2012 Annual Report of Kidney Transplantation in Thailand

Thai Transplantation Society

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Preface

The kidney transplant data in Thailand has been collected since Major General Usana Luveera, MD, was the president of Thai Transplantation Society with the cooperation of key persons, namely Dr. Kovit Danviriyasap, Lt. Gen. Thanom Supaporn, MD, Prof. Yingyos Avihingsanont, MD, and the subcommittee members from transplant centers. The coordinating nurses were also key person to collect the information. The kidney transplant outcome was firstly presented in Thailand in 2002 at the annual meeting of Thai Transplantation Society. Since that time, the annual report of kidney transplant data has been the first priority for the annual meeting of Thai Transplantation Society. Such information has been presented in conjunction with Organ Donation Center of Thai Red Cross Society every year.

Currently, with the coordination between Organ-transplant registration subcommittee and coordinating nurses, the registration of organ transplant has been developed gradually. The new technology, under the support of Executive Committee of Thai Transplantation Society, has been applied to gather and measure information. Such data has been used in academic purposes such as presentation in the country-level and international-level meetings, medical publication in the international journal, as well as reference for public health units and Health Insurance Fund. In 2013, the Organ-transplant registration subcommittee, therefore; decided to publish the report in book form to facilitate related persons in searching and referencing both academic and management purposes. Thai Transplantation Society would like to take this opportunityto express our sincere gratitude to i) transplant centers, ii) coordinating-nurses for gathering patients' information, iii) Dr. Kajornsak Noppakun and his team for the analysis of 2012 kidney transplant, iv) Dr. Chaiyod Varunyoowong v) the Organ-transplant registration subcommittee for the preparation and revision of articles in this report, vi) the Organ Donation Center of Thai Red Cross Society for the comparison of number of deceased donors, vii) the Executive Committee of Thai Transplantation Society for great support, and viii) Ms. Nongnuch Khatiya, and Ms. Pharita Kilee for general coordination. Some expenses for this project were sponsored by the National Research Council of Thailand (Project Research of Organ Shortage Cause and Successful Evaluation of Kidney Transplant). It was expected that the report for other organs transplant such as liver and heart would be additionally presented in the future.

Lastly, Thai Transplantation Society hoped that this report would be worthwhile for the organ transplantation by providing the situation of organ transplant in Thailand, outcome of kidney transplant, graft survival rate, and kidney survival rate. Such information would be used to develop kidney transplant, organ donation, as well as to set public health policy in order to prepare for kidney and other organ transplants in the future.

Associate Professor Kriengsak Vareesangthip, MD
President of Thai Transplantation Society

Colonel Adisorn Lampaopong, MD
Chairman of Organ-transplant registration subcommittee

Organ-transplant registration subcommittee (term 2010-2012 and 2013-2015)
Thai Transplantation Society 2013

2010-2012 - Executive Director of Thai Transplantation society

Name	Position
Vasant Sumethkul, M.D.	President
Kriengsak Vareesangthip, M.D.,Ph.D.	Vice-President
Surazee Prommool, M.D.	Secretary
Prajej Ruangkanchanasetr, M.D.	Treasurer
Adisorn Lumpaopong, M.D.	Registration & Information
Attapong Vongwiwatana, M.D.	Scientific chairman
Sakarn Bunnag, M.D.	Social Co-ordinator
Adis Tasanarong, M.D.	Public Relation
Dusit Lumlertgul, M.D.	International Liaison
Yingyos Avihingsanon, M.D.	Research Chairman
Surasak Kantachuvesiri M.D.,Ph.D.	Organ Donation
Pat Ongcharit, M.D.	Organ Donation

2013-2015 - Executive Director of Thai Transplantation society

Name	Position
Kriengsak Vareesangthip, M.D.,Ph.D.	President
Dusit Lumlertgul, M.D.	Vice-President
Surazee Prommool, M.D.	Vice-President
Attapong Vongwiwatana, M.D.	Secretary
Prajej Ruangkanchanasetr, M.D.	Treasurer
Adisorn Lumpaopong, M.D.	Registration& Information
Adis Tasanarong, M.D.	Scientific Chairman
Surasak Kantachuvesiri, M.D.,Ph.D.	Social Co-ordinatior
Pat Ongcharit, M.D.	International Liaison
Yingyos Avihingsanon, M.D	Research Chairman
Thanom Supaporn, LTG.M.D.	Committee for Policy Planning
Sakarn Bunnag, M.D.	Organ Transplantation Expansion
Surasak Leelaudomlipi, M.D	Liver transplantation expert
Supanit Nivatvong, M.D	Liver transplantation expert
Somchai Limsrichamrern, M.D	Pancreas transplanted expert
Sukit Tassanasunthornwong, M.D	Neurosurgical and legal expert

2010-2012 - Organ-transplant registration subcommittee

Name	Position
Adisorn Lumpaopong, M.D.	Registration Chairman
Yingyos Avihingsanon, M.D.	Advisory
Thanom Supaporn LTG.M.D.	Advisory
Visit Dhitavaj, M.D.	Advisory
Kowit Danviriyasup, M.D.	Advisory
Supanit Nivatvongs, M.D.	Committee
Pat Ongcharit, M.D.	Committee
Pornpimol Rianthavorn, M.D.	Committee
Chaiyot Warunyuwong, M.D.	Committee
Adis Tasanarong, M.D.	Committee
Worawan Chailimpamontree, M.D.	Committee
Kajohnsak Noppakun, M.D.	Committee
Sakarn Bunnag, M.D.	Committee
Atiporn Insathit, M.D.	Committee
Sathit Kurathong, M.D.	Committee
Cholatip Pongskul, M.D.	Committee
Nalinee Premasathian, M.D.	Committee
Attapong Vongwiwatana, M.D.	Committee
Pawinee Kupatawintu	Committee
Arunee Jungsa-ngasom	Committee

2013-2015 - Organ-transplant registration subcommittee

Name	Position
Adisorn Lumpaopong, M.D.	Registration Chairman
Yingyos Avihingsanon, M.D.	Advisory
Thanom Supaporn LTG.M.D.	Advisory
Visit Dhitavaj, M.D.	Advisory
Kowit Danviriyasup, M.D.	Advisory
Supanit Nivatvongs, M.D.	Committee
Pat Ongcharit, M.D.	Committee
Pornpimol Rianthavorn, M.D.	Committee
Nutavudh Townamchai, M.D.	Committee
Sarinya Puwanant, M.D.	Committee
Chaiyot Warunyuwong, M.D.	Committee
Adis Tasanarong, M.D.	Committee
Nopanit Pattanachaiwit, M.D.	Committee
Kajohnsak Noppakun, M.D.	Committee
Sakarn Bunnag, M.D.	Committee
Atiporn Ingsathit, M.D.	Committee
Sathit Kurathong, M.D.	Committee
Cholatip Pongskul, M.D.	Committee
Nalinee Premasathian, M.D.	Committee
Attapong Vongwiwatana, M.D.	Committee
Pawinee Kupatawintu	Committee
Arunee Jungsa-ngasom	Committee
Sirin Jiwakanon, M.D.	Committee

Transplant Coordinator

Name	Hospital
Kaenchai Pipatwanwong	Praram9
Suwapee Chantrajessada	Phayathai1
Benjawan Sukruen	Phayathai1
Kanokporn Ratanatraisri	Buddhachinaraj
Jongruk Pongskul	Srinagarind
Panatchana Aroonrojsiri	Bhumibol Adulyadej
Nichakorn Pasook	Siriraj
Thaneeya Thammaruk	Samitivej Sukhumvit
Pitsinee Namprom	Samitivej Sukhumvit
Budsaya Dandecha	Songklanagarind
Naraporn Wongkaew	Chon Buri
Benjamaporn Unarat	Samitivej Srinakarin
Chutima Charoenthanakit	Ramathibodi
Panida Opakawinkul	Rajavithi
Sunanta Ariyakulnimit	Vajira
Sirilux Liewseng	Phramongkutklao
Patarapong Jit-im	Sappasitthiprasong
Thararat Pudpad	Bangkok
Supan Chunhanan	Police General
Orawan Tongnil	Police General
Napaporn Kaensarn	King Chulalongkorn Memorial
Amara Manoyot	Maharaj Nakorn Chiang Mai
Natnicha Vanwong	Bumrungrad International
Montira Kianlikit	Thammasat University
Sasipim Pairojkittrakul	Thammasat University
Wilaiwan Saenhome	Khon Kaen
Tasana Nilapat	Suratthani
Jakri Korsakul	Maharat Nakhon Ratchasima

