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POPULATIONAL GENETIC DATABASES IS A SPECIFIC ETHICAL AND LEGAL FRAMEWORK NECESSARY?

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Recent scientific advances and new technological developments, most notably the advent of bio-informatics, have led to the emergence of genetic databases with particular characteristics and structures. Paralleling these developments, there has been a proliferation of ethical and legal texts aimed at the regulation of this new form of genetic database.*

'Database' can be defined as a collection of data which is organized, prioritized and available for consultation, the content of which can evolve by the addition of updated information, and which, in this day and age, is always computerized, according to a variety of structures. In practice, the term 'database' refers to the data processing structure as well as the relationship between different types of data, the method of data entry, updating and filing, the contents themselves and the request system enabling consultation. The terms "databank" and "biobank" are often used interchangeably, highlighting the notion that these databases are providing a service. With respect to biological samples and data, two trends are evident. The first

makes a distinction between the physical biological samples themselves which, together, constitute a collection, and the database made up of the information derived from these samples and allowing for their characterization. The second trend, which currently predominates in the world of genomics, uses the term 'database' to denote the physical samples as well as the information derived there from. This is the position adopted by UNESCO in its *International Declaration on Human Genetic Data*.¹

Genetic data bases, traditionally considered a component of specific research projects or limited to the study of a restricted number of samples, are now more and more frequently established or developed at the level of whole populations

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or communities. Consider, for example, the Estonian Genome Project² (Estonia), the UK Biobank³ (United Kingdom), CARTaGENE⁴ (Quebec), or, at the international level, GenomEUtwin⁵ which proposes a cross-border study including eight countries.⁶

These projects contemplate the study of hundreds of thousands of individuals and propose varied methods for participant recruitment and follow up. Due to the proliferation of such databases, the question of international coordination and organization arises, both on a scientific and ethical level. International projects such as the “Public Population Project in Genomics” consortium (P3G)⁷ have been put in place to deal with these new issues. Specifically, the P3G consortium aims to create a “knowledgebase”, a virtual observatory where scientific, ethical, legal and social tools developed and used by its various members are made available to all. In the process, it hopes to generate a certain harmonization, if this is possible and scientifically desirable.

Populational genetic databases have specific characteristics. They are a testimony to the shift from local projects to national or international projects which has been engendered by the progressive dissolution of borders and the strengthening of the global dimension of research. Designed as veritable research infrastructures rather than as projects aimed at the study of a particular illness or genetic characteristic, they constitute strategic resources allowing for the conduct of research involving stored data originating from populations or communities which may be separated by distance or time. The resulting research leads to the production of new data which may in turn enrich the initial database. As platforms for research, they are established over a prolonged period spanning several generations; the anticipated results and benefits are therefore considered over the long term.

These databases have become essential with the development of population genetics. Population-based genetic study has been defined in

UNESCO’s *International Declaration on Human Genetic Data* as “[a] study which aims at understanding the nature and extent of genetic variation among a population or individuals within a group or between individuals across different groups.”⁸

This type of study is designed to allow for the analysis of the genetic composition of populations and factors affecting this composition, as well as factors underlying its evolution and adaptation, in particular, natural selection, mutations and migrations. The knowledge derived from such studies are an essential pre-requisite for the understanding of common diseases which are usually multi-factorial, that is to say resulting from the interaction of multiple parts of the individual’s genome with each other and with the environment. In order to understand the complexities of these common diseases it is necessary to have recourse to large collections of samples derived from individuals from one or several communities or populations, both sick and healthy. In the long term, understanding these common diseases will open up the possibility of prediction and prevention from the perspective of public health.

As summarized by the Bioethics Advisory Committee of the Israel Academy of Sciences and Humanities:

3. (...) *By analyzing the polymorphisms throughout the entire genome, correlations with occurrence of disease can be established by the technique of genetic association analysis.*
4. *Because these comparisons are statistical in nature, in order to be meaningful, they must be performed on a large scale (many thousands of samples). They may also be most powerful when carried out in cohorts of patients and healthy controls having a common ethnic origin so as to minimize unrelated variations. Hence, the need to establish population-based large-scale DNA collections. (...)*⁹

Many of the characteristics particular to population databases raise specific scientific, legal, ethical and social questions which challenge the adequacy of the ethical and legal norms traditionally

applied to research. Some of these characteristics include the magnitude of the projects, the fact that the precise nature of the research that could be conducted using the database is not yet known, the absence of direct benefits (the benefits are necessarily long term), and the duration of the projects. Other issues relate to the involvement of the populations or communities studied, the possibility of stigmatization that could arise from the use of the results, the necessity of exchange and transfer of information, the possible role played by private industry, and the private or private-public financing of these platforms.

Due to these special considerations, it becomes necessary to inquire whether there are texts that seek to regulate such matters at the international, regional or national level. If such documents exist, it is necessary to determine if there are common principles that emerge or if harmonization or the elaboration of 'minimum standards' is possible or desirable in light of the need to respect cultural diversity in approaching the problem. If, on the other hand, no specific text has been adopted, it will come down to the existence of an ethical debate and the issues and conclusions emerging there from.

Finally, whether or not specific rules have been adopted, the crucial question becomes whether it would be appropriate to adopt norms specifically tailored to populational genetic databases – an approach inspired by “genetic exceptionalism”.¹⁰ We will therefore examine the existing normative context (I.) before proceeding to an analysis of the normative issues associated with populational genetic databases (II.).

I. Populational Genetic Databases : Existing Norms

The current trend is towards a proliferation of levels of norms and a specialization of national and international norms (from guiding principles for genetic research to the administration of populational databases).

a. The International and Regional Context (Table 1)

At the international and regional level, we are witnessing a proliferation and specialization of norms. Some common principles can be extracted from these norms.

Numerous texts have been adopted over the last few years, but their field of application is noticeably becoming more and more specific. Thus, we have moved from general principles relating to biomedical research (CIOMS¹¹, CE¹²), to norms pertaining to medical databases (AMS)¹³, to the collection, use and storage of proteomic and genetic data (UNESCO¹⁴, ESHG¹⁵) and/or the administration of genetic (OMS)¹⁶ or genomic (HUGO)¹⁷ databases.

These norms, which provide guidance to national jurisdictions in their normative approach to these matters, re-iterate and re-affirm the principles stated in UNESCO's *Universal Declaration on the Human Genome and Human Rights*.¹⁸ These principles emphasize respect for human dignity, solidarity, equality and justice as well as responsibility and transparency in the conduct of research.

The first provision of UNESCO's *International Declaration on Human Genetic Data* reads as follows:

*The aims of this Declaration are: to ensure the respect of human dignity and protection of human rights and fundamental freedoms in the collection, processing, use and storage of human genetic data, human proteomic data and of the biological samples from which they are derived (...) in keeping with the requirements of equality, justice and solidarity, while giving due consideration to freedom of thought and expression, including freedom of research (...)*¹⁹

Although these texts re-affirm the traditional fundamental principles, they also adapt them to new scientific realities, notably those related to genetics. In this respect, genetic data or databases are evaluated both for their acceptability and value at the individual level as well as at the

familial and communal levels. The identification and affirmation of these special considerations has led to the emergence of a variety of new concepts. For example, the right to know and the right not to know have progressively been established. Although their scope remains uncertain, these rights benefit not only the patient but also those affected by genetic risks arising, for example, from an obligation to disclose certain information in particular circumstances. Similarly, because of the 'sensitive' and 'revealing' nature of genetic information, the protection of participants against third party access to identifying information (insurers, employers, public services, institutions) and against discrimination or stigmatization²⁰ are also re-enforced.

In the more specific context of databases - considered a form of 'global public good' - the public has been given, if not an active role, then at least a right to information and consultation as well as a right to receive the shared benefits of research. Finally, special attention is given to vulnerable persons. The rules concerning their participation have been noticeably modified: although this participation is still well circumscribed, greater recognition is given to their personal autonomy.

