

## Key issues in transplant tourism

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### Abstract

Access to organ transplantation depends on national circumstances, and is partly determined by the cost of health care, availability of transplant services, the level of technical capacity and the availability of organs. Commercial transplantation is estimated to account for 5%-10% (3500-7000) of kidney transplants performed annually throughout the world. This review is to determine the state and outcome of renal transplantation associated with transplant tourism (TT) and the key challenges with such transplantation. The stakeholders of commercial transplantation include: patients on the waiting lists in developed countries or not on any list in developing countries; dialysis funding bodies; middlemen, hosting transplant centres; organ-exporting countries; and organ vendors. TT and commercial kidney transplants are associated with a high incidence of surgical complications, acute rejection and invasive infection which cause major morbidity and mortality. There are ethical and medical concerns regarding the management of recipients of organs from vendors. The growing demand for transplantation, the perceived failure of altruistic donation in providing enough organs has led to calls for a legalised market in organ procurement or regulated trial in incentives for donation. Developing transplant services worldwide has many benefits - improving results of transplantation as they would be performed legally, increasing the donor pool and

making TT unnecessary. Meanwhile there is a need to re-examine intrinsic attitudes to TT bearing in mind the cultural and economic realities of globalisation. Perhaps the World Health Organization in conjunction with The Transplantation Society would set up a working party of stakeholders to study this matter in greater detail and make recommendations.

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**Key words:** Living unrelated donor; Organ trafficking; Transplant commercialism; Infection; Graft survival; Patient survival; Complication

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### INTRODUCTION

Medical tourism refers to patients travelling across national borders for healthcare elsewhere. People tend to travel for care that either is not available in their home country or perceived to be superior (better quality and delivered in a more timely fashion) to where they live. Medical tourism has emerged as a global health care phenomenon, valued at \$60 billion worldwide in 2006<sup>[1]</sup>. With insurance companies in the US beginning to integrate foreign care into their coverage by offering discounts to patients agreeing to overseas travel, medical tourism is projected to become a \$21 billion a year industry in the US by 2011<sup>[2]</sup>. Transplant tourism (TT) has been used to indicate travel outside of one's country of residence for the principal purpose of obtaining organ transplantation services<sup>[3-5]</sup>. TT unlike general medical tourism, has always been surrounded with controversy regarding the

source of organs, donor's care after transplantation, and recipient outcome<sup>[4]</sup>. Though instances of organ buying, selling and/or trafficking occur, emotionally and/or biologically related living donor transplants are also achieved by transplant tourists<sup>[3]</sup>. Despite objections to TT by the transplant community and efforts to boost altruistic organ donation, many patients continue to travel to other countries to receive commercial transplants<sup>[3,6]</sup> - confirmed by WHO statistics: Saudi Arabia (700 in 2005), Taiwan (450 in 2005), Malaysia (131 in 2004) and South Korea (124 in the first 8 mo of 2004)<sup>[7]</sup>.

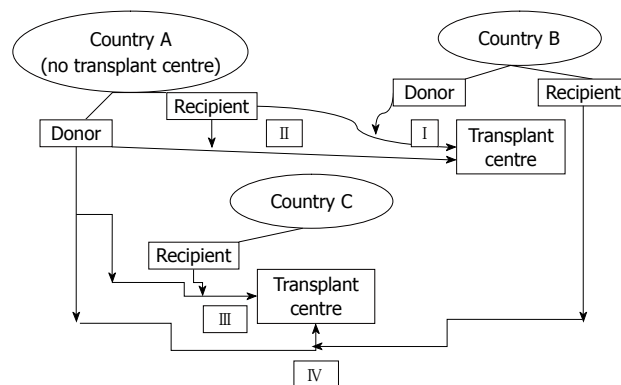
Access to organ transplantation varies according to national circumstances, and is partly determined by the cost of health care, availability of transplant services, the level of technical expertise and the availability of organs. The extent of organ sales from commercial living donors (CLD) was estimated in 2007 to account for 5%-10% of kidney transplants performed annually throughout the world<sup>[7]</sup>. If the 69 400 renal transplants performed worldwide in 2008<sup>[8]</sup> is an indication of annual transplant activity, then between 3500 and 7000 commercial renal transplants are performed per year. The stakeholders of commercial transplantation include: patients on the waiting lists in developed countries or not on any list in developing countries; dialysis funding bodies (states, insurers, and providers); middlemen (brokers, officials, and doctors), hosting transplant centres; organ-exporting or selling countries; travel and tourism industries; and organ vendors<sup>[9]</sup>. Patients refused entry on the waiting list for medical reasons may sometimes seek commercial transplantation.

The worldwide escalation in the number of patients with kidney failure, increasing demand for transplantation, shortage in the supply of organs and deaths on the transplant waiting list continue to fuel TT<sup>[10-13]</sup>. Only about 10% of the approximately 12 000 patients on a waiting list for a transplant in Japan are transplanted per year<sup>[14]</sup>. TT is facilitated by several factors including the ease of travel as the world has become a global village; difficulty in ensuring compliance with international law; and the widening gap between the rich and the poor<sup>[15]</sup>. The aim of this review is to determine the state and outcome of renal transplantation associated with TT and the key challenges with such transplantation.

## TYPES OF TOURISM

According to Shimazono<sup>[7]</sup>, TT takes various forms as depicted in Figure 1. In the traditional model, patients generally travel from less developed nations (country A, Figure 1) to transplant centres in relatively more highly developed countries (B and C, Figure 1) to receive services that are not typically available in their own countries. However, TT can occur when donor and recipients living in the same country travel to another country with less stringent requirements or better transplant facilities (model II, Figure 1).

TT has become tarnished by organ trafficking and commercialisation and is often thought to be illegal. How-



**Figure 1** Types of transplant tourism. Model I : Recipient (R) travels to country B where donor (D) and transplant centre (TC) are; Model II : R and D travel to another country for transplantation; Model III : D travels to country C where R and TC are; Model IV : D and R residing in different countries travel to another country (C) for transplantation.

ever, not all medical tourism that entails the travel of transplant recipients or donors across national borders is associated with unethical behaviour. Examples include, when travel of a related donor and recipient pair is from countries without transplant services to countries where organ transplantation is performed or if an individual travels across borders to donate or receive a transplant from a relative. Any official regulated bilateral or multi-lateral organ sharing program is not considered TT if it is based on a reciprocated organ sharing program among jurisdictions<sup>[16]</sup>. The Declaration of Istanbul has clarified the terms “organ trafficking”, “transplant commercialisation” and particularly “transplant tourism”, by introducing the term, “travel for transplantation”<sup>[17]</sup>. Organ trafficking entails the “recruitment, transport, transfer, harbouring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power, of a position of vulnerability, of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation by the removal of organs, tissues or cells for transplantation”. Travel for transplantation becomes TT when it involves commercialisation or organ trafficking or deprives the local population of their services. Whether this new definition would make a difference is difficult to judge as travel for transplantation would also be shrouded with suspicion and requiring proof that nothing untoward is associated with it. In TT, patients travel on their own to obtain organs through the organ trade or through other means that contravene the regulatory framework of their countries of origin<sup>[7]</sup>. Many clinical and bioethical concerns surround this trade, and the unavailability of sufficient amounts of verifiable data to inform discussion of this exceedingly complex issue has led to divergent views across the world<sup>[11,18]</sup>. There is need for cultural awareness and sensitivity in deliberating TT and its role in transplantation in certain parts of the world. The issue of TT is far from being settled and in the meantime, patients on waiting lists exploit the cultural

and economic differences between regions of the world to their own advantage<sup>[19]</sup>.

