

Chapter 1

Introduction

- 1.1** New knowledge about human genetics, and the links between genetic inheritance and susceptibility to diseases, have important ethical implications. Medical scientists can now identify the presence of some abnormal genes by simple tests that are easy to administer. But what uses might be made of this knowledge? Who should share it? What are the implications for people identified as having an abnormal gene or genes? For their families? For society?
- 1.2** So far many of the findings of research into the structure of the human genome are provisional and imprecise. But they have already led to controversy, both within the scientific community and in the public at large, about their implications for human well-being. Widespread concern about the ethical aspects of screening for the presence of abnormal genes led the Nuffield Council on Bioethics to set up a Working Party to examine the issues and draw up this report.
- 1.3** This report starts with an account of the scientific basis of medical genetics and of recent developments in genetic screening. Chapter 2 should be detailed enough to clarify the ethical issues associated with genetic screening programmes. We have tried to make this difficult subject accessible to readers who do not have a background in the biological sciences. The use of technical terms is unavoidable, and we have provided a glossary. We should emphasise that although the basic mechanism by which genes from both parents are reassembled and transmitted to the next generation through sexual reproduction is well understood, much has yet to be discovered about the varied and complex ways in which genes are expressed, for example in hair or eye colour, or as serious physical malformation or disease.
- 1.4** Chapter 3 surveys experience to date with genetic screening initiatives and associated counselling. It should be stressed that many of the genetic screening programmes in the UK described in the report are for the purpose of research and do not form part of a regular clinical service. Some are perhaps better described as testing programmes among people already known to be at risk for a particular genetic disease. This fact has implications both for

the ways in which groups have been selected and invited to participate, and for the resources available for counselling and follow-up.

- 1.5** The rest of the report covers the specific issues referred to in paragraph (3) of our terms of reference (page iv) : consent; confidentiality; the implications for employment and insurance; and the storage and use of genetic information. Chapter 8, on public policy, addresses the possibility of stigma, along with other social implications of screening for genetic disease. In the remainder of this Introduction, after a brief discussion of the known links between genetic inheritance and susceptibility to disease, we raise some of the ethical issues that are explored in the report.
- 1.6** In order to understand the complex ethical questions that can arise in connection with genetic screening, some knowledge of the different ways in which genetic inheritance can cause disease, or make people susceptible to a disease, is essential. A key distinction is between single gene diseases, where the causal link is strong and the outcome often largely predetermined, and polygenic diseases, where there may be interaction with the environment and where the significance of genetic factors is much less clear. A second important distinction, among single gene diseases, is between dominant and recessive inheritance.
- 1.7** The fact that an abnormality in a single gene can cause serious disease has been known for some time. Familiar examples of single gene diseases are cystic fibrosis (CF), Huntington's disease and sickle cell disease. These conditions arise from fundamental defects that are incurable by conventional therapies, though some of them, for example cystic fibrosis and sickle cell disease, may be alleviated by appropriate treatment. Many of them are rare, at least in the UK, and some are more common in specific sectors of the population. Where there is a family history it is often feasible to test selectively, on the basis of a known likelihood that the faulty gene may be present, and to offer individuals and families counselling and advice about the reproductive options open to them.
- 1.8** Polygenic diseases are a different matter. It is becoming clear that an element of genetic susceptibility is among the factors predisposing people to develop many of the common diseases, including coronary heart disease and some cancers. Several different genes appear to influence susceptibility, but how they interact with each other, and the relative importance of genetic inheritance and environmental factors as causes of these diseases, are still largely unknown. Medical researchers are interested in finding out more about the incidence of particular genetic patterns in association with cancers and other diseases.

Selective screening on the basis of familial susceptibilities is one way of doing this. However, population screening for polygenic diseases is probably some way off; it will be of questionable value until the causative significance of the genetic factors and the relative importance of the environmental influences are much better understood.

- 1.9** The phrases 'genetic testing' and 'genetic screening' are sometimes used interchangeably. There is, however, a significant difference, though not a completely hard and fast one, between testing an individual for a condition or defect that other evidence suggests may be present, and screening all members of a population for a defect or condition where there is no prior evidence of its presence in the individual. An example of the first is testing for the Huntington's gene in the limited number of families known to be at high risk of developing the disease because they have an affected member. An example of the second is the screening of all newborn children for phenylketonuria (PKU). Testing of a sub-population, such as Ashkenazi Jews for the Tay-Sachs gene, might properly be regarded as screening. Nevertheless, the distinction between testing and screening is important in several respects, including the ethical problems of obtaining informed consent and the handling of unexpected information. In this report we are **primarily** concerned with the ethical aspects of genetic screening programmes.
- 1.10** We define genetic screening as a search in a population to identify individuals who may have, or be susceptible to, a serious genetic disease, or who, though not at risk themselves, as gene carriers may be at risk of having children with that genetic disease. While it is individuals who are screened, the results will normally have wider implications. Depending on the nature of the genetic defect that is identified and its pattern of inheritance, siblings and other blood relations, as well as existing and future offspring, may be affected. Thus the status of genetic information raises ethical questions that differ significantly from the normal rules and standards applied to the handling of personal medical records. Does the person with a defective gene have a right to withhold this information from other family members? Does he or she have a duty to disclose it? What are the rights and/or responsibilities of the rest of the family? These questions are explored in Chapter 4, on Consent and Counselling, and Chapter 5, on Confidentiality.
- 1.11** Screening programmes have a useful part to play in a health care system that aims to help people maintain good health as well as treating disease and accidents. Already well-established and familiar are the screening of all pregnant women for their rhesus blood group and all newborn infants for phenylketonuria (PKU).