All of these texts attempt to find an adequate balance between the protection of the individual as the very basis of society (e.g. limitations on purposes for which research may be undertaken, protection of individuals, communities and populations) and the necessary progression of research for the benefit of society as a whole. This tension underlies all attempts at regulation of research involving humans, but in this context takes on greater magnitude given the length of the anticipated projects and the inevitable lack of precision that exists at the time subjects consent to participate.

b. The National Context : Inconsistencies

i. Legislation Specific to Biobanks (Table 2)

In light of the emergence and proliferation of populational database projects, some countries have decided to adopt specific legislation aimed at their regulation. These laws operate in conjunction with pre-existing privacy legislation and either take the form of regulations applicable to all genetic database projects, or strive to control, supervise and provide a framework for a specific national project. Estonia and Lithuania enacted the *Human Genes Research Act*²¹ and the *Human Genome Research Law*²², respectively, with the goal of establishing and supervising their national biobank project. This course of action would appear to have been motivated by the inadequacy of existing norms, an inclination to support the thesis whereby genetic data, and *a fortiori* genetic research, require special attention and can be distinguished from traditional medical data and research, and the desire to ensure democratic legitimacy for their project.

Although the adoption of specific laws responds to particular needs and allows for legal clarity and certainty, it also raises a number of problems. Effectively, in the case of regulations applicable to all databases regardless of their nature or date of establishment, there may be conflicts between the newly delineated rules and the rules in force at the time the biobank was established. For example, if the new law requires that specific consent be obtained for participation in research involving the creation of a biobank, previously amassed collections obtained on the basis of general consent will no longer be legitimate and studies using that data will have to be interrupted.

Furthermore, by creating different standards depending on whether the research is purely medical, including genetic research for which no collection is created and which does not serve to establish a populational database, the promulgation of specific laws could lead to a genetic exceptionalism which, to date, remains unfounded. In France, a legislative text introduced in 1996²³ instituting a specific regime for genetically based collections demonstrated a lack of

coherence and sparked confusion. In 2004,²⁴ in response to the criticisms that this specific regime provoked, the legislator re-established a unified and homogeneous system covering all collections built up in the context of biomedical research.

ii. Non-Specific Legislation and Ethical Debate (Table 3)

A number of national jurisdictions do not have a text specific to populational databases. These databases are therefore governed by a group of rules found in various law. This state of affairs sometimes gives rise to confusion, conflicting rules, or insufficiency and undue complexity by reason of the co-existence of several systems or regimes. Notwithstanding this legislative silence, the 'biobank' phenomenon has not only been the subject of ethical debate, but national database projects have also come to the fore through a process of self-regulation.

The ethical debate taking place in numerous countries has generally resulted in a recognition of the specific considerations associated with populational databases, specifically with respect to their nature (research infra-structure), the impossibility of anticipating all the research studies that might be conducted based on the collected data, and the indeterminate and indeterminable duration of storage. Existing legislative frameworks being inadequate to take all of these particularities into account, the need for more precise national rules has become apparent. As noted by the Israeli Bioethics Advisory Committee:

Considerable organization and financial means are required for assembling large scale collections of DNA samples and deriving databases of genetic information linked to health records of individuals. The magnitude of the operation together with the specific ethical issues mentioned above - particularly regarding commercial initiatives - underscore the need for national guidance. Clearly there should be nationwide moral (if not financial) support for such projects.²⁵

However, for the sake of coherence and simplification, and in order to clarify

overlapping rules, it is generally proposed that existing texts be amended as necessary instead of establishing a specific legal framework. While awaiting these modifications, some jurisdictions have mitigated the absence of legislation by elaborating ethical norms applicable to biobanks.²⁶

Furthermore, in their desire to create populational data banks, researchers have developed their scientific protocol, ethical framework and project guidelines in collaboration with the community or population studied, health professionals, ethicists, lawyers and sociologists (self-regulation). These developments have resulted in reports, commentaries, workshops, forums (etc.) which are generally available on their website (see e.g. CART@GENE & UK Biobank, *supra*) and which convey a real concern for transparency.

II. Populational Genetic Databanks : Normative Issues

a. The Challenge of Harmonization

The proliferation and specialization of laws leads to a multiplication of standards and terminology. This creates difficulties for research in an era where projects are increasingly international in scope and where there is a need for transfer and exchange of data. The elaboration of an international nomenclature is therefore becoming essential. A case in point is the multiplication of terms used to describe the degree of protection of data used for research.

Traditionally terms such as 'anonymous', 'anonymized', 'coded', 'double-coded', and 'identifiable' have been used. Recent normative documents have introduced new categories which have little or no similarity with the traditional categories, thereby creating needless complexity and making interpretation more difficult. Thus, terms such as 'data irretrievably unlinked to an identifiable person' (UNESCO art. 2), 'unlinked anonymized' (ESHG), and 'proportional or reasonable anonymity' (UNESCO 4.2) reformulate the notions of 'anonymized',

'double-coded', or 'coded', as the case may be.²⁷

At the international level, harmonization has therefore become a priority, although it poses significant challenges. As the Council for International Organizations of Medical Sciences has remarked:

*The challenge to international research ethics is to apply universal ethical principles to biomedical research in a multicultural world with a multiplicity of health-care systems and considerable variation in standards of health care.*²⁸

b. Despite Emerging Consensus, Controversy Persists (Table 4)

Harmonization seems to be facilitated by the emergence of a consensus with respect to certain concepts or rules, however, many of the details remain controversial.

i. Consent

The traditional mechanisms of consent are being modified in order to accommodate the special characteristics of databases or 'biobanks'. Because of the impossibility of foreseeing all the possible future uses of the data from the start, specific consent does not seem adequate.

However, the very nature of the consent required is a subject of debate: some favor general consent or consent with a variety of options while others speak of a 'blanket consent' which approximates implied consent.

ii. Privacy/Confidentiality

It is recognized that the degree of protection of data (anonymous, anonymized, double-coded, coded, identifiable) is closely tied to questions of withdrawal from a research project, dissemination of results to participants generally or individually, follow up of participants, and third party access to research data. Unlinked treatment of these elements can lead to contradictions or practical impossibilities. There is a wide

spectrum ranging from identifying or personal data (for which there is significant protection, very limited access, and the possibility of withdrawal) to anonymized data (for which there is free access for research purposes, no possibility of re-contacting participants, and no possibility of withdrawal from the project).

However, when considering the confidentiality of data, problems of taxonomy arise. As mentioned above, the vocabulary used to describe the degree of protection of data is extremely varied, with different terms being used to describe the same realities and vice-versa. The criteria used to determine an adequate degree of protection are also problematic. Coding, double-coding, and anonymization are not established in a homogeneous fashion. And since anonymization is only well suited to a restricted number of projects due to its inherent limitations, the protection of data will vary according to the questions and norms at issue.

Finally, access to research data is another big issue. The policy on access varies drastically from project to project, even within the same legislative context or ethical framework. The precise definition of 'who may have access and under what conditions?' is a source of debate both with respect to its underlying principles and with respect to the practical implementation of the conditions of access or protection. In this manner, questions of family or third party access often lead to the decision to create different categories of data within the same biobank, which in turn complicates its management.

iii. Dissemination of Results / Participant Information

The guiding principle for the dissemination of results is one of comprehensive information prior to any participation in a project conducted on a populational scale.

However, the issue of ongoing participant information over the course of the project raises certain difficulties. The right to know and the right not to know take on new complexities in the context of populational

databanks due to the diversity of the data produced or processed; this data could simply be of statistical interest without any useful individual elements, or it could be of clinical interest with the possible need for genetic counseling and careful interpretation. It is worth noting that individual research results derived from populational databanks are often of no clinical interest and can lead to misinterpretations due to the fact that they are based on incomplete information (most often biobanks are not accompanied by access to the participant's complete medical record). In addition, if individual results are provided to participants, there may be a need for genetic counseling since a researcher cannot be left to interpret the results and communicate them to the participant without the accompaniment of adequate counseling.

