opening address

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Introduction

In this paper I shall identify both the biotechnologies which have given rise to worldwide debate and dispute and the major ethical challenges which these biotechnologies present. I shall then consider the imperative to pursue research and development in these fields. Finally I shall consider the problem of the formation of public policy concerning the technologies and the role of ethical review.

The Identity of the Technologies

F M Cornford's ironic remark that nothing should ever be done for the first time (Cornford, 1993, p.53) draws attention to the natural tendency in most of us to be somewhat wary of novelty when it involves journeys into the unknown which might have weighty consequences for life as we know it. New technologies have often excited this wariness and the everyday examples of electricity, radio, and, more recently, mobile telephones illustrate the point. However none of these have caused a fraction of the public concern which the new biotechnologies have stimulated. These direct interferences with the fundamental nature of life, both plant, animal and human, have given rise to animated debate, public consultation, weighty commission reports, legislative activity and both peaceful and violent protest across the world.

There are two fields of this research activity. Though both are located in the area of cell biology their origins are independent of each other. Yet, they have joined hands during the past twenty or so years to present a wide range of ethical challenges. The first group of these technologies arose out of the discovery of DNA, which produced a phenomenal boost to the science of Genetics. The second arose out of a concern to relieve the suffering of infertile couples through the development of *in vitro* fertilisation. Each of these families of technologies raise fundamental questions about the nature of life, and most significantly, about the nature of human life.

What is it to be Human?

On the one hand Genetics has shown us how relatively minute are the differences between species. For example, 98% of our genes are found in chimpanzees, 90% in rats and even 85% in zebrafish. It is somewhat humbling to learn that the potato has more genes than we do.[2] This raises the question of what it is specifically which makes us human. On the other hand *in vitro* fertilisation has opened up remarkable possibilities for the study of the earliest stages of human development and posed the question of when it is that a human life begins.

Keys to Diagnosing Diseases

Genetics has provided us with remarkable diagnostic tools and combined with IVF treatments enabled us to test pre-embryos for a range of conditions which would entail that the potential child would have conditions incompatible with life or incompatible with a healthy life.

Keys to Treating Diseases

By means of intricate analysis of human cells Genetics has enabled us to identify the causes of numerous serious

debilitating conditions and susceptibility to many others. By means of analysis of human embryos, which can now be produced in the laboratory, cell biologists have been able to isolate human embryonic stem cells and understand their incredible potential, which promises to provide breakthroughs in the treatment of many diseases and conditions involving tissue damage.

Keys to 'Improving' Life Forms and Controlling Nature

Genetics has enabled us to control biological weaknesses in plants and animals in ways which would make them more resistant to disease, more nutritious or of medicinal value to humans. Infertility technology has enabled us to circumvent the biological weakness of infertility in humans and provide otherwise infertile people with means of producing their own genetic offspring. Together the technologies herald the possibility of placing in our hands means of designing human lives and future generations, freeing us from the vagaries of fate.

Is this Progress?

So, at last, maybe, man really has come of age around one hundred years after this was first claimed. Or is this the most appalling *hubris* justifying the doomsday predictions of the many sceptics who are appalled at the prospects the biotechnologies present?

The Major Ethical Challenges of the Technologies

To address the question with which the last section ended we have to take on an analysis of the ethical dimensions of these technologies. Consider some of areas of ethical challenge which have occurred.

The Nature of the Research Participant

In infertility technologies the status of the human embryo has been a major issue – and still is. This is illustrated by the contrasting legislation of Germany and the United Kingdom where, in the former country, no research on human embryos is permitted and in the latter country research is permitted for a wide range of purposes in the study of infertility, genetic disease and stem cells, and even the creation of embryos for this research is permitted. Commonwealth countries generally have adopted a more liberal approach to legislation in this field than other countries though they have, by and large, not allowed the creation of embryos for research. In many of these countries such legislation has been enacted in the face of something over 20% of opposition in the population for whom it condones murder. I have argued elsewhere that this disagreement is not resolvable by any appeal to reason or evidence and that there is no prospect of a resolution to it (Evans, 1996).

