

AUSTRALIA & NEW ZEALAND

LIVER TRANSPLANT REGISTRY



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

DATA TO 30-06-2002

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STATISTICAL METHODS

Kaplan-Meier survival curves have been produced using SPSS® for Windows™ Release 11.0.1 , SPSS Inc.

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Preface

We are pleased to present the 14th Report of the Australia and New Zealand Liver Transplant Registry (ANZLTR). This report contains data to 30th June 2002 and analyses cumulative data since the establishment of the first liver transplantation units in Australia or New Zealand in 1985.

The Registry is a collaborative effort of the liver transplant centres in Australia (Adelaide, Brisbane, Melbourne, Perth, Sydney) and New Zealand (Auckland). Prior to the establishment of the centre in Auckland in 1998, New Zealand patients were transplanted in Australia and their data is combined with data from later New Zealand recipients for analysis where appropriate. This was done to provide more accurate New Zealand demographic data and does not reflect the activity of the New Zealand unit.

Donor data have been supplied by the Australia and New Zealand Organ Donor Registry and we thank them for their collaboration.

The Editors would also like to thank all the Liver Transplant Units for the contribution of their data. A full list of the Units and their contact information can be found in the Appendix. In particular, we are grateful to the efforts of Jodie Fisher, Data Manager, and Pamela Dilworth, Program Manager, Royal Prince Alfred Hospital, Sydney for their maintenance of the data prior to handing it over to Brisbane and for preparation of the cancer data.

The registry now has some financial support and we are grateful to the Commonwealth Department of Health and Ageing for their financial contribution.

The Registry is supervised by the Management Committee who will be involved in the ongoing evolution of the Registry. The members are listed on the inside cover together with contact information of the Coordinating Centre for comments or requests for further copies of this Report.

Stephen Lynch

Glenda Balderson

Summary

PAGE

5. Between January 1985 and 30th June 2002 , 2005 orthotopic liver transplants (OLTx) were performed in Australia and New Zealand on 1846 patients - 1475 adult patients (> 15 years) [80%] and 371 children [20%]. The median age of all recipients was 44 years. The ages ranged from 24 days to 70.9 years. There is a significant difference in gender distribution between children (M=45%) and adults (M=59.5%) ($\chi^2 = 25.2, p < 0.001$)
- 6-8. There was an overall decrease in the number of new patients in 2001 compared with 2000 despite the increasing number of adult New Zealand patients.
- Of 1417 Australian citizens, 1189 [84%] were adults, of 259 New Zealand citizens 202 [78%] were adults, and of 170 other citizens 84 [49%] were adults. This is reflected in the age grouping distributions.
9. There was a decrease in the total number of liver transplants performed in 2001 compared with the number in 2000.
- 10-11. In children, reduced size grafts were used in 276 [64%] of 428 cases - 241 reduced grafts (including 6 living donor grafts) and 35 split liver grafts. Of adult patients, 26 received reduced size grafts (including 1 as auxiliary graft) and 44 split liver grafts (including 1 as auxiliary graft).
- 12-15 Overall, chronic viral hepatitis (CVH) is the most common indication for liver transplantation. In children biliary atresia (BA) is the most common primary disease. In adult patients chronic viral hepatitis varied from 25% of Australian citizens, 24% of New Zealand citizens to 28% of other citizens. Familial amyloid polyneuropathy was the most common metabolic disease in other adult recipients.
- 16-18. The predicted increase in the proportion of patients requiring transplantation for CVH is evident in recent data. By 2000-02, 32.5% of Australian adults, 37% of New Zealand adults and 40% of Other adult patients had a primary diagnosis of CVH. In Australian and other citizens hepatitis C predominates while hepatitis B predominates in New Zealand citizens.
19. Current 1 year patient survival of all patients is 85%. Patient survival was 77% at 5 years and 68% at 10 years. There was no difference in survival between citizenship groups.
20. Australian adults had a significantly lower survival rate than children but this was not seen in other groups.
- 21-23. Older recipients (> 60 years) had poorer outcomes than other adults while babies (< 1 year) also tended to have lower survival than older children.
- 24-25. Patient survival in the 2000-02 cohort shows continued improvement in patient outcome compared with earlier cohorts.



Summary

PAGE

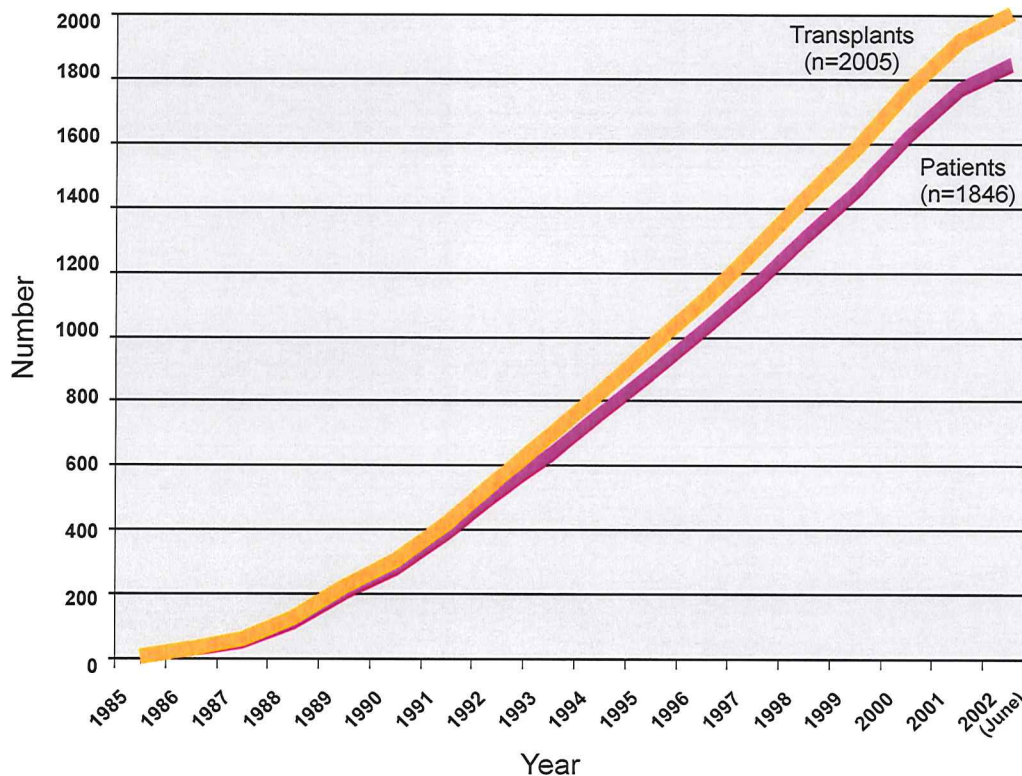
26. Children weighing < 8 kg at the time of transplant had inferior survival compared to heavier patients.
27. Type of primary graft, (whole, reduced or split liver), had no effect on patient survival in either children or adults.
28. Adult patients transplanted for biliary atresia had the best long term survival while those whose primary disease was malignancy had a significantly lower survival rate.
29. Children undergoing transplantation for biliary atresia had superior long term survival. There were no differences in survival between adults and children transplanted for fulminant hepatic failure.
30. Recent cohorts of adult patients with hepatitis B show a significantly improved survival which is not seen in adult patients with hepatitis C as primary disease. Patients transplanted for malignancy continue to have a poor outcome.
31. Seven patients have received a living related donor graft, six as a primary graft and one as a second graft.
32. Graft survival was significantly worse in second and third grafts.
- 32-33. Both split and other reduced grafts had lower graft survival in the early post-transplant years but an improving longer term outcome.
34. Vascular complications and rejection are the commonest indications for retransplantation.
- 35-36. Overall, sepsis and graft failure are the most frequent causes of death. Early graft failure is due to poor or no early graft function. After 1 year, malignancy and graft failure from recurrent disease or chronic rejection cause most deaths.
37. Donor age has little effect on patient survival after transplantation. The smaller number of transplants in 2001 was a reflection of the decline in cadaveric donors in that year.
- 38 - 43. Sixty-one (3%) patients were transplanted for primary liver cancer. There was no difference in outcome for the type of primary tumour. Incidental tumours were found in 130 (7%) of patients. Patients with incidental cholangiocarcinoma had a significantly poorer survival.

De novo cancers have developed in 208 (11%) patients including 146 (8%) patients with skin cancers and 64 (3%) with non skin tumours. Patients with either primary or incidental malignancy had a significantly worse survival than other recipients.

Section 1

Demographic Data

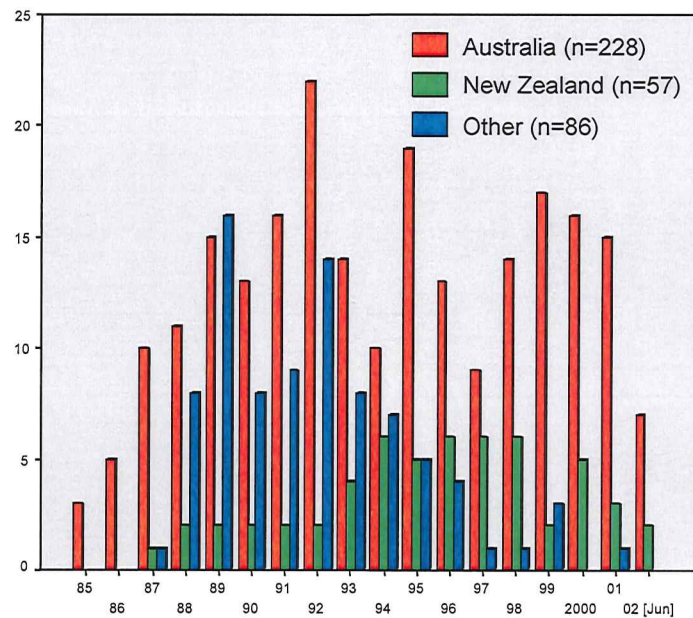
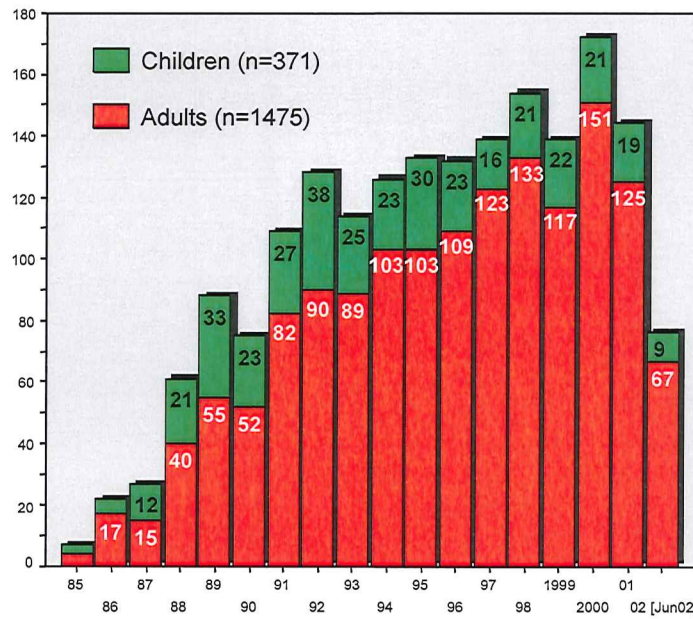




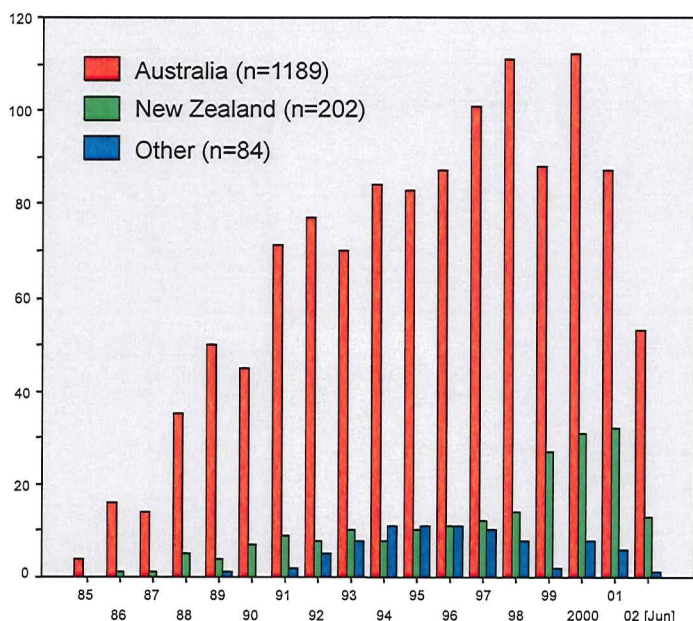
Summary Statistics - Age and Gender

ALL PATIENTS (AUSTRALIAN, NEW ZEALAND, OTHER)

	Children	Adults	Total
Patients	371	1475	1846
Age			
Mean ± SD	4.5 ± 4.3y	45.8 ± 12.1y	37.5 ± 19.9y
Median	2.5y	47.6y	44y
Range	24d -14.9y	15.0 - 70.9y	24d - 70.9y
Gender			
Female	204 (55%)	598 (40.5%)	802 (43%)
Male	167 (45%)	877 (59.5%)	1044 (57%)
Surviving	285 (77%)	1104 (75%)	1389 (75%)



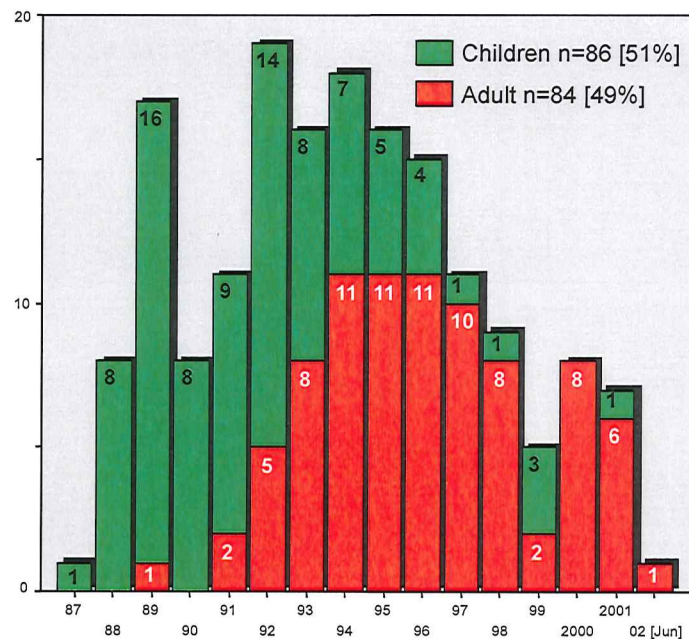
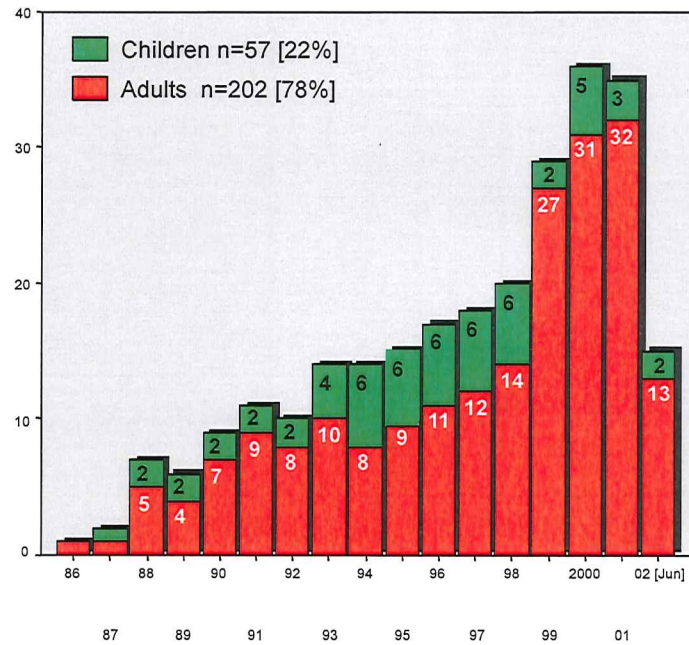
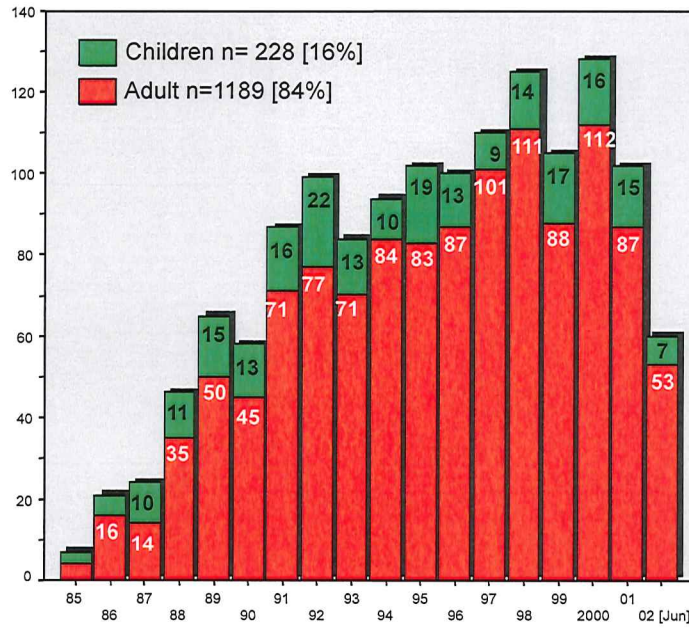
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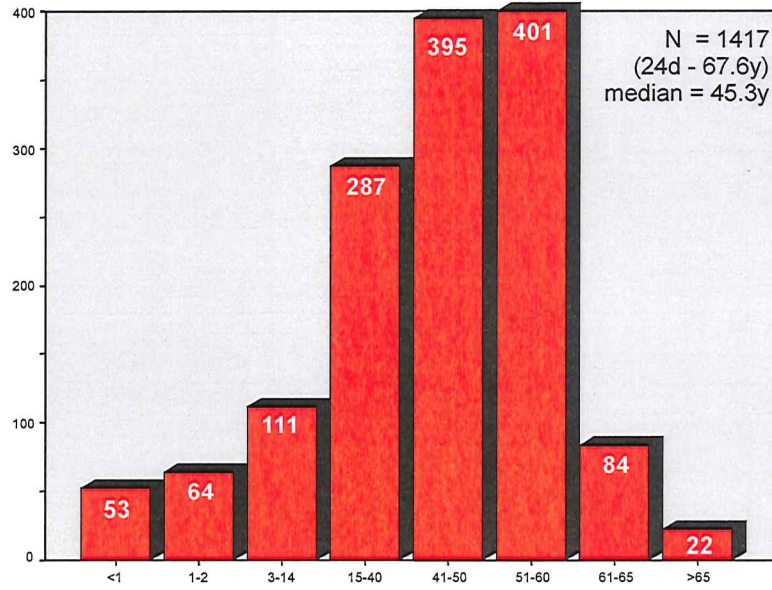
Adults
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Year of Transplant

