

# AUSTRALIA AND NEW ZEALAND LIVER TRANSPLANT REGISTRY



*From the Combined Registries  
of the Australian and New Zealand Liver  
Transplant Centres*

**DATA TO 30/06/00**

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## Preface

The liver transplant centres in Australia and New Zealand report details of their liver graft recipients to a combined registry so that a National analysis can be done. Centres are situated in Adelaide, Brisbane, Melbourne, Perth and Sydney in Australia and Auckland, New Zealand.

This, the 12<sup>th</sup> Report, was prepared by the Australian National Liver Transplant Unit, Sydney. Data collected from the six units was analysed and the outcome of all liver transplant recipients from January 1985 to June 2000 is presented. The New Zealand Liver Transplant Unit began clinical practice in March 1998. Prior to this all New Zealand patients received their grafts in Australia.

The Editors thank the Liver Transplant Units for contributing their data. A full list of units is included in the Appendix. They also wish to thank the Australia and New Zealand Organ Donor Registry for kindly contributing the donor information.

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*12th report*

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Dr D Verran  
Ms P Dilworth  
Ms J Fisher

## Summary

### Page

5. Within Australasia, between January 1985 and June 2000, 1678 orthotopic liver transplants (OLTx) were performed on 1540 patients. Of these, 1270 (78%) were adults and 333 (22%) children.
6. The rate of Tx in adults climbed steadily in the early years 1985-97 but appears to have plateaued in the 130-140 range. Child Tx fluctuated between 32 and 43 in the years 1991-93 but has fallen since to the 18-27 range, including a steady fall in international patients.
- 7 – 8. Of the adult recipients, 993 (82%) were Australian citizens, 142 (12%) New Zealand Citizens and 72 (6%) were from other countries. In the paediatric group, 200 (60%) were Australian citizens, 48 (14%) New Zealand citizens and 85 (26%) were from other countries. The mean age if adults was 45 yr and of children 4.5 yr. Male patients numbered 697 (58%) and female 510 (42%).
9. Children received reduced liver allografts in 247/385 (64%) of cases. There were no differences in the utilisation of reduced allografts in Australian citizens 148/236 (63%) compared to New Zealand 35/53 (66%) or Other 64/96 (67%) citizens.
12. The most common underlying disease for which OLTx was performed on adult Australian citizens was chronic viral hepatitis (24%), followed by primary sclerosing cholangitis (13%), alcoholic liver disease (12%), primary biliary cirrhosis (11%), fulminant hepatic failure (9%) and metabolic disorders (7%).  
  
In NZ citizens the most common indications for OLTx in adults were fulminant hepatic failure (20%), chronic viral hepatitis (19%) and primary sclerosing cholangitis (18%).  
  
In Other citizens the most common indication for transplantation in adults was chronic viral hepatitis (25%).
13. In children, biliary atresia accounted for 66% (Australian), 60% (NZ) and 88% (Other) patients.
14. Hepatitis C is the most common indication for OLTx for chronic viral illness in Australian (59%) and Other citizens (83%), while hepatitis B is the most common in NZ citizens (59%).
- 15 – 16. Current 1 year patient survival (adults and children) is 84%. Five year and 10 year survivals are 77% and 68% respectively. There were no major differences in survivals at 1, 5 and 10 years between Australian, NZ or Other citizens.
- 17 – 18. Australian patients who are in the 3-14 year age group at the time of OLTx have the best long term survival, (86% at 5 years), followed by those in the age group 15-54 years of age (77%). Those who are >60 years of age survive less well (63%).
- 19 – 20. Since 1990 adult and child patient 1 yr survival has fluctuated between 80 – 90%.
21. Children under 8 kilograms of weight at the time of liver transplantation have a 1 year survival inferior to those over 8 kilograms of weight (68% v 87%).

22. There is a trend for paediatric recipients of whole liver allografts to have a superior patient survival from 1-6 years post Tx, over those who receive reduced liver allografts (84% vs 74%), but long term survival is similar.
23. Adult patients who undergo liver transplantation for alcoholic liver disease have the best survival at 1 and 5 years (90% and 89% respectively), followed by patients with primary biliary cirrhosis (88% and 82%) and with chronic autoimmune hepatitis (88% and 84%). Those transplanted for malignancy have the worst long term survival – 46% at 5 years.
24. In children with biliary atresia 1 and 5 year survivals are 84% and 78% respectively.
24. For fulminant hepatic failure adult 1 and 5 years survivals are 75% and 71% respectively and child survivals are 60% and 60% respectively.
25. One and 5 yr survival of adults with hep C are 87% and 76% and for hep B 73% and 63%.
26. Three (43%) of 7 living donor grafts remain functional and 4 (57%) of these patients remain alive, one with a secondary cadaveric donor graft.
27. Graft survival at 1 year is 80% following primary grafting, compared to 58% for a second allograft and 40% for a third graft.
28. In the first year following OLTx, the most common indicators for retransplantation are primary non function, vascular complications and rejection. After one year post OLTx, the most common indicators for retransplantation are graft failure due to chronic rejection, recurrent disease and vascular complications.
29. In the first year following transplantation patient death and vascular complications are the major causes of allograft loss. After one year, patient death and recurrent disease are the major factors for allograft loss.
31. Sepsis and graft failure are the most frequent causes of patient death in the first year. After one year, malignancy emerges as the major cause of patient death together with graft failure due to rejection or recurrent disease.
33. There is little difference in graft survivals for donors in the various age groups except for donors >65 years where 1 and 5 year survivals are 60% and 40%, though numbers are small.
33. Liver donation has gradually increased to around 150 per year (except 1998) and the slow increase may be continuing.
34. At the time of Tx 136 (9%) patients had cancer present (primary 3%, incidental 6%). Since Tx 34 (25% of those with Ca) have recurred, 50 (3% of all patients) have de novo Ca and 134 (9%) skin Ca.
- 36 – 38. Long term survival of patients with Ca (primary, incidental or de novo) is around 40%.
41. By 10 years post-tx 30% of patients will have cancer (10% recurrent or de novo non-skin Ca, 22% skin Ca)

# **Section 1**

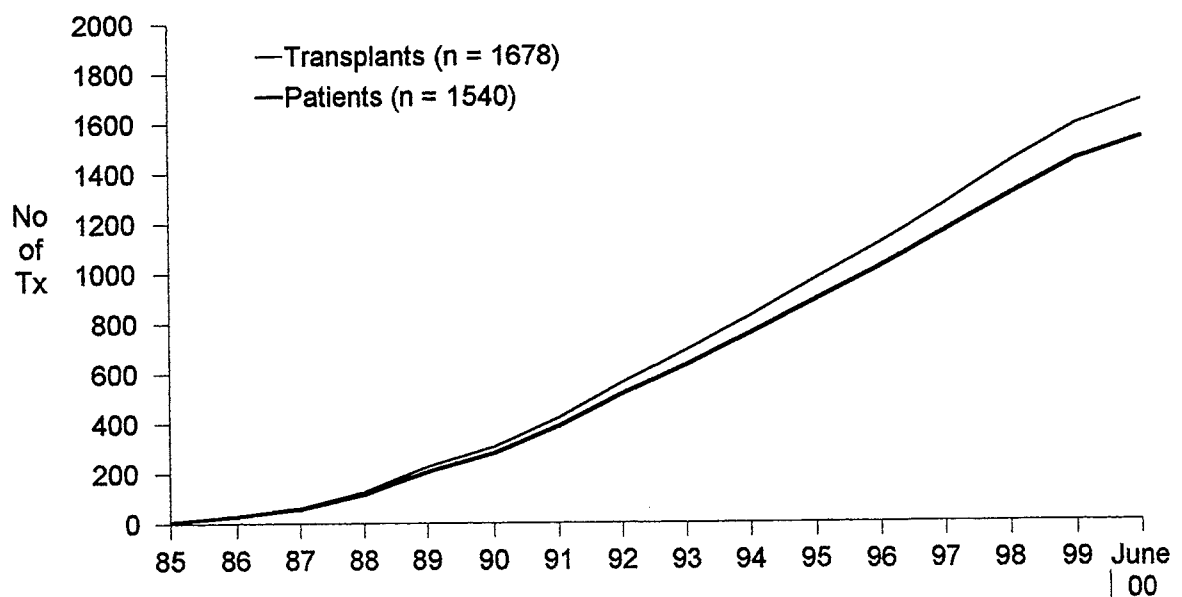
## **Demographic Data**

## Age, Gender, Survival Summary Statistics

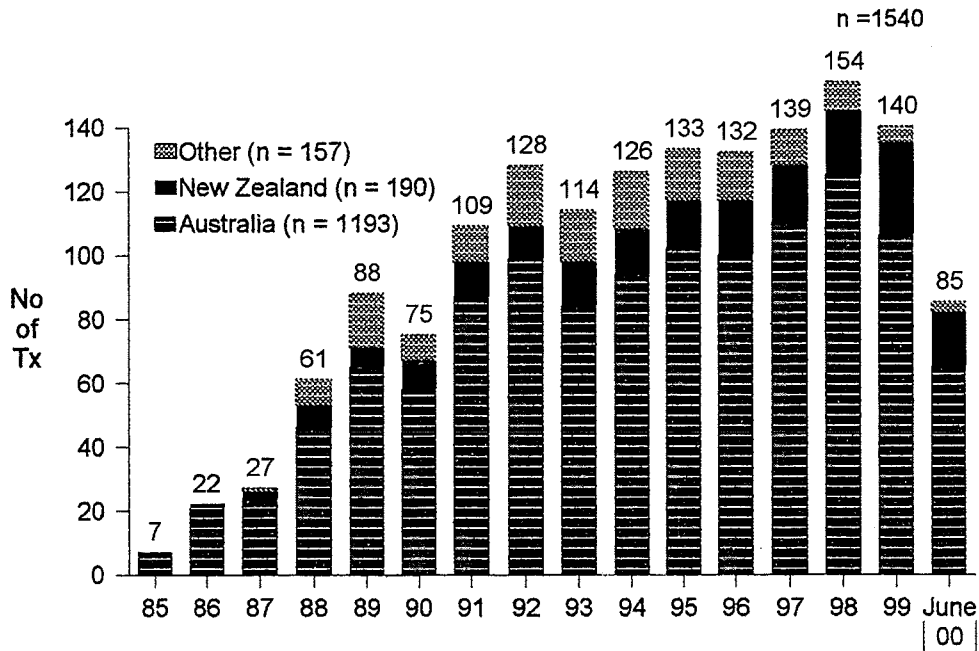
### LIVER Tx RECIPIENTS (AUSTRALIAN, NEW ZEALAND, OTHER)

	Children	Adults	Total
Patients	333 (22%)	1207 (78%)	1540
Age			
Mean	4.5 ± 4.3	45.1 ± 12.3	36.3 ± 20
Median	2.4y	47y	43.1y
Range	1m - 14.9y	15 - 67.5y	1m - 67.5y
Gender			
Female	184 (55%)	510 (42%)	694 (45%)
Male	149 (45%)	697 (58%)	846 (55%)
Surviving	256 (77%)	916 (76%)	1172 (76%)