CONTENT

Kidney Transplant Registry Data

Year 2012

Kidney Transplant Registry Data 2012

Number of transplant recipients in 2012

From 1 January to 31 December 2012,465 kidney transplants took place in Thailand. Of these, 251 transplants came from deceased donors and 214came from living donors. These transplantations took place in 24 transplant centers as detailed followings:

Table 1 Number of transplant recipients in 2012, by transplant centers

Hospital Name	Kidney transplant from living donor	Kidney transplant from deceased donor	Total
Ramathibodi	62	56	118
Srinagarind	2	59	61
Siriraj	35	25	60
Praram 9	26	15	41
Maharaj Nakorn Chiang Mai	15	22	37
King Chulalongkorn Memorial	17	15	32
Sappasitthiprasong	0	21	21
Vajira	13	5	18
Rajavithi	7	7	14
Phramongkutklao	6	5	11
Songklanagarind	6	2	8
Buddhachinnaraj	7	0	7
Bhumibol Adulyadej	3	4	7
Police General	2	4	6
Bumrungrad International	5	1	6
Samitivej Srinakarin	1	4	5
Bangkok	0	2	2
Phayathai 1	0	2	2
Maharaj Nakhon Ratchasima	2	0	2
Samitivej Sukhumvit	0	2	2
Suratthani	2	0	2

Hospital Name	Kidney transplant from living donor	Kidney transplant from deceased donor	Total
Khon Kaen	1	0	1
Thainakarin	1	0	1
Hat Yai	1	0	1
Total	**214**	**251**	**465**

Number of donors and recipients in 2012

In 2012, 214 out of 465 living donor transplant recipients were men, equivalent to 64.6%. Of these, 44.6% of total donors were men. The mean age of recipients at the surgery date was 40.3 ± 13.3 years. In this regard, 93% of recipients received first transplantation and 72.8% received hemodialysis before transplantation. (Information was shown in Table 2).

Table 2: Information of 214 living donor transplant recipients

	Recipient	Donor
Male gender, %	64.6	44.6
Age (mean + SD), years (range)	40.3 ± 13.3 (11.70)	38.5 ± 10.3 (15.62)
Number of transplant, % 1 2	 96.0 4.0	
Mode of renal replacement therapy, %		
Non-dialysis Hemodialysis Peritoneal dialysis	12.7 72.8 14.5	

SD : standard deviation

Table 3 indicated that 251 of deceased donor transplant recipients were men, equivalent to 57.6%. Of these, 78.3% of total donors were men.The mean age of recipients at the surgery date was 40.7 ± 14.1 years. In this regard, 95.4% of recipients received first transplantation and 74.5% received hemodialysis before transplantation.

Table 3: Information of 251 deceased donor transplant patients

	Recipient	Donor
Male gender, %	57.6	78.3
Age (mean + SD), years (range)	40.7 ± 14.1 (7-67)	39.1 ± 14.3 (5-67)
Number of transplant, % 1 2	 95.4 4.6	
Mode of renal replacement therapy, %		
Hemodialysis Peritoneal dialysis	74.5 25.5	

SD : standard deviation

Immunosuppressive medication use and kidney transplant outcome for year 2012

In 2012, 452 out of 465 kidney transplant patients, equivalent to 97.3%, received immunosuppressive medicine. The information of immunosuppressive formula at the discharged date from hospital, as shown in Table 4, indicated that tacrolimus, mycophenolatemofetil, and prednisolone were most used.

Table 4 Information of Immunosuppressive regimen as at the date of D/C from hospital

Immunosuppressive regimen	N (%)
Tacrolimus + mycophenolatemofetil + prednisolone	139 (30.8)
Tacrolimus + mycophenolate sodium + prednisolone	119 (26.3)
Tacrolimus + prednisolone	59 (13.1)
Cyclosporine + mycophenolatemofetil + prednisolone	59 (13.1)
Cyclosporine + prednisolone	23 (5.1)
Cyclosporine + mycophenolate sodium + prednisolone	17 (3.8)
Tacrolimus + mycophenolatemofetil	6 (1.3)
Tacrolimus + mycophenolate sodium	5 (1.1)
Others	25 (5.4)
Total	**452 (100%)**

In 2012, the survival rate of living donor transplant and deceased donor transplant patients at 1 year after kidney transplantation were 99.0% (95% CI, 93.1-99.9) and 97.3% (95% CI, 92.4-99.0), respectively. The graft survival rate in the first year exclude death-censored graft survival was shown in Table 5.

Table 5 Graft survival excludes death-censored graft and 95% confidence interval in the first year, by type of kidney transplant

	Death-censored graft survival %	
Time post-transplant	Living donor	Deceased donor
1 month	100.0	98.6
3 month	100.0	94.4
6 month	100.0	92.7
12 month	95.0	84.3

Kidney Transplant Registry Data

From 1987 - 2012

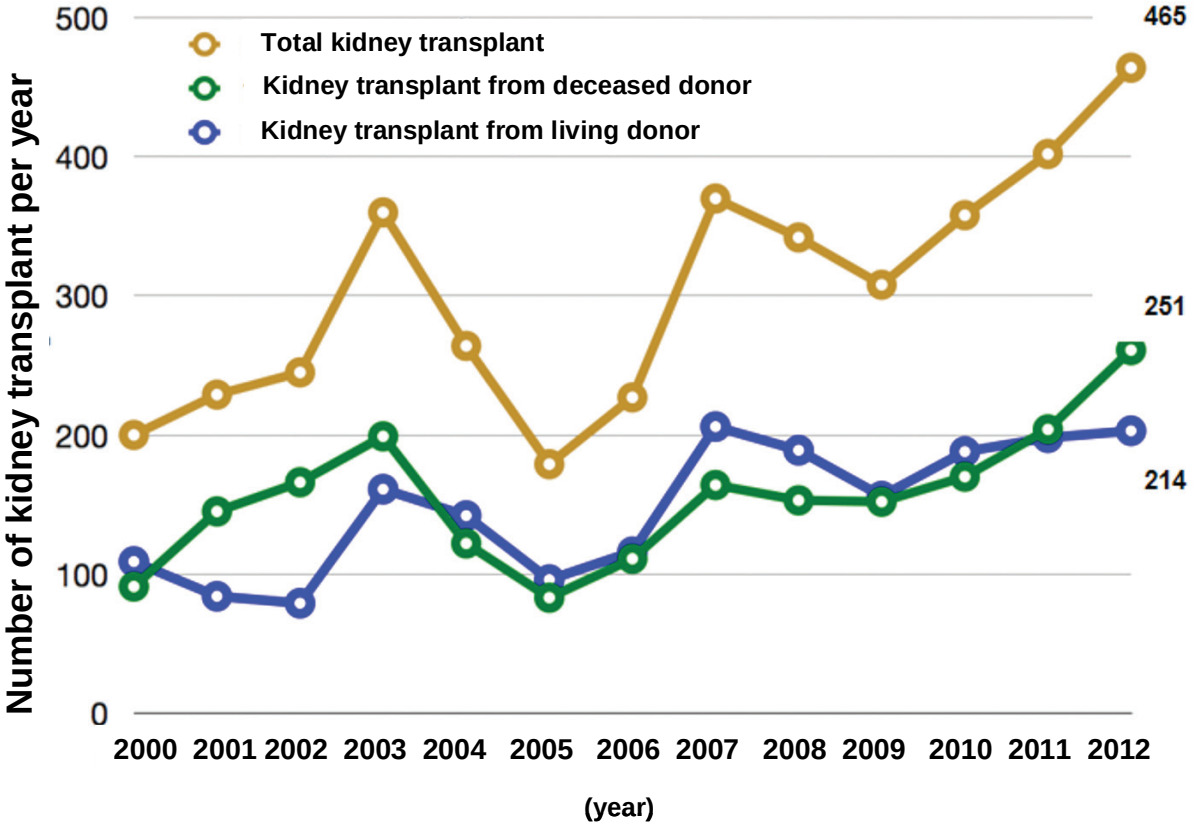
Kidney Transplant Registry Data from 1987 - 2012

Annual number of kidney transplant recipientsand kidney transplant

Since 2000, the kidney transplant information in Thailand has been recorded formally. The annual kidney transplant, which separated by type of transplant, was shown in picture 1.

