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Hilchatit Refvit"
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TRANSPLANTATION*

A. DEFINITION OF THE TERM

Organ transplantation is the procedure of replacing diseased organs, parts of organs, or tissues by healthy organs or tissues. The transplanted organ or tissue can be obtained either from the patient himself (autograft), from another human donor (allograft) or from an animal (xenograft).

Transplanted organs may be artificial or natural, whole (such as kidney, heart and liver) or partial (such as heart valves, skin and bone).

Natural organs or tissues which are currently transplantable include:

- blood and blood products
- bone marrow
- bone
- brain tissue
- cornea
- heart
- kidney
- liver
- lung
- pancreas
- skin

The following organs can be obtained from **live donors**: blood and blood products, bone marrow and kidney, partial liver and partial lung. Other healthy organs for transplantation are obtained from **cadavers**. **Artificial organs** include joints, heart valves, skin substitutes, bone

substitutes, artificial kidneys (dialysis) and heart lung machines (for temporary support during heart surgery).

Certain fundamental halakhic questions involve all transplanted organs. Others involve only specific organs.

The discussions in this section first involve general scientific and halakhic questions and then focus on individual organs. The organs are discussed in their Hebrew alphabetical order.

B. B. HISTORICAL BACKGROUND

Liver

The first animal liver transplant was performed in 1956. The first successful human transplant was performed by Dr. Thomas Starzl in 1963 (1).

Until 1980, the success rate was low – only 30% of patients survived for one year. Following the introduction of the anti-rejection medication, cyclosporine (see below in the Scientific Background section) and with improved surgical techniques and experience in liver and organ transplantation in general, the success rate increased so that liver transplantation is no longer considered an experimental treatment.

Kidneys

Initial experiments on kidney transplantation were carried out in Russia in 1936, in France in the late 1940s with kidneys from guillotined criminals, and in the early 1950s in the United States (2). Life expectancy of such kidney transplant recipients was less than nine months. In 1953, the first successful live donor transplant was done, between identical twins (3), and in 1959 between non-identical twins (4).

In 1962, anti-rejection medications began to be used in conjunction with cadaver kidneys for transplantation. Since then, surgical techniques and immunological methods to combat

rejection and provide tissue typing (HLA group) have improved so that kidney transplantation from live or dead donors is standard treatment for end stage kidney failure.

Heart

In 1905, Karl and Guthrie transplanted a heart which beat for one hour into the neck of a dog. In 1964, Hardy transplanted the heart of a chimpanzee into the chest of a patient near death. The heart beat for one hour. On December 3, 1967, Dr. Christian Barnard in Capetown, South Africa, performed the first human to human cardiac transplant (5). This unprecedented breakthrough procedure was unsuccessful since the transplanted heart functioned for only 18 days. This transplant evoked intensive ethical debate in scientific and lay communities throughout the world. The donor was judged to have been still alive at the time of surgery, informed consent was questionable, and the recipient was subjected to dangerous surgery and experimentation without adequate scientific background investigations.

In spite of these considerations and the initial lack of success, Barnard's act stimulated intense enthusiasm. During the following year over 100 heart transplants were performed in over 22 countries (6). Because of the poor initial results, only a select few centers continued to do heart transplants, notably the medical center at Stanford University in California under the leadership of Dr. Norman Shumway.

Since 1980, with the introduction of cyclosporine and improved surgical techniques, the success rate of cardiac transplants has improved markedly and it is now standard therapy.

In the early 1980s, the Israeli Chief Rabbinate was approached and it appointed a Commission on Organ Transplants. In 1987, the chief Rabbinate permitted heart, but not liver, transplants at the Hadassah Medical Center in Jerusalem.

In 1984, a baboon heart was transplanted into a baby (Baby Fae) who lived only 20 days with the new heart (7).

A totally artificial heart was first used in 1969 in the United States by Cooley (8). The heart beat for three days, at which time a human heart was transplanted into that same patient who died 32 hours later of kidney failure which had developed when the patient was connected to the artificial heart. Various subsequent investigations and trials of an artificial heart have thus far been unsuccessful.

Pancreas

Pancreatic transplants in humans began in 1966 (8a). For the next two decades, over 1000 such transplants were performed in many medical centers. Very few centers, however, performed more than 50 (9).

In the early years, simultaneous pancreas and kidney transplants were carried out in diabetic patients with end stage renal disease. More recently, isolated pancreas transplants are being performed.

To date, there has been little success in transplanting isolated islets of Langerhans (the glands in the pancreas that secrete insulin), but recent developments have created optimism that such success may soon be possible.

Brain

Parts of the brain tissue are used, especially the black matter (substantia nigra) which secretes dopamine whose absence is associated with Parkinson's disease. The first successful brain tissue transplant occurred in 1979 and involved fetal rat brain tissue transplanted into an adult rat (10). The first successful human brain tissue transplant performed in Sweden in 1982 produced temporary alleviation of symptoms in a patient with Parkinson's disease (11).

Cornea

The first successful corneal transplant in animals was performed by Brigger in 1835 (12). In man, Zirm first did this procedure in 1906 (13). The modern era of corneal transplantation began in the

1950's with the advances in surgical techniques and better understanding of ocular and corneal illnesses (14).

The first cornea bank was established in New York in 1944. Corneal banks now serve as the source of most corneas for transplantation.

Lungs

The first lung transplant was attempted in a cat by Gottrei in 1907. Human lung transplantation was first performed in 1963. The first patient died after 18 days (15). Until the discovery of cyclosporine, thirty eight lung transplants were carried out. All were unsuccessful. In 1981, the first combined heart-lung transplant was performed which reduced the complications due to lung transplantation alone. At that time, cyclosporine began to be used to reduce rejection of transplanted organs and, since then, lung transplants are usually successful (16).

C. C. SCIENTIFIC BACKGROUND

The following information regarding organ transplantation is current at the time of the writing of this chapter. Since rapid changes are occurring in this field, the passage of time will undoubtedly reveal new and more up to date information. One can anticipate major advances in this rapidly changing field.

In general, a variety of factors play a role in the success of an organ transplant:

- the age of the donor and recipient
- the underlying disease of the recipient
- the condition of the donor at the time of his death
- the condition of the organ to be transplanted
- the surgical skills of the transplant team
- the post transplant medical regimens
- the psychological and emotional status of the recipient

- the closeness of the immunological match between donor and recipient.

The main medical problem in transplantation is rejection of the donor organ. For an organ to be accepted it must be close, or preferably identical, in its tissue typing to that of the recipient so that the recipient's antibodies do not reject the organ as foreign. Therefore, tissue typing of both donor and recipient is performed. The closer the match, the greater the chance of transplant success. Another approach is the use of medications which suppress the immune response so that the transplanted organ is not rejected. However, care must be taken so that the medications do not damage the recipient's healthy cells and tissues. In 1980, the powerful immunosuppressant drug cyclosporine, derived from a species of mushroom, began to be used. This drug with fewer side-effects than similar drugs was a significant breakthrough and markedly improved the success rate of organ transplants. Although tissue typing and matching is still important, the use of cyclosporine has made closeness of the match less crucial, enabling even unrelated live donors to donate kidneys for transplantation into their loved ones. Promising newer immunosuppressive drugs are currently being tested.

Another medical advance is the improved ability to preserve organs from recently deceased people for many hours, thus allowing transport of organs from medical centers to distant locations (17).

Liver

Cadaveric livers for transplantation can be obtained only from brain dead donors. Successful transplantation can be achieved in both adults and children.

In children, congenital absence or abnormality of the biliary tract or severe hereditary disease, such as Wilson's disease, are the main indications for liver transplants.

In adults, cirrhosis is the most common indication. Untreated, these illnesses result in death. Only a liver transplant can save such patients.

In the 1980's, the five year survival in children undergoing liver transplants is about 65% (18). In infants below age one, the success rate is 54% (19). With advances in surgery and medicine, these numbers will probably improve further. About 900 such transplants were performed in the United States in 1986 (20). In Europe, up to 1987, 1218 liver transplants were carried out in 32 medical centers with 44% and 41% one and two year survival rates, respectively. In children below 15 years of age, the success rate is greater than in adults (21). In two U.S. centers, the one year survival was 68% and 83% (22).

