Biomedical Manipulation: Arguing the Case for a Cautiously Optimistic Stance

The world into which we have moved is dramatically different from all previous ones, since human beings can be controlled and manipulated biologically in ways once considered impossible. This raises bioethical, social, and theological issues of untold proportions, with numerous ramifications for the relationship between science and Christianity. The knife edge along which we walk can be illustrated by a variety of examples in biology and medicine, one of which is to determine what should or should not be done to human embryos. While the central direction theologically is provided by our understanding of God's image in humans, we have to work out how much control and manipulation this allows over our biological makeup. It also raises the query of what theological evidence exists to suggest that the structure and functioning of the human body reflect a divinely ordained pattern.

The merest glimpse into the rapidly changing world of modern biology and molecular medicine reveals a plethora of scientific and clinical possibilities. The excitement in scientific circles is palpable, as an increasing array of clinical conditions will apparently succumb to the inroads of genetic and molecular therapies. From this one might conclude that everyone would welcome these developments with unabated enthusiasm. Such, however, is far from the case. Many are deeply uneasy at the directions in which experimental science appears to be heading, and are pessimistic about what future genetic science may hold for the human race. For these, biomedical science has been too successful as it ploughs relentlessly on into an arena in which human well-being will be subject to ever-expanding control by an increasingly manipulatory form of science.

Fears of this ilk fuel much contemporary bioethical debate, and tend to dominate such debate in Christian circles, where it is not unknown for theologians and scientists to be pitted against one another. Stances on some bioethical issues have taken on the significance of dogma—certain approaches are applauded, others are condemned. This has made productive dialogue exceedingly difficult, and may be having consequences for Christian attitudes towards science.

Manipulation and control of cellular processes are the stuff of biological science, including events at the beginning of life and at the earliest stages of embryonic development. Should scientific curiosity be curbed in this realm but not in others? The objective in asking this question is not to suggest that anything that scientists want to do should be done, but to clarify what it is we are doing if we attempt to limit scientific investigation in these areas. In the Christian arena, is there theological justification for doing so?

Biomedical manipulation is no longer the realm of science fiction. We are the manipulators and the manipulated. For Christians, the tension inherent within this dichotomy is an exceedingly uneasy one. On the one hand, it points to technologies

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that appear to be bestowing upon humans a burgeoning control over themselves and others, and yet, on the other hand, we get the profound feeling that this is threatening God's control. Should this creeping control by humans be stopped before they actively usurp realms which should rightly be left exclusively to God?

This is both a theological and ethical question, because it forces us to ask what should or should not be done from a Christian standpoint. It also touches on two prevailing themes—control and manipulation. What makes the task of assessing these themes so difficult is that both are the province of scientists, who wish to understand biological processes as a prelude to controlling them and then, if necessary, manipulating them. And yet, the control and manipulation of human beings (or human tissue) especially at the beginning and end of life, pose immense problems for Christians.

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A Manipulated Community

Problems arise because certain areas of scientific exploration are deemed to lie outside the legitimate bounds of human interference. At the beginning of human life, these problems focus on the human embryo, which is regarded as a person, bearing the image of God from conception onwards.[1] Consequently embryos are inviolable, and should never be knowingly destroyed.[2]

From this it follows that there is no place for research procedures on embryos not directed at benefitting the embryos in question.[3] Since no research at present can achieve this, human embryo research becomes off-limits to developmental biologists. This, in turn, has implications for the artificial reproductive technologies, since their original development and subsequent refinement depend upon ongoing embryonic research.[4] Stem cell technologies starting from embryonic cells are regarded as unacceptable because of the inevitable destruction of embryos. Also unacceptable is the stem cell research linked with somatic cell nuclear transfer (SCNT), since blastocysts (very early embryos) would be momentarily produced as part of the process. Other scientific procedures that also may be considered of dubious ethical status include human reproductive cloning, genetic manipulation, the production of transgenic animals (especially using human genes), germ cell gene therapy, and xenotransplantation (the transplantation of organs from one species to another). While the rationale in some of these cases extends beyond the embryo,[5] it is the embryo and early human development that emerge as central concerns.