In 2003, the Kidney Foundation of Thailand held the kidney transplant project to celebrate on auspicious occasion of Her Royal Highness Princess Galyani Vadhana's 80th birthday anniversary. In 2007, the same project occurred to celebrate on auspicious occasion of His Majesty the King's 80th birthday anniversary and Her Royal Highness Princess Galyani Vadhana's 84th birthday anniversary. In this regards, number of recipients were reached 370 cases per year during that time. Such project had an effect in increasing of recipients until today.

According to the Health Security Fund, the Social Security Office approved that kidney transplant was one of benefit since year 2004. In 2008, the National Health Security Office approved to add the kidney transplant in the universal health care coverage.



Picture 1 Number of kidney transplant per year since 2000, by type of transplant

Referring to the kidney transplant data since first transplant in Thailand, there were 5,729 recipients from 26 hospitals. Of these, the kidney transplant from living donor and deceased donor was 2,840 cases and 2,889 cases, respectively.

Table 6 Total recipients in Thailand

Hospital Name	Kidney transplant from living donor	Kidney transplant from deceased donor	Total
Ramathibodi	832	732	1,564
Siriraj	408	547	955
Srinagarind	119	419	538
King Chulalongkorn Memorial	189	314	503
Praram 9	332	135	467
Maharaj Nakorn Chiang Mai	283	114	397
Phramongkutklao	43	154	197
Rajavithi	69	82	151
Bumrungrad International	80	64	144
Vajira	84	53	137
Police General	26	93	119
Bhumibol Adulyadej	38	58	96
Buddhachinnaraj	92	0	92
Phayathai 1	50	28	78
Sappasitthiprasong	19	27	46
Bangkok	25	19	44
Chon Buri	40	2	42
Samitivej Sukhumvit	11	30	41
Songklanagarind	37	2	39
Samitivej Srinakarin	19	13	32
Thammasat	27	3	30
Maharaj Nakorn Ratchasima	10	0	10
Suratthani	4	0	4
Khon Kaen	1	0	1

Hospital Name	Kidney transplant from living donor	Kidney transplant from deceased donor	Total
Thainakarin	1	0	1
Hat Yai	1	0	1
Total	**2,840**	**2,889**	**5,729**

Analysis of kidney transplant information from 1997 – 2012

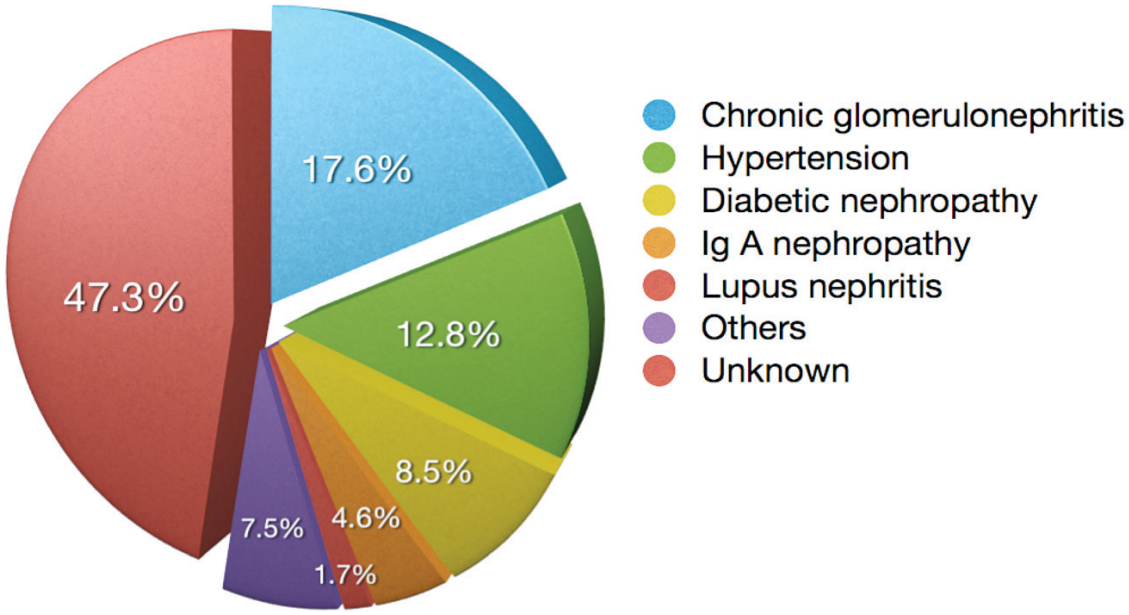
The study in this report based on the data from 1997 to 2012. There were 3,973 cases during that time whereas 62.1% of these numbers were male. The mean age at transplant occurrence was 42.2 ± 13.0 years. The percentage of non-dialysis and hemodialysis was 96.5 and 86.4, respectively. On the donor side, 61.1% was male. The mean age at the donation occurrence was 35.6 ± 12.2 years. The details were as shown in table 7.

Table 7 Information of kidney transplant recipients and donors from 1997 to 2011, totaling 3,973 cases

	Recipient	Donor
Male gender, %	62.1	61.1
Age (mean + SD), years (range)	42.2 ± 13.0 (1-78)	35.6 ± 12.2 (1-69)
Number of transplant, % 1 2 3	 96.5 3.4 0.1	
Mode of renal replacement therapy, %		
Non-dialysis Hemodialysis Peritoneal dialysis	4.6 86.4 9.0	

SD: standard deviation

The most common causes of end stage renal disease were chronic glomerulonephritis, hypertension and diabetes which represented 17.6%, 12.8% and 8.5%, respectively. Unidentified cause accounted for 47.3% of total patients.



