



# ANZIPTR Report

# 2016

This report is a compilation of data provided by Pancreas transplant units in Australia and New Zealand. The registry is funded in part by a grant from the Commonwealth Department of Health and Ageing

[www.anziptr.org](http://www.anziptr.org)

Australia and  
New Zealand  
Islet and  
Pancreas  
Transplant  
Registry data  
1984-2015



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***This report is produced and edited by:***

Associate Professor Angela Webster, Abhijit Patekar, Paul Robertson and Associate Professor Patrick Kelly.

We thank all contributors who have made the registry what it is and whose work has made this report possible. For islet data and some analysis we are grateful to Patricia Anderson at Westmead.

***Suggested Citation***

Authors: Angela Webster, Abhijit Patekar, Paul Robertson, Patrick Kelly, [chapter] [page numbers]. ANZIPTR report 2016; Australian and New Zealand Islet and Pancreas Transplant Registry, Sydney, Australia.

***ANZIPTR staff***

Prof Jeremy Chapman	Westmead Medical Director
A/Prof Angela Webster	Registry Executive Officer
Abhijit Patekar	Data Analyst
Paul Robertson	Transplant Co-ordinator
Julie McKelvey	Registry Clerk
A/Prof Patrick Kelly	Biostatistics Consultant, University of Sydney

***Contact the ANZIPTR***

Inquiries or comments should be directed to ANZIPTR:

Australia and New Zealand Islet and Pancreas Transplant Unit

Westmead NSW 2145

Phone: +61 2 9845 6962 Fax: +61 2 9633 9351

Email: [info@anziptr.org](mailto:info@anziptr.org), [Abhijit.Patekar@health.nsw.gov.au](mailto:Abhijit.Patekar@health.nsw.gov.au)

## ***Governance structure***

This report is a compilation of data provided by the three current solid-organ Pancreas transplant units in Australia and New Zealand: Auckland Renal Transplant Group, New Zealand; National Pancreas Transplant Unit Monash Medical Centre, Victoria; and National Pancreas Transplant Unit, Westmead Hospital, NSW, and the three Islet transplanting units. The ANZIPTR registry is funded in part by a grant from the Commonwealth Department of Health and Ageing.

## ***Data release guidelines***

The registry can provide de-identified data for free to Transplant Physicians, Transplant Units, research projects and Government Departments. The registry will not provide any personally identifiable data.

The clinical data provided contains potentially sensitive information and should be used only within agreed guidelines. If data are further published elsewhere ANZIPTR permission is necessary prior to submission for publication, and ANZIPTR should be identified as the source of the data. If data provided by ANZIPTR is the primary source of data, then a copy of publication should be provided to ANZIPTR.

Data provided by ANZIPTR should be utilised by requesting parties only, further data sharing with other parties or projects is not permitted without prior approval from ANZIPTR. The data supplied will be in accordance with ANZIPTR data specifications. Please see [www.anziptr.org](http://www.anziptr.org) for our data dictionary.

## ***Participating Centres***

### ***Auckland Renal Transplant Group***

Dr Helen Pilmore

Prof Stephen Munn

### ***Monash Medical Centre***

Prof Peter Kerr

Director of Nephrology

A/Prof John Kanellis

Director of Transplantation

Dr Bill Mulley

Physician

Mr Alan Saunder

Director of Surgery

Mr Roger Bell

Surgeon

Mr Ming Yii

Surgeon

Miss Nancy Suh

Surgeon

Mr Stephen Thwaites

Surgeon

Mr Michael Wu

Surgeon

Ms Tia Mark

Transplant Coordinator

Ms Elaine Kennedy

Transplant Clinical Nurse Consultant

### ***Westmead Hospital***

Prof Henry Pleass

Director

Prof Philip O'Connell

Director

Prof Jeremy Chapman

Medical Director

Dr Brian Nankivell

Physician

A/Prof Angela Webster

Physician

A/Prof Germaine Wong

Physician

Dr Brendan Ryan

Surgeon

Dr Lawrence Yuen

Surgeon

Prof Richard Allen

Surgeon

Dr Jane Holmes-Walker

Endocrinologist

Ms Kathy Kable

Transplant Nurse Practitioner

Mr Paul Robertson

Transplant Co-ordinator

Ms Patricia Anderson

Islet Transplant Co-ordinator

A/Prof Wayne Hawthorne

Director Transplant Laboratories

Mr Abhijit Patekar

Data Analyst

Ms Julie McKelvey

Registry Clerk

## ***Analysis and Methods***

The aim of this report is to record all pancreas transplant activity in Australia and New Zealand. Data included in this report was extracted from RISC (Renal Information System Catalogue) on the 17<sup>th</sup> March 2016, for all people transplanted up to the end of 2015. Please note new data is added to the registry regularly, and corrections are made where previous data is missing or where errors are discovered. This year's report continues with the new format and contents started in 2015. During 2016 we corrected many of the missing and problematic data we identified during 2015.

A functioning pancreas transplant is defined as a recipient free of exogenous insulin dependence; thus a pancreas transplant failure is declared when either a pancreatectomy is performed, or when the recipient returns to permanent insulin therapy. Kidney transplants are defined as functioning if recipients are dialysis free. All causes of death are included in the mortality analyses.

Kaplan-Meier survival curves were used to illustrate the survival distributions, and these were generated using Stata software version 14 (StataCorp, College Station, TX USA). Transplant survival is analysed and presented both including and excluding death with a functioning transplant as a failed graft. For patients receiving a second transplant, in calculating mortality, time was measured from time of first transplant.

## ***Glossary***

SPK - Simultaneous Kidney Pancreas Transplant

PTA - Pancreas Transplant Alone

PAK - Pancreas after Kidney Transplant

ITA - Islet Transplant Alone

PLK - Pancreas Liver Kidney

PLI – Pancreas Liver Intestine

## ***Synopsis***

A total of 701 solid organ pancreas transplants have been performed in Australia and New Zealand (ANZ) from 1984-2015 (excluding islet transplants)

In 2015, 48 people received a pancreas transplant, by centre this was; Auckland (3); Monash (17); Westmead (28). In 2015, 46 of transplants were SPK while 2 were PAK.

From 2002-2015, 86 Islet transplants have been performed.

## ***New in the annual report this year***

In 2015 ANZIPTR developed its own website: [www.anziptr.org](http://www.anziptr.org) which describes the registry structure and function, outlines the procedure for data requests, and provides a download area for past reports. We hope to add slides with the annual report this year.

The ANZIPTR welcomes suggestions for improvement or specific analyses you would like to see in the next annual report.

# ***Chapter 1: Waiting List***

*Authors: Angela Webster, Paul Robertson, Abhijit Patekar, Patrick Kelly*

## ***Overview of waiting list activity***

### ***Definitions***

Patients join the waiting list on the date they are referred to the transplanting centre; however this may occur some time before their kidneys fail. Patients are therefore classified as “under consideration” until such time as they medically require a kidney pancreas transplant. Once they require a kidney pancreas transplant they are classified as “active” on the list while they remain medically fit. The “under consideration” classification also captures people recently referred to the transplant centre, who are still undergoing assessment about their medical fitness for pancreas transplant. People referred to a transplanting centre when they are already on dialysis, become “active” on the list as soon as they are accepted as medically fit. People referred to a transplanting centre when their kidneys still function, become active once their kidney disease progresses to such a level that dialysis is planned in the near future. Once active on the waiting list, patients are transplanted in order of their waiting time, by blood group.

**Patient waiting list flow**

Detailed data on waiting list patient flow is only available for Australia (Westmead and Monash Units).

**Table 1.1: Waiting list activity in Australia during 2015**

	2013	2014	2015
People on active list at beginning of year	88	84	59
People added to active list during the year	41	38	42
People removed from active list during year	9	14	12
Transplants to people on waiting list	33	43	45
Kidney only transplants to people on waiting list	0	1	0
Transplants performed outside Australia / New Zealand to people on waiting list	0	0	0
People who died while active on list	3	5	4
People on active waiting list at the end of year	84	59	40
People who died within 12 months of removal from list	-	2	0
People under consideration but not active on list	89	100	97
People referred but declined for pancreas transplantation	-	-	12

**Table 1.2: waiting list activity in New Zealand in 2014**

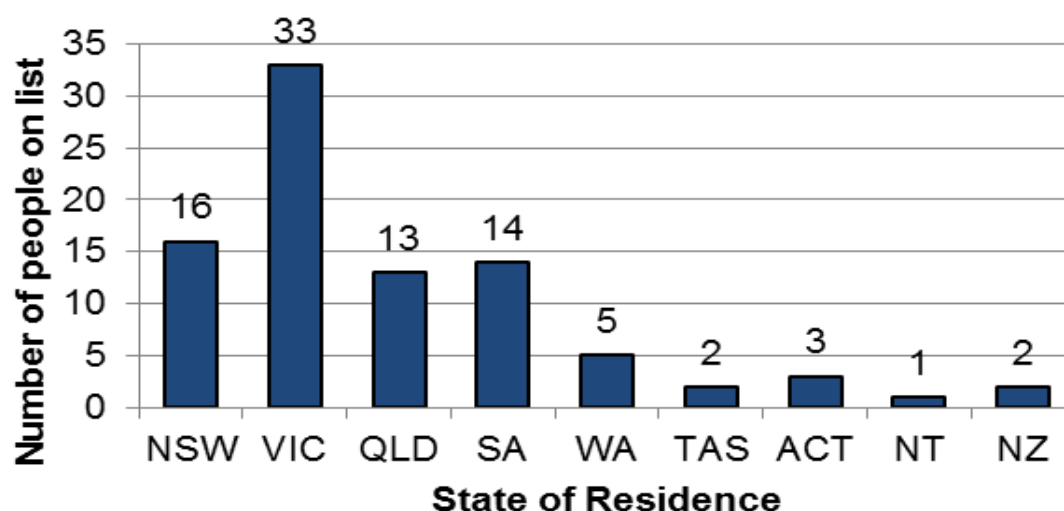
	2013	2014	2015
People on active list at beginning of year	3	4	5
People under consideration but not active on list	6	5	unknown
Transplants to people on waiting list	-	-	3



## ***Distribution of active patients***

Figure 1.1 and tables 1.3 and 1.4 show the state of residence for people active on the pancreas waiting list, by the pancreas transplanting centre they were referred to, in Australia. For data for New Zealand, there is no breakdown beyond that seen in *table 1.2*

***Figure 1.1: Distribution of people active on the waiting list by state of residence, as of December 2015***



***Table 1.3: Patient state of residence for people active on the list at Westmead national pancreas transplant unit (NSW), December 2015***

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	16	1	13	2	5	-	3	1	41
2014	23	-	11	1	5	-	1	2	43
2013	12	-	9	1	4	-	1	2	29

**Table 1.4: Patient state of residence for people active on the list at Monash pancreas transplant unit (VIC), December 2015**

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	-	32	-	12	-	2	-	-	46
2014	-	20	-	11	-	3	-	-	34
2013	-	12	-	1	-	-	-	-	13

Table 1.5 and 1.6 show the state of residence for people who are under consideration together with people who are active on the pancreas waiting list, by the pancreas transplanting centre they were referred to, in Australia. For data for New Zealand, there is no breakdown beyond that seen in *table 1.2*

**Table 1.5: State of residence for people under consideration and for people active on the list at Westmead national pancreas transplant unit (NSW), December 2015**

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	38	1	28	8	26	-	5	3	109
2014	39	1	32	5	21	-	5	3	106
2013	43	-	36	8	24	1	3	2	117

**Table 1.6: State of residence for people under consideration and for people active on the list at Monash pancreas transplant unit (VIC), December 2015**

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	-	47	-	18	-	7	-	-	72
2014	1	46	1	17	-	8	-	-	73
2013	1	49	-	7	-	10	-	-	67

## New referrals received over time

Table 1.7, 1.8 and 1.9, so the distribution of new referrals received by the transplanting units over time.

