



Scientific Contribution

From what should we protect future generations: Germ-line therapy or genetic screening?

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Abstract. This paper discusses the issue of whether we have responsibilities to future generations with respect to genetic screening, including for purposes of selective abortion or discard. Future generations have been discussed at length among scholars. The concept of ‘Guardian for Future Generations’ is tackled and its main criticisms discussed. Whilst germ-line cures, it is argued, can only affect family trees, genetic screening and testing can have wider implications. If asking how this may affect future generations is a legitimate question and since we indeed make retrospective moral judgements, it would be wise to consider that future generations will make the same retrospective judgements on us. Moreover such technologies affect present embryos to which we indeed can be considered to have an obligation.

Key words: embryo, future generations, genetic screening, genetic testing, germ-line cures, Guardian

Introduction

The question whether we have responsibilities towards future generations has recently emerged on the agenda of philosophy and ethics (McMahan, 1995). Questions of the “common heritage of mankind” addressed in the United Nations General Assembly, such as the statement to reform the traditional regulation of the Law of the Sea which is affected by modern technologies, are clearly addressed towards what future generations will inherit from the present (Pardo, 1975). Moral theories have however had notorious problems in providing a solid basis for the foundations of these obligations. We cannot take for granted that the problems we envisage today will be the same as those perceived by future generations. Conversely the question of whether we have a right to speak on behalf of future generations always imposes its toll. Any legislation or social order will have widespread effects on the details of people’s lives (Parfit, 1982, 1984). This in turn means that legislation will determine who will be born, and that therefore the latter will not have existed were it not for these changes. Any theory about future generations therefore must be impersonal rather than applied to individuals (Parfit, 1984). However traditional theories were impersonal and these had led to impossible implications when applied to questions concerning future generations. Hence “questions on our obligations to future generations has resulted in a profound challenge to moral theory itself” (McMahan, 1995, p. 302).

However, these questions have become more urgent in relation to the genome that our future generations will inherit. Clearly *prima facie* we have a duty not to disturb the genome through germ-line intervention. Any damage that we do now will be transmitted to future generations who can hold us responsible. As an extension of the protection of the common heritage of mankind, Agius has proposed that the concept of “Guardian” be extended to the genetic system (Agius, 1998). A conference held in Malta (1995) debated this proposal. In this contribution we will critically evaluate the arguments brought for and against such a proposal within the perspective of future generations arguments.

The concept of a Guardian

The idea of allowing future generations to participate in the “administration of the human genetic heritage” by the provision of a “Guardian” has been put forward to UNESCO (Agius, 1998, p. 75). Such a Guardian would not have legislative powers, nor powers to stop processes from happening but would serve as a voice before institutions and technological companies whose decision could affect the welfare of future generations. His role would not be to decide but to promote enlightened decisions, opposing attitudes which are inconsiderate towards future peoples.

The main idea behind the guardian hypothesis is that the current intellectual property system must be

altered for the regulation of biotechnological interventions because of its potential threats to future generations of the industrialized countries and to present generations of developing countries. Genetic engineering today is inducing farmers to use only the most efficient plants or animals; by cross breeding lines with valuable characteristics and screening the progeny for desired traits, a reliance on particular lines is encouraged. This of course is dangerous because of unforeseen diseases and the possible loss of biological diversity. Moreover in nature a species is in itself a biological boundary. Genetic engineering by gene splicing gives us the power to cross-fertilize species threatening the species unity by an artificial form of interbreeding. The direct application of gene-splicing to cure human genetic disease is thus a concern of disrupting the human genome. Finally, it is argued that third world countries can be put at a disadvantage because of the firm control over these technologies by industrialized countries. Environmental destruction is aggravated through further erosion of genetic diversity, as local crops are replaced by genetically engineered crops and increased use of harmful agrochemicals. By defining genes as a common heritage we can amend the current patent system which protects the right to private ownership of small segments of mankind's genetic heritage which is far away from the ethical ideals of the common heritage of mankind principle. In this essay we concentrate only on human genetics.

