

Bioethics and biotechnology

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Abstract Biotechnology is at the intersection of science and ethics. Technological developments are shaped by an ethical vision, which in turn is shaped by available technology. Much in biotechnology can be celebrated for how it benefits humanity. But technology can have a darker side. Biotechnology can produce unanticipated consequences that cause harm or dehumanise people. The ethical implications of proposed developments must be carefully examined. The ethical assessment of new technologies, including biotechnology, requires a different approach to ethics. Changes are necessary because new technology can have a more profound impact on the world; because of limitations with a rights-based approach to ethics; because of the importance and difficulty of predicting consequences; and because biotechnology now manipulates humans themselves. The ethical questions raised by biotechnology are of a very different nature. Given the potential to profoundly change the future course of humanity, such questions require careful consideration. Rather than focussing on rights and

freedoms, wisdom is needed to articulate our responsibilities towards nature and others, including future generations. The power and potential of biotechnology demands caution to ensure ethical progress.

Keywords Bioethics · Biotechnology · Personhood · Responsibility · Rights

Introduction

Biotechnology, at its core, is about understanding life and using this knowledge to benefit people. Many see biotechnology as a significant force in improving the quality of people's lives in the 21st century. Obviously, biotechnology is intimately tied to science and scientific knowledge. I will argue that biotechnology is also closely tied to ethics. At the very least, biotechnology promotes a certain vision of life, one in which some things are viewed as good and to be encouraged or pursued, and other things are bad and should be avoided or eliminated. That vision influences people's choices and what is viewed as ethically appropriate. A two-way flow exists in which ethics influences biotechnology even while the science impacts ethics.

At times, the relationship between biotechnology and ethics is portrayed as one of conflict. Sometimes the impression is conveyed that ethics is

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needed only when someone wants to tell others that what they are doing is wrong. To a degree, this is understandable since controversy, debate and argument are usually integral to ethics discussions.

But ethics is just as important when there is consensus that a direction is good and right. The role of ethics is often invisible at this stage. There wasn't an ethical debate over whether to search for a cure for cancer. But the decision to pursue such research was motivated by a common vision that curing cancer was the ethical thing to do. Ethical examination of issues is important not only as a form of critique but also to identify and celebrate the right things people do.

The effort, resources and creativity focussed on developing better treatments are ethically laudable. As such, there is much to celebrate about biotechnology. Society and individuals have benefited in many ways from technology. Many technological developments protect people from illnesses and natural disasters, giving some people "liberation from the tyranny of nature" (Barbour 1993, p. 4). In some parts of the world, people have higher living standards. Travel and communication have developed in unprecedented ways. Many of these changes can be welcomed as ethical developments.

Yet at the same time, other ethical considerations must be considered. At what price are some of these developments realised? Some developments seem motivated by a desire to find treatment at any price. Assisted human reproduction is a particularly controversial area where biotechnological treatment of infertility leads to many ethical dilemmas. Even with less controversial conditions like heart disease or cancer, developments have left people with high expectations that cures should exist. Some are concerned that technological developments lead to dehumanisation or in healthcare lead to less emphasis on caring. Ethical concerns exist about justice, and how fairly these technological benefits are distributed—both within society and around the world. With all the options now available for some, concerns are raised about whether too much choice is bad for us (Schwartz 2004).

Overall, though, technology has a strong ethical foundation. The appropriate response to

misgivings and concerns is not to reject technology. "By turning our backs on technological change, we would be expressing our satisfaction with current levels of hunger, disease, and privation... We simply cannot stop while there are masses to feed and diseases to conquer, seas to explore and heavens to survey" (Florman 1981, p. 193).

The benefits of technology, realised and potential, point to a technological mandate: biotechnology should strive to benefit people's lives. Many of the concerns about technology can be traced to the technological imperative: the idea that something should be developed because we can, or we think we can. The distinction between a technological mandate and the technological imperative rests on the ultimate goals of biotechnology. Before addressing whether it can be done, research must answer, "Why should it be done?"

The goals of biotechnology

Ethics includes assessment of the rights and wrongs of specific technologies and applications (like cloning or genetic diagnosis). Another important pursuit within ethics is examining the broader goals and aims of enterprises like biotechnology. The relief of sickness is one goal, but there are others that can be more ethically controversial.

