Impact of Biotechnology on Society, Ethical Issues

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Abstract:
Biotechnology is a popular term for the generic technology of the 21st Century. Modern biotechnology is only about 50 year old. These technologies have is useful to human race if used responsibly, they can improve the quality of life for millions of people. They all have potential to change our Society.

Biotechnology developments are often controversial because of the ethical issues they raise in this paper decision about, bioethics, Autonomy Rights, and beneficence, environmental ethics and other key qu3estion for the purposes of this paper the discussion will be focused around the question of what ethical biotechnology is and developing approaches.

Keywords: *Autonomy rights, Culture, Ethics*

1. Introduction

Biotechnology is a popular term for the generic technology of the 21st century. Although it has been utilized for centuries in traditional production processes, modern biotechnology is only about 50 years old, and in the last decades it has witnessed tremendous developments Genetics, biotechnology, and molecular biology are some of the fastest-growing and most controversial industries of our time. Biotechnology has helped improve the quality of people's lives for over 10,000 years. Today's biotechnologies vary in application and complexity. These technologies have the power to shape the future of the entire human race. If used responsibly, they can improve the quality of life for millions of people; virtually eliminate genetic disease; vastly reduce the incidence of genetically-influenced diseases such as cancer and heart disease; However, they all have potential to change our society. The fundamental aim of biotechnology is to meet human needs or demands in order to improve our quality of life.

Ancient biotechnologies mainly aimed to provide a more reliable food source by growing plants and domesticating animals rather than depending on hunting and gathering. Over the last century, the number and range of biotechnologies have rapidly increased. A key to this increase was the discovery of the structure of DNA in 1953, leading to numerous applications, particularly in forensics, medicine and agriculture.

Biotechnology developments are often controversial because of the ethical issues they raise. They frequently become the subject of public debate. Sometimes, people are wary of new biotechnologies because they involve doing things that haven't been done before, and they are unsure of possible future effects. Public debate raises the issues and presents different viewpoints. This can help people make informed decisions and also influence government organizations that control new research and development.

2. Ethical decisions

Making decisions about new biotechnology developments is not easy. Using different ethical frameworks can help you consider the issues and make informed decisions. Try using the Ethics thinking tool to help you explore an ethical issue.

3. Biotechnology and Bioethics

As has been described in other volumes of this series, modern biotechnology has had a great impact on medicine and agriculture. It can only be expected to have an even more dominating impact in future science and technology. Its impact is not limited to the technical impact that these advances have upon industry, medicine and agriculture, any technology influences society, and one can expect that life science technology potentially has the greatest impact.

Biotechnology has also influenced the thinking of society, as will be discussed in this chapter, and we can expect further paradigm shifts to occur. These paradigm shifts include the switch to biodegradable products, industrial pressures to restructure scientific information sharing, the paradigm of sustainable and limited economic growth, and the paradigm of intervention in nature rather than observation and participation in it. Biotechnology has also been a catalyst to the consideration of bioethical issues, and the two words, biotechnology and bioethics, have coevolved. Before extending discussion it is essential to define what is meant by the words, biotechnology and bioethics. This in itself is no easy task because different people with different interests can broaden or narrow these concepts. In this chapter a broad meaning of biotechnology is taken; the use or development of techniques using organisms (or parts of organisms) to provide or improve goods or services. Bioethics is the study of ethical issues associated with life, including medical and environmental ethics.

4. Bioethics

There are large and small problems in ethics; there are global, regional, national, community and individual issues. We can think of ethical issues raised by biotechnology that involve the whole world, and issues which involve a single person. A global problem such as global warming may be aided by global applications of biotechnology, for example to reduce net atmospheric carbon dioxide increase by reducing emissions or increasing biomass, however, excess consumption and energy use can only be solved by individual action, to reduce energy use. A regional issue is the risk presented by the introduction of new organisms or of an unstable genetically modified organism (GMO) into the environment, but it also involves individual responsibility to ensure that sufficient care and monitoring of the release is made. Other ethical issues arising from biotechnology that are thought of as individual issues such as genetic testing, or use of gene therapy, also have societal implications.

