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CLINICAL ETHICS

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Implant ethics is defined here as the study of ethical aspects of the lasting introduction of technological devices into the human body. Whereas technological implants relieve us of some of the ethical problems connected with transplantation, other difficulties arise that are in need of careful analysis. A systematic approach to implant ethics is proposed. The major specific problems are identified as those concerning end of life issues (turning off devices), enhancement of human capabilities beyond normal levels, mental changes and personal identity, and cultural effects.

The transplantation of human organs gives rise to a wide range of ethical problems that are among the most thoroughly discussed issues in medical ethics. It is probable that, in comparison with transplantation, the implantation of artificial organs into patients' bodies will increase in clinical importance. The use of artificial organs instead of organs from a human donor relieves us of the difficult issues connected with organ donation, which is certainly a major advantage from an ethical point of view. However, it has not been sufficiently recognised that the use of artificial organs gives rise to another set of ethical problems that need to be considered carefully. This applies in particular to advanced implants such as artificial hearts and devices connected to the patient's nervous system.

There have been focused discussions on specific types of implants, in particular, cochlear implants, brain implants, and devices that assist or replace the heart. However, a unified approach to the ethics of implantation is lacking. It is the purpose of the present article to give a general outline of the ethical issues related to the implantation of devices that replace or assist human organs.

This subdiscipline of bioethics does not yet have an established name. In the choice of a suitable name for it, there are two competing terms that could both be used, namely "prosthesis" and "implant". According to the *Oxford English Dictionary*, a prosthesis is "an artificial replacement for a part of the body", whereas an implant is "anything implanted, esp. within the body". I propose to use the latter term, since it is somewhat more general and includes the implantation of devices with purposes other than the restoration of human capabilities, such as diagnostic devices, and those intended to provide people with capabilities that go beyond normal biological functioning. By "implant ethics", then, is meant "the study of ethical aspects of the lasting introduction of technological devices into the human body". This definition is uncommitted with respect to the purpose of the device. The word "lasting" excludes the temporary introduction of devices in surgery or endoscopy.

Implant ethics overlaps with several other subdisciplines of bioethics. The term "neuroethics" has recently been introduced to cover the ethical issues to which advances in neuroscience, including brain implants, may give rise.[1] Some of the ethical issues associated with implanted devices apply also to many external devices. However, there are also differences, such as the greater potential for implanted devices to be regarded by persons as parts of their own body. Partly due to these differences, but also in order to not to lose focus, non-implanted technological devices will not be treated here.

NEW IMPLANTS—NEW ETHICAL ISSUES

The use of implants dates back at least to the ancient Egyptian practice of hammering sea shells into the jaw to replace missing teeth. However, it was only in the twentieth century that a wide selection of implanted devices were introduced in surgical treatment, from pacemakers to intraocular lenses, from artificial hip joints to cochlear implants. For our present purposes it is sufficient to introduce a few types of device that have particularly strong ethical implications.

Owing to the lack of donor hearts for transplantation there is a need for technological devices that delay or eliminate the need for a transplant. Mechanical bridging devices have been developed that can maintain or improve a patient's cardiac status while waiting for transplantation. The most common of these devices are left ventricular assist devices (LVADs). An LVAD includes a tube in the left ventricle of the heart, which pulls blood to a pump that sends it into the aorta. Patients with an LVAD can leave the hospital, but they typically need a family member as a support person. They can travel, but always need to take with them equipment including extra batteries and an emergency hand pump.[2] Although originally intended as bridging devices, LVADs have been used as destination therapy with good results.

The idea of a total artificial heart (TAH), to replace the patient's own heart, was discussed in the early 1970s, but it turned out not to be technologically feasible at that time.[3] Recent developments have been much more encouraging. TAHs are currently used with success as bridging devices. A clinical trial is currently being performed in which they are used as destination therapy on patients with end-stage biventricular cardiac failure. The manufacturer has submitted an application to the Food and Drug Administration for a Humanitarian Device Exemption to market the product, restricted to a defined subset of irreversible end-stage heart

Abbreviations: LVAD, left ventricular assist device; TAH, total artificial heart

failure patients. This application refers to a group of no more than 4000 patients.[4] It has however been estimated that there is a yearly potential for 100 000 implants per year in the USA alone.[5]

A major new class of implants are those in which interfaces are created between neural tissue and microprobes in order to achieve communication between a patient's nervous system and devices that replace or supplement a malfunctioning organ.