But genetic counseling requires financing and infrastructure that are not anticipated in the research context; it also seems difficult to apply the rules followed in the clinical context to the domain of research. In many cases, then, individual reporting is not planned for since the results are considered to be of purely scientific interest (e.g. the UK Biobank which is developing a research infrastructure)²⁹; in other cases normative texts will prescribe that these individual results must be provided to participants (e.g. Estonia has adopted a doctor-patient model)³⁰.

iv. Risks / Stigmatization

Because of the sensitive nature of certain genetic data, it is recognized that their treatment and study at the level of whole populations or communities can entail risks of discrimination or stigmatization. These risks must be recognized, both with respect to recruitment and interpretation of results, by properly informing participants and by taking action to avoid or minimize their occurrence.

However, informing participants of the risks of stigmatization combined with 'misinformation' on the nature of biobanks can have a negative impact on recruitment and can even introduce biases. Providing

participants with too many details on the remote possibility of stigmatization may alarm them and lead them to question the legitimacy and true nature of the proposed research. Because the probability of discriminatory events cannot be predicted with any degree of certainty, it becomes impossible to duly inform. In this case, transparency leads to imprecision and may even breed skepticism.

v. Governance and Monitoring

Well recognized guiding principles include the need for adequate ethical and scientific supervision from the moment a database is created, the establishment of control mechanisms for the entire duration of research projects (ongoing monitoring), and the independence of supervising institutions.

However, ethical supervision of international projects involving multiple countries raises a number of unresolved questions. The nature of this control and the bureaucratization of the process remain acute problems. There has been little work and little documentation concerning the question of which body will supervise multi-country projects and the possibility of an eventual gradation of controls at different levels.

Governance is another thorny question. How should powers and counter-powers be established with a view to ensuring transparency and responsible conduct of research? Numerous texts (especially those specific to biobanks) discuss this issue but remain vague as to the governance and control of projects once approved. Governing bodies need independence and real powers in order to ensure that ethical, legal and scientific norms are respected and uniformly applied.

vi. Public Involvement : Public Confidence as a Foundation

More and more, the public is recognized as an active participant in the elaboration and development of large-scale projects. The initiation, promotion and

reinforcement of dialogue between professionals and the public is gaining force not only during the establishment of all new populational databases, but also during the development of the legal and ethical framework and implementation of the project.

However, on the one hand, the definition of this 'public' is subject to dispute and, on the other hand, the nature of their involvement is unclear. The need to inform, include, and obtain the consent of the community or the population are put forward without specifying the character of this involvement.

vii. Commercial Aspects

Finally, the need to elaborate a policy on the sharing or distribution of the profits or benefits and the acknowledgement of the commercial aspects of databases are recognized.

In practice, even greater uncertainties arise here with respect to setting up guiding principles and ensuring transparency; this is due to the variable and changing nature of project financing (public projects vs private or semi-private projects) and to the still ambiguous status of genetic material for which numerous elements must be taken into account (property rights, remuneration or compensation of participants, financial gains, other types of gain, beneficiaries). The issue of direct participation of private companies in these projects, even if relatively rare, remains controversial since biobanks commingle notions of property shared by all of humanity with populational and individual considerations.

Conclusion

Certain issues dominate the horizon explored here. First of all, there is a current trend towards the proliferation of texts at the international, regional and national levels. Secondly, a degree of confusion and questioning as to the desirability of developing specific texts is becoming apparent.

Our review demonstrates that a harmonization of principles and vocabulary at the international level is becoming crucial. At the national level, our review reveals the need to amend existing normative frameworks in order to encompass characteristics common to all databases, leaving particular projects with the responsibility for self-regulation of particular facets of their research, yet putting in place mechanisms to ensure that this self-regulation is done in a responsible and transparent manner.

In elaborating such a framework, two pitfalls must be avoided: genetic exceptionalism and a purely occidental, Anglo-Saxon or Northern European approach to research and its regulation. Genetic exceptionalism could spring from the heightened scientific attention being given to genetics and genomics and may, in the long run lead, to a reduction of the individual to his/her genetic cartography by making a distinction between genetic data and health data, even in the absence of any justification for doing so. Recommendation 3 of the multidisciplinary Expert Group invited by the European Commission to look at the issue of genetic tests could equally apply to populational databanks; it reads as follows:

'Genetic exceptionalism' should be avoided, internationally, in the context of the EU and at the level of its Member States. However, the public perception that genetic testing is different [we will substitute traditional or populational genetic databanks] needs to be acknowledged and addressed.³¹

Yet international texts are ambiguous in this respect. For example, UNESCO's *International Declaration on Human Genetic Data*³² is ambiguous in its article 3 (a person's identity should not be reduced to genetic characteristics) and article 7 (special status of genetic data). Furthermore, certain national texts consider genetic data and databases as a separate category rather than as a sub-category of medical data. A purely occidental, Anglo-Saxon or Northern European approach to research and its regulation is frequently

adopted, even though exchange is crucial in this area.

These pitfalls aside, distinctions must be made between the international, national and project levels when considering populational databanks and their regulation, since each raises different issues.

At the international level, in light of the internationalization of research and the increase in data and sample transfer and exchange, a harmonization of guiding principles and terminology is essential. First of all, the guiding principles must be distinguished from the specific rules. Specific rules cannot take into account the particularities of every national legal system since these follow different legal traditions.

For example, the question of property rights in, control over, or non-availability of one's body receives different treatment in countries with a Common Law tradition as opposed to a Civil Law tradition, and therefore a consensus could not be reached. It is also important to be aware of cultural and religious diversity around the world and to seek to preserve this diversity by adapting the processes and rules. Thus, in the HapMap³³ project, the involvement of the public and the nature of the consent process have been adapted to the different populations studied while maintaining a common framework. Next, there must be an agreement as to terminology.

Even though each international organization wishes to pronounce its own rules, it is necessary to avoid unnecessary terminological complexity which confuses researchers, ethicists, legal professionals and the public, and which requires interpretation and creates immaterial semantic debate. Transparency and clarity should be the guiding principles for all organizations. Finally, there is a need to ensure that all actors comply with these norms, including public and private financing bodies, researchers, professionals involved in research (ethicists, lawyers, sociologists, etc.), as well as populations and communities.

Despite the existence of numerous declarations, guiding principles and codes dealing with the issue of genetic data, the changing conditions of genetic research call for the establishment of an international instrument that would enable states to agree on ethical principles, which they would then have to transpose into their national legislation.³⁴

At the national level, it is coherence that must be promoted. Existing legal frameworks must be amended in order to accommodate the particular features of populational databases, and ethics should serve as a guide to researchers. The modification of existing laws should not, however, translate into the creation of different legal categories, but rather should ensure increased protection for medical data. These amendments should not be done in haste and without long term vision since this would only provide specific answers to current problems. New problems may surface and legislative mechanisms, which are so heavy and difficult to change, lack the flexibility that may be required to resolve these problems. Coherence must be assured while avoiding too much bureaucratization of research and while building a dialogue between professionals and the population as a whole.

Finally, states should endeavor to provide support for national projects by offering some degree of financing, thus guaranteeing a role for public authority.

For the projects themselves, self-regulation seems preferable to legislation specifically targeted at populational databases. As highlighted above, legislative mechanisms lack flexibility and the process for amending legislative rules is extremely slow. Self-regulation therefore offers greater flexibility. Where research involving the creation and use of research infrastructures (populational databanks) is only in its initial stages, this research must be preceded by a debate which includes the community or population as a whole; the process must also comply with international guiding principles.³⁵

Likewise, effective involvement of research ethics committees in all stages of research will only evolve under conditions which guarantee their independence and the coherence of their evaluation (avoid too much bureaucratization), and which provide them with the powers necessary to carry out their mandate. These two elements promote and are based on the principles of caution, transparency and responsibility.

