

# Healthy limb amputation: ethical and legal aspects

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**ABSTRACT – A surgeon in Scotland has amputated the legs of two consenting, physically healthy patients. Although a handful of medical professionals believe that the desire for healthy limb amputation is symptomatic of a mental disorder that can be treated only by amputation, there is currently no consensus on what causes a person to desire such a disabling intervention. As long as there is no established body of medical opinion as to the diagnosis and treatment of such a condition, performing the surgery may be a criminal act. Given the ethically problematic history of surgery for psychiatric conditions, as well as the absence of sound medical data on this condition, surgeons should exercise great caution before complying with a request to amputate a healthy limb.**

**KEY WORDS: amputation, psychosurgery, law, ethics, psychiatry, surgery, mental disorders**

In a 1785 text, the French surgeon and anatomist Jean-Joseph Sue described the case of an Englishman who had offered a French surgeon 100 guineas to amputate his healthy leg. Protesting that he did not have the proper equipment, the surgeon refused to operate. He changed his mind however, when the Englishman produced a gun. The surgeon then proceeded to amputate the Englishman's leg under threat of death. Some time later he received payment of 250 guineas in the mail, along with a letter. 'You have made me the happiest of all men,' explained the Englishman, 'by taking away from me a limb which put an invincible obstacle to my happiness!'

Two years ago, the British press reported that the Scottish surgeon, Robert Smith, was approached by another Englishman with a request similar to the one described by Sue. After much deliberation and consultation with psychiatrists, Smith eventually became convinced that nothing short of amputation would remedy his patient's condition. He amputated the patient's lower left leg. Following the success of the first operation, Smith went on to perform another healthy limb amputation, this time on a patient from Germany. Smith was planning a third amputation when he was stopped by the Trust that ran his hospital. Smith was not stopped because of poor results however; his patients appeared to be as satisfied with their amputations as the Englishman

described by Sue two centuries before. Smith's first patient was a political science lecturer who sought out the amputation with the agreement of his wife. Before the amputation, this patient was reportedly considering suicide, but two and a half years after his amputation he told the *Observer*, 'I have happiness and contentment and life is so much more settled, so much easier. I have not regretted the operation one bit.' Smith has no regrets either: 'It took me 18 months to pluck up the courage, but it was the most satisfying operation I have ever performed<sup>2</sup>.'

What could lead a person to want a limb amputated? The answer is controversial. Most psychiatrists have never heard of such a desire, and the medical literature on the subject is very limited<sup>3</sup>. The first modern efforts to describe the desire for amputation were published in 1977. Money *et al* termed the condition 'apotemnophilia', meaning a sexual attraction to becoming an amputee. They distinguished it from 'acrotomophilia', or an attraction to amputees<sup>4</sup>. In the same year, Wakefield *et al* described a patient who would have qualified as both an apotemnophile and an acrotomophile: a 28-year-old accountant whose sexual preference was for female amputees, and who intensely wished to be handicapped himself<sup>5</sup>. In the vocabulary of *DSM-IV-TR*, both apotemnophilia and acrotomophilia would be counted as paraphilias, or what the manual calls 'recurrent, intense sexual urges, fantasies or behaviors that involve unusual objects, activities or situations that involve clinically significant distress or impairment in social, occupational or other important areas of functioning<sup>6</sup>'. *DSM-IV-TR*'s list of paraphilias includes paedophilia, exhibitionism, frotteurism, sexual sadism and sexual masochism.

However, many of the people who want such amputations today dispute this classification, as do some clinicians<sup>7</sup>. Outside the pages of medical journals, the people who want amputations simply call themselves 'wannabes'. Because of the controversy over whether this condition is a psychiatric disorder, and if it is, how it should be named, we will simply use the term 'wannabes'. Wannabes distinguish themselves from 'devotees', who are attracted to amputees, and 'pretenders', who enjoy dressing up as amputees, often going out in public in wheelchairs, on crutches, or wearing calipers. A growing web industry caters to many of these people, offering merchandise, videos,

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## Key Points

There is currently no consensus on what causes the desire to have healthy limb amputation

There is a need for an appropriate response from surgeons and psychiatrists to requests for amputation of healthy limbs

photographs, chat rooms, and listservs organised around their desires<sup>8</sup>. A Yahoo internet group for amputee wannabes currently has over 2,100 members.