In genetics research we also have the problem of the identity of participants in research due to the nature of genetic data. The peculiar nature of this data makes genetic technologies unique amongst technologies. Other technologies which have sparked widespread debate and opposition have done so because of the potential harms which their application has presented. Whilst that is an element of the opposition to genetic research there is a more immediate set of ethical problems associated with it. The knowledge involved in nuclear technology is ethically neutral insofar as, outside issues related to its application, it has no bearing upon human relations or welfare. Genetic data, on the other hand, is intrinsically so related. The shared nature of DNA raises difficult issues whether a presenting patient in isolation is the only participant in research.

Consent, Privacy and Ownership

Specific ethical issues for the development and application of genetic technologies arise out of this shared nature of genetic knowledge. Among them is the problem of consent to donate tissue for DNA analysis. Should individual or group consent be required? Should individual patients be entitled to deny relatives the benefit of knowledge of their genetic tests when they might be significant for the relatives' health? How specifically should the purposes of genetic research be spelled out in the consent process for the consent to be informed? How can the identity of participants be best protected when the link between genotypes and phenotypes are crucial, as in pharmacogenetic research? What rights, if any, should the donors of DNA have when commercial applications result from research? To which groups of people should genetic information derived in the application of these technologies be made available? Questions of this sort abound and are already of concern to ethics review committees and health care practitioners who are recipients of genetic data.

Respecting Species Boundaries

Transference of genes across species boundaries raises important issues about the integrity of the species (Brown, 2000, pp.112-3). This involves the question of human dignity and identity. Whilst benefits might accrue from such transfer in the form of the production of compatible tissues for transplantation, for example, there are some who regard this

as a challenge to their identity (such as a challenge to whakapapa) and an affront to human dignity (Smith, 2000, pp.100-19). Once again others have no problem with such processes if they turn out to be beneficial to health.

Limits to Interference

How much is enough? Whilst the transference of genes across species might be thought to be unacceptable to some what about the switching on of dormant genes in plants in order to protect them against drought, for example? Is it the matter of degree of interference in life forms at the genetic level which is the crucial issue or the fact of interference in itself?

In human applications of genetic technology the distinction between cure and enhancement or negative and positive engineering, has been made. Whereas it might be fine to correct what are perceived as genetic faults in embryos and foetuses building in enhancements to what the normal foetus would have been is thought by some to be a step too far, presaging an era of designer babies and eugenics (Annas, 1995).

Reflections on Social Order

Yet even notion of cure has been ethically challenged here as it calls for a definition of the normal, which results in a stigmatisation of those groups of people thus labelled disabled or abnormal. The response has been that it is the society where such discrimination is encouraged by technologies which are disabling rather than those identified which the conditions calling for elimination (Oliver, 1990).

The new birth technologies have also posed searching questions about the nature of the family. Should assisted reproduction legislation demand that account be taken of the child's need for a father, as in the UK? Is it a breach of anti-discrimination laws, or more generally unjust to disallow lesbians and homosexual people to access infertility services?

Threats of Injustice

The charge of injustices created by these biotechnologies has been made in a number of areas. Significant amongst them are the allegations made concerning the applications of genetic technologies in agriculture by multinational companies. Biopiracy has been alleged, where developed countries are said to have plundered the flora of developing countries in their programmes of genetic enhancement of crops (Mies and Shiva, 1993, pp.242-44). Other allegations have been made that marketing genetically altered crops to subsistence farmers has resulted in a reduction in biodiversity and an economic dependence on developed countries which loss which has driven many of them off the land and destroyed communities.

In the areas of human genetics these are also fears that the payment of royalties will render screening, testing and therapeutic interventions too expensive for general use and limit access to therapies (Dorozynski, 2001), thus widening the gap between rich and poor.

The Research Imperative

There are numbers of contributing factors to the research imperative. On the other hand there are sometimes pressing cases for the restriction of the research enterprise. The development of the new biotechnologies has involved the case being made for and against unrestrained activity in the field.

Scientific Curiosity and Academic Freedom

Scientific curiosity and academic freedom figure largely in the research imperative. The pursuit of knowledge for its own sake has characterised academic research for centuries and any restriction on the activity calls for a justification. Calls for such restrictions have, in the past, come principally from religion and the state, but what is very significant about the new biotechnologies is that the voice of the general public has been the loudest in protest. This has taken the form of calls for numerous moratoria in various areas of research activity, numbers of which have become adopted in public policy and legislation. Examples include the restrictions on germline genetic therapies, cloning, commercial trading in embryos for research, and the insertion of human embryos into animals.