Aubrey de Grey (2006) at Cambridge University has suggested that biotechnology should be directed towards "engineered negligible senescence." He stated, "I'm about indefinite extension of longevity... Average lifespan would be in the region of 1,000 years... seriously." De Grey claims that over the next 25 years enough progress will be made in biotechnology to allow people to extend their lives long enough to obtain the next set of benefits. In this way, little by little, people will live longer and longer, effectively preventing death.

Developing the necessary biotechnology for engineered negligible senescence assumes that indefinite life extension is good for humanity. Even if accepted as an ethical goal, it would be one goal among many. Would it be the most

appropriate goal for biotechnology? This question is especially pertinent given the limited resources available for biotechnology. Resources are also needed for education, to better distribute the healthcare resources already available, and to provide debt relief for poorer nations. How much investment towards the goal of indefinite life-extension would be in keeping with global justice? While people in developed countries can expect to live into their 80s, the average life expectancy at birth in 2003 was still in the 30s in some African countries (World Health Organisation 2005).

These types of questions require ethical evaluation. Time should be taken to reflect on the broader implications of pursuing biotechnology. For example, the Center for Responsible Nanotechnology claims that “much industry can be directly replaced by molecular manufacturing.” The economic fall-out from such developments would be immense, leading to significant social changes with the potential for good and harm. These ethical issues need careful examination even before the technological issues are resolved.

Taking the time to reflect on these aspects of scientific developments can be difficult, especially with the pace and focus within biotechnology. The pressures of competing for funding, making breakthroughs, securing intellectual property, and obtaining market share all push against calls for caution or time-consuming reflection. Technological development can seem like a motorway, everyone on the fast track to success. Ethics, even when well intentioned, can seem like a diversion or a road-block that prevents biotechnology reaching its destination, or delays it inexcusably.

However, there is a growing realisation that ethics must be a part of the planning process within biotechnology. In many areas of research, ethics does impact the design of scientific experiments. Any research involving human or animal participants will be scrutinised by ethics committees. The methodology must conform with ethical codes and guidelines. An argument can be made that publicly funded research should be conducted in ways that conform with society’s values. “When the nation decides an activity is worth its public money, it declares that the activity is valued, desired, and favored” (President’s Coun-

cil on Bioethics 2004, p. 38). Therefore it is important to ensure that what is publicly funded is ethically acceptable in society. The goal of relieving suffering is widely accepted, yet it must be balanced against other societal goals. The ethics of proposed biotechnological developments must be scrutinised carefully.

The darker side

Even such a laudable goal as relieving human suffering cannot be taken as condoning any and all biotechnology. Humanity’s creativeness and resourcefulness have long been recognised and praised. But human activity can have a darker side. The ancient Greek philosopher Sophocles reflected on these two sides of technological development. On the one hand he noted many human accomplishments in transport, agriculture and medicine. But he also pointed to problems with this same inventiveness.

“Many the wonders but nothing more wondrous than man....

Clever beyond all dreams
the inventive craft that he has
which may drive him one time or another to well or ill.

When he honors the laws of the land and the gods’ sworn right high indeed is his city;
but stateless the man who dares to do what is shameful” (cited in Jonas 1984, p. 2).

The human capacity for good or evil, whether intended or unintended, impacts how people view the ethics of technology. Hans Jonas fled Germany during the Nazi era and eventually taught philosophy in New York. One of his life’s projects was to develop an ethics for technology. His approach was based on his conviction that the new technological age raises several ethical challenges that earlier technology did not have to address. “Modern technology has introduced actions of such novel scale, objects, and consequences that the framework of former ethics can no longer contain them” (Jonas 1984, p. 6). Biotechnology is a particularly fitting example of technology with such fundamentally different characteristics that it requires a careful

re-examination of how its ethical dimensions are evaluated. Biotechnology “raises moral questions that are not simply difficult in the familiar sense but are of an *altogether different kind*” (Habermas 2003, p. 14).

Challenging characteristics of biotechnology

The vulnerability of nature

Jonas contends that ethics prior to the new technological age focussed on human–human interactions. Human dealings with the non-human world were regarded as ethically neutral. The capacity for new technology to have global impact shows that ethics needs to broaden its focus. Environmental problems and the existence of nuclear technology demonstrate the importance of ethical examination of more than just human–human interactions.