Picture 2 Cause of end stage renal disease

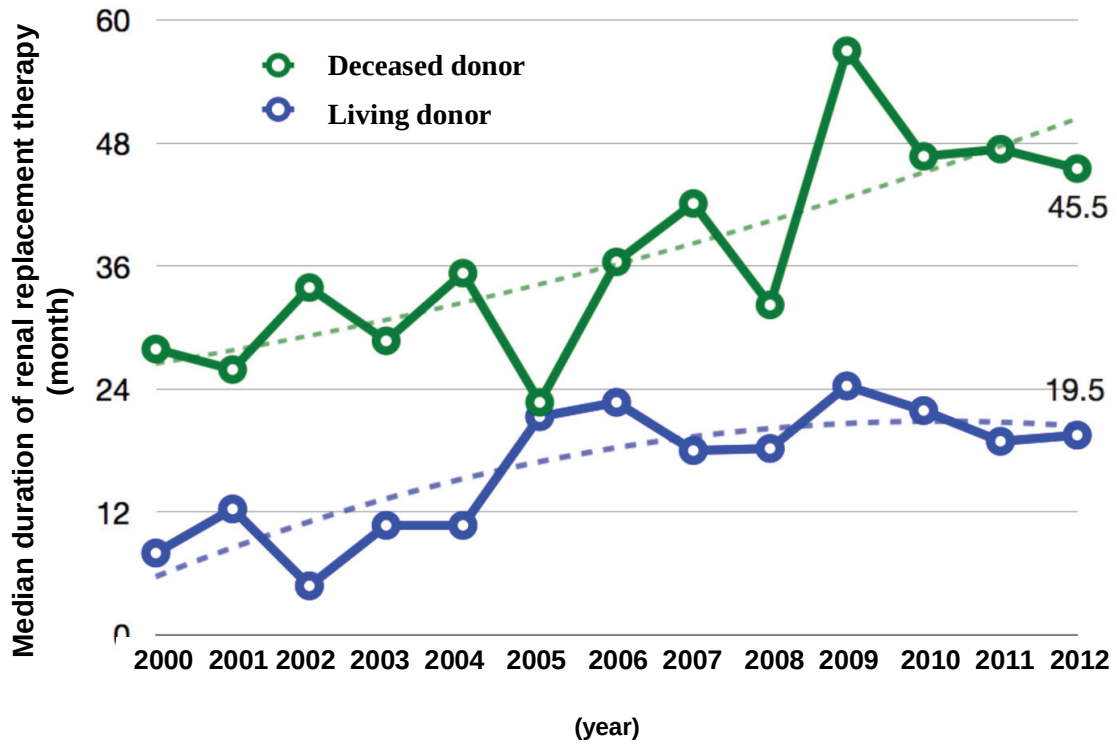
The comparison between living donor and deceased donor was shown in table 8. With reference to that information, totaling 3,973 cases, there were only 3,808 cases which could be analyzed. Of these, 2,063 came from living donors and 1,745 came from deceased donors.

Table 8 Information of recipients from living donor and deceased donor

	Living donor	Deceased donor
Number	2,063	1,745
Recipient age, year	42.1±12.6	42.6±13.3
Donor age, year	36.4±11.2	34.7±13.3
Median dialysis vintage, month (IQR)	20 (10-36)	44 (25-73)
Median HLA mismatch (IQR)	3 (0-3)	2 (0-3)
Median PRA (P5-P95), %	0 (0-6)	0 (0-40)
Payment type, %		
Civil Servant Medical Benefit Scheme	17.7	28.3
Social Security Scheme	13.7	18.1
Universal coverage Scheme	20.5	24.9
State Enterprise/SAO/PAO/Private Sector	3.2	3.3
Self-Affordability	44.3	24.7
Others	0.6	0.7

HLA, human leukocyte antigen; IQR, interquartile range; PRA, panel reactive antibody; P_5, 95th percentile

Since 2005, recipients from deceased donor have to wait longer when considering the duration of renal replacement therapy (picture 3). On the other hand, waiting time of recipients from living donor has not been varied. For 2012, renal-replacement-therapy duration of recipients from deceased donor and living donor was 45.5 months and 19.5 months, respectively.



Picture 3 Duration of renal replacement therapy, by type of donor

Information of Donor

From 2,063 living donors, 50.7%were male. In light of this, 1,879 out of total donors had relationship with recipients as shown in table 9.

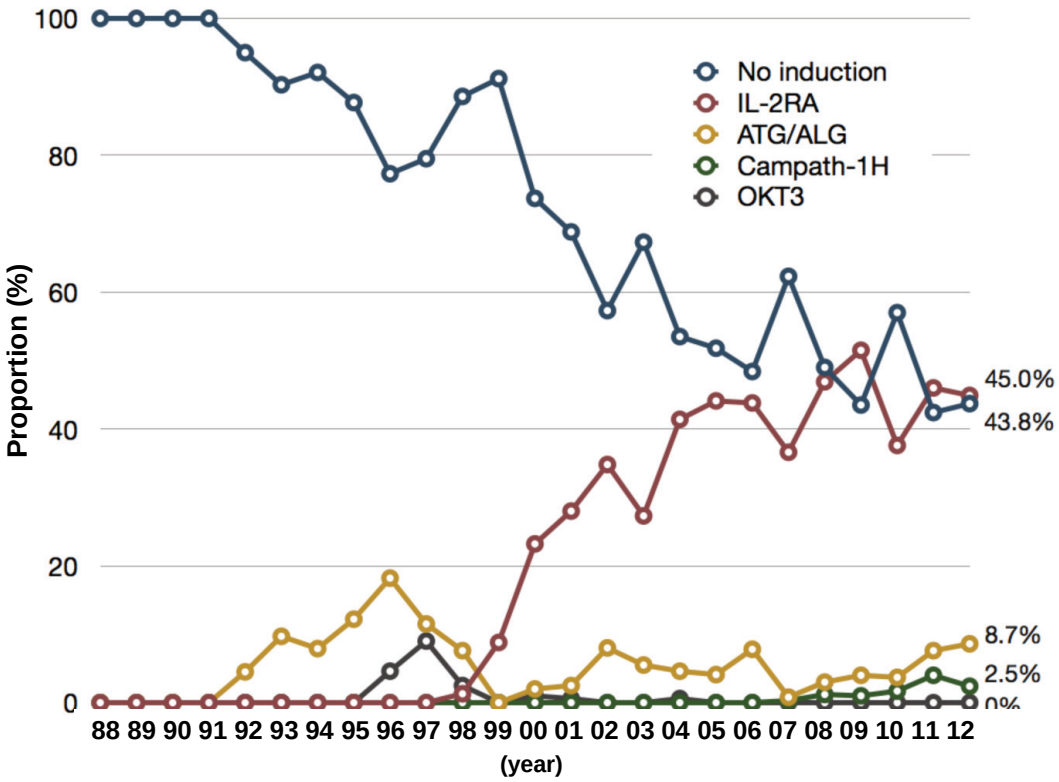
Table 9 Relationship between living donor and recipient

Relationship with recipient	Number of living donor (%)		
	Male	Female	Total
Siblings	339 (18.0)	494 (26.3)	833 (44.3)
Parents	75 (4.0)	152 (8.1)	227 (12.2)
Offspring	146 (7.7)	163 (8.7)	309 (16.4)
Spouse	32 (1.7)	128 (6.8)	160 (8.5)
Others (ex. Cousin, Blood relation)	245 (13.1)	105 (5.6)	350 (18.7)
Total	**836 (44.5)**	**1,042 (55.5)**	**1,879 (100)**

From 1,745 deceased donors, 73.1% were male. The causes of brain death were car accident, cerebrovascular accident, and others; for example; falling accident, gun accident. The percentage of which was 49.7%, 11.2%, and 13.9%, respectively, while the remaining 25.2% could not identify the cause. 69.9% of deceased donors had hypotension symptom before transplant, 11.9% of them had been performed the cardiopulmonary resuscitation (CPR), and the remaining 2% was expanded criteria donors.

Immunosuppressive medication use and kidney transplant outcome

Antibody induction therapy has been higher acceptable. In 2012, it was applied at 55%, which divided into 43.8% as interleukin-2 receptor antagonist (IL-2RA), 8.7% as anti-thymocyteglobulin (ATG)/anti-lymphocyte globulin (ALG), and 2.5% as campath-1H.



