knowledge, the absence of any practical implications as far as the medical treatment of genetic diseases is concerned contrasts sharply with the progress

made in diagnostic methods using cytogenetic, biochemical and molecular techniques, which were initially developed for chromosome anomalies and monogenic diseases both in individuals and in the context of family studies.

Plans for public health programmes based on these diagnostic methods have gradually emerged. Some of these programmes have already been implemented, others are planned for the short or long term; together, they form what is generally termed predictive medicine, where the primary objective is prevention – but a new aspect of prevention. Hitherto, prevention has been a collective process with general measures such as vaccinations or screening for cervical cancer, based on broad criteria such as age.

With the advent of genetics, a more personalised approach to at-risk individuals and prevention has developed, depending on the genetic characteristics of each person. This brings with it a risk of stigmatisation and discrimination.

Predictive medicine covers a variety of situations, with diagnostic tests being carried out on healthy subjects. These tests include:

- pre-symptomatic screening to reveal the existence of a genetic anomaly before any of the clinical signs are visible. As part of a public health initiative, these tests are carried out before birth or in the neonatal stage;

- genetic diagnoses to assess the risk for the descendants of the tested individual as part of a screening campaign among a population with a high incidence of a particular genetic disease such as thalassemia in Cyprus;

- probabilistic diagnoses to identify a predisposition to a serious illness, with the aim of assessing an individual's risk of contracting the disease compared to the risk for the population as a whole. A distinction can be made here between certain forms of cancer representing high-risk situations and multifactorial diseases resulting from the interaction between different genetic characteristics and environment-related factors, the latter often being predominant.

Public health programmes should be based on a series of criteria already commonly used in other health fields, to which certain rules specific to genetics should be added.

1. <u>Medical data</u>
   - the seriousness and frequency of the disease
   - possibility of diagnosis before any clinical signs are visible
   - a reliable and effective screening method
   - a prevention strategy evaluated in terms of its effectiveness and inherent constraints.

2. <u>The public health cost</u>
   - evaluation of the cost should not be restricted to the test itself, which may already be significant (e.g. breast cancer €2,700), but should also include the provision of information by qualified doctors before and after the test, which takes time. The cost of a prevention policy should be evaluated in terms of the cost of avoiding a "statistical case" of the disease.

3. Ethical considerations

First, there are the customary principles of medical ethics: causing no harm, giving precise information, especially verbally, and obtaining the patient's freely given consent.

But there are also ethical problems specific to genetic studies which Bartha Knoppers terms "genetics":

- the risks of stigmatisation and discrimination at individual or community level;
- the wrongful use of genetic information and samples when research is extended to other areas without consent;
- the use of data for purposes other than research and care, e.g. insurance, employment and other wrongful uses;
- lastly there is the problem of data and sample appropriation and patentability.

A few examples will suffice to illustrate the different situations and the ethical problems to which they give rise:

Prenatal screening for chromosome anomalies, in particular trisomy 21 syndrome (Down's syndrome).

This screening has become very much more common since 1970. In France in 1971 there were a few dozen tests, in 1980 about 3,000, in 1990 about 20,000 and in 1998 75,000, i.e. one pregnancy in ten.

Such screening raises a problem not encountered hitherto: should the pregnancy be terminated if a serious anomaly in the unborn child is detected? There are two patients to be taken into consideration: (i) the mother who can be informed and whose freedom of choice must be respected, and (ii) the unborn child in the mother's womb for whom the decisions to be taken by the doctor and parents may lead to termination of his or her life. How can this be reconciled with the principle of causing no harm?

The demand for prenatal screening came from women and was not a result of a particular public health policy which because of its proactive nature could be thought of as discriminatory or even eugenic.

The role of public health should be to make available and cover the cost of high quality diagnostic methods for all women who request them.

There are ethical problems directly linked to the screening process itself. It is therefore essential that parents are informed verbally before and after the test to avoid any feeling of stigmatisation or guilt in cases where a request is made for the pregnancy to be terminated.

The widespread use of prenatal screening has led to a sharp fall in the number of births of children suffering from the diseases in question. This has led to some concern on the part of parents who, not having been screened, are responsible for

taking care of older children or adults suffering from Down's syndrome. They fear a lack of interest in providing them with support at a time when there is already a shortage of social resources. This is viewed as discrimination against people with disabilities.

Screening to detect predisposition to breast cancer, and the problem of how widespread such screening should be.

Breast cancer linked to the BRCA 1 and 2 genes accounts for approximately 5% of such cancers. Women who inherit these genes have a very high risk of developing cancer; preventive measures – some of which represent a considerable imposition and others less so – can be taken in respect of such women.

Should this screening be available to all women or should it be limited to women whose families have been shown to have this gene? (This is the attitude currently adopted by many cancer specialists.) Where this gene is not present, approximately one in ten women develop breast cancer in its sporadic form. This complicates the medical information given to women, who cannot be totally reassured since it is only the hereditary forms that can be detected.

Making this screening part of a public health initiative is complicated by the conditions governing the test, which was granted a European patent on 10 January 2001. The patent requires the DNA samples to be sent to a single laboratory belonging to Myriad Genetics in Salt Lake City.

The test, which is a very difficult one and at the moment incomplete because of the very large number of mutations of the BRCA 1 gene, is very expensive. The results are sent by post directly to the patient.

This situation is a serious one. It is natural that the inventor of a technique should reap the benefit of his or her discovery through royalties paid by the users, but it is shocking that responsibility for carrying out the diagnosis should remain with the inventor, particularly in a field such as genetics where diagnosis is not only a technique but part of the patient's medical management.

There are more worrying ethical considerations in connection with the widespread application of genetic screening to detect a predisposition to frequently occurring diseases (such as neuro-degenerative or cardiovascular diseases) for which there are as yet no prevention or treatment strategies. Such screening would result in a loss of freedom for the at-risk individuals and cause them anxiety as they await the first signs of the disease.

While tests might make it possible to predict the disease, there are no tests which can predict our capacity to cope and come to terms with the idea of it.

All the same, this field is the focus of numerous research programmes, particularly those studying the genetic characteristics of large population groups. Such research requires heavy investment and because of the high cost a number of financial agreements have been concluded with industrial companies and government

bodies. This has created a de facto monopoly on the use of genetic data relating to a particular population (eg Iceland, Tonga, etc).

The following questions should be asked:

- Will the population which has enabled the research to be carried out benefit from those studies if they lead to prediction tests or treatment (which is often very expensive)?
- Is there not a danger of creating a feeling of discrimination, stigmatising a particular group on account of characteristics constituting the group's genetic identity?
- Are we moving towards situations similar to what happened recently with the genetic screening test for breast cancer?

This is a form of appropriation of genetic data which raises issues similar to those addressed in the debate on the non-commercialisation of human substances and patents.

Because research is so expensive, it is geared mainly to diseases which are frequent among wealthy populations; there is practically no research on rare diseases and those which are prevalent among poor populations; this is another form of discrimination.

Attention also needs to be focused on the ethics of scientific information in the field of genetics. Scientists often announce breakthroughs, that are picked up and amplified by the media, which they claim will transform the treatment of the major diseases, thereby giving rise to immense hope which unfortunately all too often is unrealistic.

There is a long way between the acquisition of knowledge and the medical application of such knowledge.

As we are in Cyprus, I should like to mention the long history of haemoglobin. Born exactly one century ago in 1901, Linus Pauling was awarded the Nobel Prize in 1954 for his work on the molecular structure of haemoglobin. Since then, thousands of publications have added to our basic knowledge of this molecule.

Today, decades later – and our Cypriot friends are only too aware of this – not one single child suffering from beta thalassemia has been cured as a result of all this knowledge.

We must remain modest and vigilant.

Professeur André Boué, Professeur de génétique médicale, Ancien membre du Comité consultatif National d'Ethique français

Depuis une trentaine d'années les progrès de l'acquisition des connaissances en génétique se sont accélérés de manière spectaculaire. Mais dans les applications médicales de ces connaissances on constate une profonde différence entre l'absence de retombées dans le domaine du traitement des maladies génétiques et les avancées

réalisées dans les méthodes de diagnostics utilisant des techniques cytogénétiques biochimiques et moléculaires, d'abord développées pour des anomalies chromosomiques et des maladies monogéniques au niveau individuel et pour des études familiales.

Progressivement ont été envisagés des programmes de santé publique basés sur ces diagnostics. Ces programmes déjà appliqués ou envisagés à court ou à long terme constituent ce qu'il est convenu d'appeler la médecine prédictive avec comme objectif la prévention. Il s'agit d'une dimension nouvelle de la prévention. Jusqu'ici la prévention était collective avec des mesures générales comme les vaccinations, le dépistage du cancer du col de l'utérus, basées sur des critères généraux comme l'âge.

Avec la génétique la sélection des sujets à risque et la prévention deviennent individuelles dépendant des caractéristiques génétiques de chaque sujet, avec comme conséquences des risques de stigmatisation et de discrimination.

La médecine prédictive recouvre des situations différentes, les diagnostics étant faits sur des sujets en bonne santé :

- Les diagnostics présymptomatiques qui mettent en évidence l'existence d'une anomalie génétique avant les manifestations cliniques. Dans le cadre d'une action de santé publique ils concernent essentiellement les diagnostics prénatals et néonatals.

- Les diagnostics génétiques ayant pour objet d'évaluer le risque pour la descendance de l'individu testé dans le cadre de dépistage dans une population dont l'incidence d'une affection génétique est élevée comme la thalassémie à Chypre.

- Les diagnostics probabilistes de prédisposition à une maladie grave qui ont pour objectif d'évaluer chez un individu le risque de survenue en comparaison de ce risque dans la population générale. On peut distinguer : D'une part certains cancers qui représentent des situations à risque élevé, et d'autre part des maladies multifactorielles qui résultent d'une interaction entre différents caractères génétiques et des facteurs liés à l'environnement, ces derniers étant souvent prédominant.

Un programme de santé publique doit répondre à une série de critères déjà développés dans d'autres domaines de la santé et auxquels s'ajoutent des règles particulières pour la génétique.

1. <u>les données médicales</u>
   - la gravité de la maladie et sa fréquence
   - la possibilité d'un diagnostic avant l'apparition des signes cliniques
   - une méthode de dépistage fiable et performante
   - une stratégie de prévention évaluée quant à son efficacité et aux contraintes qu'elle entraîne.

2. <u>Le coût de santé publique</u>

L'évaluation du coût ne doit pas se limiter au test lui-même qui déjà peut être très onéreux (ex : cancer du sein 2700 euros), mais comprendre l'information par des médecins qualifiés avant et après le test, ce qui demande du

temps. D'où l'évaluation d'une politique de prévention pour prévenir un « cas statistique » de la maladie.

3. Les questions éthiques

Ce sont d'abord les principes éthiques habituels de la déontologie médicale : ne pas nuire, bien informer avant tout oralement, obtenir un consentement libre.

Mais apparaissent des problèmes éthiques spécifiques des études génétiques, ce que Bartha Knoppers appelle la « genetics ».

- Les risques de stigmatisation et de discrimination au plan individuel ou d'une population.
- L'utilisation abusive des informations génétiques et des prélèvements par l'extension des recherches à d'autres études sans le consentement.
- L'utilisation des données à d'autres fins que la recherche et les soins, c'est le cas des assurances, de l'emploi, et il peut y avoir d'autres dérives.
- Il y a enfin les problèmes liés à l'appropriation des données et des prélèvements et à la brevetabilité.

Pour illustrer les différentes situations et les problèmes éthiques qu'elles génèrent nous donnerons quelques exemples :

Le diagnostic prénatal des anomalies chromosomiques, la trisomie 21 en particulier.

Ces diagnostics se sont fortement développés depuis 1970. En France en 1971, quelques dizaines de diagnostics, en 1980, environ 3000, en 1990, environ 20 000, en 1998, 75 000 soit une grossesse sur dix.

Ces diagnostics posent une question jusqu'alors inédite : la décision d'interrompre la grossesse lorsqu'une anomalie grave du futur enfant est décelée. On a à faire face à deux patients : (i) la mère qu'on peut informer, il faut respecter son autonomie et (ii) le futur enfant caché dans le sein de sa mère, pour lequel les décisions envisagées par le médecin et à la demande des parents peuvent conduire à un arrêt de sa vie. Comment respecter le principe : ne pas nuire ?

La demande de diagnostics prénatals est venue des femmes et non d'une politique de santé publique qui par son caractère incitatif pourrait être assimilée à une discrimination voire à un eugénisme.

Le rôle de la santé publique doit être de mettre en œuvre la prise en charge et l'organisation de moyens de diagnostic de qualité disponibles pour toutes les femmes qui le demandent.

Il y a d'abord les problèmes éthiques directement liés au diagnostic lui-même, avec la nécessité impérieuse d'une information orale avant et après le diagnostic pour éviter des sentiments de stigmatisation et de culpabilité de parents ayant demandé une interruption de la grossesse.

L'application large des diagnostics prénatals a conduit à une forte diminution des naissances d'enfants atteints, il en résulte une inquiétude des parents qui n'ayant

pas bénéficié de diagnostics ont la charge de grands enfants ou d'adultes trisomiques. Ils redoutent un désintérêt de leur prise en charge alors que, déjà, il y a une insuffisance des moyens sociaux. Ceci est ressenti comme une discrimination envers les handicapés.

Les diagnostics de prédisposition au cancer du sein où se pose la question de leur champ d'application.

Les cancers du sein liés aux gènes BRCA 1 et 2 représentent environ 5% de ces cancers. Les femmes ayant hérité de ces gènes ont un risque très élevé de développer un cancer ; pour elles des conduites préventives, plus ou moins contraignantes, peuvent être instituées.

Faut-il appliquer ces dépistages à toutes les femmes ou la limiter aux femmes où des études ont montré l'existence de ce gène dans leur famille (ce qui est actuellement l'attitude de nombreux médecins oncologistes) ? Il faut savoir qu'en absence de ce gène environ une femme sur dix développe un cancer du sein dans sa forme sporadique. Ceci complique l'information médicale donnée aux femmes auxquelles on ne peut donner aucune certitude puisque seules les formes héréditaires sont décelables.

L'application de ce dépistage dans le cadre d'une action de santé publique se complique par les conditions de la diffusion de ce test qui a obtenu un brevet européen le 10 janvier 2001. Ce brevet impose l'obligation d'envoyer les échantillons d'ADN à un seul laboratoire de la société Myriad Genetics à Salt Lake City. Ce test difficile, et encore incomplet du fait du grand nombre des mutations du gène BRCA 1, est très onéreux. Les résultats sont transmis par courrier directement à la patiente.

Cette situation est grave. Il est normal que l'inventeur d'une technique bénéficie de sa découverte grâce à des royalties versées par les utilisateurs, mais il est choquant que la pratique de ces diagnostics reste aux mains de ses inventeurs en particulier dans le domaine de la génétique où le diagnostic n'est pas seulement une technique mais aussi une prise en charge médicale de la patiente.

Les réflexions éthiques deviennent plus préoccupantes lorsqu'on envisage l'application élargie des diagnostics génétiques de prédisposition à des maladies fréquentes (par exemple les maladies neurodégénératives ou cardiovasculaires) pour lesquelles on ne dispose encore ni de stratégies de prévention, ni de traitement. Un tel dépistage engendrerait une perte de liberté pour les sujets dits à risque et une anxiété dans l'attente des premiers signes de la maladie.

Si des tests pouvaient permettre de prédire la maladie, aucun test ne permet de prédire notre capacité d'en éprouver et d'en assumer l'idée.

Et pourtant c'est dans ces domaines que sont orientés de nombreux programmes de recherches et en particulier les recherches de caractères génétiques sur de larges populations. Le coût de ces recherches qui demandent de gros investissements a conduit à des accords financiers entre des firmes industrielles et des instances gouvernementales créant, de fait, un monopole imposé sur l'utilisation des données génétiques d'une population (ex. : Islande, Iles Tonga...).

On doit se poser des questions :

- La population qui a permis ces recherches, recevra-t-elle un bénéfice de l'étude si celle-ci permet le développement de tests de prédiction, ou même des thérapies souvent de coûts élevés ?
- Ne pourrait-il pas se développer un sentiment de discrimination, stigmatisant un groupe humain particulier, par des caractères qui constitueraient une identité génétique du groupe ?
- Se dirige-t-on vers des situations comme celle qui vient de se produire pour le dépistage génétique du cancer du sein ?

C'est une forme d'appropriation des données génétiques et ceci rejoint les discussions sur la non-commercialisation des éléments du corps humain et sur les brevets.

Du fait du coût des recherches, celles-ci sont orientées vers des maladies fréquentes dans les populations riches et les maladies rares ou les maladies fréquentes survenant dans des populations pauvres sont pratiquement exclues, autre forme de discrimination.