The view that human embryos are inviolable has profound repercussions for whether particular research procedures are or are not regarded as allowable. Since this view is driven in large part by theological considerations, research on human embryos becomes antipathetic to Christian aspirations; it is something in which Christians should not indulge.[6] Hence, whatever scientific knowledge can be gleaned from such research is illicit knowledge and should not be obtained; neither should any of the clinical developments that may stem from it be utilized. At present, these include many of the artificial reproductive technologies, and in future they may well include many examples of genetic modification and an array of stem cell technologies.[7]

This is the knife edge along which science and Christianity are moving in the uneasy world of biomedical technology. The issues I have touched on are generally regarded as bioethical ones, and are usually approached from an ethical perspective. What I have done is turned the debate around, to ask how scientists (rather than consumers or societies) are to tackle these issues. From the perspective of a scientist interested in understanding cellular differentiation, striving to understand the control of very early developmental processes and cloning constitutes the driving force and the context for the work. This applies as much to scientists who are Christians as to any other scientists. While the material on which the research is to be conducted is to be obtained ethically, the avenues opened up by the research (such as clinical application and therapy) are of considerable importance. This does not mean that the two perspectives inevitably lead to different end-results, but that both have to be taken into account in decision-making.

It is here that Christians with a scientific training and perspective may come into conflict with their Christian peers; and conflict is probably greater today in the biomedical

realm than in any other. This is because the nature of the investigations appears to intrude into the inner recesses of the human "soul"—into what makes us the sort of people we are. What shines through is a fear at the possibilities opened up by human control, particularly where the object of that control is the human person.[8] Biomedical scientists are portrayed as power hungry and out-of-control, as they want to dismantle the last remaining bastion of human dignity. Surely, it is argued, there must be some inner sanctum of the human person that is forever beyond the reach of other human beings.

God's Image in Humans

One of the fundamental tenets of Christian theology is that humans are created in the image and likeness of God. It is this that is seen as distinguishing human beings from all other creatures and plants. There is something special about humans, and this is one way of expressing it. The concept of the image of God has been interpreted in a variety of ways historically. It can refer to the spirituality, rationality, and morality of human beings, to their dominion over creation, to their capacity to enter into relationship both with God and with other humans in human community, and to physical attributes such as their physical bodies and upright posture. It is these capacities taken together that in Christian thinking bestow upon humans their uniqueness.

The phrase "image of God" occurs principally in the early chapters of Genesis (1:26, 27; 9:6), as well as in a small number of New Testament passages (1 Cor. 11:7; 2 Cor. 4:4; Col. 1:15). There is also reference to people being in the likeness of God (Jas. 3:9). Other New Testament passages refer to the transformation of Christians into the image of Christ (Rom. 8:29; 2 Cor. 3:18; Col. 3:10). The picture suggested by these phrases is of God as the original and human beings as copies of that original (at least in certain respects). God, in making us, gave us something of himself, imparting to us some of his own characteristics. In other words, human beings have many God-like attributes. We are persons; we make choices and act upon them; we have values and value systems; we are aware of ourselves and of others; and we are held responsible for our actions. In a nutshell, we have some of the personal features of a personal God.[9]

Implicit within these concepts is the moral agency of human beings. In the Genesis account of the creation of humankind, God treated Adam as someone capable of deciding issues morally and rationally (Gen. 2:16,17). There is no hint of God treating human beings in any other way, even when it would lead them into serious strife. The moral responsibility characteristic of humans is an echo of the moral responsibility of God, enshrining as it does the capacity to act wisely and lovingly. Human beings have been given a mandate to heal and restore God's creation.

