A Market Approach to the Shortage of Organs for Transplant

By
Karen Ann Parker
A.B. (University of California, Davis) 1985

THESIS
Submitted in partial satisfaction of the requirements for the degree of
MASTER OF SCIENCE
in
HEALTH AND MEDICAL SCIENCES
in the
GRADUATE DIVISION
of the
UNIVERSITY OF CALIFORNIA, BERKELEY

Approved: June 20, 1988
Chairman

Date
June 17, 1988

June 20, 1988
CONTENTS

Introduction .................................................. p. 1
The Current Situation ......................................... p. 1
The Proposal ....................................................... p. 15
  Purchases from Donors ...................................... p. 16
  Purchases from Family ...................................... p. 22
  Sales by Organ Procurement Organizations ............... p. 23
  Sales by Hospitals .......................................... p. 26
The Market for Cadaver Organs .............................. p. 26
  Organ Procurement Organizations ........................ p. 27
  Registries ...................................................... p. 30
  Individual Donors .......................................... p. 31
Arguments Against Organ Sales Discussed ................. p. 33
  Is the Market too Imperfect? ............................... p. 34
  Will They Inflate the Price of Transplants? ............ p. 36
  Will They Unfairly Benefit the Rich? .................... p. 41
  Will They Allow the Rich to Jump the Waiting List? .. p. 43
  Will They Encourage Murder and Suicide? ............... p. 44
  Will They Decrease Quality? ............................... p. 45
  Do They Encourage Thinking of People as Property? ... p. 47
  Are They Inherently Immoral? .............................. p. 47
  Should We Limit Organ Supply? ............................ p. 48
  Are Donor Sales Coercive? ................................. p. 49
  Do They Decrease Societal Altruism? ...................... p. 50
  Are Donor Sales Unnecessary? ............................. p. 50

Conclusion ..................................................... p. 51

Appendix A: Some Facts About Different Types of Organ Transplant ......................... p. 53
Appendix B: A Brief Discussion of Other Possible Types of Organ Sales ..................... p. 64

References ...................................................... p. 71
INTRODUCTION

There is currently a shortage of organs for transplantation. This both limits the number of transplants that can be performed but decreases the success rate of transplantation by making it more difficult to get good blood and tissue matches between donor and recipient. In this thesis I propose one method of increasing supply: allowing organ sales.

There are two basic sorts of organ sale I will discuss. 1) sales by the donor or his family with organ removal occurring only following the donor's death and 2) sales by organ procurement organizations and hospitals of organs procured by them. All types of organ sale are currently forbidden by the Organ Transplant Act of 1984.

PART I: THE CURRENT SITUATION

Advances in medical technology have provided the opportunity to save people's lives and/or greatly improve the quality of their lives through organ and tissue transplantation. The success of organ transplantation has increased dramatically in recent years in part because of improved surgical techniques but primarily because now, particularly since the advent of cyclosporin A (an immunosuppressive drug), it is possible to control graft rejection much more successfully (1-8). Cornea, kidney, liver, heart, heart-lung, pancreas, bone and skin
transplants from cadavers are all currently performed with a reasonable anticipation of success. (See Appendix A) The one year patient survival rate in 1984 was 92-95% for kidney transplant patients, 75-85% for heart transplant patients, 60-75% for liver transplant patients, 50% for heart-lung transplant patients, and 75-85% for pancreas transplant patients, and is continuing to rise. The mortality in following years is 3-8%, closer to the lower figure in most cases, and is continuing to fall. Graft survival rates are slightly lower because some patients survive an unsuccessful transplant. Graft survival rates are now approaching the 70-80% range for all the above organ transplants from unrelated donors with the exception of heart-lung transplants and pancreas transplants (relatively new procedures where the transplant failure rates is high)(9-18).

The number of people in the U.S.A. who could benefit from organ transplants is significant. The shortage of organs and tissues for transplant, however, severely limits the use of this technology; and as a result, many people die who might be otherwise be saved. In addition many people who are sustained through kidney dialysis lead substantially more debilitated lives with a reduced life expectancy than if they had a kidney transplant. They are also have a substantially lower quality of life and productivity. Kidney dialysis consumes 12-20
hours/week for most patients and involves a number of complications (20-22). Dialysis is also considerably more expensive than transplantation in the long run (25).

In the U.S.A. there were 88,510 people enrolled in the Medicare End-Stage Renal Disease Program on chronic dialysis in 1985.(26) It is estimated that at least half of these patients would be suitable transplant candidates (27-29). However, though the number of renal transplants has been rising, the number of kidneys available still is not enough to meet this demand. Only 7,695 kidney transplants were performed in 1985(30). It is estimated that approximately 20-40/1,000,000 population (or 5,000-10,000 people per year in the U.S.A.) could be saved by liver transplants. About 50% of these are children(31-33). However only 308 liver transplants were performed in 1984(34). The estimates of the number who could benefit from a heart transplant vary greatly. They range from 1,000 per year to 75,000 per year(35-37). The estimate of 1,000 is generated using the very stringent conditions currently used by transplant centers; the larger figure includes transplants for many children suffering from congenital malformations of the heart and many people suffering from other chronic diseases in addition to heart failure. These conditions complicate the surgery and reduce transplant success and patient survival rates and there is considerable disagreement
among physicians as to whether these patients are suitable transplant candidates. A more realistic estimate of the number who could benefit from a heart transplant is probably 4,000-5,000. However, only 373 heart transplants were performed in 1984 (41).

The shortage of transplantable organs is particularly acute for members of certain minority groups. Some minority groups, particularly black Americans, because of their higher rates of diabetes and hypertension, suffer much higher rates of kidney and other organ failure. However, they have consistently received a lower than proportional share of organ transplants. For example, in 1985 although blacks represented 33% of those on chronic dialysis and 69% of those newly entering the dialysis program, they received only 21% of the kidney transplants performed (42). This is not primarily due to inability to pay, nor racial discrimination although some of the criteria used by transplant centers work disproportionately against blacks. Rather it is because the HLA antigens that are used in matching donor and recipient kidneys are correlated with race, and minorities are underrepresented in the organ donor pool. Certain HLA antigens are more common in blacks than in whites and vice versa; therefore one is more likely to get a good match for a black transplant recipient from a black donor than from a white
donor. The percentage of black americans requiring transplants is greater than their representation in the general population, but the percentage of black organ donors is lower. This means that in addition to the general organ shortage there is an even greater shortage of organs that can be transplanted into minority patients(43).

Increasing the supply of transplantable organ would have a number of beneficial effects. First and foremost it would increase the number of transplants that could be performed thereby saving lives. Secondly, expanding the donor pool would allow for better blood and tissue matching between donor and recipient and this could in turn increase graft survival rates by 10-20%.(44-50) Third expanding the supply could increase access to transplants to minorities and other disadvantaged groups. There are two ways that expanding the supply would particularly help minority groups. First as already mentioned the shortage of organs is particularly acute for black americans. If my proposal even proportionately increased the percentage of minority donors it would disproportionately increase the percentage of organs which would be good matches for this population. Secondly, because of the shortage transplant centers must ration transplants. They do this mostly by restricting the number of potential recipients they
accept. In choosing who they will accept they use a combination of criteria. Some of the more subjective of which have worked disproportionately against minority groups. For example, subjective assessments by the transplant center of the patient's ability to understand and take responsibility for the medical regime he must maintain following a transplant and of the level of social support he will have to aid him in this are made and used by many centers. These assessments often disproportionately disqualify those of low income, low education, or people with non-traditional families etc.(51-52). Transplant centers also look at the transplant success rates for different groups. Black americans have a lower transplant success rate than the general population probably because of poorer blood and tissue matching(53). If the supply increases the need for rationing will lesson and, as it does, this additional barrier to minority patients in need of transplants will be lowered.

This is not to say that if the supply of organs was sufficient all beneficial transplants would be performed. Other constraints such as the availability of other resources would probably still limit the number of transplants. However, currently the most stringent constraint is the shortage of organs. If this problem were solved a great many more transplants could be
performed.

Finally, although there is a shortage of organs and tissues actually donated there is not a shortage of potential donors. Many more people die with organs and tissues in transplantable condition than there are people who need transplants(54-57). The National Center for Disease Control estimates that 20,000 people per year die in a state which would make them ideal multiple organ donors (58-59). In addition, some of the organs from those who do not meet all of the criteria for multiple organ donation could be used without compromising quality (for example, there could be damage to one organ which did not affect the others). Some estimate that up to 18% of those who die in hospitals could donate at least some organs(60). In addition many cadavers which are not suitable for organ donation are suitable for tissue donation (e.g. an estimated 40%-45% of people who die in hospitals have usable corneas (61-62) as the requirements for tissue donation are much less stringent because ischemia is less of a problem and because tissues can be stored for long periods between the time they are harvested and when they are transplanted(63-64).