While almost any generalisation about amputee wannabes should be treated with caution given the absence of reliable data about the condition, at this early stage two important points appear to be emerging. The first is that, for at least some people with the condition, the desire for amputation is not at all trivial. Some people say that the desire to be an amputee is so intense and all-consuming that it is ruining their lives. Many have had the desire since they were children. The mainstream news media has reported cases of people attempting to amputate their own limbs with shotguns<sup>9</sup>, guillotines<sup>10</sup> and homemade freezing methods. At least one amputee wannabe has died as a consequence. An American, Philip Bondy, sought out a black market amputation from a surgeon in Mexico in 1999, then died a week later in a hotel room when gangrene set in<sup>11</sup>.

The other striking thing about many amputee wannabes is the degree to which they identify with their desire. Many do not see their desire for amputation as alien and unwanted, like the desires of a person with obsessive-compulsive disorder, but as part of who they are. Realisation of the desire through amputation would allow them to become their true selves. The desire for amputation may be sexual, explicitly or otherwise, but at least as often it is connected to the way that wannabes see themselves and the discomfort they feel in their own bodies. 'My left leg was not part of me'<sup>2</sup>; Smith's first patient told the newspapers after his amputation in Scotland. Another wannabe says, 'I will never feel truly whole with legs'<sup>12</sup>. One of Money's patients told him that what she needed was 'to be allowed to be myself and live honourably'<sup>13</sup>. Richard Bruno describes a pretender in therapy who dreamed she was a young girl walking into her elementary school with leg braces and crutches: 'I walked into the school and felt in the dream, Yes! This is the real me. This is who I wanted to be: a disabled child'<sup>14</sup>.

Surgeons faced with a patient requesting the amputation of a healthy limb might well refuse on ethical grounds, citing the motto: *primum non nocere*, or 'first do no harm'. Yet it is not at all clear that the harm of amputation for these patients is less than the harm of living with a desire so obsessive that it leads to thoughts of suicide. Nor is it clear that the amputation of a healthy limb necessarily conflicts with the goals of medicine. If the empirical data on the efficacy of the procedure were to prove convincing, it might well be argued that the disability caused by the loss of a limb is a reasonable therapeutic trade-off, given the relief of suffering that the amputation could produce.

Moreover, surgeons have already established at least three precedents for elective removal of healthy body parts. The first is cosmetic surgery, where an invasive, non-therapeutic procedure is justified by the patient's own aesthetic preferences. The second is living-donor organ transplantation, in which invasive, non-therapeutic procedures are primarily justified by the benefit to the organ recipient rather than the donor. In both cases, defenders of the surgery have argued that the procedure will improve the person's 'psychological well-being' – even, in the case of live kidney donation, when the surgical candidate is a non-consenting child<sup>15</sup>.

This appeal to a patient's psychological well-being is made even more explicit in a third precedent: sex reassignment surgery. Clinics offering sex reassignment surgery treat an incongruence between the ideal self and the actual self as a psychiatric disorder. In fact, many wannabes and clinicians suggest that sex reassignment surgery is the closest medical parallel to healthy limb amputation, reasoning that in both cases surgery is used to remedy a psychiatric condition<sup>16</sup>. If wannabes can convince the medical profession that, like transsexuals, they suffer from a mental disorder appropriately remedied by surgery then the courts might consider healthy limb amputations to be legally permissible.

Should surgeons amputate the limbs of amputee wannabes? We argue that they should not. Yet the issue of healthy limb amputation is far more complex than some public commentators have made it seem<sup>17</sup>. It raises broad legal and ethical questions not just about the proper scope of medicine, but about the malleability of psychiatric diagnoses and the uses to which they can legitimately be put.

## Legal precedents

Some doctors and hospitals may be concerned that performing healthy limb amputations may expose them to legal sanctions. Theoretically a patient could sue a surgeon in contract if he or she is subsequently dissatisfied with the amputation, or sue a surgeon in tort for medical malpractice if there is evidence of negligence. Apart from the usual opportunities for negligence, a court might consider a healthy limb amputation itself to be negligent because the procedure is not yet considered by a responsible body of medical opinion to be an appropriate and effective treatment of a medical condition<sup>18</sup>. Performance of such novel surgery in the absence of any research to suggest that the surgery is either indicated or effective may go beyond the bounds of reasonable medical care.