Currently the most important of these neural interface implants are cochlear implants, which are used routinely in the treatment of deafness. A cochlear implant is a device, which, when activated by sound, directly stimulates the auditory nerve, thereby bypassing dysfunctional parts of the inner ear. Cochlear implants give rise to an ''artificial'' sense of hearing that is inferior to natural hearing but yet sufficient for social functioning. Most importantly, patients with a cochlear implant can understand speech. In order to obtain the best results from an implantation in a deaf child, it is essential to perform the operation when the child is as young as possible.[6]

Research is being conducted on prosthetic vision for blind people, based on essentially the same principles as cochlear implants, namely that stimuli from technological sensors are relayed to the nervous system via a nerve–implant interface. Two major alternatives are being investigated for the placement of this interface: retinal chips and chips implanted in the visual cortex of the brain. Prosthetic vision is currently still experimental.[7]

There are several other promising applications for neural interface implants. Brain implants for bladder control have been developed, and so have brain implants intended to block tremor in patients with tremor-inducing diseases, including Parkinson's disease. In April 2004 approval was given for a clinical trial in which chips will be placed in the brains of paralysed patients.[8] The goal is to use signals from the brain to control a wheelchair or other assistive technology, and ultimately to move muscles and limbs. In October 2004 it was reported that a brain chip containing 100 electrodes had been successfully implanted into the motor cortex of a 24-year-old quadriplegic patient. He is reportedly able to control his television while talking and moving his head, and, as expressed in newspaper reports, ''sends e-mail by thought''.[9]

If efficient implantable brain chips become available, the next step after therapy may be enhancement. It has been speculated that military applications could come first, producing soldiers with enhanced abilities.[10 11] Some computer visionaries dream of a future in which many or all humans have implantable computer chips that connect them to sensors, assist memory, and bestow a variety of capabilities. The ''cybernetic'' organisms of science fiction, which are mixtures of man and machine, would then become reality. It has even been claimed that such mechanisms could in the future be used to scan, upload, and transfer (the contents of) a mind. However, no credible mechanism has been proposed by which an implant can be used for that purpose,[12 13] so all this is hypothetical. We do not know whether or not complex sensory impressions, feelings, and thoughts can be communicated in either direction through an implant.[14]

Although some of these predictions are quite unrealistic, that does not make them irrelevant to medical ethics. Judging by experience from other areas, technological and clinical research on neuroimplants may very well become subject to counterreactions that relate it to possible dangers of cybernetic creatures. There is then a risk that patients who need therapeutic implants will suffer from debates in which their needs will be treated as a secondary issue. To avoid this, ethical analyses should be undertaken that help to separate the therapeutic issues from the more speculative ones.

The possibility of providing the human body with new functions or capabilities is not limited to science-fiction-like developments. Currently, microchip devices are implanted in animals for identification purposes. It is technically possible to implant similar devices into humans. One comparatively innocuous use of such chips is to let aeroplane passengers travel without a ticket; instead they would be scanned. Other more sinister uses are not difficult to invent. A more sophisticated read–write chip could carry a person's medical history or criminal record. An implanted radio transmitter can be used to track a person.[15] A less problematic prospect is that of implanting a device in the body that continuously monitors levels of substances in the bloodstream, and adjusts drug release accordingly.[16]

AN OVERVIEW OF THE ETHICAL ISSUES

Table 1 summarises an attempt to systematise the major ethical issues involved in transplantation and implantation. The table has two columns for transplantation, one for the ''classic'' case in which an organ or a large part of an organ is transplanted, and the other for transplantation of smaller units, typically cells such as stem cells. (It would in principle be possible to divide the implantation column into two, one for organ-sized and the other for cell-sized implants. It should be recognised, however, that the latter form of implant is as yet hypothetical. A typical example would be ''nanosubmarines'' injected into the bloodstream in order to attack cancer cells or arterial plaques.)