The actual donation rate is a great deal lower than this. Fewer than 15% of bodies ideally qualified for organs donation and an even smaller percentage of those qualified for tissue donation actually become donors(65-
In the U.S.A. a total of 3,290 cadaver donors were made available for organ removal in 1984 (69). And while recruiting efforts did increase the number of organ donations initially, the rate of organ donation now seems to have stabilized at this fairly low level (70).

The current U.S. system asks for voluntary donations either directly from the individual through a donor card signed by the individual prior to his death (or in the case of kidney transplants sometimes from living related donors) or asks his family to donate his organs following his death. Prior to donation an individual must be diagnosed as brain dead and generally must be maintained on ventilatory support to prolong organ viability. The family is then asked by the deceased's doctor or by a representative of an organ procurement organization (OPO) to allow donation. Once consent has been gained limited ABO and HLA typing is done, suitable recipients are found by the OPOs (either through different transplant centers or through the national registry), and the organs are removed. The precise order of these steps is determined by the possibility of maintaining respiration and circulation artificially in the donor after his death. The organs are then generally sent to the transplant center where the recipient is located. The recipients are notified by the transplant center and cross-matching is done to see that the recipient does not already have
antibodies to the donor's organs and that other requirements are met. The transplant is then performed. In the case of heart lung transplants an effort is often made to have the donor and recipient in very close proximity (e.g. the same or adjacent operating rooms because lungs stand transportation much less well than other organs)(71,72).

OPOs can recover the direct costs of organ removal and transportation but no more. The Organ Transplant Act of 1984 made it illegal to give any "valuable consideration" (i.e. money, goods or services) to individuals or institutions as an incentive to encourage donation. The Uniform Anatomical Gift Act, however, does allow people to indicate that they wish to donate their organs on their death. Many states (California among them) have made this procedure very simple by having the Department of Motor Vehicles distribute cards which people can sign and stick on the back of their drivers licenses stating their desire to donate(73). There is no penalty, however, for ignoring these wishes. A person's relatives can also give permission for the donation of an individual's organs after his death. In some states physicians are required by law to ask, after the death of a potential donor, if the family would consider donation; this is referred to as a required request law.

People have a generally favorable attitude toward
organ donation. At least 75-80% of people surveyed indicated they were favorably disposed toward organ donation(75-77). In one survey, those questioned were offered the chance to join a computerized donor list 75% did, giving some indication that their agreement was genuine and not merely an attempt to say what a surveyor might want to hear(78). In spite of this high level of support for the concept of organ donation, surveys estimate that only 1.5%-20% have actually signed and carry donor cards and only 3% of those who actually donate had donor cards(79-81). Even when they do, the donor cards are frequently ignored (82-85). The result is that, while there has been a great deal of success in presenting organ donation to the public in a favorable light, there has been only moderate success in translating that attitude into action. This is in spite of subsidization to organ procurement agencies, public education campaigns, required request laws and the organ donor card system.

Europe has gone even farther in its quest for organs but with even less success. A presumed consent law with respect to organ donation is one which allows the removal of organs from a cadaver without the prior consent of either the individual (through a donor card for example) or of the family. While we have only discussed the possibility of presumed consent laws in this country
(with the exception of some states which have presumed consent for corneal donation if the body is under the jurisdiction of a coroner (90)) many European countries have actually implemented them. Austria, Denmark, Finland, France, Greece, Italy, Norway, Spain, Sweden, and Switzerland all have presumed consent laws with respect to organ donation. In France, Austria, Denmark and Switzerland the donors family need not even be notified. Unfortunately, in European countries, rates of organ procurement are no better and in many cases are substantially lower than those in the U.S. in spite of these laws(91-92).

Why are the rates of organ donation so low? Several studies have explored this question(93-98). Three main problems seem to exist:

1) Doctors are often very uncomfortable discussing the possibility of organ donation with the bereaved relatives of a potential donor (though they may be slightly more likely to do so if the deceased had indicated he wishes to donate). They are also unwilling to proceed with a donation without the consent of the donor's family even in countries where presumed consent laws exist or in situations where the deceased has indicated he wishes to donate. Because physicians are unwilling to discuss the subject with the potential donor's family and at the same time unwilling to proceed
without such a discussion, many families who would willingly give consent are not given the chance to do so. Even people who have indicated they wish to donate through a donor card are not given the opportunity to donate.

2) There is also no penalty for ignoring a donor card although donor cards are technically legally binding. This is because there is no specific identifiable party with a right to those organs, nor any known specific, identifiable individual who has been harmed because the organs were not donated, to object. While the people who would otherwise have received the organ transplants have been harmed, they remain anonymous as it is only after the decision to donate a cadaver's organs has been made that doctors begin looking for suitable recipients.

3) Typically people do not like to think about or prepare for their own deaths, and young people in particular see little reason to do so.

There is a fourth problem that reduces the number of organs transplanted though it is actually related more to utilization than to procurement. Even after permission to use the organs is obtained many organs are wasted, despite the fact that suitable candidates for the organ are available on waiting lists at transplant centers around the country. Organs are sometimes removed and not
used and in some cases only one organ will be removed from a cadaver which is suitable for multiple organ and tissue donation. This occurs for several reasons. First, the OPO may only look for a donor locally, sometimes only within the hospital where the organ is procured. Second, if the local candidate is not a suitable match or dies before the transplant can be performed, the OPO often does not look elsewhere for a suitable recipient or delays doing so until it is too late to successfully transplant the organ. Third, unlike Europe, the U.S. transplant registries currently do not stock serum samples to aid in rapid cross matching of donor and recipient. The percentage of organs removed and not used is particularly high in the U.S., reaching 19% (100-102).

OPOs are of two main types, independent OPOs and hospital based OPOs. Approximately half are independently incorporated entities and half are hospital based. The independent OPOs are not organizationally subordinate to transplant centers and concentrate exclusively on the procurement of organs for transplantation. The independent organ procurement agencies are all financially responsible to Medicare through the Aetna Life Insurance Company. There were 54 accredited independent OPOs in 1985 and the number is increasing. The hospital based OPOs are organizationally
subordinate to a transplant center. They are generally administered by the Department of Surgery or the transplant division of the transplant hospital. There were 59 of these in 1984.

Much of the funding for both the independent and hospital based transplant organizations comes from Medicare's End Stage Renal Disease program (ESRD). Medicare covers all kidney acquisition costs. Reimbursement for extrarenal organ procurement has come from the third party payers (primarily insurance companies) that cover extrarenal transplants. Now that Medicare has broadened its coverage to include some heart and liver transplants Medicare, will probably also reimburse for the cost of organ procurement for those extra renal transplants it pays for.

Independent OPOs are substantially more effective in both the number of organs procured/million population (20/million population served vs. 13/million population served) and in the percentage of procured organs that were in fact transplanted (84% vs. 81%). This appears to be due in part to their larger average size. There appear to be economies of scale up to a size of 70 kidneys procured per year; above this level these economies of scale appear to disappear. Also helpful are their connections with a greater number of transplant centers; independent OPOs routinely provide organs to
many different transplant centers whereas hospital based OPOs routinely supply only the transplant center at their base hospital and often seek to procure only those organs currently needed by the transplant center (103-104).

PART II: THE PROPOSAL

I propose harnessing economic forces to deal with the shortage of organs for transplant, as we do with other problems of resource production and allocation.

The fundamental proposition of welfare economics is that all exchanges, trades and transactions should be made which make all parties to them better off. Clearly opportunities for voluntary exchanges are being forgone. This occurs because the property rights are poorly defined with respect to the organs of dead individuals and because a legal market in organs is prohibited. By defining these property rights more clearly and by legalizing the transfer of these rights we could allow mutually beneficial transfers to occur.

I propose to harness market forces at two different levels. The first is at the level of the donor and the donor's family. Here there are has three advantages to a market based system: 1) it is based on free choice, 2) it benefits the producer of a valuable service thereby giving him increased incentives to provide that service and thus 3) increase the supply of organs for transplant.

The second is at the level of the organ transplant
organization. An appropriate market based system could lead to two improvements: 1) increase the supply of organs for transplant and 2) increase the efficiency with which such organs are harvested and distributed.

I will discuss four basic types of cadaver organ sale.

I) Purchases from the Donor:

A) An OPO could pay living individuals now for the right to their organs when they die.

B) An OPO could contract with living individuals to pay those individuals' heirs or designated beneficiaries in exchange for the right to the individuals' organs. The amount of the payment could either be fixed in advance or could vary with the number of transplantable organs.

II) Purchases from the Donor's Family:

The OPO could pay the family of the deceased for the right to use his organs.

III) Purchases From OPOs:

A transplant center could pay OPOs for the organs procured.

IV) Purchases from Hospitals:

An OPO or transplant center could pay hospitals a fee for every organ donor they locate.

I will discuss the benefits of each of these
different types of sale below.

I) Purchases from Donors

Purchasing the right to an individual's organs after his death from that individual before his death has a number of advantages. Ethically, it presents few problems. Requiring parental approval before a minor could sign such a contract and mandating a buyback clause in case a donor changed his mind are necessary. Otherwise this sort of contract seems a legitimate exercise of individual autonomy, one which causes harm to no one and leads to substantial benefits to others: it increases the supply of transplantable organs. There can be no societal interest to be served by making it illegal and many are served by legalizing it.