The quality of life after a successful transplant is extremely good and patients lead a near normal life.

At times, partial liver transplants are performed. Only part of a cadaver liver may be transplanted into a child who needs a new liver and cannot accept a large adult liver. Here, too, the success rate is about 80% (23). The first live liver donor transplantation was performed in 1984 from an adult to a child (24). This technique has markedly improved over the years, and the success rate was 80% in the end of the 1980's (24a).

Kidneys

A patient with end stage kidney disease cannot survive unless his blood is "cleansed" from waste products by dialysis or by transplanting a healthy kidney into the patient. There are two forms of dialysis, hemodialysis and peritoneal dialysis, where the "cleansing" is performed, respectively, through tubes in blood vessels or through a tube in the abdominal cavity. Each of these methods has advantages and disadvantages from medical, psychological, social, ethical and halakhic viewpoints. Hemodialysis requires a close connection to the hospital or dialysis facility, requires attachment of the patient to the dialysis machine for three or four hours 2-4 times weekly, requires compliance with dietary measures, interferes with fertility, and involves the societal issue of limited resources and limited numbers of dialysis machines. Peritoneal dialysis interferes

less with the quality of life than hemodialysis in that it can be performed at home. However, it is associated with various medical complications such as peritonitis.

Transplantation eliminates these problems, quality of life is much better for kidney recipients than dialysis, and dialysis machines are freed up for other patients. On the other hand, transplantation requires the use of immunosuppressive medications, may be associated with rejection or other medical complications, and both live and cadaver kidneys are in very short supply.

Life expectancy of a patient following a live donor kidney transplant is longer than with dialysis alone or with cadaver kidney transplantation (25). The one year survival rates following live donor or cadaver kidney transplants are 95% and 88.6%, respectively. One year graft retention rates are about 90% (26). In children, the numbers are comparable: the three year retention rate from cadaver organs is 80% and from live donors is 90% (27). The success rate of adults above 60 years of age is not different than younger recipients. Therefore, age should not be a limiting factor (27a). Until the introduction of cyclosporine, life expectancy following cadaver kidney transplants was similar to that in patients maintained on dialysis, but subsequently it has surpassed survival on dialysis.

The use of close relatives as live donors is preferable because of the closeness of their tissue type to that of the patient. In recent years, live unrelated donors are also being used successfully by first priming the patients with blood transfusions from the donor (28).

The danger to the donor of the surgery is minimal with a mortality rate of estimated at around 0.03% (29). Early complications in the recipient following a live donor transplant vary between 15% and 47% and are mostly mild and transient. Only 2.5% are serious (30). Late complications in the donor may include hypertension and proteinuria. Some authors attribute these findings to involvement of the remaining kidney (31) whereas others consider them as normal processes of aging unrelated to the earlier kidney donation (30). In a follow-up study of

57 live donors of kidney in a period of 20 years no renal dysfunction was found beyond expected changes related to age (30a).

Cadaver kidneys can be obtained from donors who are either brain dead or cardiac dead (31a). There is no difference in the 5 year survival rate of the transplanted kidneys and of the recipient between the two types of donors (31b).

The use of live donors is still preferable because the success rate and retention rate are slightly higher, there is a paucity of cadaver organs available, and preparations for the transplant are easier. In the 1980s, about 25% to 31% of kidney transplants in the United States involved live donors (32). About 10,000 kidney transplants are performed annually in the U.S. (33).

Heart

The heart can be transplanted only if it is obtained from a brain dead donor.

Until 1980, the success rate was very low, with less than 30% of recipients surviving for one year. Following the introduction of cyclosporine and improvements in surgical techniques, a dramatic increase in survival occurred so that 80% of recipients survive one year and 60% are alive and well five years after their transplant (34). Most such patients return to a normal life style with few if any restrictions.

Indications for heart transplantation include severe end stage heart disease in the absence of or lack of response to standard therapies and a high probability of death in six to twelve months; recurrent cardiac arrest; recurrent hospitalizations for heart failure; secondary abnormal functioning of liver and kidneys; age under 55 years; relatively good health of potential recipient except for heart disease; cooperative nature and good emotional state of the patient.

Contraindications to cardiac transplants include concomitant serious general illnesses especially lung, liver and kidney diseases; cancer; active infection; extreme obesity; addiction to drugs or alcohol (35); severe poorly controlled hypertension; insulin dependent diabetes mellitus; active peptic ulcer disease; and advanced peripheral blood vessel disease (36).

It is estimated that 17,000 to 35,000 persons in the United States are candidates for heart transplantation annually. The World Organization for Heart Transplants reported that up to 1987, about 5000 heart transplants were performed worldwide (35) including 200 children from birth to 18 years of age (37).

Newborns with certain congenital heart defects such as a two chambered heart can be saved only by cardiac transplantation. There is a great shortage, however, of small donor hearts for such patients. Possible solutions include the use of animal hearts if one can overcome the problem of rejection, the use of healthy hearts of anencephalic newborns (38) whose life expectancy is only a few days, or the use of an infant after it dies (39). The survival rate of infants with heart transplants in one medical center is up to 84% (39).

Pancreas

Pancreatic transplants are done to treat juvenile diabetes in which there is a lack of insulin production, causing the blood sugar to increase markedly thereby producing serious complications in the small blood vessels of the eyes, kidneys and nervous system. One can transplant all or part of the pancreas or only the Islets of Langerhans with improvement in the quality of the diabetic patient's life . It is not yet clear whether such transplants prevent or delay the late complications of diabetes (40). However, combined transplantation of pancreas/kidney has decreased the late complications of diabetes (40a). In the 1980's, one year survival rate was 86%, and if combined pancreas-kidney transplantation was done the survival rate was 90% (40b).

Brain

The whole brain cannot be transplanted, nor can most parts of the brain, but experiments on the use of fetal brain tissue (see below) have been done both to understand the biologic basis of nerve cells and their ability to be transplanted, and to try to obtain therapeutic benefit in patients with diseases of the nerves and brain such as Alzheimer and Parkinson's diseases.

Bone Marrow

Bone marrow tissue is obtained from a live donor and is infused into the needy recipient. This procedure, with varying degrees of success, is used for patients with neoplastic diseases such as leukemia, primary diseases of the bone marrow such as aplastic anemia, congenital immunodeficiency disorders, and genetic diseases associated with enzyme deficiencies (41) and more recently for multiple myeloma and in cases of breast cancer.

There is no danger to the donor except from the general anesthesia. There is some discomfort and pain at the sites of bone marrow puncture. The donor does not lose any organ or tissue permanently since the marrow rapidly regenerates. On the other hand, serious complications may occur in the bone marrow transplant recipient, especially pulmonary complications (42). In 1987, about 4000 marrow transplants from unrelated donors were performed (43). In many countries, central tissue typing registries are maintained to appropriately match donor with recipient.

Intestines

Transplantation of intestines in humans has been performed in a small number of cases with limited success. The main problems are rejection, serious infections, and technical complications (44). With improvement of surgical techniques, anti-rejection treatment and better post-operative methods there is a definite trend of more favorable outcome (44a).

Skin

Skin can be removed from a cadaver with an instrument called a dermatome. Skin can be used even if obtained from a non heart-beating dead patient. This tissue is about one and a half millimeters in thickness. The skin is taken in ten centimeter strips from the thighs and hips and sometimes from the arms, back and abdomen. After the removal of the thin layer of skin it can be hardly noticed externally on the body. The skin can be stored in liquid nitrogen at minus 180°C for long time periods.

Patients with severe burns cannot survive if the burned areas are exposed. They die of serious infections and loss of proteins and body fluids. The transplanted skin is retained for almost two weeks and is then rejected by the burn patients' body. In the meantime, the body is protected from infection and fluid loss, permitting the patient's own skin to begin to regenerate from islands of skin cells that were not burnt (45). In the future, artificial, rather than human, skin may be used for this purpose. However, to-date human skin is superior to any artificial skin (45a).

