

# **An Overview of Organ Transplantation in Iran over Three Decades: With Special Focus on Renal Transplantation**

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## **Abstract**

Organ and tissue transplantation have a long history in Iran. Some researchers believe that Avicenna was the first to suture nerves together. However, organ transplantation using modern methods and technologies goes back to 1930s. Registered data from Iran shows an acceptable progressing trend in the quantity and quality of various types of organ and tissue transplantation in Iran over recent decades. For instance, Iran has one of the most successful kidney transplantation programs in the region, along with various attempts of policy-makers in order to provide preventive approaches for end-stage renal diseases, distribute dialysis equipment, and enhance cadaveric organ donation. Referring to some published and unpublished data, the current article provides an overview of transplant activities in Iran over the past three decades. Furthermore, the background and characteristics of the Iranian Model of kidney donation will be also reviewed.

**Keywords:** *Transplantation, Kidney transplantation, Living donation, Cadaveric donation, Rewarded gifting, Iran*

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## **Introduction**

Organ transplantation has shown increasing trends worldwide in recent decade. About 15,000 kidney transplantations were performed in America, Europe and Asia in the year 2000 (1). In the same year, around 5,000 cases of liver transplantation were performed in the US and Europe and 1,000 cases in Asia. In 2005, only in USA, 5766 living donation and 6352 deceased donation have registered (2). However, the increasing number of heart transplants did not resemble that of kidney or liver transplantation. The numbers of transplantation performed in these geographical regions are compared in Table 1 (1).

In the realm of organ transplantation, an important point is the difference between the number of living and cadaver organ donors. In America, while renal transplants from cadaver donors remained relatively stable between 1984-2001, there has been an increase in the organs obtained from living donors (1, 3). In Europe, there is only a mild rise in organs taken from both living and dead donors (1). In Asia, ca-

cadaveric renal transplantation comprises merely 10% of total kidney transplantation (4). Also, cadaveric renal transplantation in MESOT (Middle East Society for Organ Transplantation) countries constitutes 15% of total kidney transplantation, giving the region a favorable status in cadaveric transplantation (5). There are significant differences among countries; for example, most kidney transplantation performed in India is from living donors (1). Similarly, most liver transplants in Japan are from living donors. In China, on the contrary, the majority of transplants are obtained from cadavers (1), mostly from subjects who are to be legally executed. This is based on the belief that by this humanitarian action these people, who have done wrong, shall become free of sins (1).

Developed countries boast the highest rates of cadaveric transplantation; the rates of cadaveric kidney donation in the United States, England, Australia, and Spain are 26.5, 25, 23.1, and 49.2 pmp, respectively (6). Spain has the highest cadaveric kidney donation rate in the world with

over 99 percent of all transplants coming from deceased donors (7).

**Table 1:** Number of transplants per million populations (PMP) worldwide

Area	Population (Million)	Number of transplants (PMP)		
		Kidney	Liver	Heart
USA	260	52	19	8
Europe	520	27	10	4
Asia	3600	3	0.3	0.03

## Material and Methods

Through a comprehensive search in Medline, Ovid, and Google, by using of some keywords including "transplantation", "kidney transplantation", "living donation", "cadaveric donation", in combination with the words "Iran" and "Iranian", we found the main resources to compile the current article, which provides an overview of transplant activities in Iran over the past three decades. The names of some famous Iranian scientists in this field have been used in the searching process. Furthermore, contemplating the importance of challenges in the field of renal transplantation, we will also review the background and characteristics of the controlled program of unrelated organ donation, named "Iranian Model".

## Results

### *Turning Points in the History of Transplantation in Iran*

Organ and tissue transplantation in Iran have a long history. Some researchers believe that Avicenna was the first to suture nerves together (8). Also, Seyed Esmail Jorjani, in his book called "Zakhireh Kharazmshahi" stated that the transplantation of dog bone results in regeneration of human broken bone (24). However, standard organ transplantation has been taking place since 1930s in Iran. The ever-increasing advancement of transplantation is owed to the hard work and faithful conscience of professors and

physicians working in this field. The present history of transplantation has been compiled from documented reports and published articles or unpublished data obtained from the pioneers and professors of medicine in Iran. The sequence in which the first transplants were performed in Iran is mentioned in Table 2(10).