We hardly need to ask why we need ethics; rather we need to ask what principles and factors are crucial for guiding decision-making, especially over such a diverse spectrum of issues. Medical ethics involves decision making on a personal level, it concerns the patient and the health care professional, especially the physician. At a further level away may be many others who will be indirectly affected by such questions as the cost of very expensive treatment that takes funds away from other patients. At this level higher policy-making is required, as in the case of issues such as environmental risk, or intellectual property protection policy.

Some key principles of ethics are outlined below, with brief discussion of their relevance to biotechnology issues. We should balance the implications that arise from each principle to arrive

at more ethical decisions. We may need to develop further principles, and bioethics is still being developed.

5. Autonomy

\All people are different. This is easy to see, if we look at our faces, sizes and the clothes that we chose to wear. This is also true of the choices that we make. We may decide to play tennis, or golf, or chess, read a book, or watch television. These are all personal choices. In a democratic society we recognize that we have a duty to let people make their own choices. Above the challenges of new technologies, and increasing knowledge, the challenge of respecting people as equal persons with their own set of values is a challenge for all. This is also expressed in the language of rights, by recognizing the right of individuals to make choices.

6. Rights

Legal rights are claims that would be currently backed by the law if the case went to court, while human rights are critical to maintaining human dignity but may not have yet attained legal recognition. The recognition of human rights has changed the situation in many countries, and many countries in the world have signed the U.N. Declaration of Human Rights, or one of the regional versions of this. This can be applied to many situations; for example, we all have a right to be involved in decisions about our country, the freedom of religion, or speech, to raise a family, to share in the benefits arising from scientific advances, and a right to a reasonable future. Respect for personal rights should change the nature of relationships between people in power and people without power from being characterized by authoritarianism or paternalism to becoming a partnership.

Ethics is not the same as law. Ethics is a higher pursuit, doing more than the law requires. The law is needed to protect people and to set a minimum standard, but you can not determine good moral behavior by settling cases in a court of law. We only need to think of medical litigation or environmental damage penalties, which can lead to huge sums of money being paid for accidents (or negligence) which cannot really be compensated by monetary reimbursement. The solution is to have more careful and moral physicians, companies, and politicians, and the replacement of monetary balance sheets by ethical values, as the primary motive of decision-making.

7. Beneficence

One of the underlying philosophical ideas of society is to pursue progress. The most cited justification for this is the pursuit of improved medicines and health. It has often been assumed that it is better to attempt to do good than to try not to do harm. A failure to attempt to do well, working for people's best interests is taken to be a sin of omission. Beneficence is the impetus for further research into ways of improving health and agriculture, and for protecting the environment. Beneficence supports the concept of experimentation, if it is performed to lead to possible benefits.

The term beneficence suggests more than actions of mercy, for which charity would be a better term. The principle of beneficence asserts an obligation to help others further their important and legitimate interests. It means that if you see someone drowning, providing you can swim, you have to try to help them by jumping in the water with them. It also includes the weighing of risks, to avoid doing harm.

Governments have a duty to offer their citizens the opportunity to use new technology, providing it does not violate other fundamental ethical principles. Just what the definition of fundamental

ethical principles are may be culturally and religiously dependent, especially in the way that they are balanced when opposing principles conflict Although different cultures vary, they all share some concept of beneficence and do no harm. People should be offered the option of using new technology in medicine and agriculture, and such applications should be made, providing internationally accepted ethical and safety standards are applied. Governments have a duty to offer their citizens the opportunity to use new technology, providing it does not violate other fundamental ethical principles. Just what the definition of fundamental ethical principles are may be culturally and religiously dependent, especially in the way that they are balanced when opposing principles conflict Although different cultures vary, they all share some concept of beneficence and do no harm. People should be offered the option of using new technology in medicine and agriculture, and such applications should be made, providing internationally accepted ethical and safety standards are applied.