## FACTORS DRIVING TT

### **Need for transplantation**

There is a significant emerging burden of chronic kidney disease in developing countries, due to the ageing population and a high incidence of type 2 diabetes mellitus and hypertension. The majority of those with established renal failure (ERF) die because of lack of funds as few can afford regular maintenance dialysis or renal transplantation which is often not available<sup>[20]</sup>. Unavailable or under-developed organ donor and transplant services coupled with poor dialysis facilities pose significant barriers to the delivery of efficient and cost-effective renal replacement therapy. Rich patients living in such economies would be tempted to seek help elsewhere. It is thought that the lack of provision of transplant services in developing countries has made TT inevitable<sup>[21]</sup>.

In countries with developed transplant services, lengthy waiting times can contribute to increased risk for clinical deterioration, reduced quality of life, and in many cases, removal from the list if their clinical picture significantly deteriorates. Some patients with monetary means have responded to this dilemma by placing themselves on waiting lists at multiple hospitals in the US (where the system allows), thereby increasing their chances of receiving a transplant. Review of TT in British Columbia showed that it mainly involved ethnic minorities (90%) who traveled to their country of origin for transplantation after waiting a median of 2 years<sup>[22]</sup>. Some patients from developed countries with established transplant programmes whose immediate prospects of being transplanted are low, travel to other countries where they can acquire kidneys either from executed prisoners or live unrelated donors (LURD)<sup>[23,24]</sup>. According to the Korean Network for Organ Sharing, 7641 patients were on the waiting list for kidney transplantation by 2008 with only 481 (one in 15) receiving a deceased donor transplant<sup>[25]</sup>. Recently, active and proposed US medical insurance programs are taking steps to address the problems of organ availability, long waiting times, and high medical and surgical costs by promoting TT. Such programs are created explicitly to encourage policy holders to travel to foreign countries for the purpose of obtaining transplants<sup>[26,27]</sup>. So unlike many illegal markets, this one is driven by the need of patients with irreversible kidney failure at risk of increased morbidity and mortality<sup>[28]</sup>. The longer the wait for a transplant, the higher is the risk of a poor outcome.

### **Organ donation**

The lack of legislation and infrastructure has prevented growth of deceased donor programmes in developing countries so living donors have continued to be the major source of transplantable kidneys<sup>[29]</sup>. Even the most well-developed deceased-donor programs (e.g., the Spanish program) can barely cover 50% of its waiting list because

**Table 1 Types of living donation**

Genetically related	
1st degree relative	Parent, sibling, offspring
2nd degree relative	Grandparent, grandchild, aunt, uncle, niece, nephew
Other	Cousin
Emotionally related	Spouse, in-laws, adopted, friend
Unrelated (not genetically or emotionally related)	Directed (possibility of donor-recipient financial arrangement)
	Non directed (altruistic)
	Paired exchange
	Living-deceased exchange

the demand for deceased-donor organs far exceeds supply. LURD transplantation (Table 1)<sup>[30,31]</sup> is amenable to donor recruitment by undesirable or illegal practices such as coercion or commercialisation<sup>[32-34]</sup>. Commercial LURD transplantation is made possible because a high proportion of the population in developing countries live below the poverty line and some believe that selling an organ can positively change their circumstances<sup>[28,35]</sup>.

### **Bribery and corruption**

Though commercial transplantation is prohibited in most countries<sup>[23,35]</sup>, the practice of organ sales is common in some parts of the world and drives TT<sup>[16]</sup>. The countries where such practices are common score poorly on the corruption perception index compiled by Transparency International<sup>[36]</sup>. The declaration of Istanbul<sup>[17]</sup> on organ trafficking and TT provides clear strategies for stopping these practices but no sanctions for those states failing to comply. It is suspected that in some countries like India, sale of organs might still be going on due to bribery and corruption<sup>[37]</sup>.

### **Cultural issues and disregard to the rule of law**

Between 2002 and 2008, the Philippine government, through the Department of Health, administered a program called the Philippine Organ Donation Program that allowed prospective kidney donors to sign up, be allocated to prospective recipients and receive gratuities for their kidney. TT flourished during this period because of rampant disregard for the regulation limiting foreign recipients to 10% of total kidney transplants<sup>[38]</sup>.

TT is perceived in certain cultures and developing economies as a human right that meets the demands of all stakeholders and should therefore be organised rather than declined in the interest of Western countries<sup>[39]</sup>. As such, the merits of culturally insensitive policy statements issued by otherwise well-intended transplant professionals/organisations must be evaluated within the broader context of foreign relations and diplomacy, as well as cultural and ethical relativity. Some have called for caution in imposing beliefs and values on others, given the differing cultural and socio-political circumstances in a global economy. Policies or position statements emanating from a relatively superficial assessment of an exceedingly complex issue fail from a multi-cultural perspective<sup>[11]</sup>. Critics

state that the primary issues to which position statements on TT are directed concern the source and circumstances surrounding the procurement of donor organs - confusing the donor organ acquisition process with the receipt of a transplant surgical procedure in a foreign country. The situation in China where executed prisoners are used as a source of donor organs directly and indirectly raises many questions about the role of capital punishment, religion, informed consent, financial incentives in relation to organ donation. Capital punishment has in the past been practiced in virtually every society, although currently only 58 nations actively practice it. Whereas in the US, both the ethical justification and the legal basis for capital punishment remain open to debate, it has been abolished in the European Union, Australia, New Zealand and Canada<sup>[40]</sup>.

## TRANSPLANT OUTCOME

In addition to ethical reasons, concern about paid unregulated renal transplantation is due to the associated excessive morbidity and mortality, for example, in one study seven of 36 commercial transplants performed in India and Pakistan during 2006-2007 died within 2 mo of transplantation<sup>[41]</sup>. It is important that accurate data on outcomes of transplants carried out abroad are known so that patients can be counselled about such activity<sup>[24,42]</sup>. The outcome of recipients of organs through TT is reported to be inferior to those transplanted under ethically more acceptable conditions (Table 2)<sup>[5,6,23,25,41-54]</sup>.