Therefore, humans are to exercise responsible dominion over the world (Gen. 1:26–28; Ps. 8:6–8). They are to preserve and protect it by being stewards of the whole environment (Gen. 2:15), utilizing their capacities and abilities for the good of all—other creatures, the physical world, and the human community. Humans have been placed in control of everything else, and also over the weaker and dependent members of our own species. They have been given immense responsibility under God, including the onerous privilege of making decisions and choices affecting other human beings, other species, and the environment.[10] In this, we are driven to restore and improve the world, rather than accept it and its fallen state in some fatalistic manner. We are to understand, protect, care for, develop, nurture, and manage the earth for God and ourselves. Humans are to change their world for good, although we are all too conscious that self-centered changes can be detrimental and can work against the interests of others. Either way, there is no escape from both the privilege and responsibility of decision-making.

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But is this not dangerous, since we live in a fallen world, where our actions and aspirations are so frequently marred by selfishness, foul motives, and rank incompetence? As we reflect on these dangers, we are reminded of two principles: (1) God is to be placed firmly at the center of human existence; and (2) God does not readily abrogate human freedom. When these are ignored in the technological realm, either we end up replacing God by technological achievement and human prowess, or we seek to limit human freedom by imposing arbitrary rules and regulations. While the driving forces in these instances are different, the end-result is remarkably similar: the loss of an elevated view of human dignity and of the freedom centered on a relationship to God. Consequently, implicit within all human achievements, including those in the technological realm, is a tension between expecting too much of them and attempting to limit them unduly. This is the choice between realizing their exciting possibilities and facing up to the necessity of imposing limitations upon them. Nevertheless, the transformation of which they are capable is always limited, and their possibilities are finite.

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None of the above would be possible were it not for human creativity, mirroring as it does God's creativity. From this it has been argued that human creativity is designed to "preserve what God has given and to build on it through further creative ventures using the resources that God has provided."[11] It is in this sense that humans are sometimes referred to as being co-creators with God, although this designation may be hazardous since humans do not create *ex nihilo*. Nevertheless, there can be no doubt that humans are co-workers with God since human work is needed if God's full purposes in the universe are to be realized. In view of this, humans can be referred to as "pro-creators,"[12] not just in the reproductive sense, but across all aspects of our existence.

Another approach is to recognize that humans "are called to mitigate the Fall's effects and thus improve human and planetary life."[13] It is this creativity that is of such profound significance for every area of human life, from the arts to science and commerce, and yet its thrust is to break down old barriers, to explore unexplored territory, and to establish new frontiers for investigation and development.

Human Intervention and Human Responsibility

Ancient as these concepts are, they serve as a foundation for thinking about what may or may not be appropriate when human action is directed at modifying the bodies and brains of human beings. As artificial devices move from the external environment to the internal environment, from the world around us to the world within us, are we being forced to see ourselves differently? When the artificial takes precedence over the natural, is there a sense in which our likeness to God is diminished, and even God's role in bringing us into being is usurped?

As we look back throughout human history, we find that people have tinkered endlessly with nature. These intrusions into nature have taken many forms: building houses to protect people from the weather, draining swamps infested with malaria-bearing mosquitoes, undertaking surgery, and using antibiotics. Time and again, the Christian Church has backed these ventures with its investment in hospitals and clinics and its efforts to make communities self-sufficient with adequate clean water supplies. People are confronted by genetic combinations that lead to Huntington's disease, diabetes, and heart disease, but few would argue that these particular combinations reflect God's will, and should not be combated by the most effective means at one's disposal. Medicine traditionally has done its best to cope with these conditions, and the concern normally expressed has not been whether intrusion is justified, but whether it will enhance or diminish the human condition. This reflects a Christian emphasis upon caring for people and restoring them as far as possible to wholeness and a state of well-being.

Efforts such as these depend upon the creativity and compassion of fellow humans. In this way, human societies have been transformed. For example, the human life span has been extended, infant mortality rates have decreased dramatically, and the overall quality of people's lives and experiences have improved. The significance of this transformation becomes only too apparent when healthy communities in developed countries are compared to the misery and limited expectations of communities living at bare subsistence levels. Human interventions like these are illustrations of biomedical manipulation, although some may be relatively technologically unsophisticated. Their effects, however, are no less dramatic for that. What criteria do we have by which to judge their acceptability in Christian terms?