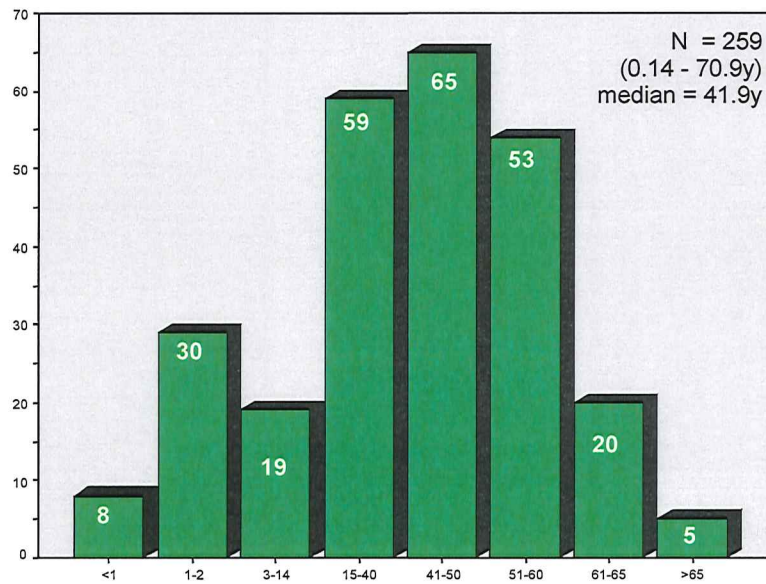




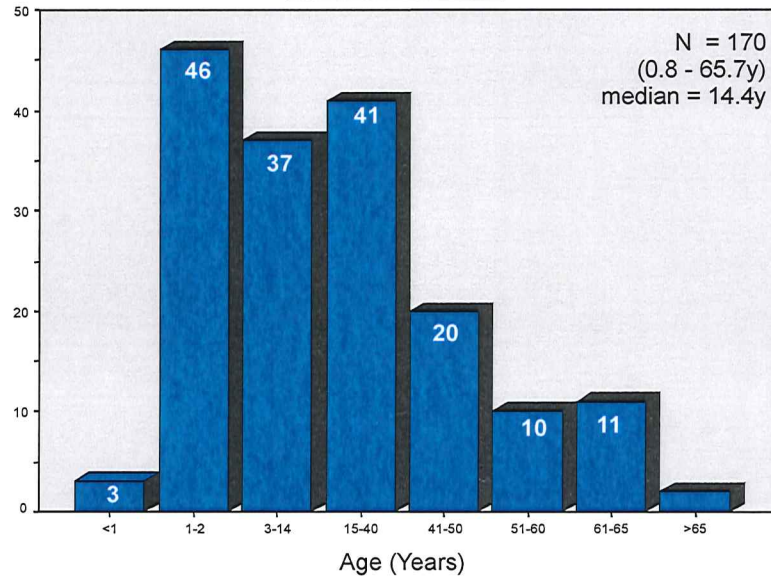
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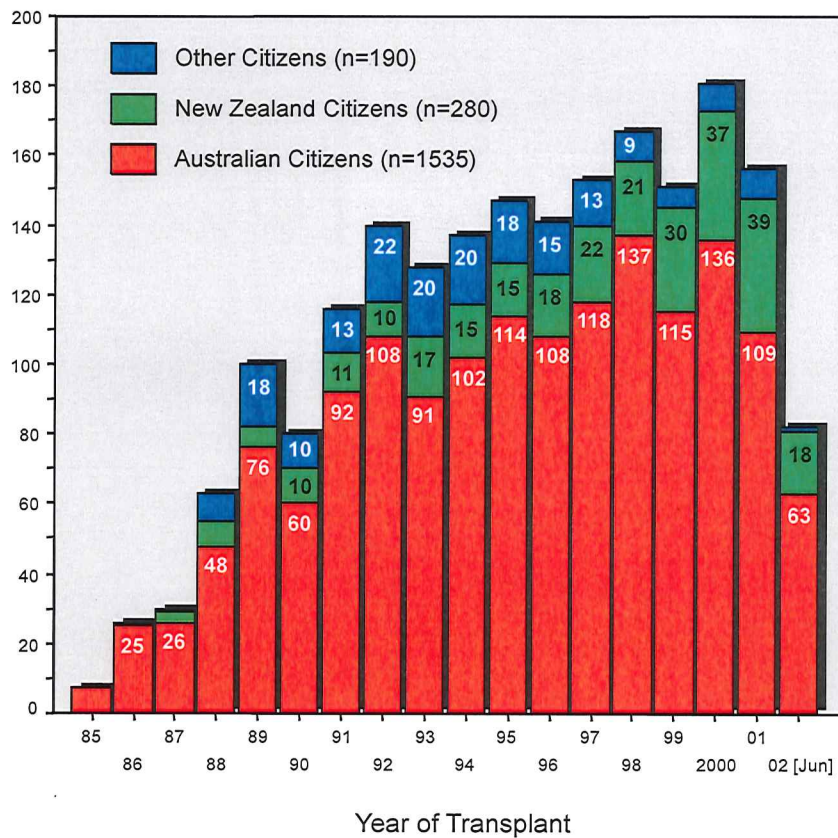
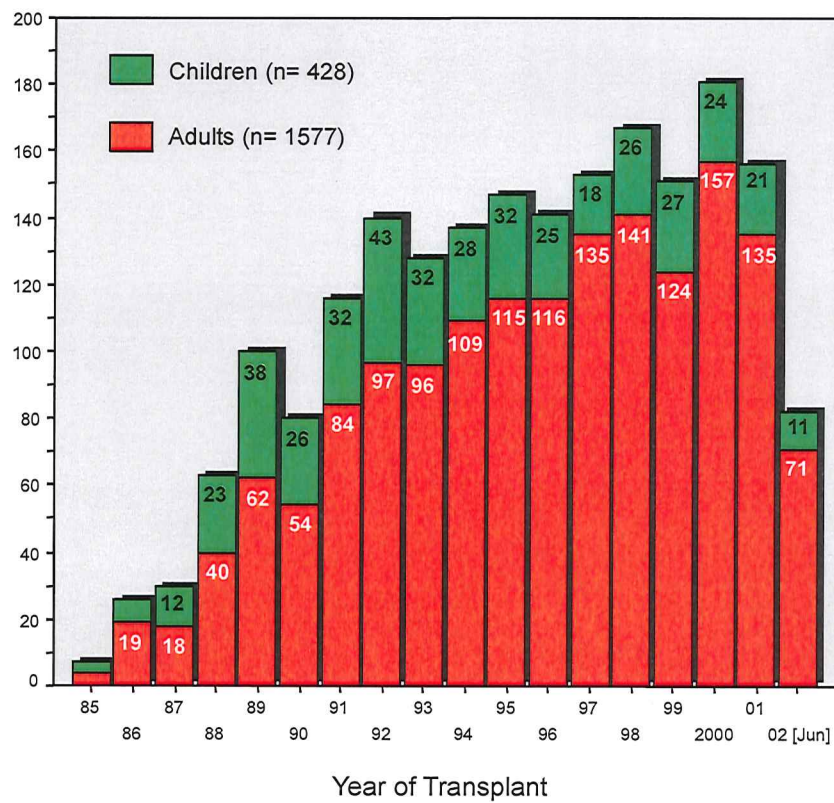


New Zealand Citizens



Other Citizens

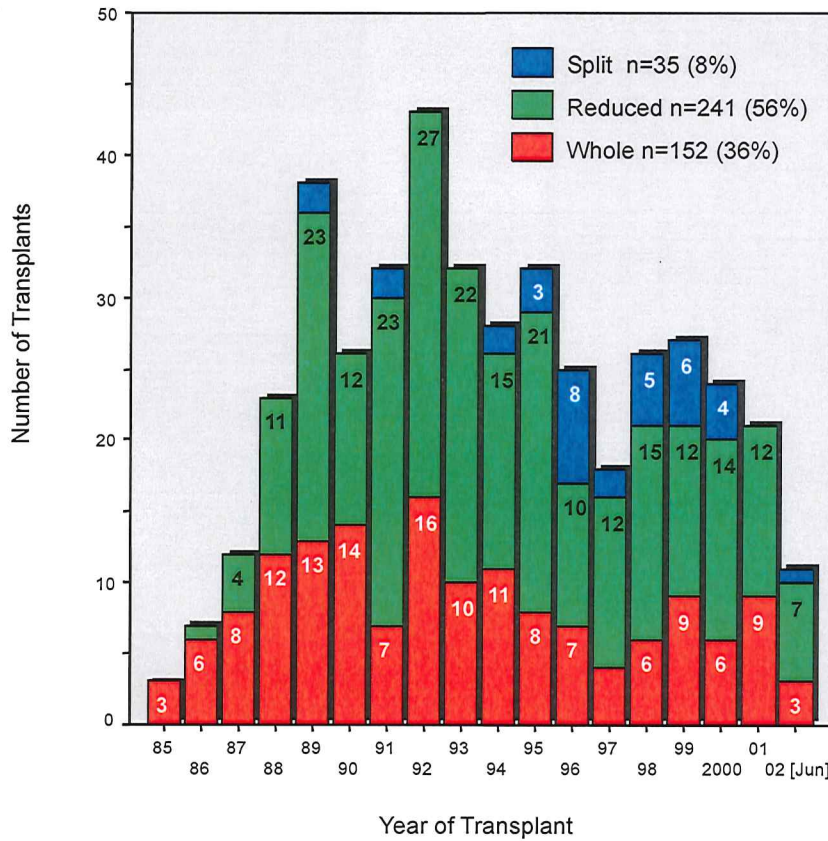




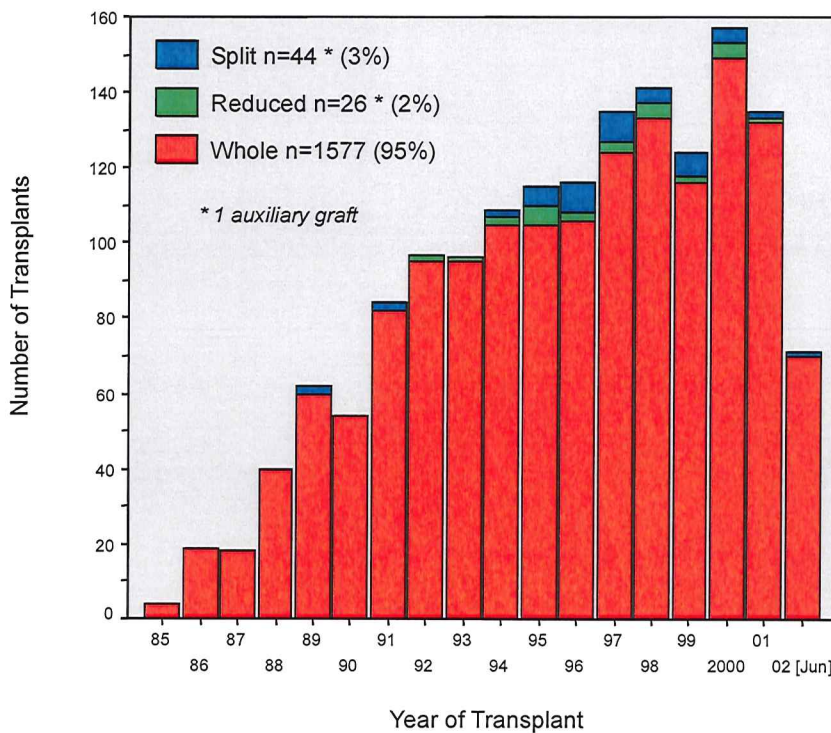
Type of Graft by Year

Split vs Reduced vs Whole

Children (n = 428)