With future technological development, the line between transplantation and implantation may become less sharp. One concept that has been discussed is ''tissue engineering'' in which cells are grown on a technological scaffold that defines the structure required to produce an organ, thus building an organ such as a heart or a liver.[16] For the foreseeable future, however, the distinction between biological and technological material is clear enough.

The ethical issues listed in the table are those that have been discussed either in relation to the transplantation of organs or cells, or in relation to the implantation of various types of technological device. It does not seem possible to foresee what other types of ethical issues may come to be discussed in the future in connection with implant technologies. The list should therefore be treated as provisional.

Donation issues are of course at the centre of the debate on organ transplantation. Issues such as consent, compensation, and the risk of exploitation have made transplantation surgery one of the medical practices most intensely discussed by ethicists. In cell transplantation, donation issues are in most cases less pressing because scarcity is eliminated when

Table 1 Overview of ethical issues in transplantation and implantation

	Transplantation		
Issue	**Organs**	**Cells**	**Implantation**
Donation	+	(+)	−
End of life decisions	+	−	(+)
Distributive issues	+	(+)	(+)
Disease concept and enhancement	−	−	+
Mental change and personal identity	−	+	+
Cultural effects	−	−	+
Non-voluntary interventions	−	−	(+)

+, very high degree of relevance.
(+), significant but not very high degree of relevance.
−, low degree of relevance.

cells can be grown in vitro. For technological implants, donation issues do not arise.

End of life decisions concerning donation are among the most pressing issues in transplantation ethics. In implantation ethics, this problem does not exist, but end of life decisions may reappear on the recipient's side. Implanted organs, in particular heart assist devices and heart replacements, can be life sustaining in the same sense as external apparatus such as respirators, so the same type of end of life issues can be raised for these implants as for external devices.

Distributive issues arise in health care whenever access to interventions is restricted, due either to natural limitations (such as organ transplantation) or to budget restraints (as may become the case for many implant devices). In the 1980s, research on artificial hearts was the target of critical discussion on the use of medical resources. It was argued that research on mechanical hearts should be stopped because the eventual cost of their deployment would be unbearable.[17] More recently, it has been pointed out that advances in neuroscience, such as brain implants, have the potential to both create and remedy social inequalities. Therapeutic uses can reduce social inequalities, whereas enhancement implants available only to those who can pay for them would have the opposite effect.[1 10 18]

Although distributive issues are essential for some implantation therapies, the severity of the problem is determined by the price of the intervention rather than whether or not it involves an implantation. Distributive issues will therefore not be treated in more detail here.

Although the most that one can hope for from a transplant is the restoration of normal function, technological devices can, at least in principle, be constructed to improve function to above-normal levels. Implant ethics therefore has to deal with issues of normality and disease, and with the admissibility of human enhancement. These are questions that do not arise in organ transplantation. (It is conceivable that such issues would become apparent if cell transplantation in the normal human brain was shown to have an impact on mental capacity. However, this is highly speculative.)

To the extent that mental function can be substantially influenced by implanted devices, or by cell transplantation into the brain, difficult problems relating to mental change and personal identity will arise. Should the cognitive abilities of patients with dementia be improved at the price of changing their personality to such an extent that they are not perceived as the same people any more?

One form of implantation, namely cochlear implants, has been heavily criticised by members of the Deaf community for undermining their very existence. Other forms of implantation may give rise to different effects on human cultures and subcultures.

Finally, fears have been expressed that non-voluntary interventions may be carried out, perhaps in the form of brain implants used to control other human beings. Brain implants are indeed one of the stock in trade conspiratory theories spoken about in fringe groups such as the UFO movement. Admittedly, the technical possibilities of manipulation through implantation are not far away. Electrical stimulation of a happiness centre could make people addicted to this procedure, and other types of stimulation could change their perceptions of reality and perhaps make them easier to control.[11] However, other much simpler means of manipulating and controlling people are already available. In the absence of a social setting in which someone seems to have a need for a brain implant in order to achieve the control he or she desires over other people, this does not seem to be an imminent danger.