While accepting that there is no ideal in human efforts, the examples just quoted are all characterized by attempts to diminish suffering and remedy defects. They all have plausible therapeutic goals, which are Christian goals, as they seek to bring wholeness and purpose to real human beings contending with a broken, fragmented world. Goals such as these are not exclusively biological ones; sometimes the spiritual dimension is far more important. Nevertheless, the biological is generally not too far from the surface. What we should be aiming for is improvement of the human condition, as long as the bottom line is an

enhancement of people's capacities to relate better to God and to one another. There is no virtue in being complacent with the alterable, since this denotes sloth and an acceptance of mediocrity. On the other hand, we have to learn contentment with the unalterable, that which is currently beyond our ability to change for the better.[14] The balance between the two is a matter of judgment and discernment, depending in part on the current state of the relevant science.

The world in which we live is not an unchanging given; neither is it to be elevated to some untouchable status as if it were fixed and immutable. The context for determining what human stewardship of the created order amounts to is provided by our ever-changing environment and also by the constant changes affecting what we ourselves are. The crucial issue is to decide what sort of interference with nature will advance human welfare, while at the same time respecting the dimensions of what it means to be human.

We have every reason to be cautious over the directions of technology, but our caution has to be balanced against the immensely destructive forces of nature out of control. Christians would do well to examine the effects of both, and then direct their efforts at seeing that the good of the interference outweighs the evil of both interference gone wrong and of nature unrestrained.[15]

The ground covered so far has been relatively noncontentious, since if diseases can be overcome by public health measures or by applying antibiotics or by surgery, all we seem to be doing is making life better for people by allowing them to live more fulfilled lives. This is surely what medicine at its best is all about; it is straight-forward therapy. However, in practice, life is not usually this simple and agonizingly ambivalent decisions have to be made.[16] Not only this, what may seem straight-forward today was experimental and very unclear just a short time ago, besides which the borderline between treatment and enhancement may be a decidedly blurred one.

Control

Cloning, genetic manipulation (especially genetic targeting), and the whole of the human genome project (HGP), point toward an ever-increasing precision of control over what we are biologically as human beings. Numerous examples of precise control and of a new dimension to biotechnology and molecular medicine are available. They include the ability to: (1) pinpoint genes and what they do and how they go wrong, (2) reprogram a genome, (3) switch on genes that under normal circumstances would have been switched off during differentiation, and (4) utilize simple cells like fibroblasts as the source of cloned animals and a vast panoply of tissues and even organs. Should techniques like these eventuate, they will liberate biology in ways that once seemed unimaginable, having the potential to transform medical practice and human expectations.[17]

In turn, these techniques present immense challenges to theology, because it has to be determined where God's hand can be recognized. According to one scenario, God appears to be sovereign over only the uncertain and uncontrolled parts of human existence, because his presence and influence are recognized mainly (perhaps only) in the ill-defined and the mysterious. If one follows this line of reasoning, every biological advance becomes a threat to his sovereignty. Since cloning and genetic engineering offer the prospect of removing much randomness and uncertainty from the early stages of human existence, God's territory inevitably shrinks and a time may come when it becomes invisible (this parallels what has been referred to as the weightlessness of God—his unimportance[18]). As a result, do the controlled parts of human life become some sort of human domain over which God has neither interest nor concern, let alone control? In other words, does it make sense to speak about divine control over processes ostensibly under human control?

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This dilemma can be illustrated by what some writers refer to as the genetic lottery and its importance for human dignity in the reproductive realm. The significance of the lottery element within human reproduction is that it imparts to the whole of sexual reproduction an unknown and uncontrolled aura, which some view as having Christian significance. For instance, in discussing human cloning, Meilaender contrasts the mystery of the genetic lottery with the predictability of cloning, which, according to him, would convert any resulting children into products of human will.[19] The latter leads to the "making" of children, as opposed to their "begetting," the essence of "making" being deliberation and mass production against "begetting" with its uncertainty and unpredictability (at least within limits). For many Christian writers, "begetting" is congenial to Christian thinking and practice whereas "making" is antipathetic to it.[20]