Reported outcomes of commercial kidney transplantation may not be reliable for the reasons that: commercial transplantation is illegal; recipients of such transplants return to their native countries soon after the operation and may not return for follow up; and it may not be in the interest of practitioners to publish poor results<sup>[37]</sup>. Furthermore, data on such activity is often based on reports by returning patients to home transplant centres or units for continuing care<sup>[25]</sup>. Peri-operative deaths and defaults from treatment may not be included in published results. Transplants performed in less than ideal circumstances are characterised by inadequate pre-transplant evaluation, general lack of information about peri-operative issues, immunosuppression and long term outcome. Despite these factors, there are numerous reports indicating that TT is associated with a high incidence of surgical complications, acute rejection and invasive infection which cause major morbidity and mortality<sup>[5,23,25,29,43,44,46,49,50,51,55-58]</sup>.

Transplant tourists have a more complex post-transplantation course with higher infectious complications including the transmission of HIV and hepatitis B and C viruses<sup>[5,23,25,41,46,53,55]</sup>. The Dubai experience with 45 paediatric renal allograft transplantations performed outside the United Arab Emirates between 1993 and 2009 is shown in Table 2. Major viral infections (Epstein-Barr virus, cytomegalovirus, varicella zoster) were four-times more common in patients that had received LURD grafts than

in those that had received living related donor grafts<sup>[48]</sup>. Infectious complications with unusual pathogens and contraction of illnesses because of unsafe blood-banking processes have been reported<sup>[18]</sup>. Nineteen cases of invasive fungal infections occurring in 17 patients resulting in graft loss or death in 13/17 (76%) of patients and overall mortality of 59% (10/17) have been described<sup>[59]</sup>. Invasive fungal infections, frequently originating at the graft site, have emerged as a serious complication of commercial renal transplantation and are associated with high rates of graft loss and death.

One study from the United Kingdom reported that patients who had been suspended from the local transplant list for medical reasons were operated on abroad indicating the existence of substandard medical practices<sup>[60]</sup>. Furthermore, transplantation of LURD kidneys is associated with a high complication rate affecting graft and patient survival<sup>[48]</sup>. A comprehensive review of commercial kidney transplantation performed in several developing countries showed patient and graft survival were generally inferior to internationally accepted standards<sup>[61]</sup>. Some studies report survival figures comparable to local standards<sup>[5,47,58]</sup>. Analysis of 16 renal patients from the Ivory Coast transplanted abroad between 1995 and 2009 showed an overall graft survival was 93% at 1 year and 80% at 5 years. Not only did five of their 16 patients die during the study period but the remaining had inadequate follow up because they were unable to afford it<sup>[45]</sup>.

## EFFECT OF TT ON TRANSPLANT SERVICES

TT may result in a significant proportion of donor-recipient couples undergoing assessment with no favourable end point. Between January 2006 and June 2008, 69 potential renal transplant recipient and 99 donors were investigated but transplants could be performed only in 35 patients (51%) as 11 opted for TT and 23 others withdrew for different reasons<sup>[62]</sup>. However, Israeli experience shows the beneficial effect of TT. An analysis of waiting time and mortality among patients placed on the kidney transplant waiting list at the Rabin Medical Centre in Israel, between 2001-2005 shows that the annual rate of transplants of newly listed candidates increased from 13.6% in 2001 to 30% in 2005, mainly because of the growth in the number of patients transplanted abroad. In the same time period, the mean waiting time for kidney transplantation in Israel fell from 705 to 509 d. The death rate for newly listed patients has remained low at a mean of 3% per year<sup>[63]</sup>.

Large transplant centres with long waiting times are increasingly likely to see patients return newly transplanted from overseas requiring urgent attention, with particular consideration to infectious complications<sup>[4]</sup>. Biggins *et al*<sup>[64]</sup> conducted an anonymous internet administered case-based questionnaire survey of healthcare professionals with affiliations to hepatology and transplantation. Of 674 completed surveys, the majority stated they would provide



**Table 2 Outcome of living donor renal transplantation performed outside recipient countries**

Study (country), period	n	Graft survival (%)		Patient survival (%)		Type	Comments
		1-yr	5-yr	1-yr	5-yr		
Tsai <i>et al</i> <sup>[6]</sup> (United Arab Emirates), 1987-2006	215T 321H	55.0 60.0		81.5 89.3		Both LRD and LURD	China; 10-yr survival figures; Higher risk of cancer in T group
Kennedy <i>et al</i> <sup>[23]</sup> (Australia), 1990-2004	16	66.0		85.0		LURD	Commercial transplants in India and China. Aspergillosis in one patient
Kwon <i>et al</i> <sup>[25]</sup> (South Korea), 1999-2005	462T	96.8 (death censored)		96.5		LURD	All transplants performed in China. Fifteen patients died; 42.5% complication rate. Results based on returning patients' accounts
Ivanovski <i>et al</i> <sup>[41]</sup> (Macedonia), 2006-2007	36T H	60.0 100.0		78.0 100.0			Transplants in India and Pakistan; 16/36 wound infections; active HCV+ in 9; seven died; 3 MI; TN in 3; 56% developed complication in early post op period. Acute rejection in 9/36. Poor communication
Krishnan <i>et al</i> <sup>[42]</sup> (UK), 1996-2006	36T 40H	87.0 97.5		83.0 97.5		Commercial Living donor in UK	Indonesians in the UK. Poor clinical outcome in tourists - 42% had major infections
Rizvi <i>et al</i> <sup>[43]</sup> (Pakistan), 1997-2007	180 126	94.0 86.0	80.0 45.0			LURD	Mortality 16 (6%) for LRD and 34 (27%) for LURD
Sever <i>et al</i> <sup>[44]</sup> (Turkey), 1992-1999	115		66.0		80.0		Commercial transplants in India, Iran, Iraq. Significant medical complications
Ackoundou-N'Guessan <i>et al</i> <sup>[45]</sup> (Ivory Coast), 1995-2009	16T	93.0	80.0	93.0	53.0	Both	Patients from Ivory Coast; two losses from AR; 5/16 died during period; death-censored graft survival
Gill <i>et al</i> <sup>[46]</sup> (US), 1995-2007	33 UCLA	89.0 98.0				UCLA - University of California Los Angeles	Transplants in China, Iran, Philippines, etc.; three graft losses; 17/33 (52%) had infections; one death; AR 30% vs 12% in home transplants; survival figures inferior to cohort of 66 matched local patients
Geddes <i>et al</i> <sup>[47]</sup> (Scotland), 2000-2007	18						Travel from Scotland to Pakistan for transplants. No deaths; Malaria in one; acute rejection rate 11.1%; eGFR at 1 yr 51.8 mL/min every BSA1.73 m <sup>2</sup>
Majid <i>et al</i> <sup>[48]</sup> (United Arab Emirates), 1993-2009	45	100.0 87.8	100.0 43.4	100.0 91.2		LRD (10) LURD (33)	Paediatric; DBD 2; three death within 4 mo of transplantation; 10-yr survival
Ghods <sup>[49]</sup> (Iran), 1986-2006	1995	90.5	74.4	93.9	87.1	496 LRD; 1499 LURD	Kaplan-Meier estimates; rates for LURD. 10-yr graft and patient survival rates were 49% and 72% respectively. Paid and regulated system in Iran
Rizvi <i>et al</i> <sup>[50]</sup> (Pakistan), 1990-2002	1000	90.0	75.0	95.0	85.0		Private-public partnership model
Salahudeen <i>et al</i> <sup>[51]</sup> (United Arab Emirates/Oman), 1984-1988	131			81.5			Transplants performed in India. 25 deaths in first year; HIV = 5; HBV = 3; Septicaemia in 4. Insufficient information to patients
Morad <i>et al</i> <sup>[52]</sup> (Malaysia), 1990-1996	289 126 258	90.0 90.0 91.0		93.0 92.0 96.0		India China Local (Malaysia)	Comparable results to local transplants
LURD Transplant Study Group 1997 <sup>[53]</sup> , 1978-1993	540 75	90.0 90.0	72.0 83.0	97.0 95.0	92.0 91.0	Commercial Emotionally related	22 centres in India; Higher infection risk amongst commercial transplants: Hep B infection 8.1 v 1.4 in commercial renal transplantation
UK Transplant <sup>[54]</sup> , 2002-2004	1000	95.0	90.0	98.0	96.0	Both	First transplants only