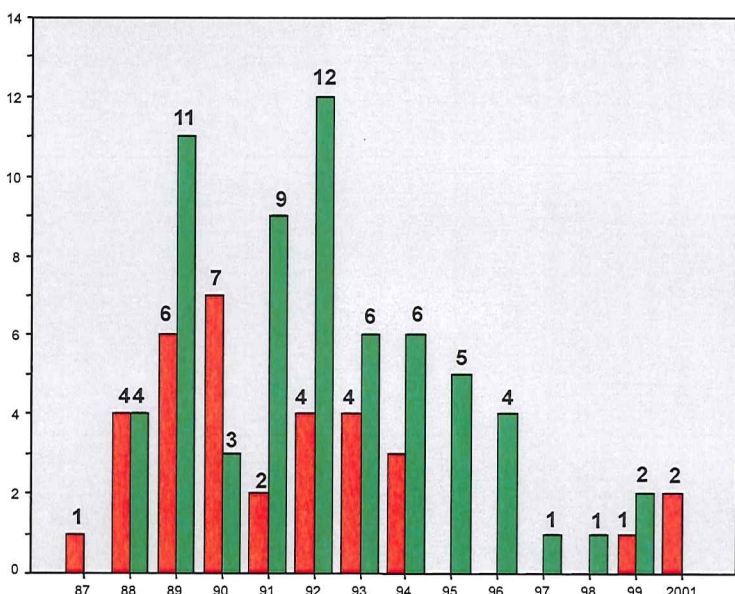
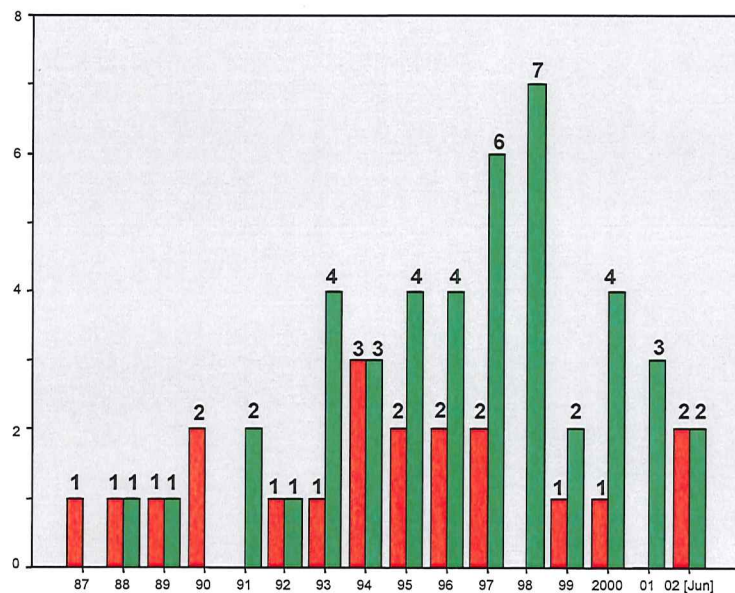
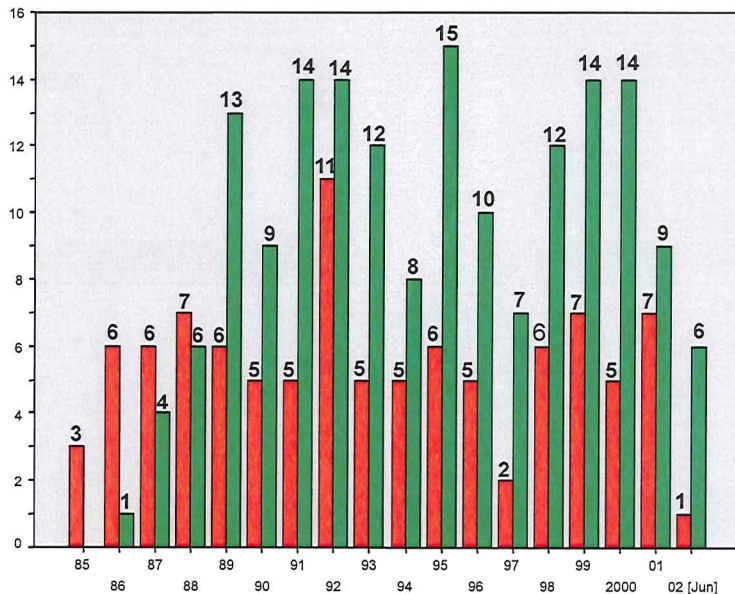


Adults (n = 1577)



Type of Graft by Year

Children - Reduced vs Whole



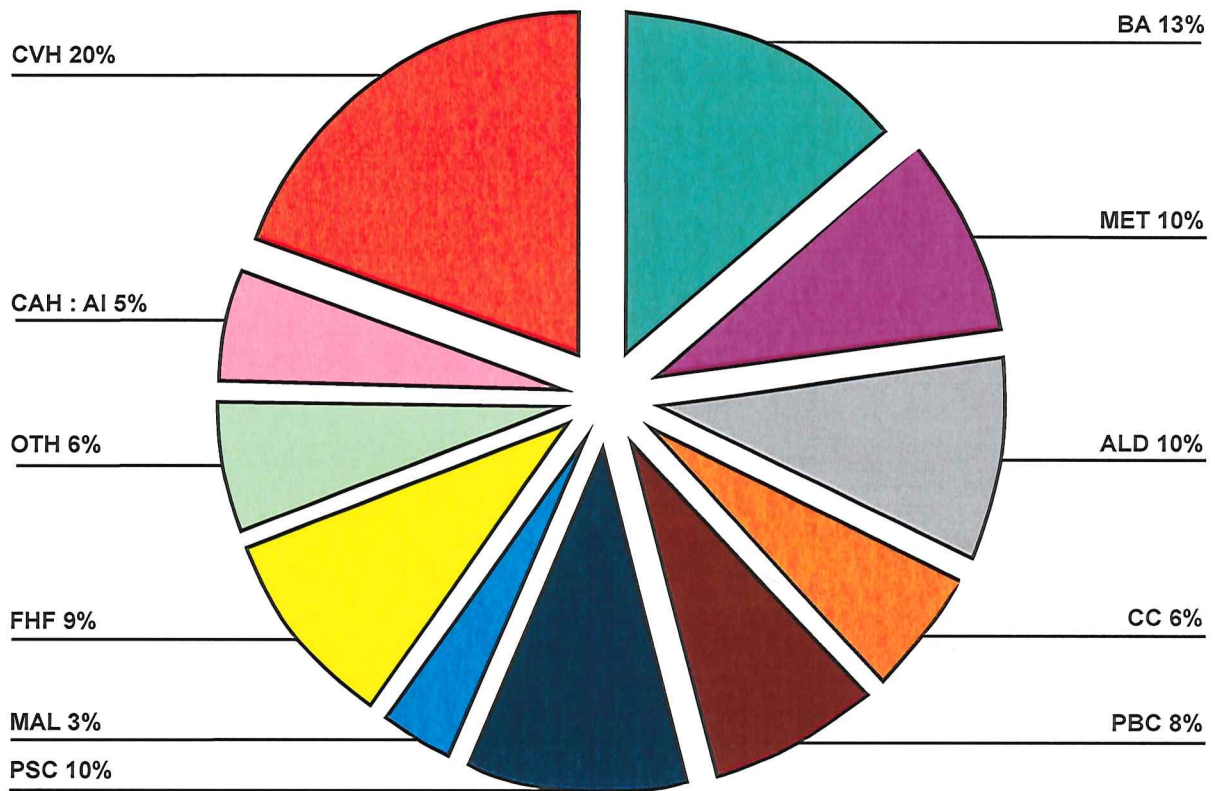
Year of Transplant



Section 2

Primary Diagnosis

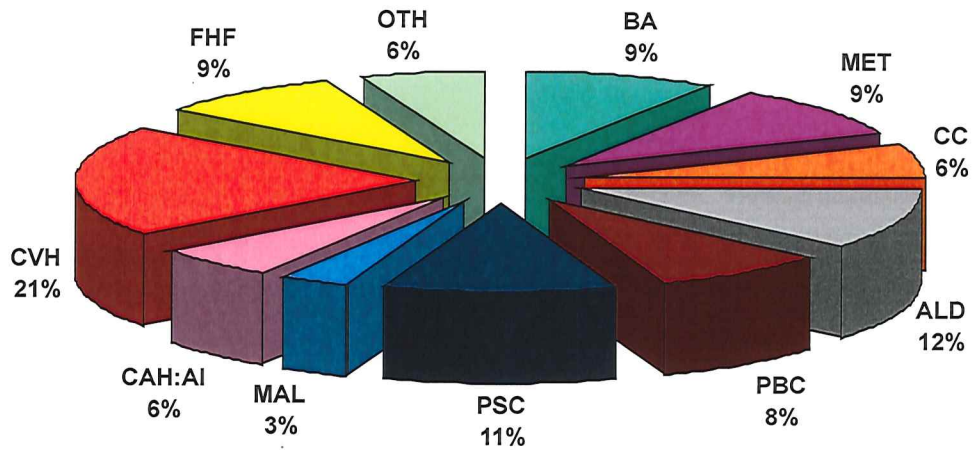




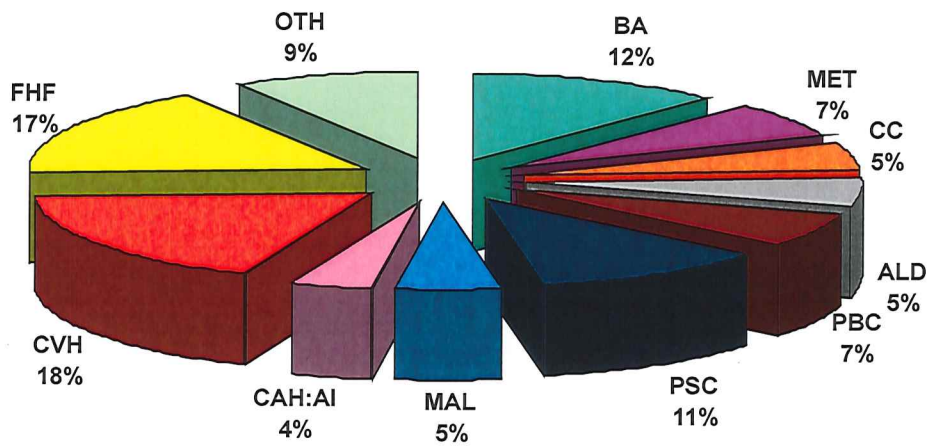
Disease Abbreviations

BA	-	Biliary atresia
MET	-	Metabolic diseases
ALD	-	Alcoholic cirrhosis
CC	-	Cryptogenic cirrhosis
PBC	-	Primary biliary cirrhosis
PSC	-	Primary sclerosing cholangitis
MAL	-	Malignancy
FHF	-	Fulminant hepatic failure
OTH	-	Other diseases
CAH : AI	-	Chronic active hepatitis [autoimmune]
CVH	-	Chronic viral hepatitis