Finally, at the international as well as the national and individual project level, prudence and openness are in order due to the difficulty of predicting all the problems that will be faced by 'bankers' who have established or are managing populational databases. Furthermore, in light of the uncertain long term scientific value of these banks as tools in achieving the desired goals, mechanisms must be put in place to evaluate the use of these research infrastructures and their impact on the progression of knowledge in genomics and their application in the domain of public health.³⁶

Table 1. International Instruments (2000-2004)

<i>International norms pertaining to biomedical research in general</i>	
World Medical Association (WMA)	Declaration of Helsinki, 1964, amended in 2000 , clarification notes 2002 et 2004, http://www.wma.net/e/policy/b3.htm (Date accessed : February 24, 2005)
Council for International Organizations of Medical Sciences (CIOMS)	International Ethical Guidelines for Biomedical Research Involving Human Subjects, Geneva, November 1, 2002 , http://www.cioms.ch/frame_guidelines_nov_2002.htm (Date accessed : February 24, 2005)
Council of Europe (CE)	Additional Protocol to the Convention on Human Rights and Biomedicine Concerning Biomedical Research, Strasbourg, June 30, 2004 , opened for signature January 25, 2005 http://www.coe.int/T/E/Legal_Affairs/Legal_co-operation/Bioethics/Activities/Biomedical_research/195%20Protocole%20recherche%20biomedicale%20e.pdf (Date accessed : February 24, 2005)
<i>International norms specific to biobanks of human biological materials and/or (associated) data</i>	
European Society of Human Genetics (ESHG)	Data Storage and DNA Banking for Biomedical Research: Technical, Ethical and Social Issues , November 2001 , http://www.eshg.org/ESHGDNAbankingrec.pdf (Date accessed : February 24, 2005)
World Medical Association (WMA)	The World Medical Association Declaration on Ethical Considerations Regarding Health Databases, Washington, October 6, 2002 , http://www.wma.net/e/policy/d1.htm (Date accessed : February 24, 2005)
Human Genome Organisation (HUGO)	Statement on Human Genomic Databases, London, December 2002 , http://www.biol.tsukuba.ac.jp/~macer/HUGOHGD.htm (Date accessed : February 24, 2005)
World Health Organization (OMS)- European Partnership on Patients' Rights and Citizens' Empowerment	Genetic Databases – Assessing the Benefits and the Impact on Human and Patient Rights, 2003 , http://www.law.ed.ac.uk/ahrb/publications/online/whofinalreport.pdf (Date accessed : February 24, 2005)
United Nations Educational, Scientific and Cultural Organization (UNESCO)	International Declaration on Human Genetic Data, Paris, October 16, 2003 , http://portal.unesco.org/en/ev.php-URL_ID=17720&URL_DO=DO_TOPIC&URL_SECTION=201.html (Date accessed : February 24, 2005).
European Union	(1) European Commission, Directorate-General for Research, Directorate C (Science and Society), Unit C3 (Ethics and Science), 25 Recommendations on the Ethical, Legal and Social Implications of Genetic

	<p>Testing, May 2004, http://europa.eu.int/comm/research/conferences/2004/genetic/pdf/recommendations_en.pdf (Date accessed : February 24, 2005)</p> <p><i>N.B. These recommendations were prepared by a multidisciplinary expert group consulted by the European Commission. Though this document focuses on genetic testing, several recommendations address human biological material collections and associated data specifically (see e.g. Recommendations 19, 20 and 21). Their base is detailed in a report from the same group including a chapter on biobanks and were discussed at a Conference in May 2004. The report and the Conference proceedings are available at : http://europa.eu.int/comm/research/conferences/2004/genetic/report_en.htm (Date accessed April 15, 2005)</i></p> <p>(2) Directive 2004/23/EC of the European Parliament and of the Council of 31 March 2004 on setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissues and cells, Strasbourg, March 31, 2004, http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=32004L0023&model=guicheti (Date accessed : February 24, 2005) Official Journal L 102, 07/04/2004 P. 0048 - 0058</p> <p><i>N.B. Though the scope of this directive is limited to therapeutic applications, the principles it lays down have implications for research.</i></p>
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Table 2: National legislation specific to biological material and/or data collections (examples)

Legislation regulating biobanking activities (general)	
Iceland	<p>(1) <u><i>Act on Biobanks no. 110/2000, May 13, 2000</i></u>, http://brunnur.stjr.is/interpro/htr/htr.nsf/printview/Act-biobanks (Date accessed: February 24, 2005)</p> <p>Art. 2 Scope This Act applies to the collection of biological samples, and their keeping, handling, utilisation and storage in biobanks.</p>

	<p>This Act does not apply to temporary keeping of biological samples taken for purposes of clinical testing, treatment, or for specific study, provided such samples are destroyed when the tests, treatment or research are completed. Temporary keeping means storage for up to five years, unless the National Bioethics Committee authorises a longer period of storage. Should the long-term preservation of such samples be desired, they shall be stored in a biobank.</p> <p>The Act does not apply to the storage of gametes and embryos under the provisions of the Act on Artificial Procreation, to organs under the provisions of the Act on Organ Removal, or to bodily remains under the terms of the Natural Heritage Act”.</p> <p><u>Regulations on the Keeping and Utilisation of Biological Samples in Biobanks No 134/2001, Reykjavik, February 6, 2001,</u> http://brunnur.stjr.is/interpro/htr/htr.nsf/pages/lawsandregs0001 (Date accessed: February 24, 2005)</p> <p><i>Art. 1 Scope</i> “These regulations apply to the collection of biological samples, their storage, handling, utilisation and preservation in biobanks.”</p>
<p>Norway</p>	<p><u>Act on Biobanks No 12, February 21, 2003,</u> http://www.europa.eu.int/comm/research/biosociety/pdf/norwegian_act_b_iobanks.pdf (Date accessed: February 24, 2005)</p> <p><i>Para. 3 Scope</i> “This Act applies to the collection, storage, processing an destruction of human biological material and information that forms part of a biobank [includes diagnostic, treatment and research biobanks, including the organization of these activities] (...) Biological material that is taken for the purpose of medical examination, diagnosis and treatment and that is destroyed shortly afterwards does not come within the scope of this Act. The Act nevertheless applies if such material is used for research purposes.”</p>
<p>Legislation on biobanks established from samples collected as part of care</p>	
<p>Sweden</p>	<p><u>Biobanks [Health Care] Act (2002:297), May 23, 2002,</u> http://www.sweden.gov.se/content/1/c6/02/31/26/f69e36fd.pdf (Date accessed: February 24, 2005)</p> <p><i>Section 3</i> “The Act applies to:</p> <ol style="list-style-type: none"> 1. Biobanks that are established in Sweden as part of a care’s provider’s medical activities, irrespective of where the material in the biobank is stored, and 2. Tissue samples from a biobank as indicated in 1 that are released for storage and use on the premises of another care provider, an institution for research or diagnostics, a public research institution, a pharmaceutical company or other legal entity or other legal entity, and which after the release are traceable to the person or persons from whom they originate <p>Relevant parts of the Act shall apply for tissue samples taken and collected for transplant purposes in accordance with the Transplants Act (1995:831). The Act does not apply to specimens that are routinely collected in the course of medical care for analysis, and which are solely intended to form the basis of a diagnosis and the ongoing care and treatment of the donor, and which are not stored for a long period.”</p>