New technology also highlights the vulnerability of nature. Previous technological developments appeared to assume that natural resources were in endless supply and that nature could rebound from any human impact. Environmental changes show these assumptions were problematic. Ethical evaluations of biotechnology need to take the vulnerability of nature into account. These issues also point to limitations in previous ethical approaches that focussed only on humans. At the same time, a concern for these broader issues can lead to new technological challenges and exciting research opportunities, such as has occurred with research into renewal energy sources stemming from ethical concern for the environment.

Limitations with rights

Rights-based approaches to ethics have made important contributions to human welfare. They provide a means by which vulnerable humans can argue for more ethical treatment. However, such approaches have their limitations (O’Mathúna et al. 2005). A rights-based approach can become very individualistic, with each party focussed on his or her rights. Access to biotechnology and new treatments can be defended on the basis of

individual rights and personal autonomy. Yet this approach does not lend itself easily to concerns about people seeking treatments that are ethically questionable or of uncertain benefit. For example, individuals may want reproductive cloning, but the concerns of future generations and society as a whole need to be considered. Rights-based approaches are problematic in these situations since rights are typically held by individuals and are not given to those who do not as yet exist.

A rights-based approach to ethics must include some method of identifying those who bear rights. Those who have rights place duties on others to uphold those rights. It has proved very difficult to find consensus on how rights are to be ascribed. One approach is that all humans are inherently entitled to all human rights. This raises questions about when a human is given these rights (at fertilisation or birth or some other point). It also leaves no guidance on how to treat the non-human world. Biotechnology requires answers to these questions to address ethical concerns about non-human species and nature as a whole. This has led to an approach where rights are granted based on particular abilities and attributes. There is little consensus over what abilities entitle an organism to rights. Philosophically, it is also difficult to justify why any particular attribute should lead to the granting of rights. The whole approach is criticised as being motivated by a desire to treat unethically those not given rights. This is particularly relevant to research on human embryos, especially embryonic stem cell research.

Developments in biotechnology point to serious limitations with a rights-based approach to ethics. Rather than providing insurmountable problems for ethics, these point to the need for a different approach to ethics. Jonas and others point out that rather than focussing exclusively on human rights and entitlements, the new technological era requires a greater focus on human responsibility.

Future consequences

Earlier technology impacted humans and their lives, but did not have the potential to change human nature. Biotechnology does. With that comes the potential for broader and long-range

consequences. Predictions about these consequences can be difficult and unreliable. This is particularly cogent with genetic technology. The consequences of our ability to manipulate the human genome could impact many, if not all, future generations. The way genes interact with one another means that manipulating one gene could have unintended effects on other genes or their expressed proteins. This is especially important given the recent realisation that the human genome contains fewer genes than originally presumed.

Biotechnology's mistakes may produce problems, but so too might its successes. As technology has developed and spread, "the more all of reality is seen as matter-of-factly material and hence as controllable in a completely technical and rational manner" (Schuurman 2005, pp. 16–17). Successful technological solutions could lead people to view all our problems as needing a technological fix. The medicalisation of patients and the instrumentalisation of people are consequences of technology's successes. This can have a dehumanising effect on human life, which makes it easier to treat some humans as less than fully human. This is a way in which technology can take on a life of its own and have much more profound ethical consequences.

Biotechnology has the added capacity to produce products that literally do take on life. The technology humans developed in the past was inanimate and could be left unused if found to be ethically problematic—as difficult as that might have been. However, biotechnology now makes possible the creation of products that are themselves alive. "The work of [human] hands takes on a life of its own and independent force, no longer figuratively but literally" (Jonas 2004, p. 570). The living products of biotechnology are no longer under human control in the way an inanimate machine was. Now the living product itself could influence its impact and might develop into new forms of life with unexpected consequences (although such problems have not developed to date with genetically modified bacteria).

Such factors should remind us of the place of awe and mystery in the face of nature. We humans are limited in our ability to understand, control and direct nature. That realisation should

cause us to pause before attempting to manipulate life through biotechnology. It should lead to a sense of caution. Yet often the very opposite is the case, with the pressure to rush to be the first to develop something new. The precautionary principle is particularly pertinent with experimentation on humans.