I agree with liberal philosophers like J. S. Mill, Hume, Locke, Hayek, Thomas Jefferson, and James Madison that individuals have the right to do as they see fit as long as their actions do not infringe on others' rights.

This view seems reasonable on two counts: first, competent adults, while not necessarily very good judges, are better judges than anyone else, especially the state, of where their own best interest lies. This does not mean that individuals are not often mistaken about what is in their best interest, only that they are less likely to be mistaken than another decision maker. Only
an individual can truly feel his own preferences, fears, and desires and interpret them and only the individual himself can not be corrupted by ulterior motives with respect to himself.

Secondly, the exercise of free choice is in itself a good and pleasurable thing. Removal of that liberty even by a good and benevolent master demeans the worth of the individual and stifles the human spirit.

Our society is dedicated to the preservation of individual liberty. The government exists to help citizens maintain their liberty by preventing other individuals or states from interfering with it. If there is a compelling societal interest which requires such interference, then the state must have the power to do so. However, in this case I see no such interest. No one is harmed by allowing individuals to dispose of their bodies in the interest of others as they see fit.

Practically there are also a number of advantages.

1) Allowing individuals to sell their organs would expand the supply of people who formally indicate they wish to become organ donors by increasing their incentive to donate, by allowing donors who benefit society by supplying an otherwise unobtainable, life saving resource to reap some financial reward.

ii) It might also help address a particularly difficult problem: the even greater shortage of minority
donors. One of the reasons that minorities are under represented in the donor pool is that minorities have expressed less willingness to donate than the general population (105) If allowing cadaver organ sales increased the percentage of minority donors even proportionately the percentage of minority transplant recipients could increase more than proportionally.

iii) It would allow antigen typing of potential donors prior to their deaths so this information and relevant medical history would be available without delay, allowing for better and quicker matching of donor and recipients. Currently, HLA-D antigens, a particularly useful predictor of rejection, can not be typed routinely prior to transplants from cadavers because the procedure (mixed leukocyte reaction) takes too long (5-6 days)(although it can sometimes be approximated using HLA-DR)(106). Many hearts, hear-lung, and liver donors are not HLA typed because of the more restrictive time constraints on these transplants. However, retrospective studies comparing the fortuitously better matched transplant recipients with the less well matched recipients indicate that good matching particularly of hearts, if it could be done within the time constraints, could significantly improve survival rates. If better tissue typing were available routinely organ survival rates could be improved by between 10% and 20%(107-116).
iv) Donor contracts would help insure those who formally express a wish to donate have their wishes honored both by making these wishes clear and more difficult for doctors and hospitals to ignore.

Considerable effort has been expended to encourage people to sign donor cards. Little effort has been expended to make donor cards (or other donor contracts) binding. In practice explicit wishes have little effect on whether an individual's organs are donated (119-122).

In principle, donor cards appear to show the greatest respect for the donor's individuality and autonomy. However, in practice they are not treated as binding (though under law they are) and are generally ignored. Their effect has been limited to getting people to think about organ donation (123, 124). Instead, whether or not a donor card has been signed, the decision to donate is generally left up to the family of the donor, or worse yet, not even raised or addressed. If the family is not available; can not be located; does not want to deal with this issue at the time; or, as is often the case, if the physician is reluctant to break in on its grief with a request for organ donation, the individual's organs are wasted even when a donor card indicates his specific wish to have them put to use.

One of the main reasons that the deceased's wishes can be so easily ignored, even when he has clearly
indicated them by means of a donor card, is the current system provides no living effective constituency to protect them. At the time his wishes are violated the deceased is obviously in no position to object to that violation; his family are either not in favor of the donation or unaware of the opportunity; and, since the organs are not willed to any specific group or individual, there is no one to notify and no one to protest the fact that they were not used. The California organ donor card, for example, reads "Pursuant to the Uniform Anatomical Gift Act, I hereby give, effective upon my death:

A ___ Any needed organ or parts or
B ___ Parts or organs listed__________________.
Date___ Signature of Donor__________.
Witness__________________________
Witness__________________________(125)

If an individual could transfer the right to his organs and tissues to an OPO, this problem would be well on the way to a solution. If the contract were not fulfilled there would be someone with both a legal right and a good reason to protest the hospital's inaction. At the very least the hospital would have a responsibility to use ordinary care to preserve another's valuable property, especially when it is known that lives may be unnecessarily lost unless it does so. If hospital
practice was already to check if an individual had a donor card to facilitate hospital based sales, as discussed in part III, it would almost certainly have a duty to inform the OPO if the organs had already been deeded.

II) Purchases from Donors' Families

There are advantages and disadvantages to this type of sale both ethically and practically.

Ethically, it is the family's decision which allows the organ donation to occur and some compensation for this seems reasonable. Second, in general, the family probably has a better knowledge of the individual's preferences than anyone except the individual himself. (This is why in the absence of clear wishes from the individual, or a clearly designated decision maker the family is often asked to make health care decisions for an incapacitated individual).

However, post mortem sale by the family carries with it a conflict of interest. A family may decide to donate the individual's organs for financial reasons even though they know he would object. The family currently has the power to donate but the law does not permit the additional financial incentive provided by the sale. One could prevent the sale and therefore the potential profits to relatives from such a sale, if the deceased had indicated that he did not want his organs used. This
may not be enough to solve the problem, however, because if the family wishes to conceal the individuals preferences it would be difficult to find out what these preferences were. In fact I am not sure there is a perfect solution. It can be argued that, following the death of the individual, his family or others have the right to do as they wish with his corpse, that his wishes should no longer be binding. This is an alternative way of defining the property right. While legally this argument may have some force, ethical objections can be made on the grounds of individual autonomy. I find these objections sufficiently disturbing, that, although giving the family the right to sell the organs of the deceased has a number of practical advantages (such as a knowing at the time of contract that the deceased has suitable and currently available organs), I do not advocate this type of sale. Perhaps in those cases where someone had been given a durable power of attorney for health care, sale of organs at death could be among the decisions considered, unless it had been clearly forbidden by that durable power or in some other way.

III) Sales by Organ Procurement Organizations

Such sales would have a number of advantages over the present system.
1) They would give OPOs an incentive to encourage people to sign donor contracts and would give the OPO an incentive to find the most cost effective methods of recruiting donors. The advantages of increasing the number of donors in this way has been discussed above in the section Purchases From Donors. Such encouragement could be through financial incentives or merely by active recruitment of unpaid donors similar to our current blood donation system. Blood banks do not currently pay donors for the blood they contribute; however, the blood banks do then sell it to those who need it, through the hospitals that are affiliated with them. The sales price helps them cover the cost of recruiting donors and gives them a financial incentive to be efficient. They advertise for donors, go to businesses, college campuses and other places to recruit donors, provide free T-shirts proclaiming that one is a donor, provide donuts and juice for donors after donation etc.

11) Paying OPOs for organs would also give those involved in organ procurement increased incentives to be efficient both in searching for suitable recipients and in not wasting organs. Instead of being reimbursed for the costs associated with removal, whether or not the organ was used, they would be reimbursed only for organs successfully delivered to a transplant center. This gives incentives to be efficient both in organ removal
(e.g. to get to suitable donors quickly and to remove multiple organs where possible) and in finding suitable recipients and increase the incentive to find ways to successfully store organs for longer periods of time.

iii) The existence of a contract would give the OPO the ability to object if hospitals failed to show reasonable diligence in notifying it promptly when one of it's clients died with organs in transplantable condition. It also would enable the OPOs to capture the attention of the hospitals and insist on effective programs for the handling of transplant organs. They could also strengthen their right to object by specifically contracting with different hospitals.

IV) Hospital Based Sales

As discussed above, doctors' reluctance to ask the families of potential donors for permission to use organs is one of the main reasons for the low percentage of suitable donors that end up donating. Instead of being directed at the donor therefore, this type of sale puts the onus on doctors to ask potential donors or their families, and gives hospitals a reason to insist they ask, because failure to ask denies the organization much needed, valuable resources. It would also encourage hospitals to ask about organ donation on hospital
admission forms and give them an incentive to look for and honor organ donor cards.

Ethically, there seem to be only positive results from this type of sale, as long as the hospital does not require or otherwise coerce either patients or their families to agree to organ donation. Paying the hospital for organs procured there would still leave the family, or the donor if he has expressed his wishes, in charge, and in fact would help insure that they were given the option of donation which they are currently often denied. Although required request laws have not worked particularly well in getting doctors to ask families about organ donation at the critical moment, this more positive approach would almost certainly have more success as it provides additional incentives for the doctor to ask and a good reason for the hospital to insist that he do so.

As discussed above in section III, sales by OPOs would also increase the incentives of those involved in organ procurement to be more efficient and to find better ways of successfully storing organs for longer periods. When the hospital procures the organs and sells them it is acting as an OPO.