The emergence of systems of ethical review in research on human participants and animals illustrates the fact that unrestrained research activity is not acceptable nowadays. The moral imperative might impose restraint on the most promising means of realising the most desirable research outcomes. This is reflected in the Declaration of Helsinki's principle that the interest of science and society should never take precedence over consideration related to the wellbeing of the subject (World Medical Association, 2000, A5).

The Needs of the Planet

The pressure of the burgeoning population of the world and

the need to ensure adequate provision of food supplies has encouraged the science of genomics in agriculture to engage in modification of plants and animals to enable them to combat destructive pests and adverse weather conditions and to improve their nutritional value (Montag *et al*, 2000-2005). Related goals targeted by pro-genetic engineering groups have included the reduction of damaging pesticides released into the environment, and the development of oil slick dispersal techniques.

Opponents of the technologies have responded with their own appeal to the needs of the planet. The possibility of dramatic reductions in biodiversity have been cited as constituting a serious threat to the well being of the environment (Fox, 1990, p.42). In addition the possibility of the production of new mutations and toxins in the use of viral vectors in gene transfer and of retroviruses in xenotransplantation has been raised as a major threat to world health (Lin and Culp, 1994).

The Needs of Suffering People

The most immediate and emotive appeal of protagonists for research and development in the new biotechnologies is made on behalf the many sufferers from disease and injury conditions whose lot could be vastly improved by some of the breakthroughs which the technologies promise. An example would be sufferers for whom stem cell technology holds out great promise such as those with spinal lesions for whom freedom from paralysis is promised by such therapeutic advances, together with Alzheimer sufferers, people with other degenerative neurological diseases, and patients with coronary, muscle, skin, lung, kidney and a score of other kinds of tissue damage.

It is difficult to resist the imperative to relieve such suffering. Yet, for some, the apparent delay of such breakthroughs, if not the failure to achieve them, is justified by the imperative to protect the welfare of early embryos and concentrate on the use of stem cells available from adults and cord blood. Even for those who support the research there is a reticence to rush into clinical trials when so many questions remain to be answered and dire possibilities of harm exist.

The Economics Card

In order for any research to proceed funding is required. The traditional home for much scientific research has been the universities. They have been extremely creative in the ideas which they have produced but not so good at translating those ideas into commercial realities. The funding provided to them by industry has always been outcome focussed but their blue skies research has been supported by traditional government and research foundation monies.

The new environment in which universities have to survive, viz. where they have to be seen to pay their way, and the need to provide returns for government investment in order to enable the economy to support higher education, has placed a keener emphasis on outcome research. Funding bodies such as FoRST in New Zealand have recast their funding policies to reflect this change. The application of science in biotechnologies has become the flavour of the month. Even though this poses a threat to traditional blue skies university research, universities have joined in the game. The procurement of Intellectual Property Right (IPRs) arising out of university research is a major goal for many universities. For example, the Universities of Stanford and California received royalties of US$38.5 million in 1997-8 alone from their patent for recombinant DNA technology.

Whilst this setting of research policy is not subject to ethical review there are some serious ethical issues which arise out of it. One of those is the barrier to the progress of research presented by the royalties which have to be paid in order for much research to progress. Another is the restriction of access to new therapies imposed by the royalty costs involved. The traditional collegiality of university research and the free sharing of scientific knowledge which was an important part of that is under threat from the new research imperatives.

Ethical Review and the Formation of Public Policy

The fact of the matter is that ethics committees have for some time been receiving many research proposals connected with the biotechnologies. Many of these preceded such public policies as have been produced in various countries and most of them still lie outside any public policy enshrined in law or regulation in New Zealand.

What Should be Done in a Public Policy Vacuum?

What should ethics committees do with such applications?

There are two extreme alternatives available to committees, neither of which is acceptable. First there is the view that what is legal is permissible and that ethics committees have no right to be restricting the freedoms of researchers to pursue their research pending the issue of public policy on the matter. This

is the *laissez faire* approach to research on human embryos in the United States where, despite the government ban on this research using public funds, there is no ban on the research in privately funded trials.