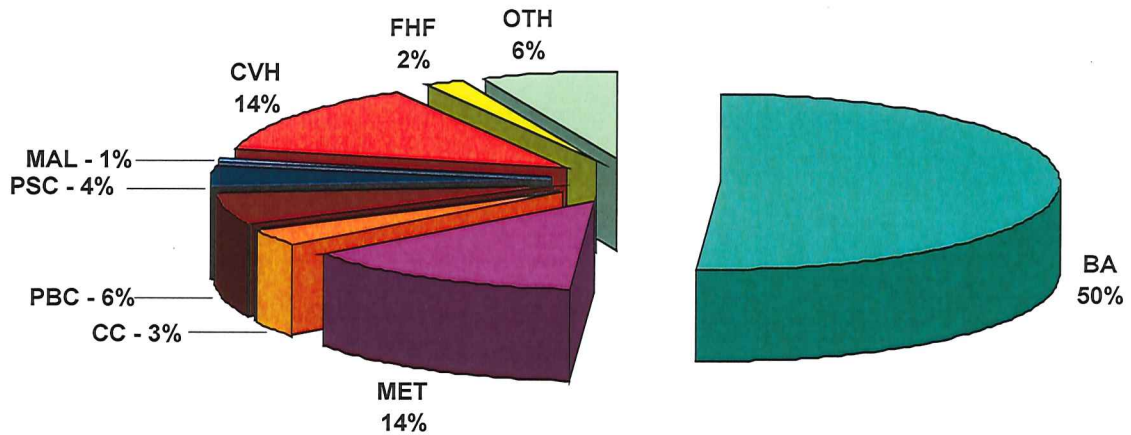
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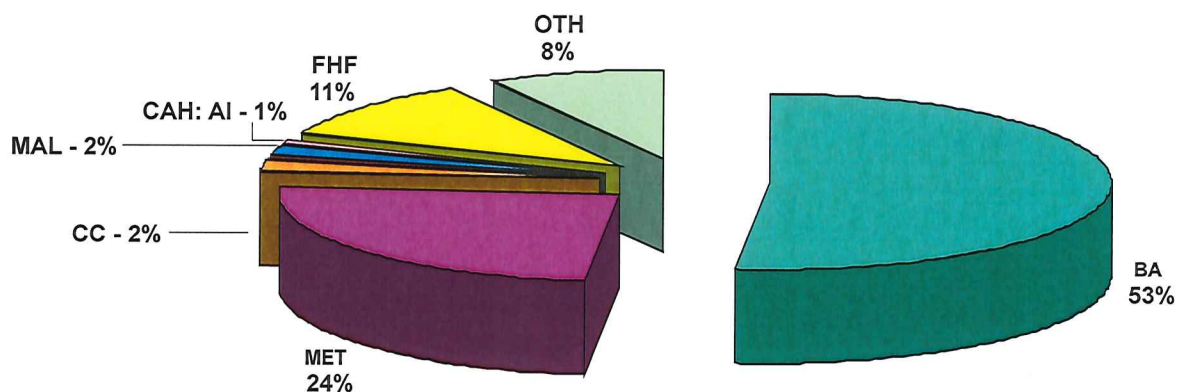
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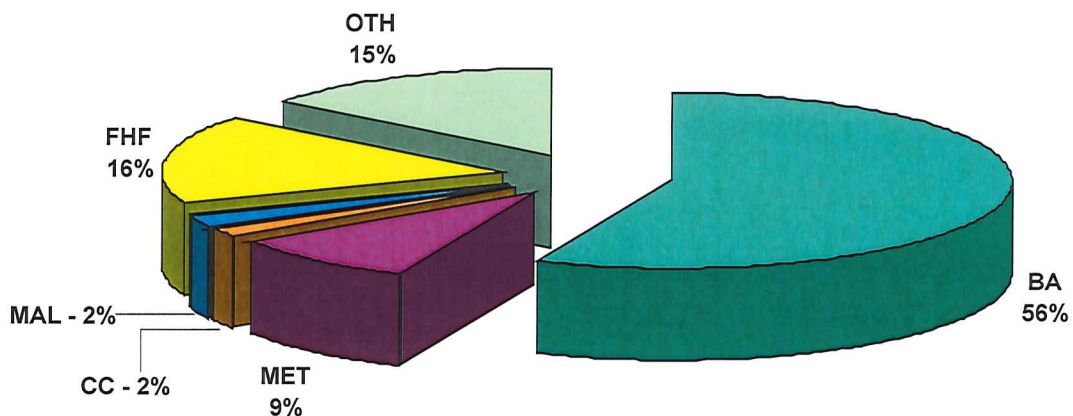
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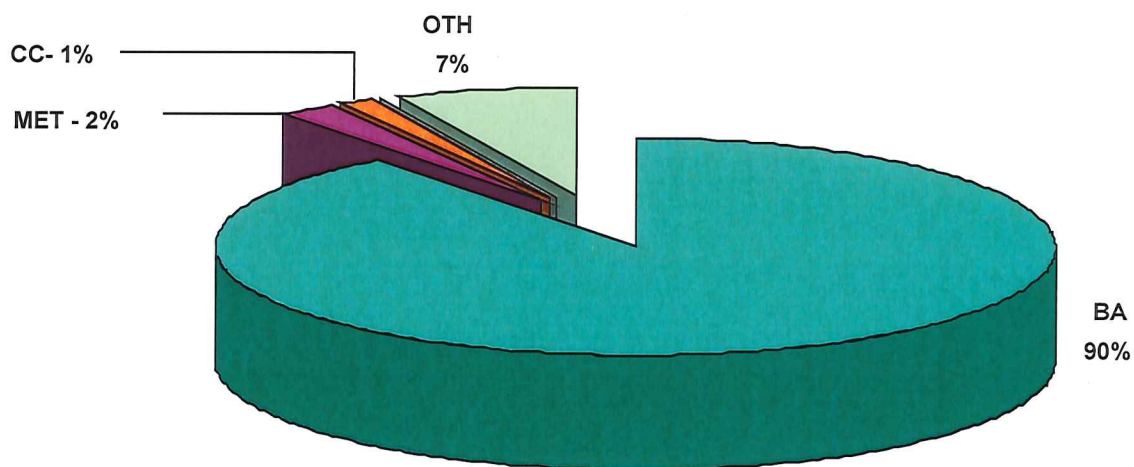
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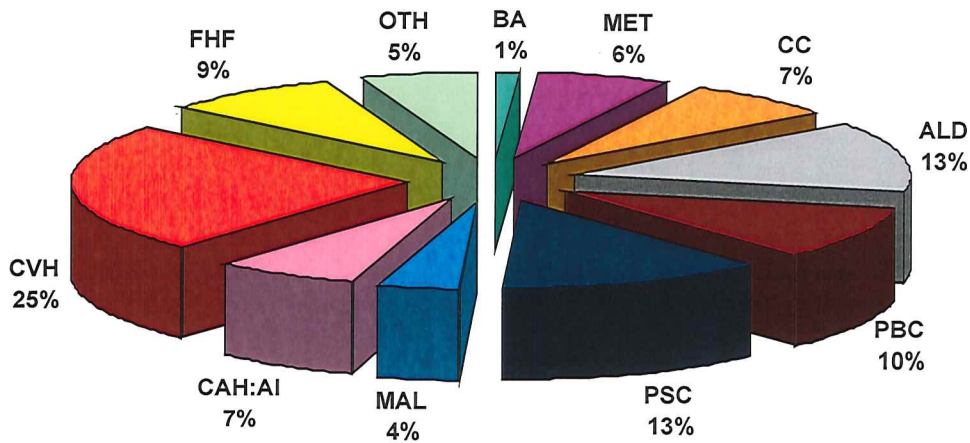
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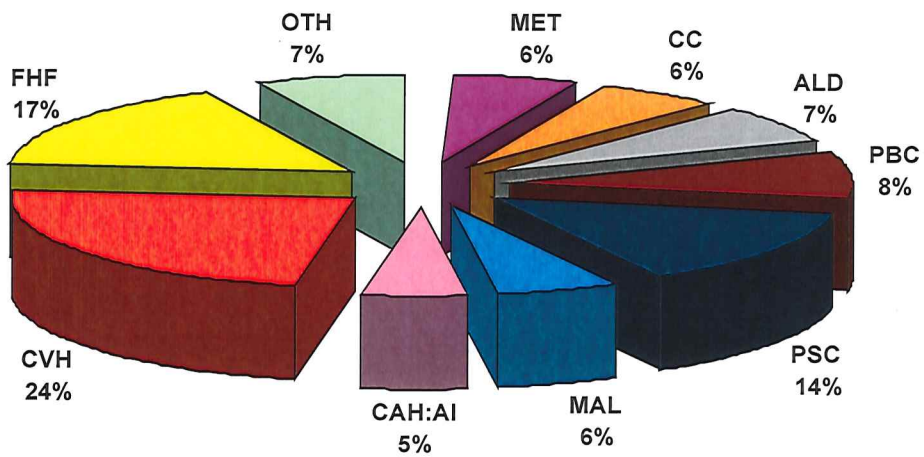
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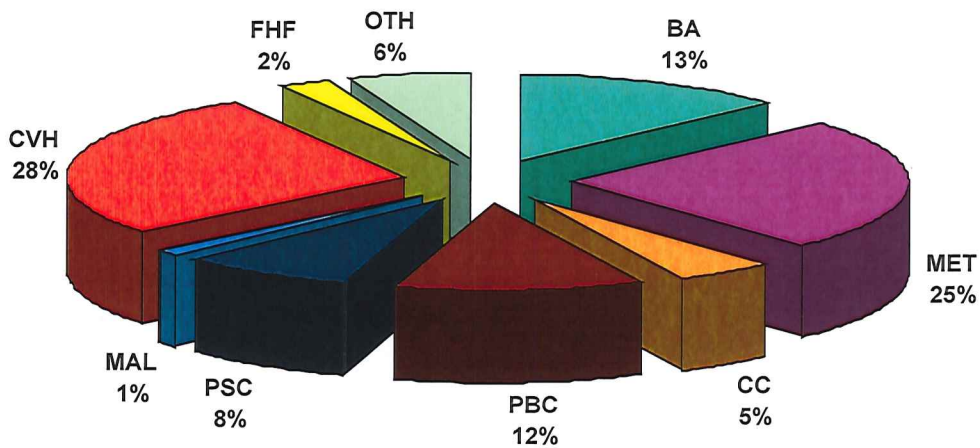
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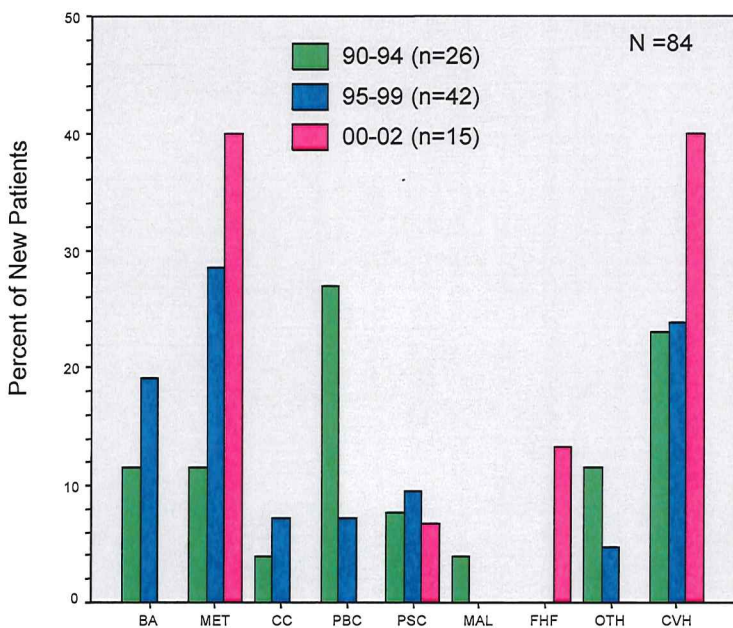
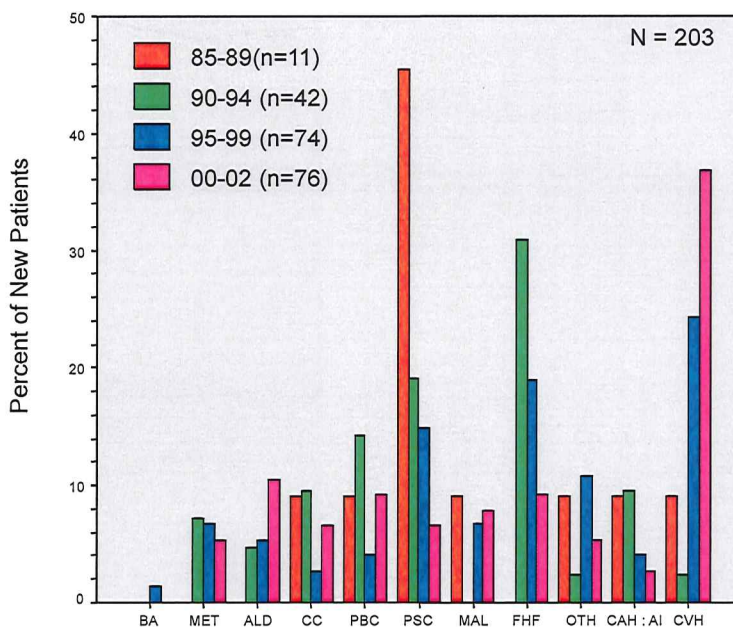
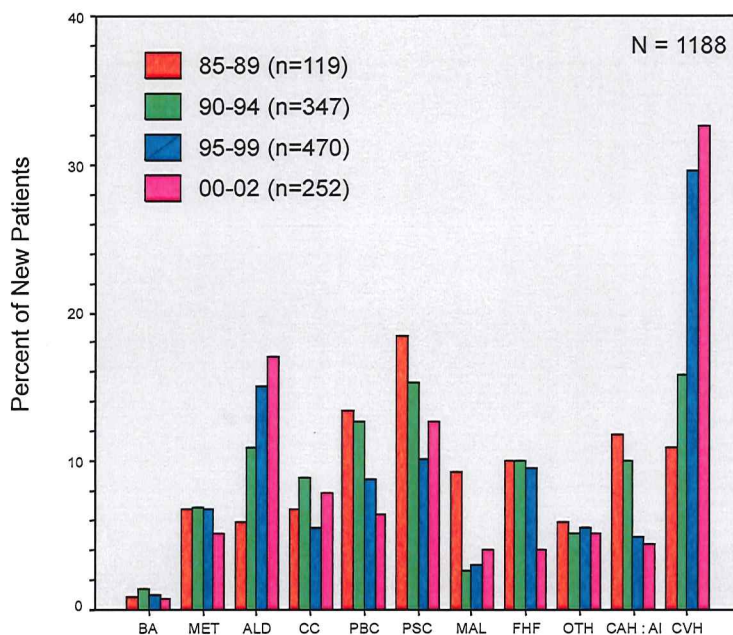


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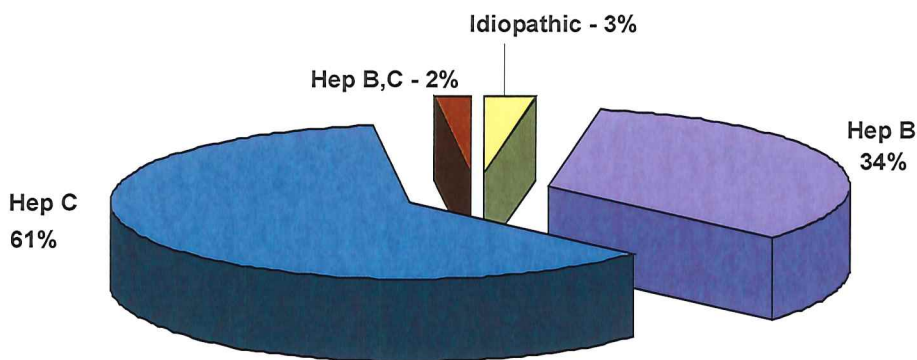


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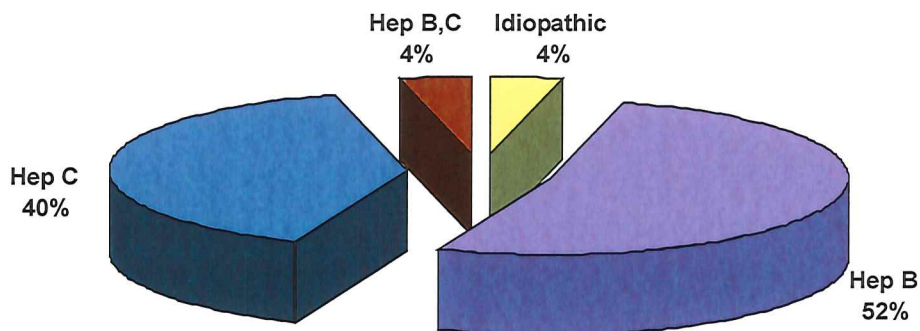




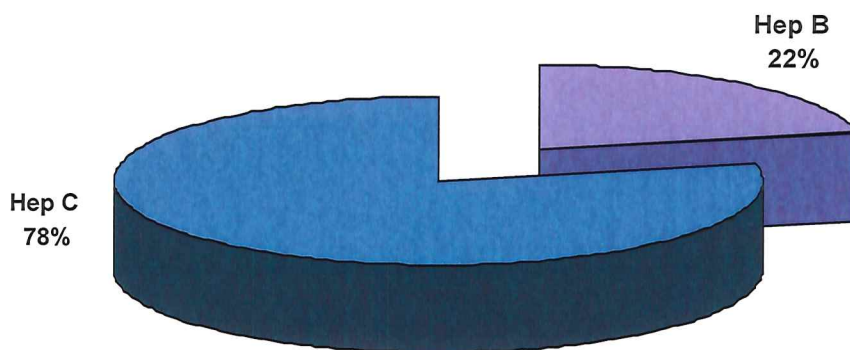
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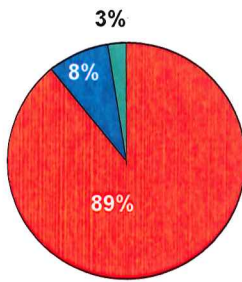
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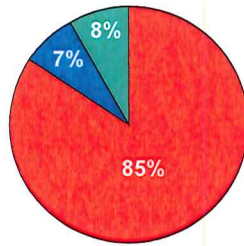
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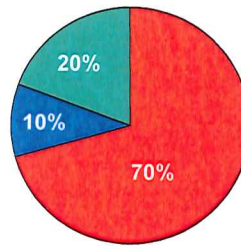
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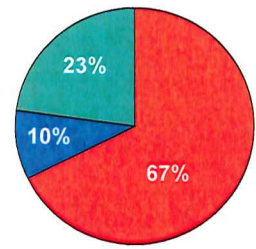
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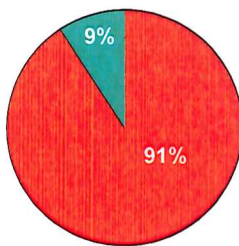


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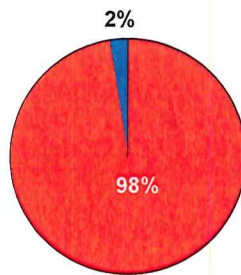


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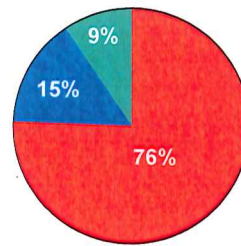
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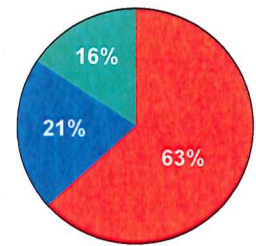
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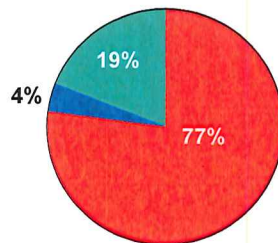
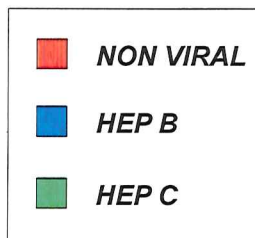


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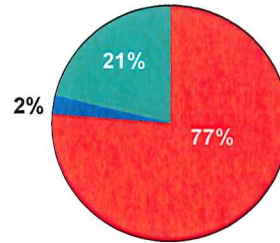