PART III: THE MARKET FOR CADAVER ORGANS

What might the organ market be like?
A) Effects on the Organ Procurement Organizations

New OPOs would come into existence and existing types might grow and change. Currently there are a variety of OPOs. About half are located within hospitals which also have transplant centers. They supply primarily that transplant center. Others are independent organizations which supply organs to a number of transplant centers. Most are involved only with organ procurement and distribution. Some are actively involved in asking for donations from bereaved families, and in educating doctors and the public about the need for organs and what a suitable donor is. Organ donor card distribution in most states is state funded and done through the DMV rather than by OPOs.

The same type of independent OPOs would probably continue under the new system, but they would need to expand their activities to include encouraging people to sign donor contracts. Hospital based OPOs would probably be the most convenient method of administering hospital based organ sales, at least in the case of large hospitals where a fairly large number of organs could be procured annually.

There would, however, probably be some changes. In particular, instead of being primarily associated with one transplant center the hospital would probably procure organs for many. In the past this association with only
one transplant center has lead to significant organ waste, both because organs that transplant center does not need are often not harvested and because if the in-house recipient turns out to be incompatible the OPO has often had little incentive to find alternative recipients at other transplant centers. Hospital based organ sales would change this, as they would give OPOs such an incentive. Large hospitals without their own transplant center would also be more likely to develop internal OPOs. Small hospitals might not find it worth the trouble to have an internal OPO to contact transplant centers and do the other administrative work associated with having one, as there would probably be some economies of scale associated with maintaining an internal organ transplant organization. They might therefore want to turn this over to an independent OPO for some financial consideration.

Independent OPOs might also recruit people to sign donor contracts. Some have in fact tried this under the current system with unpaid donors. However very few of the people they signed up ever had their organs harvested by them, and this procedure has largely died out. The low return rate was probably due, at least in part, to the fact that hospitals have little incentive, financial or legal, to notify organ transplant organizations under the current system. With this corrected, as discussed
above, they might be more successful. However, other structures could be more efficient for types of organ sale which involve contracting directly with a large number of individuals.

One of the largest costs of getting people to sign these contracts will probably be finding the people, either by attracting them through advertising or by some form of appeal. In a structure involving competing private OPOs with incentives for success, one would expect a number of innovative approaches for attracting organ donors to be tried. One could have organ drives on campuses similar to the blood drives that different blood banks do on college campuses now. Blood banks could even add organ procurement to their current duties of blood procurement. One could distribute the information to doctors offices or take out ads in popular magazines or magazines that potential organ donors are likely to read. Motorcycle magazines might be one choice, since a lot of organ donors die in motorcycle accidents.

Health insurance companies are almost ideally suited for organ procurement from donors. First, since most under 65 have private health insurance, health insurance companies have easy access to the population. They would only have to tack a paragraph or two onto the the insurance form that their enrollees sign, asking if they wish to sign an organ donation contract and describing
the benefit they offer for doing so. They could also require their enrollees to make a decision for or against organ donation. Insurance companies often have access to much of the patients medical history and this would help in excluding unsuitable donors. Furthermore, it would be particularly easy for hospitals to find out that an individual was a donor if their donor status was indicated on their medical insurance card as this is something hospitals almost always look at when a patient is brought in. The insurance company is also notified of most hospital care and of the death of the patient. This means that if a hospital did not use reasonable care in notifying the insurance company/OPO that a potential donor had died in that hospital, the insurance company would find out about it quickly. An insurance company would also be in an ideal position to get compensation from the hospital if they were negligent as they could simply deduct the value of the lost organ from the hospitals reimbursement provided that they had previously notified the hospital that this was their general practice in such cases (this would have to be done in such a way that the hospital could not then charge the patient this amount). Insurance companies are also are in a good position to get the hospital to agree on notification procedures.

B) Improved Donor and Recipient Registries
It would also be to all OPOs' advantage to set up a central computer registry of donors and people waiting for transplants, with their blood and tissue type and the type and size of organ required, and to keep serum samples available from people waiting for transplants to speed the matching of donor and recipient. This would cut the administrative costs associated with contacting numerous transplant centers considerably, particularly if the number of transplant centers continues to increase and facilitate more accurate matching and increasing the speed with which organs could be delivered to where they were needed. It would also help them detect people signing up with more than one OPO. There are currently computer registries of people on waiting lists for a transplant. However, because the shortage of organs is so acute and the waiting lists are kept somewhat limited, most patients can't even get on a waiting list and also therefore never get on the computer registry. Although serum samples of those on transplant waiting list are routinely kept by registries in Europe to facilitate donor and recipient matching, in the U.S. serum samples are not kept. (126-128) In addition many OPOs don't consult waiting lists; under the current system they have little incentive to do so.

C) Incentives for Individual Donors

How might people be encouraged to sign organ donor
contracts? A variety of different incentives could be offered.

First, OPOs could offer cash, either paid at the time the contract was signed or paid at the time of death. If it was paid at the time of death it could be either a variable amount depending on how many organs could be used or a predetermined fixed amount (less than the variable amount would be if he died with all organs transplantable but more than the variable amount would be if he died with no organs suitable for transplant). I suspect the most likely form of contract would offer to pay out only in the event of an enrollee death and probably only for usable organs or tissues. Such a contract would allow a much more substantial payment than would be possible at the time the contract was signed, since most enrollees will not die for years after they enroll and most of those will not be suitable candidates for multiple organ donation. Therefore, I suspect this would be the more attractive alternative to OPOs and to potential donors(129). The incentive one would be offering would be similar to a free life insurance policy: the opportunity to leave one's heirs better off. As discussed above, 1-18% of people who die in hospitals would be suitable organ donors and over 40% could donate tissues. The OPOs could easily improve on these percentages somewhat as they would not enroll obviously
unsuitable candidates (e.g. people who are already known to have diseases which make them ineligible, the elderly etc.). Therefore, a fairly large percentage of the enrollees who did die would probably bring in at least some revenue. Paying out only upon notification of the death of the individual would also help deal with the problem of people signing up with more than one OPO.

Immediate incentives that might be offered would probably be ones that are useful to both parties. For example the organ transplant organization might offer to blood and tissue type the individual, and if the individual wished, to keep a copy of their medical record on file which they or a doctor or hospital could gain access to when medically necessary. They could then carry a card which would give a number where this information could be obtained as well as indicating that the individual had signed an organ donor contract with their company. This is similar to the service Memic Alert provides(130). If the individual were in an accident this would enable doctors at the hospital to get his medical records to aid in treatment of the patient and if he died it would provide information useful for organ donation about the individual’s blood and tissue type and medical history.

PART IV: ARGUMENTS AGAINST CADAVER ORGAN SALES DISCUSSED
1) The market is too imperfect.
Admittedly the market for medical care is not perfectly free and competitive. In particular, a lack of consumer sensitivity to price when purchasing insured medical care, a lack of cost consciousness on the part of providers due to cost based reimbursements, a lack of reliable consumer information about differences in quality, and specific local monopolies have been a problem. However, cadaver organ sales will suffer less from these problems than many other areas of health care provision:

First, the transplant center and the OPO will be the buyers. Unlike the insured health care user, who has little incentive to be cost conscious, both these organizations will. The OPO will be cost conscious because its profits will be determined by the difference between cost and price. How cost conscious the transplant center will be will depend on how it is reimbursed. If this is done at a fixed rate as with a DRG system (the likely method of reimbursement), transplant centers will want to hold the cost it pays for organs down. This incentive would be much reduced if a cost based reimbursement system were used because the transplant center would be reimbursed for the cost of the organ whatever it was and would therefore have little incentive to keep the cost of the organ low. Currently
however Medicare has moved away from cost based reimbursement systems, as have many insurance companies and they have strong financial incentives to continue doing so.

Second, potential transplant recipients have access to information about transplantation, the success rates of different transplants and the success rates at particular transplant centers. Books and journals on transplantation are also available. While most of these are written for professionals, many are accessible to educated laymen. Since there are relatively few transplant centers, it is easier to get this sort of information. For example in 1986 there were only 190 kidney centers, 94 heart centers, and 41 liver centers in the U.S., and available information allows consumers to assess their quality(131).

Third, while OPOs may have economies of scale which make for local monopolies, they are unlikely to have much monopoly power because modern rapid transportation makes the market for organs national not regional. First, there are relatively few hospitals which have their own transplant center; therefore most hospital based and all independent OPOs that develop under a market system (or any other system which procures organs outside of the transplant hospital) will often have to send organs to distant organ transplant centers anyway, and even those
that do have an an in-house transplant center may end up
doing so if a better match is available elsewhere or if
they do not currently have a patient requiring a
particular type of transplant. Today, without a well
developed market, one of the biggest reasons that
available organs are wasted is that not enough of this
occurs. When it comes to selling organs, OPOs will
essentially be competing against all other organ
transplant organizations in the nation. There may be a
slight advantage if a transplant center is close, as
transportation costs would be somewhat less. Although in
1985 there were only 114 OPOs, this number would increase
under my proposal as both profitability and available
organs increased, so no seller would have too great a
market share(124).