Legislation regulating population biobanks	
<p>Estonia ▶ The Estonian Gene Bank (Estonian Genome Project)</p>	<p><u>Human Gene Research Act, 13 décembre 2000.</u> http://www.legaltext.ee/text/en/X50010.htm (Date accessed: February 24, 2005) <i>Para 1 Purpose and scope of application of Act</i> (1) The objective of this Act are to regulate the establishment and maintenance of a Gene Bank, to organise the genetic research necessary therefor [sic], to ensure the voluntary nature of gene donation and the confidentiality of the identity of gene donors, and to protect persons from misuse of genetic data and from discrimination based on interpretation of the structure of their DNA and the genetic risks arising therefrom.(...)</p>
<p>Latvia▶ The Unified Genome Database of the Latvian Population (Latvian Genome Project)</p>	<p><u>Human Genome Research Law, July 3, 2002.</u> http://bmc.biomed.lu.lv/gene/print/Human Genome Research Law, Latvia.doc (Unofficial translation by the Biomedical Research and Study Centre) (Date accessed: February 24, 2005) <i>Section 2. Purpose and Scope of the Law</i> (1) The purpose of the Law is to regulate the establishment and operation of a single genome database of the State population (hereinafter – genome database), the genetic research related thereto, to provide the voluntary nature and confidentiality of gene donation regarding the identity of gene donors, as well as to protect persons from misuse of genetic data and discrimination related to genetic data (...)"</p>

Table 3 : National ethical debate on biobanking activities : amendments to existing legal standards (examples)

Biobanking activities and ethics : debate and norms	
<p>Canada / Québec</p>	<p>1) <u>Recommendations for the implementation of a framework for biobanking activities (Québec)</u></p> <p>Commission de l'Éthique de la Science et de la Technologie, <i>The Ethical Issues of Genetic Databases : Towards Democratic and Responsible Regulation : Position Statement- Summary and Recommendations</i>, Sainte-Foy, December 16, 2002, http://www.ethique.gouv.qc.ca/eng/ftp/Avis10-02-03.pdf (Date accessed: February 24, 2005)</p> <p>Recommendations, need for</p> <ul style="list-style-type: none"> - Provide adequate financial support to Research Ethics Boards (REBs), training opportunities and certification to their members, as well as improve communication between REBs. Reflection on the role of REBs in the private sector to be continued. - Ensure for all population biobanks the participation of the Quebec population in the decision-making process - Promote biobanks' social legitimacy and transparency - Strengthen the protection of participants through carefully drafted informed consent procedures - Establish a registry under the responsibility of the public curator of research participants that are incompetent to provide an informed consent. - Remedy the shortcomings of current consent forms: consent (living and deceased individuals) and secondary uses

- Warrant the involvement of genetic counsellor in all stages of research projects
- Enhance security and protection mechanisms of data transferred or exchanged to researchers outside Quebec
- Educate the population regarding the scientific and ethical aspects of genetics and genetic research
- Ensure public representation in organizations that financially support genetic research

It is noteworthy that the Quebec's *Conseil de la Santé et du Bien Être* has also released recommendations and suggestions to the government, conclusions to which the *Commission d'Accès à l'Information* (CAI) has subscribed. These two institutions notably recommend for : (a) the establishment of an approbation process for population biobanks that would involve the public (b) the creation of an independent institution accountable to the CAI (for instance) and responsible for the surveillance, accreditation and counselling of REBs as well as private and public organizations that collect, store and process human biological material and/or data, (c) provide financial support and adequate training opportunities to REBs and the CAI to ensure expertise and efficiency.

Conseil de la Santé et du Bien-Être, *L'Information génétique et l'accès à l'information des chercheurs : Il est urgent de protéger la population*, (mémoire adopté par le Conseil de la Santé et du Bien-Être le 28 août 2003), Québec, 20 septembre 2003, http://www.ftsr.ulaval.ca/ethiques/memoire_cfr.pdf (Date accessed: February 24, 2005)

Commission de l'Accès à l'Information, *Une réforme de l'accès à l'information : le choix de la transparence*, novembre 2002,

http://www.cai.gouv.qc.ca/06_documentation/01_pdf/quin.pdf

(Date accessed: February 24, 2005)

Conseil de la Santé et du Bien-Être, *La santé et le bien-être à l'ère de l'information génétique : enjeux individuels et sociaux à gérer*, Québec, 2 février 2000,

http://www.csbe.gouv.qc.ca/fr/publications/rapports/20000202_rapp_cfr.pdf (Date accessed: February 24, 2005)

2) **The elaboration of guiding principles by the Quebec Network of Applied Genetic Medicine (RMGA)**

Network of Applied Genetic Medicine (RMGA), *Statement of Principles on the Ethical Conduct of Human Genetic Research Involving Population*, Montréal, January 1, 2003,

<http://www.rmga.qc.ca/doc/ENONCE2002.ENG.pdf> (Date accessed:

February 24, 2005)

In the absence of a specific legal or ethical framework, the RMGA (an not-for-profit organization funded by the *Fonds de la Recherche en Santé du Québec*) published its *Statement of Principles on the Ethical Conduct of Human Genetic Research Involving Populations*. This document, induced by the recent advances in genetics, genomics and bio-informatics, provides researchers guidance on the ethical and legal issues to be addressed when elaborating population biobanks ethical and governance framework.

The fundamental principles that should govern population genetic research are individuality, diversity, complexity, reciprocity, solidarity, security, accountability, equity, citizenry and universality. These principles should underlie the specific norms and standards pertaining to consultation, recruitment, consent, confidentiality, governance, research results communication, commercialization, and contribution to the well-being of society.

	<p>3) <u>Federal ethical norms: updating existing ethical principles</u></p> <ul style="list-style-type: none"> - The Tri-Council (Medical Research Council of Canada, Social Sciences and Humanities Research Council of Canada and Natural Sciences and Engineering Research Council of Canada) are currently updating their statement, notably its section 8 on human genetic research that is not adapted to the most recent scientific advances. The statement considers population biobanks to be one category of research to which additional rules apply rather than distinct research enterprises. However, it fails to take into consideration their specific features, ethical and governance challenges. The Tri-Council Policy Statement is applicable to all research funded by one of the three institutions. <p>It is to be noted that these ethical principle must be applied by researchers financed by one of the three councils and can be voluntarily followed by other researchers.</p> <p>Medical Research Council of Canada, Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council of Canada (IRSC, CRSNG et CRSH), <i>Tri-Council Policy Statement — Ethical Conduct for Research Involving Humans 1998 (with 2000, 2002 updates)</i>, Ottawa, August 1998, http://www.pre.ethics.gc.ca/english/pdf/TCPS%20June2003_E.pdf (Date accessed: February 24, 2005)</p> <ul style="list-style-type: none"> - The Canadian Institutes for Health Research have published a consultation draft of Best Practices in April 2004: Canadian Institutes for Health Research, <i>Guidelines for Protecting Privacy and Confidentiality in the Design, Conduct and Evaluation of Health Research, Consultation Draft</i>, Ottawa, April 2004, http://www.cihr-irsc.gc.ca/e/pdf_22427.htm (Date Accessed: February 24, 2005) <p>4) <u>The Federal Government : assuming a role in the delineation of principles</u></p> <p>The Canadian Biotechnology Advisory Committee has published an advisory memorandum in which it elaborates on the role the Federal Government has to play in the promotion of the Committee’s recommendations pertaining to population biobanks within the limits of its legislative competence. These recommendations address issues such as public education and engagement, privacy and confidentiality protection of research participants, recruitment and informed consent procedures (a balance between individual autonomy and freedom of research), benefit-sharing, and the elaboration of policies and best practices that promote such sharing, in collaboration with other levels of governments and interested parties.</p> <p>Canadian Biotechnology Advisory Committee, <i>Genetic Research and Privacy - Advisory Memorandum</i>, Ottawa, February 2004, http://cbac-cccb.ca/epic/internet/incbac-cccb.nsf/vwapj/genetic_research_privacy.pdf/\$FILE/genetic_research_privacy.pdf (Date accessed: February 24, 2005)</p>
<p>Denmark</p>	<p>1) <u>The sufficiency of the existing legal framework</u></p> <p>Working group composed of the Interior, Health, Science and Justice ministries, report 2002, (Betaenkning no 1414, May 2002) (Information obtained from the European Commission website European Commission- Research Directorate General, Directorate E Biotechnology, Agriculture and Food, <i>Survey on opinions from National Ethics Committees or similar bodies, public debate and national legislation in relation to</i></p>