Criticisms of the guardian proposal

a) *By whose authority?*

The proposal for a Guardian to take care for future generations has been criticized however for various reasons. Wildes (1998) argues that in a secular world there can be no appeal to a higher authority such as God, nature or reason. The only way to move forward in bioethics is by consent between moral strangers. If we cannot appeal to reason, nor to a powerful deity, nor to nature, we lack a common secular morality. In this absence our only alternative is allowing each other to do things – a principle of *permission*. We can arrive at resolving controversies by agreement. Moral authority can thus be arrived at by collaboration between parties. In the same manner, Engelhardt (1998) argues that assuming a general responsibility towards a unique genetic inheritance, free from engineered alternations, is indefensible at least in general secular terms. Only three “content-less” moral principles can guide us. The first would be to avoid malevolent acts against future generations, the second not to undertake changes to the

human genome that one has good grounds for knowing the recipients would find unacceptable, and finally to act prudently so as not to cause more harm than benefit. He argues that history provides ample grounds for concern; the establishment of a Guardian would be the secular equivalent of establishing a particular “religion” and imposing it upon the entire world. Engelhardt asks in what sense would future generations have a right to be denied benefits as procured by enhancements. What obligations does one have to future generations not to make them better off in these respects? He argues that perhaps the purported right of future generations not to receive an altered genome is that they should be protected against harm, risks and dangers possibly associated with altering the genome. If such is the case one can at best argue not to alter the genome unless one has good grounds to believe that the benefits involved outweigh the risks. The obligation would thus be not to act imprudently. Moreover, insofar as significant benefits can be achieved, then one is obliged to pursue the good and indeed, all else being equal, to develop human germ-line engineering and enhance human capacities through altering the genome. Like Wildes, he argues that any moral content must be agreed upon between parties. Any Guardian, if it is to have secular moral authority, will be obliged to act in a most general and content-less fashion that it would have to leave moral communities free to act peaceably on their own understanding of the good. Any attempt to impose a particular all-encompassing vision of obligations to future generations would, and should, be the object of contempt by secular environments.

Engelhardt's and Wildes' arguments have at heart the notion of dialogue between moral strangers. Unless they can show that they propose a form of arriving at common moral ground between moral strangers, which they do not, the principle of permission which is proposed is fraught with difficulties. James Lindemann Nelson for example notes that Engelhardt will not accept that achieving coherence among principles together with our conceptions and morals of the world will be enough to warrant any judgements (Nelson, 1997). Nelson asks what reason is there for one to adhere to any agreement between moral strangers if it does not serve one's interest? Even concern for peaceableness is not warranted as some people may opt for not wanting peace. Even if it is in my interests to act peaceably, this leaves me acting strategically and not morally. If one is advantaged in the relationship there is no reason why one should care about the other. It seems impossible therefore that permissions and agreements count as moral reasons for action.

There is also an inherent *reductio ad absurdum* in a principle of permission between moral strangers for this presupposes that the two put aside their moral

ideals in order to agree upon another moral stance between them. For example, two people may disagree upon abortion (else they would not be moral strangers in this regard) and agree to perform abortion within their relationship, professional or otherwise. Now this would presuppose that at least one is compromising his or her moral ideal on abortion. In this respect the message he or she will be sending is that they cannot be trusted with their own moral ideals, and therefore how can they be trusted within this secular moral agreement? Indeed why at all should I want to agree with someone, unless for example, there is something in it for me?