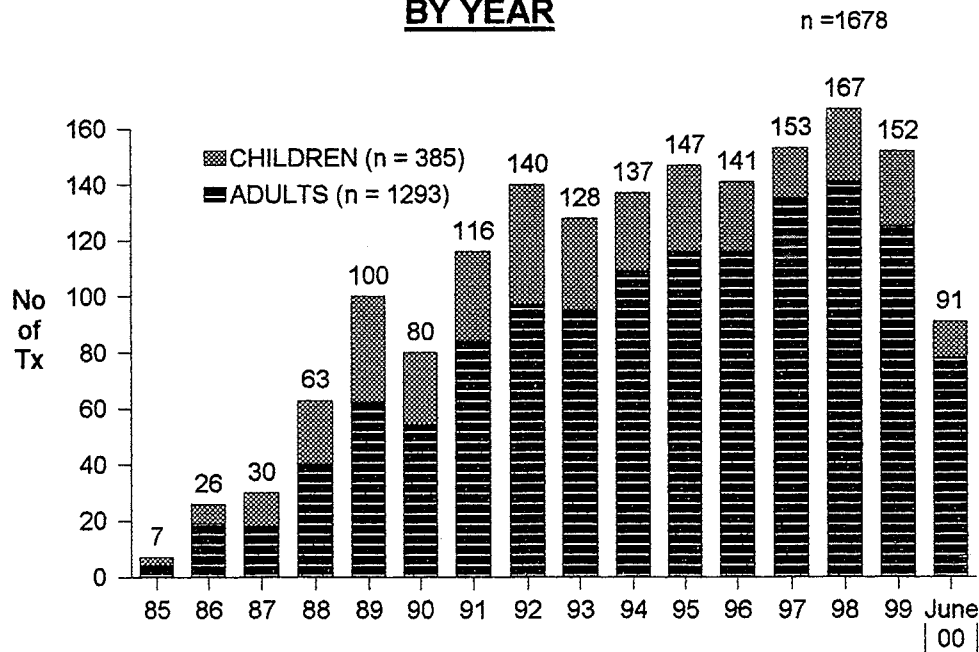
### CUMULATIVE NUMBER OF PATIENTS AND TRANSPLANTS



### NUMBER OF NEW RECIPIENTS BY YEAR



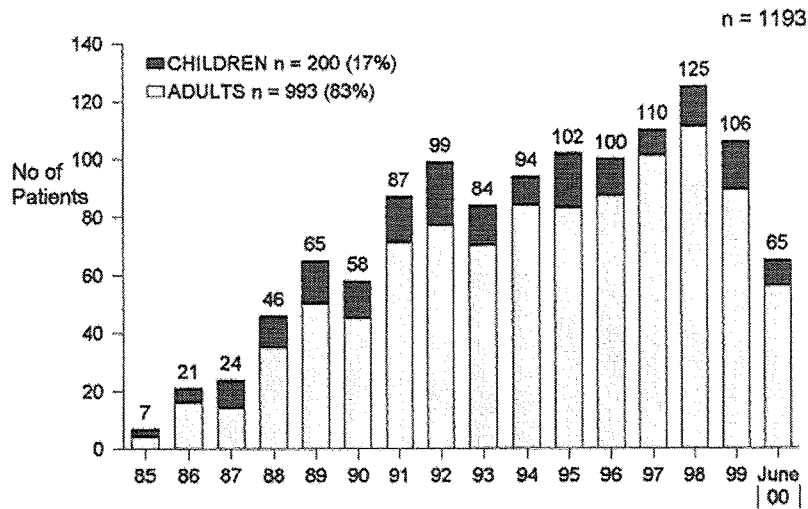
### NUMBER OF TRANSPLANTS BY YEAR



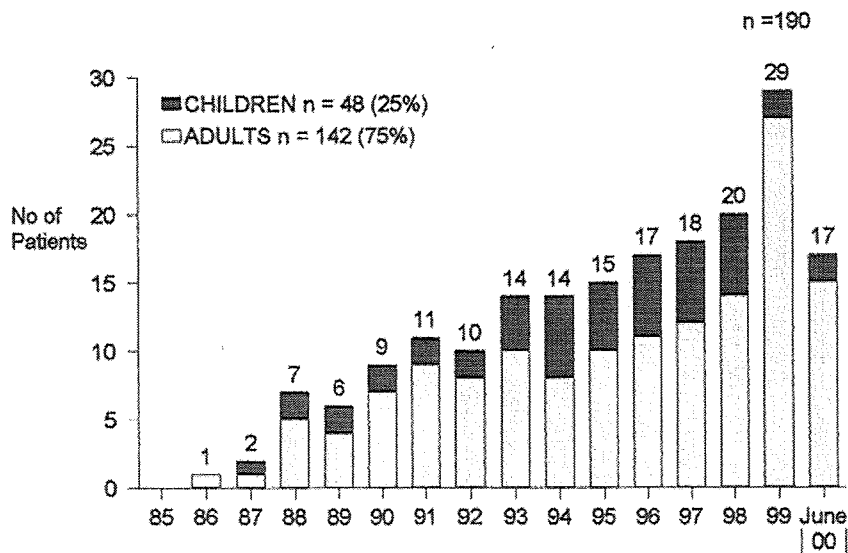


## NUMBER OF RECIPIENTS BY YEAR (n = 1540)

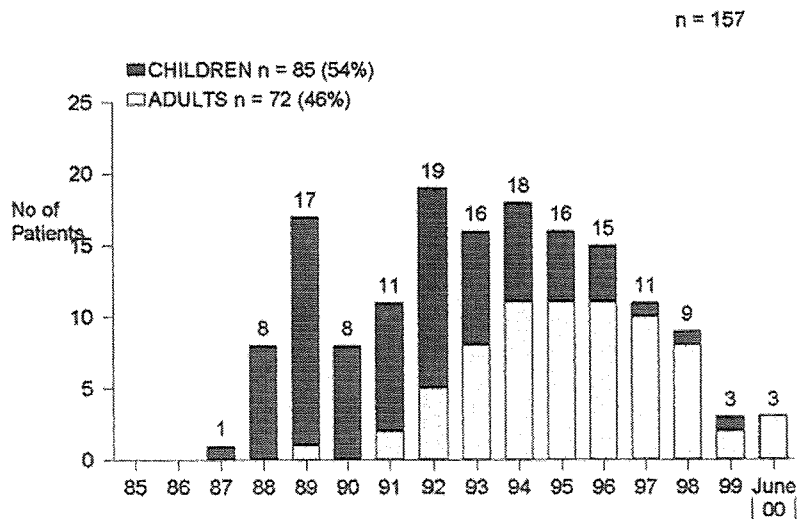
### AUSTRALIAN CITIZENS



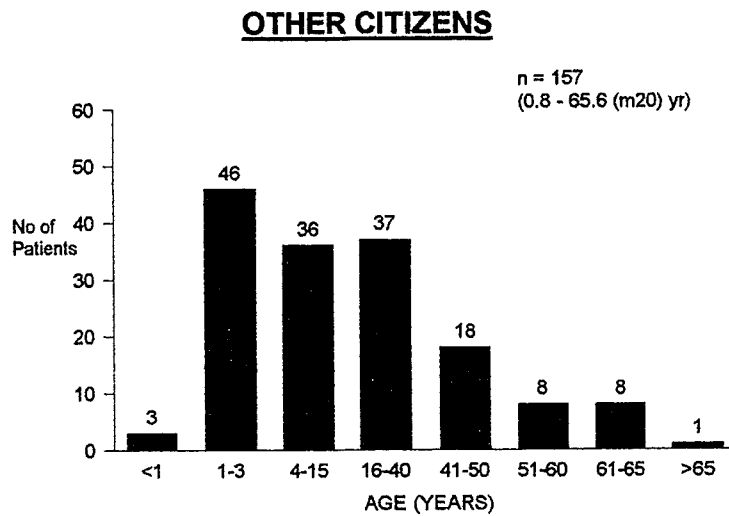
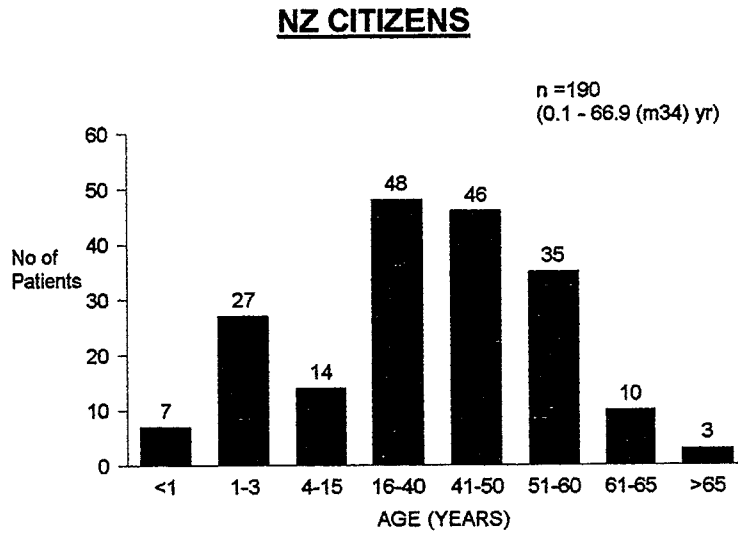
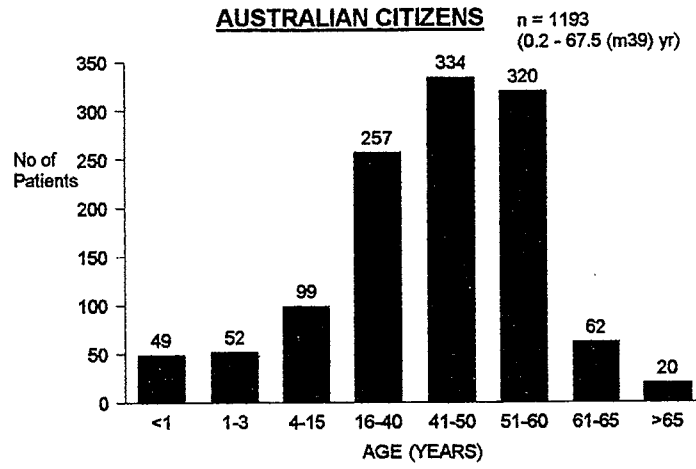
### NZ CITIZENS



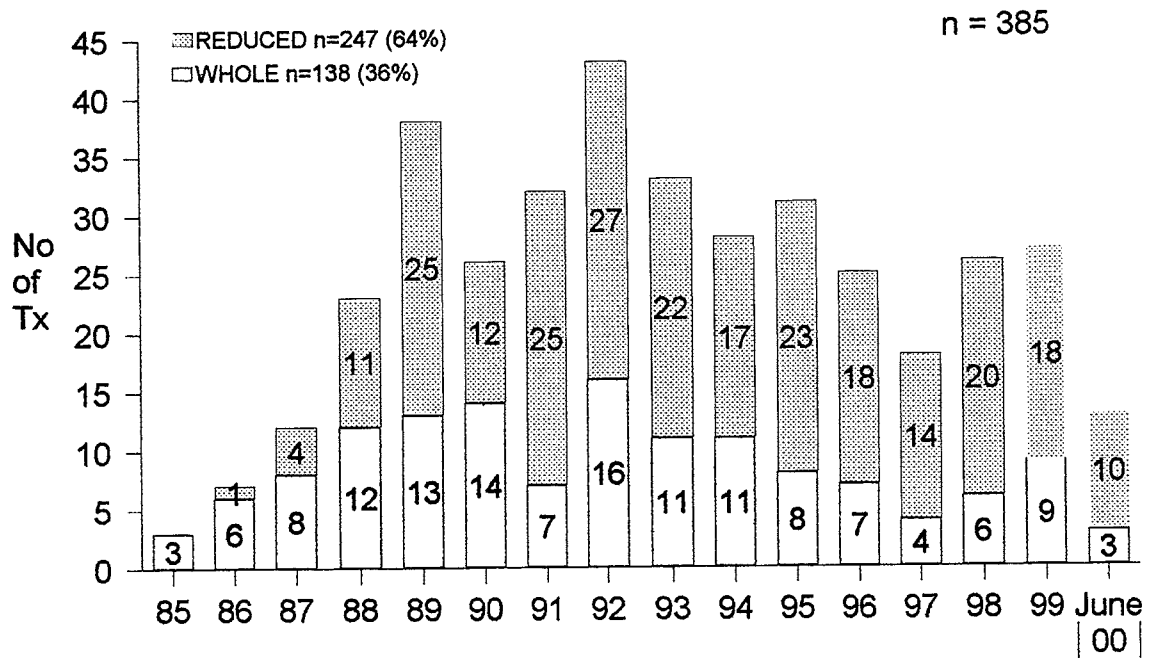
### OTHER CITIZENS



**NUMBER OF RECIPIENTS BY AGE**



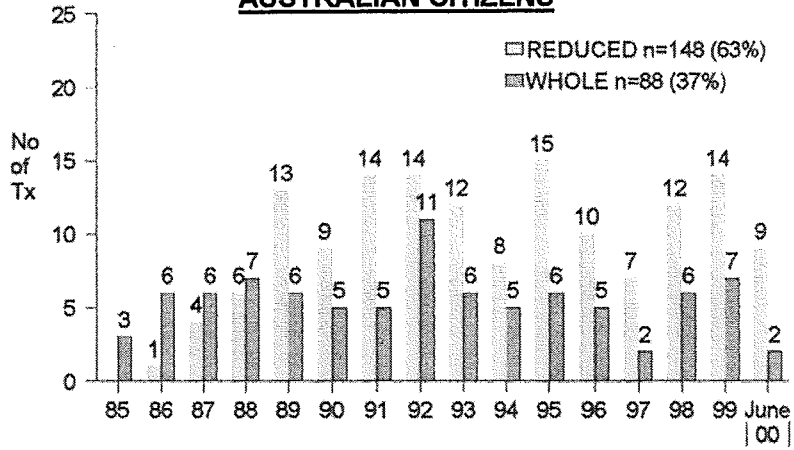
## NUMBER OF GRAFTS BY YEAR CHILDREN - REDUCED vs WHOLE



## CHILDREN NUMBERS OF GRAFTS BY YEAR

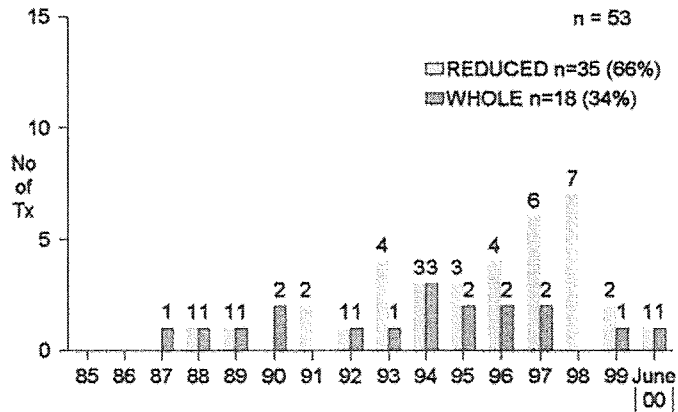
### REDUCED vs WHOLE AUSTRALIAN CITIZENS