### *Some Statistics of Transplantation in Iran*

There has been an acceptable progressing trend in the quantity and quality of various types of organ and tissue transplantation in Iran over recent decades. Registered data from Iran has shown in table 3. Also, preliminary figures of donation and transplantation in Iran in 2005 are mentioned in table 4, according to the International Registry of Organ Donation and Transplantation (IRODaT) (2). Nationally, there are 61 corneal, 26 kidney, 5 heart, 3 liver, 3 bone marrow, 2 lung and 1 pancreas transplantation centers in Iran right now.

**Table 2:** The first organ and tissue transplantations in Iran

Date		
B.C	Solar yr	Organ Transplantation
1935	1314	First corneal transplant; Farabi Hospital, Tehran
1967	1346	First Kidney Transplant; Shiraz
1990	1369	First bone marrow transplant; Shariati Hospital, Tehran
1993	1372	First Liver Transplant; Namazi Hospital, Shiraz
1993	1372	First Heart Transplant; Tabriz
2001	1380	First Lung transplant; Imam Khomeini Hospital, Tehran
2002	1381	First Heart and Lung transplant; Imam Khomeini Hospital; Tehran

**Table 3:** Number of transplants performed in Iran

Number	Kidney	Heart	Lung	Liver	Bone marrow	Cornea	pancreas
Total	21359	122	20	338	>2000	28838	7
2006 statistics	1858	18	7	108	430	--	7
2002 statistics	1681	11	2	23	170	2581	--
Living-organ donor (2002)	1585	-	-	1	170	-	--
Cadaver-organ donor (2002)	96	11	1	22	-	2581	--

**Table 4:** 2005 donation and transplantation preliminary figures in Iran

Total Value	Deceased Donation	Living Donation	Deceased Kidney Tx	Deceased Liver Tx	Heart Tx	Lung Tx
Number	115	1680	221	51	18	5
PMP	1.6*	24.7	3.2	0.7	0.2	0.1

\* The recent data has increase to 2.3 pmp.

Currently, Iran has one of the most successful kidney transplantation programs in the region such that rates have reached 24 cases per one million people (11). These rates are 0.33 and 0.16 cases per one million population for liver and heart transplantations, respectively. By the February 2007, 21359 renal transplants have been carried out in 25 transplant centres in Iran; 865 from cadavers, 2770 from Living Related Donors (LRD), and 17,724 from Living Unrelated Donors (LURD).

The first liver transplantation (LT) in Iran took place in Namazi Hospital in Shiraz in 1993 by Dr. Malekhosseini and his colleagues (12), and to date over 500 LTs has been carried out in Shiraz. In January 1998 a liver from a relative living-donor was transplanted in the same hospital (13) in which the left lobe of a mother's liver was transplanted to her own child, who survived for nine months after the surgery. Until 1999, cadaver organ transplantation was performed in only six patients, four of whom survived for one year and the other three remained alive for slightly longer. After passing the law on brain death, the rate of cadaveric liver transplantation has rapidly increased such that at present, more than 100 liver transplants are being carried out annually in several provinces

including Shiraz and Tehran. According to Dr. Saberifiroozi, et al, the LT program has been successful by improving survival of patients with end-stage chronic liver disease. However, only about one-fifth of patients listed for LT in Iran undergo this procedure (14). Of the 480 patients originally listed for LT from 1994 to 2004, 104 (22%) underwent LT. The mean time to LT was 7.7 (8.4) months (14). Referring to data of 338 liver transplants carried out at transplantation center of Nemazee Hospital at Shiraz University of Medical Sciences, eleven LTs were from live donors (15).

The first heart Transplantation (HT) in Iran took place in 1993 in Tabriz, and then at Dr Shariati Hospital, Tehran. However, the first lung transplantation was performed in 2001 and the first combined heart and lung transplantation was done in Imam Khomeini Hospital in Tehran in 2002. The number of HTs exceeds 160 today. In one inclusive study, the data of all individuals who had undergone heart transplantation between July 1993 and July 2003 were evaluated. Among these 45 patients, one-month, 1-year, and 5-year survival rates were 80, 59.5, and 50 percent, respectively (16).