In table 1, the larger number of "+" signs in the column for implantation should not be read as evidence that technological implants are more ethically problematic than organ transplantation. Owing to the extensive problems connected with donation and end of life decisions in organ transplantation, it is probably fair to say that present forms of organ transplantation are more ethically problematic than currently known and foreseeable forms of (cell transplantation and) implantation.

Issues of end of life decisions, enhancement, mental change and personal identity, and cultural effects are discussed below.

END OF LIFE DECISIONS

End of life issues are bound to arise for any form of life sustaining treatment that can be administered to persons with a low level of consciousness. As yet, the implants that are the subject of such debate are artificial hearts and heart assist devices. Several authors have discussed when it is legitimate to turn off an LVAD or an artificial heart.

Consider a situation in which an LVAD has been implanted as a bridging device, but circumstances have changed so that transplantation is no longer an option. It could then be claimed that, since the device is no longer medically indicated, it can be turned off or removed. However, both of these actions would be expected to hasten the death of the patient. An implanted and yet unpowered LVAD impedes the natural function of an already weak heart, and explantation involves considerable risks for the patient.[19] It should be evident that switching off the device under such circumstances would be contrary to generally accepted ethical principles.

The same problem arises, perhaps in more drastic form, for TAHs. In a recent article, Katrina Bramstedt claimed that

> the fact that a TAH (or any other implant or assist device) is functioning without flaw is of no relevance to the futility discourse. What is relevant to these discussions is whether the "perfectly" functioning device is serving the goals of medicine and the best interests of the patient. Just as with a ventilator, a TAH can be functioning "perfectly", yet be ethically inappropriate.[5]

Furthermore, she says:

> As with implantable defibrillators, inactivation of a TAH is a simple procedure not involving surgery, and this inactivation should not be seen as ethically separate from the withdrawal of other life support measures such as dialysis or ventilation.[5]

A contrary view was expressed by Robert Veatch, who claims that Bramstedt

> appears to be endorsing unilateral actions by physicians that will directly cause the death of their patients and do so against the will of the patient or surrogate. That should be called "murder".[3]

According to Veatch:

> Throwing a switch that stops a TAH is more like injecting a drug that paralyzes the heart muscle or like excising the SA [sino-atrial] node. Either of these would be considered direct, active killing. How can it be that turning off the heart is any different?[3]

Whereas other authors have stressed the similarity between turning off an artificial heart and discontinuing other life-prolonging treatment,[17] Veatch emphasises the difference.

It is reasonable to assume that patients who receive an artificial heart will regard it as their own, in much the same way as they would regard their original heart or a transplanted one. In my view, such a standpoint should be presumed and respected, and consequently nobody should have the right to stop a person's artificial heart under conditions when stopping a natural heart would be disallowed.

Future technological developments may provide us with other types of life sustaining implants that give rise to essentially the same type of questions as the artificial heart. This would apply, for instance, to an artificial lung or kidney. A somewhat different type of end of life issue would arise from a brain implant that is not required to preserve life but is necessary to support consciousness. If the quality of the achieved consciousness deteriorates, arguments could be made in favour of turning off such an implant. This would, however, be a highly problematic standpoint for the same reason as turning off a life sustaining artificial organ.

ENHANCEMENT

Whereas organ transplantation ''only'' provides a sick person with a normal organ, implantation can provide new or enhanced functions that go beyond the normal. Implant ethics therefore has to deal with the difficult issue of enhancement. If it becomes possible to improve a healthy person's physical strength or memory to levels above his or her natural endowment, to what extent is it advisable to do so?

Enhancement is an issue that implant ethics shares with several other branches of medical ethics. Much of the recent debate has referred to genetic enhancement, which only few writers defend.[20] In this area, the enhancement discussion is anticipatory because no enhancing treatment is currently available. However, there are at least two other branches of medicine that already deal with enhancement in clinical decisions, namely cosmetic surgery and neuropharmacology. Many types of cosmetic surgery, including breast implants, have been criticised for not complying with the aims of medicine, since they do not treat a disease or malfunction.[21 22] Several drugs developed to treat diseases of the nervous system also have the ability to improve normal functioning. Hence, drugs for narcolepsy are already in use in the armed forces as wakefulness agents. Drugs developed for depression are used for mood elevation by people with no psychiatric diagnosis, and drugs for erectile dysfunction are used for pleasure.[23] Agents developed to prevent cognitive deterioration in Alzheimer's disease seem to be capable of improving cognitive functioning in healthy people.