2) **Organ sales will merely inflate the price**(135)

There are five problems with this argument.

First, the overall cost of a successful organ
transplant\individual recipient might actually fall as
other savings induced by the market offset the increase
in organ price. The other costs of organ procurement
(e.g. the cost of removing and transporting the organ)
are already paid under our current system and average
$5,000-6,000(136,137). As discussed above, allowing organ
sales might substantially increase the efficiency of
organ procurement and improve coordination between
hospitals, OPOs and transplant centers, reducing these costs. As increased organ supply allowed an increase in transplants, economies of scale and learning might also lower the cost per transplant. It is not clear that cost would fall, since they have not fallen for many surgical procedures even though volume has increased. However, in many such cases the quality (i.e. success rate) has increased so the comparisons are not between identical services. For example, costs of open heart surgery have not declined substantially though volume has increased, but surgical outcomes have improved for surgeons who do a lot of bypass surgeries and in hospitals where a lot of bypass surgeries are performed (138).

In addition, other methods of maintaining and increasing organ supply also have costs. e.g. the donor card system and public education campaigns. If permitting a market for organs is successful in increasing the supply, one could reduce these expenditures. The market would see that allocation between various types of promotion and direct payment would result in the lowest overall cost.

Second, as one could tissue and blood type donors when they sign up, one could get quicker and more complete donor recipient matches and thereby decrease the number of transplanted organs that fail due to rejection. This would reduce the number of retransplant needed and
avoid their associated costs.

Third, The cost of cadaver organs will probably not rise much. Economic theory predicts that price will fall to cost unless entry is restricted and cost appears low. The donor's cost is the inconvenience of signing up to be a donor and any psychological discomfort that thinking about the possibility of death and the process of organ donation might bring. For many people these costs are negative (because of satisfaction they get out of agreeing to donate). These are the 1-20% who currently sign donor cards. For many others cost is very close to zero, i.e. people who would donate if asked but who won't go to any inconvenience to do so. It is not clear what percentage of the population these people are though the generally favorable attitude people express suggest it may be high. If it is very high, active solicitation of unpaid donors by OPOs may be sufficient. This would occur more readily if the OPO had a financial incentive (as discussed under Sales by OPOs above). If the resistance to organ donation is higher as, for example, it appears to be among certain minority groups, and may be in the general population, additional incentives might have to be offered at least to some. However, I suspect the amount would not have to be large; and others might still donate. Systems for purchasing and giving blood have existed side by side. By analogy, one might expect
that, although some people who would have given their organs may now sell them, many would still give them (particularly as payment would probably come at the time of an individual's death). It does, however, appear true in some cases that hospitals' selling price for blood is higher in areas were blood is purchased than where it is donated exclusively. (140-144)

Fourth, even if the price of a transplant did increase, the expanded supply would allow many more people to get a life saving transplant. Given a choice between no transplant at all (the current situation for many) and an expensive transplant, most people would obviously choose the latter. There are situations where price might increase significantly. First, as already discussed, if cost based reimbursement were used became there would be no price competition. Neither the transplant recipient, transplant center, transplant procurement organization or donor would have any incentive to keep price down. However, there is no reason to expect cost based reimbursement would be used to pay for organs.

Fifth, the organ price is only a small part of total transplant cost, therefore even a substantial increase in organ price is unlikely to substantially effect the transplant cost.

Organ prices might be high if supply did not
increase as predicted. The number of organs might remain small and insensitive to price for three reasons: first if the potential supply is actually much more limited than estimated and second, if there is a much greater perceived distaste for donating than polls suggest and third if allowing organ sales changed peoples perceptions of organs donation and made them less likely to donate(145-147).

There is no indication that the first or second is true. Furthermore, if the second were true, and a high price is necessary to induce people to donate, it would indicate that the real costs to people of becoming organ donors are high. Otherwise people would be willing to contract at a lower price. OPOs would try to address whatever concerns people might have about donation and to have carefully designed advertising campaigns to lower perceived costs. However, if this cost remained high, it should be paid. People who agreed to donate would be providing a service others needed. It is perfectly reasonable to compensate them at the level required to maintain voluntary donation. The market compensates people who do unpleasant jobs at a higher rate than those with more pleasant jobs requiring equal skills and abilities; this is necessary to attract enough people to do these jobs voluntarily. The alternative is forcing people to do these jobs or simply not having them done.
The third case is more troublesome. People have made the same argument about paying people to be blood donors. Whether this effect actually occurs however is controversial (148-151). Furthermore, although there may be some merit to the argument that some people will not donate if donation is no longer perceived as altruistic, people's perceptions and reactions probably depend a great deal on how the organ sale is presented. Skillful advertising (which the OPOs would have an incentive to do) could probably make a big difference.

3) Organ sales will unfairly benefit only the rich. (152,153)

This is a specious argument. First, allowing organ sales says nothing about how transplants should be financed. It is true that organ transplants, like many of the highly technical advances of modern medicine, are very expensive. For example, it costs about $30,000 for a kidney transplant, as much as $100,000 for a heart transplant and $150,000-200,000 for a liver transplant. This does not include the cost of the immunosuppressive medication which must be taken for the rest of the patient's life to avoid rejection. This costs about $10,000/yr (154-156). Currently kidney transplants (though not the post transplant immunosuppression) are heavily subsidized by the government through ESRD. Liver and heart transplants have recently been added to the
list of procedures Medicare will pay for. Medicaid in many states also pays for some transplants for the poor. In 1986 Medicaid covered heart transplants in 24 states, heart/lung transplants in 13 states, liver transplants in 33 states and pancreas transplants in 3 states. Medicaid in California covers certain heart and liver transplants (160). People who want a transplant must either be covered by one of these programs, have enough money, have medical insurance that covers transplants, borrow the necessary funds, or raise the money from charitable contributions. This is true whether the organs are purchased or donated. The additional price of the organ is unlikely to change the affordability of an organ transplant. Most people do have medical insurance (although an estimated 39 million do not) and 85% of the US insurance companies do cover heart and liver transplants(161,162). As a society we must decide whether we want to subsidize transplants for the poor and uninsured and if so how much. Whether the organs used were purchased or given, however, need not affect this decision.

Second, as discussed above, increasing supply will reduce barriers disadvantaged groups currently face which reduce their access to transplants.

Third, even if the rich are the main beneficiaries of the increased supply, just because someone is rich
does not mean they deserve to die. Saving a rich person is better than saving no one. As long as they are financially responsible for the operation and do not depend on subsidies needed by others, there should be no objection to the rich purchasing transplants per se. They certainly have a right to try to extend their lives using their own money. If society wants to subsidize these transplants for the poor, it can. If it chooses not to, that does not seem sufficient reason to deny them to people who can afford them.

4) **Organ sales will allow the rich to "jump the transplant waiting list".** (163)

This is unlikely. Organ sales would simply be another way for transplant centers to obtain organs. Transplant centers, not patients directly, procure organs and only they have the necessary expertise to do so. People waiting for a transplant are also often very ill and in no condition to search for an organ themselves. Selling organs need not make a difference in how organs are allocated except that by expanding the supply there would be more organs to allocate and more people will benefit.

Secondly, "jumping the list" is only a problem if there is an organ shortage. Because we have not allowed the financial incentives of the market place to expand the supply of organs we currently need to use a
number of methods to ration the limited supply. Among these methods are waiting lists. As the market increased the supply the waiting time would decrease as would the advantage of "jumping the list". The only people who would still have an incentive would be those who should be at the head of the list on the basis of need: People who are close to death and needed an immediate transplant and people who are highly sensitized or have a very rare HLA type and therefore have few chances to get an organ they won't reject. Others have an incentive to wait for a good match as it improves transplant success avoiding the need for a retransplant and the association morbidity, mortality and expense.

Finally, if organ supply increased substantially, even if a few people did "jump to the head of the list" the wait for everyone else would still be shorter and more people would receive transplants than do currently.

5) **Organ sales will encourage people to kill others for their organs or the desperate to kill themselves.**

First, there would be some logistical difficulty in doing this because any violent or suspicious death and any suicide is automatically autopsied in most states. An autopsy is incompatible with organ donation because it involves slicing all the organs up to look for abnormalities(164). In addition, organ donors must die in hospitals if their organs are to
be harvested in time.

Second, even if this difficulty could be circumvented, the risks would be considerable and the gains limited. The incentive to murder for organs is probably greater now as their are many desperate people who can not get organs than it would be if organ were readily available. Furthermore a person willing to murder for profit probably has many of other more lucrative opportunities. Nor are hospitals likely to engage in murder for profit. If they were, they currently have much stronger financial incentives to direct their efforts elsewhere (e.g. Medicare patients who will remain in the hospital long after the DRG payment has been earned, charity patients, any money losing patient in fact)). While issues of quality of care and patient dumping do at times arise, out-and-out murder for gain by hospitals is hardly a common occurrence.