	<p><i>human biobanks</i>, Line Matthiessen (ed.), update October, http://www.europa.eu.int/comm/research/biosociety/bioethics/documents_en.htm (Date accessed: February 24, 2005)</p> <p>« The task group has assessed that the personal data act in interaction with the relevant legislation within health and research (The <i>Act on the Legal Status of Patients</i> and the <i>Act on Science-Ethical Committee System Treatment of Bio-Medical Research Projects</i>, <i>Act on the Central Management of the Public Health Service</i>, etc., and other acts) does sufficiently regulate the majority of aspects of biobanks. (...)»</p> <p>2) <u>The need to amend certain provisions to take into consideration the specific features of « biobanks »</u></p> <p>“However, the task group does find that there is a need for new legislation in two areas:</p> <p>(1) Self-determination of biological material donated in connection with examination or treatment should be separately regulated by including new rules in the act on the legal status of patients. This will provide the patient with the opportunity to “back out” in relation to a central register; “The Register for Application of Tissue” with regard to non-treatment related application of donated biological material at the same time as the patient is given a right to destruction and a conditioned right to surrender donated biological material</p> <p>(2) It must be ensured that all research projects – also including register research projects – that incorporate biological material are notified to and approved by a science ethical committee. This will require an amendment of the act on science-ethical committee system treatment of bio-medical research projects”</p> <p>3) <u>The amendments of existing legislative provisions</u></p> <p>Le Danish legislator has adopted the recommendations made by the working group and amended accordingly two of its Acts in May 2005, the <i>Act on the Legal Status of Patients</i> and the <i>Act on Science-Ethical Committee System Treatment of Bio-Medical Research Projects</i>.</p>
France	<p>1) <u>The necessary harmonization of the legal status of biological material and its processing without unduly distinguishing between genetic and medical information.</u></p> <p>National Consultative Ethics Committee for Health and Life Science, Ethical Issues Raised by Collections of Biological Material and Associated Information Data : « Biobanks », « Biolibraries », Opinion No 77, Paris, March 20, 2003, http://www.ccne-ethique.fr/english/pdf/avis077.pdf (Date accessed: February 24, 2005)</p> <p>« Firstly, there is a need to imagine a coherent framework to cover both the status of the physical elements collected and the rules governing the storing and the computerisation of the data. Genetic science must be reinstated within that system and not singled out for exceptional treatment (...). » (Report, II. 1. p.11)</p> <p>2) <u>An imperfect legal framework</u></p> <p>« In the French legal system, one point is clear. We are in a domain which legislators are intent on regulating. Neither the collection of elements, tissues, cells, etc. Of human</p>

origin, nor the processing of the resulting information, are unregulated activities. Nor are they subject to the laws of marketable goods and services. On the contrary, several systems co-exist so that the same problems are approached from different angles which ignore each other. (...) The medley of legal approaches which could be applied to these collections in France, forms a miscellaneous assembly, containing references to various principles, and nevertheless leaving loopholes (...). » (Annex 1, p. 25)

3) The recommendations of the National Consultative Ethics Committee (CCNE): the ethical principles that should govern “biobanks” or “biolibraries”

The CCNE recommends the adoption of several ethical principles that would govern the collection, storing, use/processing of biological material and associated data.

- It is of the responsibility of the State to harmonize the existing legal framework and institute a coherent and explicit status for biobanks and biolibraries. Transparency should be furthered
- Collaboration between researchers and between researchers and banks as well as accountability mechanisms should be implemented.
- The role, functions and obligations of the biobank’s curator or conservator should be defined
- Consent requirements at the time of the collection of biological material and data, confidentiality and security of stored information should be strengthened
- The importance of the concept of solidarity should be acknowledged and the consultation of the French population ensured
- The principle of the non-patrimonial nature of the human body should be respected and a reflection on the involvement of the private and public sector in research should be instigated
- Benefit or advantages sharing policies should be considered

4) The recent *Loi relative à la bioéthique* has amended several dispositions of the *Code de la santé Publique* taking into consideration the recommendations made by the CCNE:

Loi no 2004-800 du 6 août 2004 relative à la bioéthique, Paris, 6 août 2004, J.O. no 182 du 7 août 2004, p. 14040 texte no 1, <http://www.admi.net/jo/20040807/SANX0100053L.html> (Date accessed: February 24, 2005)

Amendments made to the legal framework with regard to organs, tissues and cells and the collections composed of such biological material, more particularly Title 3 of the Act. Sont apportées au *Code de la Santé Publique* les modifications suivantes
The following modifications to the *Code de la Santé Publique* are implemented as follow:

- **Article L. 1131-4** specifies that the establishment of biological material collections when constituted for research purposes are regulated by articles L. 1243-3 and L.1243-4
- **Article L. 1243-3 al.2** defines collections of biological materials as collections constituted for scientific purposes and containing biological samples (and associated data) collected from a group of identified individuals selected in light of the specific clinical or biological characteristics possessed by one or several members of this group.
- An organisation wishing to create (process and store) such a biobank will have to be authorized to do so by either the Research Minister or the said Minister and the « agence territoriale régionale d’hospitalisation » (Territorial and regional hospitalisation agency) if the organisation is an health establishment. This authorization can only be granted once the “Comité consultatif sur le traitement

	<p>de l'information en matière de recherche dans le domaine de la santé ») (Consultative Committee on the Processing of Health Information for Research purposes) has expressed its opinion on the question. This Committee is established by virtue of article 40-2 <i>Loi n 78-17 du 6 janvier 1978 relative à l'informatique, aux fichiers et aux libertés (article L. 1243-4).</i></p> <ul style="list-style-type: none"> - L' article L. 1243-3 states that, once this authorization obtained, the organization must declare its intention to constitute (and use) a collection of human biological material for research purposes. This declaration to be sent to the Research Minister as well as the territorial hospitalisation agency for health establishments must be preceded by an ethical and scientific evaluation of the research project undertaken by a competent REB. In the course of its ethical evaluation, the Committee will notably examine the contemplated consent procedure and the information to be transmitted to the participants. (<i>al. 1 et 3</i>) - The Minister and agency, when applicable, upon receipt of the declaration can oppose it during a fixed period set by regulation. This opposition might be motivated by concerns regarding the safety of the professionals involved in the project, the protection of the environment, or the consent procedure and other ethical or scientific aspects of the project (article L. 1243-3 al. 4). These authorities can , likewise, put an end, suspend or forbid biobanking activities that do not respect ethical and scientific exigency and standards (article L. 1243-3 al. 5) This decision can only proceed once the "Comité consultatif sur le traitement de l'information en matière de recherche dans le domaine de la santé" has expressed its opinion on the matter. (article L. 1243-3 al. 6)
<p>Germany</p>	<p>1) <u>The need to elaborate a new regulatory scheme</u></p> <p>National Consultative Ethics Committee for Health and Life Science, Nationaler Ethikrat, Ethical Issues Raised by Collections of Biological Material and Associated Information Data : « Biobanks », « Biolibraries », Joint Document, http://www.ccne-ethique.fr/francais/pdf/avis077.pdf (Date accessed: February 24, 2005)</p> <p>« The analysis shows that, despite some differences, there is a need in both France and Germany, to elaborate a new regulatory framework covering collection, conservation, processing, and utilisation of the elements and data assembled in biobanks, and the development of research including protection of individuals. Since these activities are by no means restricted to national boundaries, efforts to achieve these ends must also be international » (at p. 40)</p> <p>2) <u>The Opinion of the German National Ethics Council</u></p> <p>Nationaler Ethikrat, Biobanks for Research, Opinion, March 17, 2004, http://www.ethikrat.org/english/publications/Opinion_Biobanks-for-research.pdf (Date accessed: February 24, 2005)</p> <p>« Few specific instruments and provisions exist concerning the handling of human bodily substances and personal data. It is clear from the international debate in the last ten years that biobanks present a variety of ethical, legal and social challenges. To tackle these, there is an evident need for a framework of new and consistent rules, particularly as cooperative projects involving researchers from different countries are increasingly likely. » (at p. 24)</p> <p>►► In its Opinion, the German National Ethics Council proposes 30 regulatory proposals that should guide the establishment and use of biobanks constituting of</p>