Both programmes identify potentially serious risks which can be prevented by timely treatment. Other screening programmes offered to individuals known to be at risk because of their sex and age are for cancers of the cervix and breast. While the latter are not **genetic** screening programmes, they share some, though not all, of the ethical issues that are discussed in this report.

1.12 The ethical questions raised by genetic screening differ from the ethical aspects of the relationship between individual patients and the professionals caring for them in some important respects. One key difference, already mentioned, is that genetics and diseases of genetic origin inescapably involve families. Another is that for diseases such as cystic fibrosis, where there is usually no prior evidence to suggest that the gene may be present, screening is initiated by a doctor or other healthcare worker inviting a perfectly healthy individual to undergo a procedure that may have worrying implications. The person may be in no danger of developing the illness himself or herself, but may have to consider whether or not he or she is prepared to run the risk of passing on the gene to one or more children, who may then suffer from the genetic disease. A man or woman, asked to accept screening for a defective gene that, if it is present, is not causing any illness and may never do so, is not being asked to consent to treatment in the ordinary sense of the term. The kind of information he or she needs about the possible consequences of a positive result is different from that sought by a patient considering whether to undergo surgery or other medical treatment. We discuss the question of informed consent to screening in Chapter 4, and the need for a greater public understanding of human genetics and the nature of genetic diseases in Chapter 8 on Public Policy.

1.13 Throughout our report we have kept in mind two fundamental points on the ethics of health care decisions. First, there may be certain courses of action that should be ruled out whatever their seeming benefits. In the context of genetic screening we emphasise that compulsion should be ruled out (see, for example, paragraphs 4.21(i) and 10.4). Second the question must always be posed : does the potential good outweigh the possible harm? This question is not always an easy one for patients or their medical advisers to answer, even in a conventional doctor/patient encounter where a well-established form of treatment for an identifiable disease is under consideration. It is even more difficult in the context of a screening programme, and especially a genetic screening programme, where the potential benefits to individuals and their families must be weighed against possible adverse consequences.

- 1.14** Genetic screening offers a number of potential benefits to individuals, their families and society. They include:-
- (i) the identification of treatable genetic disorders at an early stage;
 - (ii) giving couples the possibility of making informed choices about parenthood; and,
 - (iii) more speculatively, and largely in the future, identifying genetic susceptibility to common serious diseases.

As medical knowledge about genetic susceptibility develops further, it may become possible to encourage people at risk to take appropriate preventive measures such as stopping smoking and altering dietary habits.

- 1.15** At the same time, there are the adverse possibilities already indicated. These include the risk of increasing personal anxieties about health, the difficulties sometimes experienced by individuals and families in deciding whether to pass on genetic information to other family members, and the agonising decision whether to terminate a pregnancy following an adverse prenatal diagnosis. There are also potentially adverse consequences for both individuals and society as a whole if normal prospects for employment and life insurance were to be seriously affected by access to, and the misuse of, the results of genetic screening programmes. One serious potential misuse discussed in Chapter 7 would be an over-cautious interpretation by insurance companies of the as yet limited knowledge of genetic susceptibility, especially to polygenic and multifactorial disease (for example, some heart diseases and some cancers).

- 1.16** In all our discussions, both of the written evidence we have received, including work being done by international bodies, and of the problems encountered by those members of our Working Party who are actively involved in genetic testing and screening, we have been struck by the need for care in providing information to people invited for screening. We have also been struck by the variety of responses encountered. The factors affecting the acceptability of a screening programme are so diverse that it is difficult to draw general conclusions about the desirability of genetic screening. These factors include the severity of the condition being screened for, people's previous experience of children or family members who have suffered from the disease, the stage at which screening is offered (before conception or during pregnancy), individual moral and religious beliefs, and the available therapeutic options. Any screening programme runs some risk of raising false anxieties or giving false reassurance :

the size of that risk depends on the sensitivity and the specificity of the particular test. Each and every proposed screening service must be assessed on its individual merits. The kind of information that screening is intended to reveal, its confidentiality, and the therapeutic options available, are among the matters that need to be taken into account and are explored in our report.

1.17 The profound moral dilemmas that screening can create are illustrated by the statements of two women who refused an offer of screening for cystic fibrosis early in pregnancy.¹ One of them, who had understood that even if she carried the cystic fibrosis gene there was no cause for concern unless it turned out that her partner also carried the gene, was nevertheless worried:

“If he is negative the worry is unnecessary. If he is positive, even more worry would result until the prenatal diagnosis when if the baby is negative, again the worry has been unnecessary.”

The other was worried about the moral choice that she might face:

“I think I would face a very difficult moral dilemma if I discovered, whilst pregnant, that both my husband and I were CF carriers. I would then want to have the baby screened, and if it had CF I would be very worried about making a decision to have an abortion, which in theory I’m opposed to, but realistically, I don’t know what I’d do.”

1.18 The views cited above are minority views (see paragraph 4.13). For the majority of the women who accepted screening for cystic fibrosis the benefits outweighed any temporary psychological stress. The screening offered an opportunity to avoid both a child born to suffering and the lifelong emotional cost to the rest of the family in caring for a child in such a condition. But the minority views are important precisely because one test of ethical sensitivity is the way in which minority views are taken into account and given an appropriate response. We discuss these matters later in the report.