Third, life insurance companies currently deal with the problem of suicide for gain. Many will not pay out on a suicide or will not pay out if the suicide occurs within two years of the purchase of the policy. The same kind of rules could be used by OPOs.

6) Organ sales will decrease organ quality.(165-168)

First, OPOs will not sell poor quality organs. They have a reputation to protect. Particularly as the supply expanded they would have to compete to convince
transplant centers to purchase their organs. Transplant centers would not want to purchase organs from a procurement organization with a poor reputation, in part because poor organs would result in poor outcome statistics for them. Both could also face significant liability if their negligence caused harm to a patient. Transplant centers are also currently under much greater pressure to purchase inferior organs because many of their patients will die if they do not(169-170).

Second, increasing the donor pool increase quality because it would contain more blood and tissue types, allowing a better matches.

Third, organ procurement agencies could do tissue typing when prospective donors sign up, allowing faster and more accurate and detailed tissue matches between cadaver organs and recipients.

Fourth, although financial incentives might encourage unsuitable candidates to sign donor contracts this is not likely to be a major problem. This argument has also been used in the analogous situation of paid blood donation. Although paid donors in some places have had higher rates of hepatitis B antigen this is not a big problem as blood is screened before donation(171). Organ donors are also tested for a whole host of things (hepatitis infection, HIV infection, etc.) at he time of donation.
Fifth, knowledge of a donors medical history is often incomplete. OPOs could keep a medical history of the person on file for examination following death.

7) **Organ sales encourage thinking of people as property.** (172)

This is only true superficially, in a deeper sense they do the opposite by respecting individual liberty and autonomy. It is unjustified constraints on liberty and autonomy that demean the individual. When a person is alive his spirit and his freedom to act are tied to his body; when one constrains his body one constrains his liberty and freedom of action. Once a person has died, it seems more respectful to follow his or her wishes than to disregard them.

8) **Organ selling is inherently morally repugnant.** (176,177)

If this is truly a fundamental moral principal for them, rather than as a derivative from the other arguments against it which I have outlined above, it is difficult to argue against them. The right of people with such views to refuse to participate must be guarded vigorously. However, people who find the practice immoral need not participate. As it would directly benefit many and harm none, the moral indignation of a few should not limit the right of others. We are after all a society which prides itself on diversity and
individual liberty.

9) **Organ transplants are costly and must be limited and limiting organ supply is a good way.** *(178)*

The first point has merit. Organ transplants are admittedly expensive. Society will almost certainly have to set a limit on the amount spent subsidizing medical care. However, the ethics of restricting organ transplants in this covert and hypocritical manner is extremely questionable. If we don't want to subsidize organ transplants this should be stated clearly. As the nation sets limits on the subsidization of medical care it should do so in a rational and cost effective manner. This can't be done if alternatives are concealed.

Second, given that Medicare currently pays the cost of dialysis, kidney transplant actually save the government money. Dialysis is more expensive than transplantation. It costs between $18,000 and $25,000/patient/yr. *(The lower figure is for home dialysis, the higher one for center performed dialysis).* By transplanting all suitable kidney transplant recipients we could save as much as $2 billion dollars every year *(180)*. Furthermore, dying patients receive a lot of high cost care. Given the care we give patients dying of liver or heart failure it is not clear how much more expensive a transplant would be particularly as medical technology extends further and further the lives
of the very ill. I do not claim that there will be a net monetary gain on heart and liver transplants, but the overall cost will be less than the cost of transplant and associated costs taken in isolation. The Task Force on Organ Transplantation calculated the cost of performing all beneficial heart and liver transplants to about 550 million. This is less than the savings transplanting all suitable patients on dialysis would bring.

10) Organ sales disproportionately induce the poor to sell organs and are therefore coercive. (182-184)

The poor may be more eager than the rich to pursue this opportunity. But this definition of coercion is faulty. By this definition anything done for pay which would not be done otherwise is coerced. It is more coercive to deny someone who would otherwise wish to sell their organs the opportunity. I propose the distinction given by Anthony Kronman in "Contracts and Distributive Justice". In his opinion a party can voluntarily and autonomously contract even under coercive situations (such as poverty) if A) the coercive situation on the party was not created or maintained by the other party or someone intending to benefit the other party, and B) if the party subject to the coercive situation participates in the negotiations willingly. (185) This does not deny that poor people have fewer options than the rich. Further reducing their options does not benefit them,
however, it further constrains their liberty. The poor certainly deserve to have their autonomy respected as much as the rich. In fact society must be particularly careful to protect the autonomy of the poor because they have fewer resources and less power to protect it on their own. However, placing excessive restrictions on peoples ability to voluntarily enter into contracts infringes on, rather than protects autonomy. Particularly as selling the right to one's organs after one's death poses no risk to one's health or well-being; is voluntary and as our society does not disapprove of organ donation, there seems little justification for this highly paternalistic attitude.

11) Paying for organs decreases altruism (186-189)

This argument is flawed. First though the percentage of organs donated without payment would certainly decline the absolute number might not, if OPOs efforts to increase organ supply in other ways were effective. Even if this did not occur it seems more altruistic to give something when one could have sold it than to give it when ones only other option is essentially to throw it away.

12) Contracting with donors is unnecessary — hospital based organ sales would be sufficient particularly if coupled with presumed consent laws. This would be simpler and more efficient.
This is a valid argument. Paying hospitals could overcome their resistance to implementing presumed consent laws in the same way it could overcome hospitals resistance to asking entering patients or the deceased's family to donate organs in the event of death. But presumed consent laws, even when they contain an opting out provision, are an unnecessary violation of individual rights. The state should not have the right to do as it pleases with someone's body even if he has already died (required autopsies are somewhat different as they serve an important law enforcement purpose which can not be easily served in other ways). Opting-out is complicated and uncertain(190). Many will not even know about the requirement(191). Finally, presumed consent laws could reduce peoples willingness to donate. In addition one would lose other advantages to signing up donors in advance. In particular the opportunity to blood and tissue type them in advance.

CONCLUSION

In conclusion, legalizing two sorts of organ sale, sales by donors and sales by OPOs (or hospitals acting as OPOs), would eliminate the shortage of organs for transplant and allow for better tissue matching. Legalizing sales by donors has three advantages 1) it increases supply, thereby saving lives 2) it removes a restriction on individual liberty, and 3) it allows for
prospective blood and tissue typing of the donor. Legalizing sales by OPOs also has advantages 1) it increases supply thereby saving lives, 2) it increases efficiency.

Organ sales are of course not the only way to increase supply. Further efforts on public and professional education, public funding to improve transplant registries and so on could also increase supply. More drastic changes like implementing presumed consent laws and strongly enforcing them could as well. However, the advantage of allowing organ sales over these methods is that it is non-coercive and would encourage choice cost effective methods. Allowing this type of sale would benefit many and harm none.
Appendix A

SOME FACTS ABOUT ORGAN AND TISSUE TRANSPLANTATION (200-211)

An ideal organ donor is a young previously healthy person, with healthy organs, rendered brain dead by head trauma, intracranial bleeding etc., with, at most, minimal damage to the rest of the body. Generally, it must also be possible to temporarily maintain the body mechanically to prolong organ viability. In some cases, if this is not possible, organs can be harvested from non-heartbeating donors but the organs must be removed immediately following the donors death. The requirements for tissue donation are much less stringent because ischemia is less of a problem and because tissues can be stored for long periods between the time they are harvested and when they are transplanted. In addition the donor must not have been suffering from cancer, or any infection which might be spread from the organ donor to the transplant recipient (e.g. HIV infection, hepatitis B infection or rabies).

Kidney Transplants

In 1985 alone, 6910 kidney transplants were performed. The success rates of kidney transplantation have increased dramatically from a one year survival rate of less than 50% in 1960 to a one year survival rate of
over 90% currently. Kidney transplantation now is accepted as a desirable form of treatment for most patients in terminal renal failure. Almost all patients on chronic dialysis could probably benefit from renal transplantation. Transplantation can be used to treat renal failure resulting from glomerulonephritis, pyelonephritis and polycystic diseases of the kidneys, diabetes mellitus, systemic lupus erythematosus, and hypertensive kidney disease. In 1985 there were 88,510 patients receiving chronic dialysis in this country.

Kidney donors must meet the requirements discussed above under general organ donor requirements. Where circulation and ventilation can be maintained kidney donation is compatible with multiple organ donation. If circulation can not be maintained (e.g. in someone who has died of a heart attack) a fast nephrectomy can be performed to prevent long warm ischemic times. The kidneys are then perfused and cooled to 4 degrees Celsius. A perfusion pump may or may not be used. Kidneys can be preserved in this manner for 24-72 hours. HLA typing for A,B and particularly D loci significantly increases graft survival.