b) *Protect the “present” rather than the “future”?*

A second type of objection to the Guardian proposal states that our concern with future generations is out of focus (Juengst, 1998). We should direct protective efforts towards people with genetic differences and people with disabilities instead of focussing on genes we have inherited or will transmit. Juengst argues that the Common Heritage (CH) view is conceptually flawed and even socially dangerous. It distorts the accepted biological concepts and risks social abuses, thus enforcing an awkward and impractical right to inherit one’s share of a common heritage of mankind. The genetic engineer can go a long way by changing alleles at a natural locus, rather than deleting existing loci or adding new genes, towards therapeutic achievement and enhancement applications. It is the common *gene-line*, not the germ line that is at issue. The concept of the human genome does not really concern itself with all the substantive variations or different alleles that are possible at a given locus, any more than the concept of the human skeleton must account for the minute variations observable between bones of different people (as for example used in forensic studies in identifying people). The human genome is thus an abstraction and not a concept comparable to the seabed. It is not a natural resource and thus does not constitute common heritage. What we should be concerned with therefore is the protection of disabled persons and people with genetic differences in the *present*. Juengst however omits to address legitimate concerns about what the future can hold for those generations. Will parents for example be forced not to withhold genetic “cures” (and in the process affecting their family germ-line) as occurs frequently today with certain surgical procedures especially when concerning malformed newborns? Moreover the concept of the human genome does indeed include a recognition of variation and that is precisely why it is an abstraction.

c) *Are future generations moral agents?*

The third type of objection denies that future generations can be moral patients (Heyd, 1998). For logical reasons possible people cannot be moral subjects or have moral rights. Thus one cannot argue against the creation of genetically modified creatures in their interests as otherwise they would not exist. However this argument is flawed in certain circumstances of genetics. Whilst it can be shown that social programs affect who meets whom and thus who is actually born, it does not limit the birth of genetically modified individuals who would otherwise still have been born. Thus if one refers to a genetic programme, such as occurred in Cyprus, whereby the state tries to prevent the marriage of individuals with carrier traits for thalassaemia, then it can be supposed, and thus Heyd’s argument validated, that individuals who are homozygous for thalassaemia are prevented from being born. The same cannot hold for the modification of germ-lines. If I modify my germ line genes to make my offspring free from a genetic disorder which I may carry, or enhance them to make a particular trait (say more intelligent) possible, then I will be affecting offspring which may have been born otherwise had I not made the intervention. Clearly any side effect or genetic quirk transmitted to my offspring is my responsibility in some way, especially had I known in advance about the possible side effects. Heyd furthermore argues that future generations may hold different ideal standards than our own and that therefore the idea of a guardian or trustee cannot hold. However he concludes that we do hold responsibility in how we want our descendants to look like, but we cannot be their keepers.

d) *Present guardians: Politicians and peer review*

Spicker (1998) argues that geneticists should be held accountable to others as they conduct scientific research by adhering to the prevailing normative standards of scientific inquiry. He argues that “protecting” future generations is a logical worry. Although Spicker agrees with Parfit’s contention that future generations cannot coherently claim that their predecessors failed in their duty to protect them (because they would not have existed), he contends that future generations can claim that governments of previous generations acted irresponsibly in failing to regulate the actions of genetic engineers, whose research outcomes and discoveries concerning the human genome could be used either to the detriment or benefit of actual future individuals and generations. This is precisely because temporarily contiguous generations (the next generation or two) have to be necessarily affected before

future ones can. Therefore geneticists are morally responsible not only for the known, but maybe more importantly, for the unknown effects towards future generations.

Spicker's contention can be supported by the following argument. Consider present day doctors prescribing antibiotics. It is a known fact that these powerful medicines are abused and given when they should not be. This has given rise to resistant microbes. If doctors do not act responsibly now, we know that future generations (at least the contiguous "in between" generations) may benefit less from antibiotics than we do today because there will be a considerable amount of resistant strains around. So present doctors are clearly responsible for this "foreseeable" disaster. Yet they should be responsible even for the "unforeseeable" – in this case the scenario may be that future generations may not be able or find considerable difficulty in generating new antibiotics to these resistant strains (as for example we are finding difficulty generating an antiviral for HIV simply because it is different than the usual virus we usually deal with). Therefore if future generations find themselves taken back to the nineteenth century when antibiotics were not available and people died from a simple infection, surely they can judge previous generations for acting irresponsibly when antibiotics were available. This puts a burden on present generations to act responsibly now. This responsibility is nothing but an effort to protect future (even contiguous) generations from an absence of treatment weapons.