Il faut aussi se pencher sur l'éthique de l'information scientifique dans le domaine de la génétique. Des scientifiques, relayés et amplifiés par les médias, annoncent des découvertes qui, selon eux, devraient transformer les traitements de grandes maladies, suscitant ainsi un immense espoir qui hélas relève souvent de l'utopie.

Il y a loin entre l'acquisition des connaissances et leur application médicale.

Comme nous sommes à Chypre il faut rappeler la longue histoire de l'hémoglobine. Il y a juste un siècle en 1901 naissait Linus Pauling qui a eu le prix Nobel en 1954 pour ses premiers travaux sur la structure moléculaire de l'hémoglobine. Depuis des milliers de publications ont apporté des notions fondamentales sur cette molécule.

Aujourd'hui des dizaines d'années après, et nos amis chypriotes le savent bien, il n'y a pas eu un seul enfant atteint de béta thalassémie qui a été guéri grâce à toutes ces connaissances.

Il faut rester modeste et vigilant !

ROUND TABLE : THE FUTUR OF GENETIC TESTING / TABLE RONDE : LE FUTUR DES TESTS GÉNÉTIQUES

Address by Professor A.N. Nicolaides, General director of the Cyprus Institute of Neurology and Genetics

Madam Chairman, Mr Chairman of the Session, ladies and gentlemen,

First, I would like to welcome you to Cyprus also, it is a great honour also for me to be invited to speak at this session and my task is to give you the clinician's point of view of what will happen in the near future, what is going to happen to us by the year 2010. As far as this past is concerned, in the last 20 years molecular techniques have isolated many of the genes in serio-genetic disorders and we have heard about this this morning, we have also heard that the majority of those single genes determining inherited diseases, the mono-genic diseases have also been identified. We are now proceeding with the recognition of specific genes involved in common disorders in later life just cardiovascular disease and cancer and the situation as we have again heard is very complicated because there are environmental factors that play a major role, the xxx of inheritance are less clear cut and multi-gene xxx are involved in the expression of these genes is different in different tissues in different parts of the body. We clinicians tend to think of risk factors as follows: we have the exogenous, indogenous and gene polimorphiuses, in each one of these classes has the adverse risk factors such as smoking and healthy protective factors such as xxx intake. As far as the gene polimorphiuses are concerned, there are adverse xxx that are bad for you and there are protective xxx that are very good for you and so on so we have a very complicated picture and I am going to give you an example of one gene polimorphiuses that is very is become very important in the last five years, this is factor five in mutation. And this is an example of a genetic environmental interaction. The normal factor five gene, if a woman is not on oral contraceptives, the risk of getting thrombosis is point eight per ten thousand persons, years. But if they are on oral contraceptives, this goes up three times. Now if you have the abnormal mutation and this abnormal mutation is found in about ten to twelve percent of people in Northern Europe, it is about thirteen percent here in Cyprus, the risk goes up to five point seven percent / six percent but if at this same time a woman is on oral contraceptives this goes up to twenty eight and if in addition there is smoking you multiply that by ten and you get an interesting figure. Now, for me, being a doctor, knowing the presence of absence of this gene is very important for making clinical decisions every day. When I see a patient with the vein thrombosis and I have to decide whether they will go on anti-coagulants for one year or all their life, I need to know that information, I have to test that patient and it is in all the guidelines, European guidelines, International guidelines and so on. By the year 2010, molecular genetics will be used not only in research but also in the practice of all medical specialties and underline this all medical specialties. There is an accelerated shift of emphasis from rare genetic disorders as we have heard today, traditionally we feel the xxx of geneticists towards common conditions in all medical specialties and most important our understanding of the pathogenecist at molecular level is being translated into the possibility of prevention and I will come back again and again to prevention a novel and more effective method of therapy and this is where we are

going. The aim of my presentation is to give you a vision of genetic testing in the year 2010, say in ten years' time from the doctor's point in view of terms of diagnosis therapy and prevention to demonstrate the importance of a multi-disciplinary approach and to try and be provocative in order to stimulate a lively part of the discussion. Before I start, I will tell you one or two key things, I realise a lot of you are non-medical, I will say something about xxx and first about the diagnosis. Think of every diagnosis as a probability, the more information the doctor has about the patient the higher this probability becomes and it becomes one hundred percent when you have something that you put under the microscope. Therapy, clinical decisions made by doctors depend on the balance of risks, to operate or not to operate, to treat with this drug or to treat with the other drug or not to treat at all depends on knowing the risks and academics like me spend their lives doing clinical trials in order to define these risks. And in the past, most doctors spend their time in diagnosis and therapy, even now, physio-cardiologists spend all their time on diagnosis and therapy but prevention is creeping in, prevention is possible these days because a pre-clinical diagnosis is visible, I shall come back to that, screening is practical and can identify individuals at increased risk and finally, for the first time, we begin to have effective prevention in these common polygenic diseases. The other thing I would like you to have in mind is that until recently, even now with all the signs that we have, clinical practices currently only 20% scientific, only 20% of our practices is based on clinical trials, run under my control, clinical trials. 40% of our practice is rational and 40% is empirical because our teachers and the teachers of our teachers were practising like this. The aim of our research is to make clinical practice more scientific to set more of these rational and empirical decisions up to make them scientific. Ok, I have made a list of the subjects I shall be touching upon, but time will restrict me in some of them and I think I am going to jump on some of them but let's see how we get on. I am going to start with some examples of my own speciality which is arterial disease and this diagram on the left shows the bifocation of the carotid artery in the neck and one of these arteries sends the blood up to the brain and here you see the first deposits of cholesterol on the wall of the artery, the plaques, and here you show, it shows how a little plaque produces an ulcer, bits break off and go to the brain and then you get plateless sticking and then you have a thrombos forming and then a bit of this thrombos can break off, block the artery, hide the brain and gives you a stroke or, the the thrombos, the clot may grow and occlude the hole vessel. We have now learnt that there is a definite combination of gene polymorphism mutations finding the people, people who are more than 1% of the population, responsible for how the cholesterol gets into the arterial wall of some and not in others, why these plaques ulcerate, why the plates stick in some and do not stick in the others, why a clot becomes stay small or grows and so on. By finding and testing for these gene polymorphisms, we will be able to find the correct therapy and I'm going to give you some examples. It is now possible to look at arteries with ultra-sound and I'll come back to that in a minute, the same way you look at babies in your mother's tummy you can look at arteries in the neck and here is the front wall of the artery, the skin is up here, the back wall of the artery there is a deposit of cholesterol called plaque and in this artery, look at this one, this is pure cholesterol, it is very black here and a very thin black wall and this is the one that is about to break and get the contents discharged and go to the brain and give you problems. Now we know that there are different gene polymorphenes that are responsible for this and we can identify them and on the basis of this, methods of therapy are being developed and we can make this unstable plaque become stable like this, and this is happening right now. For

example, we now know that we have a list here of genetic and bio-medical chemical markets associated with strokes, here is the list, some of them are genetic mutations, some of them are part chemical, and on the basis of these markets, medical practice is changing. Coronary heart diseases five years ago everybody would be getting the same treatment, now nobody will be getting the same treatment. If, because we are able to find out what is wrong that gives you the coronary heart attack, if the problem is based on the receptors on the platelets the treatment will be under platetherapy. If what is wrong, is the emptyageaphare gene, specific treatment will be xxx and folic acid and this is happening today and if you have an unstable xxx plaque like the one I showed you on this side earlier on, xxx would be the answer and clinical trials are happening right now. If the problem is increased, oxygen free radicals the xxx oxidants and so on. The same thing is beginning to happen with cancers and targeted therapy for breast cancer for example is an expansion of the, think of it, an expansion of the classic genetic markets. If you are going to have a blood transfusion, you are going to be tested for the ABO blood group and if you are going to have a renal transplant you are going to have tissue typing. So I am going to tell you the latest story on breast cancer and hiseptine, hiseptine is a new drug and 30% of the breast cancers respond to this drug, and this drug comes with the Hessa test, which is a test that identifies the patients, the 30% of them, who are expressly open to the receptor on the tumour tissue, this is a gene receptor. Therefore one is not wasting the drug, one is treating those who can actually respond and one identifies them first. I am going to say something about pharmical genetics, that has been mentioned by Violetta Anastasiadou and it is very very important. The response of a patient to a particular medicine, the efficacy and the side-effects may depend upon one or more factors that may vary according to the genes of an individual and this effects drug absorption, metabolism, elimination etc. Pharmical genetics aims to use pharagenetical profiles to select those people who are likely to respond favourably to a particular medicine and those who are susceptible to particular adverse effects. And here I am giving you some examples and I am giving you three genes, and I am giving you three polymorphis, frequent mutations and here are the drugs with adverse effects in the people who will have these polymorphises. We know that and therefore if I want to stop somebody from bleeding on warfarine I would need to test for that so what I see happening in the next five years, each one of us will have an abbreviated profile, sneak profile single nuclear polymorphis card. We take this plastic card to our doctor, he will put it into his pc and out will come the answer for the treatment for this problem you have, you should not take this medicine you would do better with this one and this is a reality. Now, on the ethical issue, the pharmaceutical companies are claiming because this is not based on genes producing disease but is based on single nuclear polymorphis these sneaks, we will have eight hundred thousand along the geneome it will not be able to decipher or translate from that card or get out any information about predisposition to particular disease, that is very exciting. I am not going to say anything about this, we will skip it because time is at a premium, a little bit about gene therapy. I heard this morning a discussion and let's get a few things straight. Gene therapy is the intracellular delivery of genetic material to generate a therapeutic effect by correcting an abnormality of the DNA or giving the cells a new function that is not there that should have been there. There are two types of gene therapy one is germ line gene therapy and we had a touch upon this on the discussion this morning. It is currently considered ethically unacceptable though it has the potential to eradicate many hereditary diseases it is now possible, I am not saying it should be done, all I am saying it is possible using homogolus recombination to

replace old genes for new. In such genetic intervention that could be passed down through generations as a permanency that frightens us, therefore, to date, all gene therapy applications have been considered only for somatic gene manipulation and I am coming to somatic therapy to give you a vision of where we are going. This is the insertion of genes into deployed somatic cells of individuals where the genetic material is not passed into the children, transfer is achieved by use of lipids and virus mediator systems. And the delivery available at the moment consists of three methods: xxx delivery xxx delivery xxx delivery for those who want to be more technical and for example severe combined immuno-deficiency, it was mentioned earlier on today and this is the picture of last years' "Telethon", we run a "Telethon" as well here in Cyprus every year, and this is a baby who was born with, I believe, with sever combined immuno-deficiency in France, it is now held by his father. Bone-marrow cells were taken out, gene therapy was performed, placed back into the baby and this baby will now, we hope, have a normal life, instead of being isolated in a bubble away from all the dangers of infections. And today, many diseases have reached the stage of clinical trial and if you want to get a list of them you can look it up on this web-page it is very very large. And I am giving you a glimpse into what is going on for mono-genic disorders being investigated for gene therapy. These are the numbers of prevalence of these mono-genetic disorders, you all know very well, in Europe and the current clinical trials in mono-genetic disorders I have listed here. There are more than 300 clinical trials going on now in Europe or is it 3000? What about cancer? The major cancers in Europe are listed here, well their annual incidents are listed here, and the current clinical trials using gene therapy in cancers are also listed here, we just have to wait for the results and they won't be far off. So, I would like to conclude that although gene therapy is in its infancy it has the potential to revolutionise the way we treat disease, the facts available now indicate that it is only a matter of time before we see the dream becoming realised before medicine is transformed. I will say, I will use only one slide, and say something about genetic testing screening for cancer. The previous speaker this afternoon mentioned that about five percent only one in twenty patients have a gene defect underlying the cancer but today they can only be found after there have been multiple cancers in the family and genetic testing is not advised unless the history in the family exists. As mutation scanning becomes faster and cheaper it will be possible to offer this testing to all patients in each year and somebody in the audience, I'm going to say Nicolaides, you're a dreamer, you're an enthusiast, well it is a reality because Professor John Burne in Newcastle and his team are now screening 60,000 patients with cancer that are presenting and what they are hoping to do is that by finding the one in twenty whose families are at greater risk and where prevention is possible such as by regular removal of part polyps etc. in the relatives, the benefits of genetic testing to the relatives will be demonstrated and when this is demonstrated and you show a definite benefit that you actually reduce the incidents of cancers not treatment reduce the incidents of cancers we all doctors will have to be asking for this particular test. And I am going to finish by telling you an interesting story that touches upon the insurance things we talked today that I am facing right now myself. The same way you can use ultrasound to look at babies in the mother's tummy, you can have high-resolution ultra-sound, you can place a probe on the neck of somebody, you can visualise the carotid arteries in the neck, the blood flow, everything, and you can see exciting things, you can see the position of plaques and we used the method initially in a number of villages in Italy, this is San Valentino in Pescara, we have used it as part of the xxx study in UK in Newsbury, in Maidstone. Newsbury has the highest

rate of heart attacks in the UK. Maidstone the lowest and the ratio is two to one. There are reasons for this. We screened 10,000 people, we followed them for ten years, it has all been published and we identified ten percent of the population that had deposits of cholesterol in little plaque and those that had big plaques, this one and this one here producing considerable narrowing, I call these big plaques, in their arteries. We followed them for ten years and look at the results. We have identified, as I said, that those with the little plaques, here, in ten years, forty percent had a heart attack or a stroke and in those that had large plaques, eighty percent had a heart attack or a stroke and this population here … percent of the whole ten thousand and they contain ninety / ninety five percent of all the heart attacks and strokes so suddenly something exciting is possible, something you could not do with normal risk factors, smoking, cholesterol, blood pressure and so on this is now happening with ultra-sound. How do insurance companies react? Very important because it is a lesson of how the insurance companies will react with our genetic tests. Life insurance companies say to me, we are not interested in this because we ask people who come to us for insurance to go and have the ultra-sound test it will cost fifty hundred Euros, they will not do it, they will go to another insurance company and we are going to loose all our clients, they are not interested. Insurance companies that provide health care and health care providers are very excited. Why? They have calculated and this comes from one insurance company writing to me, they have calculated that if 50%, if there is a 50% reduction in cardiovascular veins, I forgot to tell you, by, it has now been shown that by aggressive risk factor modification these heart attacks and strokes can be reduced by 50% now they said to me, sorry, in the randomised control studies are published, now, if there is a 50% reduction in cardiovascular veins, then for every one million US Dollars spent on screening, we will be saving approximately ten million Dollars. We will pay, we will not increase the premium and we will pay the hundred Dollars for the people who come to us for insurance to go and be tested because by drawing to them the problem, attention that they have, have this risk, they will be taking Profilaxis and we, the insurance companies, will be saving an enormous amount of money. So the conclusion is, and the problem is far more complicated that this but I am simplified, simplifying it to make a point, the conclusion is that because genetic information for genetic disease is unlikely to explain more than 50% of the variability and risk, 50% is I am generous, maybe colleagues, my genetecist colleagues, will say Nicolaides you're generous and I think 50% will be the environment or probably more, the main impact will be the results of prevention and health care providers and medical health insurance will be more interested than life insurance. I hope, thank you, I hope that I have thrown enough ideas to stimulate a lively discussion, thank you very much.

Ah yes, I need the final slide, the final slide is to acknowledge and thank all my colleagues and here they are, not all of them, some of them from the Cyprus Institute of Neurology and Genetics for what they taught me in the last three years and I'm very grateful to them, many of them are here in the audience and they will be contributing to the discussion. Thank you to all of you.

Thank you very much Professor Nicolaides, the presentation was very interesting and I am sure that it regretted many questions so:

Any questions, comments?

I have a question for Dr Boué, but before I ask it, I would like to ask the last speaker as he is looking into the future as a clinician, you mentioned that germ-line therapy has a permanency that frightens us, which is why we automatically just put it on the list of prohibitions without much further discussion. In pre-implantation genetic diagnosis, the selection of embryos and the implantation of only those that would not present with the condition which we are selecting out, also has the effect that the next generation of children born from that particular embryo will be permanently altered not in a way that frightens us but in a way that I think contributes to the quality of life. What then is the difference between the two techniques?

I think I should have said first that within 20 to 30 years we should re-examine this issue. I think that within 20 to 30 years, we will have the ability and the methodology to get rid of many diseases and I think we will come back to this and start thinking about germ-line gene therapy. As far as pre-implantation diagnosis, you are only affecting one individual and you are not affecting the germ cells, when the embryo is there in the form of eight cells or ten cells, you take one, you examine it and you determine whether it has or it has not got phalacemia and then you either proceed or not proceed to implantation. And the children of these embryos, when they grow up, will have germ cells that have not been interfered with.