Cornea

Corneas can be used even if obtained from patients after cardiac death; however, they should be procured no later than twelve hours after death to prevent post mortem changes. Corneal transplantation is the most common type of organ transplant in the United States. In 1985, more than 30,000 such transplants were performed on patients, 90% of whom obtained their new corneas from 88 cornea banks throughout the United States. Nevertheless, there was a shortage of 3500 to 5000 corneas in that year. The success rate of corneal transplantation is about 90%.

Lungs

The procedure of lung transplantation can involve either a single lung, or two lungs, or a combined lung-heart transplantation. With appropriate indications and recipient-selection criteria the 3 years survival rate after transplantation of one lung was 60-80% (45b), and 50-60% after combined heart-lung transplantation (45c).

Fetal Tissue

Parts of the central nervous system of aborted fetal tissue can be transplanted into diseased brain areas of adult humans to improve the secretion of hormones or neurotransmitter substances from diseased parts of the brain (46). Normally, specific nerve fibers in the brain secrete the chemical substance dopamine which is necessary for normal muscle movement. This chemical is lacking in Parkinson's disease. Therefore, such patients have difficulty moving about (47).

Medically, the advantage of using fetal tissue for transplantation is that there is less immunological rejection than adult tissues because the basic HLA tissue type does not become expressed until twelve weeks of fetal life. This is especially true regarding nerve tissues and does not apply to other tissues (48). Also, fetal tissue is capable of maturing and growing fast, it can adapt to various functions and it can produce growth factor. Thus, one should use six to eleven week old fetal tissue obtained from an artificially aborted fetus. Spontaneously aborted fetuses are not as suitable donor material since they often have various abnormalities. Also, the time between intrauterine fetal death and fetal expulsion from the uterus is important in terms of the ability to use its tissues, and spontaneously aborted dead fetuses are often retained in the uterus for a long time. The first fetal nerve tissue transplant was performed in Sweden (49). Only a limited number of such transplants have been carried out to date with inconclusive results (50). Problems still to be solved include the exact location in the recipient for proper placement of the fetal tissue, the best age and type of fetal tissue to be used, the need for immunosuppressive drugs, and the issue of graft rejection (51).

A variety of other uses of fetal tissue are being tried including fetal pancreas transplants into diabetic patients, fetal liver tissue transplants into patients with immunological disorders and blood diseases such as leukemia. Such transplants are still experimental and far from being routine (52). Other diseases or injuries where fetal transplants are being performed or considered include brain or spinal cord injury, Huntington's disease, Alzheimer's disease, schizophrenia, manic depressive psychosis, certain types of cancer and more.

Multiple Organ Transplants

Combined heart-lung transplants are more successful than lung transplants alone.

In 1989, multiple abdominal organ transplants were first tried such as the simultaneous transplantation of the stomach, small and large intestine, pancreas and liver, for children suffering from the short bowel syndrome who have to be fed intravenously leading to irreversible

liver damage (53). Such multiple organ transplants have also been performed in adults with intra-abdominal cancers (54). These procedures are still experimental with very limited success to date (55).

D. D. SPECIFIC LAWS

1. *artificial organs and parts*

The use of artificial organs for transplantation poses no halakhic problems as long as the prospects for success are greater than the risks. Hence, there are no halakhic objections to the transplantation of heart valves, bone parts and joints, and the use of dialysis.

Nowadays, artificial heart transplantation is not permissible because of serious medical complications and low success rates. If these problems can be overcome, artificial heart transplantation will be ethically and halakhically permissible (56). Nowadays, a patient may require a temporary circulatory support with an artificial pump device while waiting for an appropriate human heart transplant. This procedure is often successful as a stop-gap measure (57). If a person is living by use of an artificial heart and another person breaks or disconnects the machine so that the patient dies as a result, the perpetrator is guilty of first degree murder and not only of indirect manslaughter (58). If artificial heart transplants become possible, the use of parts of the recipient's excised heart for other needy recipients will be permissible (59).

There has been rabbinic debate about what to do with artificial organs or parts within a person after his death. One rabbi ruled that it is absolutely prohibited to perform an autopsy in order to take out the artificial parts, even if it is needed for another person (59a); Another rabbi ruled that it is permissible to take out such parts provided the person agreed to the autopsy before his death and that the parts are needed for another one (59b); Yet other rabbis distinguished between artificial parts that are naturally replaced from time to time (i.e., cardiac pace-maker)

which can be removed after death, and parts that are put into the body permanently (i.e., metal parts for bones) than cannot be removed after death (59c).

2. animal organs (xenograft)

If it becomes possible to use tissues and organs from animals (even non-kosher animals) for transplantation, there are no halakhic objections to their use to save human lives (60).

Medical science, however, has not yet advanced to the point of being able to use either artificial organs or animal organs on a routine basis. Therefore, the only sources for organs are live or deceased human beings or fetuses.

The halakhic as well as legal and ethical concerns revolve around the donor, the recipient and society in general.

3. live donor transplants

In general, one considers the use of an organ from a live donor only if the following conditions are met:

- surgery to remove the organ is not dangerous
- the donor's life can continue normally after the donation
- the donor will not need prolonged and chronic medical care
- the success rate in the recipient should be high.

In each case, informed consent must be obtained from the donor (61).

Several types of tissues/organs can be obtained from live donors: kidney, blood, bone marrow, lobes of lung and lobe of liver. Following kidney donation, the donor remains with only one kidney and there is a small danger associated with the procedure. Blood and bone marrow regenerate in the donor and there is practically no risk involved in that procedure. Following lung or liver lobe donation the donor remains with enough lung or liver tissue for normal functions, but the surgery itself is of major proportions..

a) Kidney: The main halakhic question when using a live donor for kidney transplantation is whether or not a person is permitted or obligated to endanger his life somewhat in order to save the life of another person who is in grave danger. Some Rabbis prohibit kidney donation from live donors (62). Other Rabbis allow it as an act of piety but do not require it (63). Yet other Rabbis rule that it is not only allowed but required; otherwise, one violates the precept, *thou shalt not stand idly by the blood of thy fellow man* (64).

One Rabbi was asked about a case of twin brothers asked to give a kidney for their sister. One brother was married and his wife opposed the donation. The unmarried brother was concerned about not being able to find a mate if he gives up a kidney. The Rabbi ruled that it is preferable for the married brother to donate a kidney provided he is able to carry on normal marital life after the donation. In that case, the wife's objection is overruled for the sake of saving life (65).

If a person donates a kidney to save someone's life, he is performing an act of piety, even if his parents object (65).

At times the closest tissue type matched donor is someone legally unqualified to give consent. In such cases, it is prohibited in Jewish law to take that kidney for transplantation. A boy less than thirteen years old cannot legally give consent since his transactions such as purchases, sales, and gifts, have no legal validity in Jewish law. Nor can the parents consent on his behalf, because they do not own his body. If he is more than thirteen years old, he can freely consent (66). Similarly, a mentally retarded person cannot consent nor can his guardian consent for him because a legally incompetent person has no obligation to fulfill precepts including the saving of life and one may not endanger his life, even a little, to perform the transplant (67). The only exception is if the transplant might directly benefit the donor and it is done specifically for his benefit and that no other solution exists to provide him that benefit.

b) Blood and Bone Marrow: It is permissible to donate these tissues because there is little or no danger to the donor, the tissues regenerate rapidly. Relatives should donate, when necessary, to save the life of another person (68). If the donor refuses, some Rabbis rule that one cannot coerce him even if the donor has a very rare blood type without which the potential recipient might die. However, it is an act of piety for him to donate. Other Rabbis rule that he should be forced to donate (69). It is permissible to obtain bone marrow from a competent minor donor who agrees to the procedure; if he is still completely incompatible his parents can agree on his behalf (69a).

One is allowed to donate blood to a blood bank for financial compensation even if there is no immediate life to be saved (70). Some Rabbis are frown on the practice of asking for payment for blood donation but if the donation was given in return for a promise of payment, the promise must be fulfilled (71). Routine blood donations to a blood bank should not be made on the Sabbath. In time of war or for other emergencies it is obviously permissible (72).