Like many interventions performed by surgeons, amputation is often considered to be *prima facie* a kind of criminal assault at common law and under any statutory law that has replaced or supplemented the common law in countries such as the UK, the USA, Canada and New Zealand. Surgeons, however, are generally excused from criminal liability, because most surgery is considered to be a 'lawful activity'. Surgery is considered a lawful activity when it is 'reasonable'<sup>19</sup>, or when it constitutes 'proper medical treatment'<sup>20</sup> and if it is performed with the patient's consent<sup>21</sup>. Unfortunately the common law provides

little guidance on what constitutes 'proper medical treatment' or 'reasonable' surgery. However, it seems unlikely that the courts would consider amputation of a healthy limb to be 'proper medical treatment' without evidence of some kind of therapeutic benefit. Whether amputation could nevertheless be considered 'reasonable' is not clear. But it is relatively clear that for a procedure as invasive as an amputation, the patient's consent alone will not be enough to excuse the surgeon from criminal liability.

The leading common law case on consent to criminal assault is *R v Brown* [1994] 1 AC 212. The case involved a group of men who had videotaped themselves performing consensual sado-masochistic activities, which included branding, burning, hitting of the genitals, whipping, caning, biting and stinging with nettles. Police found the videotapes and charged the men with assault under the Offences Against the Person Act 1861 (UK). Although none of the accused men's acts caused any permanent injury to their 'victims', and although all acts were done in private and with the consent of all parties, the House of Lords upheld all the convictions by a three to two majority. The majority judges held that the presence of consent is not a defence against a charge of assault that has caused actual bodily harm. A court might well reason similarly about a surgeon who amputates healthy limbs, even if the amputations were performed with the consent of the patients.

However, the minority judges in the *Brown* case moved away from precedent cases and held that for some kinds of assault, consent could in fact serve as a defence. According to these judges, the consensual infliction of harm is outside the realm of the criminal law unless the public interest requires otherwise. In their opinion, the public interest did not require that consensual assault occasioning merely 'actual bodily harm' be considered a crime. However, both minority judges restricted their comments to this particular level of assault, which they explicitly distinguished from assault occasioning grievous bodily harm, a category that would almost certainly include healthy limb amputations.

The position of the minority judges was enforced in 1997 when another case of consensual harm came before the English courts. In *R v Wilson* [1997] QB 47, a man was charged with assault after he branded his initials on his wife's buttocks at her request. Instead of condemning this act as criminal assault occasioning actual bodily harm, the Court of Appeal said that Mr. Wilson was merely helping his wife to acquire a 'desirable piece of body adornment'<sup>22</sup> and that it was not in the public's interest that activities such as this should amount to criminal behaviour. The judges implicitly rejected a general rule against consensual harm, stating that instances thereof ought to be decided on a case-by-case basis.

Wannabes in search of hospital amputations could try to extend the *Wilson* case and argue that healthy limb amputations are merely one of a group of procedures not generally performed for their therapeutic benefit, but performed simply because a competent adult requests them. Examples of such elective body alteration include body piercing, tattoos, sterilisations, abortions and cosmetic surgery. According to this argument, a

healthy limb amputation is simply an extreme example of a person exercising their right to control their body. Surgeons and hospitals are involved only because they are the best places to get safe and tidy amputations. If medicine and the law are to look behind such decisions, it can only be to check that the person requesting body-altering surgery is competent to give consent.

However, this argument seems unlikely to succeed. Although the result in the *Wilson* case may help people performing piercings, brandings and other non-disabling body modifications, it probably does not stretch to assaults as serious as amputations. Surgeons will need to show that healthy limb amputations are in some other way excused from the criminal law: consent alone will not be enough. And while a libertarian argument may explain why it might be 'morally' wrong to prevent a wannabe from amputating their own limb, or to prevent someone else from amputating the limb of a wannabe at the wannabe's request, it does not explain why medicine should co-operate. This is ultimately the problem with this approach. Even if the courts agree not to interfere to prevent a wannabe from receiving an amputation, and even if it is not a crime for a surgeon to amputate a healthy limb with the patient's consent, many surgeons may still refuse to perform the operation, reasoning that the amputation of a healthy limb needs to be justified by something more than a mere desire.