Following a kidney transplant most recipients are able to lead a normal life, unlike dialysis patients who are often depressed, fatigued and lethargic.
Liver Transplants

There have been over 1,000 liver transplants since the first attempt in 1963. In the early years the 1 year survival rate was less than 30%. Improvements in surgical technique and in the diagnosis, treatment and prevention of rejection have substantially increased the survival rate. About 70% of liver transplant recipients are now alive and well after 1 year. The survival rate is somewhat better in children and somewhat worse in adults. Some 90% of surviving children will be able to lead normal lives. They are free of major medical problems and able to attend school; 85% of surviving adults are able to return to their occupation or other full time activities. Women can have normal pregnancies.

The diseases that can be treated with liver transplantation include primary hepatocellular malignancy if it has not yet spread beyond the liver (although this is somewhat controversial because of the high chance of recurrence), hepatic cirrhosis, acute and subacute hepatic failure, and congenital biliary atresia which can not be otherwise corrected.

After surgery, patients are generally placed in the intensive care unit for at least 12 hours. Immunosuppression is begun within the first 12 hours.

Liver donors must have a healthy liver and meet the same general donor requirements discussed above under
general organ donor criteria. Livers are generally harvested as part of a multiple organ donation. This procedure usually takes about 1.5 hours. The liver is cooled using hypertonic citrate solution at 4 degrees Celsius. This allows the liver to be stored for 4-8 hours. Experiments with other solutions and perfusion techniques indicate that this limit may be increased in the near future by several hours. Poor HLA matching seems to have relatively little impact on graft survival. Some transplant centers will even perform liver transplants across ABO blood types. Liver recipients do, however, need lifelong immunosuppressive therapy and are therefore subject to its complications.

HEART TRANSPLANTS

The first successful human heart transplant was performed in 1967. The one year survival rate has improved from 22% in 1968 to 67% in 1979 (pre-cyclosporin A). Following the discovery of more effective immunosuppressive drugs, primarily cyclosporin A, the patient survival rate again improved; the one year survival rate for cardiac transplant recipients is currently greater than 84%.

By far the most common indication for a heart transplant is end-stage cardiac failure, where no
effective alternative treatment exists. End-stage cardiac failure is generally caused by cardiomyopathy or terminal ischemic heart disease. Terminal valvular disease, myocarditis, cardiac tumor, some forms of congenital heart disease, coronary emboli and cardiac aneurysm are also occasionally the reason for a heart transplant.

In addition to the general organ donor criteria already discussed, cardiac donors should not have current heart disease or a previous history of heart disease. Long periods of external cardiac massage or severe hypotension are contraindications to donation. The donor should also be within 20% of the body mass of the recipient unless the recipient has significantly elevated pulmonary vascular resistance, in which case a larger donor is necessary to prevent heart failure. Because of the time pressure involved, HLA matching is not generally practical. It is generally attempted only when the recipient is known to be already sensitized to certain HLA types. Donor and recipient are however routinely matched for ABO blood groups. Retrospective HLA crossmatching has indicated that patients with a good crossmatch do better than others, particularly if they are matched for the HLA-A2 locus. The donor heart can be kept viable for up to 4 hours after removal from the donor. Therefore it is possible to transport a heart
removed in one hospital a considerable distance but coordination of the donor and recipient surgeries is important.

The removal of a heart for transplant is relatively straightforward surgically and can be performed in a standard operating room; it does not require cardiopulmonary bypass. The heart must be cooled to 4 degrees Celsius and maintained at that temperature if it is to survive until it is placed into the recipient. A saline solution is generally used for cooling.

Following a transplant, patients must remain in intensive care and be reverse barrier nursed until their immunosuppression has reached base line (up to a week). However they generally do not need ventilatory support and can be extubated the first postsurgical day. Rejection is monitored by periodic heart biopsies though less invasive techniques are under investigation.

Most patients are well rehabilitated following surgery and can return to work and lead active lives. They do, however, need lifelong immunosuppressive therapy and are therefore subject to its complications.

HEART-LUNG TRANSPLANTS

Several heart-lung transplants were attempted between 1968 and 1971 but the longest survival achieved in humans
was 8 days, and attempts at human transplants were suspended. In 1981, following the introduction of cyclosporin A, Stanford began a cardiopulmonary transplant program with considerably greater success. Stanford is currently reporting one year survival rate for heart-lung transplants is approximately 65% with most of the mortality occurring very shortly after surgery.

Most patients who receive heart-lung transplants have either primary or secondary pulmonary hypertension. The survival rate for heart-lung transplants is greater than for lung transplants as it is considerably easier surgically to move the heart and lungs as a unit rather than to make the myriad of connections between the heart and lung necessary when one moves them separately. Therefore, they are also sometimes done to treat patients with primary lung conditions like cystic fibrosis. The heart of the heart-lung transplant recipient in these cases may be undamaged and following its removal form the recipient can sometimes be transplanted into someone awaiting a heart transplant.

Lungs are the most sensitive organs to ischemic damage. There is controversy about the optimal method of preserving lungs and as well as about the length of time they can be preserved. Some estimate 3 hours some slightly longer. Cardiopulmonary bypass is not required
however during removal of the heart and lungs.

The number of eligible donors is limited because many brain dead patients are maintained on respirators prior to organ harvesting. This often causes pulmonary complications which make them unsuitable pulmonary donors even though their other organs may be usable. The donor should have a thoracic cage size equal to or smaller than the recipient. If the recipient has had previous thoracic surgery the procedure is substantially more difficult due to scarring, and given the current shortage of suitable donors this is generally considered a contraindication for transplant.

Rehabilitation following heart-lung transplantation has been very good. Most patients have essentially normal cardiopulmonary function. Some longterm survivors do develop late respiratory failure, possibly due to late rejection of the lungs. This may be reversible with increased levels of immunosuppression.

PANCREATIC TRANSPLANTATION

The first human pancreas transplants were done almost 20 years ago. However this procedure has not been much in demand until recently, because until recently the difficulties encountered by the patients outweighed the benefits. Pancreatic transplantation is used to treat
diabetes by replacing the defective insulin producing pancreatic islet cells. Although diabetes is a serious illness its complications have generally been less than the combined complications of major surgery and immunosuppression. Two changes have occurred that now lead doctors to consider pancreatic transplants for certain diabetic patients. First the success rate has increased for these transplants. Second, the success rate for kidney transplants in diabetics has increased. Diabetes is one of the main causes of kidney failure. If a diabetic patient is getting a kidney transplant the additional risk associated with a simultaneous pancreatic transplant is relatively small, as the patient has to undergo surgery and immunosuppression anyway. Furthermore a successful pancreatic transplant seems to prevent the transplanted kidney from developing diabetic nephropathy leading to subsequent kidney failure in the graft, as well as potentially reducing the incidence of other complications of diabetes such as retinopathy and microangiopathy. In addition, of course, successful pancreatic transplants eliminate the requirement for exogenous insulin administration or dietary restrictions.

SKIN TRANSPLANTATION

Skin transplants are primarily done to treat severe burns. While skin can regenerate if only a partial loss
of thickness has occurred, no regeneration occurs after the loss of the entire thickness as occurs with a third degree burn. Such injuries can be treated by grafting partial thickness skin removed from unburned areas of the donor. However if a large area of the body has been burned the patient may not have enough uninjured skin area left to provide prompt coverage of the injured areas. In this case the wound must be closed in a temporary fashion to help prevent the dehydration and infection that would otherwise result until the patients remaining skin has regenerated sufficiently to allow complete coverage. Temporary coverings include chemical dressings, synthetic "skins", animal skin and human skin harvested from cadaver or living related donors. Human skin has proven to be one of the most effective of these options particularly in cases were the patients burns cover more than 70% of his surface area. Permanent skin grafts from donors other than the patient himself or his identical twin are currently not practical because of the highly immunogenic nature of the skin and HLA matching is considered important in prolonging the survival of the graft. Roughly 50% of patients suffering burns of 80-90% of the body surface survive and return to a reasonably normal life if treated in this manner. Because the graft is temporary long term immunosuppression of the patient is not necessary
although it is generally used while the graft is in place. Skin harvested from cadavers can be successfully stored for long periods by freezing. Donor criteria are not strict.

CORNEAL TRANSPLANTATION

Corneal transplants are the treatment of choice for corneal scars resulting partial or complete blindness. Corneal transplants were first attempted on humans about 200 years ago by Reisinger. These attempts were almost always failures, however. The development of aseptic technique, anesthesia, improved surgical techniques, and the availability of human corneas have combined to dramatically improve success rates. Corneal grafts have been the treatment of choice for corneal scarring for at least the last 30 years. Currently good vision is regained by over 90% of transplant recipients.

In general the whole eye is removed from the donor and the cornea removed later. Corneas can be stored in three ways. 1) The eye may be stored in a moist chamber at 4 degrees Celsius for up to 48 hours following the death of the donor. 2) It can be stored for up to seven days in tissue culture medium 199 and 5% dextran. 3) Long term storage can be achieved by freezing of the isolated corneas.
Appendix B

A BRIEF DISCUSSION OF OTHER TYPES OF ORGAN SALE

There are a number of other possible types of organ sale I will briefly discuss: the sale of organs and tissues obtained from living individuals, cadaver organ and tissue sales for purposes other than transplantation and, fetal organ and tissues sales for transplantation or research.