n = 236



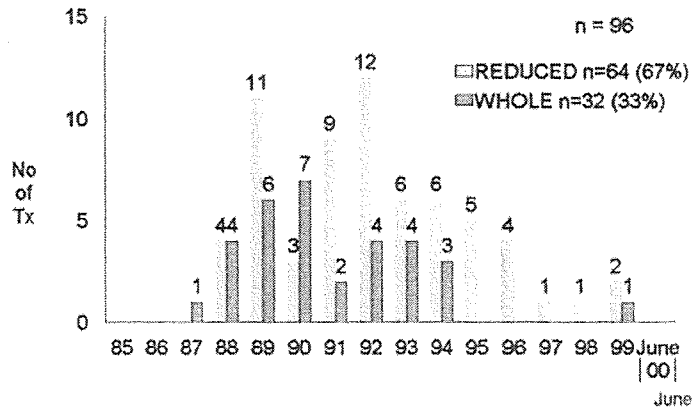
### NZ CITIZENS

n = 53



### OTHER CITIZENS

n = 96

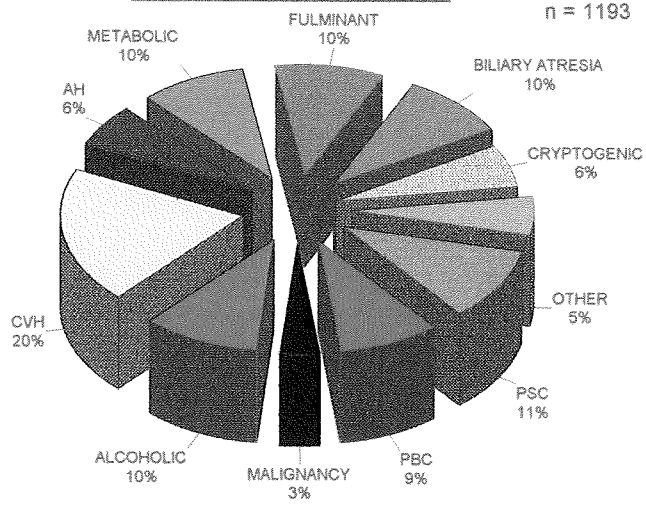


# **Section 2**

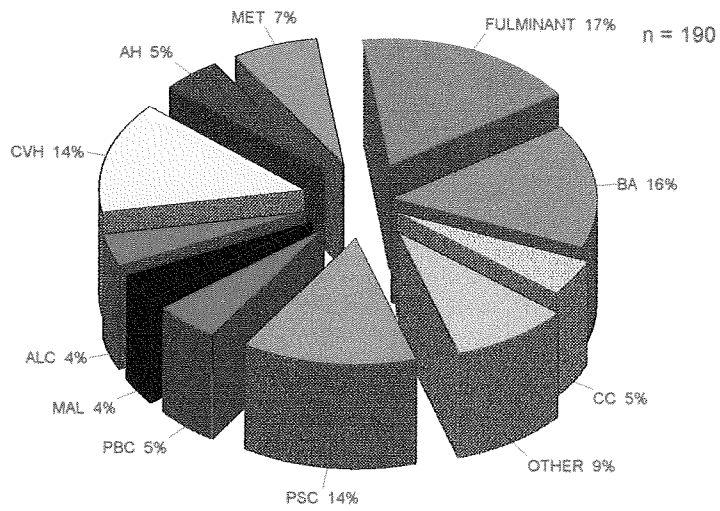
## **Primary Diagnosis**

## PRIMARY DISEASES OF RECIPIENTS

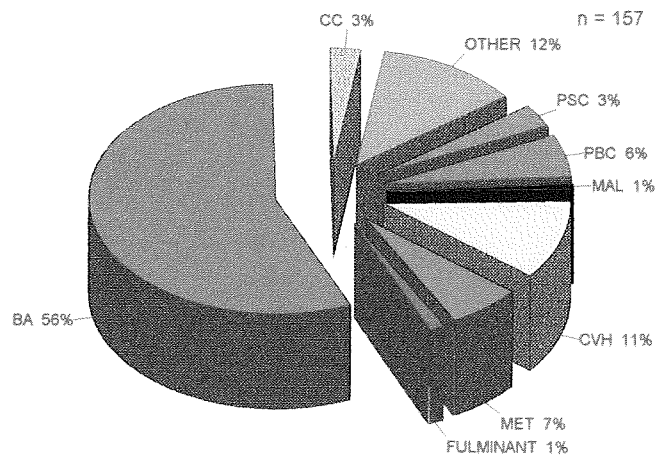
### AUSTRALIAN CITIZENS



### NZ CITIZENS



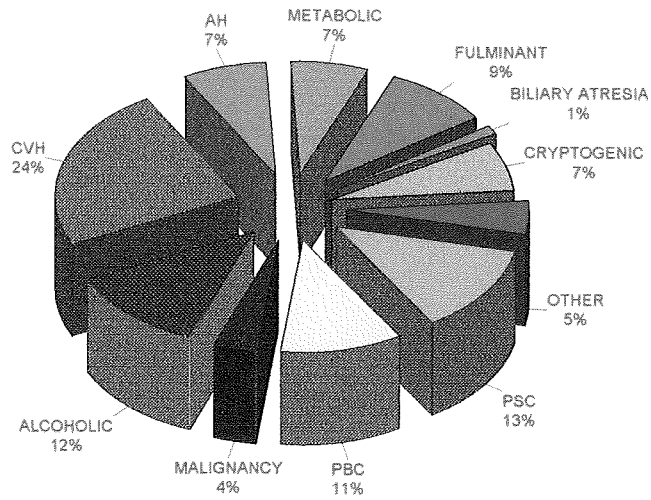
### OTHER CITIZENS



## PRIMARY DISEASES OF RECIPIENTS

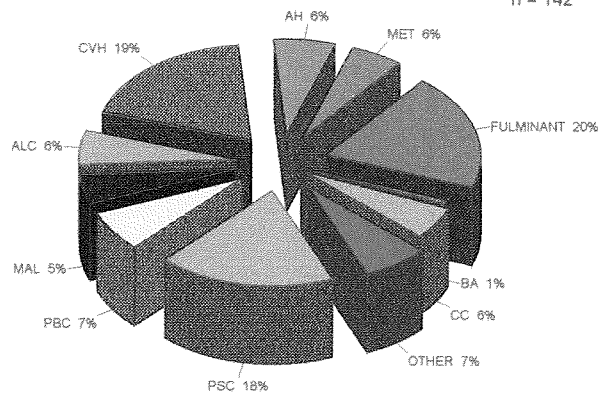
### ADULTS - AUSTRALIAN CITIZENS

n = 993



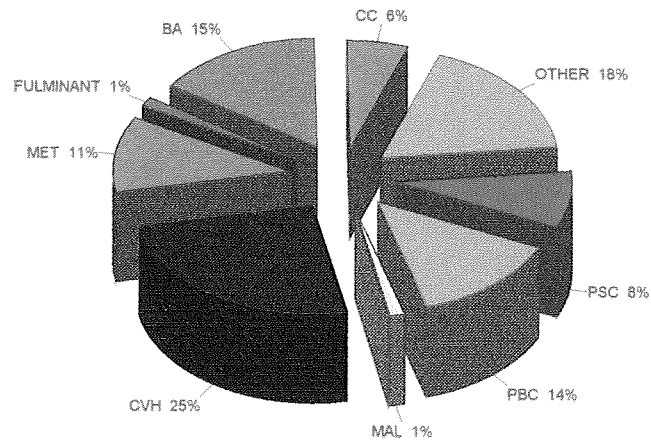
### ADULTS - NZ CITIZENS

n = 142



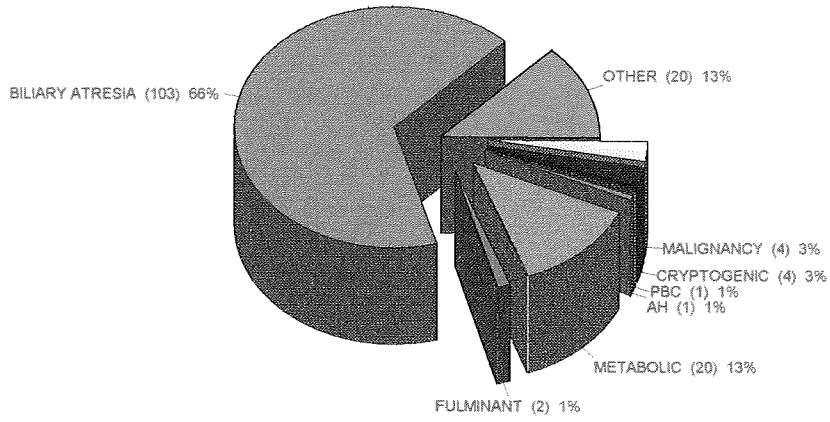
### ADULTS - OTHER CITIZENS

n = 72



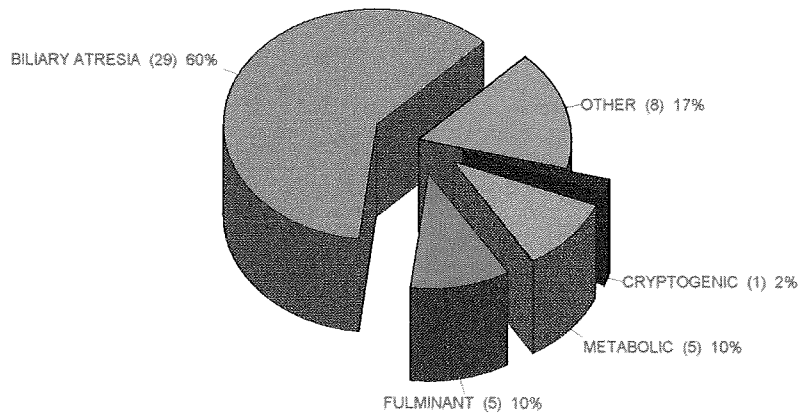
### PRIMARY DISEASES OF RECIPIENTS CHILDREN - AUSTRALIAN CITIZENS

n = 200



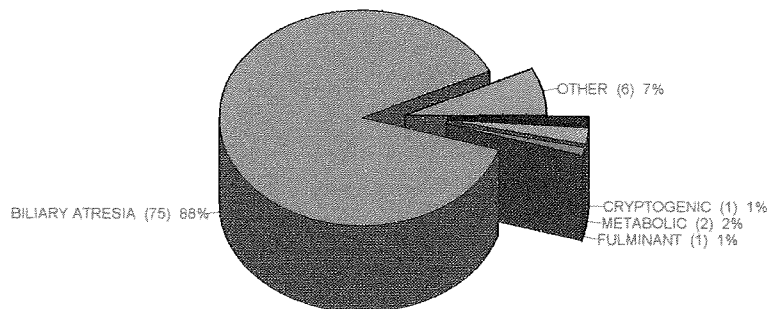
### CHILDREN - NZ CITIZENS

n = 48



### CHILDREN - OTHER CITIZENS

n = 85

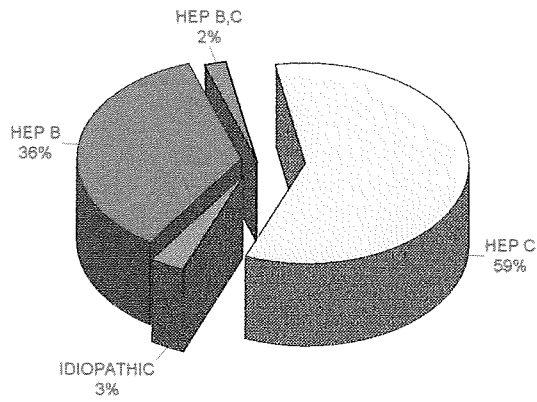




## CHRONIC VIRAL HEPATITIS

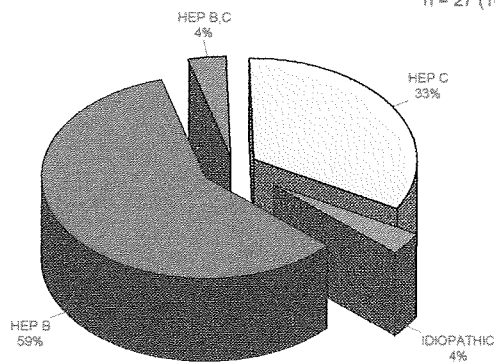
### AUSTRALIAN CITIZENS

n = 235 (20%)



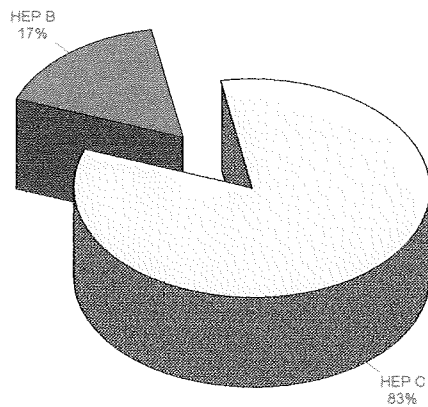
### NZ CITIZENS

n = 27 (14%)



### OTHER CITIZENS

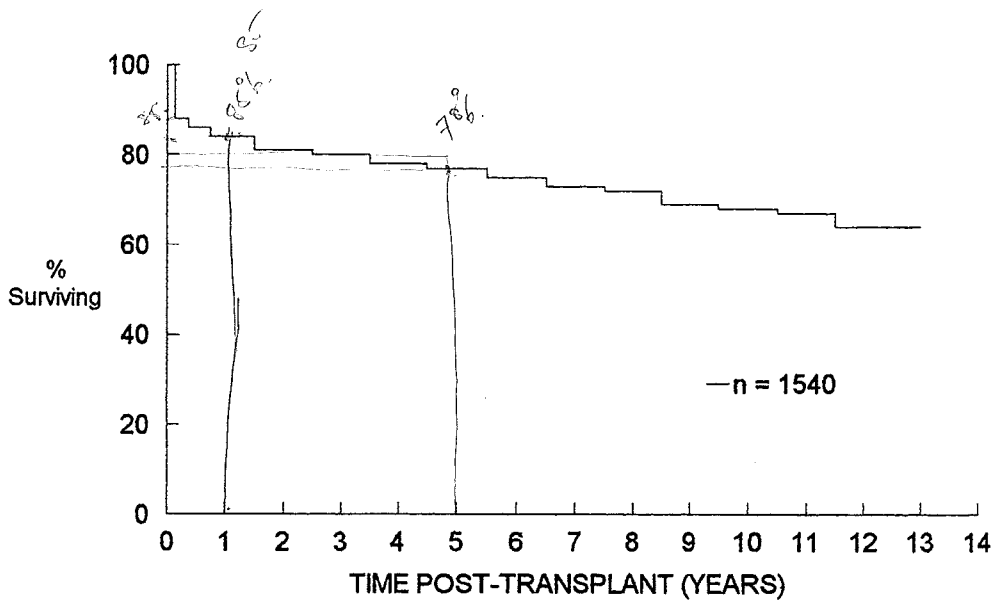
n = 18 (11%)



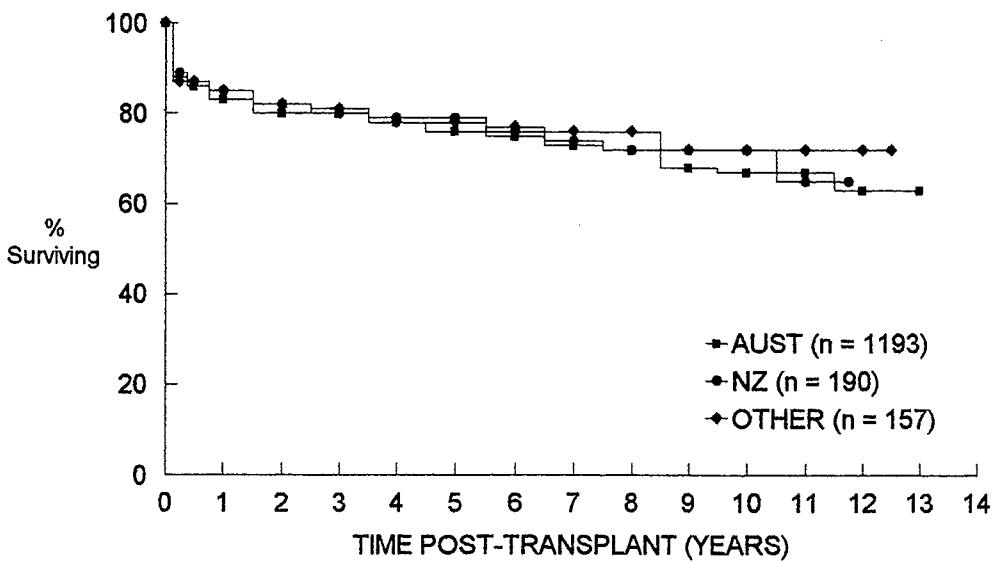
# **Section 3**

## **Patient and Graft Survival**

**PATIENT SURVIVAL POST Tx**

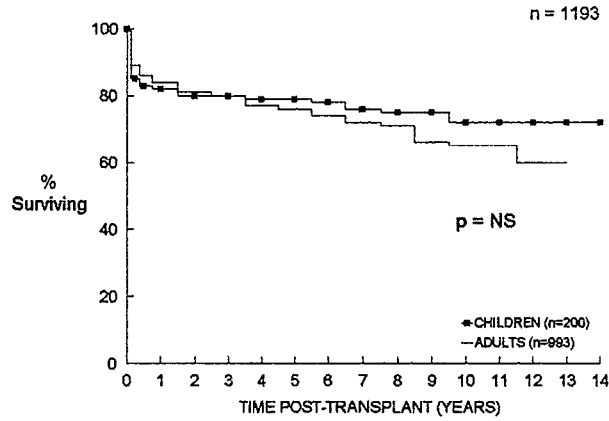


**PATIENT SURVIVAL POST Tx**

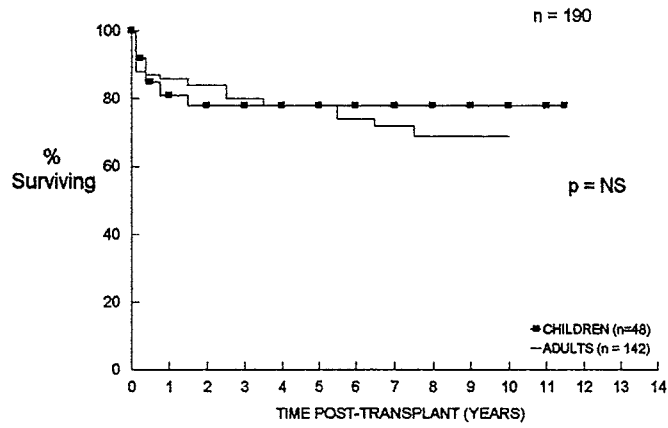


**PATIENT SURVIVAL - ADULTS AND CHILDREN**

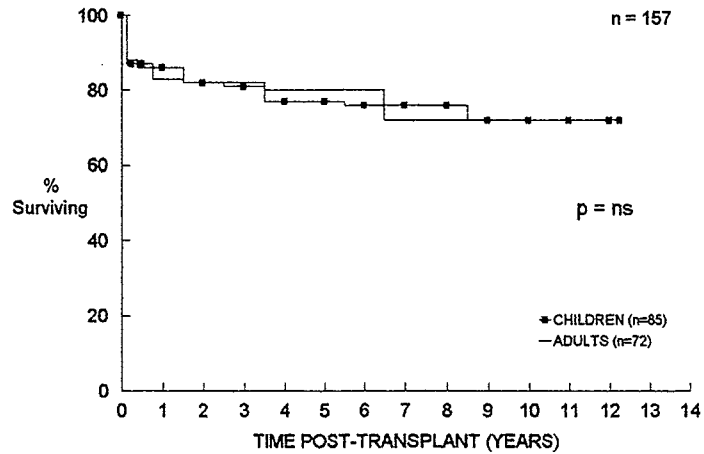
**AUSTRALIAN CITIZENS**



**NZ CITIZENS**

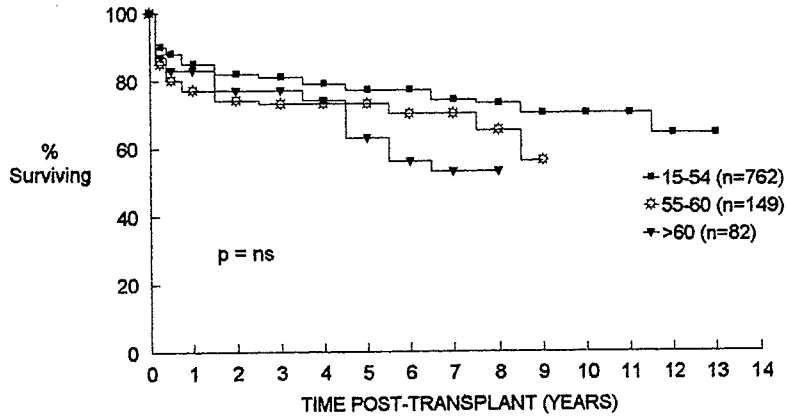


**OTHER CITIZENS**



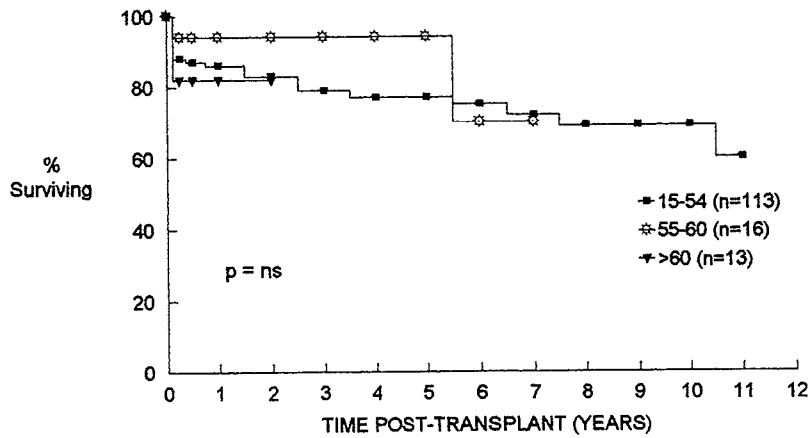
## PATIENT SURVIVAL BY AGE AT TRANSPLANT