An obvious reaction to the possibility of enhancement is to exclude it with reference to the traditional task of medicine, which is to treat and prevent diseases, not to improve humanity generally. ''[T]he goals of medicine concern not all human suffering, but only that suffering connected with a malady.''[21] However, there are at least two problems with this standpoint. First, the distinction between disease and health or normality is not as clear as it may first seem. Disease is not a biologically well defined concept but one that depends largely on social values. Some conditions previously regarded as diseases are now thought of as normal states of the mind or body. Others that were previously perceived as variations of normality are now regarded as diseases. Homosexuality is an example of the former, attention deficit hyperactivity disorder of the latter.

Secondly, it is easy to show with examples that our intuitions about whether treatment should be offered for a condition are strongly influenced by other factors than whether or not that condition is classifiable as a disease. One well known example is the treatment of short stature. Both public and private insurers have chosen to pay for growth hormone treatment only if children have some diagnosable growth hormone deficiency, not otherwise, regardless of how short the stature is projected to be.[24 25] As was noted by Norman Daniels,[24] this criterion for treatment is difficult to defend from an ethical point of view. If one person is short ''just'' because of his or her genotype, and another is short owing to some identified dysfunction, this does not mean that the first person suffers less or needs treatment less. Clearly, neither of them is short through choice or a fault of his or her own. (In practice, however, we have been saved from ethical predicaments of growth hormone therapy by studies showing that this treatment does not affect the final, adult height of children who have a normal endogenous production of the hormone.[26])

Presbyopia is a normal feature of ageing, and should therefore not be regarded as a disease. Nevertheless, we do not hesitate to treat this condition (mostly with spectacles). It is to be hoped that no one would try to prevent ophthalmologists from treating this or other age dependent conditions of the eye. Now suppose that a remedy becomes available for age related cognitive decline. It is a good guess that our attitude to such a treatment would be the same as to presbyopia, or would anyone say, ''Just let grandma become confused. It is not a disease, so, although there is a treatment she should not receive it. Treatments are only for diseases.''

We already endorse improvements of the immune system (via vaccinations). Other ways to improve the body's resistance against disease would probably find acceptance relatively easily. There are also situations in which improved cognitive function would be seen by most of us as an advantage, such as better driving ability and improved capability of surgeons to operate.[27]

Hence, the disease/normality limit does not tell us what treatments are acceptable. However, this does not mean that all kinds of enhancement are acceptable. There may still be other reasons to reject an enhancement, reasons that do not depend on the distinction between disease and normality.

One obvious type of argument that could be made against enhancement is that it may have serious side effects. Perhaps a method to improve memory would also make people forget other things instead of those they are induced to remember better.[28] Maybe improved memory would have psychological side effects. ''Who needs to remember the hours waiting in the Department of Motor Vehicles staring at the ceiling tiles, or to recall the transient amnesia following a personal trauma?''[23] Perhaps we already have an optimal level of memory capacity. Similar fears have been expressed with respect to genetic enhancement. Genetic therapy may remove a gene that has unknown positive effects.[29] Indeed, mice that were genetically engineered to be better able to perform learning tasks had a greater sensitivity to pain.[30] However, although this type of argument can be used against many methods of enhancement, it is not an argument against enhancement as such.

Fundamentally, the enhancement issue is about what kinds of human beings there should be. Should future people be stronger and more intelligent than we are? This is clearly an issue about which there are very different opinions. A common, often religiously motivated view is that human nature has been given to us and should not be changed. Others see considerable scope for improvement of the human race. In one of the few scholarly articles devoted to this issue, James Hudson maintains that, to the extent that we can

influence the innate nature of future people, we should make them intelligent and probably without a sexual drive or "*any drive* … other than a drive to *rational thought and action* in general."[31]

The issue of what kind(s) of persons there should be is one of the most difficult to deal with rationally in moral philosophy. The very basis for the discussion is insecure. What criteria should we use? Should we judge future persons by our own criteria, or by the criteria that we predict (and partly determine) them to have? (Population ethics, which deals with how many people there should be, provides similar difficulties.) Possibly, the best way to tackle issues of enhancement is to deal with them incrementally, judging each case on the basis of our current values without even trying to take future values into account.