Likewise, after a long time of research, pancreas transplantation was started in Iran in 2005

in Shirz University. Over 50 cases of pancreatic transplants have been carried out up to now, two thirds of which combined with kidney transplantation. At present, several research centers and universities are working on pancreas and islet cell transplantation in collaborative international studies.

Bone Marrow Transplantation (BMT) was initially performed in the year 1990 in Shariati Hospital (affiliated to Tehran University of Medical Sciences) and has been one of the most successful achievements in Iran (17). In January 1990, Dr. Ghavamzadeh performed the first Bone Marrow Transplantation in a girl with Ewing's Sarcoma and within the following 3 yr, 73 Bone Marrow Transplantations were performed (18). A special ceremony for 2000th BMT was installed in TUMS recently. Also, peripheral blood stem cell transplantation and umbilical cord blood stem cell transplantation were first done in 1997 and 1998, respectively (17), and is now being performed as an ordinary practice.

The first corneal transplantation in Iran was performed in Farabi Hospital in Tehran in 1938 by Professor Shams and was then followed by pioneering work of Dr. Khodaparast and others until around 1967-77. After some delay, in 1981, it was restarted by Dr. Sajadi in Tehran. At present, this operation is being done in majority of public and private hospitals, so that; there has been no need to send patients abroad for corneal transplantation since 1986. The Eye Bank of Islamic Republic of Iran was established in 1988 based on the late Imam Khomeini religious approval (Fatwa) (19). Corneas are obtained from deceased corpses up to 6-12 h following death considering all necessary health percussions.

The transplantation of bone, tendon and other skeletal organs, skin, heart valves, and vessels are successfully taking place in Iran by well-experienced surgeons and with advanced technology. Organ and tissue banks have been established in various universities and are now providing the required services in this field. According to data from the organ bank of Tehran

University of Medical Sciences (<http://itb.tums.ac.ir/news.php>), in 2002, a total of 225 heart valves, 210 bone allografts and 83 amniotic membranes had been used for transplantation.

There is no integrated national statistics in organ transplantation in Iran; however, several studies have been published by the pioneers of transplantation in recent years. The overall patient and graft survival of performed transplantation are comparable with other centres in the world (20). Considering the success of kidney transplantation and challenges about the living program, we intend to discuss this multi-dimensional issue. At first, the published data about the results of renal transplantation in different centers will be reviewed in following.

The data from Hashemi Nejad Hospital's Transplantation center, one of the founding institutes in the field of kidney transplantation in Iran, shows that between 1967 and 2000, the one, 5- and 10 yr patients' survival rates have been 92.8, 83.7 and 73.3 percent, respectively (21). The same report shows that the survival rates for the grafts have been 87.2, 66.2 and 49.8 percent after 1, 5 and 10 years, respectively (21).

In other experience, 1995 renal transplants were performed in Hashemi Nejad Kidney Hospital between April 1986 and January 2006 (22). A total of 496 (25%) were from living-related donors, and the remaining 1499 (75%) were from living-unrelated donors. According to the data analysis, the overall patient survival rates have been 93.8, 87.8, and 76 percent and the overall graft survival rates have been 90.4, 75.4, and 52.8 percent at 1, 5, and 10 years, respectively. There were no significant differences in graft survival rates between recipients of one HLA haplotype-matched living-related donor and living-unrelated donor recipients ( $P= 0.35$ ). In living unrelated donor renal transplant recipients, the patient survival rates were 93.9, 87.1, and 72.2% and the graft survival rates were 90.5, 74.4, and 48.8% at 1, 5, and 10 yr, respectively.

Likewise, from 1984 to July 2004, 2155 kidney transplantations have been performed at Labbafi Nejad Medical Center in Tehran (23).