Well, I agree with what Dr Nicolaides said but I should add that the difference is the following: in another way of looking at it, if you had not done the pre-implantation diagnosis you would have probably gone with a prenatal diagnosis, speaking only of serious diseases, for example cystic fybrosis. So, you would have prevented the birth of a sick child, either you do it before you implant or you do it after the conception by terminating the pregnancy. The important point is what Dr Nicolaides said, you have not interfered with the germ line, therefore it is not going to pass on. Also, as regards to recessive disorders, perhaps the purpose is not to prevent the purpose is not to eradicate different genes and by saying a different gene here I mean even genes that carry mutations. As I said in the morning, some of these genes indoubligate in a person and generate the disease, however, in ??? in other words when you have one normal and one abnormal gene, may be beneficial. We know they have been beneficial in the past, otherwise they would not have been survived during evolution. In any case, the important point is that by doing either prenatal or pre-implantation diagnosis, most of the times as regards regressive disorders you allow abnormal genes to stay within the gene pool without necessarily giving birth to sick children. I am sorry if I'm being too technical but it's the only way to answer this.

One remark, I am not a genetist but as far as I know there is some risk that the sequence of genes which is transferred by the lector will not hit at the target itself but there is the danger that it will be implemented somewhere in another position and it may cause more harm than benefit and this is the risk which is not come in pre-implementation diagnosis.

There is one of the problem of ??? condition diagnosis is this is good when it is ??? when you are a fertile couple, the success rate is low so the mean essay you have five times to have one living child you need five ??? what it means for the mother, something terrible, yes so you have to think of the mother, she is fertile and she need a

child, not within three or four years because you have to do assez, assez et assez to succeed.

I certainly agree, however, here we have to think of the available ??? and apparently we are dealing here with a couple who do not want to have a child with a severe disease for example cystic fibrosis. Either they go ahead with the one in 25, one in four, 25% risk and they terminate the pregnancy in case it is affected and this is discovered by prenatal diagnosis and when you look at prenatal diagnosis you, she may become pregnant once or twice or more times and every time she may be found to be pregnant with an affected child and she will have to terminate the pregnancy or she goes with prenatal diagnosis, these are the available options, take it or leave it.

Well, my question goes to Dr Boué but may be answered by anyone on the panel, as we see, you know, I do not feel that proud myself, that in Cyprus no more newborns we have with Thalasemia because we tend to have more and more killed babies with Thalasemia and nowadays that we are at the point to speak of ?? therapy and gene therapy for Thalasemia those children whose pregnancy was terminated 15/20 years ago could be good subjects to these new treatments if they were alive today, so I think it possible that first I fear that the time is mature for whatever was legally ok a few years ago to terminate a pregnancy or do implementation testing should not be any longer, we want to argue other gene therapy and bone marrow transplantation, new techniques for specific disorders. This is one point I want to make and the second one, when it comes to cancer predisposition testing I totally agree with Professor Nicolaides that yes cause effectiveness is positive and we have even more studies actually coming from the UK regarding colorectal cancer that for every single year life gained due to genetic testing and intervention we have three thousand sterling gaining for each year that the person survives longer. So I fear that maybe still we the time is mature to plan more integrated projects when we target specific genes to be ready and preparing the therapeutic approach and the chemotherapeutic intervention at the same time so that the time closer from the time of detection to intervention.

I wonder if I could answer to the first part, can I answer to the first part? Mr Chairman, you were talking about children who have a disease that might in the coming years be treated with gene therapy that those children should not be aborted anymore. In my opinion and in the general opinion from the country where I come, which is Finland, this is the decision of the families. The families have to get to, get to know that there is a treatment being developed and it is their decision. It is not an easy thing for the family to have a severely ill child and wait for therapy so it must be their decision and not anyone else's. But there are treatments available, I mean, ???? which are still an option nowadays and we have invested a lot of money on these modalities nowadays. And I feel that these options should be given when the patient can't enough from, you know, prenatal cancer and when we subject someone to the trait diagnosis they are carriers.

Well of course, these things are discussed with them, but as I said I think the decisions goes to the families.

Thank you, please.

Yes, this is a question to mostly the legal experts on the panel, there appears to be a little irregularity in the way in which we handle the, if you like, the implementation of legislation regarding medical genetic testing and so on, but it seems to me at this point in time genetics has actually covered a very little amount of extracting information to what actually is relevant to their, the population at large, as Professor Nicolaides said earlier on, the challenge from the, even from the commercial point of view and also the policy making point of view lies in the future, i.e. how we deal with polygenic diseases that affect most people. For the present we have no answer to that we can only predict what will happen so that we are all kind of overwhelmed a little bit by the number of reports that came out of mologenic diseases and we think that we should take decisions now regarding to actually the problem that will arise in the future and as Professor pointed out, as Professor Nicolaides pointed out at the end, if insurance companies ask us whether we smoke and we have taken a collective decision for example to say yes we allow them to ask us this question, if we ask us where decisions will leave or what kind of work we do or whether we can handle hazardous material. At the end of the day it may not be too bad if they ask us a question what is your genetic profile? Because that actually could help, so if we implement legislation now at national level and then we come back later in ten years' time and say well, we have created legislation today and we are asking companies to operate in that environment ten years later that may not actually have any effect because companies, if they operate for example in the European Union, well they can choose where they can operate and then it doesn't matter, so I just want people to, the legal experts to comment on that, what will happen if we have legislation today and implementation of that legislation in ten years' time?

I think that is a very important point, I think that is an argument in favour for, of a moratorium approach because we are seeing the technology changing quite rapidly as you point out and the conditions in which these decisions made as to insurance and other matters obviously changing and therefore I think that a good approach to this is to say let us see what happens over the next five years or so, rather than committing ourselves to a particular position at present. And that has the advantage also of dealing with peoples' fears about this because that is something that we found was very very strong that people really worried about genetic testing in some way disadvantaging them. If we take a moratorium approach we can say to them well it is not going to cause you any disadvantage over the next five years or so during which this moratorium or whatever period one chooses applies. So deals with that, and it would also perhaps enable people to get used to the fact that genetic information, there is a great deal of genetic information now being elicited and it is going to form a part of our lives. Could I just add one point, which I would be very interested to hear Professor Nicolaides say something about because his very stimulating talk raised this issue, he referred to pharmaco genetics bringing out a lot more information and he mentioned this little card that will contain this pharmaco genetic information about us which doctors will have ready access to, I wonder whether the technology is now proceeding so quickly that we can no longer control genetic information, that so much genetic information is getting out, particularly with the development of multiplex tests, multiple as say chips for example and that this is really going to cause us to consider whether the right not to know, which is written into a number of international statements on this particular point, can ever really be protected. Are we really, in fact, in the grip of technological progress here that actually cannot be controlled because if for example there are chips that are capable of

testing for 200 conditions or something of that sort, what is going to happen to that information? Can you say, only give me information on one thing or are we now committed to getting information on everything, in which case, it is rather too late to try and control the uses of personal genetic information?

It is a very interesting question, and it raises many issues. First, I do not think there is any, oh, I am sorry do you want to go first? no. There is no single test or chip that can test for as those conditions. I don't think, I'm aware of it yet and I stand to be corrected if I'm wrong. Now, for example in pre-implantation diagnosis you can test for one and only one possible condition, you cannot test for five, six or seven and that is based on the family history and the predisposition and all that. As far as being in the grip of technology that is going very fast, to a certain extent the answer is yes and the way I see if employers, if insurances and doctors and doctors are reasonably good at this point, they don't set their own ethical code it will be imposed upon them by legislation, maybe I am provoking a reply back.

For answering, for giving a concrete answer to the way in which legal system must react let me tell you a story associated press reported that in '98 30% of American women who offered breast cancer test refused to do it. Asked why they refused all of them said that they were deeply concerned about the risk that the result of the test could be known by insurers and employers so you can see that if human rights dimension is not integrated in the perspective in genetic perspective, we cannot exploit at its best or we cannot exploit at all the opportunity offered by the innovation in this scientific field and moreover and more dramatically, you can see that how this case shows how woman are confronted with a tragic choice and they prefer to risk their health in order to avoid some social negative effects. So I think that if there is no enough protection for these very sensitive data there we can get negative reactions on the social side.

I would like to respond to this question about the time dimension of the laws related to genetic information again from the perspectives of insurance law. What has been very much praised in the circles of human rights spirited biomedical lawyers were interpreted very interestingly by insurance company. This is about the moratorium approach in a genetic test, access to genetic information, but I received in answers by insurance companies that they took a waiting position, actually they said that they understand that people should be not discouraged to undergo genetic testing and moreover they think that there are not enough genetic data available so they very interest is to freeze at the moment, the access to genetic information and later on there is another question when there will be sufficiently enough genetic information which could be also used, the dimension of access to genetic data which we didn't cover the duty to disclose already existing medical data in certain forms of insurance contract. So we are witnessing, I don't want to act that all the ??, this is a very unpleasant task of using references from the insurance law but we should know their perspectives on these issues and I would just like to say one interesting element of genomics law, which I think is more and more present, just as genetics has to make some predictions about the future, interestingly genomic law very early on developed these predictions on what would happen in the future, this is a very special innovative field of law and just as many fields in genetics, we have to make predictions on the future, genetics related law is making predictions on the future assessment of the social impact on certain information, it was a learning process and it is very different from let's say a

hundred years ago the first vaccination was redacted in a public health law fifty years later, now there is a synchron between of medical science and the law tried to follow the events but the problems with assessment is there is enormous risk of failure of interpretation therefore there is enormously important here to have follow-up, regular follow-up of the laws which try to follow the development of biomedical science. I think very much based on the fact they are forced to make some predictions on the future social impact related to the present by medical researches.

The October 26 Editorial and Science magazine had the title "legislate in haste, repent in leisure" and I think we have all seen the short-sightedness of hastily crafted legislation to assuage public opinion to comfort the politicians so that they can get back to other business, we have to be very very careful in this area to not further stigmatise genetics by having legislation adopted and in particular not putting in definitions of scientific definitions which as we found out with cloning a few years later were totally irrelevant to the technique used.

So, please, ?? Baumgert from Austria, I am in the job for a very long time now and I am not all that enthusiastic because I have experienced so many promises having been given for medicine and I would like to draw your attention to one point which I haven't heard mentioned yet, talking about the potentiality of germ line therapy or designer babies. What does it mean for women? In my opinion it depends on ?? and then you have the pregnancy and then you have the end product. What makes it easy for you to talk about this is because some prenatal monitoring you have the option of abortion, this makes it easy but what does it mean for women? They are instrumentalised, something is promised and if it goes wrong you're not taking the risk and if the woman aborts she carries the risk. I think there is something we all have to think about what we are promising these people, what we, excitement this hype you know is so detrimental another point, if we recall the opening remarks of President Christofiaf, he not being a scientist but maybe a down to earth politician brought into his statement proportionality. We are talking here about things that effect in many respects a tiny proportion of the world's population and if you're talking of preventive measures, not smoking, eat less, and we have changed a lot. People will still be die of something but many of our predictive factors and so on, now nobody doubts today that smoking is not a healthy thing, nobody exists who knows that obesity, overeating is unhealthy. I do not know how many of you have experienced with lifestyle interventions, these are very until now, very unsuccessful attempts to modify behaviour, so having a prediction does in no way mean that you have a result. In some ways you may have an intervention but if prediction means that you suggest to somebody that they should change lifestyle we have many predictions which we certainly, blood pressure, cholesterol, overweight, smoking, we can serve our patients and compliance is absolutely very low.

Thank you.

I think, I think it was more a comment like perhaps the first part on what does it mean for women clinical geneticists should try and comment, I will say about the obesity and about lowering cholesterol and about smoking, the prediction wasn't as good right now and if you use the prediction from the ??? equations and procamequations you can identify a high risk group that at best will only have 50% of the heart attacks and strokes. We now think we can do better and the question I'm

raising if we say to a group you, you're going to, you belong to a group that contain 95% of all the heart risks and strokes, maybe we will influence just a few more to give up smoking but certainly not all of them, but there is specific targeted preventive therapy, we have tablets that will do it and specific other things that I didn't have time to mention and they will take the tablet even though they may not be willing to give up smoking. So you join up with the drug companies on the one hand and you predict you will not receive, suffer from cancers or keep on smoking that the quick test to certified smoker.

Yes, ??? from Poland, there is a fundamental question appearing during the discussion, is there prenatal diagnosis, the genetic selection of living organisms belonging to human species or is the prenatal diagnosis the diagnostic for eventual treatment in group of risk, either selection or diagnosis? And this fundamental question we must answer.

I am not sure if I have understood well your question, I would be very interested if you could rephrase it or repeat it maybe.

Ok, is the prenatal diagnosis the way of selection of human organisms, living organisms belonging to human species? Should we select and allow to live or to die the living organism because of genetic reasons or should we perform the prenatal diagnosis only as a test for eventual treatment of the living organism?

Thank you, thank you very much. In my opinion, many things happen in medicine just like in the way the ancient Greeks opened the box of Pandora, so when they opened the box of Pandora a lot of good things came out and then some bad things were also there, so with prenatal diagnosis, we do have an access to early diagnosis for some disorders, not all, and not too many. Some of these disorders might be very, might be seriously disabling the embryo and the infant to be born, so what do I think is the point of offering prenatal diagnosis is to offer the real knowledge which means some protection of some anomalies and these anomalies some of them could be cured either inter-uterus, either during pregnancy or early after birth, so we actually offer the benefit of intervening with treatment or management at the early possible timing. The option of abortion or termination is one of the options available and it is only the couples' decision and primarily the woman's decision in my opinion so prenatal diagnosis has an important impact on treatment and management.

Thank you very much, so we have, please, a few questions, my name is ??
Time is …

I'm just a guest to your meeting because I'm not part of the medical committee, could I ask, raise an entirely different topic, we have had a very interesting programme with a very interesting speakers, for example Dr Sándor has reported on her research, Professor McCall Smith has given some overview of what happened in the UK, where, but I haven't heard much of the rule of ethical committees in bringing society forward on these issues of employer related or insurance related issues. Tomorrow I see seven presentations from medical, ethical committees that might be addressed, but I'm not too sure. My question is are there any examples over the past years that the ethical committees as such have brought this issue that we have been

discussing the whole day further and much more forward? It's a factual question, thank you.

So, Mr ??? I think the positions adopted by various countries to date have almost without exception been preceded by discussion by national ethics committees, commissions, councils or ad hoc committees appointed by governments, my country having been one that hasn't done anything but on the whole, yes, and I think the documentation you have, the historical, that's for ten-years we've been on this insurance employment business, the first resolution of the European commission was in 1989 on employment and insurance which I can say to you later if you want.

Just to add one more thing to this very important question, but if someone looks at the composition of ethics committees in working on these issues you can see excellent outstanding researchers on molecular biology and you can see the names of outstanding lawyers, ethicists, public health experts, but I have not seen that many experts in the insurance sector, so many times the things about which I was talking about, the duality of legal norms exist in some countries because there are not so much communication between these two sectors so sometimes we make a law not able to understand that in a civil court or ?? the laws on insurance there is a duty to disclose or an existing risk or predisposition, so I think that even if these topics are concerned and they will be the future topics of national and international ethics commissions, maybe some invited experts should be present who are also tried to help to serve a better harmony between of the different norms. I agree that in some countries this duality do not exist but in some countries it is quite remarkable collision between the already existing insurance and employment norms and the biomedical legal norms and I think that the composition of health care commissions or invited experts could help in overcoming this gap.

Thank you, so dear friends, the time is up, the last question please. Mr ???

Thank you very much, I'm afraid it's a little bit different question. Having in mind that there are increasing number of biomedical research activities being done which involved additional protocols on genetics, I mean there are, for research, pharmaceutical companies saying engaged in the research of cancer drugs or any other drugs and they have additional protocols for genetics. They take some blood and then they also disappear, my question is, are you, do you think it could cause some problems in the future in the terms of confidentiality or is that question controversial at all? Thank you.

Well, this is a very important question and it is a very hard one. What do you do with a piece of DNA or a sample of DNA that was taken by somebody for a specific test. The issue of confidentiality is a very central one and there are offers being made and there are decisions taken as regards the safety and confidentiality around these kind of data. It is an absolute and clear understanding that when you get a sample for a specific DNA test that is what you do unless the individual who gave the sample gave his or her informed and signed consent for any additional tests, usually for research purposes and many people, including myself and my colleagues, yes, many times when we accept a sample for a specific genetic test we ask for permission to use it for additional tests specifically and solely for research purposes. I should also say that many scientists in the past, all over the world I might say,

including ourselves, we have used without signed permission, samples for research purposes, anonymously we never care about the name or the occupant of the sample, we do not even look at it but solely for research purposes we have done it for ??? studies for example. Perhaps it was wrong, I am almost certain it is being done, perhaps it should stop but this will be a major drawback on a number of research activities. But if the community, if the society feels that's the way it should be done, I am sure we should do it, we and others as well. But the issue of confidentiality is a very critical one and it's a very difficult one to secure.