LRD: Living related donor; LURD: Living unrelated donor; T: Tourism; H: Home country.

post-transplantation care for patients who underwent liver transplantation at another domestic centre, but respondents who suspected unethical procurement practices in China were more reluctant to do so. Their choice of travelling to China for an organ leaves transplant centres with decisions about how to respond to the needs of patients who return after transplantation. Rhodes *et al*<sup>[12]</sup> discussed two cases that raised this dilemma, and argued for upholding commitments to traditional principles of beneficence and non-judgmental regard in sorting out the policies that a transplant centre should adopt. Adopting positions based solely on high moral grounds without consideration

of the plight of the affected patients might not be appropriate<sup>[65]</sup>. Most professional societies do not condone TT but this should not abrogate a physician's right to care for such patients. It is thought that ethical principles mandate transplant physicians to provide adequate care for returning transplant tourists<sup>[66]</sup>.

The rate of organ donation in Israel has remained stagnant over the last 10 years, while in the same period many other countries (for example, Spain, Italy and the USA) have made significant progress in improving their donation rates. It is not unreasonable to conclude that TT is directly responsible for the low deceased donation

rate in Israel. Furthermore, it would appear as if unrelated donors are instead being used as alternatives to related donors. Shroff<sup>[67]</sup> opined that in many affording middle class or upper class families, even when there are relatives in good health who can donate, the general argument that is often presented is “why donate and take any risks when you can buy a kidney?” In Korea where there was a rapid increase in TT between 2001 and 2005, the number of deceased donors stagnated during the same period<sup>[25]</sup>.

The indirect effects of TT on transplantation in Israel are significant. For example, the population of patients who do remain on the waiting list for kidney transplantation at home now consist mainly of high-risk patients. Furthermore, admitting patients transplanted elsewhere early after their transplant (5 d to 1 mo) with severe complications such as humoral rejection, severe infectious complications or urinary leak or even with a failed graft frustrates the team and adds extra work and significant costs for local hospitals<sup>[21]</sup>.

## EFFECT ON VENDORS

The risks associated with living kidney donation such as surgical complications, death and deterioration of remaining kidney function which may result in the need for dialysis or transplantation<sup>[68]</sup> also apply to CLDs as well. Kidney vendors are reluctant to reveal their identity<sup>[69]</sup>. This culture of secrecy means that it is impossible to fully understand the full effects of their donation. Unlike other similar exploitative social situations, organ donation requires an invasive surgical procedure that has both physical and psychological implications<sup>[67]</sup>. Detailed longitudinal interviews conducted by Budiani<sup>[69]</sup> revealed that 78% of 50 CLD reported deterioration in their health condition. This is likely a result of factors such as insufficient donor assessment, pre-existing compromised health conditions. Naqvi *et al*<sup>[70]</sup> conducted a cross sectional survey of 104 kidney vendors in Pakistan concentrating on their general health status and post-operative renal function. They compared this group to 184 matched living related kidney donors from their centre. They found a higher rate of hypertension (17% *vs* 9.2%,  $P = 0.04$ ); lower Cockcroft-Gault glomerular filtration rate (mL/min) of  $70.94 \pm 14.2$  *vs*  $95.4 \pm 20.44$  ( $P = 0.0001$ ); hepatitis C positivity in 27% *vs* 1.0% ( $P = 0.0001$ ); and hepatitis B positivity 5.7% *vs* 0.5% ( $P = 0.04$ ), respectively in vendors compared to matched controls. They concluded that vendors had compromised renal function suggesting inferior selection and high risk for developing chronic kidney disease in long term. Ninety one percent expressed social isolation about their donation and 94% regretted donating<sup>[69]</sup>. The studies in Pakistan and Egypt are consistent with findings in India<sup>[71]</sup>, Iran<sup>[72]</sup> and the Philippines<sup>[38]</sup> that revealed deterioration in the health condition of CLD.

A kidney sale does not solve the most frequently given reason for being a CLD as 81% spent the income from donation within 5 mo, mostly to pay off financial debts rather than investing in quality of life enhance-

ments<sup>[69]</sup>. A socioeconomic and health survey of 239 kidney vendors from Punjab in eastern Pakistan showed that while 93% vended kidneys for debt repayment, after the event 88% had no economic improvement in their lives and 98% reported deterioration in general health status<sup>[73]</sup>. Goyal *et al*<sup>[71]</sup> studied 305 commercial kidney donors in India and reported that the average family income declined by 33% after nephrectomy and 86% reported worse health status. In a study of 300 commercial live donors, Zargooshi<sup>[72]</sup> showed that poverty prevented 79% from attending follow up care. A long-term financial disadvantage is reported following nephrectomy from a compromised ability to generate a prior income level.