*Table 1.7: New referrals received by Westmead national pancreas unit (NSW)*

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	22	-	16	3	11	-	4	2	58
2014	25	1	12	4	9	-	2	3	56
2013	16	-	16	4	9	-	1	1	47
2012	14	-	13	6	12	-	3	2	50
2011	11	-	14	4	9	-	2	1	41
2010	15	-	12	4	7	-	1	-	39

*Table 1.8: new referrals received by Monash pancreas transplant unit (VIC)*

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	-	18	-	9	-	2	-	-	29
2014	-	38	-	6	-	4	-	-	48
2013	-	30	-	5	-	3	-	-	38
2012	-	26	-	1	-	5	-	-	32
2011	-	28	-	3	-	2	-	-	33
2010	1	29	1	1	-	2	-	-	34

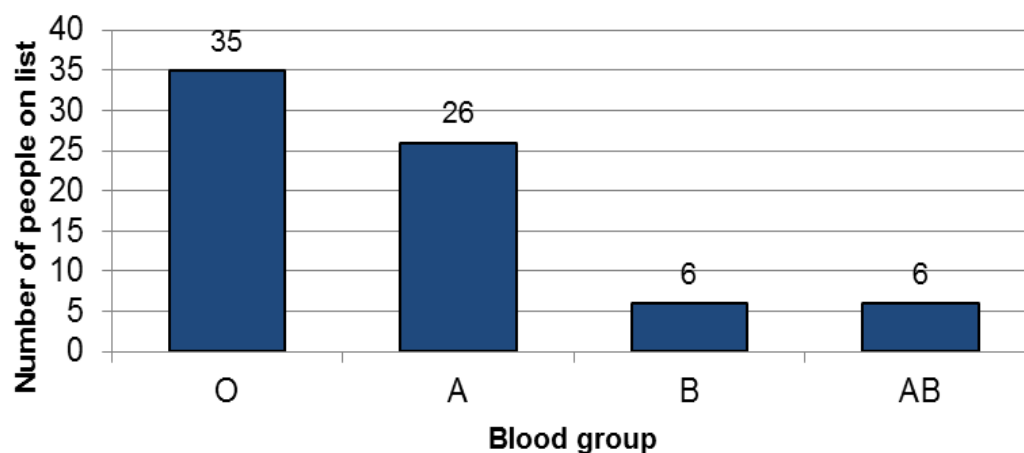
**Table 1.9: new referrals received by Auckland national pancreas transplant unit (NZ)**

	NZ
2015	unknown
2014	9
2013	4
2012	5+
2011	5+
2010	2+

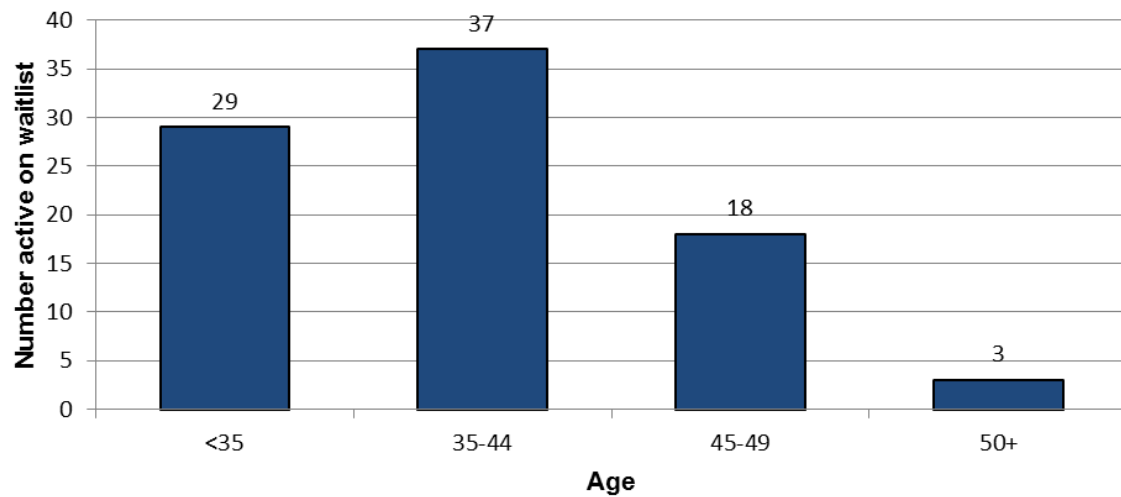
### ***Distribution of patient characteristics for those active on the list in 2015***

The following figures illustrate the distribution of other characteristics of those active on the waiting list in 2015, including the distribution of Blood groups and patient ages.

**Figure 1.2: Distribution of people active on the list by their blood group, as of December 2015**



*Figure 1.3: Distribution of people active on the list by their age, as of December 2015*



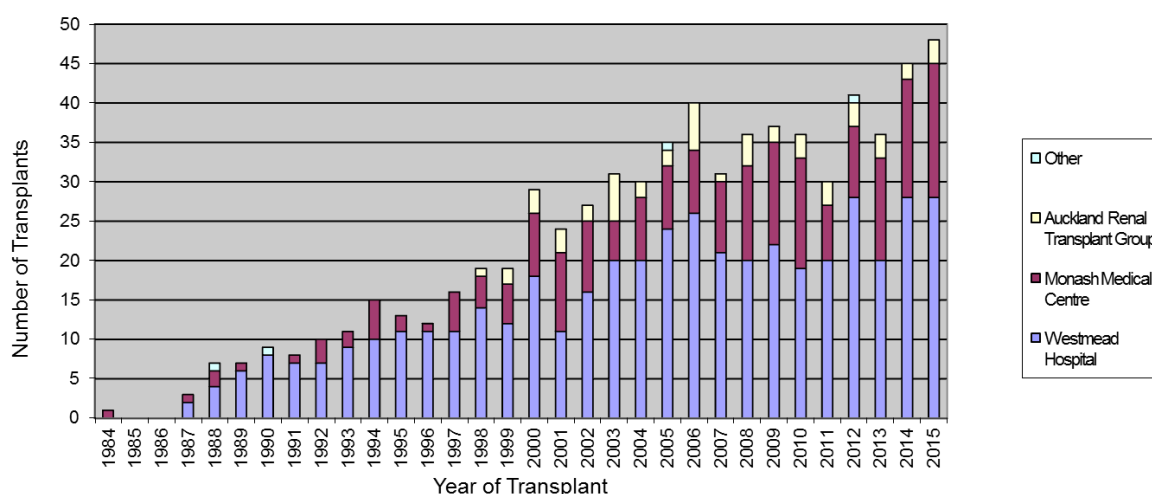
# ***Chapter 2: Pancreas transplant recipients***

*Authors: Angela Webster, Paul Robertson, Abhijit Patekar, Patrick Kelly*

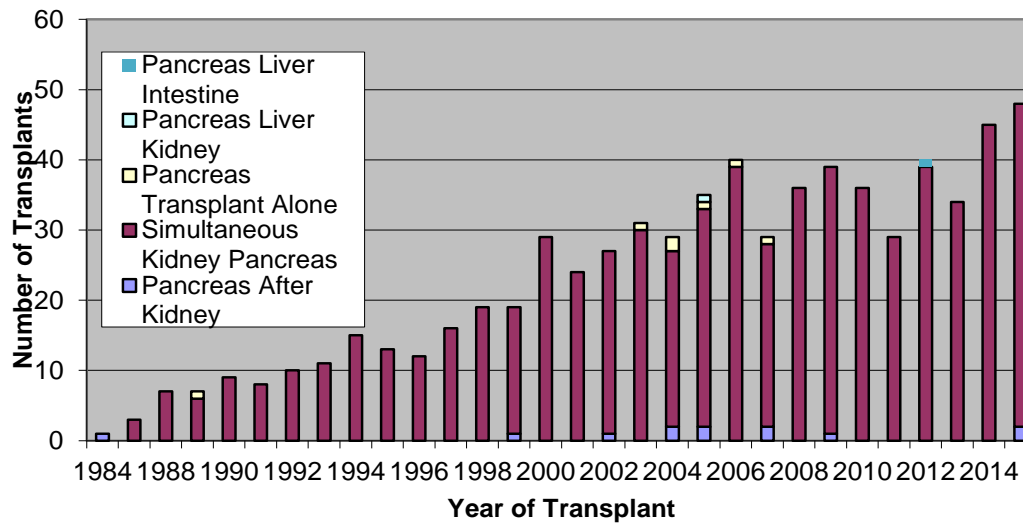
## ***Pancreas transplant incidence***

A total of 701 solid organ pancreas transplants have been performed in Australia and New Zealand (ANZ) from 1984-2015 (excluding islet transplants). Figure 2.1 illustrates pancreas transplants over time. The transplants were performed in Westmead (449), Monash (200), Auckland (48), RPA (1), RMH (1), QEH (1), Austin (1). The number of transplants has substantially increased in last decade compared to previous years.

In 2015, 48 people received a pancreas transplant, by centre this was; Auckland (3); Monash (17); Westmead (28). In 2015, 46 of transplants were SPK while 2 were PAK. The number of incident transplants in 2015 increased by 7% compared to 2014

*Figure 2.1: Incidence of pancreas transplants over time, 1984-2015.*

Not all pancreas transplant operations are undertaken with the same organs. Simultaneous pancreas-kidney transplant (SPK) is the most common operation, representing 97% of all pancreas transplants in Australia and New Zealand. From 48 transplants performed in 2015, 46 were SPK and 2 were Pancreas after kidney (PAK). PAK operations are done for people who either had a first kidney transplant without a pancreas (most commonly from a living donor relative) and subsequently opt for a pancreas, or for people who underwent an SPK but had a pancreas transplant failure, so need a further pancreas transplant. Pancreas transplant alone (PTA) is a less common operation and occurs rarely. On rare occasions, a multi-organ transplant is undertaken which includes a pancreas transplant. There was one simultaneous Pancreas, Liver plus Kidney transplant which was performed in 2005, and one Liver, Pancreas plus Intestine transplant in 2012. The distribution of operations is displayed in Table 2.1, and shown graphically in figure 2.2

*Figure 2.2: pancreas transplants by type, over time*



*Table 2.1: Pancreas transplant operations by centre, over time*

year	Westmead			Monash			Other*	New Zealand	Total
	SPK	PAK	PA	SPK	PAK	PA		All	
2015	27	1	0	16	1	0	0	3	48
2014	28	0	0	15	0	0	0	2	45
2013	20	0	0	13	0	0	0	1	34
2012	28	0	0	9	0	0	1	2	40
2011	19	0	0	7	0	0	0	3	29
2010	19	0	0	14	0	0	0	3	36
2009	22	0	0	14	1	0	0	2	39
2008	20	0	0	12	0	0	0	4	36
2007	16	2	1	9	0	0	0	1	29
2006	25	0	1	8	0	0	0	6	40
2005	21	2	1	8	0	0	1	2	35
2004	15	2	3	8	0	0	0	2	30
2003	19	0	1	5	0	0	0	6	31
2002	15	1	0	9	0	0	0	2	27
2001	11	0	0	10	0	0	0	3	24
2000	18	0	0	8	0	0	0	3	29
1999	11	1	0	5	0	0	0	2	19
1998	14	0	0	4	0	0	0	1	19
1997	11	0	0	5	0	0	0	0	16
1996	11	0	0	1	0	0	0	0	12
1995	11	0	0	2	0	0	0	0	13
1994	10	0	0	5	0	0	0	0	15
1993	9	0	0	2	0	0	0	0	11
1992	7	0	0	4	0	0	0	0	11
1991	7	0	0	1	0	0	0	0	8
1990	8	0	0	0	0	0	1	0	9
1989	5	0	1	1	0	0	0	0	7
1988	4	0	0	2	0	0	1	0	7
1987	2	0	0	1	0	0	0	0	3
1986	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	1	0	0	0	1
<b>Total</b>	<b>433</b>	<b>9</b>	<b>8</b>	<b>198</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>48</b>	<b>703</b>

SPK= simultaneous pancreas-kidney; PAK= pancreas after kidney; PA= pancreas alone; Other = other multi-organ transplants, or SPK done at a centre other than Westmead, Monash or Auckland.

### ***Patients transplanted by region***

The states of origin of the people receiving pancreas transplants are shown in the following tables, stratified by transplanting centre. Numbers for New Zealand can be found in table 2.1.