Among the transplants, 1760 were from LURDs that this is the largest experience at a single center in the world. According to the data, graft survivals at 1, 3, 5, 10, and 15 years for LRD were 91.6, 81.7, 76.4, 64.4, and 48.4 percent, and in LURD 91.5, 86.7, 81.4, 68.2, and 53.2 percent, respectively ( $P= 0.07$ ). Patient survivals for 1, 3, 5, 10, and 15 years in LRD were 94.6, 91.9, 83, 79.5, and 73.9 percent, and in LURD 93.6, 91.7, 89.3, 84, and 76.4 percent, respectively ( $P= 0.14$ ). This long-term follow-up has showed that patient and graft survivals among living unrelated kidney donations (LURDs) were living related kidney donations (LRDs) (23).

Furthermore, the donor morbidity and mortality rates are comparable to transplant centres in developed countries. In more than 18,000 live-donor nephrectomies that were performed in Iran, there have been four (0.02%) perioperative donor mortalities in the whole country (22). The major and minor perioperative complications reported from one centre has been 1.5 and 8.5%, respectively (24).

#### ***Iranian Model of Renal Transplantation***

The first renal transplant was performed in Shiraz University by Prof. Sanadizadeh (1967) (11, 25). Twelve years later, by the time of the Islamic revolution (1978), a total of around 100 renal transplantations had been performed in specialized centers in Shiraz and Tehran (11). Then, during 1980-1985, around 400 Iranian patients had undergone renal transplantation abroad (11). Most of those transplants took place in European countries, especially in England and to a lesser extent in the USA. The patients were, however, faced with a large number of problems and due to the high costs (more than 80-100 thousand dollars); only a small number of patients could afford this type of surgery. Since the patients were forced to return to their homeland as early as possible, they were deprived of the post-operative care normally given to transplant patients for the first few years after the operation.

At the same time, due to the Iran-Iraq war (1980-1988), economic sanctions and many other obstacles limited the availability of dialysis facilities in our country. A time came when a large number of renal patients from different cities died due to the lack of facilities needed for hemodialysis. This was a psychologically moving incident which had deep effects on everybody, especially on our physicians. To perform renal transplantation, which although had its own problems, was the only practical solution. Few surgeons had some experiences in transplantation. However, renal transplantation was performed once more, the first of which took place in 1984 in Tehran (26) and during the next two years, almost 40 cases of transplantation had been performed in the country. Considering the successful renal transplantations performed and the increasing demand of patients for transplantation, waiting lists rapidly extended. From 1985 to 1987 two renal transplantation teams were formed in Iran. During this period, 274 renal transplantations were done with living organ donors (11, 27, 28).

At first, kidney donors were individuals chosen specifically from the patient's relatives but there were a number of patients without volunteer relative kidney donors. Therefore, a well-controlled program was initiated in 1988 for the transplantation of non-relative organs (11, 29). The first allograft transplantation was done in Shahid Labafi Nejad Hospital in Tehran from a woman to her husband. At first the donations were mostly from emotionally related individuals such as the patient's husband or wife but this range rapidly extended to include strangers and in time, the number of non-relative organs predominated. In that situation, because only 30 percent of patients in the waiting list for transplantation could receive a kidney from LRD, this program was an obligatory approach for saving many lives not merely for ameliorating quality of life (30, 31).

By virtue of the teaching of new medical teams, the number of renal transplantation teams increased from 2 to 32 by the end of 2000 (11).

From 1985-1990 around 1300 cases of renal transplants took place in Iran, and by the end of the year 2000, a total of 10,957 renal transplantations (2468 living relative donors, 8405 living non-relative donors and 84 cadaver donors) were performed. It is important to mention that there has been no waiting list in Iran since 1999.

Concerning the negative experiences which existed about buying and selling of body organs in other countries, and to prevent organ trafficking, transplantation of foreigner individuals was banned unless the donor and recipient were from the same nationality. Furthermore, a state supported program was initiated to offer a sum of money (so-called rewarded gifting or compensated donation) to each donor. All hospital expenses are also paid by the government (32). Consequently, even patients of low socio-economic class could afford renal transplantation. Statistics show that more than 50% of renal recipients with kidneys from a non-relative donor came from a poor socio-economic background (32, 33). Meanwhile, more than 80% of living kidney donors also come from a low socio-economic status (33). In a national survey in Iran, the ratio of living non-related donors to living related donors was 84% (33).