## LEGALISED MARKET IN ORGAN PROCUREMENT

The current reality is that demand for transplantation far outstrips supply of organs throughout the world. ERF patients are desperate for transplantation and some die on the waiting list. In many developing countries, there are no deceased donor programmes and no dialysis facilities. It is thought that TT functions according to market laws and is profit-driven, as opposed to the legal organ exchange programs in Europe and the US, which are non-profit and patient-oriented<sup>[21]</sup>. The data on TT is sketchy and probably unreliable but it is estimated to represent about 10% of world transplant activity<sup>[7]</sup>. There is evidence of unrelenting increase in commercial transplantation and the failure of legislation to eliminate this practice<sup>[74]</sup>. Several countries have laws prohibiting the practice of TT and consequently, where this practice takes place illegally, it is unregulated. Given the desperate desire of patients to undergo organ transplantation, their risk of being exploited should not be underestimated<sup>[7]</sup>. Comparing CLD to people being sold as slaves, Demme opined that buying and selling under conditions of severe inequality amounted to coercion<sup>[75]</sup>.

The arguments against TT are that it encourages CLD, which is immoral because it treats the human body as a commodity and exploits the poor. It also undermines altruistic donation of cadaveric organs, encourages exploitation of kidney donors by unscrupulous middlemen and endangers the lives of donors undergoing nephrectomy in poor, unregulated conditions<sup>[74,76,77]</sup>. Rothman *et al*<sup>[78]</sup> speculate that the introduction of cash payments may weaken the moral obligation to donate. There are concerns about justice and fairness as well as it is felt that a market system rewards the better-off<sup>[73]</sup>. It is also argued that commercialisation of living kidney donation does not serve the interests of the donors, endangers the health of recipients, and undermines the healthy development of the international transplantation<sup>[76]</sup>.

On the other hand, some believe that those against a market system may indirectly be supporting TT because refusal to allow organ sales also does not allow for proper regulation of sales. Many places where organ sales cur-

rently take place do not share Western views of informed consent. Those in favour of a regulated market argue that vendors ought to be allowed respect of their autonomy to do as they wish with their own organs.

The current system of organ procurement which relies on altruistic donation is inadequate to meet the current and future need for transplantable kidneys<sup>[11]</sup>. Hippen<sup>[79]</sup> argues that a regulated market in organs from living vendors is the only plausible solution arguing that such a market would ensure: safety for both vendors and recipients; transparency regarding the risks to vendors and recipients; institutional integrity regarding guidelines for cooperating with kidney vendors; and operation under the rule of law. Clemmons<sup>[80]</sup> advocates a legalised organ market as a way of curtailing the black market in organ procurement. Some of the arguments labelled against CLD are in fact against the effects of an unregulated market - "exploitation" of "vulnerable" vendors<sup>[9,17]</sup>. There are those who feel that equating transplant commercialism to "violating human dignity"<sup>[17]</sup> must be counterbalanced by holding a society that forces many of its members to consider transplant commercialism accountable<sup>[81]</sup>. Despite much discussion about its ethical problems<sup>[82]</sup>, some individuals have advocated a regulated program of financial incentives for kidney donation<sup>[83,84]</sup>. Certainly, the high mortality rate and frequency of serious complications seem not to justify such unregulated commercial transplantation.

### **Iranian model**

The Iranian model provides a useful example of a regulated system of paid donation. Some experts believe that the use of financial incentives to shape human behaviour is much better understood than the use of altruism<sup>[85]</sup>. The Iranian government pays all of the hospital expenses of renal transplantation; provides essential immunosuppressive drugs; and gives an award and health insurance to the LURD. The majority of LURD also receive a rewarding gift (arranged and defined by the Dialysis and Transplant Patients Association before transplantation) from the recipient or one of the charitable organisations. The program is under the close scrutiny of the transplant teams and the Iranian Society for Organ Transplantation regarding all ethical issues. To prevent TT, foreigners are neither allowed to undergo renal transplantation from Iranian LURD nor permitted to volunteer as kidney donors to Iranian patients<sup>[85]</sup>. The Iranian model had no role for a broker or an agency in this transplantation program. As a result, the number of renal transplant centres and renal transplantations that were performed rapidly increased such that by 1999, the renal transplant waiting lists in the country were eliminated<sup>[85]</sup>.

The elimination of renal transplant waiting lists would indicate that all patients with ERF have equal access to renal transplant facilities, provided there is equity of access to the transplant waiting list. A study of 500 renal transplant recipients and their LURD to determine which socioeconomic classes received transplants more from

paid kidney donors showed no significant differences. The results showed that 84% of paid kidney donors were poor and 16% were middle class, and of their recipients, 50.4% were poor, 36.2% were middle class, and 13.4% were rich meaning that > 50% of kidneys from paid donors were transplanted into patients from a low socioeconomic class<sup>[86]</sup>. However, Harmon *et al*<sup>[87]</sup> argue that a government regulated system is not ethically achievable, that the elimination of the waiting list in Iran might have to do with the limitations imposed on listing.

The Iranian experience suggests that a regulated market will reduce harm by opening it to scrutiny, enforce compliance with standards to protect donors, recipients and society, remove middlemen, and enable the poor to receive transplants on an equal footing with the rich<sup>[74]</sup>. Even though strongly opposed to TT and the associated unregulated black-market trafficking of organs, Starzl *et al*<sup>[88]</sup> recognise that simply making organ trafficking illegal will not make it go away. In addition to efforts to increase voluntary donation from deceased and conventional living donors, they called for a regulated trial of incentives for donation, to determine whether such incentives would increase the number of available organs while preserving the health, well being and dignity of donors and their families. This view is in consonance with an earlier call for a change in the law so that trials of financial incentives to promote organ donation can be done<sup>[89]</sup>.

Healthcare authorities and professional transplantation organisations have to tackle the continuing donor crisis by designing legally acceptable utilitarian solutions, for instance, through the establishment of a regulated compensated donation system<sup>[21]</sup>. Epstein<sup>[9]</sup> states that the recent achievements in the struggle against international organ trafficking do not seem to herald the abolition of transplant commercialism but rather presage its reconfiguration in deglobalised forms. The main argument in favour of compensation is simple-financial incentives will increase donation, so fewer transplant candidates will suffer and die while waiting. In addition, development of a regulated system of compensation is the most effective means of crippling the core economic support for TT. Because dialysis is so much more expensive than a transplant, compensated donation could be cost-neutral to the healthcare system in developed countries. Despite this, the warning that a regulated market could be counterproductive to efforts to increase altruistic donation<sup>[78]</sup> must be considered carefully. The reported decrease in the proportion of living donor transplants in Hong Kong following the transfer of sovereignty from Britain to China may support this contention<sup>[77]</sup>.