The other alternative is that nothing should be done in this field until a public policy is developed. This will not do either for it would constitute a serious harm to patients who would have new therapies postponed indefinitely. It would also constitute an unacceptable restriction on the activity of scientific research, for public policy cannot be developed until it is known what that policy is supposed to cover. Without scientific investigation of possibilities this would be impossible. We would thus have 'Catch 22' situation where public policy could not be developed without the information only scientific research could provide, but that information could never be forthcoming because the absence of public policy would prevent the research to produce it.

The Dangers of Ad Hoc Public Policy

There is a middle way between the unacceptable alternatives outline above. That is that in the absence of public policy research be permitted to proceed subject to ethical review by accredited independent ethics committees. These committees would be informed about the international discussion that had proceeded on the technologies but would be free to independently approve research proposals on a case by case basis in the light of those discussions.

There is a danger in this approach, viz. the development of public policy on an *ad hoc* basis by an unelected group. The New Zealand National Ethics Committee Assisted Human Reproduction (NECAHR) has been accused of this in recent months.

There is a possibility of inconsistent decisions being made by such committees as cases differ, there is also the possibility of difficult cases making bad policy. But committees placed in this position cannot but create precedents which will solidify into policies. It is to be hoped that their deliberations will inform the formation of public policy and that, where such policies are thought to be required, that policy will not be unduly delayed.

However it would be difficult to make a telling case against this middle of the road solution which both facilitates research and imposes restrictions where public concern merits it. For example, the benefits accruing to patients, the progress of assisted reproduction services in New Zealand, the avoidance of harms to prospective children and the continued presence of a research capability in this field in New Zealand far outweigh the dangers outlined above.

International Precedents

There are international precedents for proceeding in this manner. The formation of legislation is a time consuming and complicated matter which is further complicated by political interests from time to time. Other countries have taken steps to ensure that patients, the research community and research participants do not suffer as a result of the vagaries of public policy formation. Two examples, one from research and the other from the field of biotechnological innovation, illustrate the value of proceeding thus.

In Canada, as well as in New Zealand, the formation of public policy on assisted reproduction and human embryological research has been protracted. In Canada it has taken more than 10 years to produce Bill C-13 An Act Respecting Assisted Human Reproduction and Related Research and get it through the House of Commons (October 2003). However it failed to get through the Senate due to lack of time and now awaits a place in the legislative priorities of the new Prime Minister. The Bill bans somatic cell nuclear transfer (cloning) but allows researchers to derive stem cells from embryos which have been discarded by assisted reproduction clinics. The pressure to engage in stem cell research in the country is great. Teams of researchers have been built and there is large investment in the field. As outlined above, there are powerful reasons for proceeding with the research. But there is still no official public policy. The Canadian Institutes of Health Research which fund research on behalf of the government have therefore set up a stem cell oversight committee to consider research proposals in the field on the basis that they comply with guidelines which are in sympathy with the surrogate legislation. Its concern is to approve proposals for funding. Any institution which receives research funds of any kind from the Institute has to comply with these guidelines in any stem cell research carried out within it or else lose all the Institute research funding for all research. This is a powerful tool to avoid procedures which are thought to be harmful or ethically unacceptable to the Canadian people as a whole, whilst facilitating the progress of very promising research.

The most celebrated case for the middle of the road solution is the history of the Interim Licensing Authority in the United Kingdom prior to the passage of the Human Embryology and Fertilisation Act in 1990. That Act had almost as long a gestation period as the Canadian Act. It proposed the setting up of a regulatory body. But some years before this occurred an Interim body with no statutory powers acted as a super ethics committee granting permissions to researchers and clinicians to carry out research and innovative treatments. Its lack of statutory authority was compensated for by its moral authority. It was instrumental in preventing procedures which would have been dangerous for patients, including the replacement of large numbers of pre-embryos into the uterus in order to increase the chances of pregnancy. With hindsight few would argue about the benefits which have proceeded from those early applications of this biotechnology. And of those none would argue that it would have been better to wait until the politicians had got around to producing controlling legislation before engaging in the treatments for needy patients.

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