	<p>biological material and associated data collected as part of care and to be secondarily used for research . The Council first defines biobanking activities and their current applications. It outlines their scientific value providing specific examples. Finally, the Council enunciates the guiding principles that Germany should edict for the scientific and ethical evaluation of biobanks, detailing the specific rules that should be implemented regarding the collection, storing, processing and use of information. The Opinion also proposes transitory rules for « old » collections.</p>
<p>U.K.</p>	<p>1) <u>The scientific value of Biobanks</u></p> <p>Important public debate on the collection and storage of human tissues.</p> <p>Human Genetics Commission , <i>Inside Information - Balancing Interests in the Use of Personal Genetic Data</i>, London, May 1, 2002, http://www.hgc.gov.uk/insideinformation/index.htm (Date accessed: February 24, 2005)</p> <ul style="list-style-type: none"> - The Commission makes a number of recommendations to the government advocating the striking of an adequate balance between participants protection (privacy) and the advancement of science - Value of biobanks emphasized - The Commission recommends that an in-depth study of the issues specific to population biobanks be undertaken (notably issues such as consent, privacy and confidentiality protection, access, ownership). - The Commission advocates that biobanks for research be only used for research purposes, be supervised by an independent ethics board and an independent monitoring institution in order to ensure that such databases or collections are used in accordance with public wishes. The commission also promotes on-going public debate on the issues surrounding biobanks. <p>-</p> <p>2) <u>UK Biobank: the collaborative drafting of an ethics and governance framework</u></p> <p>UK Biobank Ethics and Governance Framework, Version 1.0, The Wellcome Trust, the Medical Research Council, the Department of Health, 24 September 2003, http://www.ukbiobank.ac.uk/documents/egf-comment-version.doc (Date accessed: February 24, 2005) Commented version.</p> <p>This framework discusses the specific issues and challenges population biobanks face while proposing solutions (open for comment). Among these issues the questions of governance (scientific monitoring, independent oversight by the Ethics and governance Council), consent requirements, data protection, accountability mechanisms or commercial aspects are analysed.</p> <p>3) <u>UK Biobank Draft Policy on Intellectual Property and Access</u></p> <p>UK Biobank Policy on Intellectual Property (“IP”) and Access, Draft, London, January 11, 2005, http://www.ukbiobank.ac.uk/docs/UKBiobankIPandAccesspolicyfirstpublicdraft11.1.5final2.pdf (Date accessed: February 24, 2005).</p> <p>In its draft policy, the UK Biobank specifies intellectual property and property rights in the resource as well as delineates the access rights of users and to samples or participants.</p> <p>According to this document, UK Biobank will be the steward and when permitted by law the</p>

	<p>owner of the samples. Furthermore, with regard to access by users, the standards will differ depending on the nature of the material to be used: protected material, data in the public domain or non-proprietary material, or proprietary information. Access to protected material (i.e. data in an anonymized form about a participant including samples and data derived from these samples) will be allowed by application. It will be limited for research uses compatible with the bank's purpose, scientifically and ethically approved by competent authorities, and in compliance of the Ethics and Governance and the participants' consent.</p> <p>Access to data in the public domain comprised of findings and patent applications that have been published, and to data that though not in the public domain does not poses risks to participants should be openly accessible. However, discussions on this issue is on-going.</p> <p>Finally, access to proprietary data, i.e patented, will be controlled by the UK Biobank, watchdog of proprietors' rights. The specific rules for such access will be determined at a later time.</p> <p>Turning to requests for access to samples or to re-contact participants for secondary purposes, these will be prioritised by the UK Biobank. The basis for such prioritisation will be determined by the UK Biobank's Board of Directors, taking into consideration the Science Committee's advice and after consultation of the Ethics and Governance Council on the issue.</p> <p>It is noteworthy that UK Biobank will only transfer physical samples to a researcher on an exceptional basis. In most cases a laboratory contracted out by UK Biobank will be responsible for the analysis, and access to the results will be granted to the researcher for use for a limited period of time.</p> <p>Finally, the draft policy also contains rules concerning fees for access, royalties, the dissemination of results and return of results as well as details regarding Access Agreements and Materials Transfer Agreements.</p>
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Table 4 : Of some similarities and differences

	Convergence – Consensus	Divergence- controversial issues
Consent	- Adjusting traditional consent mechanisms to the specificity of biobanks	- The width of the original consent to research and the secondary use of samples and data
Privacy/Confidentiality	- Correlation between the degree of data identifiability (anonymous, anonymized, double-coded, coded, identifiable) and the need to re-contact participants, the possibility to withdraw from research, the question of results dissemination to participants and access to data by third parties	- Determining the adequate degree of identifiability - Access to data

	-	
Dissemination of results/information to participants	- Requirement for exhaustive information prior to any large-scale population biobank	- The right to know and not to know in the context of population biobanks : clinical interest, genetic counselling and interpretation of results
Risks – discrimination	- The need to take into account potential risks of discrimination not only at the time of recruitment but also when interpreting results	- Information provided to participants on the risk of discrimination and impacts on participation rate
Governance and monitoring	<ul style="list-style-type: none"> - The need for adequate scientific and ethical oversight at the time of the biobank creation - On-going monitoring during the length of the project - Independence of the oversight institution, and efficiency of its controls powers including sanctions 	<ul style="list-style-type: none"> - Ethical oversight for international projects involving several countries: the nature of the control and bureaucratization of the Governance : check and balances
Public involvement	<ul style="list-style-type: none"> - Promoting and reinforcing the dialogue between professionals and the public: the public as an active participant <ul style="list-style-type: none"> • In the drafting of the ethical and legal framework governing population biobanks • In the establishment of each population biobanks project 	- Information, engagement, consent of the community or the population
Commercial aspects	- The need to elaborate benefit-sharing policies and to take into account the potential commercial uses of the data held in population projects resources	<ul style="list-style-type: none"> - Financing such enterprises (public projects vs private or semi-private projects - The status of genetic material: ownership, participants , financial gains – beneficiaries - Involvement of private companies including the industry

¹ United Nations Educational, Scientific and Cultural Organization (UNESCO), International Bioethics Committee, International Declaration on Human Genetic Data, Paris, 16 October 2003, http://portal.unesco.org/en/ev.php-URL_ID=17720&URL_DO=DO_TOPIC&URL_SECTION=201.html (consulted 28 April 2005). This declaration concerns "the collection, processing, usage and storage of human genetic data, human proteomic data and of the biological samples from which they are derived" article 1.

² Estonian Genome Project, <http://www.geenivaramu.ee/index.php?show=main&lang=eng> (consulted 28 April 2005).

³ UK Biobank, <http://www.ukbiobank.ac.uk> (consulted 28 April 2005).

⁴ CARTaGENE, <http://www.cartagene.qc.ca> (consulted 28 April 2005).