### AUSTRALIAN CITIZENS - ADULTS n = 993



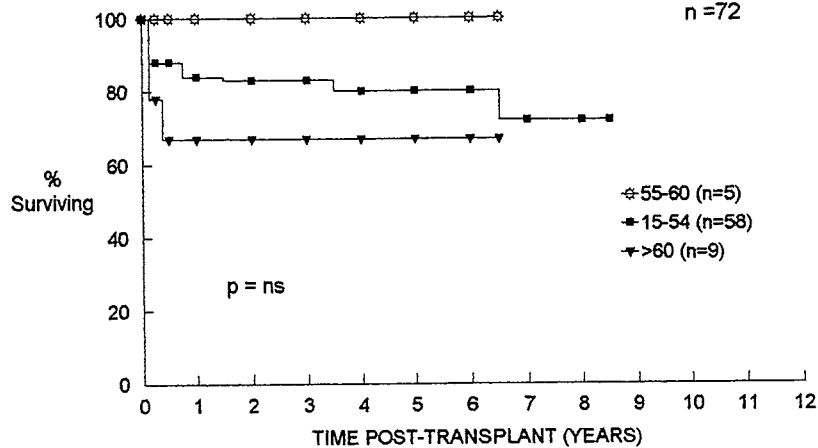
### NZ CITIZENS - ADULTS

n = 142



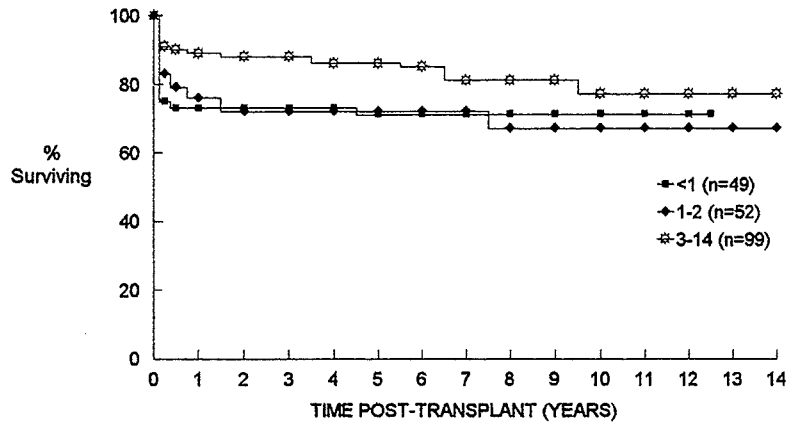
### OTHER CITIZENS - ADULTS

n = 72



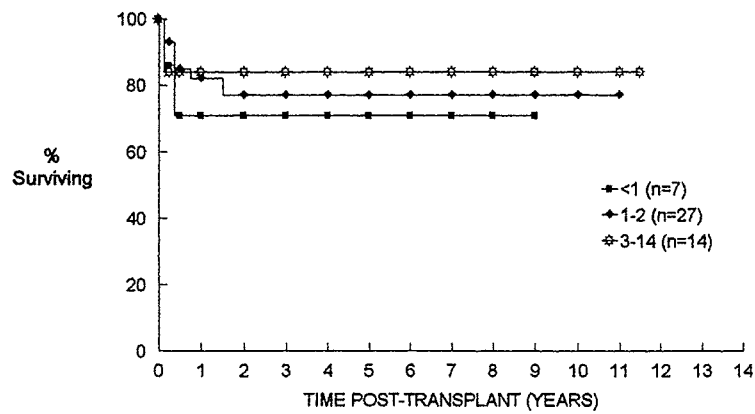
## PATIENT SURVIVAL BY AGE AT TRANSPLANT

### AUSTRALIAN CITIZENS - CHILDREN n = 200



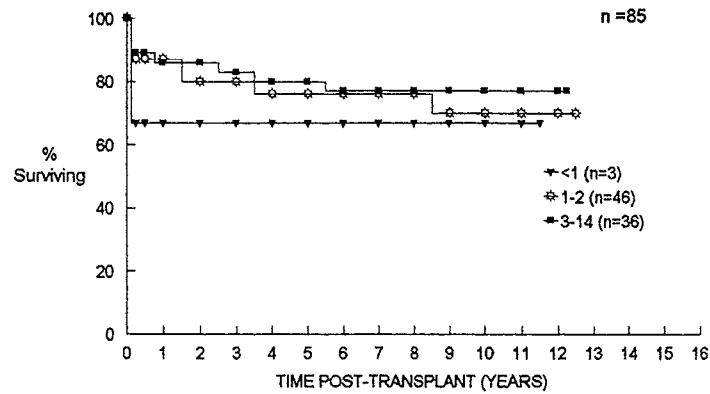
### NZ CITIZENS - CHILDREN

n = 48

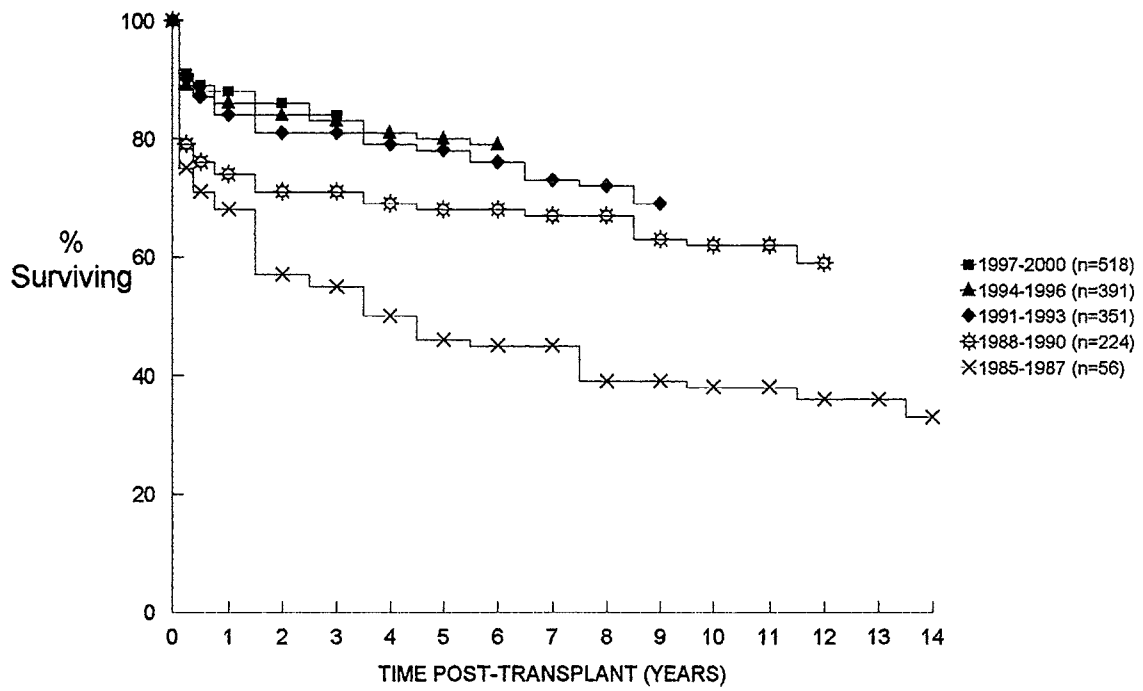


### OTHER CITIZENS - CHILDREN

n = 85

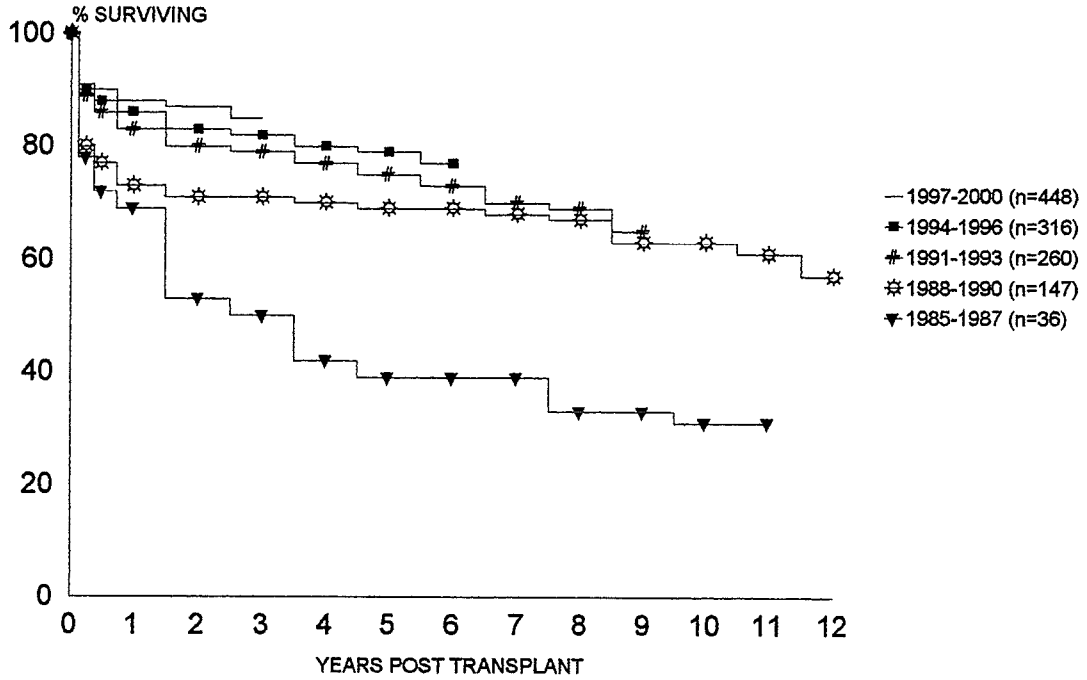


## PATIENT SURVIVAL - BY YEAR OF Tx



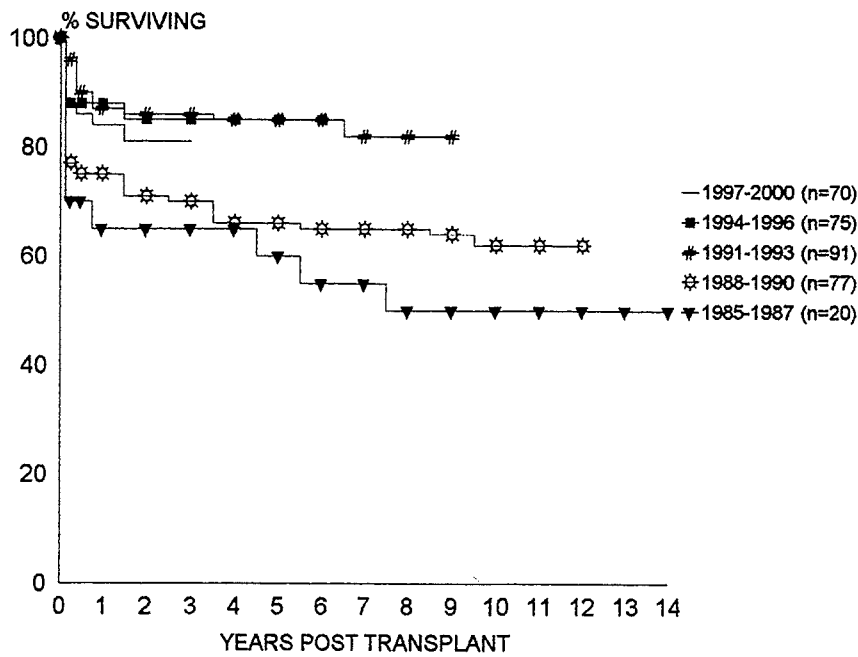
# ADULTS

n = 1207



# CHILDREN

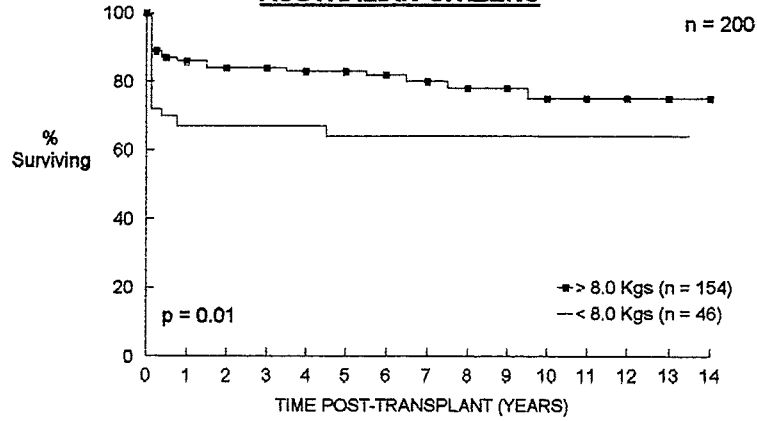
n = 333



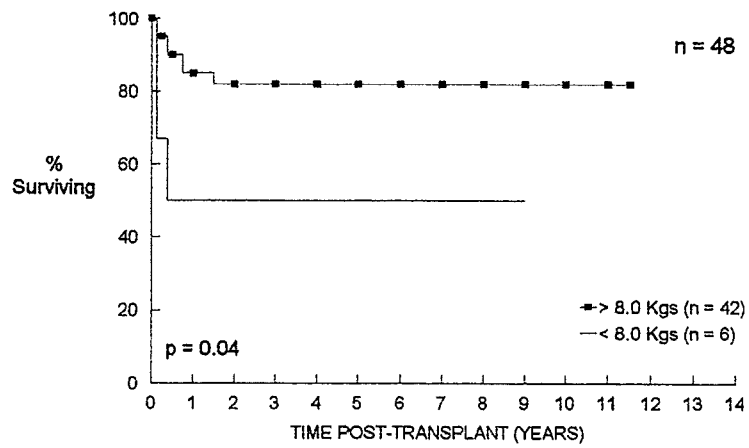


**PATIENT SURVIVAL**

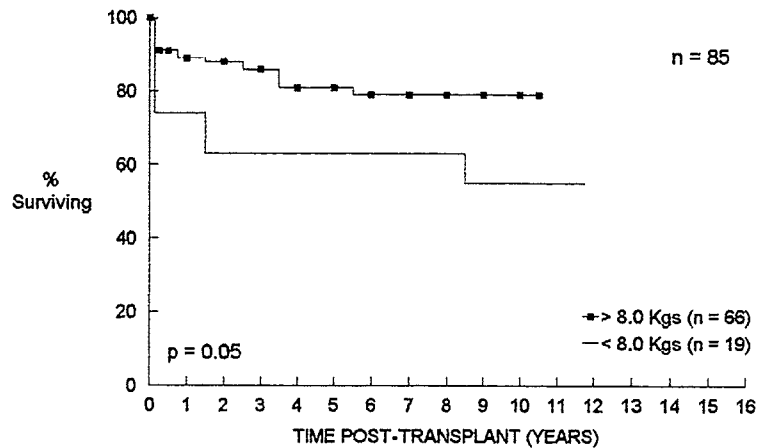
**CHILDREN > 8.0 KG AND < 8.0 KG  
AUSTRALIAN CITIZENS**



