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The Icelandic Healthcare Database and Informed Consent

Modern information technology is rapidly changing how new knowledge is discovered in most fields of science, including medicine. This technology offers interesting possibilities in the development of methods to understand diseases better, but it also presents new ethical challenges. The new technology offers the possibility of mining large data sets for knowledge, without a priori hypotheses, by systematically juxtaposing various data in the search for the best fit. This kind of pure combinatorial analysis may be particularly powerful in the case of the common diseases, most of which are complex and have remained beyond the reach of the classic hypothesis-driven approach to biomedical research. However, to take full advantage of the new techniques, it is important to have access to large amounts of primary data in one place. This calls for large data bases on health care that can be mined for knowledge, either alone or in combination with other data on disease and health, such as variations in the human genome.

Three years ago, deCODE genetics, a genomics company located in Iceland, proposed the construction of a centralized data base, called the Icelandic Healthcare Database (IHD), with information from the entire health care system of Iceland. One of the principal advantages of this data base is the ability to cross-reference phenotypic information with a large amount of genotypic and genealogic data.[1,2] We expect that the IHD and other data bases of its kind will provide ideal opportunities to study interactions among genes and between genes and environment in the pathogenesis of common diseases. The ultimate goal is to discover new methods to diagnose, prevent, and cure common diseases. The IHD will also allow studies of the interface between health care and the rest of society, which may, for example, lead to a better understanding of how cost and benefit are linked. The data-base proposal, however, raised many questions about scientific ethics, protection of privacy, and the corruption of science by commercial interests.

Community Consent

Before conducting large-scale biomedical research on a population, it is considered important to obtain the consent of that population.[3,4,5] After a vigorous debate in Icelandic society, the Icelandic parliament passed a law permitting the construction of the IHD, a data base made up of information from the medical records of all Icelandic citizens.[6] The debate included 700 newspaper articles, more than 100 radio and television programs, and several town meetings all across Iceland. On the eve of the parliamentary vote, a poll showed that 75 percent of Icelanders supported the passage of the bill, whereas 25 percent were against it. The data-base law was passed by the same margin, and since then support for it has been growing. A poll taken by the Gallup organization in the beginning of April 2000 showed that 90 percent of those who took a stand on the issue supported the data-base law, and 10 percent were against it. The vigorous debate in Icelandic society over the IHD was mostly constructive and had a substantial effect on the final legislation and the data-base license that was eventually granted. Debate is one of the most important mechanisms by which complex ideas are processed by democratic societies.

Individual Consent

According to the law, the data in the IHD will be collected under the assumption of "presumed consent." Presumed consent is a nebulous concept, but in the context of this project, we regard it as the consent of society to the use of health care information according to the norms of society. These norms may vary from one society to another and may change with time. It is important that the data in the IHD will be only data from medical records that are produced in the process of delivering health care. Some argue that presumed consent is inconsistent with the right of individuals to decide for themselves and actually amounts to no consent at all.[7] However, presumed consent is the standard used for research on health care data that is produced in the process of delivering medical services. It is not certain that we would have health care as we know it today if explicit consent had been a prerequisite for the use of medical data.

To enhance the authenticity of the presumed consent in the case of the IHD, the law stipulates that individual persons can opt out of the data base.[6] They can request that their data not be entered into the IHD by signing a form that is available at all health care institutions in Iceland, including all clinics and drugstores. In the list of those who have opted out of the IHD, no names are shown and social-security numbers are encrypted to diminish the likelihood that opting out of the IHD will lead to discrimination. In April 2000 (17 months after the data-base law was passed), a Gallup poll showed that 8.6 percent of Icelanders were against the IHD; by that time, 80 percent of that number, or 7 percent of the nation, had opted out of the data base.

The law allows the cross-matching of medical information in the IHD and genotypic data, but only data from individual persons who have consented to the generation and use of genotypic data.[6] Such cross-referencing must be performed with methods approved by the Data Protection Commission of Iceland (Figure 1). An unresolved issue is whether deCODE will be allowed to ask for broad consent from participants to correlate any information in the data base with data on variance in their genomes (genotypic data). "Broad consent" as applied here indicates consent in which the potential subjects

cannot be informed in the same detail required by informed consent. Broad consent is a far cry from "blanket consent," which would give researchers an unrestricted right to use the data or the biologic sample. With broad consent to use the genotypic information to study the genetics of health and disease it would be possible to use combinatorial analysis systematically to seek the best fit between all regions in the genome and all phenotypic variants recorded in the data base. The interests at stake are not trivial, because, without broad consent, the data base would be only an extraordinarily effective tool for classic gene mapping, rather than a revolutionary method for studying the interplay between genetics and environment in human disease and health.

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Figure 1. A Diagram of the Icelandic Healthcare Database (IHD), Showing Some of the Possibilities for Exploring Correlations in the Data.