⁵ GenomEUtwin, <http://www.genomeutwin.org/> (consulted 28 April 2005).

⁶ Other populational databanks have equally been established around the world; an overview is provided by Dr. Anne Cambon-Thomsen in her article, Cambon-Thomsen A., "The social and ethical issues of post-genomic human biobanks," (2004) *5 Nature Review Genetics* 866-873; see also Institute national de la santé et la recherche médicale (INSERM), *Les collections de ressources biologiques humaines* (Coll. Repères) (Paris : INSERM, 2005) [only available in French].

⁷ Public Population Project in Genomics (P3G), <http://p3gconsortium.org> (consulted 28 April 2005).

⁸ International Declaration on Human Genetic Data, *supra* note 1 art 2 (v).

⁹ The Bioethics Advisory Committee of The Israel Academy of Sciences and Humanities, *Population-based large-scale Collections of DNA Samples and Databases of Genetic Information*, Jerusalem, December, 2002, http://stwww.weizmann.ac.il/bioethics/PDF/Finalized_Dna_Bank_Full.pdf (consulted 28 April 2005) p. 1.

¹⁰ Genetic exceptionalism consists of the conviction that genetic data require a greater degree of protection than other medical or personal data because of their genetic nature. This attitude is largely linked to the assimilation of all genetic data to data predictive of serious, monogenic, and incurable diseases such as Huntington's Disease. McGee, G. "Foreward: genetic exceptionalism" (1998) *11 Harv J Law Technol* 3:565-570.

¹¹ Council for International Organizations of Medical Sciences (CIOMS), *International Ethical Guidelines for Biomedical Research Involving Human Subjects*, Geneva, November 1st 2002, http://www.cioms.ch/frame_guidelines_nov_2002.htm (date accessed: April 28, 2005).

¹² Council of Europe (CE), 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, Oviedo, 4 April 1997, <http://conventions.coe.int/Treaty/en/Treaties/Word/164.doc> (consulted 28 April 2005); Council of Europe, Additional Protocol to the Convention on Human Rights and Biomedicine, concerning Biomedical Research, Strasbourg, 25 January 2005,

<http://conventions.coe.int/Treaty/EN/Treaties/Html/195.htm> (consulted 28 April 2005).

¹³ World Medical Association, *The World Medical Association Declaration on Ethical Considerations Regarding Health Databases*, Washington, 6 October, 2002, <http://www.wma.net/e/policy/d1.htm> (consulted 28 April 2005).

¹⁴ International Declaration on Human Genetic Data, *supra* note 1.

¹⁵ European Society of Human Genetics (ESHG), *Data Storage and DNA Banking for Biomedical Research: Technical, Social and Ethical Issues*, Birmingham, November 2001, (2003) *11 European Journal of Human Genetics* suppl. 2, S8-S10, <http://www.nature.com/ejhg/journal/v11/n2s/pdf/5201115a.pdf> (consulted 28 April 2005).

¹⁶ World Health Organization, *Genetic Databases : Assessing the Benefits and the Impact on Human and Patient Rights*, Geneva, 2003, http://www.law.ed.ac.uk/ahrb/publications/online/whofin_alreport.pdf, (consulted 28 April 2005).

¹⁷ Human Genome Organization, Statement on Human Genomic Databases, London, December 2002, http://www.hugo-international.org/Statement_on_Human_Genomic_Data_bases.htm (consulted 28 April 2005).

¹⁸ United Nations Educational, Scientific and Cultural Organization (UNESCO), International Bioethics Committee, Universal Declaration on the Human Genome and Human Rights, Paris, 11 November, 1997, http://portal.unesco.org/en/ev.php-URL_ID=13177&URL_DO=DO_TOPIC&URL_SECTION=201.html (consulted 28 April 2005).

¹⁹ International Declaration on Human Genetic Data, *supra* note 1, article 1.

²⁰ The term "discrimination" evokes more the individual cases and the stigmatization of groups.

²¹ Estonian Government, *Human Genes Research Act*, December 13, 2000, <http://www.legaltext.ee/text/en/X50010.htm> (consulted 28 April 2005).

²² *Human Genome Research Law*, July 3, 2002, <http://bmc.biomed.lu.lv/gene/print/Human%20Genome%20Research%20Law.%20Latvia.doc> (unofficial translation of the "Biomedical Research and Study Centre") (consulted 28 April 2005).

²³ Loi 96-452 du 28 mai 1996 portant diverses mesures d'ordre sanitaire, social et statutaire, J.O. no 123 du 29 mai 1996 p. 7912,

<http://www.legifrance.gouv.fr/WAspad/UnTexteDeJorf?numjo=TASX9500161L> (consulted 28 April 2005), article 1 [available only in French].

²⁴ Loi no 2004-800 du 6 août 2004 relative à la bioéthique, Paris, 6 août 2004, J.O. no 182 du 7 août 2004, p. 14040 texte no 1, <http://www.admi.net/jo/20040807/SANX0100053L.html> (consulted 28 April 2005), especially the new article L. 1131-4 of the *Code de la santé Publique* (CSP) introduced by title III of the law.

²⁵ Comité consultatif de bioéthique, *supra* note 9, paragraph 16.

²⁶ For example, the German National Ethics Council, le Nationaler Ethikrat, published an opinion on 17 March 2004, "Biobanks for research." In this opinion, the Council proposed guidelines for biobanks destined for research and for those created by the collection of samples and of data within the medical domain but

which are afterwards used for research. See Nationaler Ethikrat, "Biobanks for research, Opinion," 17 March 2004,

http://www.ethikrat.org/english/publications/Opinion_Biobanks-for-research.pdf (consulted 28 April 2005).

²⁷ For a review of the terms used and a reflection on the taxonomic problems, see Knoppers B.M., Saginur M., "Toppling the Tower of Babel? Towards a Common Language for Biobanking" [Nature, forthcoming].

²⁸ Council for International Organizations of Medical Sciences, *International Ethical Guidelines for Biomedical Research Involving Human Subjects*, Geneva, November 1st 2002, http://www.cioms.ch/frame_guidelines_nov_2002.htm (date accessed: April 28, 2005), Introduction.

²⁹ UK Biobank Ethics and Governance Framework (Draft), <http://www.ukbiobank.ac.uk/ethics/efg.php> (consulted 28 April 2005).

³⁰ *Human Genome Research Act*, *supra* note 21, paragraphes 12(2), 16 and 22(7); see also Estonian Genome Project, "Gene Donor Consent Form", <http://www.geenivaramu.ee/index.php?lang=enq&sub=74> (consulted 28 April 2005) page 11.

³¹ European Commission, *25 Recommendations on the ethical, legal and social implications of genetic testing*, Brussels, 2004, http://europa.eu.int/comm/research/conferences/2004/genetic/pdf/recommendations_en.pdf (consulted 28 April 2005).

³² International Declaration on Human Genetic Data, *supra* note 1, article 3 and 7.

³³ HapMap Project, <http://www.hapmap.org/index.html.en> (consulted 28 April 2005).

³⁴ United Nations Economic and Social Council, *Information and comments received from Governments and relevant international organizations and functional commissions pursuant to Economic and Social Council resolution 2001/39 – Report of the Secretary General*, Geneva, June 11, 2003, paragraph 30. <http://daccessdds.un.org/doc/UNDOC/GEN/N03/395/67/PDF/N0339567.pdf?OpenElement>

³⁵ For an analysis of the emergence of these guiding principles, see Knoppers B.M., Chadwick R., "Human genetic Research: Emerging Trends in Ethics" (2005) 6 *Nature Review Genetics* 75-79.

³⁶ Some impact measurement indices have begun to be envisaged: Cambon-Thomsen A. Assessing the impact of biobanks. *Nature Genetics* (Correspondence), 2003, 34, (1): 25-26.