There is no halakhic prohibition to the receipt of financial compensation for a tissue or organ. One Rabbi, however, expressed opposition to such an act because it offends ones moral sensibility (73). According to this view, commerce in human organs is contrary to the basic framework of our ethical and spiritual value system and may lead to serious negative social consequences. The poor may feel coerced into becoming spare parts providers for other humans in order to support themselves. By contrast, other Rabbis have stated clearly that there is nothing wrong from any halakhic or moral point of view in receiving reasonable compensation for the act of self-endangerment, and by doing so one still fulfills adequately the commandment to save life (73a).

4. cadaver donor transplants

The halakhic considerations in the use of cadaver donors concern those relating to autopsy. These questions are the following:

- Does the prohibition of deriving benefit from the dead apply here since the benefit is obtained in an unusual manner (74)? In general, some Rabbis rule that the prohibition of deriving benefit from the dead does not apply (75) when they are derived in an unusual manner, whereas other Rabbis disagree (76). Some Rabbis rule that the prohibition does not apply at all in circumstances of transplantation since the donor organ functions in the recipient; thus the recipient may be regarded as deriving benefit from the living and not from the dead (77).
- Does one violate the precept of burying the dead and not delaying the burial of the dead if one transplants an organ from a deceased person? Some Rabbis say there is no violation involved because the transplanted organ is considered alive when it functions in the recipient (77).
- Does one violate the prohibition of desecrating the dead by making an incision in the donor to remove an organ such as the kidney or eye for transplantation? Some Rabbis answer in the affirmative (78). Some Rabbis say the violation only applies if the donor did not consent thereto during his lifetime (79). Other Rabbis rule that no violation at all is involved since it is done for a needy recipient (80). All the aforementioned applies if the tissues or organs are needed but not absolutely essential to save the recipient's life. Most rabbinic decisors, however, rule that if the transplant is done as a life- saving procedure, the prohibition of desecrating the dead is waived.
- Is one guilty of stealing from the dead if one takes an organ for transplantation and is this prohibition set aside in the case of saving a life? Some Rabbis rule that robbery is not set aside even for the sake of saving life, but most rabbinic decisors rule that this prohibition is also waived in order to save the recipient's life.

Jewish law is lenient in allowing organ transplants from the deceased if the following conditions are met:

- the needy recipient is at hand

- the recipient's life is in danger
- the donor consented during his lifetime to the use of his organ(s) for transplantation.

A minority of Rabbis rule that organ transplantation from a Jewish donor is prohibited in all cases even if the aforementioned conditions are fulfilled (81). Most Rabbis nowadays, however, allow cadaver organ donations if the above conditions are fulfilled and that is the current custom. Some Rabbis consider it to be a very meritorious act (*mitzvah*) to donate one's organs for transplantation to needy recipients after one's death. It is also a *mitzvah* for relatives of a deceased to consent to the donation of the deceased's organs for a needy patient at hand (82).

Some Rabbis require the donor's consent prior to death in order to permit the transplant even for a dangerously ill needy recipient. Other Rabbis say that to save a life, this requirement of prior consent may be waived (83). In each instance, however, the family of the deceased should give consent (84). On the other hand, the family cannot grant permission in circumstances where Jewish law does not allow it (85). Even if the donor gave consent while still alive, some Rabbis rule that the family may object if it is not a matter of saving the life of a needy recipient (86). However, if the organ donation is expected to save life the family's objection is invalid (86a).

Following are some specific halakhic rulings concerning various aspects of organ transplantation:

- Some Rabbis allow one to sign and carry an organ donor card on one's person in which one grants permission for organ donation after death, provided the following conditions are met: organs may not be removed before death as defined by Jewish law has been established
- the incision to remove the organ(s) must be limited to the absolute minimum necessary and only for the organs in question required to save the recipient's life
- all other organs and tissues must remain with the body and be provided promptly for burial (87).

- One should not extend the life of a terminally ill patient (*gosses*) only to prepare the patient to serve as an organ donor (88). One is also prohibited from removing an organ from a living person if he/she is close to death or otherwise non-viable (*terefah*) if that organ removal hastens the patients' death. One is prohibited from sacrificing one person's life to save the life of another, even the life of a *terefah* to save the life of a healthy person (88).

The modern-day Rabbis discuss various situations of organ transplantation and the permissibility (or lack thereof) of using organs from Jewish donors for needy recipients. For some organs the aforementioned conditions are always applicable: the recipient is at hand and it is a life and death matter. Those include the heart, liver and lung transplants. In some cases, the organ is to be donated to an organ bank for later use such as skin and corneas. In some cases, it is not clear whether the recipient's condition is classified as a danger to life. There is also the important issue of the determination of the moment of death.

Following is a brief discussion of specific halakhic issues concerning particular organs:

- **Kidneys** -- A patient suffering from end stage kidney disease is certainly classified as dangerously ill. Therefore, it is permissible to remove a kidney from a deceased person for transplantation into the needy recipient (89).
- **Liver and Heart** -- For successful liver and/or heart transplantation the donor's heart must still be beating. Thus, the question relates to whether or not a brain dead person whose heart is still beating is considered alive or dead. There is no question about the recipient being at hand and dangerously ill. For heart transplants, another question is whether or not it is permitted to remove the recipient's old diseased heart before implanting the new one. Thus, halakhic questions involve both recipient and donor. Some Rabbis absolutely prohibit the removal of an organ from a brain dead patient thus making it impossible to perform liver or heart transplants (90). Other Rabbis allow the use of organs from brain dead persons for transplantation into needy recipients (91). According to the Rabbis who prohibit heart

transplants, if one is done anyway, the recipient has no relationship to the donor and retains his original identity (92).

It is prohibited to remove the organs of anencephalic newborns who still breathe on their own. These newborns are alive according to all medical criteria because the functioning brain stem allows for spontaneous respiration. Therefore, the removal of the heart is equivalent to killing them (93).

- **Skin** -- Some Rabbis rule that the biblical prohibition of deriving benefit from the dead does not apply to skin (94). Most Rabbis, however, disagree (95). There is a difference of opinion among the talmudic Sages as to whether or not skin requires burial (96).

It is permissible to take skin from a cadaver to save the life of a seriously burned patient (97). Even if no burn victim is at hand, most Rabbis nowadays allow the preservation of human skin from cadavers in skin banks for future use for burn victims (98).

- **Cornea** -- A cornea is less than an olive's bulk in size and is perhaps therefore exempt from the precept of burial (99). Another issue is whether or not blindness is considered to be a condition involving danger to life. Some Rabbis rule in the negative asserting that blindness is only danger involving an organ (not life); *halakhah* considers only active eye ailments (100) to constitute danger to life (101). Other Rabbis consider blindness to be classified as a condition with danger to life (102). Some Rabbis prohibit the use of a cornea from a Jewish donor (103) whereas other Rabbis permit it (104). Some Rabbis permit it only for a recipient blind in both eyes (105) whereas others allow it even if the patient is only blind in one eye (106). Some Rabbis also allow the donation of corneas to a cornea bank for future use (107).

Even the Rabbis who prohibit the removal of a cornea from a cadaver for transplantation allow an ophthalmologist to implant it into a needy recipient if someone else had removed it from the cadaver (108).

The eye from which the cornea is removed requires burial even if it is less than an olive's bulk in size (109).

Concerning the function and laws of specific organs not related to transplantation, see the sections dealing with those organs.

5. fetal tissue transplants

The use of fetal tissues or parts for medical purposes is permissible, provided the fetus is obtained from a spontaneous abortion or a halakhically sanctioned abortion, and if the fetus is dead according to halakhic criteria. One should obtain the parents' consent to use parts of the fetus for transplantation. Such consent is invalid if the fetal use is contrary to halakhah.