More likely to succeed is the argument that healthy limb amputations are 'proper medical treatment', either because it has been demonstrated that they are therapeutically effective, or because they fall within a class of medical procedures that, while perhaps not strictly therapeutic, are widely accepted as legitimate nonetheless. Examples of this latter class of procedures include sterilisation<sup>23</sup>, abortion and living donor organ transplants<sup>24</sup>. Surgeons are probably most likely to co-operate with a request for amputation if they are persuaded that the desire for amputation is evidence of a psychiatric disorder for which amputation is an effective treatment. This approach has worked in the case of sex reassignment surgery, which may now be funded by the NHS in the UK. Surgeons who perform sex reassignment surgery justify it on the grounds that it is a treatment for gender dysphoria, or what the *DSM-IV-TR* calls gender identity disorder<sup>6</sup>. Surgeons who perform sex reassignment surgery have not faced charges for criminal assault. In addition, the English Court of Appeal recently implicitly condoned such surgery when it ordered a health authority to reformulate its funding policies in order to give proper weight to its acknowledgment of gender identity disorder as a medical disorder<sup>25</sup>.

### Ethical considerations

Although there is good reason to believe that many people who wish to have a healthy limb amputated are genuinely suffering, we believe that it would be premature to turn to surgery as a solution, even if the courts were to judge it permissible. Two ethical concerns stand in the way.

Our first concern is the absence of reliable knowledge about amputee wannabes. Many avoid seeking out medical help for

fear of being involuntarily hospitalised, and even mental health professionals know very little about the condition. There have been no published studies suggesting that amputation is an effective treatment for the condition, very few about the effectiveness of psychotherapy<sup>26</sup>, and none at all about possible alternative treatments, such as psychopharmacology. While some wannabes who have undergone amputations have publicly testified that their lives have improved vastly as a result, it is difficult to know how to interpret these reports<sup>2</sup>. After wannabes have invested such enormous emotional resources in getting a procedure that is not only irreversible, but which they have always seen as the only possible solution to their problems, some may well find it difficult to admit to themselves that it has been a mistake. This is not to suggest that successful wannabes cannot be believed. But anecdotal reports of success should be treated with at least as much caution as reports from patient advocacy groups.

Much of what is known about amputee wannabes has come from the Internet and the popular press, where public testimony about successful amputations has often been shallow and heavily edited. This testimony usually comes with little information about the wannabe's psychological history, and it is rarely corroborated by others, such as family members, friends, or knowledgeable clinicians. Very little public testimony has emerged from wannabes who have chosen not to pursue amputations, who have chosen alternative methods for dealing with their desires, or who have undergone amputations and regretted it later.

It is also important to remember that medical history is filled with surgical treatments for psychiatric problems. Many of these treatments now appear to have been seriously misguided, such as clitoridectomy for excessive masturbation<sup>27</sup>, and leucotomy for a variety of psychiatric conditions<sup>28,29</sup>. Nor do all of these controversial surgical procedures lie in the distant past. Many researchers are now re-evaluating the widespread practice of genital surgery aimed at preventing future psychological difficulties for infants born with ambiguous genitalia<sup>30,31</sup>. Even sex reassignment surgery has prominent medical critics<sup>32</sup>. It would be short-sighted to embark on yet another surgical treatment for a psychiatric condition without first subjecting it to the rigorous standards of research and ethical review that have come to characterise sound scientific medicine.

Amputee wannabes should be encouraged to seek help not from surgeons, but from psychiatrists and other mental health professionals. Mental health professionals are in a better position to explore the psychological roots of the desire for amputation and possible therapeutic options. Yet mental health professionals approached by amputee wannabes should treat the desire for amputation with the sense of caution and clinical scrutiny appropriate to a condition about which so little is known. For once the desire for amputation comes to be seen as symptomatic of a psychiatric disorder, a door will be opened to amputation as a therapeutic solution.