Biologically, the randomness of genetic inheritance is basic to sexual reproduction with the redistribution of

characteristics that goes to make-up the emerging individual. Consequently, any process having major repercussions for this redistribution would be foolhardy, since it would take us well beyond human abilities—now and perhaps at any time in the future. But does this also mean that the occasional deviation would be catastrophic? It appears not, since identical twins are deviations, and everyone lives remarkably easily with these deviations. Cloning on a vast scale probably would have detrimental consequences genetically, but if cloning were on a very limited scale this probably would not be the case.

Why should we look to mystery rather than understanding? When the genetic lottery goes seriously wrong, resulting in distressing diseases, we attempt to rectify what has gone wrong. Conventionally, this is done indirectly, by manipulating the results of the genetic errors using conventional medical approaches. But is there any difference *in principle* between this and directly influencing genetic combinations? Both are forms of control, although one form (the genetic) is far more efficient than the other (conventional medicine). Surely efficiency is not the issue theologically. If it is, what we are saying is that incomplete control is compatible with God's actions and purposes whereas complete control (if there is such a thing) is not. This is a god-of-the-gaps position, the gaps in this instance being provided by inefficiency.

Underlying all such niceties is a more fundamental query, and this is whether or not we are prepared to accept what the genetic lottery turns up. The history of medicine and medical intervention suggests that we are not prepared to do this. Diseases galore have been tackled, though many of them have genetic bases. Consequently, to accept whatever the genetic lottery doles out is genetic fatalism, and a rejection of the wholeness of human existence. To glory in such determinism is a strange irony for Christian thinkers.

One of societies' greatest problems is obsession with the normal, and this is something that could be accentuated by any of the current biomedical technologies. On the other hand, as far more becomes known about individual genes and their consequences, we may come to learn that there is no genetic or other ideal to be approximated. Genetically, we are all flawed in various ways, and the interaction between combinations of genes that seem to be beneficial and those that seem to be deleterious may be an intimate one. Even if there were a human ideal, it would be unattainable, since reproduction brings constant genetic variation. To look for a genetically perfect human ideal is not only to treat humans as unchanging, but to ignore our human creatureliness and the randomness of all new genetic combinations.

Outside the genetic realm, we can ask whether it is arrogant to work toward attaining a level of technology sufficient to overcome, let us say, extensive brain damage. Or is the longing to do this part of a legitimate desire to overcome the evil of accidents and illness, themselves part of the greater desire to subdue destructive forces within God's created world? Humans, as those who image God, are creative, rational beings, who long to go beyond that which they previously have achieved, especially when this involves overcoming that which is evil and destructive. Underlying much of modern medicine is an immense degree of human control, without which there would be no sophisticated medicine as we know it.[21] It is control that can be used to good effect; it is control that can go abysmally wrong. However, at no point does control like this shut God out of the picture for it is humans acting like him and utilizing their abilities to good effect. The givenness of the created order and our ability to transform it are both limited pointers to how we act in the biomedical arena. We are to seek to transform what needs to be transformed while gratefully accepting much else as given.

An important starting point is provided by the stance that God is sovereign over all. He is sovereign over the genetic realm, just as he is over human life, human community, and the ecosphere. Divine grace and creativity are evident in all these realms, and human creativity is to follow suit. If we can say that God works through creation and, therefore, through what we describe as the natural world, there is no reason to say that he does not also work through the basic processes described by biology and,

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therefore, through genetic mechanisms. For theologian Cole-Turner, treating DNA as matter is not in itself sacrilegious, and hence is not beyond the legitimate reach of science.[22] Neither is there any reason in principle why God should not work through humans to achieve intentional genetic change, and therefore make use of appropriate genetic technologies.

If this is true, the next step is to affirm that genetic modification has the potential for extending the work of God, who routinely seeks genetic change as an integral part of his creative activity. One can go even further and state that now God has more ways at his disposal to bring about fulfillment and harmony. One example of this is through the medical and pharmaceutical advances that will undoubtedly flow from the HGP over coming years.