***Table 2.2: Distribution of state of residence of people receiving pancreas transplants in Australia over time at Westmead national pancreas transplant unit (NSW)***

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	14	-	9	1	2	-	-	2	28
2014	12	-	11	2	2	-	-	1	28
2013	7	-	8	-	3	-	1	1	20
2012	12	-	9	4	2	-	1	-	28
2011	9	-	3	4	2	-	1	-	19
2010	6	-	8	2	2	-	1	-	19
<b>Total</b>	<b>60</b>	<b>0</b>	<b>48</b>	<b>13</b>	<b>13</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>142</b>

*Table 2.3: Distribution of state of residence of people receiving pancreas transplants in Australia over time at Monash pancreas transplant unit (VIC)*

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	-	13	-	1	-	3	-	-	17
2014	-	12	-	2	-	1	-	-	15
2013	1	11	-	1	-	-	-	-	13
2012	-	3	1	2	-	3	-	-	9
2011	-	4	-	-	-	3	-	-	7
2010	-	13	-	1	-	-	-	-	14
<b>Total</b>	<b>1</b>	<b>56</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>75</b>

### ***Demographics of new pancreas transplant recipients***

The characteristics of pancreas transplant recipients in 2015 and in previous years are shown in table 2.4. The primary diagnosis causing end stage kidney disease of recipients during 2015 and historically was type I diabetes. The number of diabetic recipients with other cause of end stage kidney failure was small. The number of type II diabetics accepted for pancreas transplantation was also small, and none were transplanted in 2015

*Table 2.4: Demographics and characteristics of pancreas transplant recipients*

Recipient characteristics	2015	1984-2014	total
Total (%)	48	653	701
Age (years)			
Mean (sd)	39(6.8)	49(9.5)	49(9.7)
<35	12	210	222
35-44	24	283	307
45-49	9	108	117
50+	3	52	55
Sex (%)			
Male	27	344	371
Female	21	309	330
Unknown	0	0	
Cause of ESKD			
Type I diabetes	48	647	695
Type II diabetes	0	1	1
Haemolytic uraemic syndrome	0	1	1
Interstitial nephritis	0	1	1
Wegener's granulomatosis	0	1	1
Unknown(Uncertain Diagnosis)	0	2	2
Cultural and Ethnic Group*			
White	43	620	663
North East Asian (Chinese)	1	6	7
South East Asian	0	0	0
South and Central Asian (Indian)	1	8	9
Middle Eastern or North African	1	10	11
Indigenous Australian or Torres Strait Islander	0	3	3
Maori and Pacific Islander	2	6	8
Other	0		0
Unknown	0		0
Blood group			
A	12	220	232

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O	25	266	291
B	8	52	60
AB	3	24	27
Unknown	0	91	91

\* Classified according to the Australian Bureau of Statistics standard classification, 2<sup>nd</sup> Edition;

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1249.02011?OpenDocument>

## ***Balance of donor and recipient characteristics in 2015***

Cross tabulations of donor and recipient blood group and gender for people transplanted in 2015 are displayed in the following tables 2.5 and 2.6.

These distributions remain similar to previous years.

***Table 2.5: Cross tabulation of recipient and donor blood groups for 2015***

Number (% total)	Donor Blood Group				
Recipient Blood Group	A	O	B	AB	Total
A	12(25)	0	0	0	12(25)
O	0	25(52)	0	0	25(52)
B	0	0	8(17)	0	8(17)
AB	0	0	0	3(6)	3(6)
Total	12(25)	25(52)	8(17)	3(6)	48(100)

***Table 2.6: Cross tabulation of recipient and donor sex for 2015***

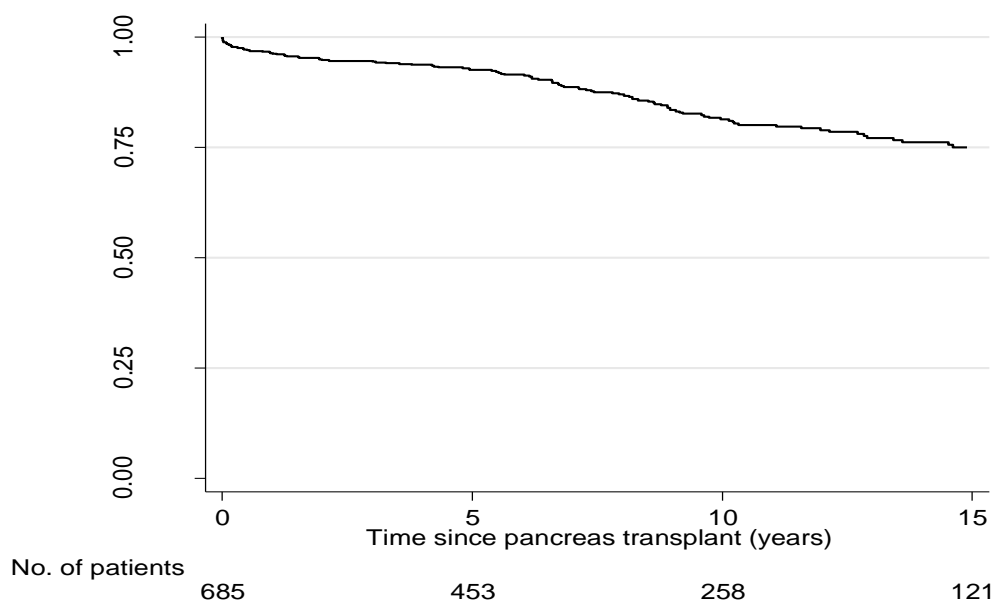
Number (% total)	Donor sex		
Recipient sex	Female	Male	Total
Female	7(15)	14(29)	21(44)
Male	13(27)	14(29)	27(56)
Total	20(42)	28(58)	48(100)

## Patient survival

Patient survival is calculated from the date of transplantation until death. Patients still alive at the end of the follow-up period are censored. For people who had more than one transplant, their survival is calculated from the date of their first transplant. For these analyses we had complete survival data for 685 patients who had a total of 701 pancreas transplants (16 patients have received two pancreas transplants). Note that the following survival plots survival proportion on the y-axis does not always start at zero; this is to better demonstrate some observed differences.

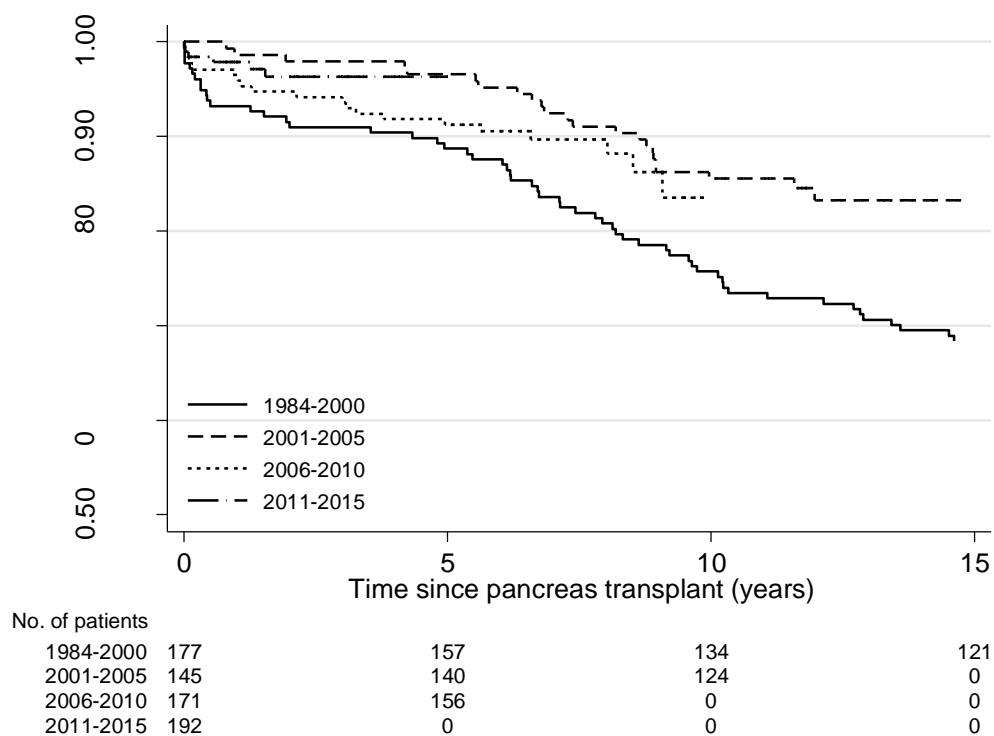
Figure 2.3 shows overall survival following pancreas transplant. There were 5,968 years of observation, and 123 people died in that time. Survival at 1 year was 96.4%, at 5 years 92.6%, at 10 years 81.4% and at 15 years 75.0%.

**Figure 2.3: Patient survival following pancreas transplantation in Australia and New Zealand.**



Patient survival by era of transplantation is shown in figure 2.4. Survival has improved over time,  $P=0.02$ . Survival at 1 year for people transplanted in 2000 or before 2000 was 93.2%; in recent years this has risen to 97.8%. Survival at 5 years was 88.7% for those transplanted in 2000 or before, where for those transplanted after 2005, 5-year survival was 91.2%

**Figure 2.4: Patient survival by era of transplantation**

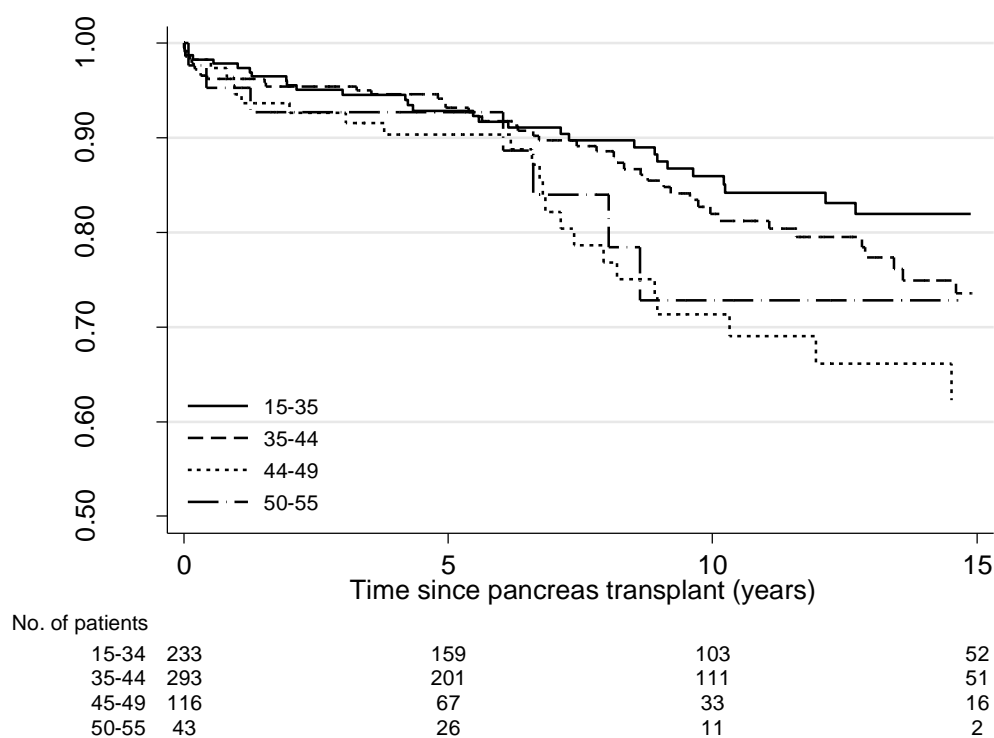


Patient survival by age at transplantation is shown in figure 2.5. People that were older at the time of pancreas transplantation had poorer survival than those who were younger,  $P=0.02$ . People aged 45 and older at transplantation were over twice as likely to die as those aged 44 or younger. Survival at 1 year for recipients aged <35 years was 97.8%, and for those aged 35-44 was 96.2%, whereas for those aged 45-49 was 94.6%



and those 50 or older was 95.3%. Five-year survival for those aged <35 years was 92.9%, and for those aged 35-44 was 93.2%, whereas for those aged 45-49 was 90.4% and those 50 or older was 92.7%.

**Figure 2.5: Patient survival by age at transplantation.**



The distribution of patient survival, Pancreas graft survival and Kidney graft survival was analysed overall and by time period (1984-2000, 2001-2005, 2006-2010 and 2011-2015) for all outcomes.

Recipient age at transplantation was also analysed for patient survival, donor age analysed for both pancreas and kidney graft survival and donor BMI was analysed for pancreas graft survival. For graft survival, a patient who died with a functioning transplant was censored at date of death.

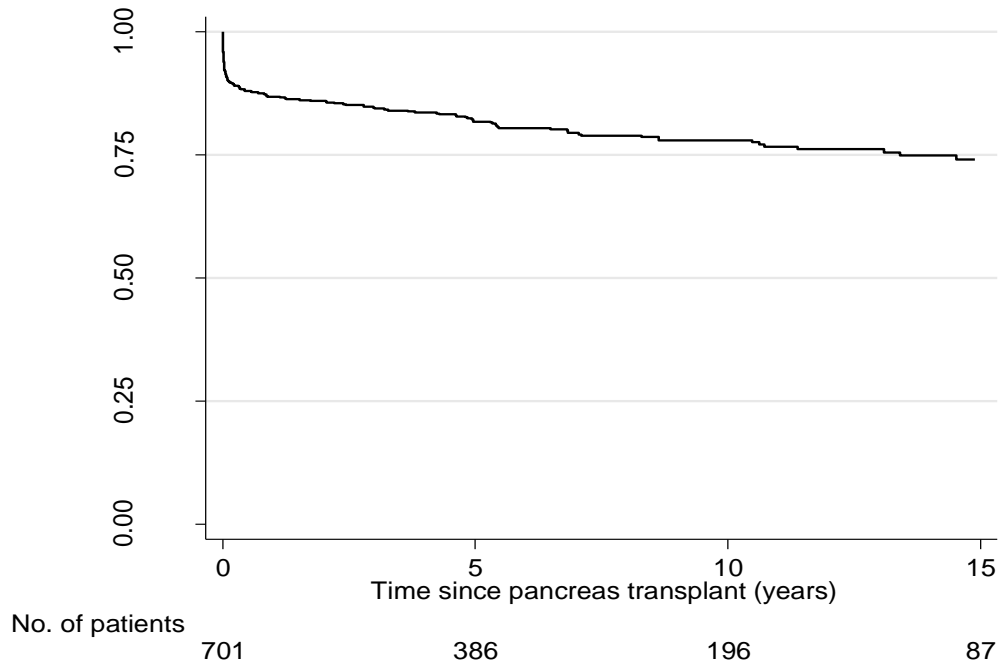
## ***Pancreas survival***

Pancreas transplant survival was calculated from the time of transplant until the time of return to insulin therapy or pancreatectomy. We calculated both pancreas failure including death with a functioning pancreas and pancreas failure censored for death with a functioning graft. For pancreas graft survival we included all pancreas transplants undertaken, including those who had received a pancreas transplant twice (16 patients). At the time of this report analysis, we had complete survival records for 701 pancreas transplants.