The legacy we may owe to future generations is therefore a demand on geneticists to act responsibly and remain careful in their work, to "... keep faith with the standards of science" (Spicker, 1998, p. 157). He contends that rather than electing a Guardian, one should urge our true guardians – the politicians – to work cooperatively through the democratic process and to mandate geneticists into educating those who work in the media about the long-term consequences and implications. However, it is difficult to agree that geneticists are responsible to educate those who work in the media. Indeed the media has often served to alarm people and to portend an image of humanity against science. Rather the media has a responsibility itself to study and transmit the right messages. Responsible media bodies today have their own reporters qualified in science and scientific writing and therefore knowledgeable of portraying true images. It is the media which can act irresponsibly and allow unqualified investigative reporters to speak about subjects which they have not covered deeply enough.

Spicker is right however in pointing out our true "Guardians." But as politicians are representatives of the people, we all have a responsibility to contribute

and point out dangers. In this respect, Felice's suggestion of Guardianship by peer review is as important as allowing politicians to do all the work. Felice (1998) argues for widening the scope of existing peer review groups. He asks what mechanisms do we have to ensure good science and to see that human interests are protected. The element of time is essential if science is to pass judgement on the value of research and technology; a review of past and present experiences provides guidelines in making projections for the future. In mainstream science, funding agencies ask for the views of expert "peer review groups" to whom research proposals are referred for evaluation. These seek specific answers to the quality of proposed research, the clarity of questions asked and the relevance and significance of the work proposed. Moreover it is their competence to ask the appropriateness of the research methods and competence of the researchers and to what extent this research advances the frontiers of knowledge. Felice argues that the collective wisdom of scientists along with educated lay persons in these peer review groups has assured and served well to direct resources into productive research while guaranteeing human assurance. However he argues that the wider scope for public participation in the peer review groups requires increased efforts to educate the public concerned.

Nevertheless, in keeping with the antibiotics analogy, it can be argued that if we can make retrospective moral judgements on past experiences, we may infer that future generations will make retrospective moral judgements on what we do today. This in itself gives us the moral obligation to act morally towards future generations. In what follows this line of argumentation is taken up and it is shown that our true concerns should be towards genetic testing and screening, for it is the consequential acts upon these issues that can adversely affect future generations.

Genetic testing and screening – the real threat

There are two principal ways in which genetic screening and genetic testing for individuals can affect future generations. Individuals can screen for traits and conditions and selectively discard embryos that do not fit their criteria. Secondly, it can be the state that imposes screening on populations to try to modify their behavior. This would include gender selection which can be done with a simple genetic test at an early stage. An obvious example is the familial selection of boys in China due to the law allowing one child per couple in over-populated regions. This has invariably led to more boys than girls being "selected" as many would prefer to have a boy to inherit their property and take care

of them when old. Clearly the creation of the problem was not the government's introduction of the law. The government probably thought that the sex ratio would remain the same. It was indeed a cultural side-effect of the *population* selecting more male babies than females which brought about the problem. Genetic testing will surely make this type of selection easier at an early stage of pregnancy. So, in what way can the state be held responsible for what happened to the present generations and what will continue to propagate to the future unless controlled. Obviously even if the government cannot be held responsible for what it did, the fact it is seeing the side effect now which is undesirable, calls for action to protect the situation from worsening. An impersonal responsibility to future generations is clearly there.