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The new factor of alarm for some Christian writers is the advent of the ability to modify human nature at the genetic and cellular levels. Some feel that this is an intrusion into a sacred mystery of genetic givenness, a givenness that should be received with gratitude and never manipulated.[23] Thus, they react negatively to cloning in its various forms, and even to some extent to the HGP. But is it any more sacrilegious to cut DNA than to cut living tissue as in conventional surgery? On what grounds does this become a sacred realm open only to God? Why should genes be any different from the proteins they produce, or the tissues and organs to which the proteins contribute? All are essential constituents of living organisms.[24]

This is not giving humans carte blanche to do anything in the genetic realm, since whatever is done there has to be consistent with the nature and purposes of God, who renews the whole creation in anticipation of a new creation. What is beginning to emerge is that the Christian's major task is not that of objecting to scientific developments, but of seeing them as one way in which God is demonstrating his grace through his creation. Daunting as this is, it brings together theological, scientific, and ethical considerations—a task that becomes feasible for those with an understanding of these three dimensions.

Although much thinking about control revolves around genetic control, people and their bodies do not exist in a social vacuum. Different as these factors are, both can have considerable repercussions for the wholeness of human existence. Compare the quality of life of the following: (1) those with potentially excellent health but living in a malnourished community where their efforts are devoted to mere survival; (2) those brought up in abusive homes and characterized by behavioral problems as adults; (3) those with cystic fibrosis or some other equally debilitating condition but brought up in loving and supportive homes and communities; (4) in the future, those brought into the world by cloning or following genetic modification of some description but raised in a loving environment where they are cherished for all they represent as individuals in their own right.

These illustrations point to different forms of control: social in (1) and (2), and biological in (3) and (4). The outcomes are not inevitable and depend as much upon social pressures as biological ones.[25] While no factors can be dismissed as unimportant, what shines through as of immense importance is the ability to be oneself and to relate productively to others within the human community. This is a crucial facet of being made in the image of God. While there may be biological limits to what should or should not be done to humans, these have to be viewed within the broader context provided by human relationships. The manner in which people are treated is crucial, since it epitomizes the thrust of any Christian perspective.

Christian directives are clear, whether the control is behavioral or biological in character. In both cases, the Christian way emphasizes the equality of all people no matter how diverse their abilities, the acceptance of the unlovely and unconventional, the looking after the interests and welfare of others, and humility on our part (Lk. 14:7–14; Rom. 12:3; Phil. 2:3–8). Our service to others in love is an outcome of God's self-giving love in Christ (Eph. 4:32), and underpins our aim to be agents of reconciliation. This is linked with the hope Christians have of a better world, and that God's kingdom will come (Matt. 6:9–13). As these elements guide our relationships, any potential for control over others will be directed toward their well-being and benefit. In this way, genetic control as much as behavioral control will resonate with new meaning.

Manipulation

Human control leads inevitably to discussion of manipulation: changing that which has gone wrong, attempting to rectify pathology, and redirecting processes. I have argued a case for this already, but now we need to go further and inquire whether it is possible to identify a boundary between being images of God and not being images of God. Such a boundary may correspond to some forms of radical genetic modification, multi-organ replacements, or the transplantation of brain cells from other species to

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humans. Could manipulation of this order actually alter the moral status of those who have been manipulated? Instead of reflecting God will they reflect their human creators? Instead of being able to live as moral agents will they be the handmaidens of their manipulators? These are disturbing possibilities, and it is hardly surprising that they elicit strong repugnance in many people, including many Christians. The difficulty here is that we are moving in uncharted territory, and future scenarios of this ilk are always troubling.

First, let us ask whether the motives of the manipulators are significant? If these procedures are being carried out with the intention of benefitting the person being manipulated, if they have been subject to rigorous scientific assessment, and if fully informed consent has been provided for the procedure, there seems to be no good reason for objecting in principle. On the other hand, if none of these strictures holds, they are unacceptable scientifically, ethically, and theologically.