## **RECOMMENDATIONS**

There is need for international cooperation aimed at supporting the development of organ donation and transplantation programs, within an effective ethical and regulatory framework, while taking into account the public health context of each country. Concerted efforts must

be made to curtail commercial organ transplantation by: (1) Expanding living donations by ensuring long-term safety of donors and removing disincentives to organ donation; (2) Maximising deceased donation by ensuring adequate infrastructure, trained personnel, effective coordination and supportive government policy; (3) Improving provision of renal care to all developing nations by forging adequate co-operation between nephrologists, patients, governments, charitable organisations and industry; and (4) Improving transplantation services and curtailment TT by collecting information on transplantation; expanding education in transplantation; and developing professional guidelines for organ donation and transplantation.

## CONCLUSION

The lack of objective verifiable data regarding TT means that the true size of the problem is unknown. Data on outcome of transplantation is mainly based on the accounts of returning patients and there is not much information about peri-operative deaths. Despite these facts, most people in the medical profession and governments accept that trade in human organs for transplantation is illegal and should be stopped. However, legislation does not address the root cause and altruism has proved inadequate in ensuring an adequate supply of organs for transplantation. As attempts to increase donation have not been universally successful and TT seems to be growing, alternative options are now required. The big choice is between a regulated compensation programme and a regulated market. Not long ago, only genetically related living donation was allowed. The increasing demand for transplantation forced professionals to explore other ways of increasing donation and emotionally related donation was approved. The ensuing excellent results of non genetically related donors and the continuing increase in demand led to modification of regulatory laws and the introduction and subsequent growth of LURD. It is now time to re-examine intrinsic attitudes to TT bearing in mind the cultural and economic realities of globalisation. Perhaps the WHO in conjunction with The Transplantation Society would set up a working party of stakeholders to study this matter in greater detail and make recommendations.

## REFERENCES

- 1 **Evans RW.** Ethnocentrism is an unacceptable rationale for health care policy: a critique of transplant tourism position statements. *Am J Transplant* 2008; **8**: 1089-1095
- 2 **Pafford B.** The third wave--medical tourism in the 21st century. *South Med J* 2009; **102**: 810-813
- 3 **Merion RM, Barnes AD, Lin M, Ashby VB, McBride V, Ortiz-Rios E, Welch JC, Levine GN, Port FK, Burdick J.** Transplants in Foreign Countries Among Patients Removed from the US Transplant Waiting List. *Am J Transplant* 2008; **8**: 988-996
- 4 **Cohen DJ.** Transplant tourism: a growing phenomenon. *Nat Clin Pract Nephrol* 2009; **5**: 128-129
- 5 **Alghamdi SA, Nabi ZG, Alkhafaji DM, Askandrani SA, Abdelsalam MS, Shukri MM, Eldali AM, Adra CN, Alkurbi LA, Albaqumi MN.** Transplant tourism outcome: a single center experience. *Transplantation* 2010; **90**: 184-188
- 6 **Tsai MK, Yang CY, Lee CY, Yeh CC, Hu RH, Lee PH.** De novo malignancy is associated with renal transplant tourism. *Kidney Int* 2011; **79**: 908-913
- 7 **Shimazono Y.** The state of the international organ trade: a provisional picture based on integration of available information. *Bull World Health Organ* 2007; **85**: 955-962
- 8 **World Health Organization.** GKT1 Activity and Practices. Available from: URL: <http://www.who.int/transplantation/gkt/statistics/en>. Accessed May 29, 2011
- 9 **Epstein M.** Sociological and ethical issues in transplant commercialism. *Curr Opin Organ Transplant* 2009; **14**: 134-139
- 10 **Bosshard G.** [Ethical problems in organ transplantation]. *Ther Umsch* 2009; **66**: 607-611
- 11 **Ghods AJ.** Ethical issues and living unrelated donor kidney transplantation. *Iran J Kidney Dis* 2009; **3**: 183-191
- 12 **Rhodes R, Schiano T.** Transplant tourism in China: a tale of two transplants. *Am J Bioeth* 2010; **10**: 3-11
- 13 **Jafar TH.** Organ trafficking: global solutions for a global problem. *Am J Kidney Dis* 2009; **54**: 1145-1157
- 14 **Fujita M, Slingsby BT, Akabayashi A.** Transplant tourism from Japan. *Am J Bioeth* 2010; **10**: 24-26
- 15 **Kokubo A.** The interaction of the international society concerning kidney transplants--a consideration of diseased kidney transplants in Japan and transplant tourism over the world. *Leg Med (Tokyo)* 2009; **11** Suppl 1: S393-S395
- 16 **Budiani-Saberi DA, Delmonico FL.** Organ trafficking and transplant tourism: a commentary on the global realities. *Am J Transplant* 2008; **8**: 925-929
- 17 **International Summit on Transplant Tourism and Organ Trafficking.** The declaration of Istanbul on organ trafficking and transplant tourism. *Saudi J Kidney Dis Transpl* 2010; **21**: 138-147
- 18 **Unti JA.** Medical and surgical tourism: the new world of health care globalization and what it means for the practicing surgeon. *Bull Am Coll Surg* 2009; **94**: 18-25
- 19 **Oniscu GC, Forsythe JL.** An overview of transplantation in culturally diverse regions. *Ann Acad Med Singapore* 2009; **38**: 365-365
- 20 **Naicker S.** End-stage renal disease in sub-Saharan and South Africa. *Kidney Int Suppl* 2003; S119-S122
- 21 **Mor E.** [Changes in the transplantation world--from altruism to a utilitarian approach]. *Harefuah* 2006; **145**: 746-78, 782, 781
- 22 **Gill J, Diec O, Landsberg DN, Rose C, Johnston O, Keown PA, Gill JS.** Opportunities to deter transplant tourism exist before referral for transplantation and during the workup and management of transplant candidates. *Kidney Int* 2011; **79**: 1026-1031
- 23 **Kennedy SE, Shen Y, Charlesworth JA, Mackie JD, Mahony JD, Kelly JJ, Pussell BA.** Outcome of overseas commercial kidney transplantation: an Australian perspective. *Med J Aust* 2005; **182**: 224-227
- 24 **McKay D, Potter SR, Behrend T, Stella F, Steinberg S.** Patients seeking alternatives to the long waiting list: a reality faced by transplant physicians. *Prog Transplant* 2008; **18**: 203-207
- 25 **Kwon CH, Lee SK, Ha J.** Trend and outcome of Korean patients receiving overseas solid organ transplantation between 1999 and 2005. *J Korean Med Sci* 2011; **26**: 17-21
- 26 **Milstein A, Smith M.** America's new refugees--seeking affordable surgery offshore. *N Engl J Med* 2006; **355**: 1637-1640
- 27 **Bramstedt KA, Xu J.** Checklist: passport, plane ticket, organ transplant. *Am J Transplant* 2007; **7**: 1698-1701
- 28 **Khamash HA, Gaston RS.** Transplant tourism: a modern iteration of an ancient problem. *Curr Opin Organ Transplant* 2008; **13**: 395-399
- 29 **Chugh KS, Jha V.** Problems and outcomes of living unre-