Thank you very much dear friends. I would like to thank everyone who participated in our discussion and Mme Questiaux, you are the next Chairman.

JOURNEE DES COMITES D'ETHIQUES

GENETICS / LA GENETIQUE

Address by Professor Juriy Kundiyev, Ukraine**,** Bioethics Committee

Thank you very much Mr Chairman, ladies and gentlemen, dear participants.

First of all I would like say to you I am not geneticist, I am occupational health man. But as a chairman of national bioethics committee of Ukraine and as vice-president Academy of Medical Science of Ukraine I am responsible person for this field.

As it is known, bioethical principles of genetical monitoring they are formulated in 1993 report from UK Nuffield Council on bioethics, in 1994by Council of Europe policy and 1997 recommendation from USLC on force of genetic testing. Each attempts to identify the criteria for legitimate voluntary screening programme with adequate protection of confidentiality. One of these criteria was that the programme can be justified economically in comparison to other ways in which health funds could be used. This criteria is especially important for countries with transitional economy, for my country too. Genetical monitoring in Ukraine is made the fast steps based on institutions of medical genetical service which has three degree: inter-district medical genetical units, region medical genetical unit and inter-regional medical genetical centre. Recently in Ukraine, was performed screening of congenital abnormal development including anencephalia, meningocele, reduction abnormalities of extremities, esophagus atresia or tracheoesophageal fistula, anus or rectum atresia, cleft lip and palate, Down's Syndrome, multi-congenital malformation. Frequency of congenital abnormal development in Ukraine on 1998 data was 26.3 on 1,000 newborns. Analysis of regional medical genetical reports on chapter 5 congenital abnormal development of newborns was made. On this basis reality were risk some watch for some types among newborns was calculated in all regions of Ukraine for the termination of newborn numbers annual statistical collection of the state committee of statistics of Ukraine were used. It is very

important as it is official statistic data. All regions of Ukraine were grouped into seven areas. Risk was calculated on Epi-Info programme in every area of Ukraine in relation to country mean. It was established that relative risk (RR) of child delivery with anencephalia elevated in southern, north-eastern and south-western areas and was equal accordingly 1.99; 1.37; 1.27. In northern area the RR was decreased almost triple 0.32. For other areas difference in relation to country an average risk was statistically not significant. RR of meningocele appearance among newborns was increased in central and decreased in northern area and was 1.32; 0.43 accordingly. RR of child birth in reductional abnormalities of extremities was increased in the central and western areas - 1.43 and 1.17. In the northern, east and south-west areas RR was decreased in relation of Ukraine mean and was 0.68; 0.75 and 0.95 accordingly.

RR of child delivery with esophagus atresia or tracheoesophageal fistula was distributed on whole Ukraine evenly. In northern area RR of child birth with anus or rectum atresia was decreased - 0.62, in other areas of Ukraine difference was not statistically significant. RR of child delivery with cleft lip or palate was reduced in northern area 0.82 and was high in the north-eastern area 1.15. Down Syndrome was distributed on whole country evenly. RR of child birth in the multiple congenital malformation was increased in the north-eastern area - 1.58 and decreased in the central 0.79 and in south-eastern 0.65 areas. If we take into account some of above mentioned cases of anomalies in period 1993 to 1999 then situation in Ukraine are following. RR in comparison with Ukrainian mean is increased in south - 1.10; and north-eastern 1.11 areas. It is industrial areas with very heavy environmental situation. In the same time there is observed increased RR in north area 0.86 and south-easterns 0.88 area. In the present time, in accordance with complex programme of genetical monitoring some regions and Kyiv city (it is big city more than three million population) is conducted genetic monitoring of population. System of genetic surveillance of population in a given state is developed. This system provides possibility of evaluation mutation processes and its prognosis. Computer register of indicated pathology of phenotypes among newborns, spontaneous miscarriages on their first one third of pregnancy, sterile marriages is started. Besides above mentioned programme, in the frames of Ukrainian - American programme of prevention of congenital abnormal development, system of congenital abnormal developments the registration in accordance with international standards was introduced in some regions of Ukraine. Verification of congenital abnormalities is composed from three levels: the first one, regional medical genetical consultation office, the second levels - inter-regional exchange of co-ordinated information with physicians, genetics of regions which are included into Ukrainian - American programme peoples. The third level-consideration of congenital abnormality cases by expert commission which included leading Ukrainian and foreign specialist of medical genetics and teratology, the regional health representatives. After this more accurate data are forming data base of regional register of congenital abnormalities. There are demands to data base for congenital malformation forming which secures ethical principle. This bioethical principle oriented on patient person data using only for direct medical care of patients and medical genetical consultant of their families. In the last year, more attention is paid to the problems of congenital abnormal development prevention. In last year 154 children were born with Spinabifida in Ukraine. There are effective method for prevention of congenital malformation of neural canal introducing to family diet of folic acid. On initiative of my institute in this year there was held on this problem

seminar with participant of Ukraine and American specialist and also medical doctors, food hygienists representatives of bread baking plants, from many regions or Ukraine. It was decided to consider questions of adding folic acid to bread products. Primary prophylaxis of congenital defects is concluded in the complex measures which are directed on protection of group population concerning exposure mutagenic and teratagenic factors, environment protection. Secondary prophylaxis has to be made by physician of medical genetical units. In this case genetical risk is the determined assistance to the family is rendered in decision taken about child delivery, and fetus prenatal diagnostic is conducted. It is alarming that there was statistically significant increasing of congenital abnormalities of development in the some areas of Ukraine. So in accordance with new data increasing frequency of "model" congenital abnormalities of development is observed in the south- western area in 90s comparison with 80s from 5.3 to 6.4 on one thousand new borns. That is why broad implementing of real genetical monitoring in Ukraine will allow to decrease the load of congenital pathology, promote the reduction of non productive expenses as public health institution so for the society in whole.

Thank you very much for your attention. Unfortunately my report was without demonstration, I am very sorry that my computer was destroyed in process my long trip.

Thank you.

Address by Dr Wybo Dondorp, Netherlands, Health Council

Prenatal Screening for Down's syndrome [34]

Wybo Dondorp, PhD[35], Health Council of the Netherlands[36]

Presentation Cyprus conference, COMETH, 11-13 November 2001[37]

Introduction

Also on behalf of Professor Knottnerus, who is now the new President of the Health Council of the Netherlands, I wish to thank you for the opportunity of presenting the Council's recent report on prenatal screening. The report itself is in Dutch, but the information you received for this conference contains a summary in English.

The aim of the report was to synthesize current knowledge on methodological, psychological and ethical aspects of various forms of screening for Down's syndrome and neural tube defects and of routine ultrasound in pregnancy. The report was made up by a broad multidisciplinary expert committee in answer to a request by the Minister of Health. The Minister made her request in view of the felt need for evaluation of the current policy toward prenatal screening in the Netherlands. In this short presentation I will have to limit myself to what the report says about Down's

[34] Health Council of the Netherlands. Prenatal Screening. Down's syndrome, neural tube defects, routine-ultrasonography. The Hague: Health Council of the Netherlands (Gezondheidsraad), 2001; publication no. 2001/11 [summary in English]

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[37] 6th European Conference of National Ethics Committees (Council of Europe)

syndrome screening.

History of Down's syndrome screening in the Netherlands

As you know, the diagnostic tests involved in screening for Down's syndrome (amniocentesis and CVS) are invasive and carry a risk of up to 1% of causing a miscarriage. Those tests are therefore offered only to pregnant women in a preselected high-risk group. In the seventies, when Down's syndrome screening started, maternal age was the only instrument by which such a high risk group could be defined, as the chance of having a child with Down's syndrome increases with the age of the mother. In the Netherlands the age limit for this screening was set at 36.

A more recently developed approach uses a risk-assessment test (for instance: triple serum test) as a preselection instrument instead of maternal age. This means the screening can in principle be offered to all pregnant women, regardless of their age. In the Netherlands, such tests are only available for those who expressly ask for them. The reason is that gynaecologists or obstetricians are not allowed to offer screening tests for which no license was given under the Population Screening Act.

This Act aims to protect the population from screening programs that may be physically or psychologically hazardous. The ongoing debate on the acceptability of Down's syndrome screening, especially of universal screening as made possible by those risk assessment tests, has so far kept the government from granting license requests other than for the existing age-based screening.

Normative framework

As screening by definition involves an unsollicitated offer, which can both benefit and harm the persons involved, any screening program requires justification. The committee started from the normative framework given by and developed after the well-known criteria of Wilson and Jungner. Crucial elements in this framework are:

1. that the screening aims at some important health problem for which timely diagnosis opens up accepted treatment options, or other acceptable options to the persons involved
2. that there is a suitable test, of sufficient discriminatory power
3. that there is a positive balance of advantages and disadvantages for those involved
4. that their participation is voluntary and based on proper informed consent
5. that the program has no important adverse social effects, for instance, for specific groups in society

I will take these points to structure the rest of my talk.

Acceptable goal?

Even though we have a three decennia history of screening for Down's syndrome in the form of aged based screening, the committee felt it had to specify again what the goal of this screening ought and not to be. According to the Committee, screening would not be morally acceptable if it aimed at avoiding the birth of as many children with Down's syndrome as possible, for instance in an effort to make cost-savings in health care. In the words of the British geneticist Clarke, writing at the time of the Balkan tragedy, that would amount to genetic cleansing, and be totally at odds with the moral basis of our society, in which equal world is ascribed to all its members.

According to the committee, screening for prenatal Down's syndrome *can* be morally acceptable if it aims at providing the parents to be with information, allowing them either to terminate the pregnancy in the event of an abnormal result, or to prepare themselves for the birth of a handicapped child. The justifying principle behind this aim of enlarging reproductive autonomy would be the prevention of suffering, not just or even primarily for the child to be, but for the couple and their family.

The report then considers three counter arguments saying that providing this information and choice would *not* be an acceptable goal. In the first place, it has been asked whether Down's syndrome is really a health problem, which could as such be the object of screening. Is this problem of Down's syndrome not rather a social construct, reflecting society's inability to accept persons with specific needs? Secondly, how can offering choice be acceptable, if there are no treatment options but only selective abortion as a way out? In the third place: does not screening for conditions such as Down's syndrome imply a discriminatory value judgement, either on the part of the couple taking the test, or of society offering it?

For the sake of time, I can only tell you here that the committee found that neither of these objections amounts to a valid reason against the acceptability of the stated goal of Down's syndrome screening. Of course, if they *were* valid, also the current screening policy would be morally unacceptable.

Suitable test?

The report contains an extensive cost effectiveness analysis of diverse strategies of Down's syndrome screening, including the present policy of aged based screening and several strategies based on risk-assessment tests, both in the second and first trimester of pregnancy. Main parameters in this analysis are the detection/miscarriage ratio, meaning the number of Down's syndrome pregnancies detected for each miscarriage caused by the screening, and also the cost/detection rate, meaning the costs involved in detecting one foetus with Down's syndrome.

STRATEGY	invasive procedures x	detection rate	false-positive rate	cost/detect rate in 1000	detection/ miscarriage

	1000			Euro	ratio
age (36+)	29	44	(14)	110	0,61
tripeltest	20	67	9	105	1,38
NT & serum	12	85	6	104	2,92
integrated test	9	89	4	114	4,15

The table shows some of the main outcomes of the analysis. The two first horizontal rows compare age-based to triple test screening, where the latter would be offered universally, that is: to all pregnant women. Even so, the triple test approach would lead to considerably fewer invasive procedures: twenty versus twenty nine thousand per year. As you see in the last two columns, this approach would also have a much better detection/miscarriage rate (1.38 versus 0.61) whereas the cost/detection rate would remain largely unchanged. It is clear from this that the triple test approach is considerably more cost effective than the present policy in the Netherlands.

In its last two rows, the table also shows that the recently developed alternatives for the triple test promise to be even more cost effective. It should be noted, however, that the scientific basis for those alternative tests is not yet as strong on all counts as is the case for the triple test.

Advantages and disadvantages for those involved

I come to the balance of effects for those to whom the screening is offered. On the one side, there is the reassurance gained by a negative result and the information and choice offered by a positive final diagnosis. On the other side, there is the psychological impact of the screening, especially of false positive or negative test results, the complexity of handling risk information and the fact that, especially if universal screening is offered, there is no escaping from having to choose. The report contains an analysis of the psychological literature about the impact of triple test screening on the well being of the woman involved. Even though lacunas in our present knowledge are pointed at, there is no evidence of very serious or enduring adverse effects of such screening.

The committee then takes the accepted age-based policy as a point of reference and concludes that strategies based on risk-assessment tests have the clear advantage of exposing considerably fewer women to invasive procedures, thereby leading to less stress and fewer miscarriages, for a higher detection rate. Furthermore, these strategies allow all pregnant women to participate if they choose so.

The committee concludes that the scales do tip in favour of the advantages of the triple test approach. It is left an open question whether this would also apply to screening based on alternative risk-assessment tests, notably in the first trimester. Scarcely any research has until now been conducted into the psychological effects of such tests.

Counselling and informed consent

Whether the balance for the triple test approach and possible also for those newly development tests will indeed be positive, very much depends on the quality of counselling and informed consent. Counselling should be non-directive, present choices as equivalent, and take heed of the fact that tests offered in the context of care tend to be regarded as something which *must* be good and which therefore does not require real decision making.

In combination with the delusively simple nature of the tests (same blood taken, and ultrasound performed), this may easily lead into what has been called the screening trap. All of a sudden what looked an innocent test turns out to present one with a life or death decision. But the trap is closed and there is no turning back. Opposite to this is the danger of overloading participants with more information they can handle, thereby also undermining adequate decision-making.

The committee proposes a phased approach to steer free from these opposite dangers. This involves regarding informed consent as a process rather than as a single event. At the start of this process subjects should at least be informed about the nature and implications of possible decisions later in the screening trajectory. They should also be informed about the possibility of other findings than Down's syndrome (for instance: sex chromosomal anomalies) and have their right *not* to know respected as fully as possible.

Social effects

Finally, the committee considered the social effects universal Down's syndrome screening might have. A main concern is that such screening will contribute to a climate in which societal acceptance of the mentally handicapped will come under even greater pressure. According to the committee this concern needs to taken very seriously. It can be answered only by presenting and delivering the screening in such a careful way that it will not send any messages about genetic cleansing. Moreover, if a real choice is to be offered between termination and allowing the pregnancy to proceed to term, then facilities and conditions need to be guaranteed within society for the care, support and integration of people with a handicap.

Conclusion

The committee concludes that there are good reasons to have the existing age-based screening replaced by a strategy based on a risk-assessment test. It recommends the triple test for this as the most tried and tested, but also recommends further research into the advantages of alternative tests in the first trimester, including nuchal translucency measurement.

However, this positive conclusion only holds if the goal of the screening is indeed the enlargement of reproductive autonomy by providing information and choice, not the elimination of affected pregnancies. In this connection, a very

important warning has been made by Angus Clark, saying that the morality of concrete screening programs is to be judged, not from the goals their providers pay lip service to, but from the 'implicit goals' that show in the way the program is delivered in practice. If the information given is incomplete or unbalanced, if the counselling is directive and support is absent or minimal, it would be difficult to maintain that the goal of the program is really to enlarge opportunities for reproductive choice. The very opposite will then be achieved. Moreover, it would then appear as if the *real* aim of the program were indeed to carry out a 'search and destroy mission' for Down's syndrome foetuses. Seen in this light, information and counselling are not just moral and legal side constraints to offering prenatal screening. Rather they are the moral hinges on which the acceptability of the screening turns. It is clear that this makes the recommended introduction of triple-test screening a very serious challenge.

The report insists on the set up of an integral quality system including guidelines and education and also on permanent evaluation of all programs, by a national monitoring committee.

At this moment, the recommendations of the report are subject to a public consultation round set up by the Ministry of Health. The Minister's official reaction to the report, indicating her further policy plans, is announced for early next year.

Address by Sven Asger Sorensen, Danemark, Council of Ethics

Thank you Mr Chairman,

I would first like to thank the organising committee for having given me the opportunity to participate into this conference and also for the opportunity to present some of the opinions and recommendations of the Danish Council of Ethics on pre-symptomatic testing.

We have discussed this topic for quite a long time and have recently published a report that has been translated into English and part of it has been distributed to you. In this context, we defined pre-symptomatic testing as the genetic examination of a person for a hereditary disease or for a predisposition to disease before that disease has presented symptoms.