Currently, organ transplantation is performed exclusively in governmental hospitals affiliated

with universities. Members of the transplantation team have no role in identifying potential donors. The surgical team is not also involved in this interaction and there are not any middlemen for transplant team (11, 34). In order to strengthen the program, some approaches have been carried out by MCTSD in recent years, including; ratification of "Chronic Kidney Disease Patients' Care Project", establishment of "Iranian Network for transplant Organ Procurement", emphasis on complete health assessment, informed consent and follow-up visits for donors, affording hospital charges, paying a rewarded gift, an arrangement for health insurance for living donor (35, 36).

Recently, the Iranian Academy of Medical Sciences has compiled *the Professional Codes of Organ Transplantation* (Table 5) (37), according to which compensation of donors in the cases of unrelated living donation would be permissible if the donor is fully informed and willing to donate. This Code determines the necessary conditions in which paying donors could be considered an ethically-sound action: for example, the donors must be between 18 to 45 years old and completely healthy without any contraindication for surgery. Also, the donors must be provided with the coverage of health insurance (37).

**Table 5:** The Professional Codes of Organ Transplantation prepared by the Iranian Academy of Medical Sciences, Feb 2008

Science the protection of the lives of human beings should be considered the most fundamental moral principal, which however, is subject to different cultures and societies and to satisfying modern needs and offer the best and most advanced medical services to the patients, the committee on ethics of the Academy of Medical Sciences (IRI) declares that the act of kidney donation, from living related and unrelated volunteers is generally acceptable and exchange of money as a reward, gratitude of gift or compensation is not considered unethical and should not discourage this noble act provided:

- 1- The donor is truly willing to donate a kidney in right mind, free from coercion.
- 2- The donor undergoes complete medical check-up and psychological evaluation and is found fit for the operation.
- 3- There should be no contraindication for the operation.
- 4- Donor should be able to get long term medical attention after donation.
- 5- The medical team has no part in the process of donation.
- 6- Donor and recipient should be from same nationality. Tourist transplantation is forbidden.
- 7- No one under the age of 18 and over 45 is accepted for donation.
- 8- A national committee assigned by the ministry of Health and Medical Education with cooperation of Iranian Transplantation Society will regulate and supervise the renal transplantation centers nationwide.

Undoubtedly, the Iranian model has succeeded in delivering a standard medical service for donors and recipients in the pre-transplant period and within the surgery. There is also a free service for follow-up of donors including a 1 yr health insurance after transplantation. Nevertheless, additional safety measures must be taken for strengthening this service.

It should be pointed out that the quantity and quality of services for dialysis are significantly improved in recent years. In addition, patients who need dialysis or renal transplantation have special health care coverage in Iran and most of the services are free of charge. Governmental aid covers the expenses of transplant surgery performed in hospitals. In order to minimize donor morbidity, Laparoscopic Donor Nephrectomy (LDN) has been introduced in Iran since 2000 (38).

#### ***Main Legal and Jurisprudential Points***

It is important to mention that, in Iran, as an Islamic country, the passing of religious decrees concerning the approval of organ transplantation by the religious scholars has played an important role in the progress of transplantation (39). However, lack of enough public awareness about the issue has caused a lower statistics of cadaver-donor organs than those of other countries (9).

Since Islam considers human life to be of a special value, everything which is done to save or cure a human being is permissible in Islam. Of course, organ transplantation in its early days confronted some objections in the Islamic world, but later most Islamic scholars (both Shia and Sunni) considered organ transplantation as acceptable. The principle of the donor's consent is of great importance in Islam. Also, respect for an individual's dead body is a necessity. The late leader of Iran, Ayatullah Khomeini, has replied to a number of essential criticisms of organ transplantation through jurisprudential reasoning, during an interesting scholarly discourse dating back to 1964, and has proved that transplantation of organs is not prohibited by

Islam (9). On the other hand, Sunni scholars have a considerable unanimity in this regard. For instance, the association of Sunni scholars issued a Fatwa on permissibility of organ transplantation in 1982 (9). Other Fatwas have also been issued on the subject. After a conference in 1989, some Islamic scholars while emphasizing on respect for human body and keeping it from damage and humility (dead or alive), mentioned that using human body in a way that does not contradict with God's decrees, would be permissible (40).