This possibility raises a second ethical problem. Classifying the desire for amputation as a psychiatric disorder may eventually encourage a much broader range of people to see

their own psychic distress as a problem that can be relieved only by amputation. A large body of academic literature has developed to explain how psychiatric disorders arise and become widespread<sup>33</sup>, and how they are culturally shaped<sup>34</sup>. Common to the rise of most disorders is the development of a specialised language to describe them and a set of institutional structures to detect and treat them: formal treatment guidelines and recommendations, diagnostic instruments, measurement scales, reimbursement codes, a body of specialised literature, and formal recognition in the *DSM* and *International Classification of Diseases (ICD)*. Once the desire for amputation is recognised as a formal psychiatric disorder, these linguistic and institutional structures may also help nurture and shape an emerging social identity.

Something like this may have happened with sex reassignment surgery. In 1953, Swedish surgeons described transsexual Christine Jorgenson's condition as 'an extremely rare syndrome'<sup>35</sup>. By 1973, transsexualism was being described as a 'serious and not uncommon gender disorder'<sup>36</sup>. Today, transsexualism and transgenderism have become instantly recognisable features of the culture. One surgeon in Colorado has performed almost 4,000 sex reassignment procedures<sup>37</sup>. Clinicians specialising in sex reassignment surgery often complain that they are routinely approached by patients who want surgery, have memorised the criteria for gender dysphoria, and have incorporated these criteria into their own medical history<sup>38</sup>.

Whatever the roots of the desire for amputation may be, the boundaries of the condition are flexible and overlap with other social phenomena. For example, the desire for amputation appears to overlap with a sexual attraction to amputees<sup>39</sup>. It also appears to overlap with the desire for extreme body modification, such as scarification, branding, piercing, genital modifications and digit amputations<sup>40</sup>. Anecdotal evidence suggests that a smaller number of people desire disabilities other than amputations, such as paraplegia or blindness. In many cases the desire for amputation is related to broader psychological issues surrounding identity, especially the desire for a social identity as a disabled person. It is not implausible to think that if the desire for amputation is classified as a psychiatric condition, the number of people falling within its scope might grow, especially if amputation is eventually offered as a treatment.

## Conclusion

When Robert Smith performed his first healthy limb amputation in 1997, he had no published studies or body of medical opinion to suggest that the procedure would successfully treat his patient's condition. Although his action was motivated by humane concern for the psychological well-being of his patient, it nonetheless constituted both a technical crime and a worrying precedent. By operating outside a framework of oversight by a research review board, Smith blurred an already fuzzy line between innovative therapy and clinical research<sup>41</sup>. By offering a surgical solution for psychic distress, he gave implicit support to any move to classify amputee wannabes as sufferers of a medical

disorder. But it is not yet clear that the desire for amputation is properly seen as a medical disorder, let alone that amputation of the limb is the appropriate response. We believe that the proper response to people who wish to have healthy limbs amputated will not become clear until much more is known about the nature of the condition itself. In the meantime, resort to surgery should be strongly discouraged.