Pre-symptomatic testing is at present mainly done for rare or ??? that have answered in adults. The risk for manifest disease by positive result is 30 to 100% depending on the pen trance and other factors. But in the near future it will be possible to analyse for predisposing genes for common multi-factorial diseases as cancer, cardio-vascular diseases, psychiatric disorders and so on. And it was this matter that preoccupied the genetic, the ethical council and one of the things we would like to was debate this because it before it became a common offer. This is what we at the council call ethics in time.

The Danish Council of Ethics views with some concern the fact that new techniques and procedures within the health services are introduced without the ethical consequences having made the subject of prior public debate. Such debate should take place even as a given technique is at the research and development stage

without waiting until the technique is ready for use and patience and cares have acquired an interest in it. Pre-symptomatic testing as I said is now possible for some rare diseases and we have seen many of the problems that may arise with pre-symptomatic testing but looking into the future we see that many many problems will arise and we find it very important that these problems are debated.

We should distinguish between a diagnostic and a pre-symptomatic symptomatic test. A diagnostic test is a genetic examination analysis of a persons having symptoms and a positive finding supports or verifies the clinical diagnosis. In contrast, pre-symptomatic test is done in a completely healthy person and a positive finding is a genetic diagnosis not a clinical one, the person is exactly as healthy before and after the test has been done. One other problem concerning these tests is that on certain prognosis in most cases cannot be predicted. The ethical dilemmas of pre-symptomatic testing concerns the examined person, the family and the society and I will shortly try to go through some of the dilemmas in each of the three. The possible consequences of a positive result for the examined persons is of course the psycho social effects. The person may be stigmatised when having the knowledge that he or she carries the gene for a severe disease for which maybe there is no treatment and for which he or she does not know when it will have its answered.

Insurance, pension and employment was discussed yesterday and I will not go into details with this but just mention the need in Denmark, according to the law it is not allowed for insurance companies, pension companies and employers to ask for pre-symptomatic test and even if they get the knowledge about it they may not make use of it. But still we are a bit concerned about these problems even that we have this law that works very very well but we are a bit worried about what is going on in other countries and especially in the United Kingdom because we are afraid of that the results there may influence the legislation in other countries as well.

Going to the relatives, because having made a diagnosis in a patient having a genetic disease may influence at the same time on his relative and then the question may be raised well on the right to know and the right not to know about one's genetic status. The first thing is the information to the patient, who often is the first one to be diagnosed as having a genetic disease. It is our opinion that before the pre diagnostic test is carried out on a patient, he should be told about the test and the consequences, namely that if he has that disease it may influence on his relatives as well. The next problem is the information to the relatives, how to inform the relatives, who should do that? Should it be the genetical counsellor, the person's physician or should it be the patient himself? In our opinion, it is the last that should be the case, namely that the person who is diagnosed having a genetic disease should be the one that informs his relatives because he has the knowledge about his relatives, he may know who of them wants to know about it and who of them do not want to know.

One problem we see I can illustrate with the problems with pre-symptomatic testing of persons at 25% risk and this places the question who owns our genes? Take for example a late answered disease where the black is effected and his daughter has a risk of for 50% for having inherited that gene and her son has a risk of 25%. Maybe she is not interested to know whether she has the gene or not and therefore is not interested in having a pre-symptomatic test. In contrast, her son may have that interest because while the mother is so old that she has not use of the results of pre-

symptomatic test because she has had the children she wanted, she has had the education and so on, then the situation of her son is completely different because he may be in the situation that he has to choose his education, he has to choose whether he wants to have children or not and so on. So, therefore there may be a conflict between the mother and the son whereon a pre-symptomatic test and this risk may of course raise a lot of problems. It is the opinion of the Ethical Council of Denmark that the younger should be allowed to have a pre-symptomatic test done but of course with not giving the result to his mother who is of course raises a lot of problems. He has the right to know and she of course has the right not to know. Then we have the problem concerning pre-symptomatic testing of children, should the parents of a child under the age of majority have the right to know the right to have pre-symptomatic testing of the child undertaken or should the parents' right to know be superseded by the child's right not to know and the right of self-determination. Again, it is the view of the Danish Council of Ethics that pre-symptomatic testing of minors should only take place on the basis of the overriding principle that minor's right not to know and his or her rights of self determination should be allocated sufficient weight so that pre-symptomatic genetic testing of minors should not be carried out for diseases on setting after the age of majority when the child can adopt its own position pro or contra genetic testing. This statement is of course primarily for diseases that for which there are no treatment, in the cases where treatment is possible, of course, pre-symptomatic genetic testing may be done. The last item I would like to talk about is the society's attitude towards pre-symptomatic testing. And here, I have set some questions. Should pre-symptomatic testing of healthy persons be done for diseases which cannot be prevented or treated? Should the limited economical resources be served to the treatment of sick persons? Should pre-symptomatic testing be limited to certain selected diseases? And finally, what are the consequences of commercialisation of pre-symptomatic testing?

The last question concerns about the many industries are very very interested in making kits and so on for pre-symptomatic testing and we think it will be more and more simple as the techniques becomes more advantaged and the results may be that pre-symptomatic testing will be carried out without genetic counselling previous to the pre-symptomatic testing and also the follow-up after the pre-symptomatic testing will not be done. So therefore we are very worried about the consequences of commercialisation of pre-symptomatic testing.

One other question that has been raised is, if the limited economical resources should be reserved to the treatment of sick persons because as I said before pre-symptomatic testing concerns persons who are completely healthy and the economical resources are limited and should these resources be reserved for treatment of sick persons or should we also use our economical resources for testing persons who are healthy and again it is the view of the Genetic, the Ethical Council that this should be done because persons have the right to know whether they have, they are carriers of disease genes or not. Many questions may be raised as I have gone through this and we feel that a debate, it is necessary that debate is going on in the future so we have, so we know exactly the consequences, in particular, what are the consequences of pre-symptomatic testing in the long run? Pre-symptomatic testings has been done for quite a restricted time of years but now we are beginning to know what the results, the consequences for those who have been tested positive are but we still feel that more

science and research should be done on this so we are able in the future to make better decisions concerning pre-symptomatic testing.

Thank you very much.

Address by Professor Giovanni Incorvati, Italy, National Ethics Committee

L'avis, ligne directrice bioéthique pour les tests génétiques qui est là, est parmi les avis du Comité National pour la Bioéthique celui qui a l'histoire la plus longue. Il naît, si j'ose le dire, avec la première idée du CNEB à la fin des années 80 et il est du même âge, et pour cause, du Human Genome Projet.

De ce projet il suit, dans un certain sens, la vie et les aventures de ce projet, il adopte aussi les valeurs de départ, quatre principes cardinaux du Human Genome organisation qui constituent aussi une partie intégrale de la Déclaration Universelle sur le Génome Humain et sur les Droits de l'Homme de l'Unesco de 1997.

Le premier principe, c'est que le génome humain fait partie d'un héritage commun de l'humanité. Le deuxième, l'acceptation des normes internationales sur les droits de l'homme, le troisième qui est peut-être de grande envergure, le respect des valeurs, des traditions, de la culture et de l'intégrité des participants à la recherche génétique. Le quatrième, l'acceptation et la revendication de la dignité et de la liberté humaine.

Les premières applications de ce principe regardent tout d'abord les possibilités d'un diagnostic prénatal, cela permettrait d'identifier les altérations génétiques responsables de spécifiques maladies héréditaires qui se manifesteront à la naissance ou à l'époque néonatale. Cela rend nécessaire une consultation génétique pour vérifier la consistance effective de l'indication, les risques, les possibilités d'erreur, le problème éthique en cas de positivité de l'enquête. Mais des problèmes encore majeurs sont soulevés par les diagnostics des maladies qui se manifesteront dans un âge adulte. A coté du droit de savoir, il faut reconnaître le droit de ne pas savoir. Aussi la prescription d'un test génétique n'est acceptable que s'il existe une thérapie appropriée. Hier, ici, on a entendu s'ajouter à cette condition une autre, c'est-à-dire qu'il faudrait aussi un pouvoir, une capacité à modifier son propre style de vie. Mais ce rappel à la capacité et au pouvoir est intéressant de notre point de vue, du point de vue objectif social, je dirais, plutôt que subjectif. Est-ce que j'ai les moyens en connaissance et en ressources matérielles qui me permettent d'utiliser la possibilité qui existe d'une thérapie ? Tandis que la question des ressources matérielles reste ouverte à des réponses internes de non-discrimination et d'équité, pour ce qui regarde les connaissances, il faut qu'il y ait toujours une consultation génétique, avant de procéder à une indication de test génétique. Il faut des choix libres et responsables et il faut une consultation qui ne soit pas directive de la part du consultant. Des problèmes plus spécifiques sont présentés par les tests génétiques à l'oncologie pour ce qui regarde les mineurs, pour ce qui regarde le rapport du travail et les assurances.

En Oncologie, une enquête génétique est recommandable,

en premier lieu pour un patient affecté lorsque le diagnostic génétique modifie le traitement,

en deuxième lieu, pour les familiaux asymptomatiques afin d'avoir un diagnostic précoce,

en troisième lieu, pour un individu asymptomatique lorsque le diagnostic génétique peut produire un changement dans le style de vie, ou le protéger des facteurs environnementaux. Pour ce qui regarde les mineurs, deux ordres de problèmes, en premier lieu, la balance des bénéfices et des désavantages, primo un test génétique est justifié lorsque l'avantage médical est certain et important, secondo, lorsqu'il est justifié par des bénéfices substantiels au niveau psycho-social, tercio si les bénéfices ne maturent pas jusqu'à l'âge adulte. Il faudrait alors attendre cette époque-là.

en quatrième lieu, si la balance est incertaine, il faut se remettre à la décision des adolescents ou des familles.

Le deuxième ordre de problème qui regardent les mineurs c'est la participation de la famille au choix. En premier lieu, le test devrait être précédé d'une consultation génétique et d'une œuvre de formation des parents et des mineurs. En deuxième lieu, les professionnels des soins de santé doivent obtenir la permission des parents et le consentement des mineurs. En troisième lieu, la demande des mineurs capables d'autonomie d'être informés, devrait être jugée prioritaire par rapport à la demande des parents de ne pas révéler l'information.

Pour ce qui regarde le rapport de travail, un screening génétique n'est proposable qu'à ces trois conditions :

primo autonomie de choisir de se soumettre ou de ne pas se soumettre au test et de choisir un travail compatible,

secondo, bénéficialité. L'employeur avant d'exécuter un programme de screening est obligé d'éviter d'utiliser l'utilisation de substances cancérigènes,

tercio, justice. Les employeurs ne doivent discriminer les groupes avec une plus grande susceptibilité de tomber malades.

Pour ce qui regarde les assurances, je me limite à citer que les compagnies doivent s'abstenir de prendre en considération les informations génétiques.

Je passe au dernier point, c'est-à-dire les screenings génétiques.

En premier lieu, il faut qu'un jugement sûr, qu'il soit présent, un jugement sûr de la communauté scientifique internationale là-dessus ;

en deuxième lieu, il faut connaître bien les critères pour sélectionner les populations et les pourcentages des faux positifs et des faux négatifs ;

en troisième lieu, il faut un modèle de communication avec les personnes ;

en quatrième lieu, il faut approfondir les résultats d'un point de vue thérapeutique ;

en cinquième lieu, les informations doivent rester réservées ;

en sixième lieu, il faut éviter les discriminations dans l'utilisation des tests ;

en septième lieu, le consentement doit être libre et indépendant.

Qu'est-ce qu'il se passe aujourd'hui, après l'émission de cet avis ?

Nous assistons de plus en plus à une remise en cause de chacun des quatre principes posés par le Human Genome projet. Il y a dans nos sociétés des détours par

rapport à ces principes. Des tests génétiques se font de plus en plus au moyen d'Internet, en plus, ces tests se font sans aucune consultation. Cela doit nous faire réfléchir sur nos rapports avec les intérêts sociaux et avec la politique.

Et alors, je voudrais donner un appendice de l'histoire de cet avis italien, c'est-à-dire que les lignes directrices bioéthiques pour le test génétique, dans l'histoire du Comité National pour la Bioéthique prend place entre deux autres documents. Le premier, c'est l'avis «Problèmes bioéthiques d'une société multi-éthnique » de 1998 et l'autre, c'est l'avis «Bioéthique interculturelle » élaboré entre 2000 et 2001 et dont le texte provisoire est maintenant soumis à une discussion nationale ouverte.

Les problèmes de tests génétiques ont agi comme un trait d'union pour le passage de la multi-éthnicité à l'interculturalité dans le domaine de la santé. Dans quel sens ? On s'est rendu compte, qu'il ne suffit pas de soutenir l'idée d'une société multi-éthnique, du melting-pot, où les différents groupes vivent l'un à coté de l'autre. Cette société est toujours menacée par des idéologies égocentriques et eugéniques. Cette menace ne peut être rendue vaine et inoffensive qu'en dissipant l'idée qu'il existe des gènes bons à garder et des gènes mauvais à éliminer. L'idéologie que la connaissance du génome tend à faire monter plutôt qu'à faire disparaître. Mais si on veut que ces projets aboutissent, on doit dépasser la phase de la simple connaissance du génome, il faut se mettre à étudier sérieusement les inter-relations. Ce n'est que la découverte des complexes fonctions des gènes qui peux affermir la fonction enrichissante de l'inter-change et la valeur de la viabilité génétique. L'enrichissement qui vient de l'interrelation et les valeurs de l'interdépendance, voilà ce qui pousse à ne pas rester dans le domaine géographique et à examiner les problèmes bioéthiques de la santé multiculturelle. Mais avec cela, on sort déjà du thème de cette conférence et on regarde plus immédiatement, peut-être, le futur de nos sociétés.

Address by Professor Arvo Tikk, Estonia, Council on Bioethics

Mr Chairman, ladies and gentlemen,

I want to speak about Estonian genome projects and ethical considerations in connection with this.

Development in genetics has been rapid in recent years. Technological progress has made it possible to start large-scale population based genes research projects. There are a number of such projects in the World which have been put into practice or are in the stage of planning for instance, Iceland, UK, Tonga Kingdom, Hong Kong, two projects in Italy and some others. Estonia is also planning to start a population based genome project with one million participants (Estonian population is 1.4 million) and to realize it in the next five-ten years. In the very beginning of next year we start the pilot study of this project with ten thousand participants.

So far there main question has been, which gene gives rise to some of clearly hereditary and also incurable monogene diseases and how high is its manifestation risk.

In the new situation with better possibilities of large-scale studies of entire genome this enables us to put the question in another way - which variations in genome composition can give rise to such common diseases as cardiovascular disorders, arterial hypertension, diabetics, cancer, osteoarthritis, obesity and many other similar. We are moving toward the situation where the understanding of our own genome peculiarity and eventual life risks gives us possibilities of better planning of our own future. We assume that the majority of persons would like to be healthy and live longer with high quality of life and many people are ready to do something to achieve this.

Moral principles and ethical considerations are changing together with changes in society and science. New problems will be highlighted and other calmed down and take the back seat. Up to now, one of the main ethical problems in genetics has been to spare patients from unnecessary stress by the information concerning predisposition or susceptibility to certain monogene incurable disease. As we know the potential risk does not necessarily imply that the carrier will give up their disease. Thanks to the availability of large scale genomic studies there are better conditions for the analyses of common diseases determined by a number of genes. This is one of the reasons why new aspects of the ethical discussion in genetics are coming to the forefront. Now we should stress that every person has the right to get the maximum information about his own genome composition, this makes it possible to solve usual everyday life problems in the interest of the persons concerned - to modify their habits, lifestyle and diet, select the most effective treatment, pay more attention to some common curable diseases and many other similar problems can be solved. Progress in the genome studies, causing change in our ethical understanding, should not be considered as rapid change in general medical practice. The practical need to use genetic information is permeating our everyday life in different ways step by step. More sophisticated biomedical level of differential diagnosis sub-dividing as well as combining conventional clinical diseases definitions, selective impact of drugs, individual medicines, better understanding of risk factors, understanding the influence of the environment to our health and so on.

The understanding, that genetic information is not something extraordinary but it is a usual complement of medical practice becoming more and more dominant. In this moment, we exactly don’t know, where we are after five years or ten or fifteen years but I want to show the opinions of some outstanding scientists in this field of activity. Francis Collins, the director of human genome project in United States: "In ten years we should be able to make predictions for you and me for what conditions we are most likely to be at risk for, and that in itself would allow us to practice some preventive medicine strategies based on our own individualized risks. Give us twenty years and I think you won’t recognize medicine in the way the therapies are developed and applied." The other outstanding person, Craig Venter, Head of the Celera Genomics: "Within ten years every baby born in a hospital in this country will have its complete genome repertoire determined. Their parents will have it on a DVD disk - or whatever the new media is at the time - before they leave the hospital. I think it will be fantastic to have my own genetic code, because every week there are new articles in Science and Nature describing links between changes in the genetic code and disease. I would be logging into the Celera database to try and understand those." (Kevin Davies, 2001, Cracking the Genome).