In Islamic countries where laws and regulations are mainly based on Sunni's jurisprudential views, organ transplantation is recognized permissible as any other legitimate deed, on the basis of the argument that, according to known principles of Islamic laws, all that is not prohibited is necessarily legitimated. This viewpoint is based on a decision by Al-Azhar Islamic University taken in 1977 and a Fatwa by a group of great scholar of Saudi Arabia in 1981. This viewpoint is noted by legislators of Islamic countries and related laws in these countries are based on the views of religious scholars (10).

In Iran, decrees of religious leaders paved the way for ratification of the aforementioned act. This was a significant turning point in the history of organ transplantation in our country. Substantial efforts have been made in recent decades to legalize the issue of organ transplantation, the first of which was establishing the supreme council of organ transplantation that consists of specialists and official authorities. One of the most important duties of this council was to clarify legal and religious aspects of organ transplantation. It seemed necessary for Iran's legislature to review various aspects of organ transplantation and ratify a law on it, because religious scholars has confirmed its permissibility in cases where saving another's life depends on such an operation.

Preparing a bill regarding organ transplantation, especially in brain dead patients, was a very

important achievement. Considering the Fatwas of the Late Emam Khomeini and Ayatullah Khamenei on permissibility of taking organs from these patients, the bill of organ transplantation and brain death was proffered to the Parliament in 1995. It was not ratified initially, but it was brought up again and ratified in 2000.

In 1995, the bill was put out of agenda, mainly because opponents were worried about its consequences, although most MPs had emphasized on necessity of a legal framework for such a practice. Another argument offered by opponents of the bill was that such a law will be abused by some physicians. Proponents believed that without relevant regulations, there would be more opportunities for abuse and exploitation. It would be possible to adopt a comprehensive law with provisions for reliable and efficacious sanctions to prevent disadvantages. Considering the importance of this issue, the bill was again put in the agenda of the Parliament in 1999 (10).

The Fatwas issued by religious leaders were the main bases of ratification of the bill. The Fatwa by the late leader of revolution (Ayatullah Khomeini) was:

Question: *"In today's world, brain death is accepted as a fact, and if a patient is diagnosed as brain dead by certain examinations and tests, his/her life is seen as terminated, although keeping such a person temporarily alive is possible using ventilators and medications. Organs such as heart and liver are taken from these patients to be transplanted to other patients in order to save their lives. Please state your opinion regarding doing such things as taking the organs of patients with definite brain death."*

Answer: *"In the aforesaid assumption if saving another human's life depends on it, it is permissible when the owner of the heart or liver consent to it"*.

The Fatwa of Ayatullah Khomeini was:

Question: *"Some patients are in a state called brain death, which means, due to irreversible and irreparable lesion to the brain the patient*

*has no cortical activity, is in deep coma, does not respond to external, even painful, stimuli, has no brain stem activity, does (and can) not breathe spontaneously, and has no reflex to light or other physical stimuli. In these cases there is absolutely no chance of returning back to life (as defined above), the patient's heart beats automatically but only when connected to a ventilator, and then for hours, days, or weeks. At the same time, there are patients that saving their lives depends on using organs taken from brain dead patients. Considering the fact that brain dead patients do not breathe, have no perception, feeling or voluntary movements, and will never recover, please state your opinion about whether in the above-mentioned situation the brain dead patient's organs can be removed to be used for saving other patients' lives?"*

Answer: *"In the asked assumption, using the described body organs is permissible if saving a respectable life depends on it"*.

The text of the bill, which was ratified by the Parliament, has been published in English journals (41). The above-mentioned law was approved by the Parliament in early 2000. The executive bylaw of the Act was prepared by the Ministry of Health, in 2001 (42-44) and finally passed by the Cabinet Council in 2002. Passing of the organ transplantation act has entailed a rapid progress in this field in our country.