Second, would these modified individuals still be able to respond to their world, to other people and to God? Would they still be capable of understanding and of having meaningful relationships with others in the human community, of having values and hopes, of planning for the future, of demonstrating love and compassion, of making choices, of worshiping, and of enjoying pizzas? These capacities and many others like them make up the repertoire of human behavior, and point in some measure to what it means to be "in the image and likeness of God." Even now human beings vary enormously in their capacities and limitations, mostly due to natural variation, some to pathological conditions, and some to technological manipulation; but we do not doubt their humanness and their oneness with others in the human community.

Many individuals are currently manipulated in quite radical ways, although very few if any objections are raised to them. Artificial body parts are commonly used, especially joints and limbs; many operations involve removing some pathology and replacing it with an unphysiological way of functioning, such as by way of colostomies. However, if these improve the quality of life of the patients, there appear to be no ethical or theological objections to employing them. Nevertheless, the patients have been manipulated and from this point onwards will function unnaturally, something only made possible by considerable degrees of human control. Within a Christian perspective, the end-result is to be welcomed and God is to be thanked for working through what has been made possible by the God-like creativity and abilities of human beings.[26]

On the other hand, if individuals were to be modified to a degree that they could no longer function in genuinely human ways, their status would indeed have been imperilled. Any procedures or practices that take from individuals the capacity to make choices and act upon them, and that restrict their value systems or their awareness of themselves and others, seriously throw in doubt the essence of what it means to be human. This is because they impinge on the freedom to be human, something that is central to the capacity of humans to act as God's agents. Nevertheless, if this freedom remains and if individuals retain the capacity to be themselves and to express themselves, no matter how technologically manipulated they may be, they will continue to reflect the crucial relational features of a personal God.

Third, should we be concerned if an individual's abilities were capable of being enhanced, as opposed to rectified? Is the notion of enhancement antipathetic to Christian goals? In order to work through this question, let me take enhancement genetic engineering as an example. This would involve the insertion of a gene into an individual in an attempt to improve on a particular trait. In this instance, the genetic engineering would be employed, not in the treatment of a disease, but in an attempt to improve a perfectly healthy individual. This is similar to providing a growth hormone to normal individuals in order to improve their sporting prowess. Christian concerns emerge forcibly here, since any attempt to improve upon what is given may simply demonstrate rebellion against a bodily pattern ordained by God. In acting in this way, we may be setting ourselves up as creators of a new pattern rather than as stewards of God's creation. Alternatively, if

we are able to enhance human characteristics, perhaps we should do so as God's agents. The basic thought in this instance is that the present human form is not perfect, but is eminently capable of what could be viewed as God-ordained improvement.

Our responsibility is to ensure that any transformation is worthy of our status as beings in God's image, and will enhance the dignity of those involved.

Underlying these different perspectives is a fundamental query: What theological evidence do we have that the structure and functioning of the human body reflect a divinely determined pattern? In the New Testament, references to the human body fall into three major areas: (1) It is the temple of the Holy Spirit (1 Cor. 6:12–20); (2) It is used as a model of what the church is to be like (1 Cor. 12:12–31; Eph. 4:11–16); and (3) The body we now experience will ultimately be changed into a resurrection body (1 Cor. 15:35–57). From these references, we emerge with a number of principles:

- The body (including the mind / brain) is an integral part of our lives as human beings, and hence is to be taken seriously in both spiritual and biological terms (Rom. 6:12–13; 12:1–2; 1 Cor. 6:20).
- Exercise and self-control of the body are essential for healthy living (1 Cor. 9:25–27).
- Misuse of the body has spiritual as well as biological consequences, whether this is brought about by sloth and indulgence or sexual impropriety (Rom. 1:24; 1 Cor. 6:13–18).
- There is a wholeness to the body, every part of which is essential for its optimal functioning (1 Cor. 12:12–31; Eph. 4:11–16).
- There is an intimate connection between what we are as people and the manner in which we utilize our bodies (Jas. 3:6–10).
- Since the body is central to what we are, it will be built upon in some way following death (1 Cor. 15:35–57; Phil. 3:20–4:1).