The preparatory work of Estonian Genome Project lasted about two years. Heated public discussions on this new irritating subject took place in newspapers, TV and radio. Now in our society, people have gradually come to support the standpoint that large-scale gene studies are useful and they help us to solve important problems of health promotion and health care. There have been quite active discussions on this topics. The expressed points of view were for and against. At the very beginning of the discussions, the opinion that population based research project is not justified but it is in conflict with a person´s right to privacy, and that it is an intrusion on the private life of a person were quite frequent. We have had to oppose the public opinion, according to a reasent poll the people generally support the Estonian Genome Project. 40% would like to join immediately, 36% would like to get more information before decision and only 6% say a definite no, 18% decided to remain neutral in beginning.

Human gene research is a delicate field of activity. The well-being, privacy and dignity of the participants (gene donors) should be protected as well as the free self-realization principle.

The first step starting the Estonian Genome Project was introduction of a special law, Estonian Human Genes Research Act. This Act guarantees voluntary participation in the project. All gene donors have the right to know their gene data and use them in their interests free of charge. At the same time they have no right to recover their genealogical data from the database. The other central point in this law is the fully safeguarded data protection system. All the data used for research of phenotype, genealogy, and blood samples are anonymous. Data decoding for research purposes is under strict control of a special institutional ethics committee. The ethics committee is agreed by the human gene research act. There are seven members in this ethics committee, data decoding for research purposes under strict control of this institutional ethics committee degreed by the Human Genes Research Act. In this law, the limited number of situations is fixed in which the decoding of data is permitted. The institutional ethics committee expresses its opinion also in the discussion of other ethical problems in the framework of Estonian genome project, but all the research projects on the basis of, Estonian Genome Project are going to the rural human research ethics committees.

Thank you for your attention.

Address by Professor Luis Archer, Portugal, National Ethics Committee for Life Sciences

Mr Chairman, Madam President, ladies and gentlemen,

I will just mention the topics of the opinion or document on the human genome published by the Portuguese National Committee which you have in your folders. Noteworthy is the fact that this opinion was approved and published by our committee in early July of last year, just two weeks after the big news were announced. It was a quick response to the excitement and fears of our people on the genome business.

In the first part, the opinion describes the scientific significance of the sequencing of the human genome allowing the future:

1. establishment of molecular route of many more;
2. finding many more predisposition genes for common diseases;
3. pre-symptomatic diagnosis of monogenetic diseases of late onset;
4. construction of personalized medication by pharmaco-genetics and pharmaco-genomics;
5. proteomics. We stressed however that the sequencing of the genome was simply the beginning, a good beginning but just a beginning, of a new way of doing biology, a new way of understanding ourselves our evolutive past of our present condition and of the future of our life and of our species.

In the second part of the opinion, we presented the known ethical perplexities especially oriented for Portuguese concerns and problems:

1. genes are not everything in man nor represent a fatal destiny: the human person and dignity transcend genes;
2. commercialization of genetic tests. In Portugal there are at least three firms offering all kinds of predictive genetic tests without any genetic counseling or psychological, psychosocial support and this may result of course, in most serious consequences for the individuals. Still under commercialization the opinion discusses the difficult question of patents;
3. selection of embryos upon pre-implantation diagnosis. In Portugal at least one hospital is planning to do this very soon in case of children affected by leukemia. They offer to the parents, the possibility of producing several in vitro embryos, test them by pre-implantation genetic diagnosis in order to find those about 25% immunal compatible with the affected child. Those embryos are transferred to the mother's uterus and from the umbilical cord of the resulting child cells are taken for transplantation to the affected child. The other embryos immune incompatible are discarded. The necessary expenses for this project were already inscribed in the state budget for next year in Portugal;
4. the classical problem on who has access to genetic testing and to their results, at the time this opinion was being prepared, a representative of the Portuguese industries confederation stated publicly that industries were interested in genetic predictive tests for workers' selection to prefer those having, of course, higher life expectancy.

This is why in our opinion we expanded on genetic testing in the work place. Of course I will skip this matter as it this has been very well discussed already. This opinion further elaborates on several ethical principles and ends by announcing a more detailed opinion to be presented later. In fact, a longer report and opinion on the human genome was approved last week, last Tuesday and will be soon on our website www.cnecv.gov.pt.

This report and opinion gives further and more recent scientific information and the ethical considerations deal with:

1. genetic determinism and freedom;
2. global solidarity with all he other species because of the similarity of the genomes of all species. We carry really in our genome, the mandate of all other species which preceded us and which left a mark or souvenir in our

genome urging from us an ontological solidarity with our brother animals, plants and microbes. We are much closer to them and more dependant from them than our pride would wish. To protect and respect the environment means to protect and respect our own genes.

3. human dignity and genomics;
4. selection of physical characteristics of children;
5. commercialization again.

This report and opinion gives special emphasis to confidentiality of genetic data since at the moment Portugal is considering the possibility of making genetic data bases and we fear that confidentiality may not always be respected.

And now, I still have a very few minutes. I will just read a part of the conclusion of the report on the human genome:

Like genes, the human genome is also a polysemic term: it has different meanings for different people:

- to biochemists it means the instructions book of our life;
- to medical doctors it means improved therapies and personalized medicines;
- to pharmacological industries it is a fabulous business;
- to evolutionary scientists it is the family book of our ancestors;
- to Wall Street investors, it means cold cash;
- to jurists, it is a confusing candidate for juridical protection and a rich source of new approaches to fundamental rights;
- to some patients it means fresh hope;
- to some healthy people it means insolent threat;
- to some employers it means profit;
- to philosophers it may be an inspiring model for cognitive processes;
- to bioethicists, finally, the understanding of the human genome and of its applications means the challenge to find among all these perspectives and interests the genuine well-being for the human person and for society.

Thank you.

Address by Alan Williamson, United Kingdom, Nuffield Council

Merci M. le Chair et Mme la Présidente,

Thank you for the opportunity to present what is a work in progress as opposed to a completed report of the type that you have been hearing about more recently.

This is an assessment of the ethics of the patenting of DNA and proteins that has been undertaken by the Nuffield Council. The Nuffield Council set up a round table early summer last year which has the following composition: five of the people, including myself, are members of Council, others are co-opted for their expertise, in particular areas. What I am going to do today is to run through a little of the

background as to why this round table was set up, its terms of reference, a little about the legal and philosophical issues that we're considering, a comment about current law which sets the context for what we are talking about, some comments about commercial issues and some of the key questions that we are considering. I don't promise you any answers, these are questions and as such all responses and feedback would be extremely welcome, and you will see when I come to the end of the talk there is a mechanism for responses that we have in place.

The background is, of course, what I have called the "gene revolution" or the "genomic revolution" and it is really the advances over the whole of the last twenty years in genetics and micro-biology that have brought intellectual property rights to the fore in a way that they never were before in the life sciences. So, this led to the appreciation of commercial possibilities and therefore the need for intellectual property protection. As a result, DNA and proteins, but in particular, DNA ie genes, have been the subject of many patent applications and it is very hard to keep up with how many really have been filed, and there are lots and lots that have been filed that have yet to be approved. That being said, relatively few new gene based products or medicines or even diagnostic tests have reached the market yet. However, the impact of genetics and proteomics suggests that an increasing number of products may become available over the next five to ten years and beyond. The prospect of these developments raises two fundamental questions, one of which is more philosophical, that is the legitimacy of owning life via gene patterns and the other is more practical, that is, if society allows a gene pattern monopoly does society receive enough benefit in return?

Turning to the patent round table, the terms of reference start with a general statement that we would examine the intellectual property issues raised by the wide applications of genomics to the development of new products in particular those in the health care sector. The specific terms of reference are to consider the current and future issues within the current regulatory framework and to provide an ethical framework and policy recommendations to assist policy makers and others, particularly the courts. We recognise that, with so many patents already being filed and procedures having been established somewhat empirically by the Patent Offices, time was not pressing and this did not need to be an urgent report; rather, it needed to be a very considered document that might provide a basis for the ultimate tests of patent validity in the courts, through the various mechanisms either in Europe or in the United States or elsewhere. We felt that that would be a slow process but to achieve something that really did guide that process later it was better to spend time and get this right than just to put something out quickly.

The general issues around this from an ethical and philosophical point of view about patenting are fairness, rights and duties; that's the way we divided them up at least. So, to cover fairness first, really regarding the ownership of the human body, the human body and natural organisms generally are products of nature and cannot be publicly owned. That is, I think, accepted by everyone and we cannot really permit, and the law cannot permit anyone to grant exclusive rights to parts of them for further research or exploitation. But, in terms of a patent there has to be an inventive step and in gene based patents, the question is has anything tangible been created which in the philosopher's terminology is a distinctive expression of the inventor's personality? Has the person claiming the patent, really contributed an inventive step to this? In

other words, is the discovery of a gene through the application of technology an acquisition of a previously unknown natural resource? Up until now that has been a patentable entity. So, that is fairness. Rights--society we felt has the right to expect a balance between the price of the inventions and the benefits stemming from them in return for allowing the inventor a monopoly. At the same time, researchers and the private sector have the right to expect a regulatory environment in which they can operate effectively, because if they can't we won't get the products coming from this, so it's a balance, it's a trade off that has to be agreed upon. There is in philosophy a utilitarian justification for property rights which can be gone into at great length in extensive literature going back several centuries. A system of public rules which provide security and incentives for investment by individual property holders needs to be established and it can, and should, be adopted wherever there is a general good that can be enhanced. I stress that there needs to be a general good, in other words a societal acceptance that this benefits society. And then there are duties of the patent holder, and these are a little more difficult to determine but we have posed a few questions: if a patent is granted, what duties arise? Is there a duty to make it available to others? There is certainly an expected duty to apply the patent. If a patent sits unused then there are methods for people getting access to the information and forcing its use, but should it be made available even if it is being used by the patentee? Should it be enforceable; should this availability be enforceable through some force of compulsory licensing? Patent holders would, of course, be very reluctant to adopt this, they would be reluctant to share licences with broad claims to technology with their competitors, either in the commercial or the public sector. So what does the law say? The EC directive says "patents are only to be granted for an element isolated from the human body or otherwise produced by means of a technical process and cannot be granted for the simple discovery for a gene in the human body". It is explicitly conceded in that statement that a patentable isolated element may be such that the structure of that element is identical to the natural element, in other words, the only difference is that it has been isolated even though it is identical. The result is that the patent on such an element is essentially a patent on the structure of the human gene so it really is a sort of dichotomy. The term "isolation from the human body" adds to the sense that there is something more than discovery that has to be involved, in other words, the isolation has to be inventive step, the expression of the personality of the person being granted the patent. Now what happens is illustrated in this particular case which we have heard quite a lot about, this is BRCA case. BRCA1 is a breast cancer gene and Myriad Genetics, as we have heard several times already in this meeting, has a patent on that gene as it occurs in the body, in other words, they have a patent on the isolated gene but it is effectively a patent on the form of the gene that occurs in the body. Because of that, how could anyone invent around the Myriad patent by developing a test which does not involve isolating an element from the person being tested? In fact it appears to be a fairly water-tight patent. There is no way of inventing around this, they control all diagnostic tests using that gene, whatever the test is, so that is the sort of situation that one has to accept if we grant patents on a gene of this nature. There are various issues that come out of the law, that was just one point, one case, but well-applied patent law we felt will exclude information obtained when it is obvious to obtain it and the method of obtaining it involves no more than a routine technique. What appears to have gone wrong at first look at all of this, is that many gene patterns involve no more than application of a routine technique. It is really nowadays a very straightforward routine procedure to isolate a gene and with the draft sequence of the genome available you can identify

them electronically and pick them out, so the inventive step now has become somewhat trivial. Patent Officers have a huge problem to deal with. Since they were set up they have dealt with all sorts of issues but in the health area they have largely dealt with chemical patents and recently they have been swamped by thousands of cases of biological patents now and they haven't really, the round table feels, enquired sufficiently into whether information was obtained on a gene by routine methods or whether it is something novel or not. So, there is a caution there for the Patent Offices. Patents with emphasis on information, and a patent that is granted on the chemical composition of the gene, those sort of patents are likely to dominate an area of potential research and therapy by closing off all availability to others to invent around the patent, because they are very strong, water-tight, patents. Should rights of this kind be granted? Should they be qualified in ways that other patents are not? These are a questions we are posing. One of the reasons that patents are filed in the whole biological area is because of commercial potential. Are gene patents a commercial necessity? This is another question that we are posing. Is it necessary to have patents on both DNA sequences and the end product, ie a drug or a diagnostic test? It can be argued that for most commercial purposes, genes do not need to be patented and that it is sufficient to patent the product. However, legally, the courts so far have not treated genes and their products as interchangeable, so there is going to be an argument of danger here to the commercial exploitation if you are only allowed to patent one and not the other as one allows a way around the other, that is going to have to be worked out if this comes to be the solution. There are more issues about commercialisation should this position, with regard to the product and the gene be changed in the light of having the complete sequence of the human genome available. Should a gene patent be granted when the function of the gene has been determined and studied using the cloned gene? Many times now, the gene is identified electronically by electronic homology studies and one can say that that gene encodes a kinase, or that gene encodes a receptor; saying this gene might to do this, it might to that, is not a particularly inventive process. If someone actually clones the product, makes it, shows what it does and shows a real function, is that enough, and should that be required in order to obtain a patent? When might the function ascribed to a gene product justify a patent both on the gene and on the product? There may be occasions when a function is enough, we would feel, to justify a product patent on the protein but not on the gene and there are other cases where the gene itself may have such a function that justifies granting a patent. I think that all of these cases need to be considered. So, what are the key questions? These are some of the key questions we see facing us. When is the cloning of a gene considered to involve an inventive step? When might a patent on a gene be important to allow the production of a useful product? When would a patent on a gene hinder socially desirable progress? And you can see that two and three are opposite sides of the same coin, products are useful but if the patent hinders other socially desirable progress we have to balance these two things. So, finally I list our case studies. I mentioned the BRCA1 and BRCA2 diagnostic tests: we are also looking at the CCR5 patents, the hepatitis C diagnostic patents and the hepatitis B vaccine patents as case studies. In some cases there has been analysis, in the courts, in other cases they are at earlier stages but they each of those case studies illustrate some aspects of the issues that I have raised here and we think these will be helpful in illustrating the points and coming to some sort of conclusions. These are the steps and this is the stage that we have reached. We have posed all of these questions and we tried to collect answers on these. A draft paper will be prepared within the next couple of months and it will be distributed, put on the

website and a discussion workshop will be held. We will solicit responses on the web and attendance at the workshop from all interested parties and on the basis of that feedback verbally and over the net, the paper will be revised, it will be approved finally by the Nuffield Council and then it will be published (Post meeting note: The final Report was released on July 23, 2002 and is available from the Nuffield Council).

I thank you for your attention.

Address by Professor Yvon Englert, Belgium, Bioethics Advisory Committee

Madame la Présidente,
Monsieur le Président de séance,
Chers collègues,
Mesdames et Messieurs,

Il m'a semblé que l'intérêt de présenter un avis comme celui-ci pour le Comité belge réside essentiellement dans le fait de présenter notre méthode de travail et le cadre dans lequel fonctionne le Comité à travers l'illustration que peut représenter un avis.

Le Comité belge est un Comité large, 35 membres et 35 suppléants, qui prépare donc ces avis en commissions restreintes et qui fonctionne suivant des règles très strictes, définies par son texte fondateur qui est un accord de coopération. La Belgique est un état fédéral. Et donc la fondation du Comité est un accord entre les communautés et l'état fédéral et cet accord prévoit que le Comité ne vote pas, que le document d'avis doit représenter l'ensemble des opinions qui sont exprimées, c'est-à-dire que le texte fondateur précise très clairement le rôle d'avis du Comité en lui rappelant qu'il n'a pas de légitimité démocratique, qu'il n'est pas représentatif de la population et que donc, il ne lui revient pas de faire des arbitrages qui sont du domaine du politique avec la légitimité par-derrière de la représentativité populaire.

Notre rôle est donc d'éclairer le débat, de mettre en avant les conflits de valeur et les enjeux qui sont présents dans les questions que nous analysons, afin que derrière les choix éthiques que chacun puisse faire, nous puissions démasquer les enjeux et les valeurs qui sont promues. Alors, je pense que cet avis est assez représentatif, sauf peut-être qu'il est un des rares avis dans lequel le Comité ait fait des statements, des affirmations consensuelles, c'est-à-dire qui ont été approuvées par l'ensemble des membres. Alors cet avis se trouve dans le folio de manière extensive, en français et en anglais, et je vais donc pointer certains de ses aspects pour illustrer mon propos.