The majority of the international bioethics community has supported the use of broad consent.[8,9,10,11] Elias and Annas, for example, have promoted the use of broad consent in clinical genetic testing.[12] Some members of this community, however, remain skeptical of the wisdom of broad consent because of the difficulties in making certain that consent is informed.[13,14,15] Informed consent was devised to protect the autonomy of individual subjects against overzealous scientists. Nobody should participate in biomedical research unless he or she makes an informed decision to do so, and nobody should be coerced or tricked into making such a decision. The goal is to protect the autonomy of the individual; the tool is informed consent.

The demand that consent to research participation be informed is difficult to enforce and not always practical to achieve. It is possible to demand that the consent process contain certain keys to aid understanding of the proposed research, but it is rarely possible to determine whether the prospective participant understands the proposal, or wants to understand it. That is why there is a universal policy precluding children or mentally impaired persons from consenting to research. It is important to keep in mind that part of our autonomy, our right to self-determination, is the right to make uninformed and even foolish decisions. Nevertheless, most would agree that society should not sit idly by when the decision to commit suicide is contemplated, nor when a decision is made to participate in life-threatening research.[16]

Some bioethicists now say that the main reason that people cannot grant broad consent is that their decision cannot be an informed one. Hence, the requirement for informed consent has become a reason to restrict the very autonomy it was originally meant to protect. The right to self-determination is a fundamental human right, and we believe it is the right of individual persons to grant broad consent or

even blanket consent to the use of their biologic material or of information about them.

Our view is that fully alert people of reasonable intelligence should be allowed to give broad consent for the scientific use of biologic samples and medical and genetic information about them. We have deliberately left out of this discussion any mention of experiments that entail physical risk. Our argument deals only with risk entailed by the use of medical-records data.

We consider that consent for genetic research has three components. The first is consent to the acquisition of the biologic material that is used as the source of DNA. The second is consent to the genotyping of the DNA. The third is consent to the use of the genotypic information that results. The first two components are the same for the IHD as for projects related to the genetics of individual diseases. In the case of the IHD, the third component differs from the study of individual diseases, because we ask for broad consent. In both cases, however, the consent requested is for the use of genotypic data to generate knowledge about the nature of the group, rather than knowledge about the individual person. The consent process for correlating genotypic data with the medical-records information contained in the IHD has yet to be defined by the committees that will oversee the IHD (described below). We assume, however, that the consent process will not differ substantially from that currently used for correlating data on genotypes with specific features of health and disease.

Protection of Privacy

All data entered into the IHD will be copied from medical records that are filed under individual names and social-security numbers at the various health care institutions. These records are easily accessible because they are used by those who provide medical services to patients, sometimes under urgent circumstances. In the IHD these records will be stored with identification numbers encrypted by the Data Protection Commission of Iceland, which receives its charge under the Privacy Law of Iceland (Figure 1). Information will be retrievable from the data base only for groups of 10 or more people, not individual persons. Strict administrative procedures will protect the data. Actually, the data contained in the IHD would be much easier for unauthorized persons to obtain from the original institutions where they are stored in uncoded form.

Why should Icelanders trust a private company to protect their personal health care information? It is probably better for a private company to hold this information than for the state to do so, since governments can violate the privacy of individuals to advance the interests of society as a whole. Moreover, if a health care data base managed by a private company violates privacy, the company can be closed down. According to the Icelandic law, deCODE will lose the license to develop and use the data base if the conditions of the license, including the stipulations regarding the protection of privacy, are not met. Violations of the data-base law are also punishable by monetary fines and imprisonment.

The restrictions imposed on the IHD in order to protect individual privacy make it difficult to connect discoveries made through the use of the data base directly with individual persons. The Icelandic legislature decided that the protection of privacy was more important than the possibility of immediate benefits to individuals. However, if the appropriate authorities granted permission, it would be relatively

easy to identify and contact all persons in Iceland who had a particular risk factor for disease. Since all discoveries made with use of the IHD will be based on DNA from people who have granted explicit consent, it will be possible to ask the donors whether they want their genotypes to be stored under their names and whether they wish to be notified about any associations between alleles they carry and specific diseases or predispositions to the development of disease. Notifying participants in research of the results as they apply to them as individuals before the results have been confirmed and put in the appropriate clinical context is always problematic. For example, the discovery of a mutation in a gene that is found in 100 percent of patients with a certain disease does not tell us in how large a proportion of patients with the mutation the disease develops, nor how reliable the test for the mutation is. A basic discovery should always be validated clinically before it is made known to individuals.

Scientific Freedom and Commercial Influences

Since the data that are entered into the IHD are simply copies of data that will remain within health care institutions, it is not easy to see how the data base could restrict the freedom of science. There is, however, some concern that the commercial mission of private enterprise will influence the way research on the data base is performed and how the results are distributed and used.