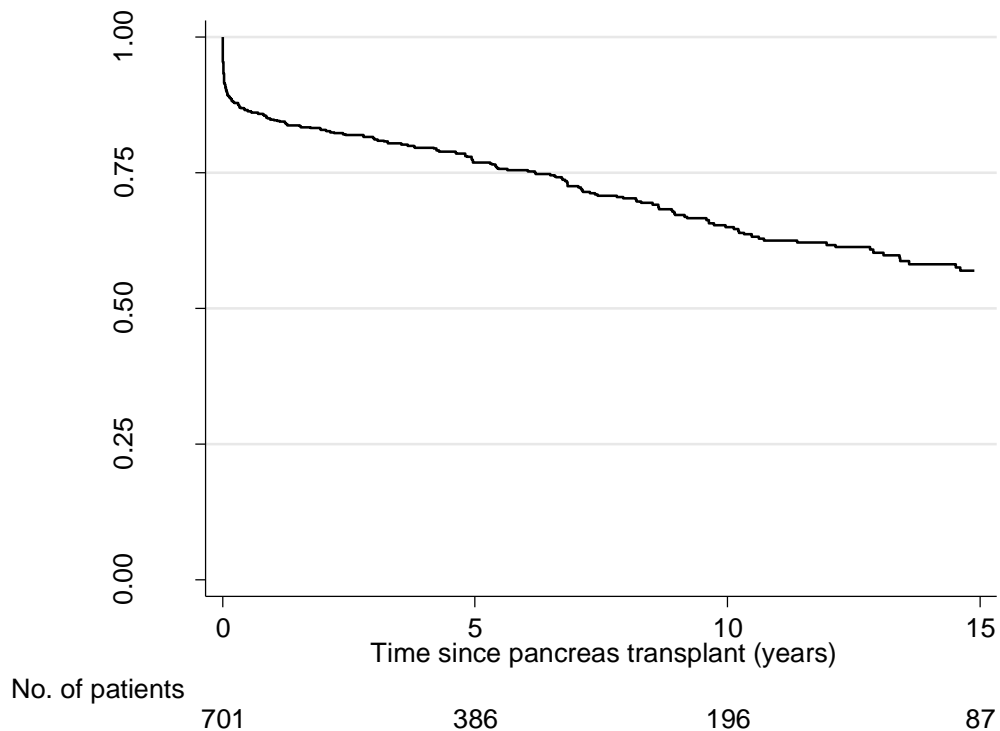
Figure 2.6 shows pancreas survival censored for death. Over 4,922 years of observation, there were 144 pancreas graft failures (excluding people who died with a functioning transplant). Overall, 1 year pancreas graft survival was 86.8%, and 5-year survival 81.8%, and 10-year survival 78.0%.

Figure 2.7 shows pancreas survival including death with a functioning pancreas. Over the same observation time there were an additional 89 recipients who died with their pancreas still functioning. One, 5 and 10-year survival were 84.9%, 76.9% and 65.0% respectively.

**Figure 2.6: Pancreas transplant survival, excluding death with a functioning pancreas graft.**

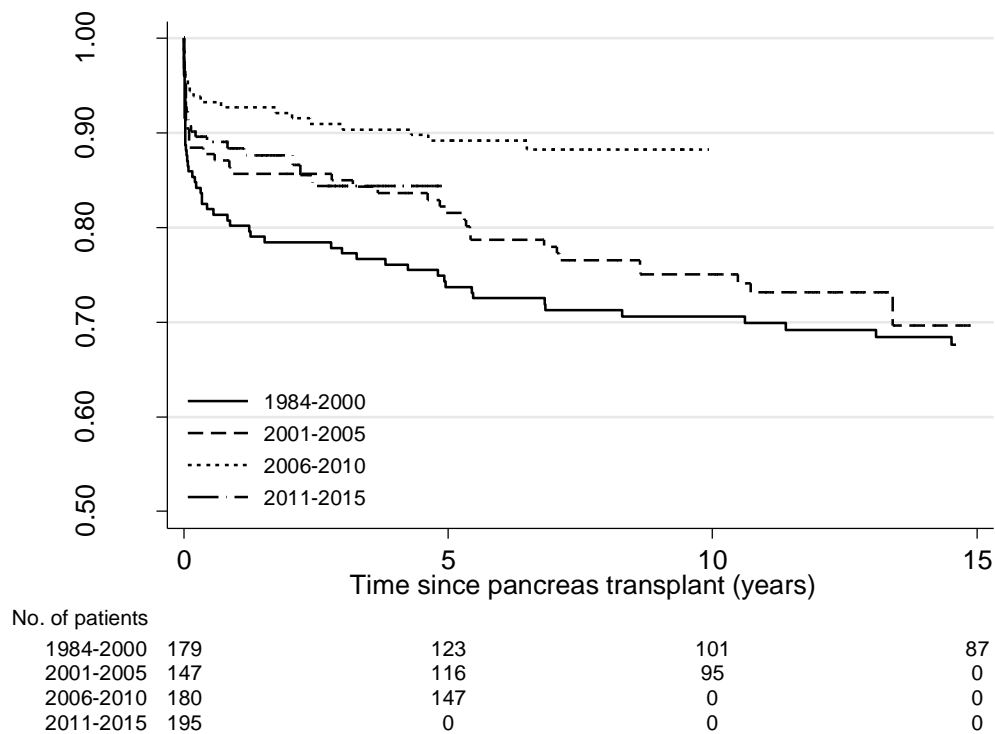


**Figure 2.7: Pancreas transplant survival, including death with a functioning pancreas graft.**



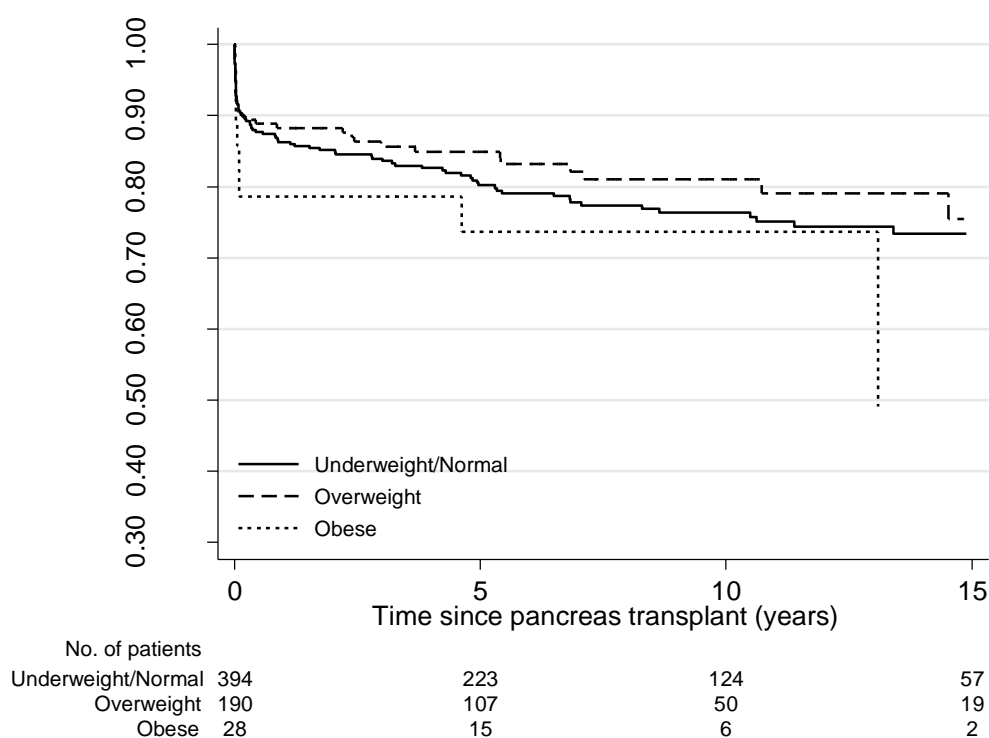
Survival of pancreas transplants varied over time, with survival markedly improving over time,  $P=0.001$ . For those transplanted in more recent years, risk of transplant loss was over 36% lower than those transplanted before 2000. This is shown in figure 2.8. Year 2000 or prior, 1 year pancreas survival was 80.2%, and 5-year survival 73.7%. For those transplanted after 2005, 1 year survival was 92.7% and 5-year survival 88.4%.

**Figure 2.8: pancreas transplant survival over time (censored for death)**



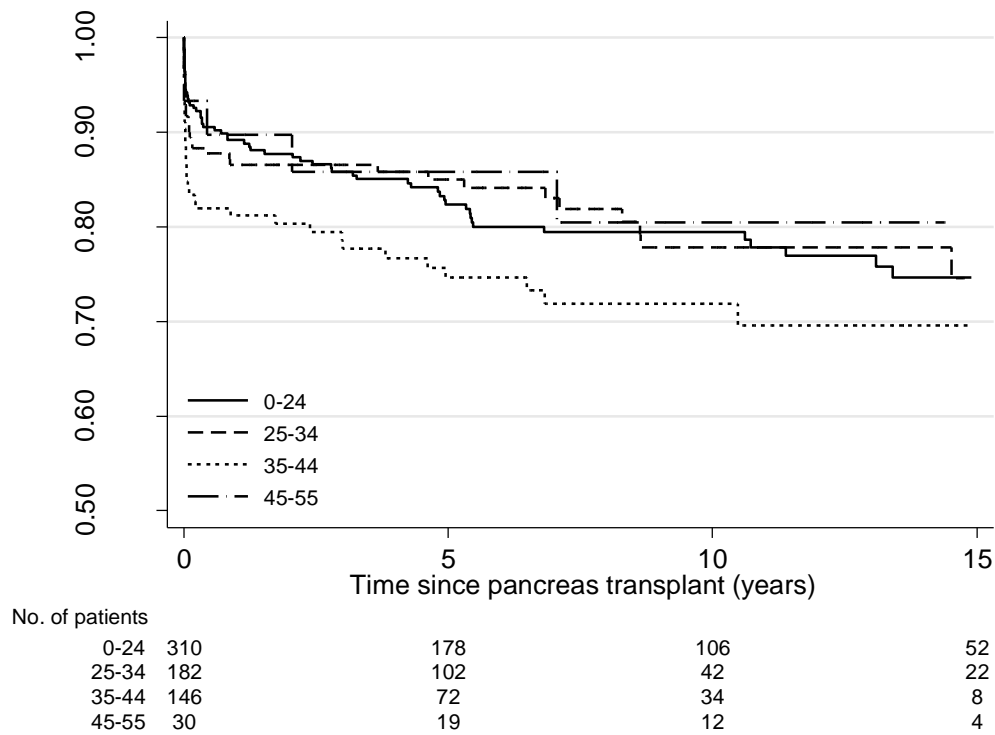
Figures 2.9 and 2.10 investigate the effect of donor factors on pancreas survival. We have data for donor BMI for 612 donations. The majority of donors (64%) were in either underweight or normal (BMI <25). However, 31% were overweight (BMI 25-29) and 5% were obese (BMI 30+). While Figure 2.9 suggests separation of survival curves, there was no difference statistically,  $P=0.35$ .

**Figure 2.9: Pancreas survival censored for death with pancreas function, by donor BMI**



We have data for donor age for 668 pancreas donors. The survival curves appear poorer for donors aged 35-44 compared with those 45 and older, or younger donors, but this difference was not statistically significant,  $P=0.17$ .

*Figure 2.10: Pancreas transplant survival, censored for death with function, by donor age.*



## ***Pancreas transplant prevalence***

We calculated the point prevalence of people living in Australia and New Zealand who were alive with a functioning transplant on 31<sup>st</sup> December each year for the last four years (table 2.7). These calculations do not include people still alive, who had a failed pancreas transplant.