Other important concerns include the following:

- women may deliberately provide their fetuses for financial remuneration or as an act of kindness to one of their needy relatives
- women might intentionally become pregnant with the specific intent of aborting the fetus so that its tissues can be used for medical purposes [such abortions are prohibited (109a)]
- live fetuses might be used
- physicians might decide on the timing of abortions in order to achieve ideal conditions for transplantation even if by such timing they might be compromising the health of the mother.

In spite of all these concerns, it is halakhically permissible to use fetal tissues to attempt to heal a patient for whom no other therapy is available, provided none of the above situations of concern exist and provided that no financial compensation is given for the donation of the fetal tissue.

6. the recipient

The main halakhic question is the degree of danger to the recipient of the transplant operation weighed against the chances for a successful outcome, and the likely outcome without a transplant. This issue is identical for any dangerous surgery, even not involving organ

transplants. One must also consider the various experimental stages of certain organ transplants before they become standard therapeutic procedures. Differences in results also exist between transplant centers.

There is no doubt about the successful surgical outcome in most recipients if the indication for the transplant is proper, if the long term survival rate from such transplants is high, and if the procedure is performed in a specialized and experienced transplant center. Most organ transplants nowadays fulfill these conditions.

A unique question arises concerning the recipient of a heart transplant. During the early days of heart transplants, most rabbinic decisors prohibited it in part because it was considered as an act of murdering the recipient since most died shortly after the procedure. Nowadays, with excellent results from cardiac transplantation, a minority of Rabbi still prohibit it because when the diseased heart of the recipient is removed, he is rendered halakhically “dead” and thus is “killed” by the doctors (110). Other Rabbis also prohibit it but not for the aforementioned reason; rather because the recipient is rendered non-viable (*terefah*) following the removal of his diseased heart (111). Both these views are rejected by most modern day rabbinic decisors for several reasons:

- since the patient is clearly alive after he/she receives the new heart, it is not possible to say that the physicians “resurrected the dead” since only God has that power
- patients who live for more than a year following a cardiac transplant are by definition not *terefah*
- when the diseased heart is removed, the patient is being perfused on a heart-lung machine which temporarily substitutes for the heart, so that the patient cannot be considered as “dead.”

Some Rabbis still prohibit the recipient to undergo a cardiac transplant because if the operation is unsuccessful, it shows retrospectively that the removal of the old heart killed him

(112). Some Rabbis assert that heart transplants were unknown to our forefathers and therefore are not included in the physician's divine license to heal (113). However, other Rabbis disagree and regard this operation as a mode of treatment not different than any other type of medical intervention, even if it was unknown in the past (113a).

Metaphysical considerations about the function of the heart and its possibly being the seat of the soul are irrelevant to the halakhic permissibility of heart transplants (114).

Even the Rabbis who prohibit heart transplants allow the desecration of the Sabbath on behalf of such a patient if it was performed (115).

Once an organ is implanted in a person it becomes part of him. Hence, the donor and/or his family have no rights on the organ whatsoever; after the death of the recipient the organ should be buried with him and with the donor (115a).

Concerning the need (or lack thereof) to bury a removed diseased organ, see the section entitled "Organ."

Concerning the priorities in choosing a recipient where organ shortages exist, see the sections entitled "Limited Resources" and "Priorities in Medicine."

Concerning the transplantation of organs into a priest, see the section entitled "Priest."

Concerning the recitation of the gomel blessing after organ transplantation, see the section entitled "Blessings and Prayers."

E. ETHICAL BACKGROUND

Live donors

The main ethical question relates to the proper informed consent required for live donors. Is it proper to convince a potential donor of bone marrow that his pain and suffering will be minimal and the potential benefit to the recipient very great? May the potential donor be coerced to

donate? How can one obtain informed consent from the donor if psychological and social pressures are brought to bear on him?

Another ethical question is whether or not mentally incompetent people may be used as donors. On the one hand, they cannot give informed consent, but on the other hand if the recipient in question is a relative caring for them, the incompetent donor may be worse off if their relative who cares for them dies for lack of a donor organ.

Another ethical issue concerns the dilemma whether or not live organ donation ought to be completely altruistic (see below regarding commerce in organs).

Yet another issue concerns the question who is allowed to donate live organs -- only closely blood-related or anyone with good intentions?

Deceased donors

The ethical questions include the following:

- what moral value or status does the deceased have?
- Is the body the property of the deceased, the family, or society?
- Can one use it in any form for the benefit of the living?
- Can one take organs only from deceased people who gave their consent thereto when still alive?
- May one take organs from all deceased people for transplantation except from those who specifically objected in their lifetime?
- What is the status of the family in such decision-making about taking organs from the deceased?

The factors to be considered in approving or denying the use of cadaver organs for transplantation include the following:

- the expressed wishes of the deceased
- the wishes of the next of kin

- the status of the recipient
- the society as a whole in regard to medical, religious and legal views.

The **Jewish** legal concerns relate to ownership of the body and the need to honor it, bury it and treat it with dignity and respect. **Catholicism** and **Islam** are divided in their opinions about the use of organs from living or deceased people for transplantation (116-117).

Fetal tissues

Most ethicists assert that fetal tissue transplants should be viewed no differently than cadaver organ transplants. An additional ethical concern is the possibility of more abortions being done specifically to obtain fetal tissue for transplantation (118). Hence, the ethical problems related to abortion are involved here. In the United States a moratorium was initially declared on the use of fetal tissues. It was removed in 1993 for the use of spontaneously aborted fetuses or medically indicated abortions (119).

Newborns and children as donors

Ethical considerations arise in the use of newborns and children as either organ donors or recipients (120).

The ethical issues concerning the use of anencephalic babies (121) as organ donors have been raised in many countries including Canada (122), Britain (123), and the United States (123a). In the 1960's several attempts were undertaken to use hearts and kidneys of such babies (123b), but the subsequent consensus of opinion has been not to use their organs until they stop breathing spontaneously and declared brain dead (123c). In Loma Linda medical center 12 anencephalic babies were intubated and ventilated immediately after their birth until brain death was diagnosed. However, none of them became organ donors for various reasons (123d).

General social policy

All agree that organ transplants are important and save lives. However, there is a serious shortage of organs available for transplantation. A 1985 study in the United States showed that only 19%

of people carry organ donor cards, 53% are willing to donate a deceased relative's organs, and 50% would agree to donate their own organs after death (124). In a 1987 study in the United States, 83% of interviewees would consent to donate their relatives kidneys but only 40% would donate their own kidneys after death (125). Another study found that most adults would refuse to serve as living organ donors even if their relative would die without the organ transplant (126).

A number of suggestions have been proposed to address the shortage of organs for transplantation. Among these are:

- widespread education of the public as well as the medical community about the importance of organ donation
- improvement of inter-institutional interchange of information and a centralized registry of patients to help in the proper distribution of organs to needy recipients
- creation of public organizations to deal specifically with organ donation, organ procurement and public education and policy
- legislation to increase organ donation.

Some countries permit use of cadaver organs only after written informed consent is obtained from the relatives or the patient while still alive; other countries presume consent and allow removal of organs without consent unless the patient or family object thereto (126a); yet other countries allow the use of cadaver organs to be determined by medical need even over the protests of the patient or family (127).

Some countries require the physician to request organs from the family of every appropriate deceased person (127a).

Some people advocate paying financial compensation to increase organ donation.

All these suggestions involve serious ethical concerns (127b).

Religious considerations about the dignity of the deceased and the various personal feelings of the family mitigate against the arbitrary and coerced taking of organs from the dead.

Commerce in organs

Payment for organs can take many forms:

- direct payment to a donor person for a living or cadaver organ donation
- direct payment to the family of the deceased in exchange for their consent to the organ donation
- payment by governmental agencies or other public funds to the donor during his lifetime, or to the family for cadaver organ donation.