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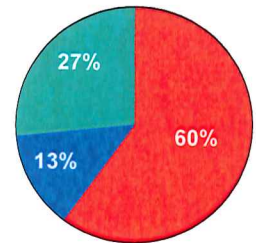
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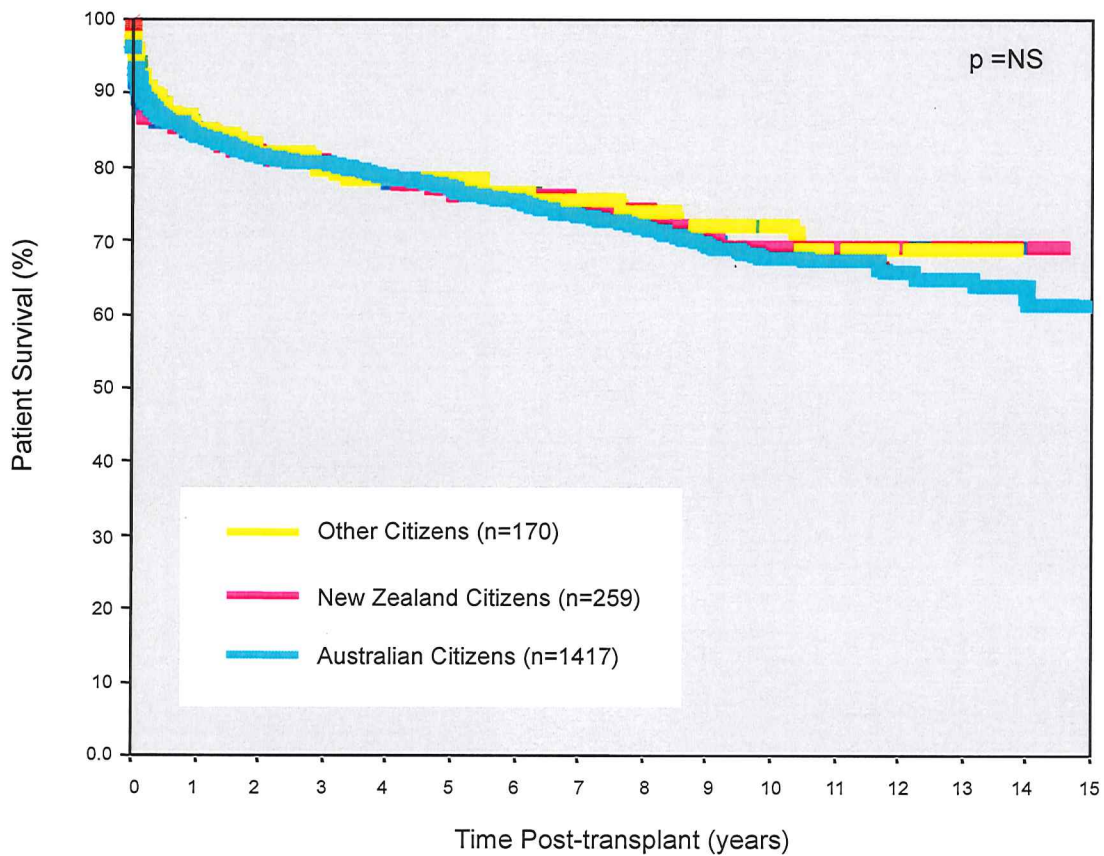
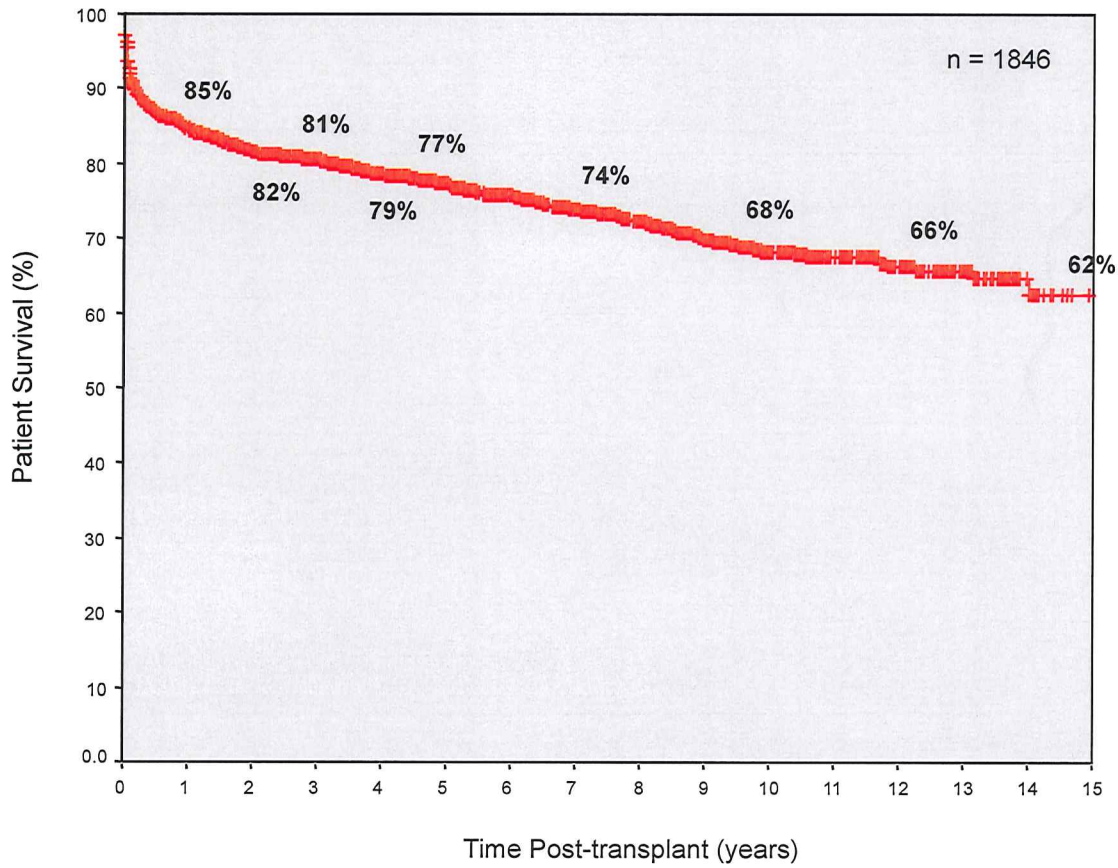
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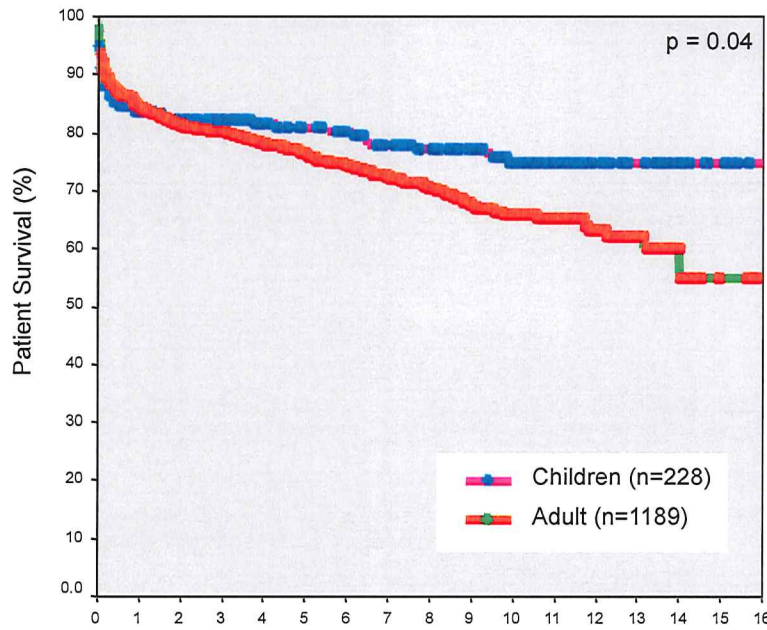


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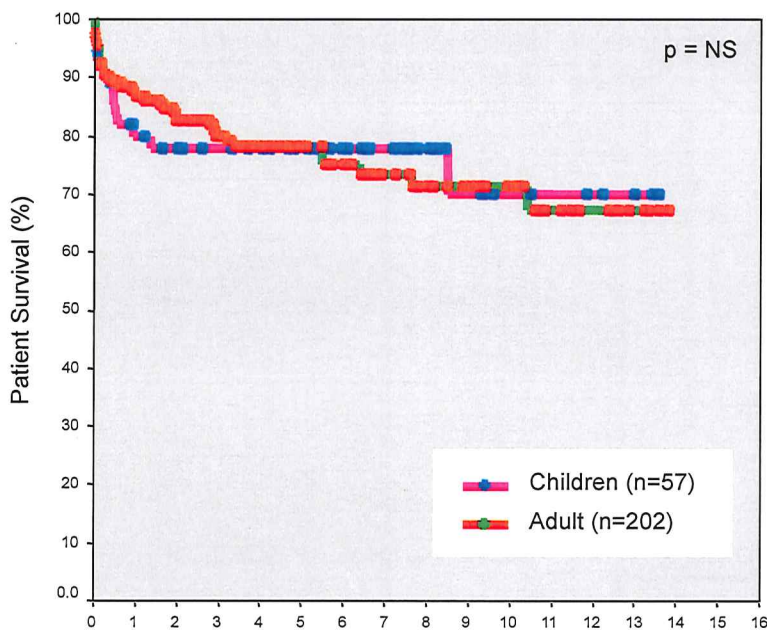
Patient Survival



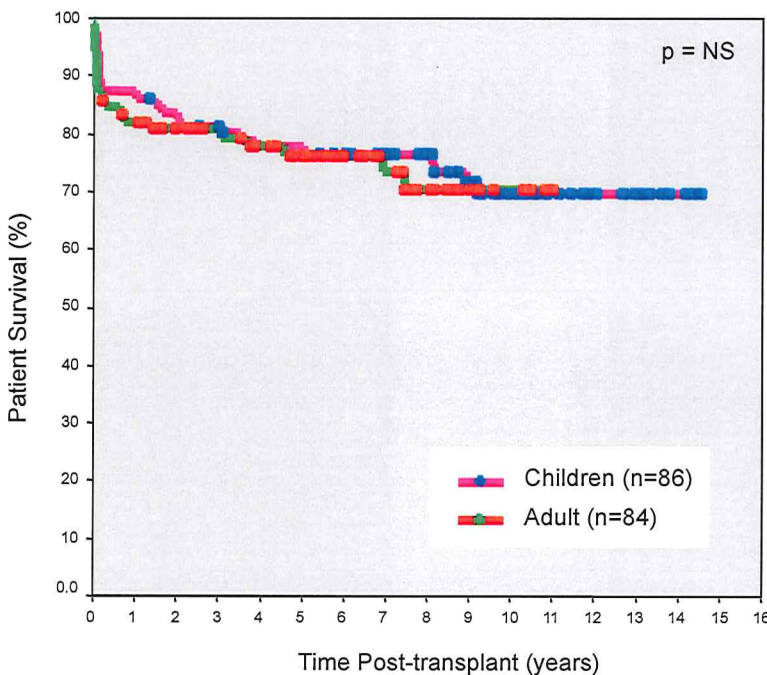




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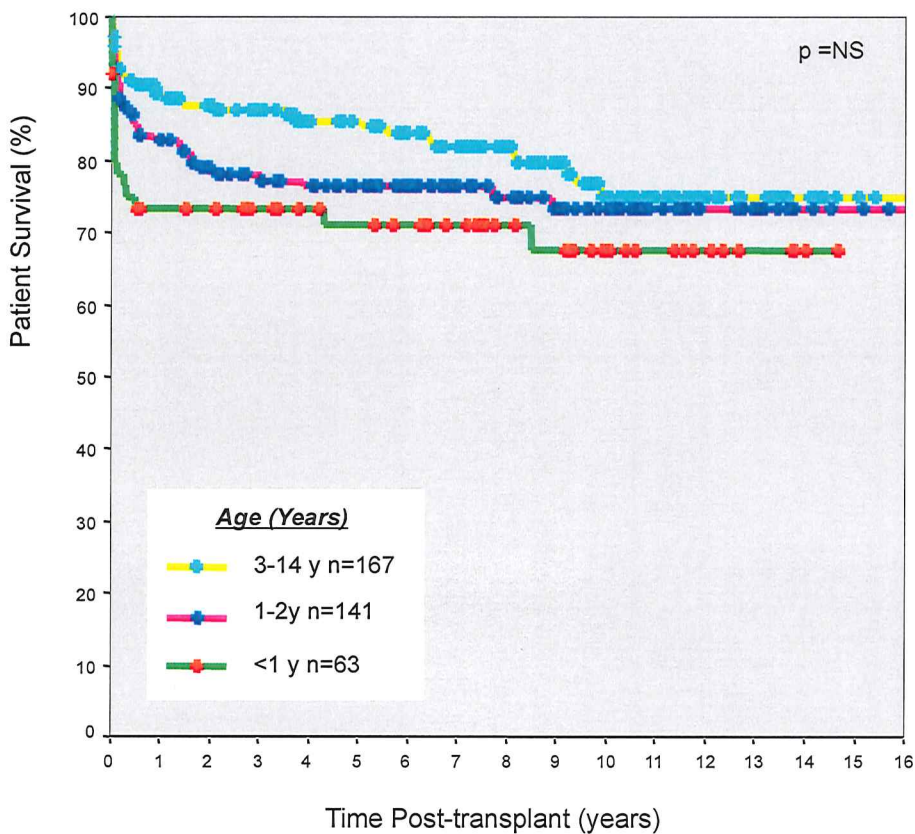
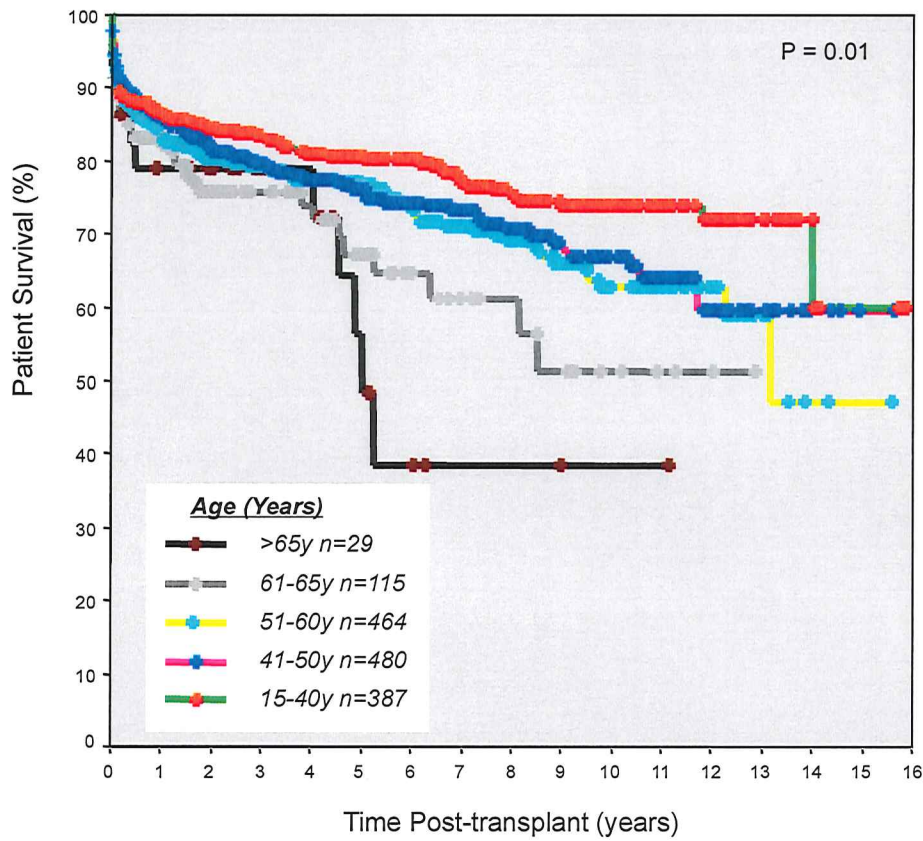