***Table 2.7: People alive with a functioning pancreas transplant in Australia and New Zealand by year and residence, at years' end.***

<b>State of residence</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
New South Wales	130	123	120	119
Victoria	143	140	137	136
Queensland	104	99	97	92
South Australia	27	27	27	27
West Australia	30	27	25	24
Tasmania	19	19	19	19
Australian Capital Territory	13	12	12	12
Northern Territory	4	4	4	4
New Zealand	43	40	37	35
<b>Total</b>	<b>513</b>	<b>491</b>	<b>478</b>	<b>468</b>

## ***Kidney transplant survival***

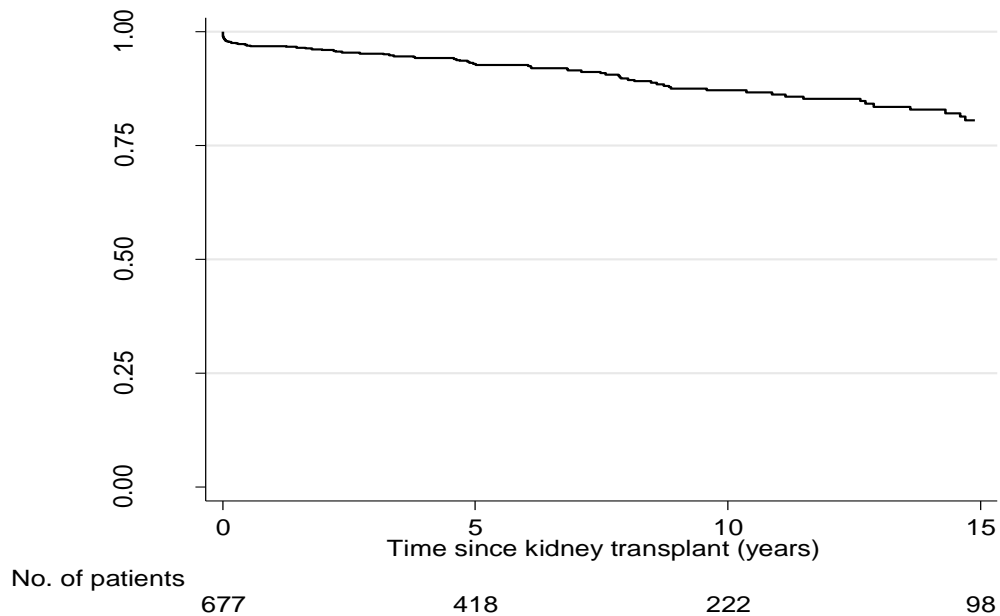
Kidney transplant survival was calculated for those who received SPK transplants, from the time of transplantation until the time of return to dialysis. We calculated both kidney failure including death with a functioning kidney and kidney failure censored for death with a functioning graft. For kidney graft survival we included only SPK transplants and excluded PAK transplant recipients. We had complete survival records for 677 SPK transplant recipients.

Figure 2.11 shows kidney survival censored for death. Over 5384 years of observation, there were 74 kidney graft failures (excluding people who died with a functioning transplant). Overall, 1 year kidney graft survival was 96.9%, and 5-year survival 93.0%, and 10-year survival 87.2%.

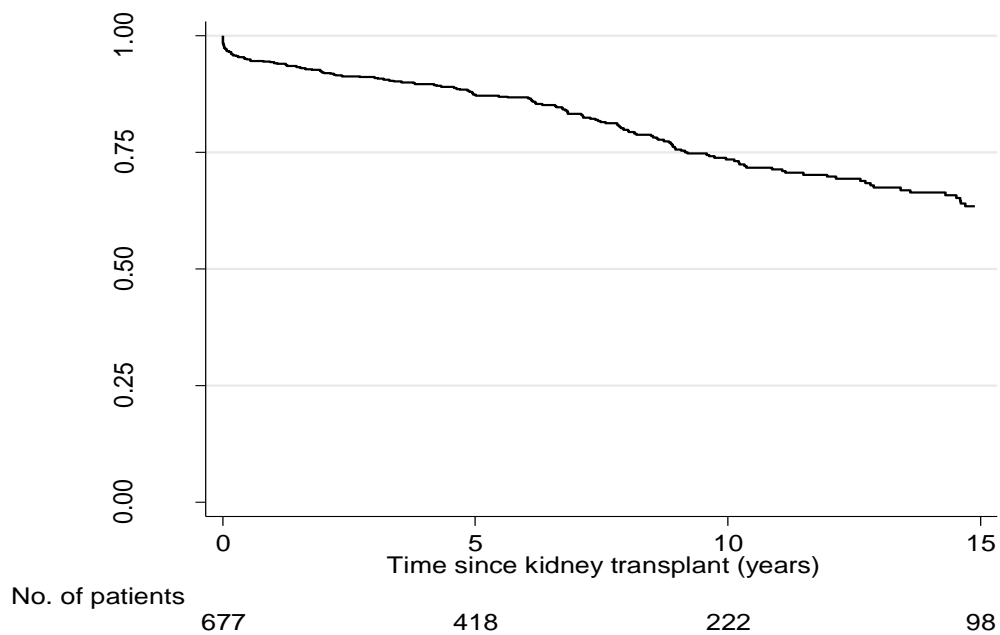
Figure 2.12 shows kidney survival including death with a functioning kidney. Over the same observation time there were an additional 92 recipients who died with their kidney still functioning. One, 5 and 10-year survival were 94.3%, 87.4% and 73.5% respectively.



*Figure 2.11: Kidney transplant survival, censored for death with kidney function, for people receiving SPK transplants.*

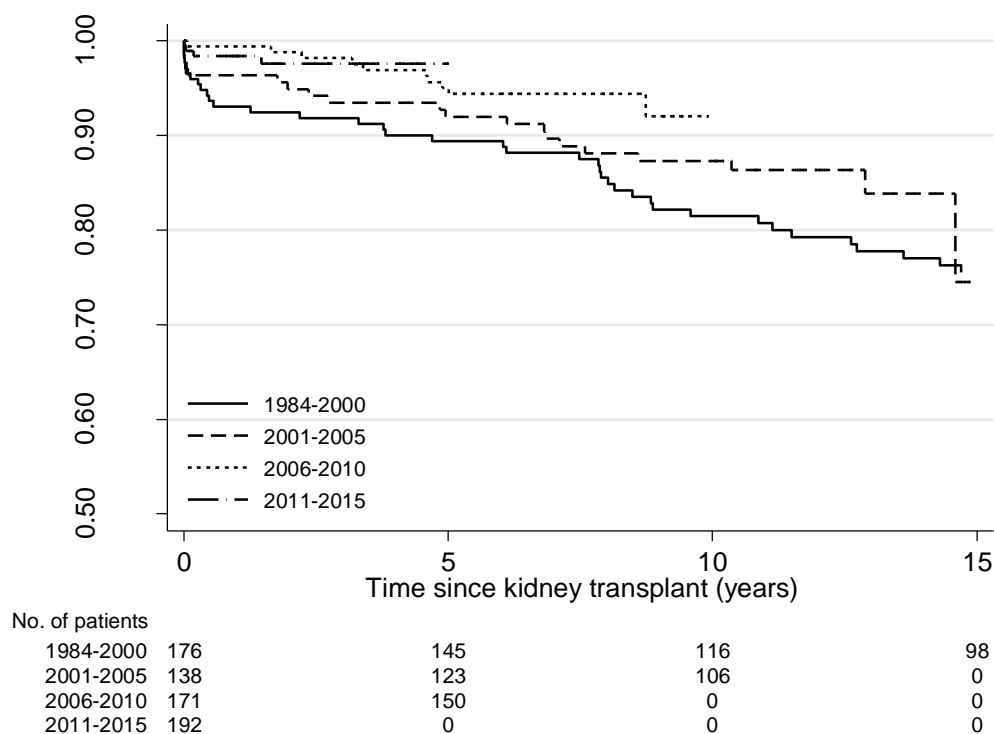


*Figure 2.12: Kidney transplant survival, including death with kidney function, for people receiving SPK transplants.*

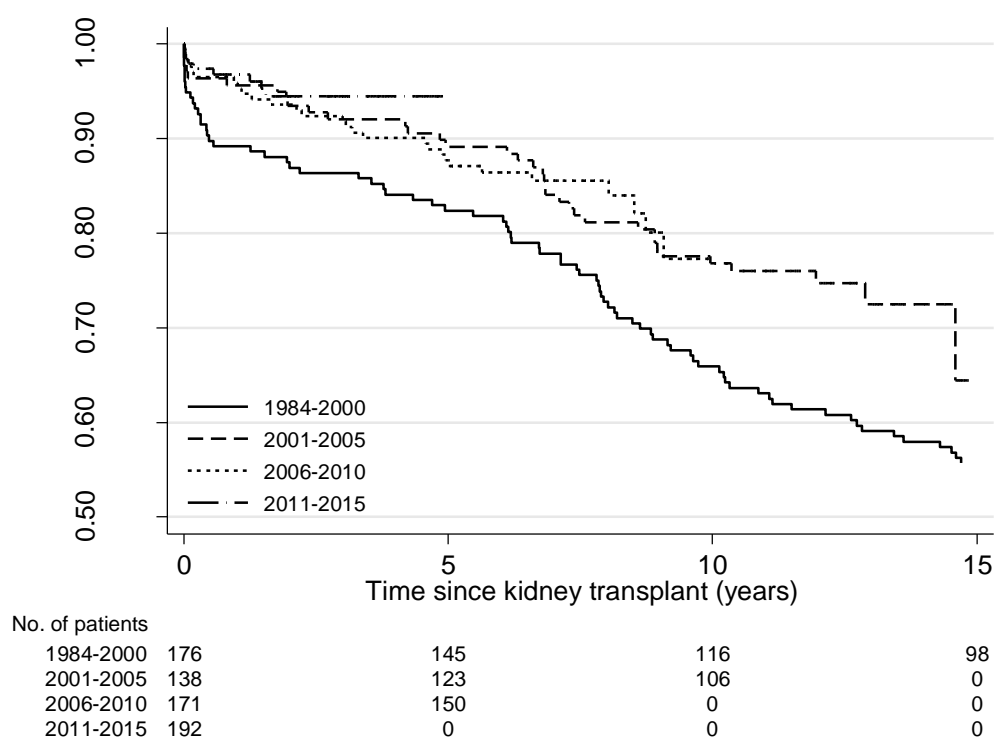


Kidney survival improved over time, with longer survival for those transplanted in more recent years,  $P=0.02$ . For those transplanted in 2000 or before, kidney transplant survival was 93.4% at 1 year and 89.4% at 5 years but was 99.4% at 1 year and 95.0% at 5 years for those transplanted after 2005. This era effect was even stronger when considering kidney failure including death with kidney function,  $P=0.007$ . For those transplanted 2000 or before, survival was 89.2% at 1 year and 82.4% at 5 years, but was 95.9% at 1 year and 87.7% at 5 years after 2005. These findings are shown in figures 2.13 and 2.14

**Figure 2.13: Kidney transplant survival, censored for death, for SPK recipients over time**



*Figure 2.14: Kidney transplant survival, including death with a functioning kidney, for SPK recipients over time*



### ***Immunosuppression and rejection***

We planned analyses in this section to document use of immunosuppression in pancreas transplantation over time. We also planned to investigate rejection rates, and donor and recipient characteristics that might impact these.

However, in preparing the data it became clear that over time data definitions and data recording were not consistent. During 2015/6 we are working to improve data quality such that we can report these analyses in subsequent reports.

## ***Pancreas transplant operative data***

Characteristics of the pancreas transplant operations for 2015, previous years, and overall are shown in table 2.8 below.

***Table 2.8: Descriptive characteristics of pancreas transplant operations***

Characteristic	2015	1984-2014	total
<b>Pancreas graft</b>			
Cold ischaemic time, hours			
Mean (sd)	10(3.2)	10(3.3)	10(3.3)
Median (range)	10(5-24)	10(5-22)	10(5-24)
Warm ischaemic time, minutes			
Mean (sd)	16(4.24)	7(6.9)	8(7.1)
Median (range)	16(13-19)	4(1-23)	5(1-23)
Anastomosis time, minutes			
Mean (sd)	30(7.7)	30(7.7)	30(7.3)
Median (range)	29(17-48)	30(12-70)	30(12-70)
Exocrine drainage			
Enteric, n (%)	46(95.8)	421(64.5)	467(66.6)
Bladder, n (%)	1(2.1)	154(23.6)	155(22.1)
Unknown	1(2.1)	78(11.9)	79(11.3)
<b>Kidney graft</b>			
Cold ischaemic time			
Mean (sd)	9(3.2)	10(6.5)	9(6.4)
Median (range)	9(4-23)	10(5-22)	9(5-22)
Warm ischaemic time			
Mean (sd)	15(5.6)	9(13.7)	10(13.1)
Median (range)	15(11-19)	4(13-23)	5(13-23)
Anastomosis time			
Mean (sd)	32(8)	32(8.5)	32(8.4)
Median (range)	32(17-60)	32(11-63)	32(11-63)
Kidney donor arteries			
1	40	473	513
2	7	78	55
More than 2	0	4	4
Unknown	1	128	129

To investigate how much the total cold ischaemic time varied dependant on the donor state, and distance travelled to the transplanting centre, table 2.10 displays a cross tabulation of donor state of origin with transplanting centre.