Most ethicists and transplant surgeons are opposed to the buying and selling of organs, other methods of compensation, or political or other pressures to increase organ donation (128). Commercialism in organ donation would lead to inequities in that the rich will be able to obtain transplants and the poor will not. In fact, the poor may sell their organs for money as has already occurred in India and South America. In addition, some transplant centers have moved rich patients, often from foreign countries, to the top of the waiting lists in exchange for money. Supporters of organ sales argue that the danger to a living person in giving up an organ in exchange for money is no different than the danger of many professionals such as firemen, policemen, soldiers, security personnel and the like, who risk their lives in return for a salary. Opponents argue that such professionals do so as their occupation whereas organ donation is a one time act which should be altruistic. Yet proponents argue that in face of significant shortage of organs the opposing views have to be reviewed carefully, and their feeling is that with appropriate control the balance is in favor of permitting organ sales (129). Many countries have outlawed the sale of organs and have laws making it a punishable crime since it is an antisocial practice (130).

It is widely accepted throughout the world that the transplant team should be separate and distinct from the medical team which pronounces the death of any potential organ donor.

Organ transplants are performed only in the following conditions:

- only by physicians specialized in this area
- only if no other medical treatment is available
- only after detailed discussions with both donor (and/or family) and recipient and explanations about the dangers and possible complications, and the obtaining of written informed consent.

Living donations are encouraged only if no alternative exists, and only as an altruistic act on the part of the donor and not for financial compensation.

Priorities in choosing the recipients for organs which become available are based on medical data as well as other criteria such as age, social status, personal status, etc. These considerations are discussed more fully in the sections entitled "Limited Resources" and "Priorities in Medicine."

FOOTNOTES AND REFERENCES

- * For further halakhic details and references -- see Hebrew Edition of the Encyclopedia, Vol 2, 1991, pp. 191-244
1. T. Starzl, et al, *Surg Gynecol Obstet* 117:659, 1963.
 2. D.M. Hume et al, *J Clin Invest* 34:327, 1955.
 3. J.P. Merrill, et al, *JAMA*, 160:277, 1956.
 4. J.P. Merrill, et al, *N Engl J Med* 262:1251, 1960.
 5. C.N. Barnard, *S Afr Med J* 41:1271, 1967.
 6. D.K.C. Cooper, *BMJ* 4:174, 1968.
 7. L.L. Bailey et al, *JAMA* 254:3321, 1985.
 8. D.A. Cooley et al, *Am J Cardiol* 24:723, 1969.

- 8a. R.C. Lillehei, et al, *Ann Surg* 172:405, 1970.
9. D.E.R. Southerland and K.C. Moudry, *Transplant Proc* 19:113, 1987.
10. M.J. Perlow, *Science*, 204:643:1979.
11. E.O. Backlund et al, *J Neurosurg* 62:169, 1985.
12. S. Bigger, *Dublin J Med Sci* 11:408, 1837.
13. E. Zirm, *Arch Ophthalmol* 64:580, 1906.
14. S.C. Forstat and H.E. Kaufman, *Ann Rev Med* 28:21, 1977.
15. J.D. Hardy, et al, *JAMA* 186:1065, 1963.
16. S.U. Jameson and H.O. Ogunnaike, *Surg Clin N Am* 66:491, 1986; R.F. Grossman, et al, *N Engl J Med* 322:727, 1990; Theodore J, et al, *N Engl J Med* 322:772, 1990.
17. S. Todo, et al, *JAMA* 261:711, 1989.
18. Gartrier et al, *Pediatrics* 74:140, 1984.
19. C.O. Equivel et al, *J Pediatrics* 110:545, 1987.
20. J.C. McDonald, *JAMA* 259:725, 1988.
21. H. Bismuth, et al, *Lancet*, 2:674, 1987.
22. Kromraf et al, *Mayo Clin Proc* 64:84, 1989.
23. C.E. Broelsch et al, *Ann Surg* 208:410, 1988.
24. H. Bismuth and D. Houssin, *Surgery* 95:367, 1984. See further R.W. Strong et al, *N Engl J Med* 322:1505, 1990. Concerning the advantages and disadvantages of using live liver donors and its concerns see P.A. Singer et al, *N Eng J Med* 321:620, 1989.
- 24a. J.C. Edmond, et al, *Hepatology* 10:867, 1989.
25. N. Vollmer, *N Eng J Med* 308:1553, 1983.
26. R.H. Kerman, *Transplantation* 45:37, 1988.
27. H. Krakauer et al, *N Engl J Med* 308: 1558, 1983.
- 27a. R.J. Tesi, et al, *Lancet* 343:41, 1994.

28. A.S. Levey, et al, *N Engl J Med* 314:914, 1986.
29. J.S. Najarian, et al, *Lancet* 340:807, 1992.
30. A. Spital, et al, *Arch Inter Med* 146:1993, 1986.
- 30a. J.S. Najarian, et al, *Lancet* 340:807, 1992.
31. R.M. Hakim et al, *Kidney Int* 25:930, 1984.
- 31a. Y.W. Cho, et al, *N Engl J Med* 338:221, 1998.
- 31b. R.M.H. Wijnen, et al, *Lancet* 345:1067, 1995.
32. W.H. Bay and L.A. Hebert, *Ann Inter Med* 106:719, 1987.
33. J.C. McDonald, *JAMA* 259:725, 1988.
34. Cohen, et.al. *Ann Inter Med* 101:667, 1984.
35. J.S. Schroeder and S. Hunt, *JAMA* 258:3142, 1987.
36. S.W. Jamieson et al, *Heart Transplantation* 1:76, 1985.
37. F.J. Fricker, et.al, *Pediatrics* 79:138, 1987.
38. L.L. Baily, et al, *N Engl J Med* 315:949, 1986.
39. M.M. Boucek, et al, *J Pediatr* 116:171, 1990.
40. G. Solders, et al, *Lancet* 2:1232, 1987; D. Pyke, *Lancet* 1:816, 1988; D.E.R. Southerland, et al, *Surg N Am* 66:557, 1986.
- 40a. R. Lendgraft, et al, *Diabetes* 1:33, 1989; S.G. Solder, et al, *Lancet* 2:1232, 1987.
- 40b. D.E.R. Sutherland, et al, *Diabetes* 1:55, 1989.
41. E.D. Thomas, et al, *Ann Rev Med* 35:1, 1984; K.M. Sullivan, *Transplant Proc* 21 (suppl. 1):41, 1989
42. J.G. Clark, *Mayo Clin Proc* 65:111, 1990.
43. M.M. Bortin, *Blood* 72 (Suppl. 1):380a, 1988.
44. D. Grant, et al, *Lancet* 1:181, 1990; T.R. Prichard and R.I. Kirkman, *World J Surg* 9:860, 1985.
- 44a. D.A. Kelly and J.A.C. Buckles, *Arch Dis Child* 72:447, 1995.

45. M. Ron Wechsler, *Assia*, Vol. 4, 5743 (1983), pp. 246-247.
- 45a. B.A. Pruitt and N.S. Levine, *Arch Surg* 119:312, 1984.
- 45b. R.F. Grossman, et al, *N Engl J Med* 322:727, 1990.
- 45c. P.M. McCarthy, et al, *J Thorac Cardiovas Surg* 99:54, 1990.
46. P.S. Fishman, *Neurology* 36:389, 1986.
47. C.G. Goetz, et al, *N Engl J Med* 320:337, 1989; Editorial, *Lancet*, 1:1012, 1987; E. Azmitia and Djorklund, *Ann NY Acad Sci* 495:813, 1987; Freeman TB, et al, *Ann Neurol* 38:379, 1995.
48. AMA Council on Scientific and Ethical and Judicial Affairs, *JAMA* 263:565, 1990.
49. E.O. Backlund, et al, *J Neurosurg* 62:169, 1985; I Madrazo et al, *N Engl J Med* 318:51, 1988.
50. W.M. Landau, *Neurology* 40:733, 1990; R. Joynt, *Ann Neurol* 22:455, 1987; R. Levin, *Science* 236:1287, 1987.
51. V.E. Yong, et al, *J Neurol Sci*, 94:51, 1989. See further O. Lindrall, et al, *Ann Neurol* 31:155, 1992.
52. AMA, Council. . ., *JAMA* 263:565, 1990; D.A. Hullet, et al, *Transplantation* 43:18, 1987.
53. T.E. Starzl, et al, *JAMA* 261:1449, 1989; J.W. Williams et al, *JAMA* 261:1458, 1989.
54. T.E. Starzl, et al, *Ann Surg* 210:374, 1989; M.F. Goldsmith, *JAMA* 261:1397, 1989.
55. F.D. Moore, *JAMA* 261:1484, 1989.
56. Rabbi S.Z. Auerbach, cited in *Nishmat Abraham, Yoreh Deah* 155:2:1; Rabbi Y.D. Bleich, *Tora Baal Peh*, Vol. 25, pp. 151-163; Rabbi M. Hershler, *Halakhah Urefuah*, Vol. 4, 5745 (1985), pp. 84.
57. See T.R. Graham and C.T. Lewis, *BMJ* 298:843, 1989; B.P. Griffith, et al, *N Engl J Med* 316:130, 1987.
58. Responsa *Tzitz Eliezer*, Part 17 #11:3-4.
59. Rabbi Hershler, loc.cit.
- 59a. Responsa *Minchat Yitzchak*, Part 7 #101.
- 59b. Responsa *Tzitz Eliezer*, Part 14 #83.
- 59c. Rabbi S.Z. Auerbach, cited in *Nishmat Abraham, Yore Deah*, 349:3; Rabbi E. Bakshi-Doron, *SheBaal Peh*, Vol 33, 5752, pp. 52ff.