The following words of warning are worth quoting:

> Whereas one can make the case that future generations should have the right to decide by themselves about their fate, it should be prevented that we enter a slippery slope towards ever greater manipulation of the human body, without medical necessity, and do so without having fully considered the consequences.[11]

MENTAL CHANGE AND PERSONAL IDENTITY

Many types of treatment change a person's personality, as certainly do many diseases. Successful treatments often reverse personality changes caused by the disease. As an example of this, the motor symptoms in patients with Parkinson's disease often have a large impact on their personalities. Treatment can in part reverse these effects.[32] On the other hand, treatments for neural dysfunction, including neuroimplants, cell transplantation in the brain, and neuropharmacological treatments, may also lead to changes in a patient's personality, other than those leading back to a previous state. The same can also occur in interventions that increase the cognitive abilities of normal individuals.

> [A]s individuals' cognitive abilities increase, their personalities will also change. Increased memory, new insights and better reasoning could all lead to new values, new perspectives on one's relationships, and new sources of pleasure and irritation.[27]

The result may be that the person is not conceived by others in his or her environment as "the same person" any more.[33]

Both the nature of personal identity and its role in moral deliberations are highly contested in moral philosophy.[34] Utilitarianism assigns no value to the individual person, but only to the mental states carried by that person. According to a utilitarian viewpoint, continuity in personal identity has no special value. On the other hand, deontological and rights based ethics assign their determining ethical relationships (duties respectively rights) to individuals. In these theories, therefore, continuity of personal identity is essential for the satisfaction of moral demands. This is one of the bioethical issues in which the choice between moral theories can be essential for the outcome of ethical deliberations.

In my view, the impersonal stance of classical utilitarianism is in blatant conflict with the moral intuitions on which we base our moral opinions, not least in the medical field. Physicians' primary obligations are owed to individual patients, and these obligations are not fulfilled by helping someone else instead. From this point of view, a treatment that completely reshapes a patient's personality and personal identity would be deeply problematic.

On the other hand, it does not follow that a treatment is necessarily unethical if family and friends report afterwards that "she is not the same person any more". The patient's own experience of personal identity and mental continuity, during and after the treatment, is prima facie a more important criterion than the views of others.

Owing to new advances and prospects in medical technology, issues of personal identity that were previously discussed by philosophers in terms of rather extreme thought experiments can now be debated in more realistic terms. However, although personal identity is important in a medical context, it has to be supplemented with other considerations such as changes in personality. Whereas personal identity is an all or nothing matter, personality changes occur by degrees.[35] Medical experience also indicates that personal identity has more to do with the body outside of the brain than what has in general been recognised in philosophy. Parts from a dead person's body are not always assimilated without difficulty as one's own. As a drastic example of this, the recipient of the first transplantation of a human hand, performed in 1998, announced two years later that he wanted to have it amputated because he had become mentally detached from it.[36]

Personality changes and possible loss of personal identity can follow from the introduction of foreign (biological or technical) material into the brain, but also from natural causes such as tumours and from the surgical removal of brain tissue.[37] Our appraisals of personality change seem to differ between these cases. This is a reason to reconsider our criteria for personal identity and personality changes, arguably in order to develop more precise and consistent criteria, just as our criteria for death were adjusted to deal with new problems of organ transplantation.[35] A further reason for reconsidering the criteria of personal identity is the key role that personhood and personal identity have in several other ethical discussions, such as those on abortion, end of life decisions, and advance directives written by patients whose personality has subsequently changed. However, as was noted by Sirkku Hellsten, it is important in these debates not to equate unreflectingly the discontinuity of psychological personhood with the discontinuity of moral personhood.[38–41]

It has been hypothesised that computer–brain connections will allow computerised communication with other similarly connected individuals in a way that may require a reassessment of the boundaries between self and community. To the extent that this should happen, the consequences for society would be major. However, currently we do not know if or how such a change could come about.