Impact on human nature and personhood

No area of biotechnology more clearly brings to focus the need for careful ethical reflection than its potential to impact human nature. Previous technology has provided new tools that impacted human activities and society. Humans were the makers of technology. Some aspects of biotechnology now make humans the objects of technology. Humans have turned upon themselves and are ready "to make over the maker of all the rest" (Jonas 1984, p. 18). The capacity for biotechnology to create and change human lives calls for careful reflection on what it means to be human and the place of human personhood. According to the contemporary German philosopher, Jürgen Habermas (2003, p. 13),

"For as soon as adults treat the desirable genetic traits of their descendents as a product they can shape according to a design of their own liking, they are exercising a kind of control over their genetically manipulated offspring that ... should only be exercised over things, not persons."

This, he continues, "results from obliterating the boundary between persons and things." Recent developments with stem cell research and cloning have been the lightning rod for debate over human personhood. These discussions point to the gulf between proponents on the different sides. Some have viewed embryos as "featureless bundles of cells" (Pearson 2002, p. 15). From this perspective the human embryo is a human non-person that can be used and destroyed in research. Others disagree and maintain that the human embryo should be treated as a person, making it unethical to treat it merely as a means to others' ends.

Personhood can be viewed as an inherent attribute of all humans. This confers all humans

with certain rights and determines how persons should be treated ethically. This approach protects humans, especially the vulnerable, from unethical treatment. The other approach makes personhood conditional on reaching some stage of development or possessing certain abilities. Only humans with those capacities are then entitled to protection. A fundamental problem with this approach is that it always arises to justify killing those declared to be human non-persons. How will it affect us to treat human lives as commodities to be manipulated and destroyed at will? When we justify doing so with embryos, will it become easier to do so at later stages of development?

This debate points to the difficulty of determining public policy when sections of society have irreconcilable positions on matters of fundamental importance. We must also examine how biotechnology itself impacts our view of human nature. Leon Kass asks how will it affect us “to look upon nascent human life as a natural resource to be mined, exploited, commodified. The little embryos are merely destroyed, but we—their users—are at risk of corruption” (Kass 2002, p. 10). This is much more than a debate over rights. This is about human dignity, including what it means for humans to act with dignity. This changes the focus from ascribing rights to determining responsibilities.

Central place of responsibility

The enormity of the potential impact of biotechnology on human nature should cause us to proceed cautiously. Biotechnology has the potential to do great good. But it also has the potential to cause much harm. This could arise in the physical realm through unexpected consequences of the technology itself. But other harms could arise through the non-physical impacts of biotechnology. Cars and computers have affected many aspects of human life and society. Biotechnology could change what it means to be human.

A rights approach to ethics makes clear where people have rights. Each right carries a corollary duty or responsibility. If people have a right to healthcare, someone has the responsibility to

provide healthcare resources. Much energy has been expended identifying and defending human rights. We now need a similar emphasis on human responsibilities.

Responsibility is also a corollary of power. Biotechnology brings new powers to humanity. These powers should remind us of our responsibility to nature and the environment, to all of life, to the future, and to human nature and personhood. To understand these responsibilities entails the development of wisdom. That wisdom requires ethical reflection before developing specific forms of biotechnology. Taking the time for that reflection can go against the pace of biotechnological developments and hubris over human wisdom.

Jonas warned that new technology was propelling us towards a utopian future. Aubrey de Grey exemplifies that vision for biotechnology. These developments have the potential for much good, but also risk changing, harming or even destroying some species, including ourselves. To make the right ethical decisions “requires supreme wisdom—an impossible situation for man in general, because he does not possess that wisdom, and in particular for contemporary man, because he denies the very existence of its object, objective value and truth. We need wisdom most when we believe in it least” (Jonas 1984, p. 21).

Jonas was referring to the post-modern rejection of objective truth that has become so prevalent—the idea that all answers are equally valid. In contrast, ethics searches for better answers to ethical questions. It acknowledges the limitations in current wisdom, and strives to improve our understanding. The way forward is muddled by our inability to accurately predict the consequences of proposed biotechnological developments. Some argue that we should push ahead and deal with problems as they arise. But given the scale of disaster that biotechnological mistakes could trigger, Jonas’ guiding principle contains much wisdom. He argued that “ignorance of the ultimate implications becomes itself a reason for responsible restraint—as the second best to the possession of wisdom itself” (Jonas 1984, p. 22).

Time and resources must be committed to examining the ethical implications of proposed

biotechnological developments. The potential impact on all aspects of nature must be considered. The social, emotional and spiritual implications of developments in biotechnology must also be examined. When humans themselves are the objects of biotechnology, great caution is necessary lest we promote a view of ourselves and our neighbours as nothing more than living bits of technology.

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