8. Do no harm

The laws of society generally attempt to penalize people who do harm, even if the motive was to do well. There needs to be a balance between these two principles and it is very relevant to areas of science and technology, where we can expect both benefits and risks. Importantly, we must balance risks versus benefits of different and often alternative technologies, and then apply these comparisons to our own behavior, as well as in determining government policy.

Do no harm is a very broad term, but is the basis for the principles of justice and confidentiality, and philanthropy. It can also be expressed as respect for human life and integrity. This feature is found in the Hippocratic tradition and all other traditions of medical and general ethics. To do no harm is expressed more at an individual level, whereas justice is the expression of this concept at a societal level. Do no harm has been called the principle of non malfeasances.

Biotechnology and genetic engineering are providing many benefits, but there are also many risks. It is also unclear who will really benefit the most. It is important to see these benefits and risks in an international way because the world is becoming smaller and ever more interdependent. Biotechnology affects the lives of people throughout the world. All people of the world can benefit if it is used well, through medicines, and more environmentally sustainable agriculture. However, biotechnological inventions that allow industrialized countries to become self-sufficient in many products will change the international trade balances and prosperity of people in developing and industrialized countries. If developing countries cannot export products because of product substitution the result may be political instability and war. This may in the end become the biggest risk. For example, the use of enzyme conversion of corn starch into high fructose corn syrup causes serious damage to the economies of sugar exporting nations, and may already have caused political instability there. We need to remember national and international issues.

Although we will continue to enjoy the many benefits to humanity, and we may hope for environmental benefits, the price of the new technology is that it may make us think about our decisions more than in the past. This is long overdue! International food safety and environmental standards should be speedily developed to ensure that all people of the world share their protection, and no country becomes a testing ground for new applications.

9. Confidentiality

The emphasis on confidentiality is very important. Personal information should be private. There may be some exceptions when criminal activity is involved or when third parties are at direct risk

of avoidable harm. It is very difficult to develop good criteria for exceptions, and they will remain rare. We must be careful when using computer databanks that contain personal information, and if they can not be kept confidential, the information should not be entered to such a bank.

A feature of the ethical use of new genetics is the privacy of genetic information. This is one of the residual features of the existing medical tradition that needs to be reinforced. It is not only because of respect for people's autonomy, but it is also needed to retain trust with people. If we break a person's confidences, then we can not be trusted. If medical insurance companies try to take only low risk clients by prescreening the applicants, there should be the right to refuse such questions. The only way to ensure proper and just health care is to enforce this on employers and insurance companies, or what is a better solution, a national health care system allowing all access to free and equal medical treatment. We need to protect individuals from discrimination that may come in an imperfect world, one that does not hold justice as its pinnacle.

10. Animal Rights

These above principles apply to human interactions with other humans. However, we also interact with animals, and the environment. The moral status of animals, and decisions about whether it is ethical for humans to use them, depends on several key internal attributes of animals; the ability to think, the ability to be aware of family members, the ability to feel pain, and the state of being alive. All will recognize, inflicting pain is bad so if we do use animals we should avoid pain. If we believe that we evolved from animals we should think that some of the attributes that we believe humans have, which confer moral value on humans, may also be present in some animals. Although we cannot draw black and white lines, we could say that because some primates or whales and dolphins appear to possess similar brain features, similar family behavior and grief over the loss of family members to humans, they possess higher moral status than animals that do not exhibit these. Therefore, if we can achieve the same end by using animals that are more "primitive" than these, such as other mammals, or animals more primitive than mammals, then we should use the animals at the lowest evolutionary level suitable for such an experiment, or for food production. If we take this line of reasoning further, we conclude that we should use animal cells rather than whole animals, or use plants or microorganisms for experiments, or for testing the safety of food.

11. Environmental Ethics

Humans also have interactions with the environment, and in fact depend upon the health of the environment for life. The easiest way to argue for the protection of the environment is to appeal to the human dependence upon it. There are also human benefits that come from products we find in nature; from a variety of species we obtain food, clothing, housing, fuel and medicine. The variety of uses also supports the preservation of the diversity of living organisms, biodiversity. As we have learnt, the ecosystem is delicately balanced, and the danger of introducing new organisms into the environment if that may upset this balance is another key issue raised by genetic engineering. However, we have been using agricultural selection for 10,000 years, so the introduction and selection of improved and useful microorganisms, plants and animals is nothing new, and we should learn from mistakes of the past.