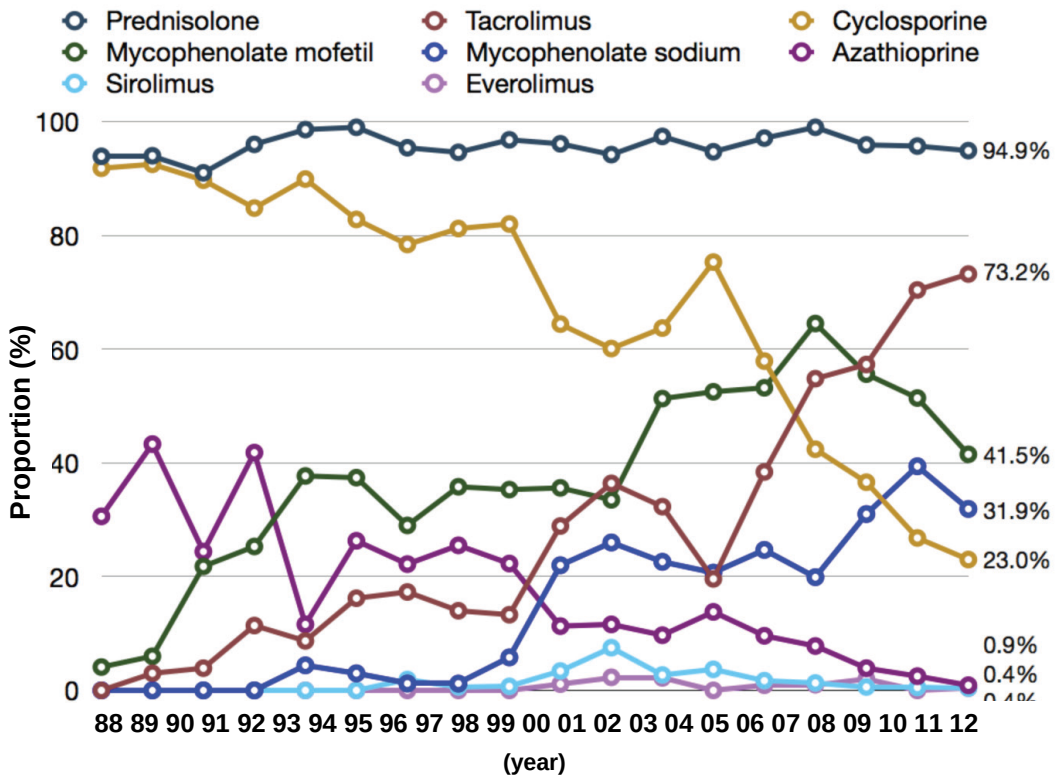
Picture 4 Proportion of recipients who received antibody induction therapy, by year of transplant

Proportion of antibody induction therapy from 1987 – 2012, which were separated by type of kidney transplant, were shown in table 10. The data was separated into 2,023 recipients from living donor and 1,701 recipients from deceased donor.

Table 10 Proportion of antibody induction therapy, by type of kidney transplant

	Number of recipient (%)	
	Living donor (n=2,023)	Deceased donor (N=1,701)
No induction	1,203 (59.5)	887 (52.1)
OKT3	3 (0.2)	14 (0.8)
ATG/ALG	103 (5.1)	107 (6.3)
IL-2R antagonist	697 (34.4)	670 (39.4)
Campath-1H	17 (0.8)	23 (1.4)

Proportion and trend of immunosuppressive medication use as at the leaving date from hospital was shown in picture 5. In 2012, patients received prednisolone, tacrolimus, mycophenolatemofetil, mycophenolate sodium, and cyclosporine at 94.9%, 73.2%, 41.5%, 31.9%, 23% respectively. Less than 2% of the patients received azathioprine, sirolimus or everolimusondischarge date.



Picture 5 Proportion of immunosuppressive treatment on discharge date, by year

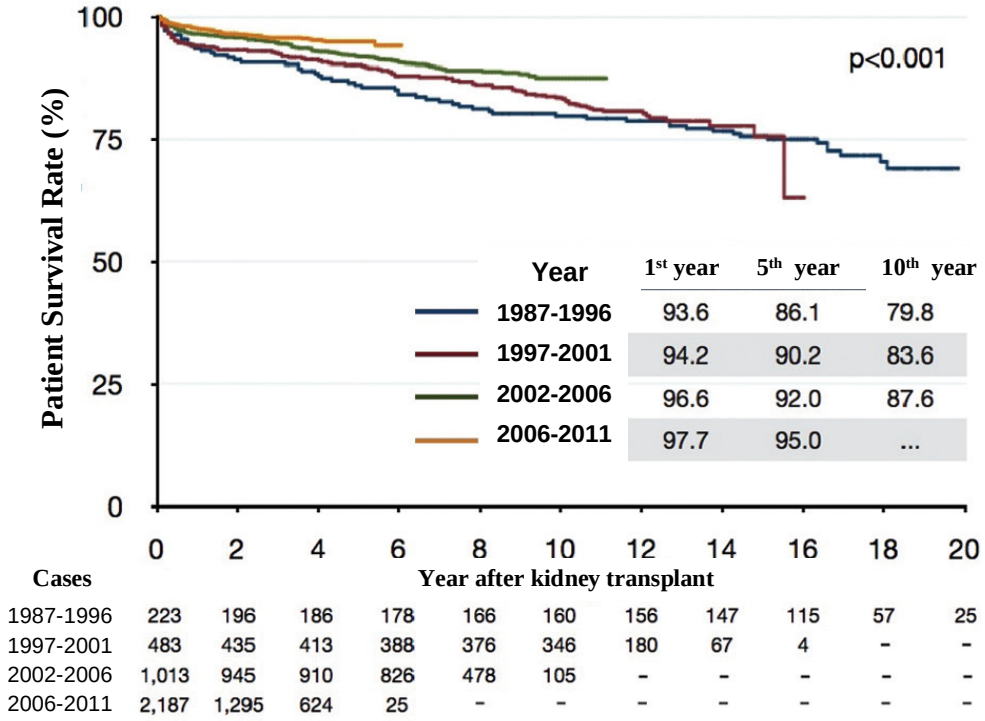
The comparison between proportion of delayed graft function after transplantation and serum creatinine level on discharge date of the recipientsfrom living donor and deceased donor was shown in table 11.

Table 11 Delayed graft function and serum creatinine on discharge date, by type of transplant

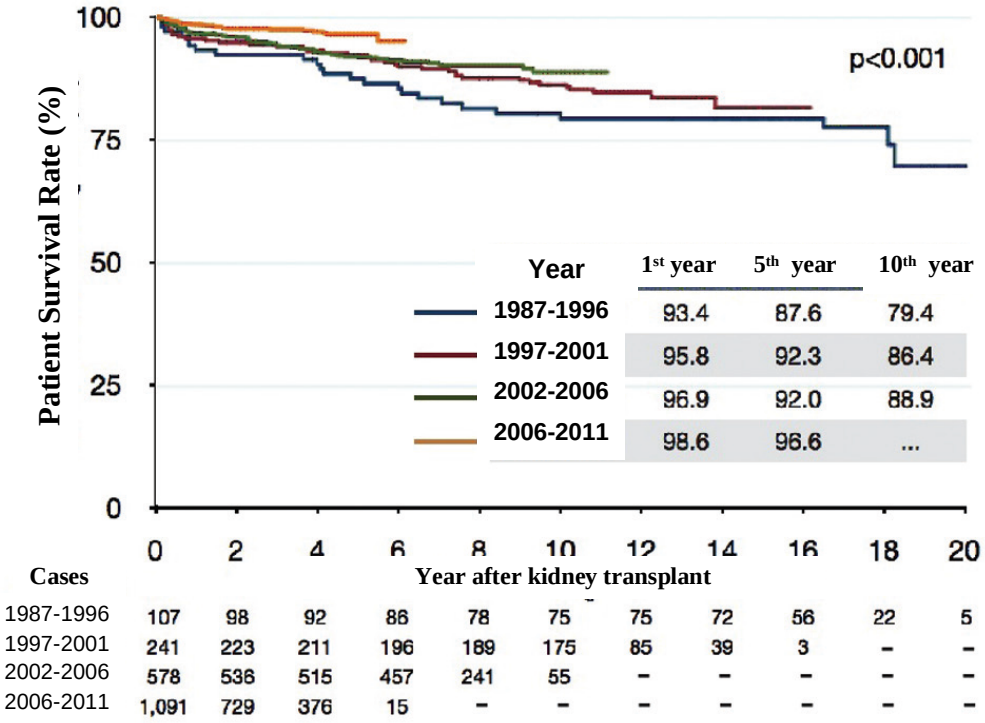
	Living donor	Deceased donor
Delayed graft function, %	11.2	32.4
Serum creatinine at discharge, mg/dl	1.54±1.25	1.96±1.47