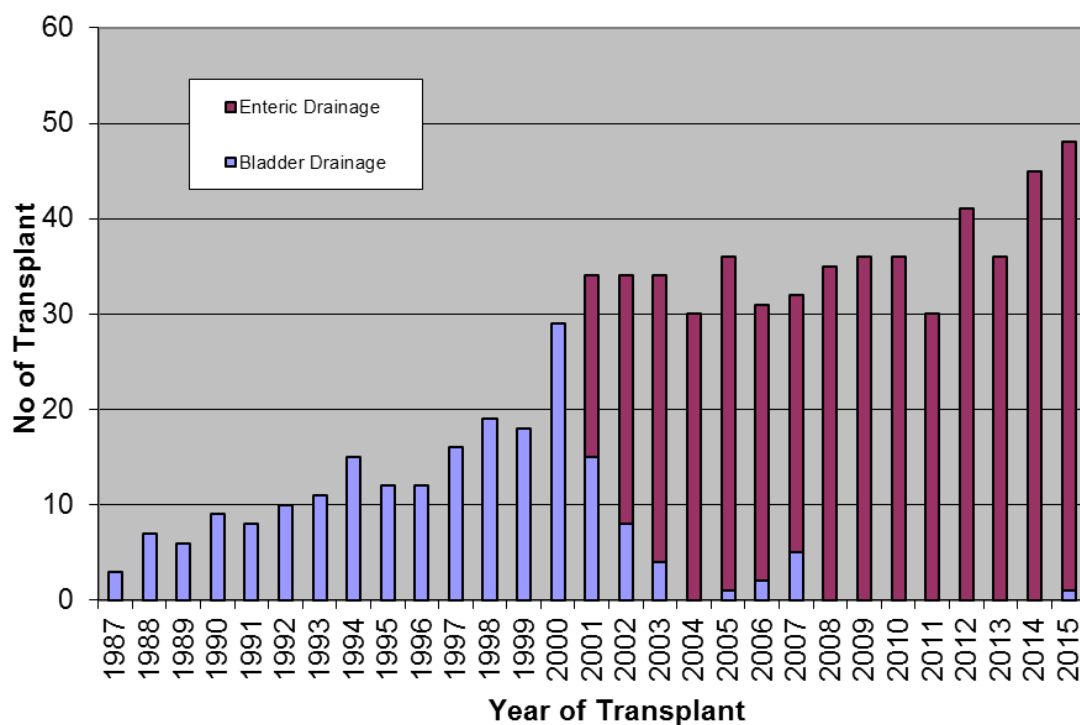
*Table 2.9: Comparison of cold ischaemic time of Pancreas grafts by donor state, for Australian pancreas transplants 2015*

Donor state of origin	Number	Cold ischaemic time, hours (mean, sd)	
		Westmead (NSW)	Monash (Vic)
New South Wales	15	9(1.8)	-
Victoria	16	11(0)	10(4.8)
Queensland	4	12(2.2)	-
South Australia	5	10(0.5)	12(4.2)
West Australia	4	12(2.0)	-
Tasmania	0	-	-
Australian Capital Territory	1	9(0)	-
Northern Territory	0	-	-
Total	45		

## ***Surgical technique***

Exocrine drainage of the pancreas graft has changed over time. Enteric Drainage of the pancreas was first used in Australia and New Zealand during 2001. Figure 2.15 illustrates the number of transplants by pancreas duct management. All pancreas transplants over the last 7 years used enteric drainage of the pancreas duct.

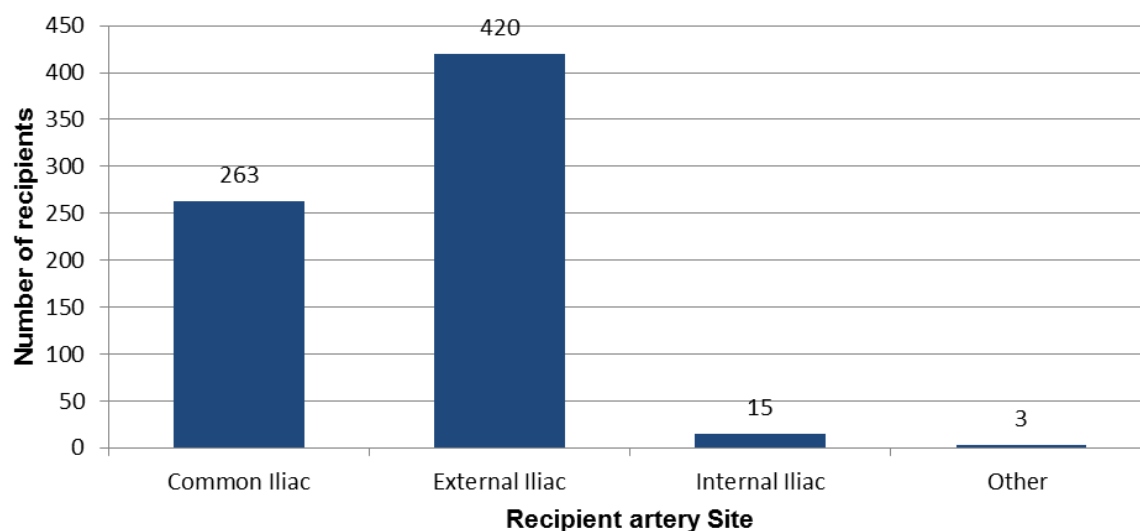
***Figure 2.15: Change in management of exocrine drainage of the pancreas over time***



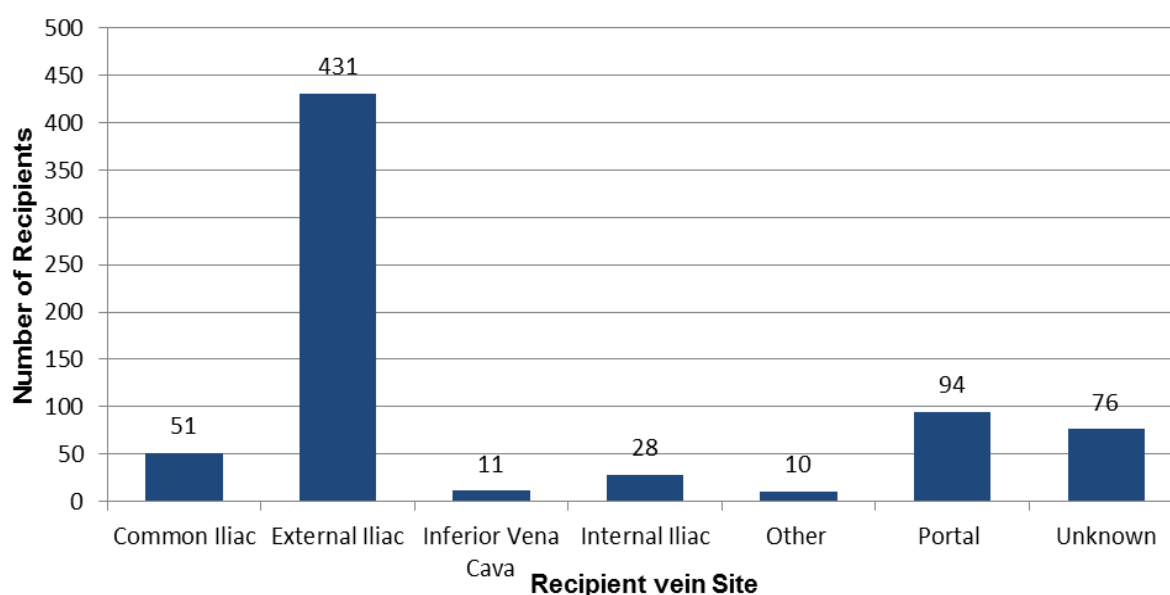
The site of donor vessel anastomoses onto the recipient vessels is dependent on many things, including but not limited to surgeon's preference, surgical ease of access, length and relative calibre of donor

vessels. The sites of anastomosis for donor arteries and veins are displayed in figures 2.16 and 2.17 below.

**Figure 2.16 Site of donor artery anastomosis onto recipient vessel**



**Figure 2.17 Site of donor vein anastomosis onto recipient vessel**





The immunological matching of donor-recipient pairs is shown in table 2.10, and the CMV and EBV matching is illustrated in table 2.11.

**Table 2.10: Immunological cross-matching of donor recipient pairs**

Crossmatch	Sample	
	Current	Peak
CDC		
Negative	594	578
T-cell positive	0	2
B-cell positive	3	4
DTT negative	1	1
Unknown	103	116
Panel Reactive Antibodies %		
Number (%)		
0-24	77(11)	76(11)
25-49	4(1)	10(1)
50+	1	7(1)
Unknown	619(88)	608(87)

**Table 2.11: Infectious disease serology cross-tabulation of donor recipient pairs**

Number (%)	Donor		
Recipient	Serology IgG		
CMV IgG	positive	negative	unknown
Positive	44(92)	3(6)	0
Negative	0	0	0
Unknown	0	0	1(2)
EBV IgG			
Positive	44(92)	0	0
Negative	0	2(4)	
Unknown	0	0	2(4)

# Chapter 3: Pancreas donors

*Authors: Angela Webster, Paul Robertson, Abhijit Patekar, Patrick Kelly*

This chapter gives an overview of donors in 2015 and over time. Donor eligibility criteria guidelines are available in the TSANZ consensus statement <http://www.tsanz.com.au/organallocationprotocols/>, but briefly require donors to be over 25kg, and up to the age of 45, without known diabetes mellitus or pancreatic trauma, or history of alcoholism or pancreatic trauma. Donation after cardiac death may be considered up to the age of 35.

Donor BMI is perceived as impacting recipient outcomes. Obese donors are more likely to have fatty pancreas, which results in more difficult surgery and increased post-operative complications, and suboptimal insulin secretion. Alcohol consumption is defined by a history of consumption of more than 40g/day. We have donor data for 628/658 donors. Table 3.1 describes pancreas donor characteristics in Australia and New Zealand to date.

**Table 3.1: Demographics and characteristics of pancreas transplant donors**

Donor characteristics	2015 N (%)	1984-2014 N (%)	Total N (%)
Total	48	653	701
Age, years (n= 683)			
Mean (sd)	27(9.9)	37(9.8)	27(9.7)

0-24	19(40)	296(45)	315(45)
25-34	14(29)	174(27)	188(27)
35-44	12(25)	137(21)	149(21)
45 and up	2(4)	29(4)	31(4)
Missing	1(2)	17(3)	18(3)
Sex			
Male	28(58)	386(59)	414(59)
Female	20(42)	255(39)	275(39)
Unknown	0	12(2)	12(2)
Donor height, m, mean (sd) (n=622)	1.7(0.1)	1.7(0.1)	1.72(0.1)
Donor weight, kg mean (sd) (n = 621)	71(17.6)	71.(15.1)	72(15.3)
BMI, kg/m <sup>2</sup> mean (sd)			
Underweight <18.5	3(6)	27(4)	30(4)
Normal Weight 18.5-25	29(60)	397(61)	426(61)
Overweight 26-29	8(17)	121(19)	129(18)
Obese 30+	3(6)	28(4)	31(4)
Unknown	5(10)	80(12)	85(12)
Donor type			
Brain Dead (DBD)	47(98)	649(99)	696(99)
Circulatory death (DCD)	1(2)	4(1)	5(1)
Donor mode of death			
Cerebral Hypoxia / Ischaemia	19	56	75
Cerebral Infarct	1	17	18
Intracranial Haemorrhage	3	106	109
Non-Neurological Condition	1	15	16
Other Neurological Condition	2	9	11
Traumatic Brain Injury	21	357	378
Unknown	1	67	68
Days ventilated prior to donation, mean (sd) (n=554)	2.4(1.3)	2.3(1.7)	2.3(1.7)
Alcohol consumption			
Current	3(6)	32(5)	35(5)
Former	1(2)	4(1)	5(1)
Never	43(90)	472(72)	515(73)
Unknown	1(2)	145(22)	146(21)
Smoking history			

Current	9(19)	149(23)	158(23)
Former	6(13)	23(4)	29(4)
Never	32(67)	395(60)	427(61)
Unknown	1(2)	86(13)	87(12)
Blood group			
A	12(25)	251(38)	263(38)
O	25(52)	321(49)	346(49)
B	8(17)	60(9)	68(10)
AB	3(6)	21(3)	24(3)
Unknown			
Kidney biopsy (retrieval or implantation)			
Performed	17(35)	131(20)	148(21)
Not performed	31(65)	515(79)	546(78)
Unknown	0	7(1)	7(1)
CMV serology			
IgG positive	44(92)	438(67)	482(69)
IgG negative	3(6)	167(26)	170(24)
Unknown	1(2)	48(7)	49(7)
Terminal glucose mmol/l (n=436)	8.3(3)	8.1(2.9)	8.1(2.9)
Terminal amylase U/l (n=399)	83(101)	88(133)	88(130)
Terminal Creatinine umol/l (n=638)	72(30)	80(44)	79(43)

The distribution of donor states of origin is shown in tables 3.2 and 3.3, stratified by transplanting unit.