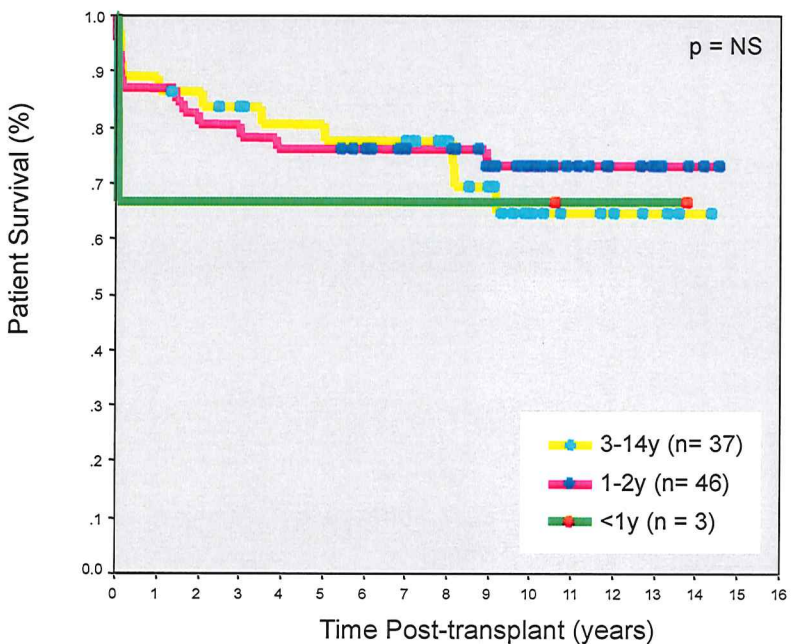
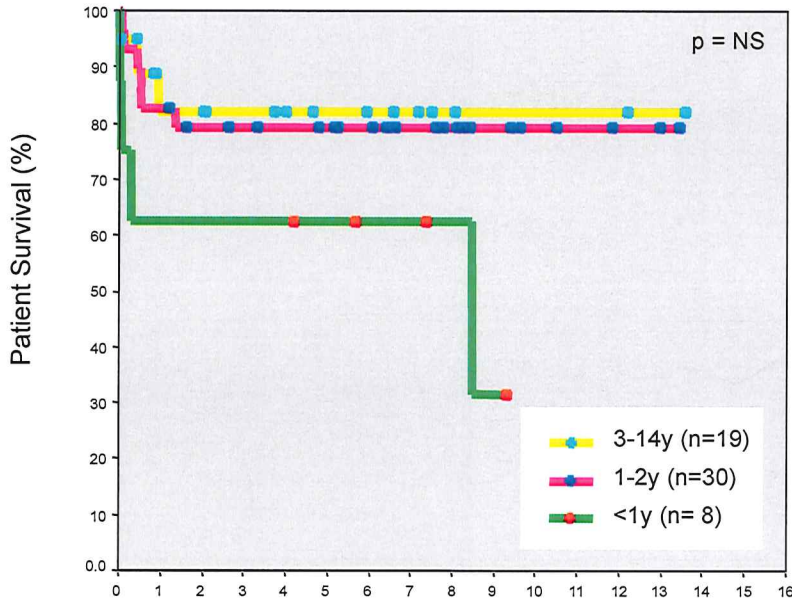
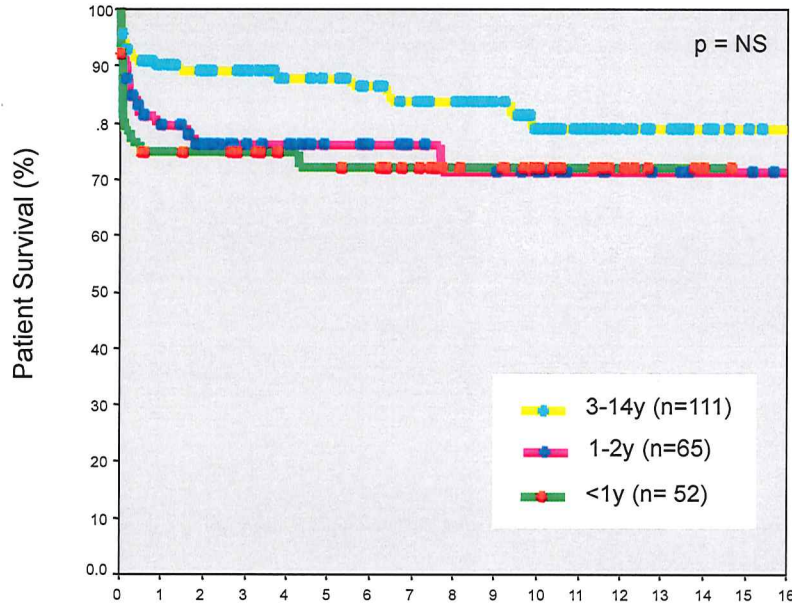
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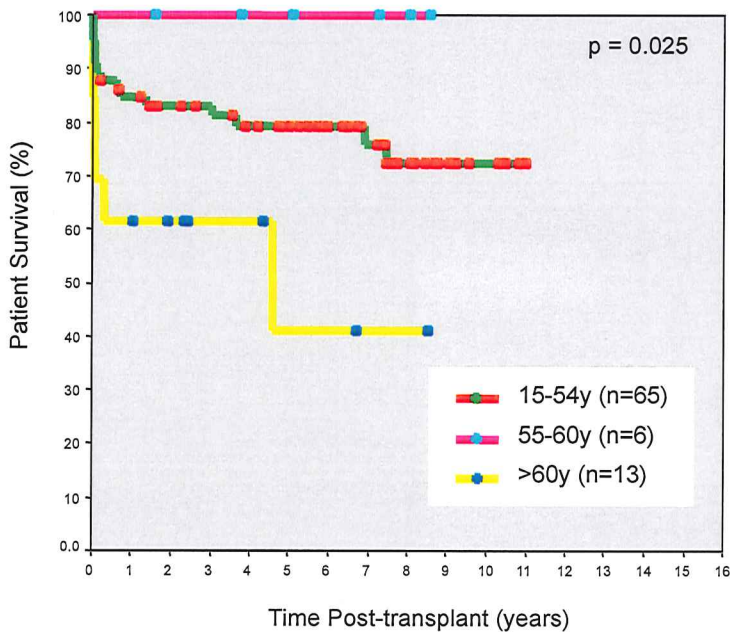
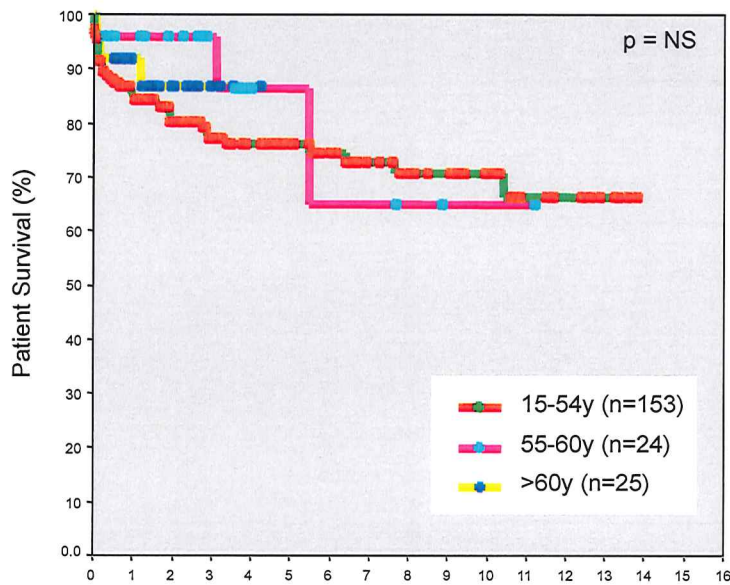
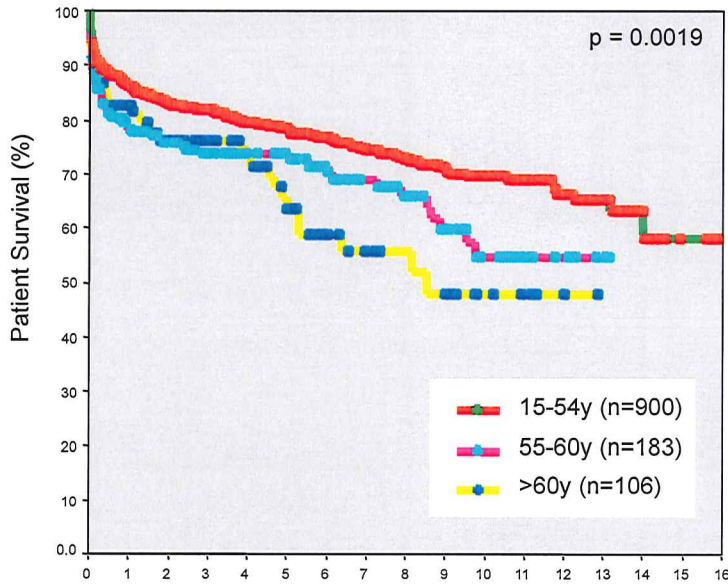


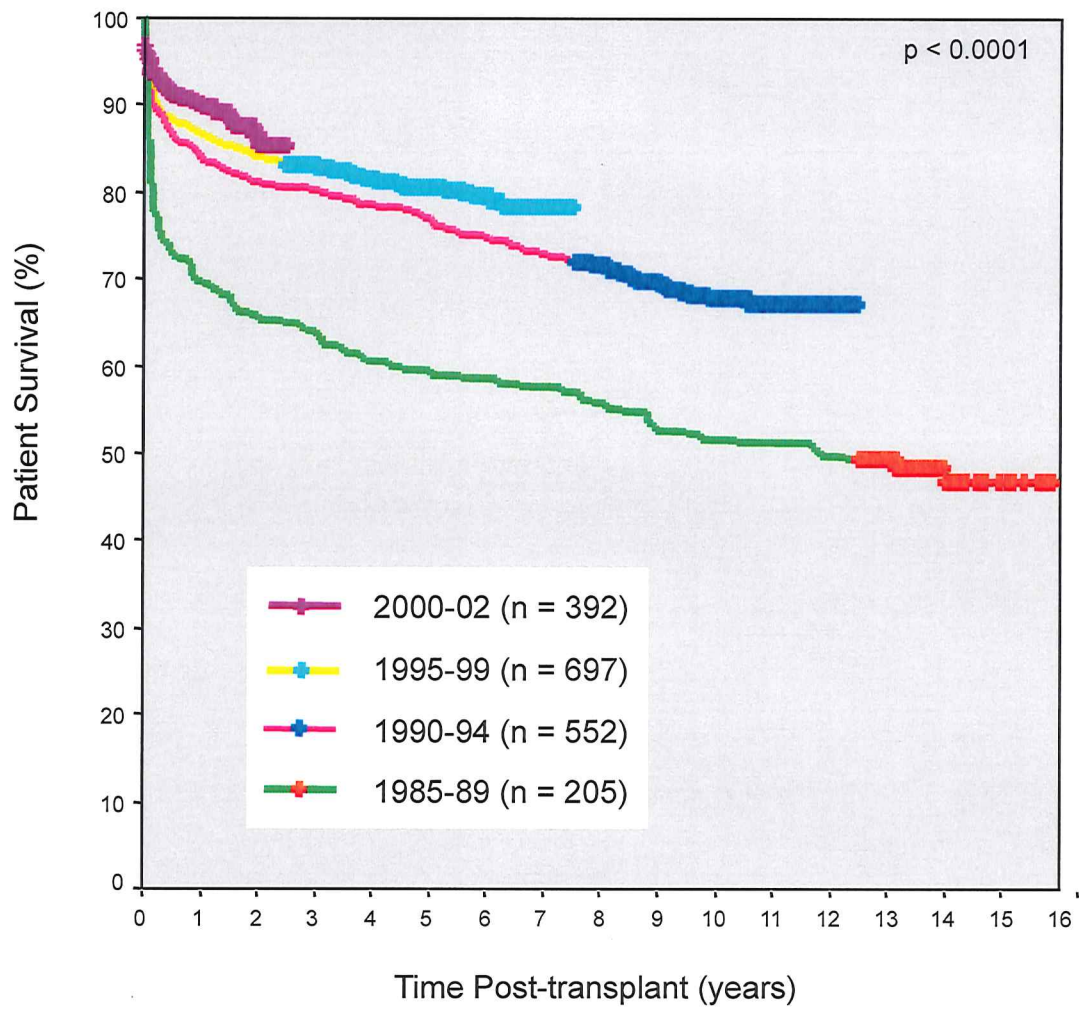
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n= 170

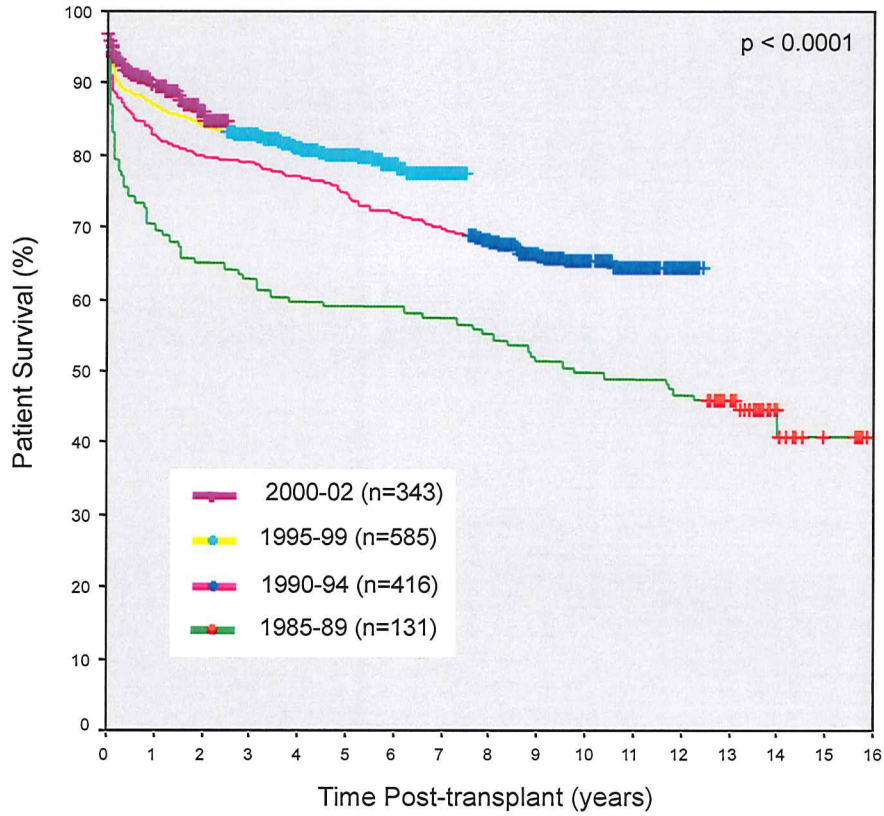




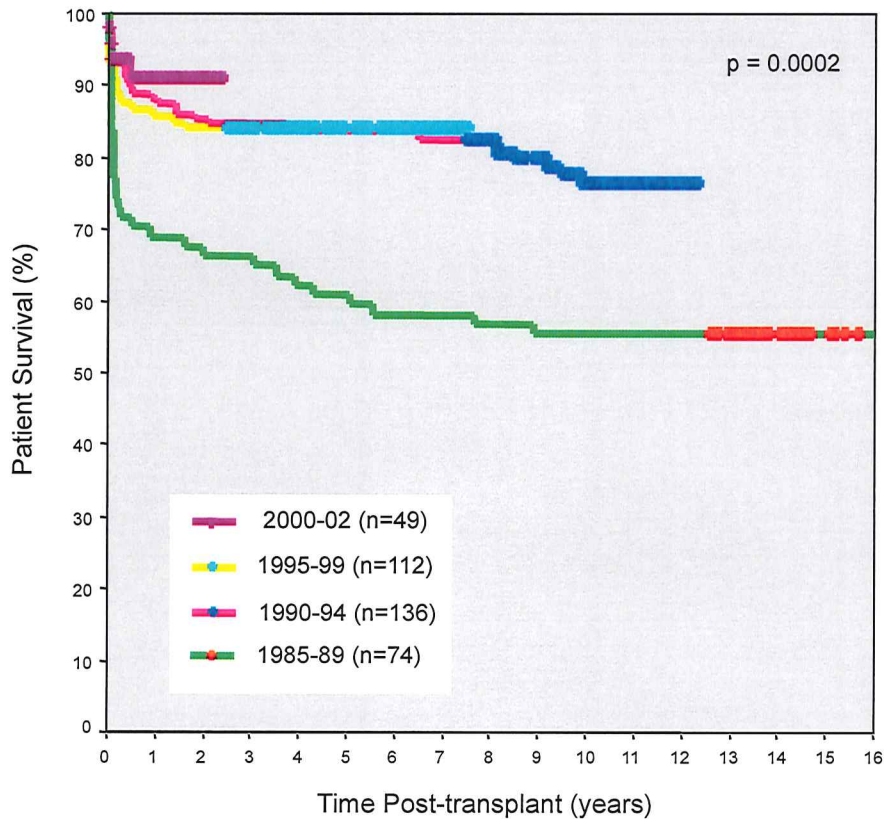


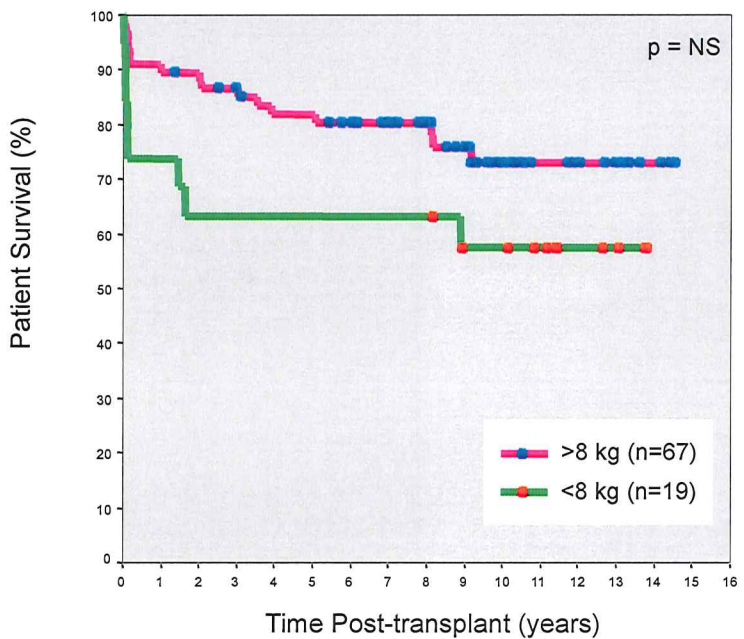
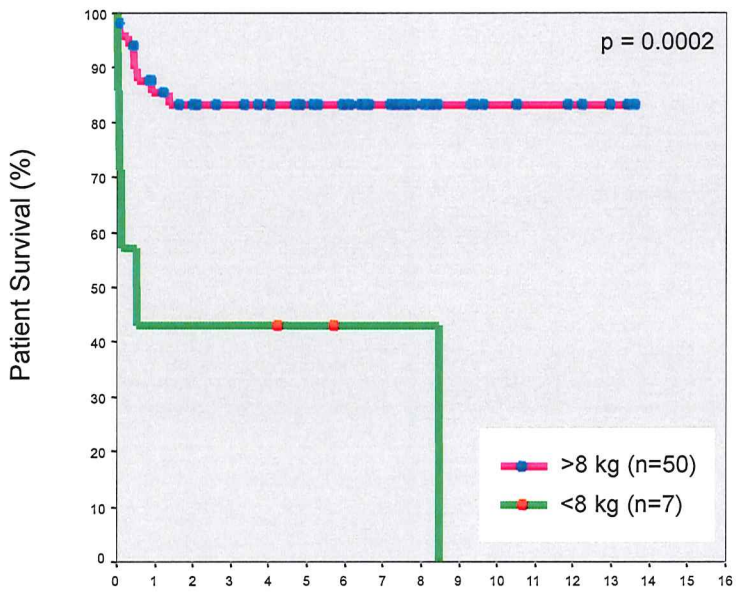
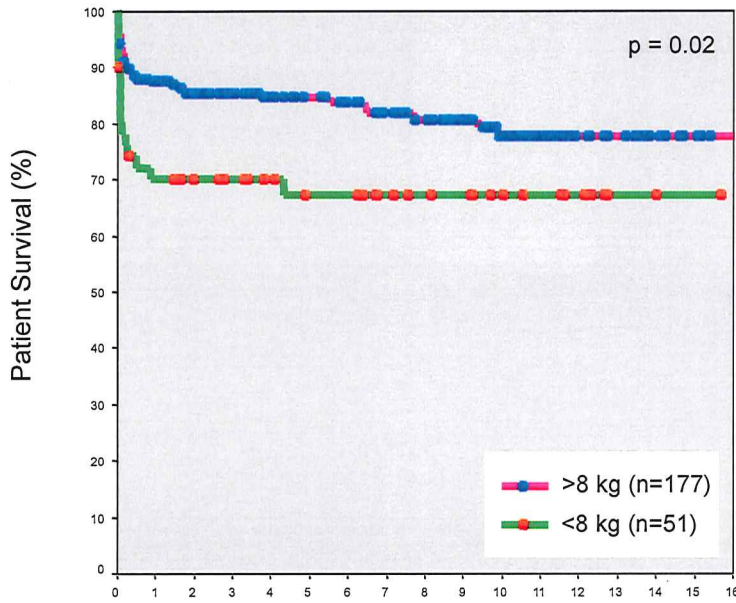