- lated donor transplants in the developing countries. *Kidney Int* 2000; **57**: S131-S135
- 30 **Davis CL**, Delmonico FL. Living-donor kidney transplantation: a review of the current practices for the live donor. *J Am Soc Nephrol* 2005; **16**: 2098-2110
  - 31 **World Health Organization**. Data Harmonization on Transplantation Activities and Outcomes: Editorial Group for a Global Glossary. Geneva: World Health Organization, 2007. Available from: URL: <http://www.who.int/transplantation/activities/ReportGlossaryMeeting.pdf>
  - 32 **Simmons RG**. Long-term reactions of renal recipients and donors. In: Levy NB, editor. *Psychonephrology 2: psychological problems in kidney failure and their treatment*. New York: Plenum Press, 1983: 275-287
  - 33 **Stephan A**, Barbari A, Younan F. Ethical aspects of organ donation activities. *Exp Clin Transplant* 2007; **5**: 633-637
  - 34 **Epstein M**, Danovitch G. Is altruistic-directed living unrelated organ donation a legal fiction? *Nephrol Dial Transplant* 2009; **24**: 357-360
  - 35 **Chugh KS**, Jha V. Commerce in transplantation in Third World countries. *Kidney Int* 1996; **49**: 1181-1186
  - 36 Corruption index 2010 from Transparency International: find out how each country compares. Available from: URL: <http://www.guardian.co.uk/news/datablog/2010/oct/26/corruption-index-2010-transparency-international>
  - 37 **Jha V**. Paid transplants in India: the grim reality. *Nephrol Dial Transplant* 2004; **19**: 541-543
  - 38 **Padilla BS**. Regulated compensation for kidney donors in the Philippines. *Curr Opin Organ Transplant* 2009; **14**: 120-123
  - 39 **Barsoum RS**. Trends in unrelated-donor kidney transplantation in the developing world. *Pediatr Nephrol* 2008; **23**: 1925-1929
  - 40 Capital punishment. Petersburg, FL: Wikimedia Foundation. Available from: URL: [http://en.wikipedia.org/wiki/Capital\\_punishment](http://en.wikipedia.org/wiki/Capital_punishment). Accessed May 31, 2011
  - 41 **Ivanovski N**, Masin J, Rambabova-Busljetic I, Pusevski V, Dohcev S, Ivanovski O, Popov Z. The outcome of commercial kidney transplant tourism in Pakistan. *Clin Transplant* 2011; **25**: 171-173
  - 42 **Krishnan N**, Cockwell P, Devulapally P, Gerber B, Hanvesakul R, Higgins R, Ready A, Carmichael P, Tomlinson K, Kumar S, Baharani J, Dasgupta I. Organ trafficking for live donor kidney transplantation in Indoasians resident in the west midlands: high activity and poor outcomes. *Transplantation* 2010; **89**: 1456-1461
  - 43 **Rizvi SA**, Naqvi SA, Zafar MN, Mazhar F, Muzaffar R, Naqvi R, Akhtar F, Ahmed E. Commercial transplants in local Pakistanis from vended kidneys: a socio-economic and outcome study. *Transpl Int* 2009; **22**: 615-621
  - 44 **Sever MS**, Kazancıoğlu R, Yildiz A, Türkmen A, Ecder T, Kayacan SM, Celik V, Sahin S, Aydin AE, Eldegez U, Ark E. Outcome of living unrelated (commercial) renal transplantation. *Kidney Int* 2001; **60**: 1477-1483
  - 45 **Ackoundou-N'Guessan C**, Gnionsahe DA, Dekou AH, Tia WM, Guei CM, Moudachirou AM. Outcomes of renal patients from the Ivory Coast transplanted abroad: time for a local kidney transplantation program. *Transplant Proc* 2010; **42**: 3517-3520
  - 46 **Gill J**, Madhira BR, Gjertson D, Lipshutz G, Cecka JM, Pham PT, Wilkinson A, Bunnapradist S, Danovitch GM. Transplant tourism in the United States: a single-center experience. *Clin J Am Soc Nephrol* 2008; **3**: 1820-1828
  - 47 **Geddes CC**, Henderson A, Mackenzie P, Rodger SC. Outcome of patients from the west of Scotland traveling to Pakistan for living donor kidney transplants. *Transplantation* 2008; **86**: 1143-1145
  - 48 **Majid A**, Al Khalidi L, Ahmed BQ, Opelz G, Schaefer F. Outcomes of kidney transplant tourism in children: a single center experience. *Pediatr Nephrol* 2010; **25**: 155-159
  - 49 **Ghods AJ**. Renal transplantation in Iran. *Nephrol Dial Transplant* 2002; **17**: 222-228
  - 50 **Rizvi SA**, Naqvi SA, Hussain Z, Hashmi A, Akhtar F, Hussain M, Ahmed E, Zafar MN, Hafiz S, Muzaffar R, Jawad F. Renal transplantation in developing countries. *Kidney Int Suppl* 2003; S96-S100
  - 51 **Salahudeen AK**, Woods HF, Pingle A, Nur-El-Huda Suleyman M, Shakuntala K, Nandakumar M, Yahya TM, Daar AS. High mortality among recipients of bought living-unrelated donor kidneys. *Lancet* 1990; **336**: 725-728
  - 52 **Morad Z**, Lim TO. Outcome of overseas kidney transplantation in Malaysia. *Transplant Proc* 2000; **32**: 1485-1486
  - 53 Commercially motivated renal transplantation: results in 540 patients transplanted in India. The Living Non-Related Renal Transplant Study Group. *Clin Transplant* 1997; **11**: 536-544
  - 54 Survival rates following transplantation. Available from: URL: [http://www.uktransplant.org.uk/ukt/statistics/transplant\\_activity\\_report/current\\_activity\\_reports/ukt/survival\\_rates\\_following\\_transplantation.pdf](http://www.uktransplant.org.uk/ukt/statistics/transplant_activity_report/current_activity_reports/ukt/survival_rates_following_transplantation.pdf)
  - 55 **Al-Wakeel J**, Mitwalli AH, Tarif N, Malik GH, Al-Mohaya S, Alam A, El Gamal H, Kechrid M. Living unrelated renal transplant: outcome and issues. *Saudi J Kidney Dis Transpl* 2000; **11**: 553-558
  - 56 **Spasovski G**, Stathakis C, Basci A. A struggle for kidney transplantation in a developing world? *BANTAO J* 2007; **5**: 2
  - 57 **Simforoosh N**, Basiri A, Fattahi MR, Einollahi B, Firouzan A, Pour-Reza-Gholi F, Nafar M, Farrokhi F. Living unrelated versus living related kidney transplantation: 20 years' experience with 2155 cases. *Transplant Proc* 2006; **38**: 422-425
  - 58 **Canales MT**, Kasiske BL, Rosenberg ME. Transplant tourism: Outcomes of United States residents who undergo kidney transplantation overseas. *Transplantation* 2006; **82**: 1658-1661
  - 59 **Shoham S**, Hinestrosa F, Moore J, O'Donnell S, Ruiz M, Light J. Invasive filamentous fungal infections associated with renal transplant tourism. *Transpl Infect Dis* 2010; **12**: 371-374
  - 60 **Inston NG**, Gill D, Al-Hakim A, Ready AR. Living paid organ transplantation results in unacceptably high recipient morbidity and mortality. *Transplant Proc* 2005; **37**: 560-562
  - 61 **Sajjad I**, Baines LS, Patel P, Salifu MO, Jindal RM. Commercialization of kidney transplants: a systematic review of outcomes in recipients and donors. *Am J Nephrol* 2008; **28**: 744-754
  - 62 **Mohsin NB**, Metry A. Reasons of preclusion of living-related donor renal transplants in Oman. *Exp Clin Transplant* 2010; **8**: 303-306
  - 63 **Mor E**. Transplant tourism in Israel: Effect on transplant practice and organ donation. Available from: URL: [http://www.esot.org/Files/Elpat/Content\\_Files/XYgDtPresentati on\\_Mor\\_text.pdf](http://www.esot.org/Files/Elpat/Content_Files/XYgDtPresentati on_Mor_text.pdf). Accessed May 9, 2011
  - 64 **Biggins SW**, Bambha K, Terrault N, Inadomi J, Roberts JP, Bass N. Transplant tourism to China: the impact on domestic patient-care decisions. *Clin Transplant* 2009; **23**: 831-838
  - 65 **Schiano TD**, Rhodes R. The dilemma and reality of transplant tourism: an ethical perspective for liver transplant programs. *Liver Transpl* 2010; **16**: 113-117
  - 66 **Schiano TD**, Rhodes R. Transplant tourism. *Curr Opin Organ Transplant* 2010; **15**: 245-248
  - 67 **Shroff S**. Legal and ethical aspects of organ donation and transplantation. *Indian J Urol* 2009; **25**: 348-355
  - 68 **Akoh JA**. Renal transplantation in developing countries. *Saudi J Kidney Dis Transpl* 2011; **22**: 637-650
  - 69 **Budiani D**. Consequences of living kidney donors in Egypt. Presentation At The Middle East Society On Organ Transplants (Mesot) Meetings; 2006 Nov; Kuwait City, Kuwait
  - 70 **Naqvi SA**, Rizvi SA, Zafar MN, Ahmed E, Ali B, Mehmood K, Awan MJ, Mubarak B, Mazhar F. Health status and renal function evaluation of kidney vendors: a report from Pakistan. *Am J Transplant* 2008; **8**: 1444-1450