But can one make a retrospective moral judgement on a government before the effects were known? Retrospective moral judgements have been made for example in the radiation experiments carried out by US scientists on patients who were not informed of the possible harm caused by radiation when the same scientists knew this could have been a possibility.¹ Clearly a more evaluative process could have brought forward the notion of what the (Chinese) people would do. Even if not, a close look at what the people were actually doing could have enacted a change in the law before it had time to have its toll. Chinese government put more weight on decreasing its population growth than on the problem of gender discrimination. If present generations can blame the past generations for faults they are suffering, future generations can do the same towards the present. Does this blame not exempt one from taking a neutral stand towards future generations? If the problems can be perceived, one has a responsibility to prevent these foreseeable situations.

Let us consider now the situation in Cyprus where widespread screening for carriers of thalassaemia takes place to genetically counsel couples where both partners are carriers. The whole programme is intended to decrease the incidence of thalassaemia, and hence decrease the number of births with this disorder. One may argue, as indeed disability rights groups do, that *possible* people are deprived of an existence. Selective abortion does not really discriminate against the disabled unless one wishes to argue that it is not in their interest to decrease the number of people with that disability. Thus deaf people may have an argument for discrimination because they do not want their numbers decreasing. But thalassaemic people do not because on the whole we want to cure people with thalassaemia. The only way one can argue for discrimination is by taking a pro-life stance, but this would defend all aborted fetuses and not only those with

a genetic disorder. From a pro-choice point of view, since one does not defend any fetus, one can only argue against decreasing numbers (such as gender discrimination). But the argument for decreasing numbers does not hold with respect to conditions that we want to cure as this will bring about a decrease in numbers of affected people, if the cure is effective.

From the foregoing it seems clear that one should be more concerned with the perils of genetic screening than with germ-line modification. This is a paradox indeed, as the former seems more innocent. Selection modifies our overall gene line more than any amount of genetic engineering to cure (or even enhance) could do. The gene line is affected because the pool, from which a choice of genetic shuffling occurs, will be changed. The "Guardian" proposal, conversely, admonishes we should beware of genetic engineering which modifies our germ-line (or gene-line as Juengst has put it). It is disconcerting however that most concerns focus only on gene-line modification through genetic engineering. As a matter of fact we may owe it to the future generations of families who carry a defective gene in their genome to liberate them from the burden of this disease. Such would be the case for Huntington's disease which probably haunts the families whose trees carry these burdensome diseases. Even if genetic engineering were to bring about side-effects to these cures, these may be more than welcome when balanced against the horror of knowing you may develop dementia and chorea at the age of forty. Moreover these side effects will only continue to manifest themselves in these relevant family trees as the present disease does. It will hardly affect the rest of the world, as these diseases do not.

Rather therefore than being concerned about gene-line for future generations through genetic engineering which will affect only specific family trees who would probably welcome such changes, one should be worried about the screening efforts undertaken against common disorders. The World Health Organization has condoned the Cyprus experience with thalassaemia to reduce the amount of homozygous individuals by a process of selective abortion, and mandatory genetic testing and counseling (approved also by the Orthodox Church) for couples (WHO, 1983). However there does exist concern that we should solve our problems of allocation of scarce resources by such drastic measures as abortion and mandatory invasion of people's lives by genetic tests (Hoedemaekers and ten Have, 1998), even though in all fairness the lives of Cypriots with thalassaemia have been enhanced by the considerable reduction in the frequency of those born with the disease (Kitcher, 1996, p. 236).

The film *Gattaca*² portrays a realistic image of how selective discard of fertilized ova carrying genes

for specific possibilities of diseases can lead to a society where people who are normal by today's standards are discriminated against. We would select those people for specific jobs who have been genetically advantaged and thus pose less risk of manifesting disease. Which employer would not prefer workers who are less likely to pose insurance and sickness benefit problems? Which insurance would not like to insure those who are less likely to claim? Will a situation thus be passed on to future generations whereby mandatory genetic testing is necessary; albeit even pre-conceptually? This raises the concern for parental autonomy, especially in regard to selective non-treatment of malformed newborns. It is not infrequent that cases are cited where parents found themselves in legal battles because the authorities went contrary to their views on refusing surgery.³ Will genetic cures be imposed on children? It should be concerning for us to see how future generations will be affected by genetic screening. Will insurance and employers make genetic testing mandatory? Will couples be pressured to have genetic testing of their unborn and pressured into selective discard or abortion because of fear of poor prospects of their offspring or at least better chances if screening is done?