60. Rabbi S. Goren, *Hatzofeh*, 6 Kislev, 5745, p.5.
61. Rabbi M. Halperin, *Assia* #45-46, 5749 (1989), pp. 34ff.
62. Responsa *Tzitz Eliezer*, Part 9 #45 and Part 10 #25:7 and 28; Responsa *Minchat Yitzchak*, Part 6 #1
63. Responsa *Iggrot Moshe, Yoreh Deah*, Part 2 #174:4; Rabbi J. Dichowsky, *Ne'ot Desheh*, Part 154-156; Rabbi C.D. Halevi, *Assia*, Vol. 4, 5743, pp. 251-259; Rabbi M. Hershler, *Halakhah Urefuah*, Vol. 2, 5741, pp. 122-128; Rabbi S. Yisraeli, *Barkai*, Vol. 3, 5746, p. 36; *ibid.*, *Assia* folio 57-58, pp. 5ff; Rabbi S.Z. Auerbach, cited in *Nishmat Abraham, Yoreh Deah* 157:4:2; Rabbi Y. Zilberstein, *Halakhah Urefuah*, Vol. 4, 5745, pp. 156-157.
64. Rabbi O. Yosef, *Dinei Yisrael*, Vol. 7, 5736, pp. 25-43; *Ibid.*, *Halakhah Urefuah*, Vol. 3, 5741, pp. 61-63; *Ibid.*, *Yechaveh Daat*, Part 3 #84.
65. Rabbi J. Zilberstein, *Rapo Yerapeh Zichron Yeshaya* p. 29.
66. Rabbi J. Zilberstein, *Halakhah Urefuah*, Vol. 4, 5745, pp. 156-157; Rabbi M.D. Tandler, *Mt Sinai* 51:54, 1984.
67. Rabbi M. Hershler, *Halakhah Urefuah*, Vol. 2, 5741, pp. 122-128.
68. Rabbi S.Z. Auerbach, cited in *Nishmat Abraham, Yoreh Deah* 349:3:3:2 and Part 4 *Even Haezer* 80:
69. Responsa *Shevet Halevi*, Part 5 #219; Rabbi N. Bar-Ilan, *Assia*, Folio 51-52, 5752, pp. 59ff.
- 69a. Rabbi S.Z. Auerbach, cited in *Nishmat Abraham*, Part 4, *Choshen Mishpat* 243:1.
70. Responsa *Iggrot Moshe, Choshen Mishpat*, Part 1 #103; Rabbi S.Z. Auerbach, cited in *Nishmat Abraham, Yoreh Deah*, 349:3.
71. Responsa *Vayashev Moshe*, Part 1 #93-94.
72. Responsa *Sheelat Moshe* #50; *Shemirat Shabbat Kehilchatah*, New Edition 40:25.
73. Rabbi M.D. Tandler, *Mt Sinai J Med* 51:45, 1984.
- 73a. Rabbi S.Z. Auerbach, cited in *Nishmat Abraham*, Part 4, *Choshen Mishpat* 420:1; Rabbi S. Yisraeli, *Assia* folio 57-58, 5757, pp. 5ff..
74. See Responsa *Iggrot Moshe, Yoreh Deah*, Part 1 #229.
75. Responsa *Radvaz*, Part 2 #548 and Part 3 #548 (#979); *Mishneh Lemelech, Avel* 14:21; Responsa *Tzvi, Yoreh Deah* #277.

76. *Hagahot Rabbi Akiba Eger, Shulchan Aruch, Yoreh Deah 349:1; Chidah, Shiurei Berachah, Yoreh Deah 349; Responsa Iggrot Moshe, Yoreh Deah, Part 1 #229.*
77. Rabbi I.Y. Unterman, *Shevet MiYehudah*, pp. 313-322.
78. *Reponsa Minchat Yitzchak, Part 5 #8; Responsa Tzitz Eliezer, Part 13 #91.*
79. Rabbi Unterman, loc.cit.
80. Rabbi H.D. Halevi, *Assia*, Vol. 4, 5743, pp. 251-259; *Responsa Yabiya Omer, Part 3, Yoreh Deah Responsa Mishpetei Uziel, Yoreh Deah, Part 1 #28-29.*
81. *Responsa Minchat Yitzchak, Part 5 #8; Responsa Tzitz Eliezer, Part 13 #91.*
82. *Responsa Iggrot Moshe, Yoreh Deah, Part 2 #174.*
83. Rabbi B. Firer, *Noam*, Vol. 4, 5721, p. 200.
84. *Responsa Iggrot Moshe, Yoreh Deah, Part 2 #174:3; Responsa Minchat Yitzchak, Part 5 #7.*
85. *Responsa Tzitz Eliezer, Part 4 #14; Rabbi Y. Arieli, Torah She Baal Peh, Vol. 6, 5724, p. 56.*
86. Rabbi Arieli, loc.cit.; Rabbi J.A. Leebes, *Noam*, Vol. 14, 5731, p. 28.
- 86a. Rabbi S. Yisraeli, *Assia* folio 59-60, 5757, pp. 105ff.
87. Rabbi I. Jakobovits, *Jewish Medical Ethics (Assia)*, Vol. 1, 1988, pp. 5-16.
88. *Responsa Iggrot Moshe, Yoreh Deah, Part 2 #174; Responsa Tzitz Eliezer Part 9 #17, Chapt. 6 and Part 10 #25:5; Responsa Minchat Yitzchak, Part 5 # 7 and 9; Rabbi S.Z. Auerbach, cited in Ni Abraham, Yoreh Deah 252:2, note 24.*
89. See Rabbi H.D. Halevi, *Assia*, Vol. 4, 5743, pp. 251-259.
90. *Responsa Tzitz Eliezer, Part 10 #25:5-6 and Part 17 #66:1-2; Responsa Iggrot Moshe, Yoreh Deah, #174 and Choshen Mishpat Part 2 #72. In 1986, Rabbi M.D. Tendler (Techumin, Vol. 7, 5746, p. 1 wrote that in later years Rabbi Feinstein allowed heart transplants in Jews in the United States; Res Minchat Yitzchak, Part 5 #7-8; Rabbi I.Y. Unterman, Noam, Vol. 13, 5730, pp. 1-9.*
91. Israeli Chief Rabbinate, discussed in *Techumin*, Vol. 7, 5746 pp. 187-192; *Assia* #42-43, Nissan 57-70-81; *Barkai*, Vol. 4, 5747, pp. 32-41; and *Assia* #42-43, Nissan 5747, pp. 95-104; *Responsa C Binyamin*, Part 1 #19.
92. *Responsa, Tzitz Eliezer, Part 10 #25:26.*