**NZ CITIZENS**

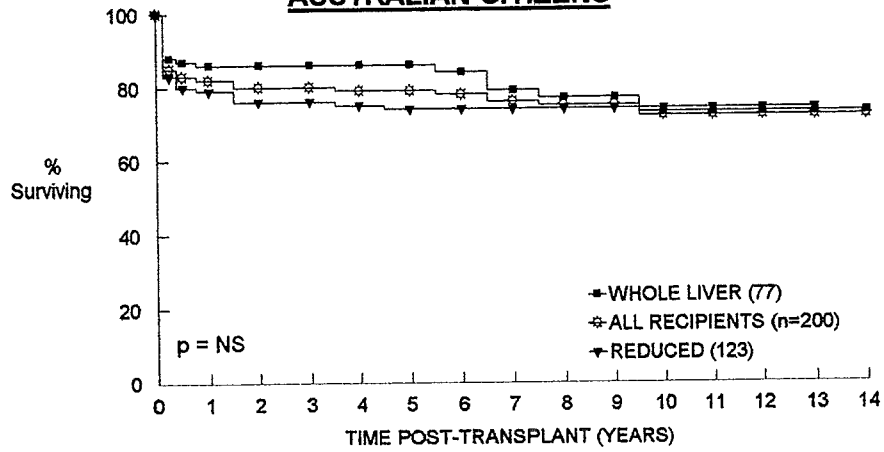


**OTHER CITIZENS**

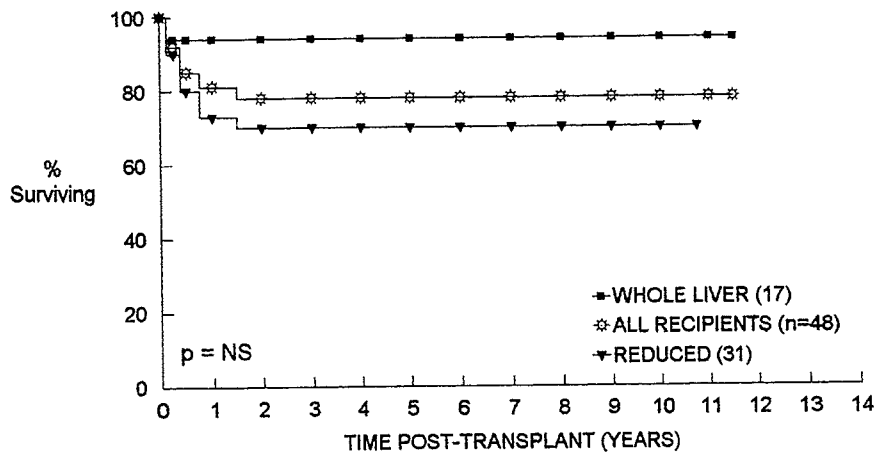


## PAEDIATRIC PATIENT SURVIVAL

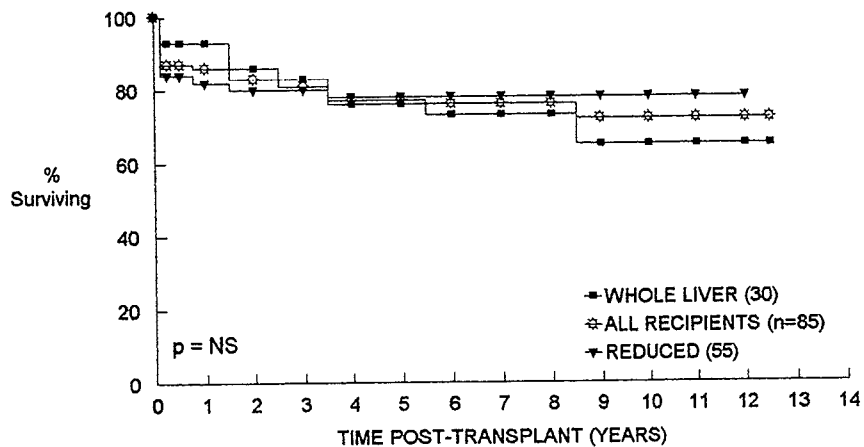
### WHOLE LIVER V REDUCED LIVER AUSTRALIAN CITIZENS



### NZ CITIZENS

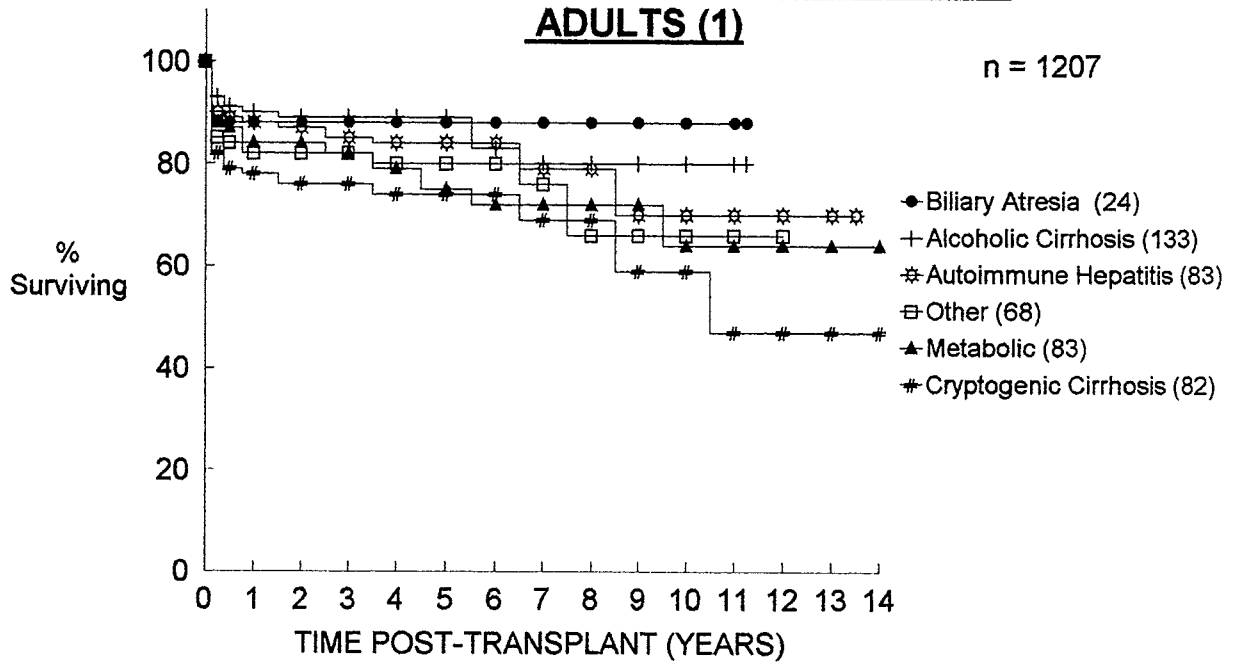


### OTHER CITIZENS

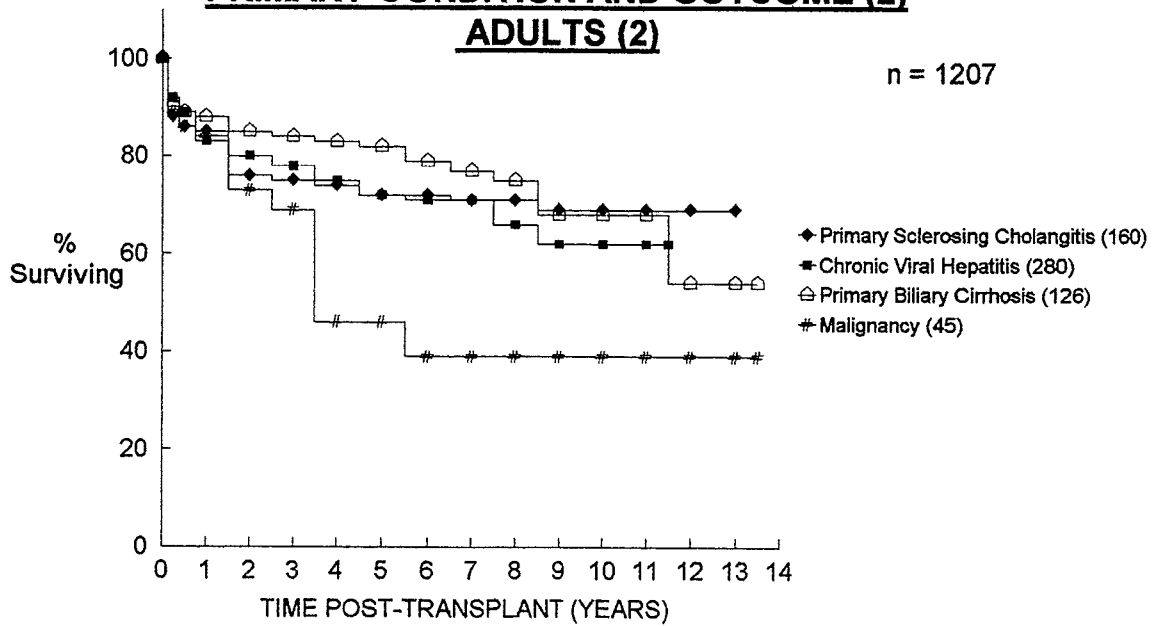


## ALL PATIENTS

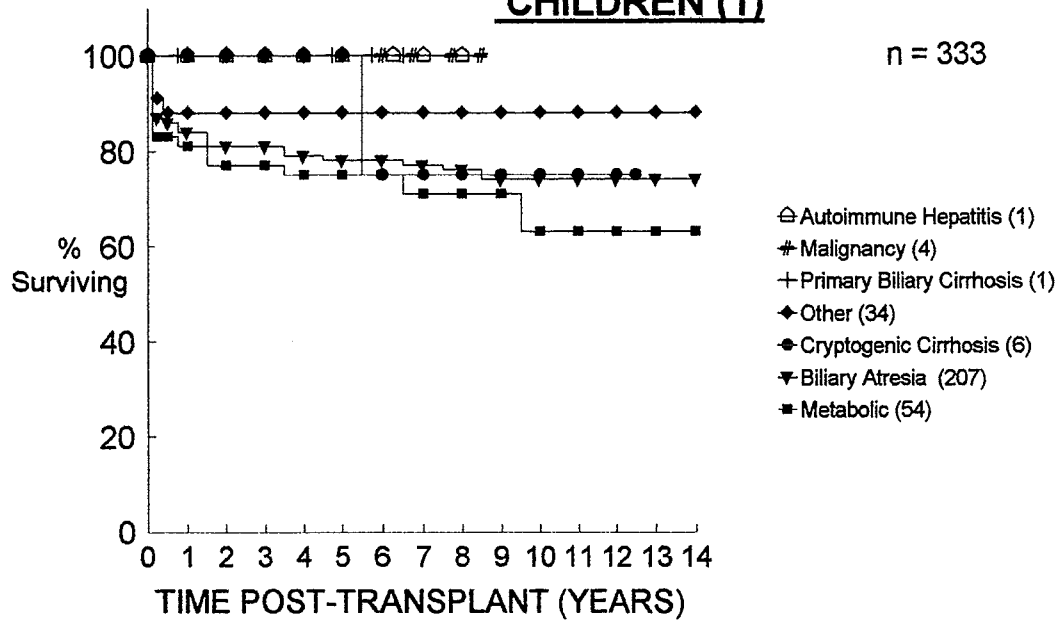
### PRIMARY CONDITION AND OUTCOME (1) ADULTS (1)



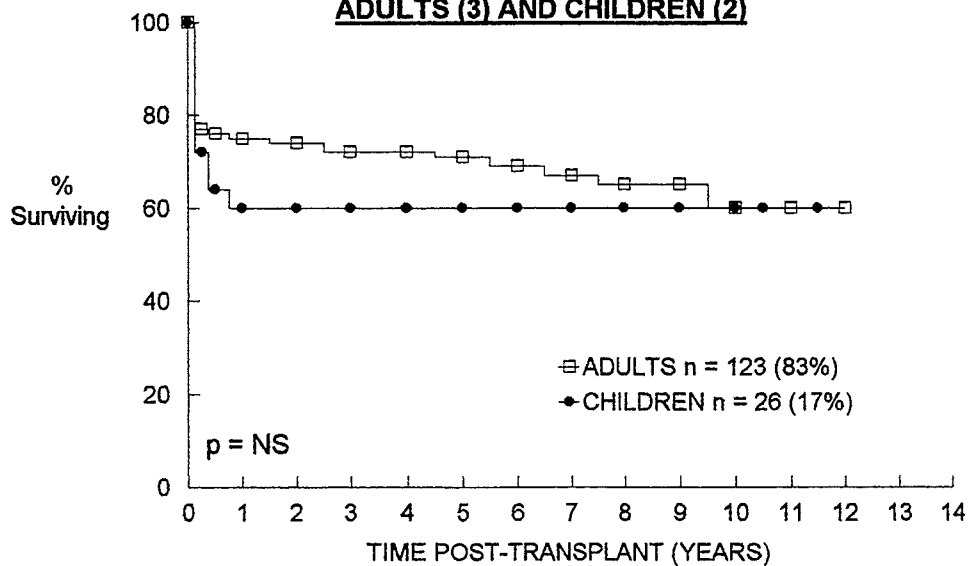
### PRIMARY CONDITION AND OUTCOME (2) ADULTS (2)



**PRIMARY CONDITION AND OUTCOME (3)**  
**CHILDREN (1)**



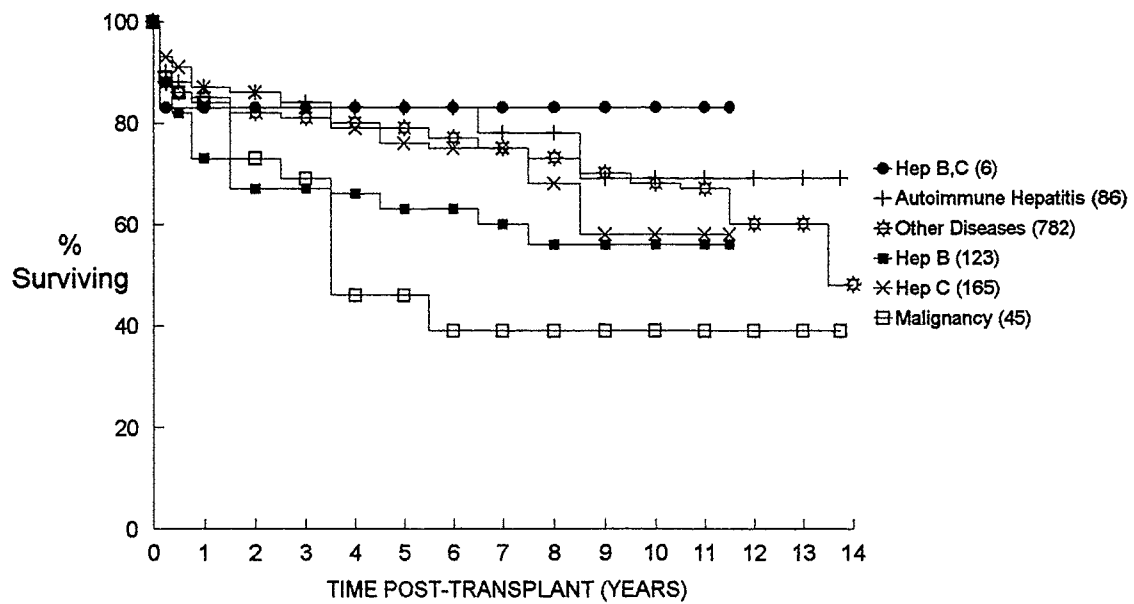
**PRIMARY CONDITION AND OUTCOME (4)**  
**FULMINANT DISEASE**  
**ADULTS (3) AND CHILDREN (2)**