## References

- 1 Sue J-J. *Anecdotes historiques, littéraires et critiques, sur la médecine, la chirurgie, & la pharmacie. 1st part.* Paris: Chez la Bocher, 1785.
- 2 Taylor P. 'My left foot was not part of me.' *Guardian* 2000 Feb 6: 14.
- 3 Money J, Jobaris R, Furth G. Apotemnophilia: Two cases of self-demand amputation as a paraphilia. *J Sex Research* 1977;13:114–25.
- 4 Money J, Simcoe KW. Acrotomophilia, sexuality and disability: new concepts and case report. *Sexuality and disability* 1984–6;7:43–50.
- 5 Wakefield PL, Frank A, Meyers RW. The hobbyist: a euphemism for self-mutilation and fetishism. *Bull Menninger Clin* 1977;41:539–52.
- 6 American Psychiatric Association. *Diagnostic and statistical manual of mental disorders, fourth edition.* Washington DC: American Psychiatric Association, 2000.
- 7 Furth G, Smith R. *Apotemnophilia: information, questions, answers and recommendations about self-demand amputation.* Bloomington: 1st Books, 2000.
- 8 [www.ampulove.com](http://www.ampulove.com), [www.dreamstumps.com](http://www.dreamstumps.com)
- 9 I shot off my good leg – I finally feel complete. *Bizarre* [cited 2001 5 Nov]. [www.ampulove.com/wannabe/wannabecases/bizarrel.jpg](http://www.ampulove.com/wannabe/wannabecases/bizarrel.jpg)
- 10 Burnett JH III. Southside man uses homemade guillotine to sever arm. *Milwaukee J Sentinel* 1999 Oct 7. [www.jsonline.com/news/metro/oct99/arm07100699.asp](http://www.jsonline.com/news/metro/oct99/arm07100699.asp)
- 11 Williams M. Jury deliberations begin in murder trial for former sex-change doctor. *The Associated Press State and Local Wire* 1999 Oct 5. 63.239.237.195/ampulove/wannabes/wannabecases/bondy01.htm
- 12 Elliott C. A New way to be Mad. *The Atlantic Monthly* 2000;286:72–84.
- 13 Money J. Paraphilia in females: Fixation on amputation and lameness: two personal accounts. *J Psychology & Human Sexuality* 1990;3: 165–172.
- 14 Bruno, RL. Devotees, pretenders and wannabes: two cases of factitious disability disorder. *Sexuality and Disability* 1997;15:243–60.
- 15 Crouch R, Elliott C. Moral agency and the family: the case of living related organ transplantation. *Camb Q Healthc Ethics* 1999;8(3): 257–87.
- 16 *Complete Obsession*, BBC2 Horizon, 2000 Feb 17. [www.bbc.co.uk/science/horizon/obsessions.shtm](http://www.bbc.co.uk/science/horizon/obsessions.shtm)
- 17 Dotinga R. Out on a limb, *Salon*, August 29, 2000. [www.salon.com/health/feature/2000/08/29/amputation/](http://www.salon.com/health/feature/2000/08/29/amputation/)
- 18 McHale J, Fox M. *Health care law: text, cases and materials.* London: Sweet & Maxwell, 1997.
- 19 *R v Brown* [1994] 1 AC 212: 244–5.
- 20 *Airedale NHS Trust v Bland* [1993] AC 789:891.
- 21 Bloy D, Parry P. *Principles of criminal law*, 3rd ed. London: Cavendish Publishing Limited, 1997.
- 22 *R v Wilson* [1997] QB 47:50.
- 23 *Custodio v Bauer* 59 Cal Rptr 463 (1967).
- 24 The Law Commission. *Consent in the criminal law.* London: Her Majesty's Printing Office, 1995.
- 25 *North West Lancashire Health Authority v A, D and G* [2000] 2 FCR 525.
- 26 Everaerd W. A case of apotemnophilia: a handicap as a sexual preference. *Am J Psychother* 1983;37:285–93.
- 27 Engelhardt T. The disease of masturbation: value and the concept of disease. *Bull Hist Med Sum* 1974;48:234–48.
- 28 Kleinig J. *Ethical issues in psychosurgery.* London: Allen & Unwin, 1985.
- 29 Lader M, Herrington R. *Biological treatments in psychiatry.* Oxford: Oxford University Press, 1990.
- 30 Creighton S, Minto C. Managing Intersex. *BMJ* 2001;323:1264–5.
- 31 Diamond M. Pediatric Management of ambiguous and traumatized genitalia. *J Urol* 1999;162:1021–8
- 32 McHugh P. Psychiatric misadventures. (Errors in psychiatry). *American Scholar* 1992;61:497–511.
- 33 Hacking I. *Rewriting the Soul: multiple personality and the science of memory.* Princeton (NJ): Princeton University Press, 1995.
- 34 Conrad P, Schneider JW. *Deviance and medicalization: From badness to sickness.* Philadelphia: Temple University Press, 1994.
- 35 Hamburger C, Stürup G, Dahl-Iversen E. Transvestism. *JAMA* 1958;152:391–6.
- 36 Edgerton MT. Transsexualism – a surgical problem? *Plast Reconstr Surg* 1973;52:74–6.
- 37 Brooke J. Sex-change industry a boon to small city. *New York Times* 1998 Nov 8;Sect. 1:18.
- 38 Blanchard R, Steiner BW, (ed). *Clinical management of gender identity disorders in children and adults.* Washington: American Psychiatry Press, Inc, 1990.
- 39 Dixon D. An erotic attraction to amputees. *Sexuality and disability* 1983;6:3–19.
- 40 Vale V, Juno A. *Modern primitives: an investigation of contemporary adornment and ritual.* San Francisco: RE/Search Publications, 1989.
- 41 Margo CE. When is surgery research? Towards an operational definition of human research. *J Med Ethics* 2001;27:40–3.