Clearly, the biblical writers did not have in mind ways in which one might be able to modify the human body, although they had a high view of its worth. Neither can one argue from these principles that there is a divinely determined pattern to the human body. On the other hand, there is no room for mistreatment of the body. While it is dangerous to argue categorically for any particular position, it is feasible to contend that whatever promotes human well-being and health (including spiritual well-being) is to be encouraged. In this sense, there is room for improvements to the human body, on condition that these promote the all-round wholeness and integrity of the individuals concerned. Our responsibility is to ensure that any transformation is worthy of our status as beings in God's image, and will enhance the dignity of those involved.

Let us imagine we could improve an individual in the sense that they will not suffer from heart disease in fifty years' time. When the genetic enhancement is carried out, the individual, albeit possibly an embryo, is healthy, and in the absence of the enhancement would continue to be healthy for many years. Is the avoidance of heart disease at the age of fifty years an improvement? The answer has to be "yes," since disease is being replaced by health. What grounds would there be for condemning such enhancement? Apart from the inevitable scientific uncertainties (and one has to admit it may turn out to be far easier speculating about this than actually carrying it out in a safe and relatively inexpensive manner), it is difficult to see why this form of enhancement would in any way challenge basic Christian aspirations. A person's life is being enhanced, so that they can live more fully than would otherwise prove possible.

But what if one could improve an individual's athletic performance by gene replacement? This is improvement in the sense that good exercise and coaching constitute enhancement. Ill-health does not come into this, but by the same token is there anything wrong with exercise and coaching? Not in principle, although there may be when the exercise and coaching become excessive. What emerges here is that the genetic approach may amount to little more than a highly efficient way of achieving what we do at present. Of course, the science itself may have numerous limitations and drawbacks, and it may prove far more cumbersome and problematic than intensive training, but the principle remains. This may be an unlikely illustration, and it may be wise not to take it too seriously, but as enhancement it is less troublesome than some might think.

What emerges is that even the issue of genetic enhancement is not as clear-cut as sometimes envisaged. Although there may be substantial reasons to be wary of it, it cannot be lightly dismissed. What are the reasons for attempting it? Do the anticipated changes amount to improvement in any meaningful sense, or are they ephemeral? Are they directed at benefitting the individual or at serving someone else's interests? What requires careful assessment are the motives and goals of those who advocate any form of enhancement, the societies in which this occurs, and whether the context is a God-centered one.

A stewardship ethic recognizes that technology is a gift to be used to benefit some, while not degrading or devaluing others.

The Christian–Science Interface

Biomedical manipulation raises many penetrating questions. These include the repercussions of scientific advances for our appreciation of human nature, the motives of scientists (including those who are Christians) for delving into highly sensitive areas, and the dynamics of the Christian-science interface. It also prompts us to look at the way in which God works in the world, the extent of legitimate human dominion, and the nature of human stewardship.

My argument has been that we should not be afraid of the power of biomedical technologies. There is no inner sanctum of the human person that is to be protected at all costs from the inroads of technology. These forms of technology are expressions of human creativity, and when used to restore and improve the human condition, are to be welcomed. Nevertheless, their use is tainted, and their drawbacks are as palpable as their potential. A stewardship ethic recognizes that technology is a gift to be used to benefit some, while not degrading or devaluing others. Reichenbach and Anderson write:

> To recognize that someone is in need biologically and to develop ways to meet those needs is not to demean their personhood; it is to recognize that they are persons for whom God has given us stewardship responsibility … We are to act on behalf of God, not out of human hubris.[27]

This approach enshrines a mix of openness to future possibilities (based squarely on a theological base) and an awareness of our responsibilities for the welfare of human beings. Such an approach should lead to extreme care and caution about where science might lead, to a skepticism stemming from the limitations and misuse of our abilities, but also to a restrained optimism about the prospects opened up by biomedical research. ✻

Notes

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