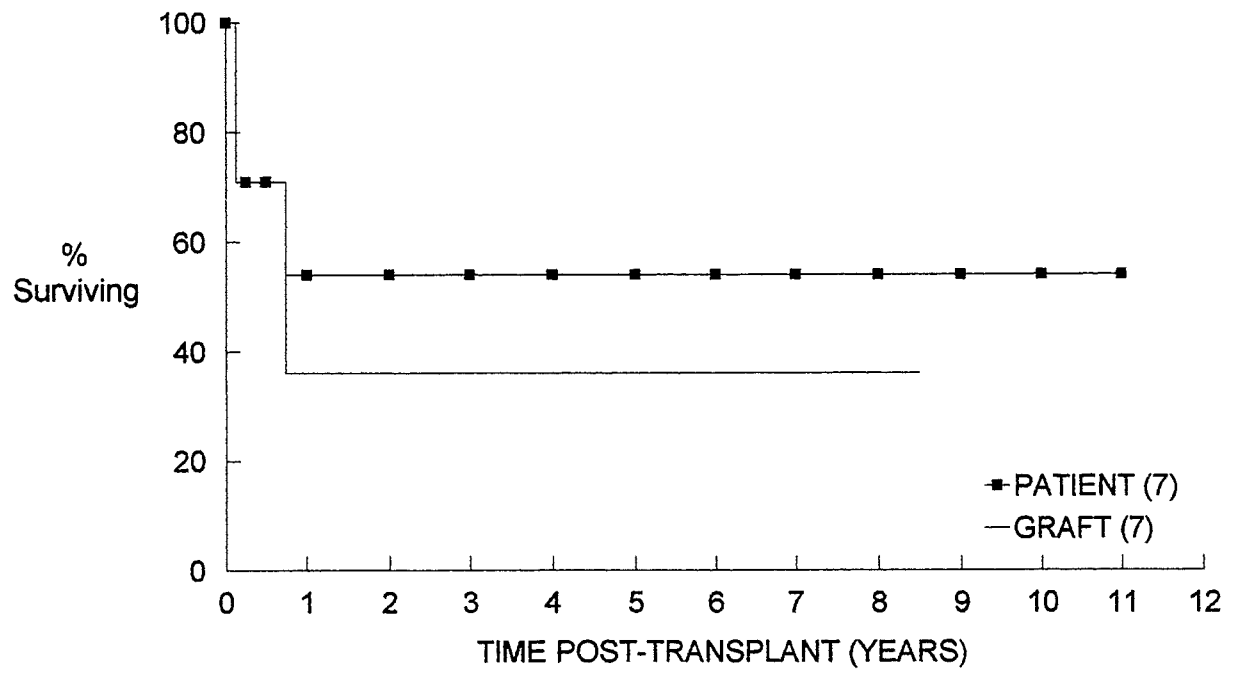
**MALIGNANCY vs HEP B vs HEP C vs  
AUTO-IMMUNE vs OTHER DISEASES**

**ADULTS**

n = 1207

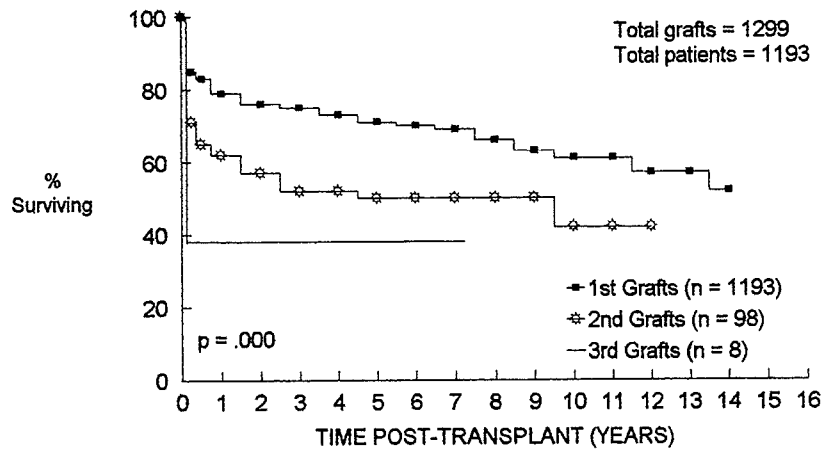


## PATIENT AND GRAFT SURVIVAL LRD

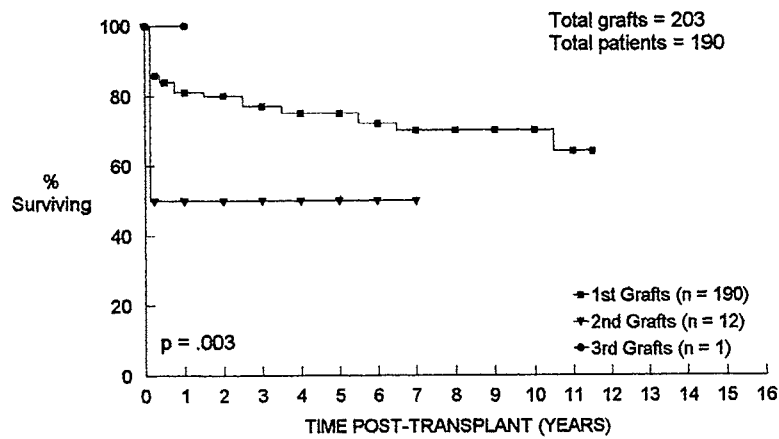


## GRAFT SURVIVAL - PRIMARY AND SECONDARY

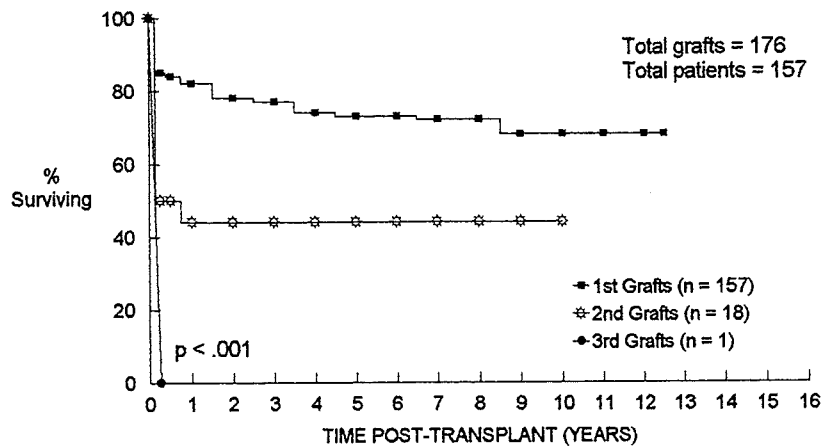
### AUSTRALIAN CITIZENS



### NZ CITIZENS

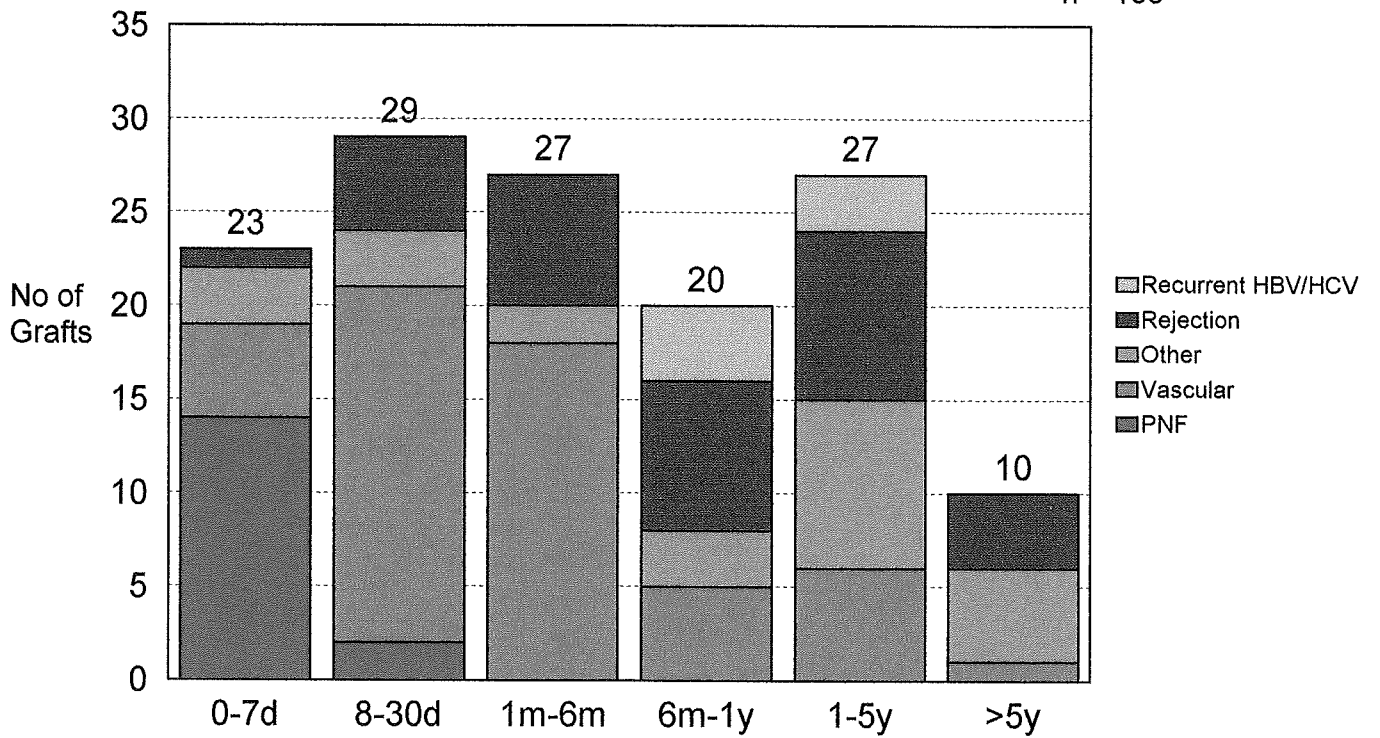


### OTHER CITIZENS



## SECONDARY TRANSPLANTATION Indication by Time

n = 136



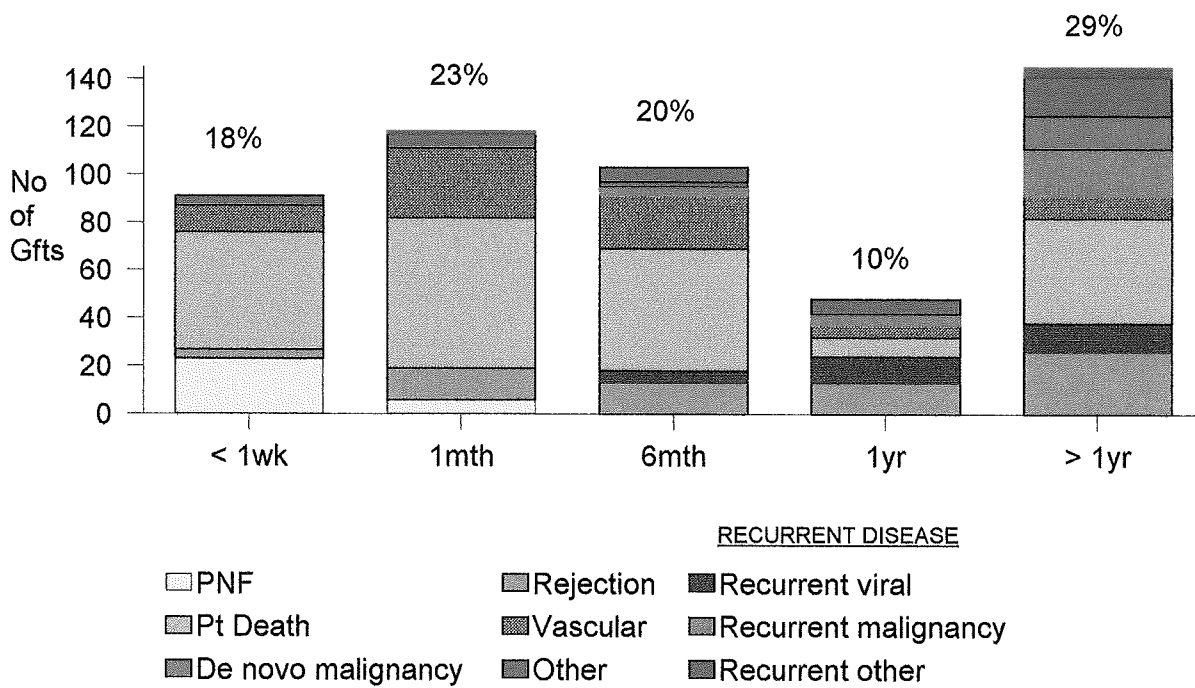


# **Section 4**

## **Cause of Graft Failure**

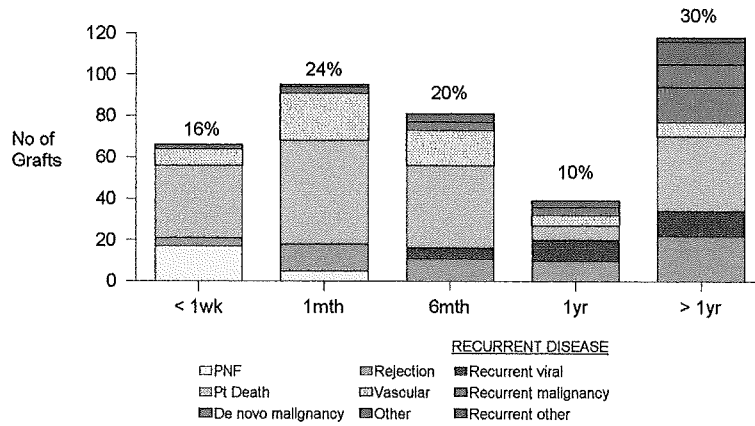
## CAUSE OF GRAFT FAILURE

ALL GRAFTS n = 505 (30%)