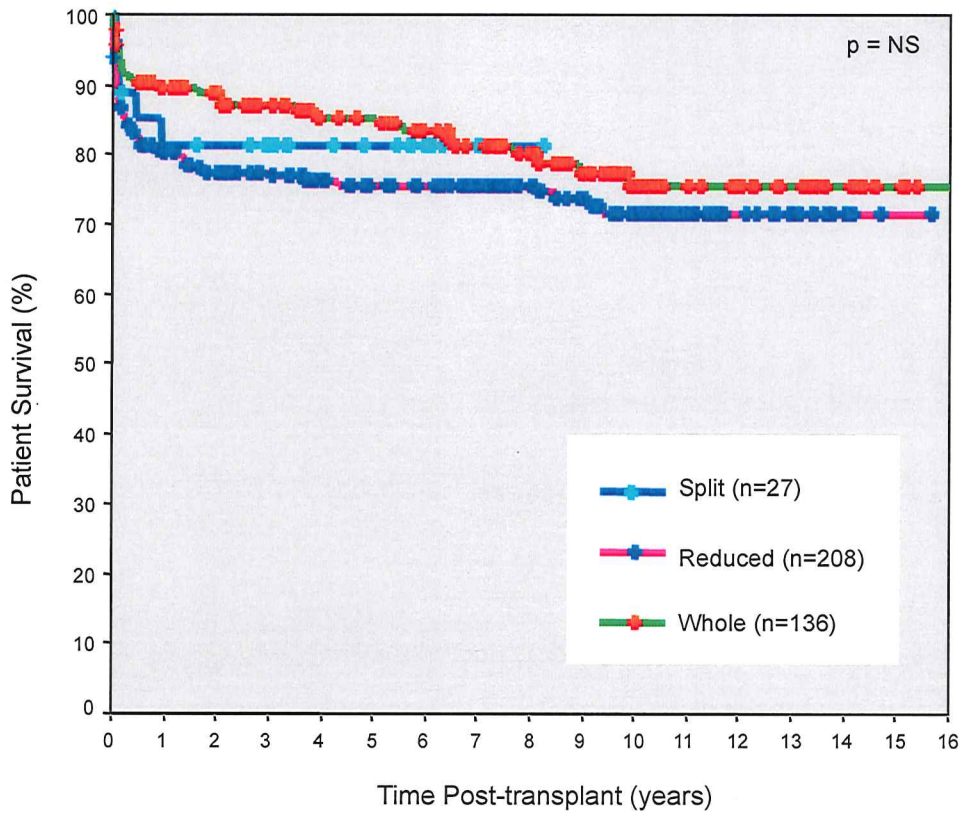


Patient Survival - Children

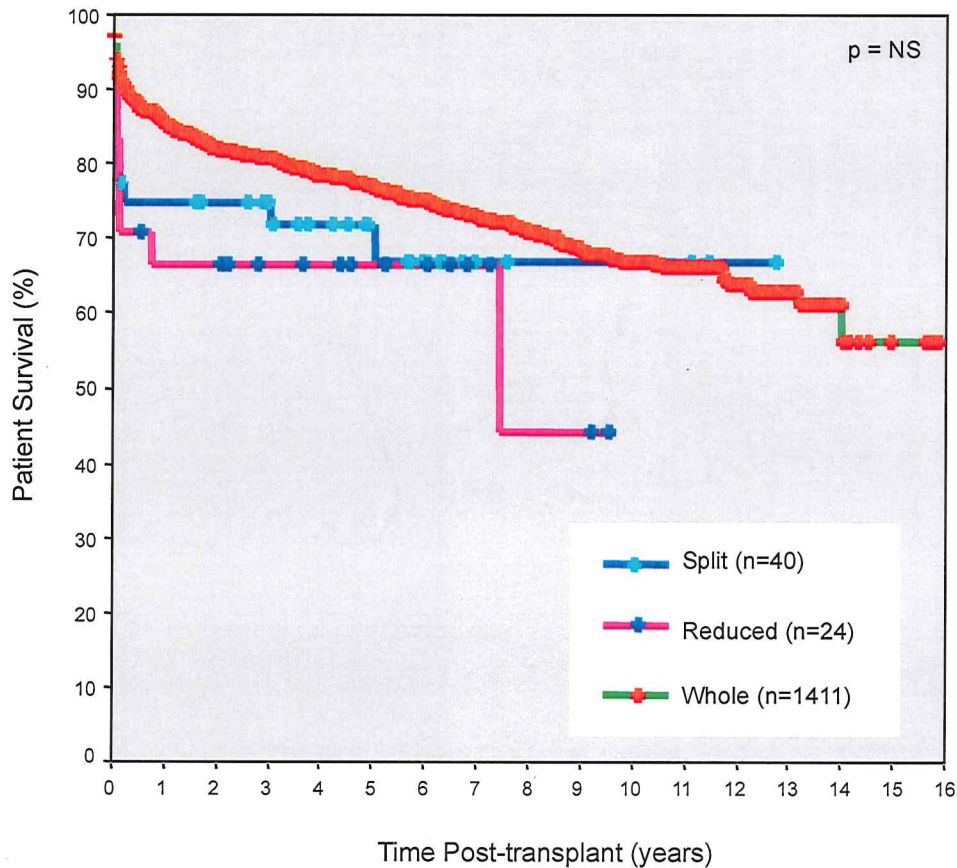




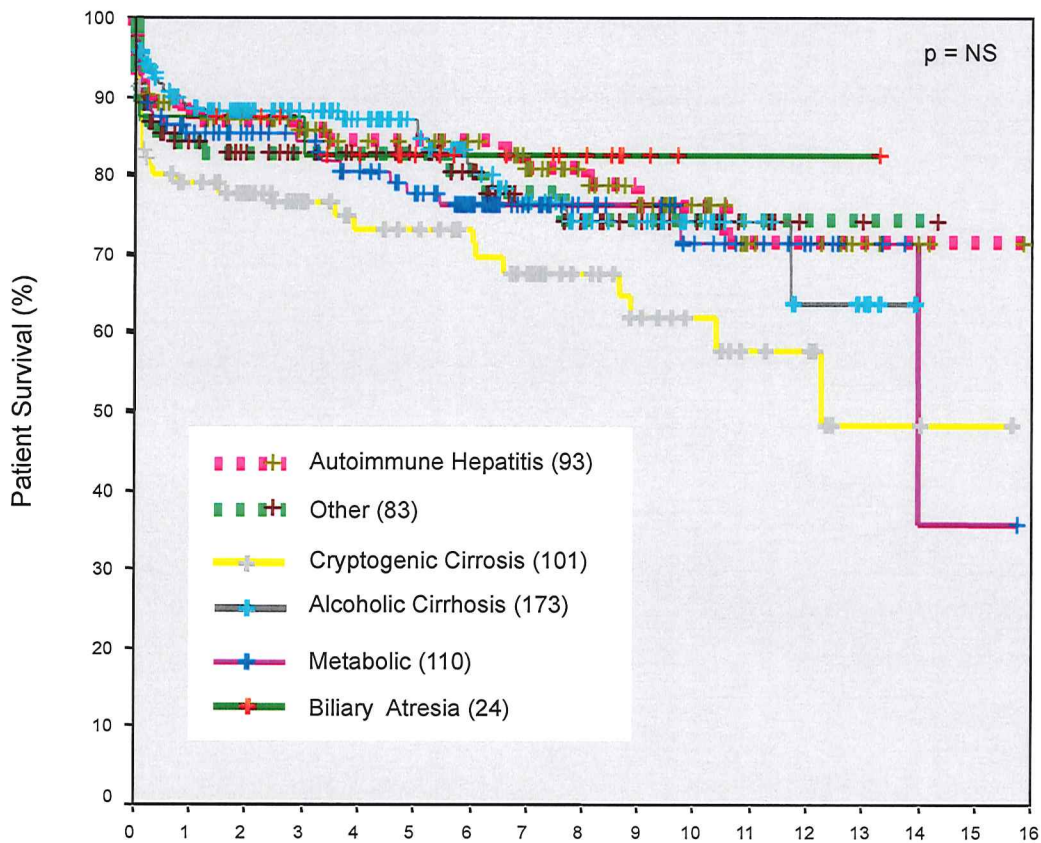
Children - n = 371



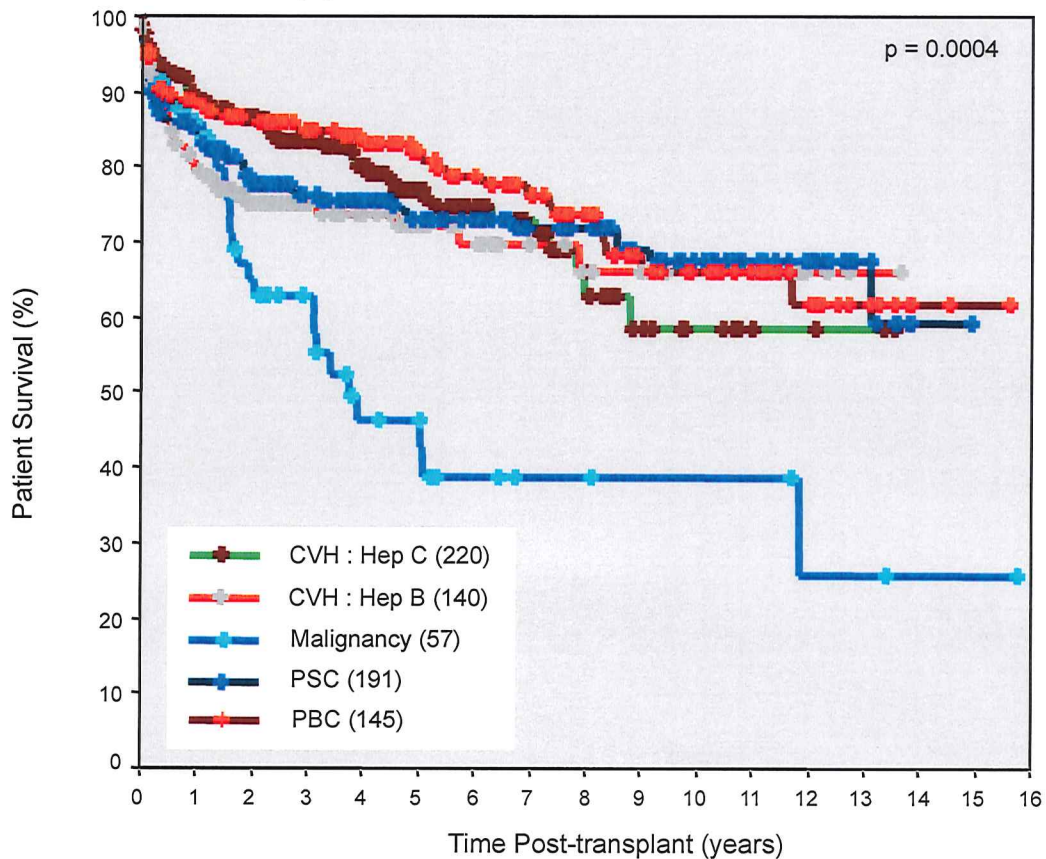
Adults - n = 1475



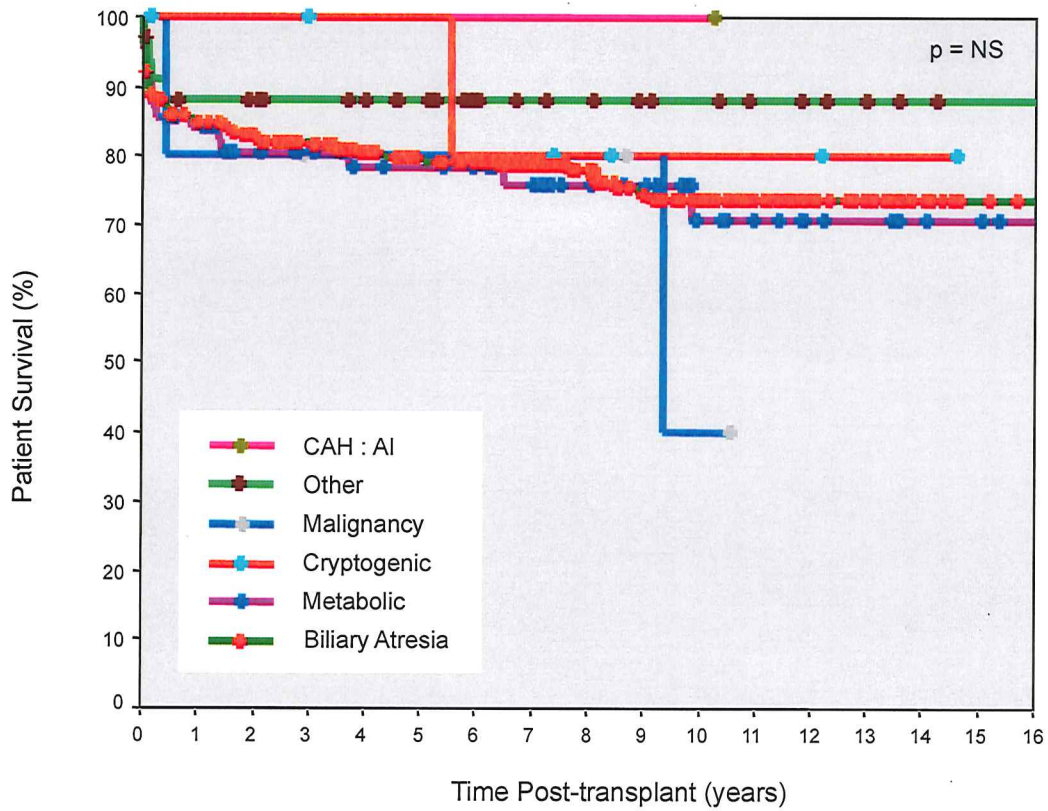
(1) Adults [excluding FHF] - n = 584



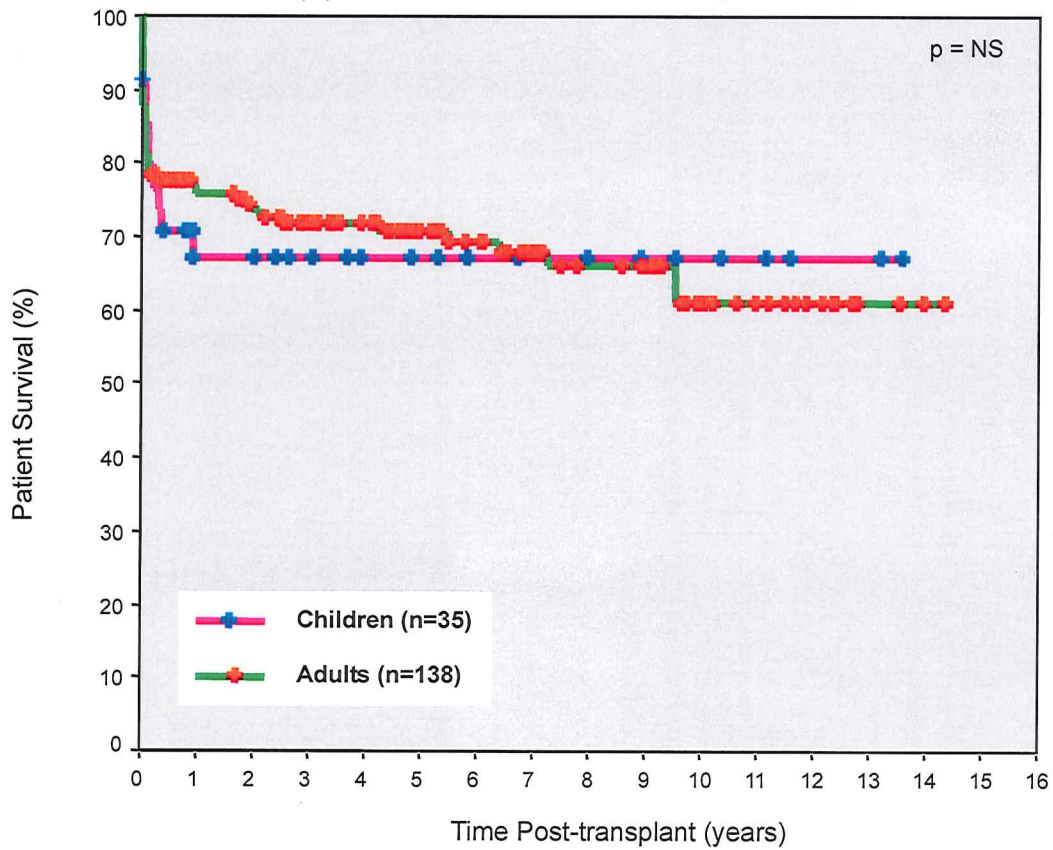