It is important to ensure that research based on the IHD meets international ethical standards. Therefore, the IHD will be subject to the oversight of four government regulatory bodies: the Data Protection Commission of Iceland (appointed by the ministry of justice), an interdisciplinary bioethics committee, the National Bioethics Committee, and an operational oversight committee (the last three appointed by the minister of health).

The enormous value placed by the new economy on high-technology companies has shifted the creation of value away from production and distribution and toward discovery, innovation, and development. As a consequence, many more resources are being funneled into innovation and discovery than ever before, and private enterprise has increased, not decreased, the pace of scientific discovery. Furthermore, the focus of the discovery of new knowledge (at least in biology and information science) has drifted away from academia and toward industry. Time alone will tell whether this is good or bad.

The question of the distribution of knowledge and the need for a free flow of information is important. We should all do our best to make certain that scientific discoveries in medicine are quickly and widely distributed. The primary goal is to use medical discoveries to develop better methods to diagnose, prevent, and cure diseases. Today, this often requires that an intellectual property be secured, which may delay publication of a discovery. The choice between early publication and the development of a product for the benefit of patients with a particular disease is, in our minds, an easy one. More often, however, these two goals go hand in hand, and no choice has to be made.

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References

1. Gulcher J, Stefansson K. Population genomics: laying the groundwork for genetic disease modeling and targeting. Clin Chem Lab Med 1998;36:523-527.[Medline]
2. Gulcher J, Stefansson K. The Icelandic Healthcare Database: a tool to create knowledge, a social debate, a bioethical and privacy challenge. Medscape, 1999. (See http://molecularmedicine.medscape.com/10835.rhtml.)
3. Statement on the principled conduct of genetics research: HUGO Ethical, Legal, and Social Issues Committee report to HUGO Council, 1996. (See http://www.gene.ucl.ac.uk/hugo/conduct.htm.)
4. Foster MW, Bernsten D, Carter TH. A model agreement for genetic research in socially identifiable populations. Am J Hum Genet 1998;63:696-702.[CrossRef][Medline]
5. Knoppers BM, Hirtle M, Lormeau S. Ethical issues in international collaborative research on the human genome: the HGP and HGDP. Genomics 1996;34:272-282.[CrossRef][Medline]
6. Bill on a Health Sector Database. Reykjavik, Iceland: Ministry of Health and Social Security, 1998. (See http://brunnur.stjr.is/interpro/htr/htr.nsf/pages/gagnagr-ensk.)
7. Mannvernd: association of Icelanders for ethics in science and medicine. Reykjavik, Iceland: Mannvernd, 1999. (See http://www.mannvernd.is/english/index.html.)
8. HUGO Ethics Committee. Statement on DNA sampling: control and access. London: HUGO, 1998. (See www.gene.ucl.ac.uk/hugo/ sampling.html.)
9. Proposed international guidelines on ethical issues in medical genetics and genetic services. Geneva: World Health Organization, 1997. (See http://www.who.int/ncd/hgn/hgnethic.htm.)
10. Research involving human biological materials: ethical issues and policy guidance. Vol. 1. Report and recommendations of the National Bioethics Advisory Commission. Rockville, Md.: National Bioethics Advisory Commission, 1999:63-4. (See http://www.bioethics.gov/hbm.pdf.)
11. Clayton EW, Steinberg KK, Khoury MJ, et al. Informed consent for genetic research on stored tissue samples. JAMA 1995;274:1786-1792.[Abstract]
12. Elias S, Annas GJ. Generic consent for genetic screening. N Engl J Med 1994;330:1611-1613.[Full Text]
13. The American Society of Human Genetics. ASHG Report: statement on informed consent for genetic research. Am J Hum Genet 1996;59:471-474.[Medline]
14. Annas GJ. Genetic prophecy and genetic privacy -- can we prevent the dream from becoming a nightmare? Am J Public Health 1995;85:1196-1197.[Medline]
15. Annas GJ. Privacy rules for DNA databanks: protecting coded `future diaries.' JAMA 1993;270:2346-2350.[Abstract]
16. Miller HI. Gene therapy on trial. Science 2000;287:591-592.[CrossRef][Medline]

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- Woolf, S. H., Rothemich, S. F., Johnson, R. E., Marsland, D. W. (2000). Selection Bias From Requiring Patients to Give Consent to Examine Data for Health Services Research. *Arch Fam Med* 9: 1111-1118 [Abstract] [Full Text]
- Worrall, B. B., Chen, D. T., Meschia, J. F. (2001). Ethical and Methodological Issues in Pedigree Stroke Research. *Stroke* 32: 1242-1249 [Abstract] [Full Text]
- Winickoff, D., Arnason, E., Gulcher, J. R., Stefansson, K. (2000). The Icelandic Healthcare Database. *N Engl J Med* 343: 1734-1735 [Full Text]

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