Patient Survival

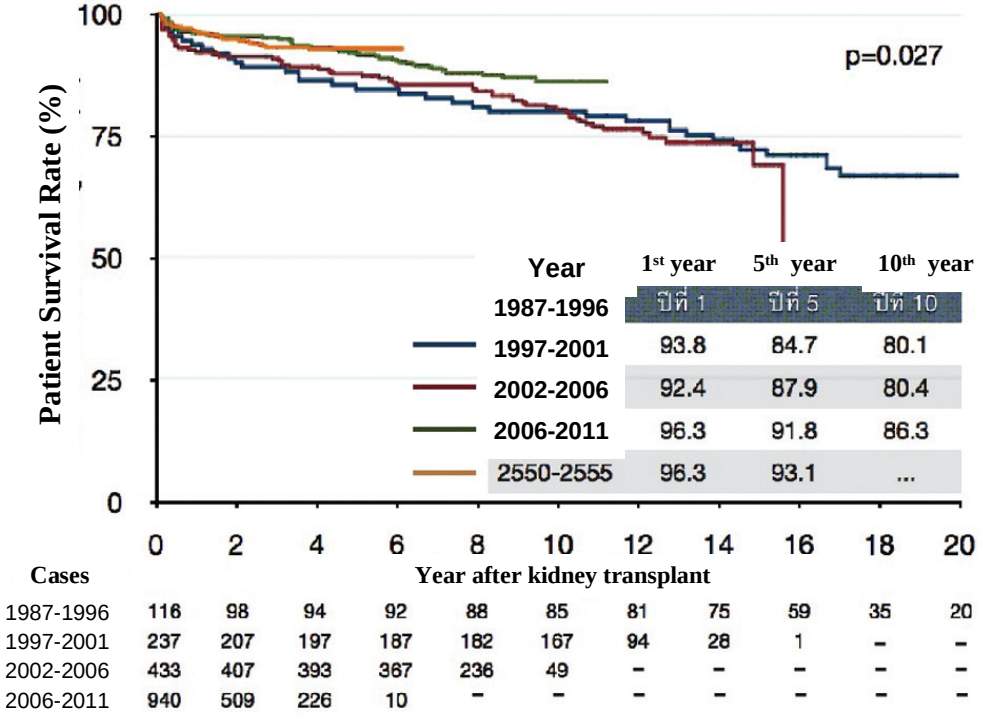
In the past 25 years, the survival rate after kidney transplant has significantly increased. During 2007-2012, the patient survival rate after 1 year and 5 years were 97.7% and 95%, respectively (Picture 6A). The survival of living donor cases after 1 year and 5 years was 98.6% and 96.6% respectively (Picture 6B). The survival of deceased donor cases after 1 year and 5 years was 96.3% and 93.1% respectively (Picture 6C).



(A) Patient survival rate of total transplant



(B) Patient survival rate of living donor cases

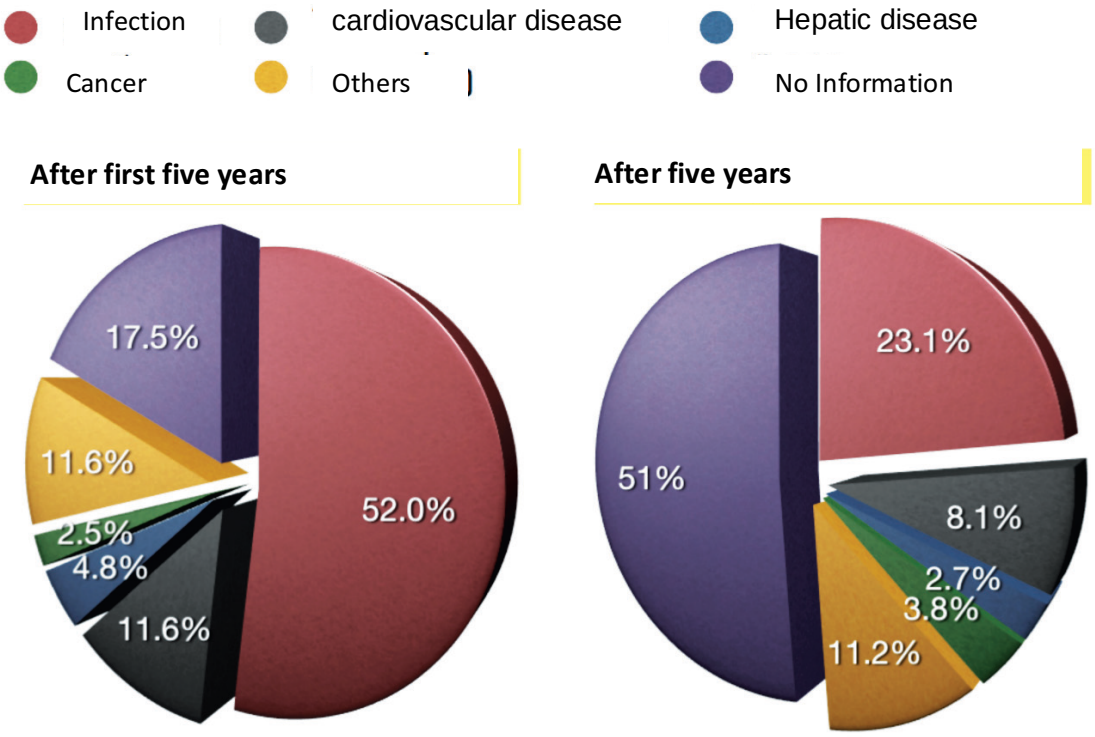


(C) Patient survival rate of deceased donor cases

Picture 6 Patient survival rate of (A) total kidney transplants (B) kidney transplant from living donor and (C) kidney transplant from deceased donor, by duration of transplant

Cause of Death

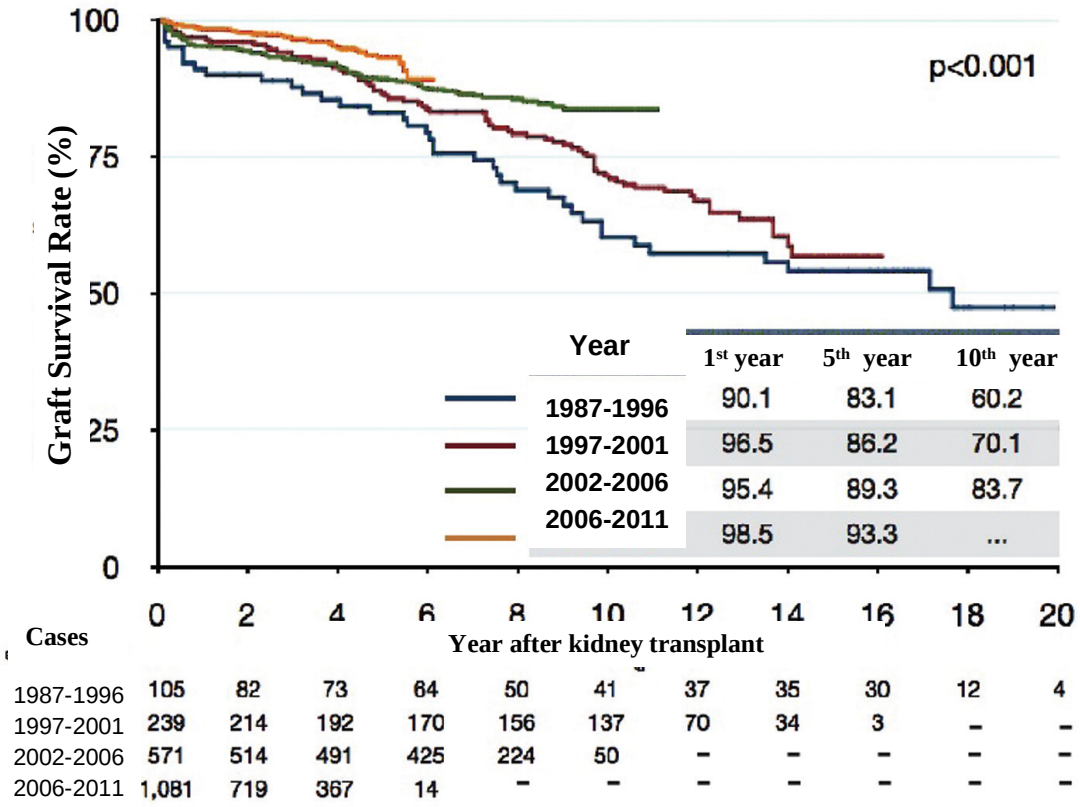
The significant cause of death within the first five years of transplantation was infection and cardiovascular disease, which represented 52% and 17.5%, respectively. Cause of death after five years of transplantation was cardiovascular disease and infection, which represented 51% and 23.1%, respectively. The detail was shown in picture 7.