**Table 3.2: Distribution of state of residence of pancreas donors in Australia over time at Westmead national pancreas transplant unit (NSW)**

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	15	1	4	3	4	-	1	-	28
2014	11	2	3	5	3	4	-	-	28
2013	7	-	2	5	4	-	2	-	20

2012	12	2	4	5	3	1	1	-	28
2011	7	3	2	3	3	-	1	-	19
2010	12	1	1	3	1	-	1	-	19
Total	64	9	16	24	18	5	6		142

***Table 3.3: Distribution of state of residence of pancreas donors in Australia over time at Monash pancreas transplant unit (VIC)***

State of residence	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
2015	-	15	-	2	-	-	-	-	17
2014	1	11	-	-	1	2	-	-	15
2013	6	6	-	-	-	1	-	-	13
2012	4	5	-	-	-	-	-	-	9
2011	1	4	-	-	-	2	-	-	7
2010	2	11	-	-	-	1	-	-	14
Total	14	52	0	2	1	6	0	0	75

Tables 3.4 and 3.5 show the distribution of donor organs according to state of origin, cross-tabulated with the state of origin of the recipients who received those organs, for 2015, and from inception of the pancreas program. Note, these tables include Australian donors and recipients only.

*Table 3.4 Cross tabulation of pancreas donor and recipient state of residence 1984-2015, for Australia only*

	State of residence Donor								
State of residence Recipient	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
NSW	125	10	18	20	10	3	13		199
VIC	27	148	1	4	1	16	1		198
QLD	59	9	15	22	10	0	9		124
SA	14	8	5	8	2	1	3		41
WA	17	2	10	5	8	1	1		44
TAS	14	6	0	1	0	0	0		21
ACT	15	1	3	2	1	0	0		22
NT	1	0	0	1	2	0	0		4
Total	272	184	52	63	34	21	27	0	<b>653</b>

*Table 3.5 Cross tabulation of pancreas donor and recipient state of residence 2015, for Australia only*

	State of residence Donor								
State of residence Recipient	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
NSW	6	1	4	3	2	0	0	0	16
VIC	1	14	0	2	0	0	0	0	17
QLD	7	0	0	0	0	0	1	0	8
SA	1	0	0	0	0	0	0	0	1
WA	0	0	0	0	1	0	0	0	1
TAS	0	0	0	0	0	0	0	0	0
ACT	0	0	0	0	0	0	0	0	0
NT	1	0	0	0	1	0	0	0	2
Total	16	15	4	5	4	0	1	0	<b>45</b>

# ***Chapter 4: Islet cell transplants***

*Authors: Patricia Anderson, Angela Webster*

Islet transplants are a treatment for type 1 diabetics who have hypoglycaemic unawareness and/or severe metabolic instability, are sensitive to insulin, but who have minimal or no kidney impairment. Whole donor pancreas organs are processed aiming to produce a concentrate of islet cells >4000 islet equivalent numbers (IEQ)/kg in a volume of <8ml. Islet transplant recipients may require more than one islet transplant to become insulin independent.

Data for islet transplant donors and recipients in Australia is still sparse. The islet transplant program started in 2002. There are three active islet transplant centres; the National Pancreas Transplant Unit at Westmead Hospital, the Royal Adelaide Hospital, and St Vincent's hospital in Melbourne. There is no islet transplant program in New Zealand.

In this year's report we have added as much data as we have available on the islet program in Australia to date, and expanded description to capture the waiting list for islet transplants, donor and recipient characteristics. We have only reported islet donors and procedures that were intended for an islet transplantation, and not islet isolation procedures that were undertaken for research purposes. Some donor isolations intended for transplantation did not proceed to transplantation.



The islet program waiting list is not long. Table 4.1 shows the islet waiting list numbers over time.

**Table 4.1 Islet waiting list status data over time; Westmead Hospital (NSW), St Vincent's Hospital (VIC) Royal Elizabeth Hospital (SA)**

	2015	2014	2000-2013
active list at beginning of year	9	6	30
added to active list during the year	5	8	2
removed from active list during year	2	1	1
Transplants to waiting list *	13 Recipients 16 Transplants	9 Recipients 10 Transplants	27 Recipients 58 Transplants
Death while active on list	0	1	2
active waiting list at the end of year	5	13	6
Death within 12 months of removal from list	0	0	0
under consideration but not active on list <i>Westmead Data Only</i>	1 Eligible 4 Delay 10 Withdrawn 0 LTFU 0 No Decision 0 Death 5 Other reasons	1 Eligible 1 Delay 10 Withdrawn 0 LTFU 0 No Decision 1 Death 2 Other reasons	6 Eligible 21 Delay 10 Withdrawn 14 LTFU 4 No Decision 2 Death 21 Other reasons
referred but declined for islet transplantation <i>Westmead Data Only</i>	2 Not Eligible	1 Not Eligible	63 Not Eligible

\*Includes Auto and SIK

## Islet isolations

Sometimes when pancreas donations are processed for islet transplantation, the resulting islets are not suitable to be used. This occurs for a number of reasons, and the decision to proceed with transplantation is made once the final concentration of islet cells is known. Occasionally, islet isolation procedures occur at one hospital, with the intent that the resulting islets are used and transplanted at another hospital in the network. Table 4.2a and b describe the characteristics of islet cell donor isolations over time, by centre, and table 4.2c combines isolations from Victoria and South Australia.

*Table 4.2a Islet deceased donor characteristics from isolations performed in Westmead Hospital*

Donor characteristics	2015 N (%)	1984- 2014 N (%)	Total N (%)
Total	9	44	53
Age, years	47.6	45.2	46
Mean (sd)	6.6	9.6	8.7
0-24	0	2	2
25-34	0	8	8
35-44	5	10	15
45 and up	4	24	28
Missing	0	0	0
Gender			
Male	7	28	35
Female	2	16	18
Unknown	0	0	0
Donor height, m, mean (sd)	175(6.6)	175.4(10.7)	175.3(10.2)
Donor weight, kg mean (sd)	47.6(19.7)	93.0(17.9)	93.6(18.1)
BMI, kg/m2 mean (sd)	31.7(8.0)	17(7.72)	30.68(77)

Underweight <18.5	0	0	0
Normal Weight 18.5-25	0	13	13
Overweight 26-29	5	11	16
Obese 30+	4	20	24
Unknown	0	0	0
Donor type			
Brain Dead (DBD)	8	43	51
Circulatory death (DCD)	1	1	2
Donor mode of death			
Cerebral Hypoxia / Ischaemia	0	4	4
Cerebral Infarct	2	1	3
Intracranial Haemorrhage	6	19	25
Non-Neurological Condition	0	6	6
Other Neurological Condition	0	4	4
Traumatic Brain Injury	1	6	7
Unknown	0	4	4
Days ventilated prior to donation, mean (sd)	1.8(0.8)	2.4(1.5)	2.0(1.2)
Alcohol consumption			
Current	0	7	7
Former	0	1	1
Never	8	28	36
Unknown	0	7	7
Smoking history	3		3
Current	0	6	6
Former	5	1	6
Never	0	29	29
Unknown	0	7	7
Cultural and Ethnic Group*			
White	9	28	37
North East Asian (Chinese)	0	0	0
South East Asian	0	0	0
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	0	0	0
Indigenous Australian or Torres Strait Islander	0	0	0
Maori and Pacific Islander	0	3	3
Other	0	0	0
Unknown	0	13	13

Blood group			
A	2	20	22
O	5	16	21
B	1	6	7
AB	1	2	3
Unknown	0	0	0
CMV serology			
IgG positive	4	26	30
IgG negative	5	16	21
Unknown	0	2	2
Terminal glucose (sd)	12.1(1.8)	9.7(2.8)	10.3(2.1)
Terminal amylase	44(30.6)	72.4(44)	63.9(41.1)

2 isolations were performed at Westmead for intended use in South Australia.

*Table 4.2b Islet donor characteristics for isolations performed in St Vincent's Hospital (VIC) and in South Australia*

Donor characteristics	2015 N (%)	1984- 2014 N (%)	Total N (%)
<b>Total</b>	10	35	45
<b>Age, years</b>	42.8	46.5	45.7
Mean (sd)	21.2	15.2	16.4
0-24	1	4	5
25-34	2	4	6
35-44	3	4	7
45 and up	3	23	26
Missing	1	0	1
<b>Gender</b>			
Male	8	18	26
Female	1	16	17
Unknown	1	1	2
Donor height, m, mean (sd)	150.6(15.3)	166(33.5)	163.7(40.6)
Donor weight, kg mean (sd)	80.3(25.7)	97(25.5)	93.7(26.1)

BMI, kg/m <sup>2</sup> mean (sd)	29.0(4.5)	32.4(6.4)	43.4(15.6)
Underweight <18.5	0	0	0
Normal 18.5-25	2	4	6
Overweight 26-29	2	8	10
Obese 30+	3	20	23
Unknown	3	3	6
Donor			
Auto			1
Brain Dead (DBD)	9	35	44
Circulatory death (DCD)	0	0	0
Donor mode of death			
Cerebral Hypoxia / Ischaemia	2	3	5
Cerebral Infarct	1	3	4
Intracranial Haemorrhage	4	21	25
Non-Neurological Condition	1	3	4
Other Neurological Condition	0	0	0
Traumatic Brain Injury	0	4	4
Unknown	1	1	2
<b>Days ventilated prior to donation, mean (sd)</b>	5.7(6.9)	2.9(3.7)	3.39(4.4)
<b>Alcohol consumption</b>			
Current	0	0	0
Former	0	0	0
Never	5	22	27

Unknown	5	13	18
<b>Smoking history</b>			
Current			
Former			
Never	1	22	23
Unknown	9	13	22
<b>Cultural and Ethnic Group*</b>			0
White	8	34	42
North East Asian (Chinese)	0	0	0
South East Asian	0	0	0
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	0	0	0
Indigenous Australian or Torres Strait Islander	1	0	1
Maori and Pacific Islander	0	0	0
Other	0	0	0
Unknown	1	1	2
<b>Blood group</b>			0
A	2	13	15
O	3	16	19
B	3	5	8
AB	0	0	0
Unknown	2	1	3
<b>CMV serology</b>			0
IgG positive	4	18	22
IgG negative	4	13	17
Unknown	2	4	6
<b>Terminal glucose (sd)</b>	13.11(2.5)	10.6(4.7)	11.6(4.2)
<b>Terminal amylase</b>	165(115)	63.2(34.3)	77.8(60.6)

## Islet isolations resulting in transplantation

Donors who provided pancreatata that resulted in islet isolations that proceeded to transplantation are summarised in table 4.3.