#### Deceased Donation

After approval of the 'Act of Organ Transplantation and Brain Death', the standard protocol of brain death confirmation was compiled and great strides have been made for enhancing deceased donation (45) by means of raising awareness of general public, extension of "Organ Procurement Units", providing "Brain Death Identification Units", and making donation cards more popular. Currently, Iran operates an 'opt-in' system in which the patient or their family must consent for organs to be donated. Meanwhile, the subject of brain death is not totally accepted by general public. It should be taken into consideration that the decision about dona-

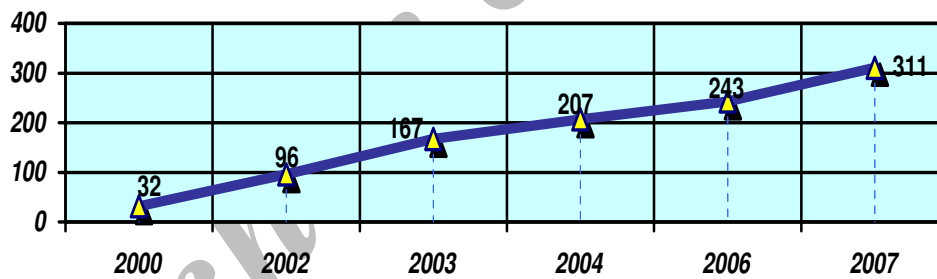


tion of brain-dead organs should be made at a difficult time—shortly after death, when the family is in shock.

By the end of 2006, 18 brain death identification units and 13 organ procurement units were organized in Iran, and a total of 1546 deceased-donor organ transplantations were performed; consisting of 1066 kidneys, 327 livers, 122 hearts, 20 lungs, 7 pancreas-kidneys, 2 heart-lungs and 2 small bowel transplants (15).

Fortunately, data derived from Iran registries indicates increasing rates of cadaveric donation in past several years. Inadequate public awareness, attitude of the medical community, frequently held misconceptions about Islamic precepts, and a sub-standard network are among the main barriers to cadaveric transplantation in Iran (46, 47). However, in some cases, cadaver organs were not used because of the technical limitations in preserving and procuring of organs. Thus, “Management Centre for Transplanta-

tion and Special Diseases” (MCTSD) of Ministry of Health (MOHME) has established a virtual Network and the Organ Procurement Units and Brain Death Identification Units in Iran have been well equipped. According to the MOHME data, the MCTSD's strategies resulted in a mean 40% growth rate in cadaveric kidney transplants in Iran. While only 32 cadaver renal transplants were carried out in 2000, this figure rose to 245 in 2006 (35, 48). Currently, there is an active cadaveric transplantation program in Iran; over 500 liver transplants have been performed in Iran, in addition to 160 heart transplants and over 34000 corneal transplants. It is also worthy of noting that in 2007, 311 kidneys, 162 livers, 3 lungs, and 31 pancreas have been transplanted using brain dead organs, according to unpublished data of MOHME. It's worth noticing that the Iranian cadaveric program is altruistic with no reward given to families except funeral expenses in a few cases (49).



No. / Year

**Fig. 1: The upward trend in deceased donation in Iran**

## Conclusion

The evidence shows that Iranian model is a state-sponsored, transparent, non-commercial, middleman-free system of kidney transplantation (50). No doubt, establishment of the Iranian model of compensated kidney donation has been successful in preventing donor exploitation and providing standard medical amenities for recipients and donors. However, the policy-makers are setting up more clear-cut strategies to overcome the program's disadvantages. For developing an appropriate strategy to deal with

disadvantages of the current program, elimination of bargaining via prevention of donor-recipient familiarity, establishing a special confidential databank of organ donors, implementing a centralized institution for financial support of donors; for instance, through the governmental funds and charity organizations' resources, must be determined by policy-makers (51).

We believe the current system is a culturally-adapted model and the sole option for saving many lives in Iran; indeed, there must be more

efforts for elimination of disadvantages of the program. Likewise, the program must frequently be evaluated, and revised if necessary. It is worth mentioning that judgment about ethical acceptance of a deed can have a more precise meaning in the socio-cultural context of a country.

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