93. A.S. Abraham, *Emek Halakhah*, Vol. 2, 5749, pp. 207ff cites Rabbis S.Z. Auerbach and I. Zilberstein
94. *Tosafot*, Niddah 55a, s.v. *Shema*; Responsa *Rashba* #365; Responsa *Chatam Sofer*, *Yoreh Deah* #330
95. Maimonides' *Tumat Met* 3:11 and *Avel* 14:21; Rabbenu Tam in *Tosafot* Sanhedrin 48a, s.v. *Meshar* Novellae *Ramban*, Chullin 122a, Ketubot 60a; *Rayah*, *Ritva*, *Ran*, *Tosafot Rosh*, and *Meiri*, Niddal Novellae *Ran*, Chullin 122a.
96. Responsa *Bet Yitzchak*, *Orach Chayim* #15.
97. Rabbi S.Z. Auerbach, cited in *Nishman Abraham*, *Yoreh Deah* 349:3:2:2; Responsa *Yachel Yisrael*, #82.
98. Rabbi S. Meshash, *Techumin*, Vol. 7, 5746, pp. 193-205; Rabbi S. Yisraeli, *Techumin* 7, 574-206-213; Rabbi M. Steinberg, *Assia*, Vol. 4, 5743, pp. 249-250.
99. Based on *Tosafot Yom Tov*, Shabbat 10:8 – see *Har Zvi*, *Yoreh Deah* 277; Rabbi Y. Arieli, *Tora Baal Peh*, Vol. 6, 5724, pp. 40-60; Responsa *Yabiya Omer*, Part 3, *Yoreh Deah* #22.
100. Abodah Zarah 28b; Maimonides' Shabbat 2:4; *Tur*, *Shulchan Aruch*, *Orach Chayim* 328:9.
101. Responsa *Seridei Aish*, Part 2 #120; Rabbi I.Y. Unterman, *Shevet Miyehuda*, pp. 313-322; Res *Yabiya Omer*, Part 3, *Yoreh Deah* #23-24.
102. Responsa *Tzitz Eliezer*, Part 14 #84; Rabbi S. Arieli, *Noam*, Vol. 6, p. 82.
103. Responsa *Yaskil Avdee*, Part 6, *Yoreh Deah* #26; Responsa *Minchat Yitzchak*, Part 5 #8; Responsa *Eliezer*, Part 13 #91:3 and Part 14 #84 and Part 15 #13:2 and Part 16 #34.
104. Rabbi Y. Arieli, *Torah She Baal Peh*, Vol. 6, 5724, pp. 40-60; Responsa *Har Zvi*, *Yoreh Deah* *Aseh Lecha Rav*, Part 2 #56; Responsa *Shevet Halevi*, Part 2 #211.
105. Responsa *Seridei Aish*, Part 2 #120.
106. Rabbi I.Y. Unterman, *Shevet MiYehudah*, pp. 313-322; Responsa *Yabiya Omer*, Part 3, *Yoreh* #22-23; Rabbi S. Goren, *Meorot*, spring 5740, pp. 18-19.
107. Rabbi M. Steinberg, *Noam*, Vol. 3, 5720, pp. 87-96.
108. Responsa *Tzitz Eliezer*, Part 14 #84 and Part 16 #34.
109. Responsa *Tzitz Eliezer*, Part 14 #84:4 and Part 15 #13:2.
- 109a. Responsa *Binyan Av*, Part 3 #64.

110. Rabbi M. Kasher, *Noam*, Vol. 13, 5730, pp. 10-20; Responsa *Divrei Menachem* #27.
111. Responsa *Tzitz Eliezer*, Part 10 #25:5-6 and Part 17 #66:1-2.
112. Responsa *Tzitz Eliezer*, *ibid.*
113. Responsa *Tzitz Eliezer*, *loc.cit.*; Rabbi S. Wasner, *Assia* #42-43, Nissan 5747, p. 92.
- 113a. Rabbi E. Bakshi-Doron, *Torah SheBaal Peh*, Vol 33, 5752, pp. 52ff.
114. See A. Steinberg, *Assia* #44, 5748, pp. 56ff.
115. Rabbi M. Kasher, *Noam*, Vol. 13, 5730, pp. 10-20.
- 115a. Rabbi E. Bakshi-Doron, *Torah SheBaal Peh*, Vol 33, 5752, pp. 52ff.
116. Catholicism does not allow the use of live donors but permits the transplantation of cadaver c provided consent is given by the patient or family. Pope John the second considered it praisewor do so – see *Int J Artificial Organs* 13:646, 1990.
117. Islam forbids organ transplantation, even to save the life of the potential recipient – see D.W. M *The Human Body and the Law*, Edinburgh, 1970, p. 126; D.A. Frankel, *Legal Aspects of (Transplantation*, doctoral thesis (Hebrew), Jerusalem, 5736, p. 129.
118. AMA, Council on Scientific Affairs and Council on Ethical and Judicial Affairs, *JAMA* 263:565, J.M. Hillebrecht, *J. Legal Med.* 10:269, 1989; J.A. Robertson and A. Fine, *Hastings Center R* (6):5, 1988; M.D. Mahowald et al, *Hastings Center Rep* 17 (1):9, 1987; C. Strong, *J Med Ethics* 1991..
119. C. Marwick, *JAMA* 269:1086, 1993. See further a summary on the scientific and ethical concerning fetal tissue in B.J. Hoffer and C. van Horne, *N Engl J Med* 332:1163, 1995.
120. M.D. Levine, et al, *J Pediatr* 86:145, 1975; J.C. Moskop, *J Pediatr* 110:175, 1987; Leading a *Lancet* 337:1470, 1991.
121. D.A. Shewman et al, *JAMA* 261:1773, 1989; M.R. Harrison, *Lancet* 2:1383, 1986; A.M. C: *Hastings Center Rep*, Feb. 5, 1987; A. Davis, *J Med Ethics* 14:150, 1988.
122. C.R. Stiller, edit., *Transplant Proc* 20 (4) Suppl. 15:1, 1988.
123. J.R. Salaman, *BMJ* 298:622, 1989.
- 123a. The Council on Ethical and Judicial Affairs of the American Medical Association, Report Anencephalic infants as organ donors. Chicago, 1988; Committee on Bioethics, American Acade Pediatrics, *Pediatrics* 89:1116, 1992.

- 123b. W.E. Goodwin, et al, *J Urol* 89:13, 1963; A. Kantrowitz, et al, *Am J Cardiol* 22:782, 1968; J. Caba et al, *Clin Pediatr* 8:86, 1969.
- 123c. G.J. Annas, *Hastings Cen Rep* 17:36, 1987; A. Steinberg, et al, *Crit Care Med* 21:1787, 1993.
- 123d. J.L. Peabody, et al, *N Engl J Med* 321:344, 1989.
124. D.L. Manninen, R.S. Evans, *JAMA* 253:3111, 1985.
125. A. Grenvik, *Crit Care Med* 16:1012, 1988.
126. R.G. Simmons et al, *JAMA* 215:909, 1971.
- 126a. See A.J. Matas and F.J. Veitch, *Theor Med* 5:155, 1984; L. Roels, et al, *Transpl Proc* 22:78, 1990; Benoit, et al, *Transpl Proc* 22:320, 1990; R.M. Veatch, *Transpl Proc* 27:1888, 1995.
127. Frankel, loc.cit., pp. 122ff. See further Council on Ethical and Judicial Affairs, AMA, *JAMA* 27:1994.
- 127a. L.M. Sanders, et al, *Chest* 102:1572, 1992.
- 127b. See for example T.H. Murry and S.J. Youngner, *JAMA* 272:814, 1994; R.M. Veatch, *Transpl Proc* 27:1888, 1995.
128. British Transplantation Society Working Party, *BMJ* 293:257, 1986; The Council of the Transplant Society, *Lancet* 2:715, 1985; WHO, *Lancet* 337:1470, 1991.
129. J.P. Wight, *BMJ* 303:110, 1991; Radcliffe-Richards J, *J Med Philo* 21:375, 1996; Radcliffe-Richards et al, *Lancet* 351:1950, 1998.
130. World Health Organization. A report on developments under the auspices of WHO (1987-1991). 1992 Geneva 12-28.