Naturally one can argue that these future generations will probably be grateful towards us as otherwise they would not have existed (had they, that is, not replaced their "inferior" siblings). But who will speak in favor of those potential genetically "inferior" siblings now? Surely it has to be previous generations. Therefore even though those who may live may have a different opinion than we do now, it is we who have a responsibility to those who potentially can be saved from selective abortions and discards. This is in fact the paradoxical absurdity pointed out by Parfitt (1984) that any theory has to be impersonal. What can be more personal than not being allowed to live (for discard and abortion means taking away an existing life, and not a potential life as that of the genetically superior who would then not exist) in order to be replaced by the genetically superior sibling. Not searching for the better genetically endowed in a pool of fertilized ova would give all an equal chance of implantation.

Developing an ethics with future generations in mind

Simulating a future scenario, Walters and Palmer (1997) picture a situation in which the World Health Organization, following a definitive genetic cure for Cystic Fibrosis on both somatic and germ cells, call for all at-risk individuals to undergo genetic testing.⁴ All those found to be affected or heterozygous will

be made to accept treatment of both their reproductive and somatic cells. In this way WHO would estimate to eradicate the disease within 35 years.

This hypothetical situation was extrapolated from past and present programs aimed at controlling infectious diseases (e.g. the world wide campaign to eliminate smallpox and mandatory immunization for measles and polio). The authors concede that there is a difference between disease transmitted genetically and infectious diseases transmitted by contact or other vectors. Also the hypothetical example does not state whether an initial voluntary program had been tried and failed. In fact, the authors say that as a matter of moral principle state intervention in reproductive decisions is virtually always wrong. They advocate a voluntary program of germ-line genetic intervention and are confident that people would participate. Conversely they counter most arguments against germ-line intervention. Although one risks irreversible mistakes, the benefits of cure should outweigh these risks. Also alternative strategies like selective abortion or selective discard are fraught with moral problems; germ-line therapy is more in line with respect for children and human life and moreover does not discriminate against people with disabilities. Although some use for enhancement may be morally justifiable this is an issue where policy makers must put their weight. Although those with power will have an advantage over those who cannot afford the treatment, public health concerns should balance this out. Moreover it is better that humans possess the technology for cure than not possess the ability at all.

The moral soundness of any eugenics-like program or policy depends on the existence of an obligation to protect or improve the genetic composition of the human species and hence directly to protect or improve future generations (Neri, 1998). Rawls (1972) has made the classical formulation of this obligation saying the early generations owe future ones the descent of a healthy genetic endowment and hence should pursue reasonable policies towards this end. Thus over time populations are expected to at least maintain the general level of natural abilities and to prevent diffusion of serious diseases. Rawls seems to be endorsing both a positive and a negative eugenics. However Agius (1990) and Serracino Inglott (1990) have criticized Rawls' treatment of intergenerational ethics in that he always assumes that future generations will inherit more if every generation had to follow a "just saving principle." This principle does not take into consideration the very high price that may be paid for growth in other areas of life.

McGleenan (1998) says that legislative responses to gene therapy are unanimous in their adoption of a somatic cell vs. germ line dichotomy. Moreover

many countries have adopted a two-tiered approach for ethical oversight, first at local research ethics committee level reviewing the proposed protocol and second at a more national level by a committee of experts. However, committees tend to emphasize scientific review rather than ethical review. Germ-line intervention is seen to pose too many risks and committees tend to be warmer to somatic cell therapy. However, McGleenan notes that this dichotomy may not be that sound and a prohibition on gene therapy will become more strenuous as safer therapy grows and public demand increases.