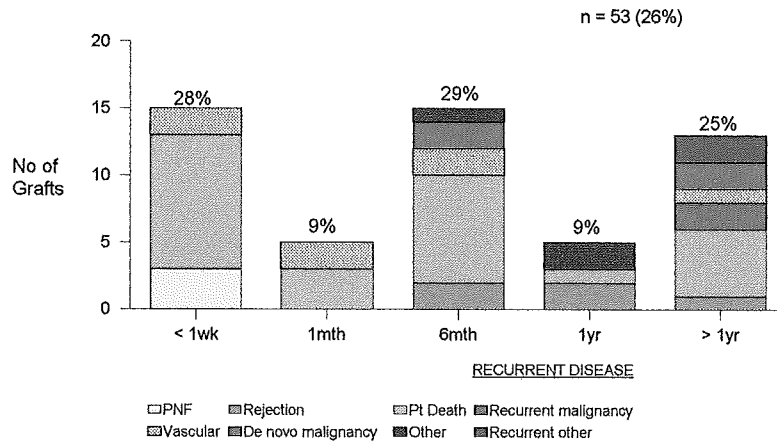


### CAUSE OF GRAFT FAILURE

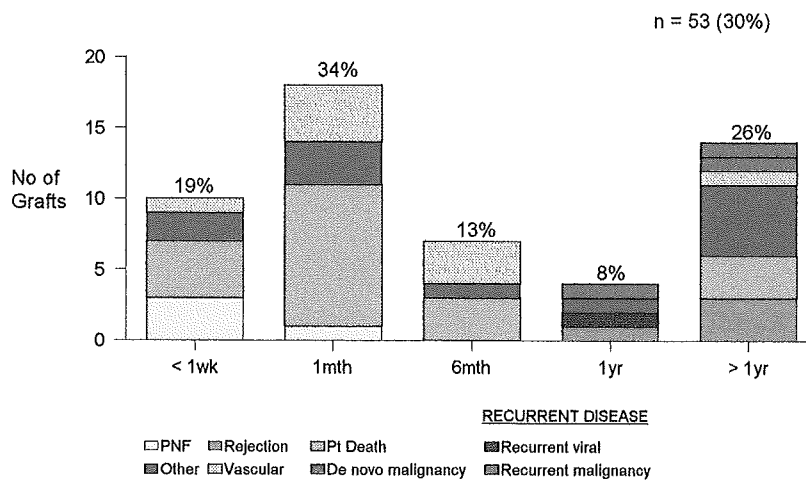
#### AUSTRALIAN CITIZENS n = 399 (31%)



#### NZ CITIZENS n = 53 (26%)



#### OTHER CITIZENS n = 53 (30%)

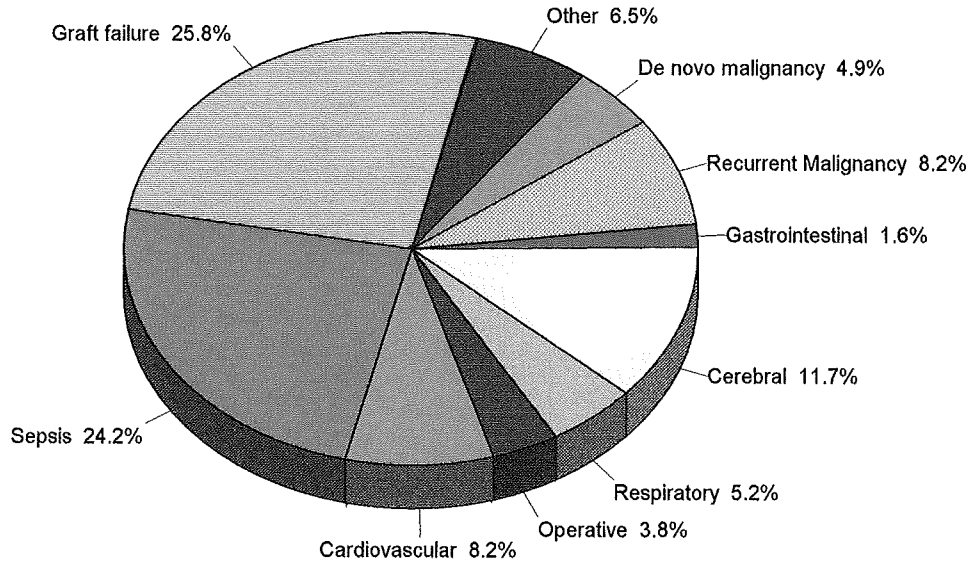


# **Section 5**

## **Cause of Death**

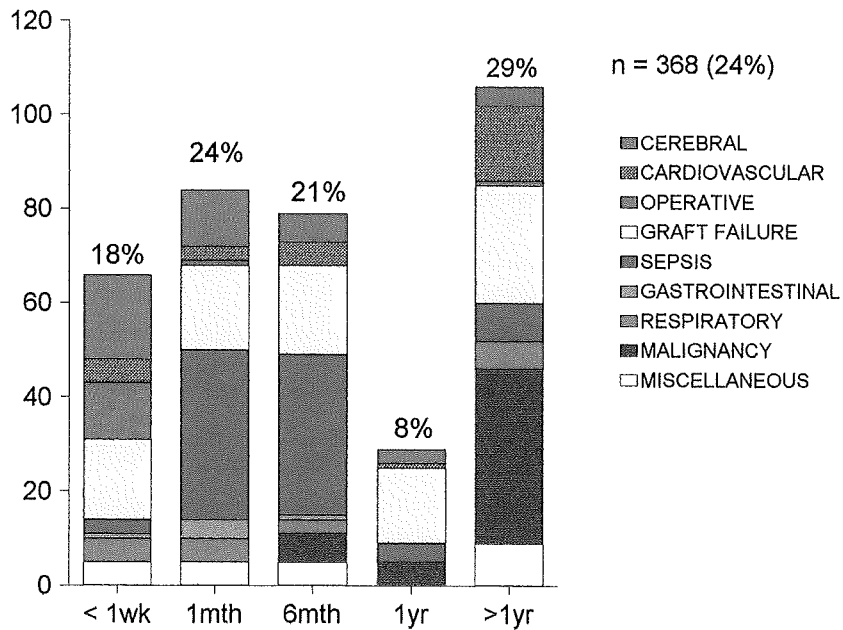
## CAUSE OF DEATH

ALL PATIENTS    n = 368 (24%)



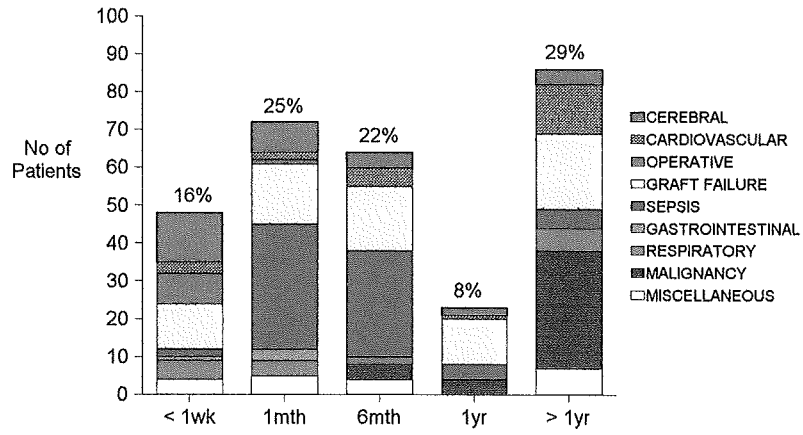
## CAUSE OF DEATH

ALL PATIENTS



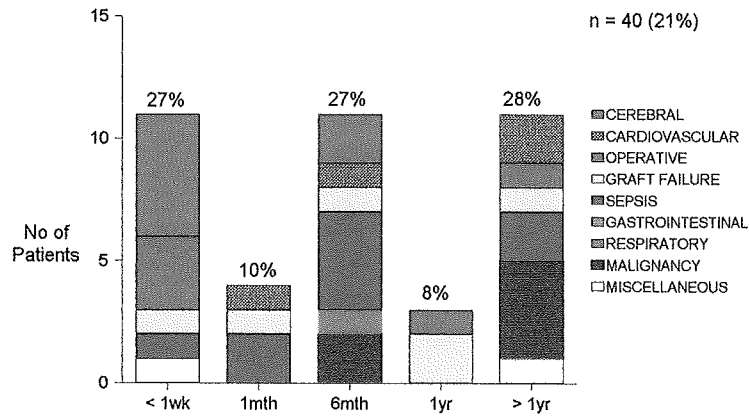
## CAUSE OF DEATH AUSTRALIAN CITIZENS

n = 292 (24%)



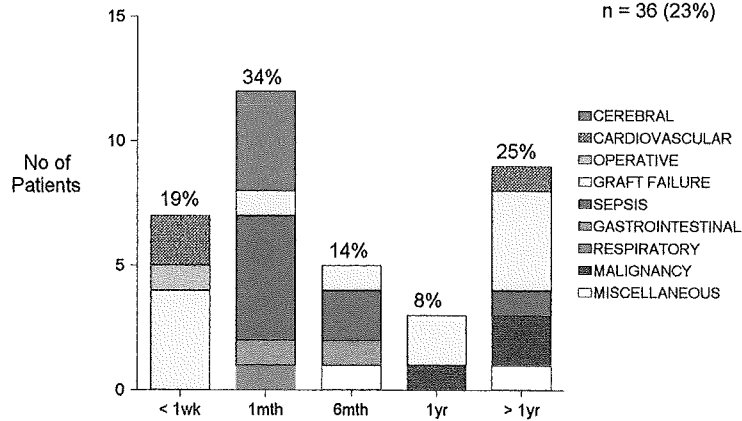
## NZ CITIZENS

n = 40 (21%)



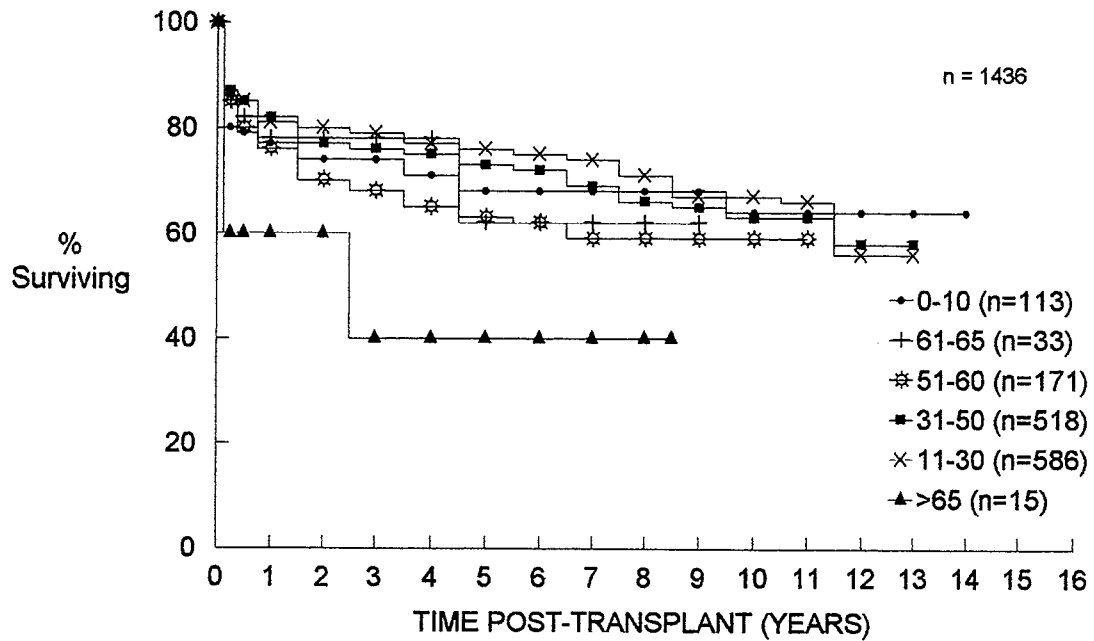
## OTHER CITIZENS

n = 36 (23%)



## PRIMARY GRAFT SURVIVAL

### DONOR AGE vs SURVIVAL



## DONATION BY YEAR

	QLD	NSW/ ACT	VIC/ TAS	SA/ NT	WA	NZ	TOTAL
1990	22	27	16	5	-	7	77
1991	28	35	20	6	8	11	108
1992	43	31	18	9	8	24	133
1993	27	39	25	13	6	16	126
1994	31	39	23	12	10	21	136
1995	32	42	24	17	8	21	144
1996	33	38	19	17	10	24	141
1997	36	49	19	19	8	22	153
1998	14	40	21	19	7	26	127
1999	21	31	32	29	11	26	150
2000 (June)	16	28	13	10	4	14	85

# **Section 6**

## **Donor Information**



# **Section 7**

## **Liver**

# **Transplantation and Cancer**

## TYPES OF CA IN LIVER Tx RECIPIENTS

### AT Tx

n = 1540

PRIMARY LIVER CA	49	(3%)
INCIDENTAL CA	87	(6%)
TOTAL	136	(9%)

### POST Tx

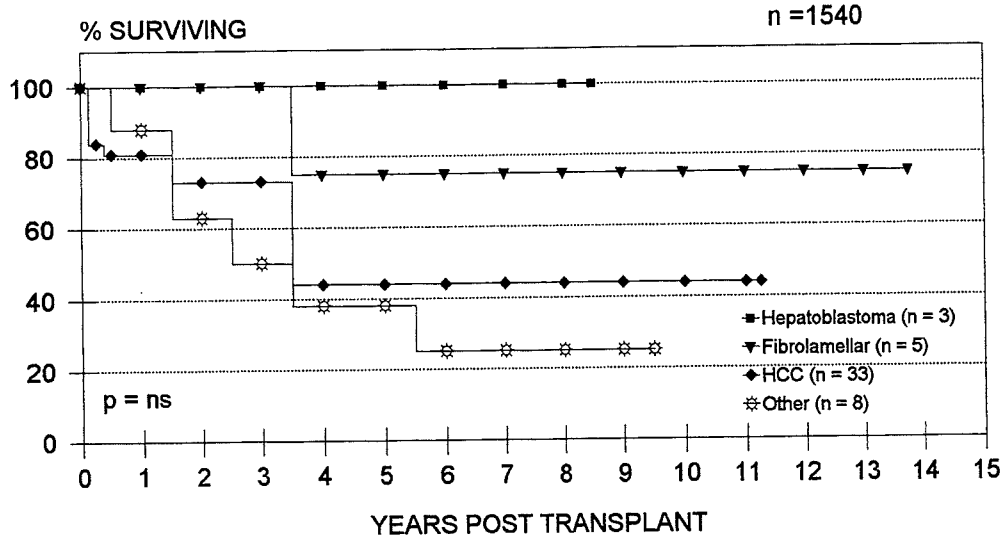
RECURRENT CA	34	(2% of all pts,	25% of pts with Ca at Tx)
DE NOVO CA	50	(3%)	52 (Ca)
SKIN CA	134	(9%)	(662 Ca)
TOTAL	218	(14%)	

**PRIMARY LIVER MALIGNANCY**

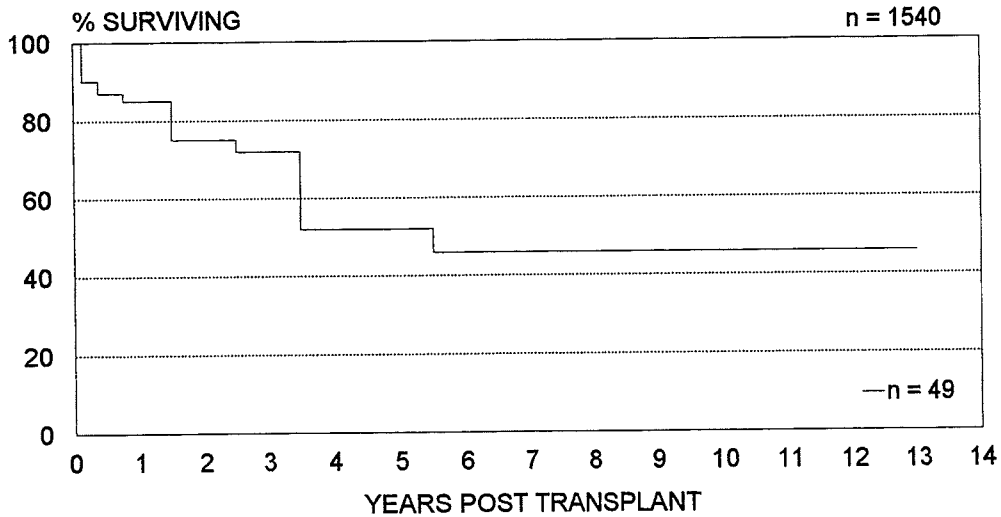
n = 1540  
 n = 49 (2%)  
 with cancer

TYPE OF CA	No	DIED	DIED OF CA
HEPATOCELLULAR CA	33	11	7 (21%)
LAMELLAR VARIANT	5	1	1 (25%)
CARCINOID	4	3	2 (50%)
ENDOCRINE	2	2	2 (100%)
HEPATOBLASTOMA	3	0	0
ANGIOSARCOMA	1	1	1 (100%)
EPITHELOID HAEMANGIOMA	1	0	0
TOTALS	49 (2% of pts)	18 (37% of those with PCa)	13 (27% of those with PCa)