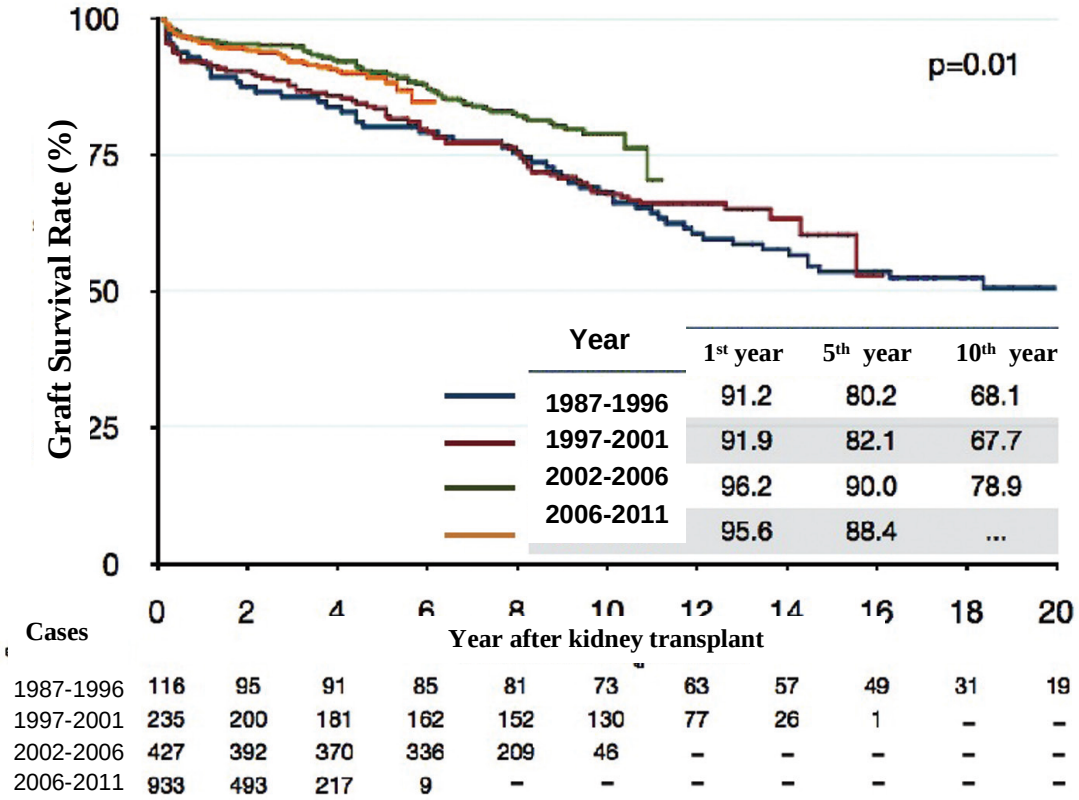
Picture 7 Cause of death after transplantation, by time

Graft survival

Comparing to the past, the present graft survival between recipients from living donors and deceased donors has significantly increased. The detail was shown in picture 8.



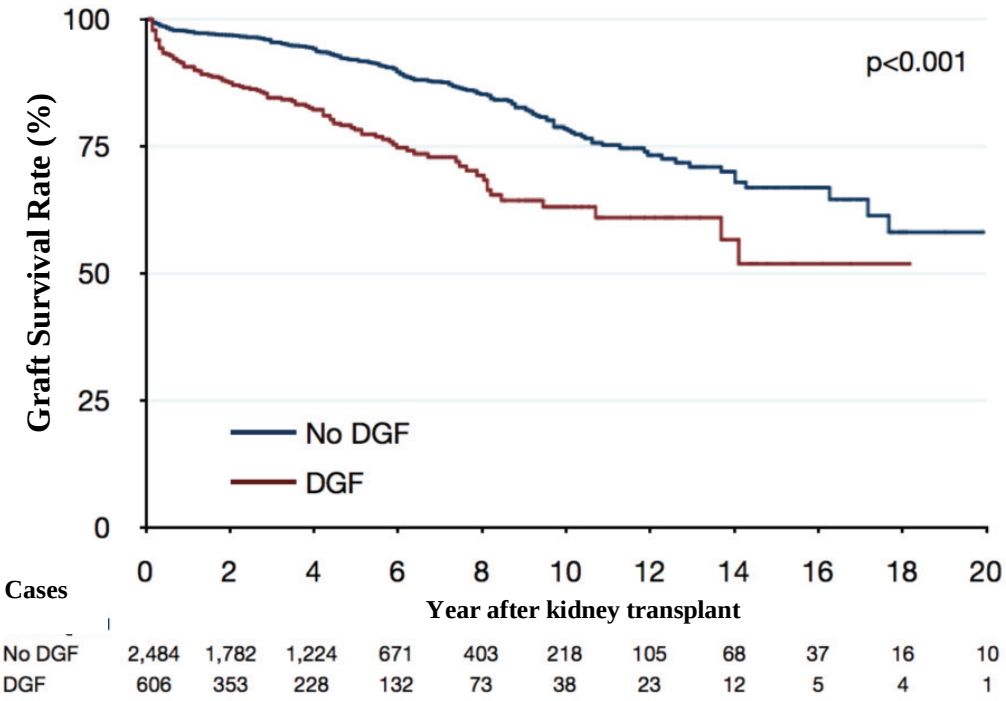
(A) Kidney transplant from living donor



(B) Kidney transplant from deceased donor

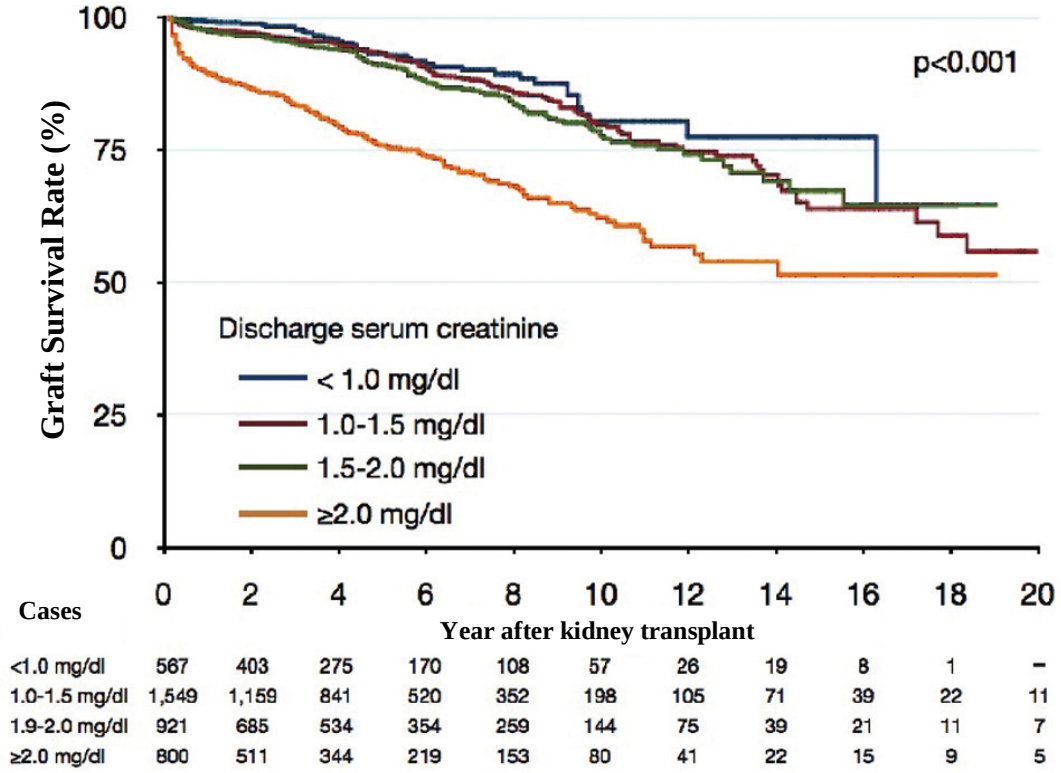
Picture 8 Graft survival of kidney transplant from living donor and deceased donor, by time