The main question therefore is what ethics should be kept in mind when considering future generations? The real ethical threats seem to be associated with genetic screening. Screening affects populations and who will or should live. It constitutes a threat to how we see illness. A country wishing to impose on its people a program where by selective discard or abortion or by the prevention of marriage, it will attempt to decrease a genetic condition, even if done on a voluntary bases will carry a heavy toll on those wishing to stay out of the program. Will people with the disease still be treated without judgement? Will insurance still insure those who have opted not to have genetic tests? Furthermore, genetic disease not being contagious and thus not an immediate threat to populations, cannot be given policies along lines of infectious diseases. With WHO's condoning of selective abortion and discard to control thalassaemia and with UNESCO's shying away from expressing its views on eugenics, we are still far away from an ethic towards future generations. Our legacy towards future generations is our responsibility to learn from past errors. We need to distinguish between eugenics and the curing of genetic conditions which the individual wants to be rid of. If our ethics is based on individual concerns rather than freeing countries from genetic conditions which are an economic burden, we are more safe than if programs intending to eradicate a genetic disease are imposed by world authorities.

Conclusion

When one asks, "will there come a time when parents will not be able to refuse genetic tests or treatment of their children" or, "will there come a time when insurance companies and employers impose genetic tests," one is showing concern for future generations and those contiguous with us. The threat is however in the present and it is present legislation and protection that we should seek in order to safeguard future policies. Moreover it has been argued that genetic cures to somatic and germ cells cannot affect families

other than those already carrying a disease. Since only family lines will be affected, there is hardly a threat to the human genome as a whole. Such ideas are based on misconceptions or misunderstandings of genetics in general. Of course, if germ line modification had to become a luxury to enhance capabilities of offspring, then this may constitute a threat; but there are other more urgent threats brought about paradoxically simply by the seemingly benign nature of genetic screening. This threatens the lives of *existent* embryos, plus poses threats to sections of the population based on their genetic makeup. This is eugenics at large.

The threats to future generations can be summarized thus:

1. Threat to family rights.
2. Threat by insurance, employers, marriage "counseling" imposed by the state.
3. Selective threat to potential future generations through abortion or discard.

Rather therefore than a threat to a common heritage which is the human genome, future generations face a threat of eugenics which comes not through some manipulative engineering of somatic or germ-line cells but through a selective process. There may be a place for a "guardian" since it seems that WHO and UNESCO have not been sensitive to these issues. More than a supervisory role, this "guardian" should help to implement legislation that protects future generations from the threat and abuse of genetic screening. There does not seem to be any concern for the gene-line at this stage that should take precedence over threats posed by screening. Whilst therefore the concept of Guardian may need to be studied deeper, the real and present danger may be in genetic screening and testing. The present "guardian," our politicians, in agreement with Spicker, are the people who should guard against this.

Notes

1. See, for example, Buchanan, A.: 1996, 'The Controversy over Retrospective Moral Judgement', *Kennedy Institute of Ethics Journal* 6(3), 245–250.
2. The film portrays the story of two boys born to a couple, one by orthodox means and the other through a selective process of "best" genetic make-up through a fertility clinic. The story relates the struggles of the former to compete in a world where all are genetically selected. He uses urine, blood and hair samples of a "selected" person who was crippled in an accident to get through a space programme course. His "selected" brother, a detective, traces him down during an investigation in the academy. The film ends with the two challenging each other to a swim in troubled seas

sending the message that determination is as good as being genetically selected.

3. See for example a case in which parents refused transplant to their child, Nicholson, R.H.: 1997, 'In the Family's Best Interest', *Hastings Center Report* 27(1), 4, and also the recent case of the Maltese Conjoined Twins: London, A.J.: 'The Maltese Conjoined Twins, Two Views of Their Separation', *Hastings Center Report* 31(1), 48–52.
4. Walter, L. and J. Gage Palmer: 1997, *The Ethics of Human Gene Therapy*. Oxford University Press, pp. 87–88.

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