Donc l'avis commence par une revue scientifique et juridique qui pose les jalons de la question qui est évoquée et ensuite, l'avis précise les limites qui sont le sien et je cite « le Comité a donc décidé de limiter le présent avis au clonage humain reproductif, à savoir le clonage à partir de noyau de cellules humaines somatiques ayant pour but la naissance d'un enfant ainsi conçu » on remarque en passant que ceux qui admettent en principe la recherche sur l'embryon ne s'opposent pas au clonage d'embryon dans un but de recherche si les arguments pertinents sont présentés pour justifier chaque recherche spécifique. Et donc le document s'attaque au clonage reproducteur et après les débats et discussions qui ont été conduites à l'intérieur du Comité, nous arrivons à trois positions qui sont présentées de manière relativement extensives dans l'avis.

La première position, dite position A est une position qui propose une interdiction du clonage reproductif pour une période limitée dans le temps. En constatant que beaucoup de déclarations péremptoires concernant le clonage humain reproductif qu'on trouve dans un grand nombre de textes, y compris dans les textes officiels, ne sont pas le résultat de débats suffisamment larges et manquent d'argumentation solide. Ils en concluent qu'une condamnation absolue et définitive de toute forme de clonages est pour le moins mal étayée, ils sont néanmoins d'avis qu'il reste tant de problèmes à résoudre au plan scientifique, psychosocial et éthique, qu'un moratoire de plusieurs années doit être imposé. Au lieu de clore le débat, cette période devrait être utilisée pour que tous les domaines précités soient éclaircis les uns après les autres. Le sens d'un moratoire est qu'il s'agit d'une interdiction provisoire compatible avec la poursuite de la recherche scientifique et technologique d'une part, et de la poursuite de la discussion au plan éthique d'autre part, premier groupe.

Deuxième groupe, dite position B dans la vie, rappelle que l'interdiction définitive du clonage reproductif, suppose des raisons absolues et définitives de rejeter celui-ci, une position que ce deuxième groupe ne reconnaît pas. Il s'appuie pour proposer, non pas un moratoire, mais une interdiction sur les points de vue éthiques différents qui consiste à évaluer le clonage au regard des valeurs et de représentation véhiculées par les rapport sociaux aujourd'hui. En faisant ce type d'évaluation, et tous ces documents se trouvent dans l'avis, le groupe B considère que dans l'état actuel des connaissances, des représentations et des rapports sociaux, une application de cette technique dans une perspective reproductive, semble hautement problématique. L'enjeu d'une application à l'homme de la technique du clonage reproductif ne dépend en effet pas seulement d'une meilleure connaissance de ses aspects scientifiques, techniques et médicaux, ni même seulement d'une meilleure élaboration des positions éthiques en la matière, mais du souhait actuel de la société et de ses membres, de leur capacité à intégrer un tel mode de reproduction et des conséquences probables de cette application au plan psychologique. Il paraît donc sage aux membres appartenant à ce groupe d'interdire le clonage humain reproductif dans l'état actuel des choses, en soulignant la possibilité de revenir sur une telle décision dans l'avenir, si le processus qu'il n'est pas possible à leurs yeux d'anticiper pour le moment, et une série d'évolutions scientifique, sociale et autre, le justifiait éventuellement.

Le troisième groupe prend une approche radicalement différente des deux premières, en considérant que l'application du clonage humain reproductif porterait gravement atteinte à la dynamique de l'existence humaine et couperait l'enfant de la symbolique qui est inscrite dans les données de la chair et particulièrement dans l'acte d'engendrement en lui-même. Donc dans cette troisième position, c'est vraiment l'absence de reproduction sexuée qui est à la base du rejet du clonage humain reproductif et qui les amène à défendre l'idée qu'il n'y a aucune raison de considérer qu'une quelconque évolution tant des données scientifiques que des données éthiques, pourraient modifier cet état de chose et les faire revenir sur leur analyse actuelle du clonage reproductif.

Alors, je vous ai présenté d'une manière très synthétique les trois positions défendues au sein du Comité. Elles sont très largement exposées et j'attirerai tout particulièrement votre attention sur une série de débats qui sont résumés dans le

document, qui me paraissent particulièrement intéressants parce qu'ils sont à chaque fois des arguments de contestation ; arguments de contestations par ceux qui doutent de la validité d'un certain nombre de critiques faites au clonage reproducteur ; arguments de ceux qui doutent des positions qui légitimeraient dans certaines situations le clonage reproducteur lui-même. Et donc, il y a à l'intérieur de l'avis un dialogue qui permet de mettre sur la sellette une série d'arguments et je vous encouragerai tout particulièrement à lire ceux sur la dignité humaine que nous avons été amenés à discuter de manière extrêmement tendue. Je pense que c'est une notion qui est à la fois omniprésente dans l'éthique des droits de l'homme mais en même temps extrêmement difficile et extrêmement sujette à débat.

A partir de toutes ces prises de positions, une très courte conclusion de l'avis, que je vais vous lire, qui résume les prises de position du Comité : « L'analyse de tous ces arguments a conduit tous les membres du Comité – et je le souligne parce que dans les avis du Comité belge ceci est certainement une exception et en cela il n'est peut-être pas le plus représentatif – à la conclusion que, indépendamment de toute autre considération il est actuellement exclu d'envisager de procéder au clonage humain reproductif ».

Tous les membres du Comité souhaitent que soient approfondies des études psychologiques, philosophiques, médicales et éthiques qui puissent aider les citoyens à se forger une opinion éclairée sur le phénomène du clonage, dont nous avons beaucoup souligné dans nos travaux que l'éclairage public a été extrêmement biaisé et réducteur et n'a certainement pas permis de mesurer l'ensemble des enjeux sous-jaçants à cette évolution technologique.

Tous les membres du Comité s'accordent aussi pour préciser que si un clone humain devait naître, fusse-t-il suite à des actes illicites, il serait un être humain à part entière et aucune des argumentations proposées ne pourraient servir à contester sa dignité et son appartenance à l'espèce humaine.

Ensuite, au-delà de ces consensus, on retrouve de manière très brève les trois positions que je vous ai évoquées, une position de moratoire qui dit d'une manière brève l'interdiction est une décision grave qui doit être correctement motivée et nous ne sommes pas aujourd'hui convaincus par les arguments qui sont mis en avant pour considérer qu'ils sont à la fois bien étayés et suffisants pour prononcer aujourd'hui cette interdiction définitive ; un deuxième groupe qui dit que nous considérons avoir aujourd'hui suffisamment d'arguments pour demander une interdiction en acceptant l'idée que celle-ci pourrait être remise en cause dans l'avenir si des arguments convaincants venaient à naître ; et une troisième position qui dit sur la base d'éléments fondamentaux structurels et qui n'ont aucune possibilité d'évoluer dans l'avenir, nous estimons que le clonage reproductif doit être définitivement et entièrement banni.

Alors voilà, je vous ai résumé évidemment en un temps très court qui était celui qui m'était imparti un avis qui est relativement long, puisqu'il fait une quarantaine de pages et si je vous ai donné envie de le lire, ces quinze minutes n'auront pas été pour moi inutiles.

Je vous remercie pour votre attention.

Address by Professor Didier Sicard, France, National Ethics Advisory Committee

Madame la Présidente,
Monsieur Incorvati, je vous remercie de votre invitation.

Si le clonage reproductif semble dans le monde entier créer une sorte de rejet, culturel au moins, il n'en est pas de même pour le clonage à visée thérapeutique.

Le clonage à visée thérapeutique est destiné à créer des cellules de réparation de soi à partir de l'introduction de cellules somatiques dans un ovocyte dénuclé.

Le Comité français s'est saisi de cette question, a été interrogé par le Premier Ministre de France à l'occasion de la révision des lois de bioéthique. Dans l'avant-projet de loi, le gouvernement français souhaitait encourager la création de cellules souches embryonnaires et nous a donc interrogés, l'avis a été rendu en janvier 2001. C'est un avis dissensuel avec tout de même une majorité pour encourager la création de cellules souches embryonnaires et je vais brièvement vous présenter les arguments de part et d'autre.

Le premier point est qu'il y a un débat sémantique sur les mots. Le Premier Ministre n'a pas souhaité que le mot clonage thérapeutique figure dans la loi. Il voulait et souhaite que l'on parle uniquement de cellules souches embryonnaires, d'embryons issus du transfert d'un noyau somatique dans un ovocyte. Et ce débat sémantique n'est pas innocent. Si on parle du clonage, les scientifiques ont un peu peur que la langue fourchera comme on a pu l'observer à plusieurs reprises et qu'on parlera indifféremment de clonage thérapeutique ou de clonage reproductif. En revanche, si on ne parle que de cellules souches embryonnaires, on a tendance quelque fois à considérer, comme cela a pu être dit il y a quelques jours, qu'il s'agit non pas d'un embryon mais d'un artefact embryonnaire. Et on voit très bien que, selon les mots que l'on utilise, la tendance à réfléchir dans telle ou telle direction sera différente.

Les arguments d'abord défavorables au clonage thérapeutique et à la création de ces souches embryonnaires :

Premier argument, c'est que l'Humanité hésite à créer spécifiquement des embryons humains pour la recherche. Et comme vous venez de l'entendre, un être humain qui serait cloné à des finalités reproductives aurait la dignité d'un être humain. Par conséquent, on ne peut pas esquiver le débat au motif que cet embryon n'aurait rien d'humain.

Le deuxième point de vue est que si le clonage reproductif est encouragé, il risque d'être banalisé par son succès même, et on voit très bien que les barrages éthiques entre clonage reproductif et clonage thérapeutique ne tiendront qu'un instant et que tous les arguments de la position B que nous venons d'entendre, seront effectivement très forts, que la science trouvera toujours des arguments pour reproduire un être humain.

L'argument d'urgence thérapeutique mis en avant de façon réitérée ne tient pas compte au fond du fait que ces perspectives sont bien souvent celles de l'espoir, plutôt que des certitudes. Il est vrai que personne ne peut prédire le destin de ce clonage thérapeutique. Dans le sujet qui nous occupe, on parlait des handicapés, on voit très bien que les handicapés ne bénéficieront jamais, dans l'état actuel des connaissances, des cellules souches embryonnaires qui sont plus destinées à réparer le vieillissement que le handicap du sujet jeune. On ne voit pas, par exemple, comment une trisomie 21 pourrait bénéficier de cellules souches embryonnaires.

Autre point, c'est que, les cellules issues de cellules adultes différenciées ou de cellules provenant d'embryons surnuméraires que l'assistance médicale à la procréation a laissé sans destin procréatif peuvent dans un premier temps suffire avant que l'on ne passe au clonage thérapeutique. Car le clonage thérapeutique se fonde sur un élément humain essentiel que sont les ovocytes qui dans l'état actuel ne sont pas contournables. Et on voit très bien qu'il y a une certaine tendance à exclure le débat sur les ovocytes du clonage thérapeutique comme si cela allait de soi que les ovocytes étaient des gamètes à disposition et que le femmes seraient parfaitement heureuses de participer à la recherche et à la thérapeutique en donnant leurs ovocytes, et qu'à partir du moment où cette tradition du clonage thérapeutique serait institutionnalisée par la recherche et par la société, il serait quasiment impossible de revenir en arrière, l'Humanité aurait décidé de créer des embryons pour la recherche, et ce pas serait peut-être comme Armstrong, « un grand pas pour l'Humanité » ou un petit pas pour l'Humanité.

Bref, il ne paraissait pas pour cette position défavorable au clonage thérapeutique souhaitable d'abandonner les références morales, la recherche scientifique a parfaitement sa légitimité, c'est à la société d'en limiter les applications à l'homme.

La position favorable qui a été majoritaire, après un débat très tendu, dit qu'il ne s'agit pas d'embryons qui aient un destin d'implantation dans l'utérus, que les barrières internationales contre le clonage reproductif sont telles que l'on voit mal des dérives dans ce domaine, que les perspectives thérapeutiques sont tellement gigantesques parce que l'on change totalement de sens même de la réparation qu'elles sont fascinantes, et cette position souhaite au fond une ouverture maîtrisée, que le clonage thérapeutique, qu'on le veuille ou non, n'est pas remplaçable par des cellules souches provenant d'embryons surnuméraires, parce que comme je le disais initialement, c'est la réparation du soi et par conséquent les embryons surnuméraires seraient toujours rejetés par le malade dont les cellules seraient éventuellement greffées.

Et puis, un point de vue très pragmatique que l'on peut utiliser dans des sens différents, la compétition scientifique, la finalité de la science, cette ascension permanente de l'Humanité, les enjeux internationaux font qu'un pays qui se priverait de la création de ces souches embryonnaires serait laissé sur le bord de la route, et qu'il vaut mieux encadrer par la loi un clonage thérapeutique que laisser tel ou tel essai sauvage se produire, comme je sais que cela se déjà produit dans notre monde. Et la France, dans ce domaine, avait souhaité dans son avant-projet de loi, qu'il y ait une agence de reproduction, une agence spécifique qui permettrait de confier à la société la responsabilité de dire oui ou non dans telle ou telle discipline.

Je voudrais pour conclure, tout de même prolonger cet avis par quelques réflexions personnelles qui n'engagent que moi :

Le premier point et qu'il m'apparaît c'est peut-être une nouvelle histoire de l'Humanité qui est fondé sur un certain égoïsme du clonage du soi, on l'a vu pour le reproductif mais on le voit pour la thérapeutique, c'est tout de même de se guérir soi par l'autre, et le soi plutôt vieillissant que le soi plutôt jeune. Le soi plutôt jeune pourrait effectivement bénéficier des ces cellules souches embryonnaires à la place du diagnostic pré-implantatoire qui pose des problèmes comme on l'a vu ce matin avec le point de vue du Portugal, et cette angoisse que nous sentons de mettre au monde un enfant pour réparer l'autre, Madame Questiaux avait utilisé le mot de « l'enfant thérapeutique », bien, nous pose une question existentielle très forte et on pourrait très bien imaginer que le clonage thérapeutique contourne la compatibilité recherchée chez un enfant à faire naître pour réparer l'autre, dans des maladies non pas génétiques mais des maladies hématologiques et ce serait peut-être plus facile effectivement d'avoir un clonage thérapeutique, que d'avoir mise en route d'un enfant au bénéfice de l'autre.

Je terminerai en parlant des femmes, et des femmes dont le statut de donneuses d'ovocytes me paraît toujours un peu légèrement abordé. En effet, qu'en sera-t-il de l'anonymat ? On sait très bien que la greffe, le don de cellule se fondent dans la plupart de nos sociétés sur la notion d'anonymat et qu'en sera-t-il de ces femmes donneuses d'ovocytes pour la recherche ? Qu'en sera-t-il de leur indemnisation ? Qu'en sera-t-il de la commercialisation ? Dans quelques mois et déjà maintenant, on arrive à congeler des ovocytes et par conséquent les ovocytes vont commencer à prendre l'avion. On voit très bien que la structure même de ces ovocytes si précieuse, risquent d'exercer des pressions peut-être excessives. Et que l'on voit déjà dans certains pays des femmes qui sont confrontées à la demande de donner des ovocytes, soit pour la reproduction, soit pour la recherche. C'est un phénomène qui n'est pas un phénomène imaginaire mais qui est un phénomène tout à fait récent.

Les coûts pour la santé sont peut être difficiles à identifier dès maintenant, mais sont probablement une des impasses devant laquelle on risquerait de se trouver face à une réparation de plus en plus coûteuse de personnes au niveau de vie les plus élevés dans les pays les plus riches, et le vieillissement des personnes grâce au clonage thérapeutique qui permettrait d'être protégées, pose à mon sens un problème éthique de notre humanité et l'internationalisation de cette question des cellules souches, me paraît fondamentale. Je vois mal comment un pays européen, asiatique, américain pourrait considérer que c'est sa liberté de mettre des cellules souches, simplement éventuellement en les brevetant, sans qu'il y n'ait de réflexion internationale et s'il y a un sujet, et un sujet européen par excellence, je crois que c'est actuellement le sujet le plus important actuellement pour notre société de réfléchir en termes globaux et non pas en termes de frontière de tel ou tel état, en effet, je crois que la question que je me pose, c'est que pour guérir, doit-on guérir à tout prix et quelle place pour l'autre et comment en même temps espérer et respecter ?

Je vous remercie.