*Table 4.3 Islet donor characteristics for isolations which resulted in transplantation at Westmead Hospital (NSW) and St Vincent's Hospital (VIC)*

Donor characteristics	NSW	VIC	Combined totals
Total	44	35	79
Age, years	47.6	45.2	45.8
Mean (sd)	9.6	15.2	13
0-24	2	4	6
25-34	8	4	12
35-44	10	4	14
45 and up	24	22	46
Missing	0	1	1
Gender			
Male	28	18	46
Female	16	16	32
Unknown	0	1	1
Donor height, m, mean (sd)	175.4(10.7)	166.0(33.5)	173.9(13.2)
Donor weight, kg mean (sd)	93.0(17.9)	97.0(25.5)	95.3(25.5)
BMI, kg/m <sup>2</sup> mean (sd)	17.0(7.72)	32.4(6.4)	32.4(6.4)
Underweight <18.5	0	0	0

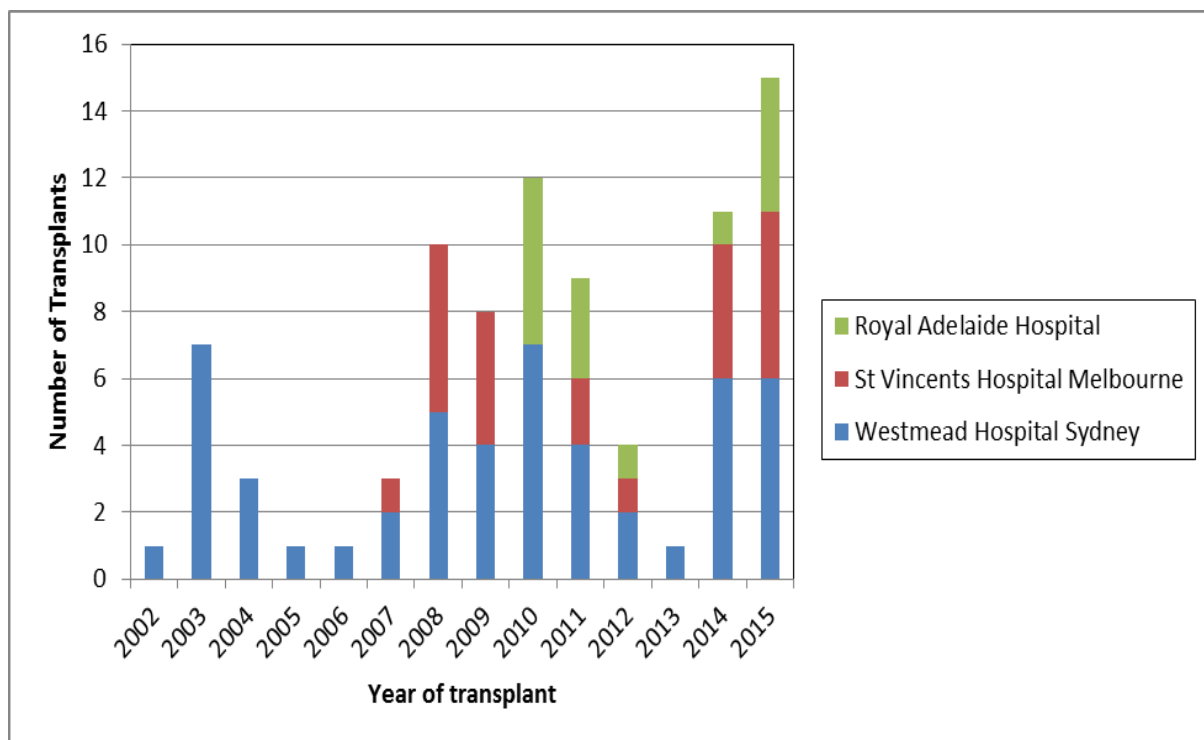
Normal Weight 18.5-25	13	4	17
Overweight 26-29	11	8	19
Obese 30+	20	20	40
Unknown	0	3	3
Donor type			
Brain Dead (DBD)	43	35	78
Circulatory death (DCD)	1	0	1
Donor mode of death			
Cerebral Hypoxia / Ischaemia	4	3	7
Cerebral Infarct	1	3	4
Intracranial Haemorrhage	19	19	38
Non-Neurological Condition	6	3	9
Other Neurological Condition	4	0	4
Traumatic Brain Injury	6	4	10
Unknown	4	3	7
Days ventilated prior to donation, mean (sd)	2.4(1.5)	2.9(3.7)	2.6(2.8)
Alcohol consumption			
Current	7	0	7
Former	1	0	1
Never	28	22	50
Unknown	7	14	21
Smoking history			
Current	6		6



Former	1		1
Never	29	22	51
Unknown	8	13	21
Cultural and Ethnic Group*			
White	28	34	62
North East Asian (Chinese)	0	0	0
South East Asian	0	0	0
South and Central Asian (Indian)	0	0	0
Middle Eastern or North African	0	0	0
Indigenous Australian or Torres Strait Islander	0	0	0
Maori and Pacific Islander	3	0	3
Other	0	0	0
Unknown	13	1	14
Blood group			
A	20	13	33
O	16	16	32
B	6	5	11
AB	2	0	2
Unknown	0	1	1
CMV serology			
IgG positive	26	18	44
IgG negative	16	13	29
Unknown	2	4	6
Terminal glucose (sd)	9.7(2.8)	10.6(4.7)	10.3(4.0)
Terminal amylase	72.4(44)	63.5(34.3)	74.1(62.5)

Figure 4.1 illustrates the number of islet cell transplants in Australia between 2002 and 2015. The transplants were performed in Westmead (50), St Vincent's (22), and Royal Adelaide (14) Hospitals. In 2015, 6 transplants were performed at Westmead, 5 at St Vincent's and 4 at the Royal Adelaide.

*Figure 4.1 Islet transplant activity 2002-2015, by transplanting centre*



The following tables 4.4, 4.5 and 4.6 describe characteristics of donor and recipient matches according to blood group, state, and sex distributions

*Table 4.4a: Cross tabulation of recipient and donor blood groups, 2002-2015, from transplants undertaken in Westmead Hospital (NSW)*

Number (% total)	Donor Blood Group				
Recipient Blood Group	A	O	B	AB	Total
A	14	3	-	-	17
O	-	14	-	-	14
B	-	-	3	-	3
AB	1	-	-	1	2
Total	15	17	3	1	36

*Table 4.4b: Cross tabulation of recipient and donor blood groups, 2002-2015, from transplants undertaken in St Vincent's hospital (VIC)*

Number (% total)	Donor Blood Group				
Recipient Blood Group	A	O	B	AB	Total
A	20	12	-	-	32
O	-	8	-	-	8
B	-	-	4	-	4
AB	2	-	1	3	6
Total	22	20	5	3	50

*Table 4.4b: Cross tabulation of recipient and donor blood groups, 2002-2015, from transplants undertaken in Royal Adelaide Hospital (SA)*

Number (% total)	Donor Blood Group				
Recipient Blood Group	A	O	B	AB	Total
A	7	1	-	-	8
O	-	5	-	-	5
B	-	-	2	-	2

AB	-	-	-	-	-
Total	7	6	2	-	15

**Table 4.5: Cross tabulation of recipient and donor sex, 2002-2015\***

Number (% total)	Donor sex		
Recipient sex	Female	Male	Total
Female	25	40	65
Male	11	17	28
Total	36	57	93

\* this includes 53 isolations at Westmead, and 45 isolations at Melbourne only. Recipients received more than 1 transplant therefore recipients may be duplicated in numbers

**Table 4.6 Cross tabulation of recipient and donor blood groups, 2002-2015, for islet transplants undertaken in Australia**

Number (% total)	Donor Blood Group				
Recipient Blood Group	A	O	B	AB	Total
A	39	16	-	-	55
O	1	27	-	-	28
B	-	-	10	-	10
AB	3	-	1	4	8
Total	43	43	11	4	101

## Islet Transplant recipients

Characteristics of islet transplant recipients are shown below. Most recipients receive more than one islet transplant, and so receive islets from multiple donors. Some people received an auto-transplant, which is where a person becomes their own donor. This may be indicated when an individual who is not diabetic needs to have their pancreas removed. This organ is then processed and the islet isolated, and transplanted back into the recipient. Recipient state of residence is shown in table 4. 7.

*Table 4.7 islet transplant recipients by state of residence*

Recipient residence state or territory	Number of recipients by number of transplants they have received			<i>Total</i>	Number of recipients by number of transplants they have received			<i>Total</i>
	<i>Westmead</i>				<i>Melbourne</i>			
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	
NSW	5	4	1	10	5	4	1	10
VIC	-	-	-	-	4	8	1	13
QLD	6	3	-	9	6	3	-	9
SA	1	-	-	1	3	3	1	7
WA	4	1	-	5	4	1	-	5
TAS	-	-	-	-	1	1	-	2
ACT	-	-	-	-	-	-	-	-
NT	-	-	-	-	-	-	-	-
<i>Total</i>	16	8	1	25	23	20	3	46

The stats of residence cross tabulation for each transplantation is shown in tables 4.8, stratified by the centre performing the transplant procedure.

**Table 4.8a Cross tabulation of islet donor and recipient state of residence for activity at Westmead hospital (NSW)\***

State of residence	Donors								
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
NSW	17	9	1	4	-	-	-	-	31
VIC	-	-	1	-	-	-	-	-	1
QLD	5	2	1	-	-	-	-	-	8
SA	1	-	1	0	1	-	-	-	3
WA	3	-	2	1	1	-	-	-	7
TAS	-	-	1		-	-	-	-	1
ACT	-	-	-	1	-	-	-	-	1
NT	-	-	-	-	-	-	-	-	0
Total	26	11	7	6	2	0	0	0	52
* 2 auto transplants included (1 NSW & 1 WA)									

**Table 4.8b Cross tabulation of islet donor and recipient state of residence at St Vincent's Hospital (VIC)**

State of residence	Donors								
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
NSW	-	1	-	-	-	-	-	-	1
VIC	-	12	-	5	-	3	-	1	21
QLD	-	-	-	-	-	-	-	-	-
SA	1	6	-	2	-	2	-	-	11
WA	-	-	-	-	-	-	-	-	-
TAS	-	2	-	-	1	-	-	-	3
ACT	-	-	-	-	-	-	-	-	-
NT	-	-	-	-	-	-	-	-	-
Total	1	21	-	7	1	5	-	1	36

**Table 4.8c Cross tabulation of islet donor and recipient state of residence at Royal Adelaide Hospital (SA)\***

State of residence	Donors								
	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
NSW	-	-	-	-	-	-	-	-	-
VIC	-	-	-	-	-	-	-	-	-
QLD	--	-	-	-	-	-	-	-	-
SA	1	7	-	4	-	1	-	-	13
WA	-	-	-	-	-	-	-	-	-
TAS	-	1	-	1	-	1	-	-	3
ACT	-	-	-	-	-	-	-	-	-
NT	-	-	-	-	-	-	-	-	-
Total	1	8	-	5	-	2	-	-	16
*1 auto transplant									

Characteristics of Islet recipients over time are shown in table 4.9

**Table 4.9: characteristics of islet cell transplant recipients in Australia**

Recipient characteristics	2015	2002-2015	Total *
	N (%)	N (%)	N (%)
Total	12	36	48
Recipient age, years	45.9	49.5	46.3
Mean (sd)	16.4	9.8	12.8
Recipient Gender			
Male	5	10	15
Female	7	26	33
No. of transplants per recipient			
1	7	12	19

2	4	16	20
3	-	8	8
4	-	-	-
Insulin dependent post transplant *			
Yes	3	15	18
No	9	21	30
Unknown	-	-	-
State of residence			
New South Wales	2	13	15
Victoria	4	10	14
Queensland	-	4	4
South Australia	3	5	8
West Australia	2	2	4
Tasmania	1	1	2
Australian Capital Territory	-	1	1
Northern Territory	-	-	-
Donor age mean(SD)	36.2(13.8)	45.8(13.5)	46.2(13.8)
Donor gender			
Male	15	47	62
Female	5	25	30
Unknown	1	-	1
* Insulin independence defined as total daily dose insulin less than 5 units per day			



*Table 4.9: Summary of Islet Cell Transplant Activity, for all centres Australia over time*

Site	Recipients	Donors	Islet-kidney	Auto	Procedures
<b>1984- 2014</b>					
Westmead	24	43	2	1	45
St Vincent's	10	18	-	-	17
Royal Adelaide	8	14	-	1	14

# Appendix

The following abstract was submitted to the Transplantation Society of Australia and New Zealand Annual Scientific Meeting for April 2016 and to the Transplantation Society meeting in August 2016.

## Abstract 1: Recipient graft survival

### RECIPIENT AND PANCREAS GRAFT SURVIVAL AFTER KIDNEY-PANCREAS TRANSPLANTATION IN AUSTRALIA AND NEW ZEALAND: A COHORT STUDY 1984-2014

**Introduction:** We evaluated survival for kidney-pancreas recipients (SPK) in Australia and New Zealand.

**Methods:** Data 1984-2014 from the Australia and New Zealand Islet and Pancreas Transplant Registry were used to analyse time to pancreas failure (first of; pancreatectomy, insulin-dependence, with and without death) or death (all-cause), using Kaplan-Meier survival curves, censoring at last follow-up. We used Cox models (Hazard ratios HR, with 95%CI) to identify prognostic factors.

**Results:** We included 627 recipients, with 5,370 years of observation, 119 (19%) deaths and 214 (34%) pancreas failures. Patient survival was 97% at 1 year, 93% 5 years, 81% 10 years, 69% 15 years and 64% 20 years (figure). After adjusting for other differences, risk of dying decreased by 48% for people receiving SPK in 2010-2014 compared to 1989-1994 (HR0.52;  $p<0.01$ ). Recipient age increased risk of death 4% for every year older at transplantation (HR1.04;  $p=0.04$ ). There was no evidence of increased risk with any other factors ( $p>0.05$ ). Pancreas survival was 84% at 1 year, 76% 5 years, 64% 10 years, 56% 15 years and 50% 20 years. Pancreas failure decreased 40% between 1989-1994 and 2010-2014 (HR0.60;  $p<0.02$ ). After adjusting for other differences, risk of pancreas failure increased by 2% for every year of donor age (HR1.02;  $p=0.03$ ). There was some suggestion that longer time on RRT associated with higher risk of pancreas failure ( $p=0.08$ ).

**Conclusion:** There has been substantial improvement in patient survival and a substantial reduction in the risk of pancreas failure since SPK first began in ANZ.

*Figure: Recipient and pancreas survival after SPK in Australia and New Zealand*