- 71 **Goyal M**, Mehta RL, Schneiderman LJ, Sehgal AR. Economic and health consequences of selling a kidney in India. *JAMA* 2002; **288**: 1589-1593
- 72 **Zargooshi J**. Iranian kidney donors: motivations and relations with recipients. *J Urol* 2001; **165**: 386-392
- 73 **Naqvi SA**, Ali B, Mazhar F, Zafar MN, Rizvi SA. A socio-economic survey of kidney vendors in Pakistan. *Transpl Int* 2007; **20**: 934-939
- 74 **Daar AS**. The case for a regulated system of living kidney sales. *Nat Clin Pract Nephrol* 2006; **2**: 600-601
- 75 **Demme RA**. Ethical concerns about an organ market. *J Natl Med Assoc* 2010; **102**: 46-50
- 76 **Danovitch GM**, Delmonico FL. The prohibition of kidney sales and organ markets should remain. *Curr Opin Organ Transplant* 2008; **13**: 386-394
- 77 **Danovitch GM**, Leichtman AB. Kidney vending: the "Trojan horse" of organ transplantation. *Clin J Am Soc Nephrol* 2006; **1**: 1133-1135
- 78 **Rothman SM**, Rothman DJ. The hidden cost of organ sale. *Am J Transplant* 2006; **6**: 1524-1528
- 79 **Hippen BE**. In defense of a regulated market in kidneys from living vendors. *J Med Philos* 2005; **30**: 593-626
- 80 **Clemmons A**. Organ transplantation: is the best approach a legalized market or altruism? *J Healthc Manag* 2009; **54**: 231-240
- 81 **Epstein M**. The ethics of poverty and the poverty of ethics: the case of Palestinian prisoners in Israel seeking to sell their kidneys in order to feed their children. *J Med Ethics* 2007; **33**: 473-474
- 82 **Friedman EA**, Friedman AL. Reassessing marketing of kidneys from the 2008 perspective. *Blood Purif* 2009; **27**: 53-57
- 83 **Sever MS**. Living unrelated-commercial-kidney transplantation: when there is no chance to survive. *Pediatr Nephrol* 2006; **21**: 1352-1356
- 84 **Berman E**, Lipschutz JM, Bloom RD, Lipschutz JH. The bio-ethics and utility of selling kidneys for renal transplantation. *Transplant Proc* 2008; **40**: 1264-1270
- 85 **Ghods AJ**, Savaj S. Iranian model of paid and regulated living-unrelated kidney donation. *Clin J Am Soc Nephrol* 2006; **1**: 1136-1145
- 86 **Ghods AJ**, Ossareh S, Khosravani P. Comparison of some socioeconomic characteristics of donors and recipients in a controlled living unrelated donor renal transplantation program. *Transplant Proc* 2001; **33**: 2626-2627
- 87 **Harmon W**, Delmonico F. Payment for kidneys: a government-regulated system is not ethically achievable. *Clin J Am Soc Nephrol* 2006; **1**: 1146-1147
- 88 **Starzl T**, Teperman L, Sutherland D, Sollinger H, Roberts J, Miller C, Merion R, Matas A, Marsh JW, Langnas A, Kam I, Hippen B, Gaston R, Freeman R, Fung J, Eason J, Fine R, Crippen J, Abecassis M. Transplant tourism and unregulated black-market trafficking of organs. *Am J Transplant* 2009; **9**: 1484
- 89 **Matas AJ**, Hippen B, Satel S. In defense of a regulated system of compensation for living donation. *Curr Opin Organ Transplant* 2008; **13**: 379-385

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