### PRIMARY LIVER CA



### PRIMARY LIVER CA ALL PATIENTS



## INCIDENTAL CA

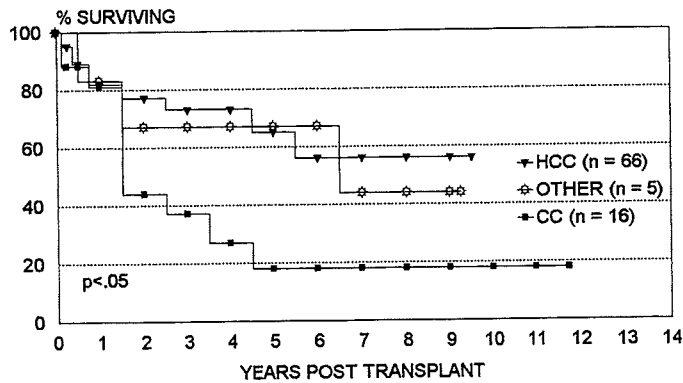
n = 1540

	NO	DIED	DIED OF CA
HEPATOCELLULAR CA*	66	16	6 (13%)
CHOLANGIO CA	16	12	10 (73%)
ANGIOSARCOMA	1	1	1 (100%)
ADENOCARCINOMA	2	1	0
HEPATOBLASTOMA*	2	1	0
FIBROLAMELLAR	1	0	0
<b>TOTALS</b>	<b>88* in 87 (6% of pts)</b>	<b>31 (36%)</b>	<b>17 (20%)</b>

\* 1 patient had 2 different incidental Ca

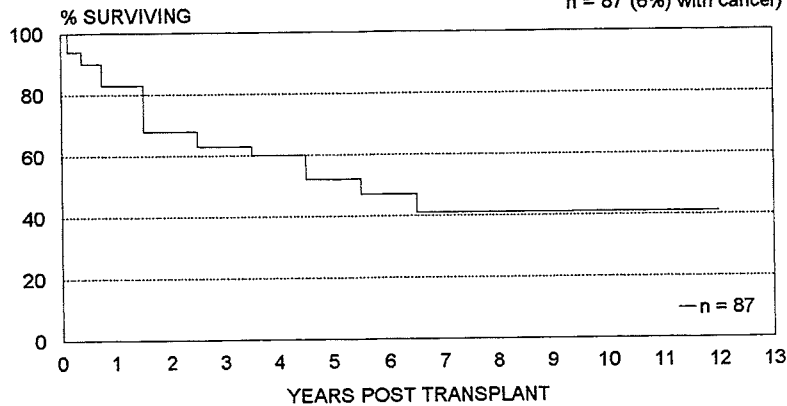
## INCIDENTAL CA

n = 1540  
n = 87 (6%) with cancer)

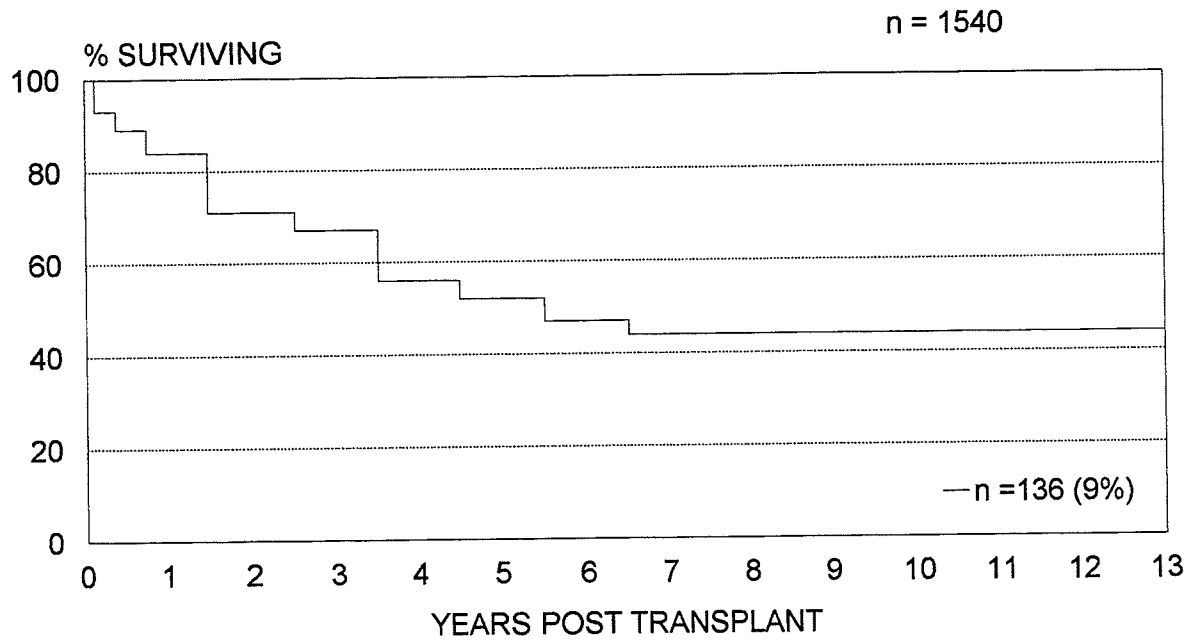


## INCIDENTAL LIVER CA ALL PATIENTS

n = 1540  
n = 87 (6%) with cancer)



## PRE-TX LIVER CA (PRIMARY AND INCIDENTAL)



## DE NOVO NON SKIN CA POST Tx

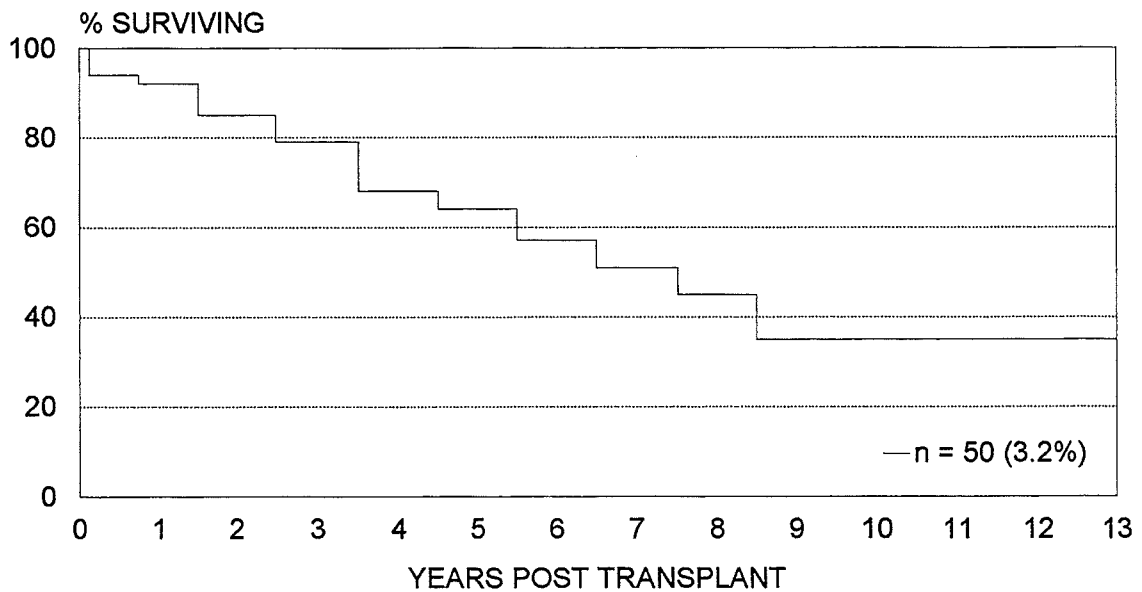
n = 1540

	NO	DIED	DIED OF CA
NON HODGKINS LYMPHOMA	19 (38%)	13	9
KAPOSI SARCOMA	4	2	0
DIGESTIVE ORGANS	11	3	1
GLOTTIS	1	0	0
STOMACH	2	1	0
COLON	7	2	1
APPENDIX	1	0	0
GENITO-URINARY	6	3	1
BLADDER	2	2	1
TESTIS	1	0	0
KIDNEY	2	1	0
PROSTATE	1	0	0
RESPIRATORY	1	1	1
LEUKAEMIA	1	1	1
BREAST	2	0	0
ENDOCRINE	5	2	2
CERVIX	2	0	0
CEREBRAL	1	1	1
TOTALS	52 in 50 (3%) pts	26 (52% of pts with Ca)	16 (32% of pts with Ca)

Seven patients also had incidental malignancy; two patients had two de novo malignancies

## DE NOVO NON SKIN CA POST TX

n = 1540



**SKIN CA POST LTx**

n = 1540

TYPE	CANCERS	PATIENTS
BCC	190	69
SCC	249	78
MELANOMA	6	6
TOTALS	445	134 ** (9%)

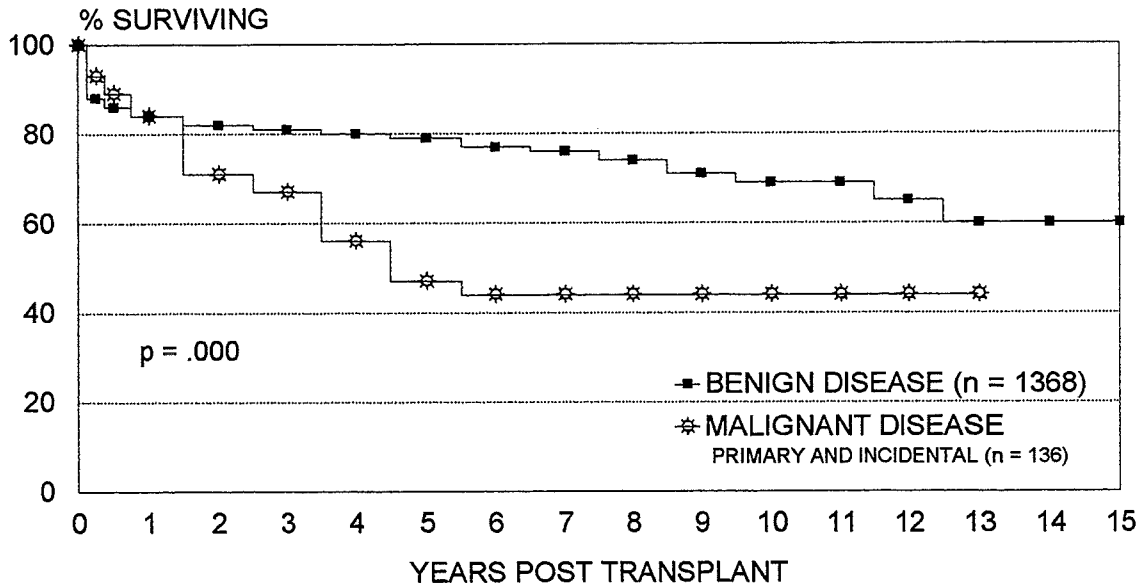
\*\* 64 pts had multiple skin cancer types



## PATIENT SURVIVAL

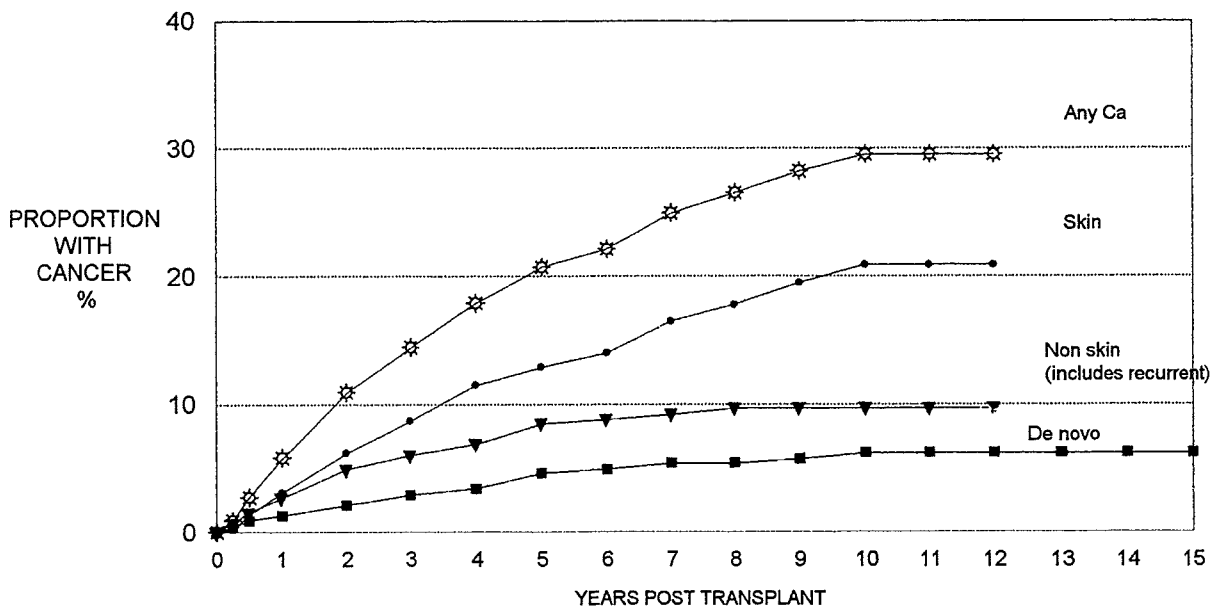
n = 1540

PATIENTS WITH BENIGN DISEASE VERSUS THOSE WITH PRIMARY OR INCIDENTAL CA



## CANCER DEVELOPMENT FOLLOWING LIVER Tx. AUSTRALIA.

n = 1540



# Appendix

## Appendix

# Liver Transplant Units of Australia and New Zealand

Australian National Liver Transplant Unit  
Royal Prince Alfred Hospital  
Missenden Road  
CAMPERDOWN NSW 2050

and

The New Children's Hospital  
Hawkesbury Road  
WESTMEAD NSW 2145

Liver Transplant Unit Victoria  
The Austin Hospital  
Sudley Road  
HEIDELBERG VIC 3084

and

Royal Children's Hospital  
Flemington Road  
PARKVILLE VIC 3052

Queensland Liver Transplant Service  
Princess Alexandra Hospital  
Ipswich Road  
WOOLLOONGABBA QLD 4102

and

Royal Children's Hospital  
Bowens Bridge Road  
HERSTON QLD 4029

South Australian Liver Transplant Unit  
Flinders Medical Centre  
Flinders Drive  
BEDFORD PARK SA 5042

WA Liver Transplantation Service  
Sir Charles Gairdner hospital  
Verdun Street  
NEDLANDS WA 6009

New Zealand Liver Transplant Unit  
Auckland Public Hospital  
Park Road  
Auckland  
New Zealand