For the delayed graft function (DGF) patients, the graft survival rate was significantly lower than non DGF patients. At the discharge date, the serum creatinine rate, which was higher than 2 mg/dL, resulted in the lower graft survival rate of living donor than the patients who have serum creatinine lower than 2 mg/dL. The detail was shown in picture 9.



Cases											
No DGF	2,484	1,782	1,224	671	403	218	105	68	37	16	10
DGF	606	353	228	132	73	38	23	12	5	4	1

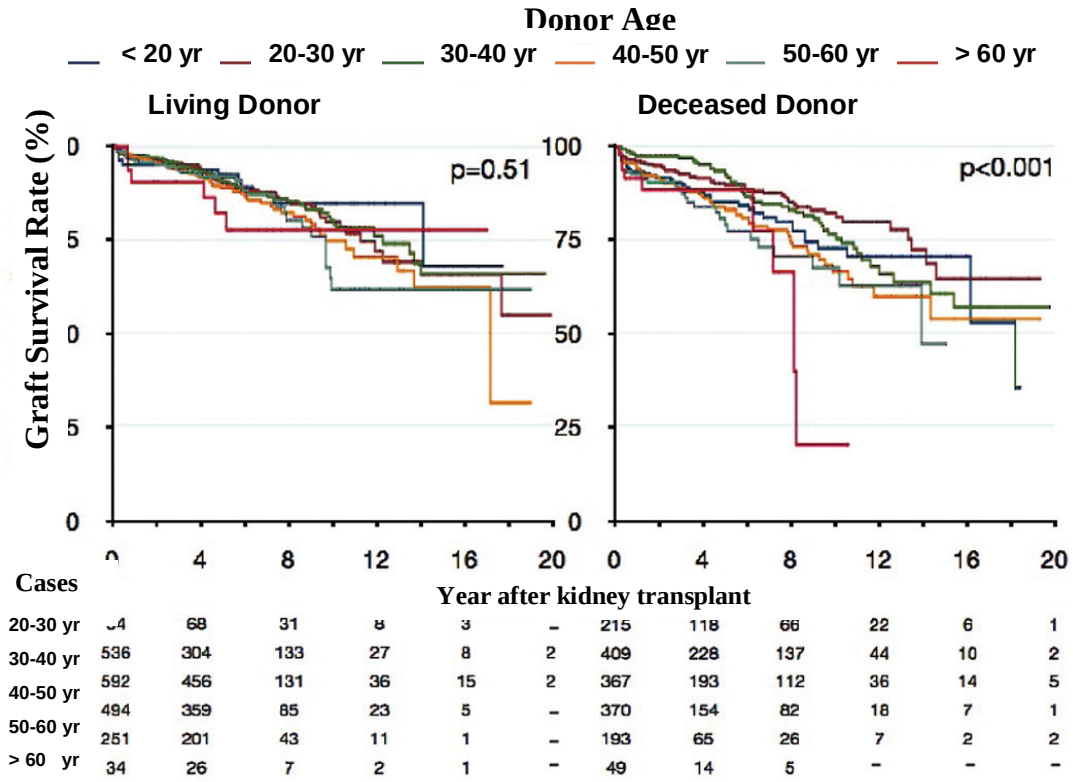
(A) Graft survival rate (separated by delayed graft function : DGF)



(B) Graft survival rate (separated by serum creatinine as at the discharge date)

Picture 9 Graft survival rate: (A) Delayed graft function and (B) serum creatinine as at the discharge date

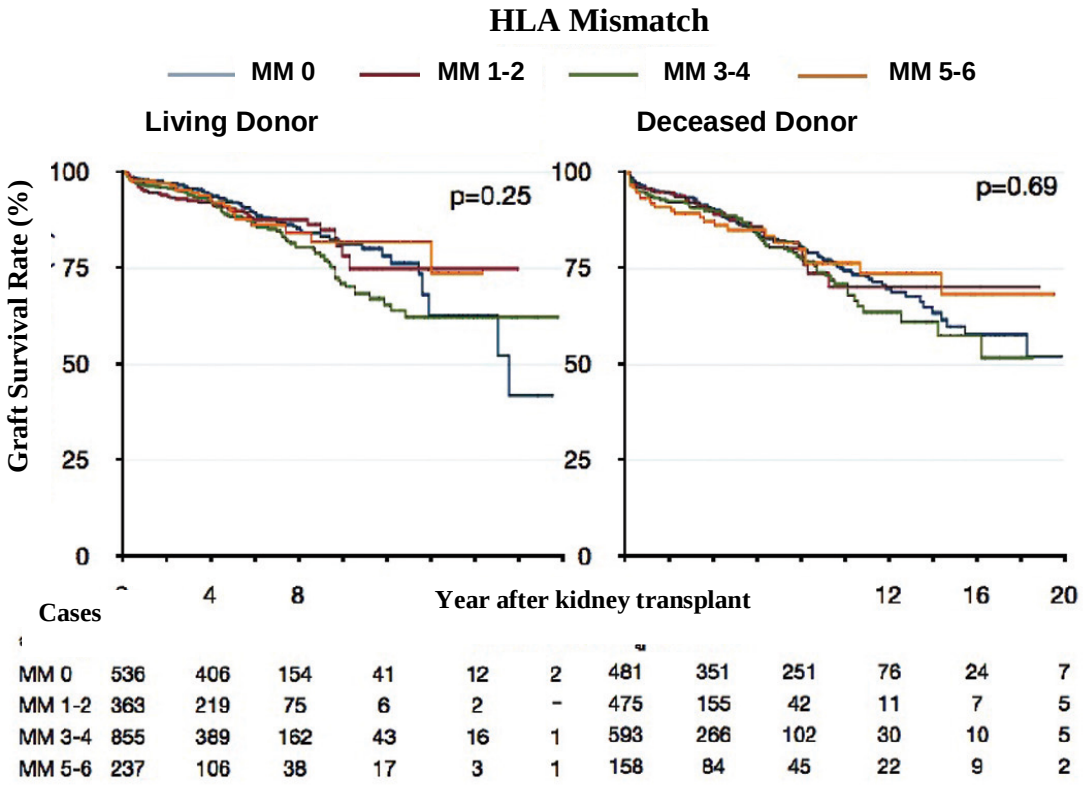
The comparison between age of living donor and deceased donor showed that the age of donors affected the graft survival rate of deceased donor case. On the contrary, there was no impact for living donor case. The detail was shown in picture 10.



Picture 10 Graft survival separated by type of transplant and age of donors

The comparison between living donor and deceased donor separated by HLA matching shown that HLA mismatch had no impact on graft survival for living donor and deceased donor as shown in picture 11.

The comparison between HLA matching of living donor and deceased donor showed that the HLA mismatch had no impact on graft survival either deceased donor case or living donor case. The detail was shown in picture 11.



Picture 11 Graft survival separated by type of transplant and HLA matching

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