CULTURAL EFFECTS

Medical technology, including implants, has effects not only on individuals but also on social groups and on society as a whole. Radical improvements in treatment will change the situation of disabled groups in our societies. Perhaps surprisingly, therapeutic improvements are not always received positively in these subcommunities. The "fat is beautiful" movement denies that obesity is a disease requiring treatment and medical attention. Segments of the dwarf community have reacted against the introduction of therapies against their condition, seeing this as a threat to the future existence of their way of life and their organisations.[42] By far the strongest counterreaction of this nature is that of Deaf World (a linguistic and cultural minority group) against the use of cochlear implant surgery in prelingually deaf children.[43 44]

This criticism of cochlear implantation is strongly connected to the positive view of deafness held in the Deaf World community. Hence, the Danish Deaf Association has stated that "deaf children are not sick or weak children, but normal Danish children, who just happen to use another language."[45] Members of Deaf World reject the idea that they have an impairment or disability. Instead, they view themselves as a minority culture with its own language, customs, attitudes, knowledge, and values. The use of cochlear implants would lead to a drastic decline in the population of this minority culture. Deaf activists have often referred to the ethical principle that minority cultures should be preserved. They claim that large scale cochlear implantation of children would conflict with the right of the Deaf language and cultural minority to exist and flourish. The term "genocide" has sometimes been used to describe that prospect.[43]

This claim has given rise to some interesting discussion about the definition of a minority culture and whether cultures have intrinsic value.[46] Critics have pointed out the problematic nature of arguments that give precedence to the preservation of a culture over the interests of individual children. Some have noted that it is difficult to draw the line if cochlear implants are disallowed for this reason. If they are unethical, then how should we judge the rubella vaccine?[47]

On balance, the Deaf World argument against cochlear implants is incompatible with well established principles of medical ethics. Physicians' responsibility towards individual patients cannot be defeated by the claims of a subculture that needs to recruit new members. Nevertheless, there are important lessons to be drawn from this debate. In particular, it shows that the ethical discussion on medical implantation must take into account the social and cultural notions of disease and the conditions under which patients both with and without implants will live.

Enhancement may give rise to additional issues related to cultures and subcultures. It is not inconceivable that persons who have received certain enhancing interventions may come to form new subcultures. Furthermore, enhancement may change our views of normality, so that some unenhanced people may come to be seen as "subnormal" in the relevant respect. If some submit to enhancement, others may feel a pressure to follow suit for the same reason that bodybuilders who use steroids induce others to do the same.

Some of the personal characteristics that can be enhanced through implantation or other interventions seem to have a function similar to that of positional goods—that is, goods that give their owner a place in the social hierarchy. As an example of the latter category, having a colour television at the time when this was a new and exciting technology contributed positively to an owner's social status. This effect decreased in importance as colour televisions became common. Access to a particular type of positional goods typically increases with economic growth; they can then lose their positional value and be replaced by other objects as markers of social status.[48 49]

Personal characteristics with similar properties as positional goods may be called positional characteristics. Height is an example. Barring extreme cases, the aim of treating persons with short stature is not that they should achieve a certain height. Rather, the aim is that they should not be too much shorter than others in their community. Therefore, if some of those predisposed to short stature are treated, the relative position of those untreated or untreatable can be expected to worsen. Experience from cosmetic surgery corroborates this mechanism. Our concepts of normal looks changed when enhancing technologies became available. Hence, buck teeth were more accepted 50 years ago when orthodontic treatment was not obtainable. The introduction of breast implants has had similar effects, and surgery that erases certain facial features has the same potential.[22 50]

Generally speaking, enhancement of a positional characteristic can in the long term have negative effects on the social situation of untreated individuals. A proactive discussion is therefore needed about distributive and procedural justice in relation to such enhancements. Cognitive capacity and capability of extended wakefulness are examples of characteristics that may be positional. Although implants resulting in enhancement are not part of today's clinical reality, they are a realistic future option for which we should be ethically prepared.

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