The above arguments should convince people of the value of the environment, and that is a first stage. However, it appeals to our sense of values based on human utility. There is a further way to argue for the protection of nature and the environment, and it is a more worthy paradigm. It is that nature has value for itself because, it is there. We should not damage other species, unless it

is absolutely necessary for the survival of human beings (not the luxury of human life). Nature has life, thus it has some value. Another paradigm for looking at the world is a religious view, that God made the world so the world has value, and we are stewards of the planet, not owners. This paradigm can make people live in a better way than if they look at the world only with the paradigm of human benefit.

There needs to be examination of the view of nature that different people have, so that we can find what the commonly acceptable limits to modification of nature, plant and animal varieties, and human beings are. In the modern world any new science can easily spread, so researchers are accountable to all peoples of the world. There will be future possible applications of technology which are against "common morality", yet there is little research on what is acceptable. We need to know what these perceived limits of changing nature are, before we grossly change the characters of individual organisms, or make irreversible changes to the ecosystem and human society.

Microorganisms are generally placed at the lowest end of the "scale" of ethical status, because the only internal character they have is the state of being alive. External factors from a human aesthetic viewpoint mean that the only argument usually applied to them is human utility.

Biodiversity may have some value in itself, though it is yet to be defined in non-religious terms. If we want to preserve biodiversity, it is essential that we separate parts of nature on land and ocean as nature reserves or parks, away from the parts of nature which are agricultural areas. However, while we separate these areas physically we should not separate them psychologically as areas which we can abuse and areas which we protect. This applies both in terms of sustainable environmental protection and animal rights. In fact, agricultural biodiversity is of direct human utility, and we should attempt to stop its continued loss.

12. Cross-Cultural Bioethics

Any attempt to develop international bioethical approaches must involve consideration of the values of all peoples. We could call this cross-cultural bioethics. This means something different from universalism - attempts to define an international ethical code of what is ethical and what is not, or a table of acceptable and unacceptable risks based on consideration of ethical principles.

Universalism is not currently possible in ethics, and we even have difficulty in universal recognition of basic laws such as those respecting human rights. However, the existence of international environmental laws, e.g. The Law of the Sea, and charters of human rights, is some encouragement for the future progress of limited universalism. We also see attempts within regions, such as by the Council of Europe, to devise a European Convention on Bioethics.

Cross-cultural bioethics involves mutual understanding of various cultural, religious, political and individual views that people have. The diversity of individual viewpoints in any one culture appears to exceed the differences between any two. For example in any culture one can find people fervently opposed to induced abortion and those who support it as a "right" for women's choice. The opinions expressed in the responses to questionnaires that have been conducted on opinions about genetic engineering in Japan and in New Zealand, suggest that people in these diverse countries have a similar variety of reasoning. This type of research should be conducted in other countries, especially in developing countries, if we want further objective data in order to better understand the reasoning of all people. We may find that people in many countries do

share the same hopes and fears, and if this is so, the call for international standards will be strengthened.

13. Conclusion

If we look at declarations of ethical codes made by different religious groups, professional groups, and among different nations, we can see the principles of bioethics that were outlined in the above section in most. A key question in cross-cultural bioethics is how the concept of do no harm should be applied and to what beings it applies. For example; at what stage of development should human embryos be legally protected, for in vitro research or abortion decisions? Which animals should be protected from which research or use? How do we balance justice within national boundaries with global distributive justice, and justice to future generations? How much individual liberty do we allow when individual choices affect society values and options for other people or beings? What is necessity and what is human desire or luxury? What is the level of acceptable risk of harm? These are wide questions, and this paper will discuss some of them. For the purposes of this volume the discussion will be focused around the question of what ethical biotechnology is, and developing approaches that may allow us to better answer this question for policy development.

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