CLOSING SESSION / SESSION DE CLOTURE

Address by Mr Georges Stavrinakis, Chairman of the Commission for the preparation of the legislation for the establishment of the Cypriot National Ethics Committee

……. approuver la mise en place d'une commission de préparation juridique en vue d'établir les aspects sociaux humanitaires et médicaux dérivant des activités de recherche sur l'être humain. Notamment en ce qui concerne l'application de la recherche sur le génome humain. Ce Comité est constitué des Commissaires Juridiques, de l'avocat Général, des Représentants du Ministère de la Santé et de l'Ordre Public. Ce Comité de rédaction juridique a pour mandat d'élaborer le cadre juridique nécessaire et de déterminer également la composition de ce Comité National d'Ethique chypriote, de même que ses compétences et sa manière de fonctionner. La première réunion de cette Commission a eu lieu le 20 juin. A la suite de cette réunion, les choses sont allées très vite, un projet de loi a été préparé pour la mise en place d'un Comité National de Bioéthique, dont l'objectif sera déterminé pour septembre. Le Comité de préparation législative a préparé un projet de loi pour la ratification de la Convention pour la Protection des Droits de l'homme et de la dignité de l'être humain, vis-à-vis de la mise en œuvre des recherches biologiques et médicales en interdisant également le clonage de l'être humain.

Ce projet de loi, qui a été élaboré par la Commission, prévoit un Comité National Bioéthique dont la mission consistera à surveiller, à analyser constamment les problèmes et les relations en rapport avec la recherche scientifique et la mise en œuvre des recherches en biologie et en biomédecine, en génétique, sans compter l'intervention humaine dans le processus biologique du génome humain et l'exploration également des conséquences morales, sociales, éthiques de toutes ses dimensions. Ce Comité National Bioéthique sera un organe indépendant, et ne sera soumis à aucun contrôle ministériel, par aucun instrument ou organe d'état. Ce comité sera composé de treize membres y compris la Présidence et le Vice-Président. Il s'agira là de personnes de réputation morale de grand renom, provenant du domaine du droit, de la sociologie, de la philosophie ou de la théologie, et également provenant du domaine des sciences médicales comme la médecine génétique, la biogénétique. Une troisième catégorie de personne sera également présente dans cette commission, représentant d'autres sciences, professions ou disciplines pas encore mentionnées, dans la mesure où ces personnes seront distinguées par une contribution dans ce domaine, par une activité. Toute nomination sera telle que les personnes seront nommées donc de ces quatre catégories, et en ce qui concerne les deux premières catégories, on demandera comme condition supplémentaire, des connaissances et une expérience dans le domaine de la bioéthique.

Les compétences pourront se résumer comme suit :

- La commission aura compétence et aura responsabilité d'étude et d'examiner, d'évaluer et d'analyser systématiquement d'un point de vue bioéthique des questions et des problèmes survenant des progrès de la science, de leur mise en œuvre dans le domaine de la technologie, biomédecine, médecine génétique et d'une manière générale, tout ce qui

concerne les soins médicaux et l'intervention humaine dans le processus biologique, sans oublier le génome humain,

- bien entendu, conseiller, donner des avis sur des questions de bioéthique et des problèmes de bioéthique, examiner des conséquences éthiques, morales, sociales, humanitaires, juridiques, en rapport avec la mise en œuvre des biotechnologies, des technologies de la génétique, et d'une manière générale, tout ce qui peut concerner les soins médicaux et l'intervention humaine dans le processus biologique et le génome humain,
- coopérer avec des organisations internationales, participer à des événements internationaux ayant trait à ces questions en rapport avec la bioéthique, faire appel à des scientifiques de l'étranger pour examiner des questions spécifiques et le mandat comprend également un manuel de bonne pratique sur toutes les questions qui s'avéreront nécessaires et dans le champ de compétence de la Commission.

Cette Commission pourra également mettre en place des sous-comités pour mieux redistribuer ses tâches, qui pourront avoir trait à un contrôle disciplinaire éthique, à une surveillance ou à la promotion des questions juridiques. Ces sous-comités seront constitués de membres de la commission et leur composition pourra être complétée par des personnes non-membres de la commission mais toujours en se reposant sur les critères de leur qualification. Ces personnes sont-elles appropriées pour le domaine de la bioéthique, leur nomination devra être approuvée par le Comité des Ministres.

En résumé, ce Comité National Bioéthique pourra contribuer de manière notable aux progrès scientifiques, à la suite de la mise en œuvre dans tous les domaines en rapport avec la biologie et la médecine et traitant de bioéthique, en rapport direct avec les sciences de la vie, l'être humain, la dignité humaine et les droits de l'homme.

Je ne parlerai pas du contenu des autres projets de loi, concernant la ratification de la Convention des Droits de l'Homme et de la dignité humaine, en ce qui concerne les applications pour la biomédecine et la médecine, et le Protocole additionnel interdisant le clonage des êtres humains. Je me bornerai à dire encore, que ce projet de loi a déjà été adopté par le Comité de Ministres, qu'il a déjà traversé la phase de contrôle juridique et technique et spécialisé et a été envoyé à la Chambre des Représentants. La semaine dernière, on en a discuté dans le Comité Permanent de la santé qui a livré la question à la session plénière qui va en discuter jeudi prochain en temps opportun.

Merci pour votre attention.

Address by Mrs Ruth Reusser, Chair person of the Steering Committee on Bioethics, CDBI

Madame la Présidente,
Monsieur le Garde des Sceaux,
Monsieur le Président,
Mesdames, Messieurs,
Chers collègues et Chers amis du Comité Directeur pour la Bioéthique,

Ces deux journées nous ont permis de débattre à un haut niveau, les bénéfices et les risques de la génétique, nous avons beaucoup discuté des droits de l'homme, je crois qu'il n'y a pas seulement un droit de l'homme dans le domaine de la biomédecine, mais il y a aussi un droit d'être nourri quand le moment est venu, et pour cette raison-là, je vais essayer d'être assez brève pour ne pas vous retenir trop longtemps !

J'aimerais quand même dire, cette 6ème Conférence Européenne des Comités Nationaux d'Ethique nous a non seulement rappelés des notions fondamentales de génétique, mais nous a également informés sur les développements dans ce domaine, elle nous a aussi présentés de manière très qualifiée les différents domaines d'applications de la génétique. Elle nous a permis d'identifier les principales questions d'éthique.

Au nom du Comité Directeur pour la Bioéthique, au nom des nombreux membres de ce Comité ici présents, et en mon nom personnel, je tiens à féliciter et à remercier chaleureusement toutes les personnes, les organisateurs, les orateurs, et les intervenants qui ont contribué à ces passionnantes journées, j'adresse encore au nom du CDBI, du Comité Directeur pour la Bioéthique, un merci tout à fait particulier à nos hôtes chypriotes qui ont permis la tenue de cette Conférence dans ce cadre superbe. Grâce à la grande générosité de nos hôtes, nous avons également pu découvrir la beauté de ce pays béni. La soirée d'hier est inoubliable, on a vu tout un congrès danser.

Ce n'est pas un hasard si le Comité Directeur pour la Bioéthique commence ses travaux cet après-midi à la suite de votre Conférence. La génétique constitue en effet un sujet de préoccupation non seulement pour les Comités Nationaux d'Ethique mais également pour le Comité Directeur pour la Bioéthique. Il ne s'agit pas de vous concurrencer dans l'évaluation éthique de la génétique. Notre tâche est d'étudier la manière de concrétiser dans le droit international, au moyen d'un Protocole additionnel, le principe fondamental de la Convention des Droits de l'Homme et la Biomédecine, selon laquelle personne ne peut subir de discrimination injustifiée en raison de son patrimoine génétique. Nous ne faisons donc que poursuivre vos réflexions bioéthiques pour passer de l'éthique au droit. Je dois aussi dire que c'est un projet ambitieux de faire un Protocole sur la génétique, cela pose différents problèmes, qui commencent par la définition ; que comprend-on par exemple en termes de tests génétiques ? Il faut clairement définir de quoi on parle si on formule des normes juridiques.

Le but de nos travaux est de garantir une utilisation de la génétique conforme aux valeurs humaines fondamentales. La formulation des principes juridiques doit toutefois se faire avec prudence. Il ne s'agit pas de légiférer sur toute question susceptible de poser un problème, le droit international ne devrait intervenir que pour protéger des biens juridiques d'un rang élevé. Cette réflexion sur le rôle essentiel des normes de droit débouche également sur l'institutionnalisation de la réflexion bioéthique.

Nous bouclons ainsi la boucle, le Comité Directeur pour la Bioéthique va poursuivre les travaux de cette Conférence et tenter d'élaborer un Protocole additionnel sur la génétique. Ce Protocole constituera probablement une base pour mener une réflexion plus ample sur la bioéthique, laissée au soin des Comités Nationaux d'Ethique et de votre Conférence.

Je souhaite à votre Conférence, mais je souhaite aussi au Comité Directeur pour la Bioéthique, de passionnantes discussions et beaucoup de succès dans le travail futur.

Merci.

Address by Mr Daniel Serrão, Chair of the Bureau of the Conference of National Ethics Committees.

Madame la Présidente,
Monsieur le Garde des Sceaux,
Madame la Présidente du Comité Directeur de Bioéthique du Conseil de l'Europe,
Monsieur Georges Stavrinakis, Président de la Commission qui prépare le nouveau Comité National d'Ethique de Chypre,
Mesdames et Messieurs les invités,
Chers amis de la Conférence Européenne,

Ici, sur le programme, il est noté qu'on aura un discours de clôture par le nouveau Président du Bureau de la Conférence. Evidemment, je ne peux pas faire un discours. Pour faire un discours, j'aurais besoin de parler ma langue maternelle, ce qui n'est pas le cas de ce français que j'essaie de parler avec vous.

En tout cas, je dois remercier les membres du Bureau qui m'ont choisi. Ils ont peut-être voulu faire honneur à un petit pays que l'on peut facilement oublier car il est à l'occident de l'Europe, il n'a aucun poids politique, militaire, etc…Alors je remercie au nom de mon pays et aussi au nom du Comité National d'Ethique portugais qui est déjà âgé de 11-12 années et qui travaille de mon point de vue très bien, merci alors à tous les membres du Bureau.

Je dois aussi remercier Madame la Présidente, Madame Questiaux, vous avez conduit cette organisation pendant ces trois dernières années d'une façon brillante. Chaque réunion a été un progrès, et c'est le résultat de votre intérêt pour la Conférence permanente, et de votre extraordinaire capacité de direction du Bureau. Vous savez être ferme, vous avez dirigé avec une fermeté dans l'essentiel comme le

rappelait hier soir le Vice-Président du Bureau, le Professeur Englert, mais vous savez aussi utiliser de la diplomatie qui est l'intelligence de la politique. Ce n'est pas facile de vous succéder, je suis bien conscient, je suis sûr de cela. Merci Madame Questiaux, croyez que je ferai mon possible pour honorer votre présidence.

Le travail du nouveau Bureau que j'ai l'honneur de présider pendant un an, c'est juste la préparation de la prochaine réunion. Peut-être resterons-nous sur ce modèle de deux jours, un jour plutôt éthique et scientifique, et un autre plutôt pour que les Comités Nationaux puissent présenter leurs opinions et leurs avis, ce modèle a, je crois, donné de bons résultats. Mais à ce propos le Bureau aimerait recevoir et connaître peut-être vos opinions, vos suggestions sur, soit le thème de la première réunion, soit évidemment quelques remarques sur l'organisation par le biais naturellement du Secrétariat.

Cette Conférence est vraiment un réseau des Comités Nationaux et le Bureau n'est pas une structure de pouvoir. Votre Bureau ne veut que réaliser vos aspirations et vos soucis de la façon la plus correcte possible. Par l'action de Madame Nicole Questiaux, cette Conférence est maintenant bien implantée en Europe et commence à être reconnue et respectée dans d'autres instances internationales d'éthique.

Il me faut aussi remercier Carlos de Sola et son Secrétariat, je crois que je peux citer les noms, il s'agit de Sandrine Sabatier, Terry Journiac et Catherine Forné. Depuis le tout début, Carlos de Sola qui a à cœur ce réseau, la Conférence et le Bureau, on doit le remercier parce qu'il est parmi nous la présence du Conseil de l'Europe qui nous accueille.

Finalement une parole de reconnaissance à Madame Petridou qui nous a reçus dans son beau pays, avec le soleil et avec une grande qualité, l'amitié.

Mon long discours est fini, on se verra de nouveau à la prochaine réunion, peut-être à la maison mère à Strasbourg.

Merci à vous.

Address by Mr Alecos Markides, Attorney General, Cyprus

Monsieur le Président du Bureau,
Madame Questiaux,
en tant qu'ex-président du Bureau, je m'adresse également à la Présidence du Bureau du Comité et du Conseil de l'Europe,
Mesdames, Messieurs, Chers Invités,

Je ressens comme un privilège le fait d'avoir pu être présent ici depuis le tout début de vos discussions et d'avoir pu suivre ainsi la 6ème Conférence des Comités Nationaux d'Ethique qui vient de prendre place ici à Paphos.

Tout au long de la Conférence, les participants issus de 43 pays, c'est-à-dire de tous les pays membres du Conseil de l'Europe à l'exception d'un seul, plus les Etats-Unis et le Canada, on eu la possibilité d'entendre des analyses extrêmement claires et

précises faites par les différents intervenants sur les grands problèmes de nos temps modernes, de participer à des débats animés qui ont eu lieu après chaque session, et je voudrais féliciter tous les intervenants et également les Présidents pour l'excellente manière dont ils ont géré les débats. Je voudrais remercier chacun des intervenants qui a su un laps de temps relativement court analyser dans une langue claire et facilement compréhensible par chacun, des problèmes difficiles, des dilemmes éthiques et juridiques qui surgissent et requièrent une solution, d'une manière crédible et fiable, en recherchant toujours le juste milieu. Cet équilibre est nécessaire dès lors qu'il y a divergence de vue ou d'intérêt sur des questions telles que nous les avons abordées.

Je suis persuadé que les exposés et les discussions que nous avons pu entendre ces deux derniers jours ont confirmé ce que je disais l'autre jour dans mon discours d'introduction, à savoir que l'essence, la substantifique moelle de la question réside dans ces conflits mais aussi dans l'effort de concilier les divergences émanant des progrès technologiques des dernières années, qui d'ailleurs ne se relâchent pas, ne présentent pas de signes de fatigue mais accusent une accélération du progrès, et de l'autre coté nous avons la nécessité de protéger les Droits de l'Homme, la dignité humaine et d'améliorer la qualité de la vie.

Les exposés et les discussions de cette Conférence ont manifesté la nécessité de se pourvoir constamment d'informations, de formations et de continuer à organiser de tels débats scientifiques ouverts, où l'on peut entendre des vues opposées, de manière à nous conduire peu à peu tous ensembles à des synthèses dans les bonnes directions.

L'effort de mon pays pour institutionnaliser et pour fournir aussi une législation sur ces questions fait l'objet du Comité d'Ethique National qui va commencer ses travaux ici, à Chypre. J'espère que d'ici la fin de ce mois, nous aurons cette législation dont notre Commissaire Juridique vous a parlé, à savoir, la législation mettant en place le Comité National d'Ethique chypriote. J'espère également qu'avant la fin de l'année, la Chambre des Représentants nous fournira aussi la législation ratifiée nécessaire sur la Convention des Droits de l'Homme et la Biomédecine, ainsi que le Protocole additionnel interdisant le clonage des êtres humains. Mais tout cela n'est que le début. La Convention européenne en soi n'est pas auto-exécutoire mais il nous faudra encore des législations spéciales dont le contenu ne pourra excéder en aucun cas les limites définies par la Convention. Donc, dans le cadre des efforts sus-mentionnés, nous espérons qu'avec l'aide de la Conférence et du Bureau, Chypre pourra continuer de participer à la Conférence et même y apporter une contribution toujours plus importante.

Et finalement, je tiens à remercier le Conseil de l'Europe qui a bien voulu faire de nous les hôtes de cette 6ème Conférence ici, à Chypre. J'espère que la manière dont nous avons organisé cela, sera jugée satisfaisante par vous.

Je voudrais également remercier non seulement le Président de la Conférence, mais les différents membres du Secrétariat et tous ceux qui ont contribué à faire de cette Conférence, une Conférence réussie à Chypre.

Et en particulier, je voudrais remercier Madame Rena Petridou qui a représenté le gouvernement chypriote et qui siège également au Comité Directeur de

Bioéthique du Conseil de l'Europe. Car c'est grâce à ses efforts sans relâche qu'il a été possible d'organiser cette Conférence sans grands problèmes. Le fait que cette 6ème Conférence des Comités Nationaux d'Ethique se soit tenue ici, à Chypre, est tout à fait significatif ; je suis persuadé que Madame Rena Petridou continuera d'œuvrer toujours avec la même flamme et le même intérêt.

Merci