The Sale of Organs and Tissues Obtained from Living Individuals

Much has been written both for and against allowing such sales. (213-220). These arguments are similar to those made presented in this paper with regard to cadaver sales particularly those pertaining to sale by the donor, although the arguments against are somewhat bolstered by the possibility of substantial permanent harm to the donor. One important argument for allowing such sales is the right of the individual to decide for himself, at least for those organs and tissues which can be removed without necessarily causing the death of the donor. As I have discussed in the main paper, individual choices should be left in the hands of the individuals concerned rather than the government as long as the individual is a competent adult and the decision
voluntary. It is important to insure that the individual is informed of the risk involved in living donation. However, purchases of organs from living individuals would probably be substantially more expensive than from a cadaver, if cadaver organ sales are allowed, as the cost to the donor is much higher for a living donation. Therefore, if cadaver organ sales are allowed almost all of the market for organ and tissues sales from living people would be eliminated.

There are two likely exceptions. First, it is likely that related kidney donors will still be used to some extent. Unpaid kidney donation from a relative is currently legal. In fact thirty percent of kidney donation are currently from living related donors. This is not only because of the wait for a cadaver kidney but also because a better tissue match can often be obtained in this manner both because there is time to do more complete matching and more importantly because blood and tissue antigens are inherited and therefore closely related individuals are more likely to share them. A better match leads to improved graft survival (though not substantially improved patient survival). I see nothing wrong with allowing compensation for the risk we currently allow these related donors to run if they wish to accept it. There might also be rare cases where a particularly good match was found in an unrelated
individual particularly if a large number of people were being HLA typed. If, for example an individual contracted to became a cadaver donor, was HLA typed in consequence, and gave his permission for others to have access to the HLA type results he might be approached for this type of donation. One would want to allow the potential donor to control the method of this approach so that undue pressure would not be brought to bear (e.g. by requiring that it go through the potential donor's doctor), but there seems little justification for refusing to allow the potential donor to make this choice.

The second case where paid donation from living individuals might be quite practical is bone marrow donation. It is the least risky of the living donor transplants to the donor because bone marrow regenerates, so there is no permanent loss to the donor and the procedure for donation while unpleasant need not be particularly risky. A good match is extremely important for bone marrow transplants. It is the bone marrow that is the source of the cells of the immune system therefore, if rejection occurs, instead of the transplant recipient rejecting the graft the graft rejects the transplant recipient in something called graft versus host disease. Because of this, related donors are used were possible. However a matched related donor is
available in only 30-40% of cases. When a good match is not found among relatives it is looked for elsewhere. A bone marrow registry has been set up of willing volunteer bone marrow donors but the response has been extremely limited. Bone marrow donation is sufficiently unpleasant that few people donate voluntarily unless they are related to the individual who needs it. A large donor pool is needed if a good matches are to be found therefore giving people an inducement to join this register would be worthwhile. Since organ procurement organizations signing up potential donors might well HLA type them in advance it would be easy for them to also ask about registering as a bone marrow donor as well.

Contract to Sell One's Body, Tissues or Organs for Purposes Other Than Organ or Tissue Transplants After Death

There are a great many uses for cadavers, organs and tissues other than transplantation (e.g. for medical research, medical school use in the study of anatomy). The same individual autonomy arguments can be used to defend this type of sale as were used to defend cadaver sales for transplant. There is a considerable shortage of cadavers and skeletons for the study of anatomy currently. Skeletons in particular are in short supply
because India, which used to be our biggest supplier has recently forbidden their export. The price of skeletons has consequently risen substantially. A skull alone currently can sell for over $200. The sale of foreign skeletons and of embalmed cadavers donated before death is currently legal in the U.S.A. In fact, the state sells medical schools and anatomy departments unclaimed unidentified cadavers from the county morgues. This is quite objectionable, as a great many people have strong feelings against having their corpse dissected. The price people would demand would be probably be higher for this type of donation than for the right to transplant their organs because of these objections, however people could be asked at the same time as they are asked about organ donation for transplant about other forms of body donation. Because almost all bodies can be used in this manner, even if only a small percentage signed up, a large number of bodies and body parts could be obtained for study.

The Sale of Fetal Tissue for Use in Transplants Or Research.

There are strong valid objections to this on precisely the grounds that paying for fetal tissue would increase the supply in what many feel would be undesirable and morally objectionable ways. It is feared that such payment would increase the number of abortions
performed and in particular the number of late abortions performed, by encouraging already pregnant women who were planning to have an abortion to delay it until the fetus was at a more valuable stage of development. It is also argued that some pregnant women, who would otherwise not have abortions, would have them or that other women would get pregnant just so that they could have an abortion and sell the tissue. Regardless of one's position on abortion, there seems no reason to object to transplants of fetal tissue or research on non-living abortuses as long as the tissue studied comes from fetuses who would have been aborted anyway and if it does not cause substantial additional pain to the fetus; this does the fetus no additional harm and may benefit others. However one must be careful not to encourage abortion by offering a financial reward for it. Proponents of a woman's right to an abortion generally argue not that the fetus has no rights but merely that the woman's right to privacy and to the control of her body and reproduction are more important. Opponents of abortion generally feel that the fetus is a human being from the moment of conception and therefore has all the rights of a human being from that time. In neither case would one wish to encourage pregnancy for the sole purpose of abortion. In both cases however once the abortion has been performed and the fetus has died there seems little reason to object to
using its tissues to benefit others and to bring some good out of an otherwise sad situation, though one might wish to require maternal permission.
REFERENCES


20) James Rosin, MD., Lecture on Dialysis given to the UCSF Joint Medical School Class of 1990 on April 1, 1987.


22) G. R. Catto, ed., Clinical Transplantation: Current Practice and Future Prospects, Immunology and Medicine


February 1986. 2501-2502.


48) P.F. Pfeffer, et. al. "Correlation Between HLA-DR Mismatch and Rejection Episodes in Cardiac Transplantation" Transplantation Proceedings:


71) Jeffrey M. Prottas, "Organ Procurement in Europe and


73) Department of Motor Vehicles, Hollister CA.


81) Testimony before the Subcommittee on Science and Technology. as found in House Report number 98-575,98th Congress, First Session, 1983. 351.


116) The advent of cyclosporin has made this assumption somewhat controversial. However a number of studies and particularly the larger sample size studies still show this improvement with good HLA matching particularly if the matching is done expeditiously and does not cause the organs to be much older than non matched organs at the time of transplant (95-118).


119) Jeffrey M. Pratts, "Organ Procurement in Europe and


125) Organ donor card distributed to Karen Parker in May, 1984 by the DMV.


129) The maximum amount OPOs could pay people at the time of signing would be small. To be specific, if one took the discounted present value of the expected value of their organs at death multiplied by the percentage chance that they are going to die with their organs suitable for transplant and subtracted from that amount the cost per enrollee of running the program and you would have the maximum an OPO could afford to pay an individual to sign up at the time of signing. The payment would end up being a very small amount. If, on the other hand, one paid out only at the time of the enrollees death one would not have to discount and if one paid only for usable organs one would only pay the small minority who died with their organs and tissues in transplantable condition.
130) Medic Alert, Turlock, CA 95381. Phone# (209) 668-3333


141) In this state certain types of blood donation (e.g. plasma donation) are paid whereas other types of blood donation (e.g. whole blood) are not. This is primarily because one can not get enough plasma donors if one does not pay as it takes considerably more time (several hours) to give than does whole blood where the actual donation time is about 15 minutes (although the predonation questions take a little time as well). There has in fact been talk in California of returning to a paid whole blood donation program because of the shortage of blood which has occurred as a result of people's fear of AIDS. (There is no way to get AIDS from donating blood as each donor uses a new sterile needle. These needles are not shared between donors or reused. However
a remarkable number of individuals when polled express fear that they could contract AIDS by giving blood and the amount of blood donated has fallen sharply).


156) James Rosin, MD., Lecture on Organ Transplantation given to the UCB/UCSF joint medical program class of 1990 on April 1, 1987.


164) Lectures and demonstrations on Forensic Pathology given to the Joint UCSF/UCB Medical School class of 1990.


172) George J. Annas, "Life Liberty and the Pursuit of Organ Sales" The Hastings Center Report, 14(1), February,
1984. p. 23


182) "Regulating the Sale of Human Organs" Virginia Law Review vol. 71:1015, 1985. pp1018, 1033, 1034,


189) A. Capron, Testimony before the Subcommittee on Science and Technology. as found in House Report number 98-575,98th Congress, First Session, 1983. p. 383

191) How many people reading this knew before they read it that in many states unclaimed bodies can be sold by the state to medical schools to be dissected!!


200) American Association of Tissue Banks, Newsletter v. 4(suppl), November, 1980.


219) Testimony before the Subcommittee on Science and Technology, as found in House Report number 98-575,98th Congress, First Session, 1983.