(2) Adults [excluding FHF] - n = 753

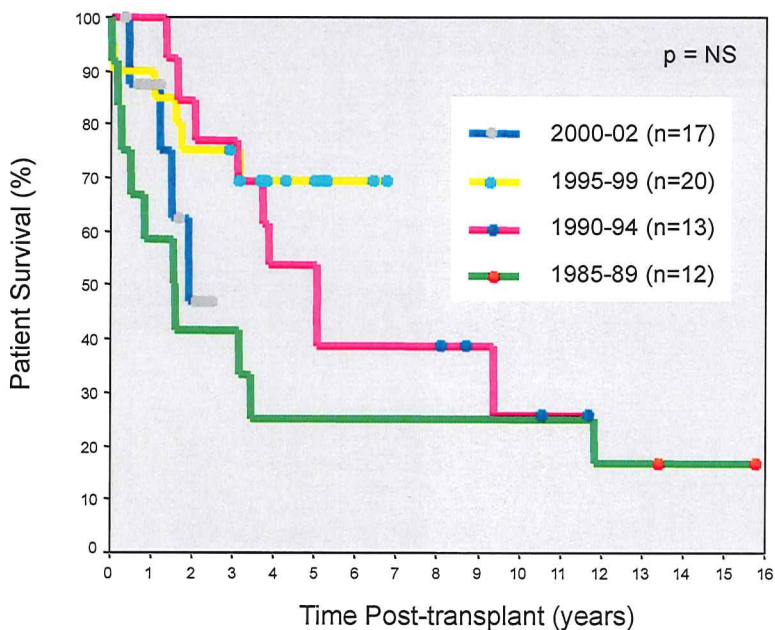
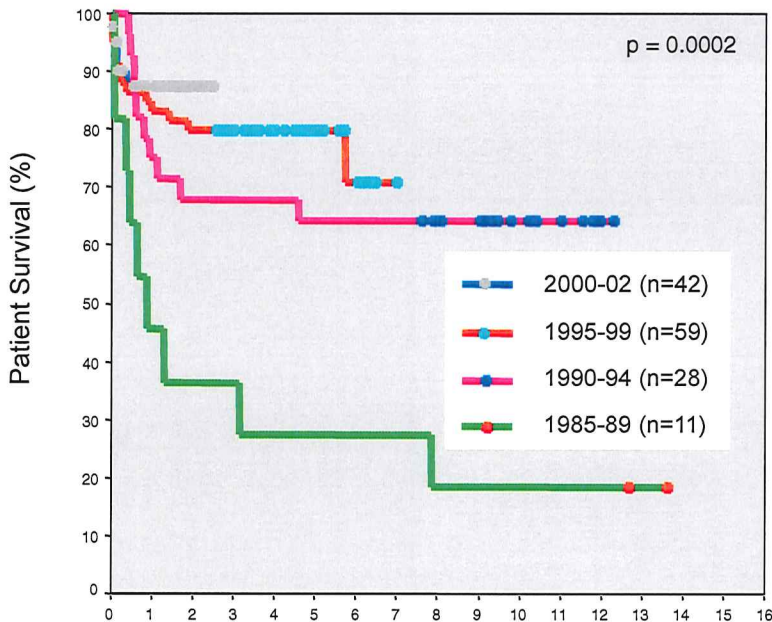
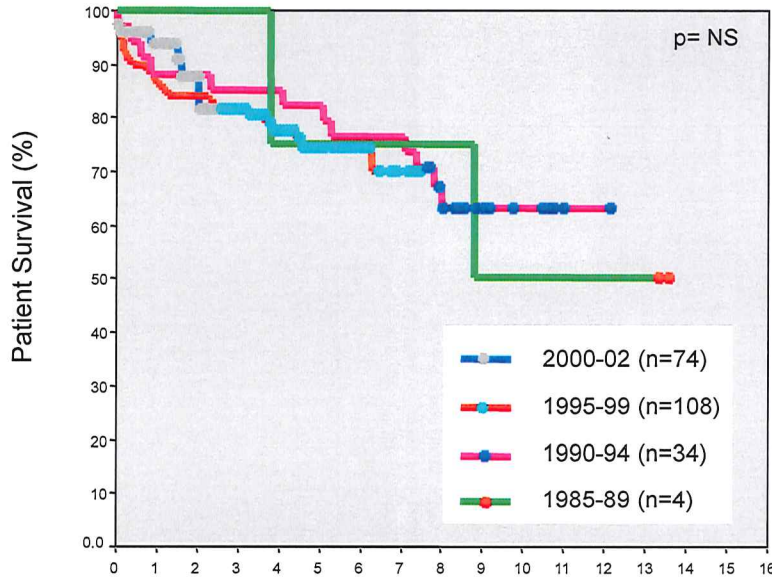


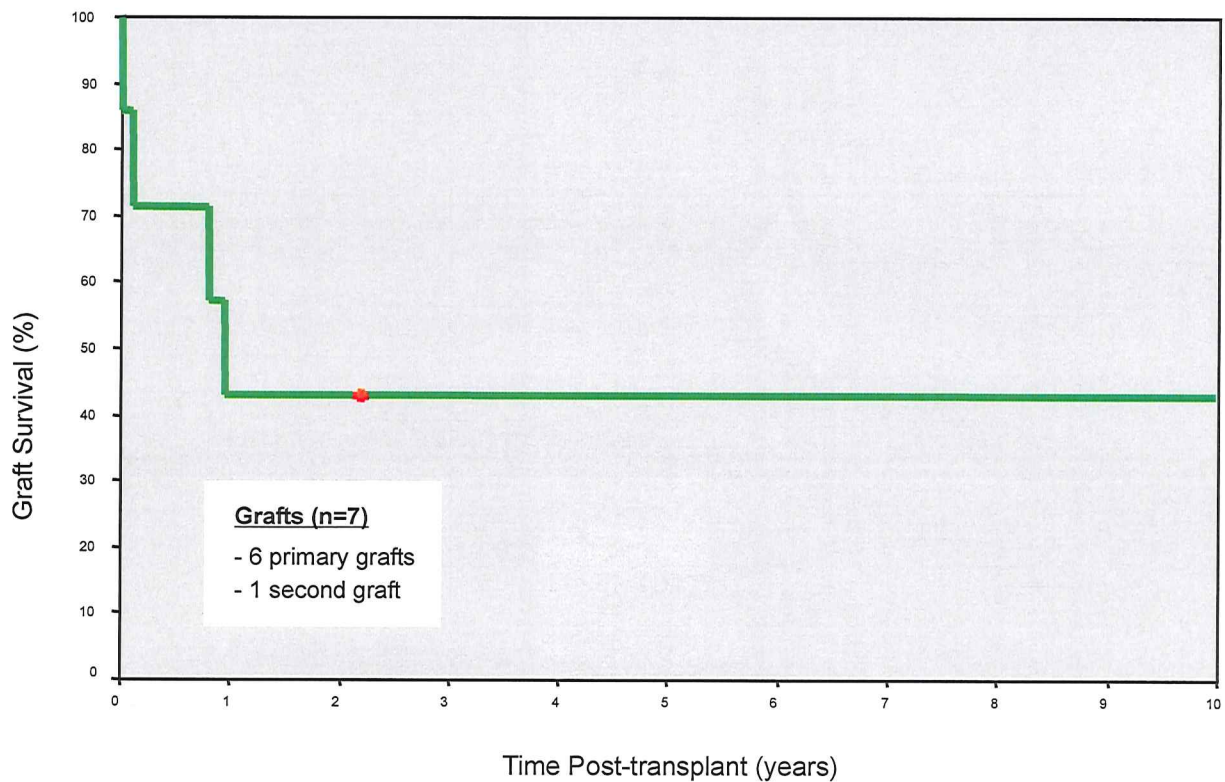
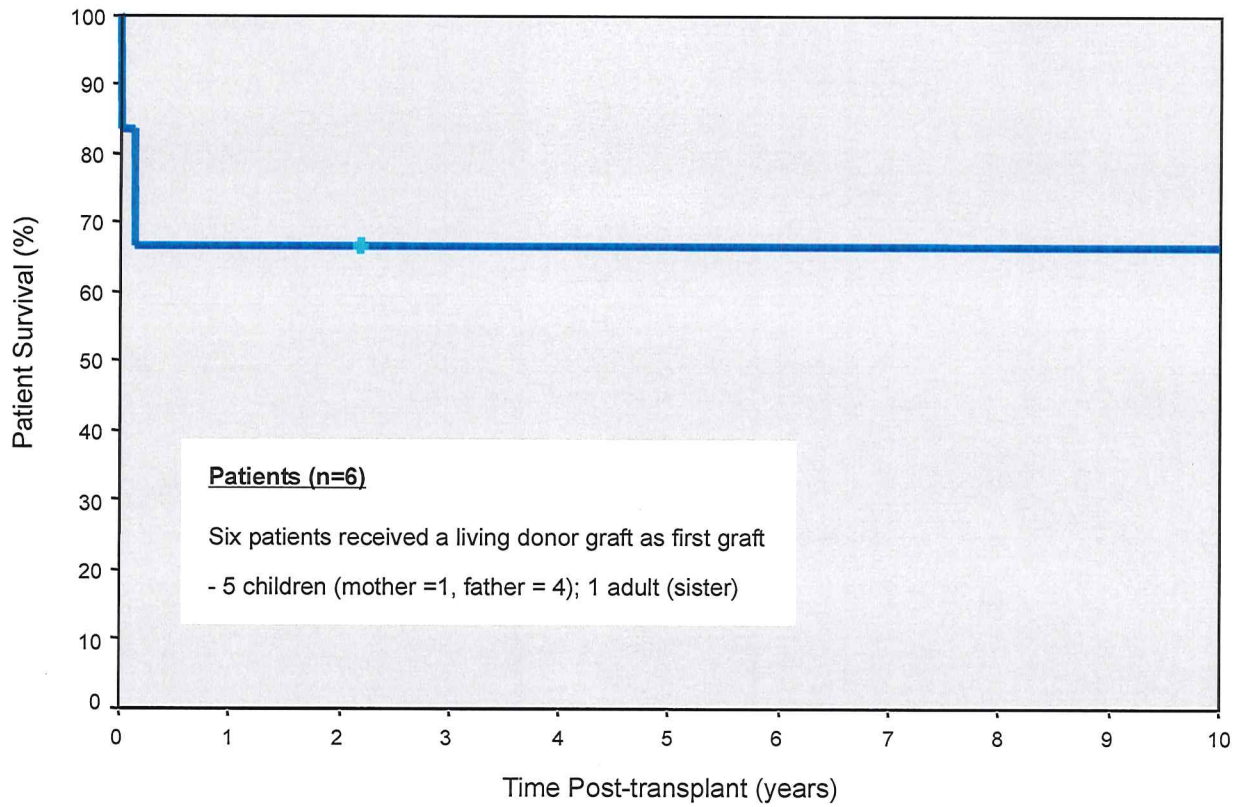
(3) Paediatric recipients [excluding FHF] - n = 336



(4) Acute fulminant failure (n = 173)





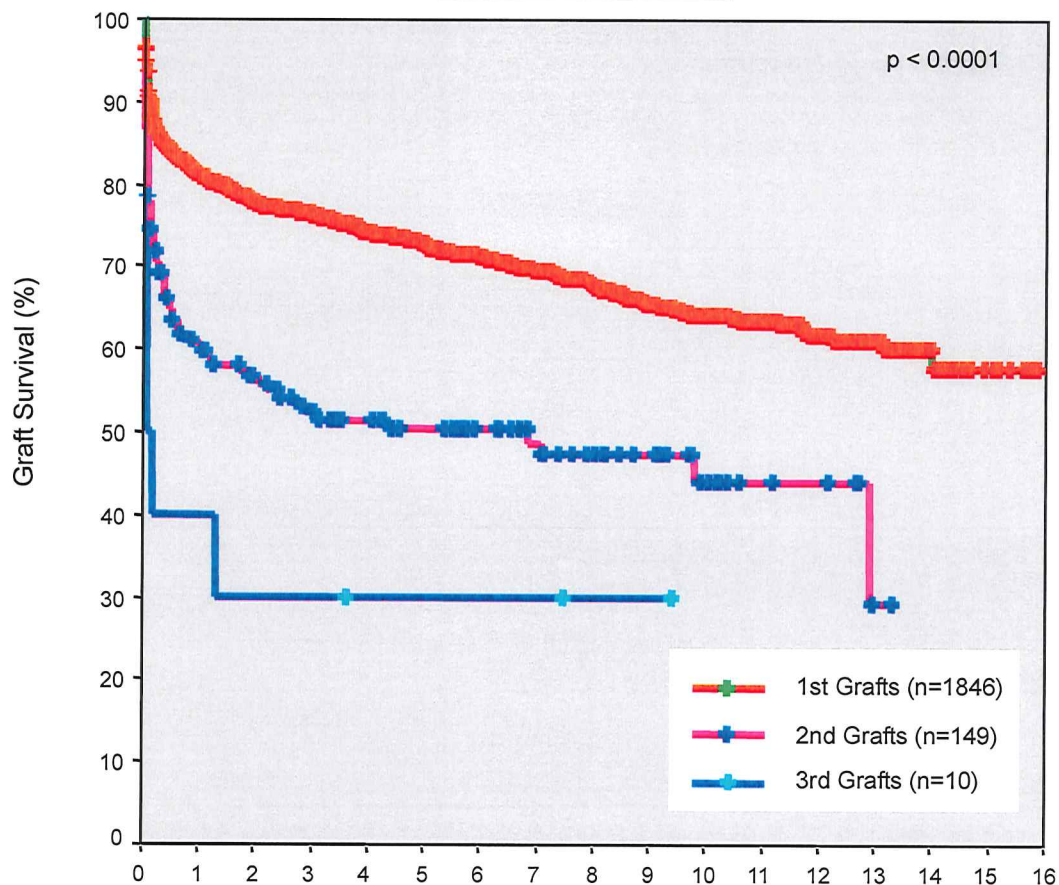


Section 4

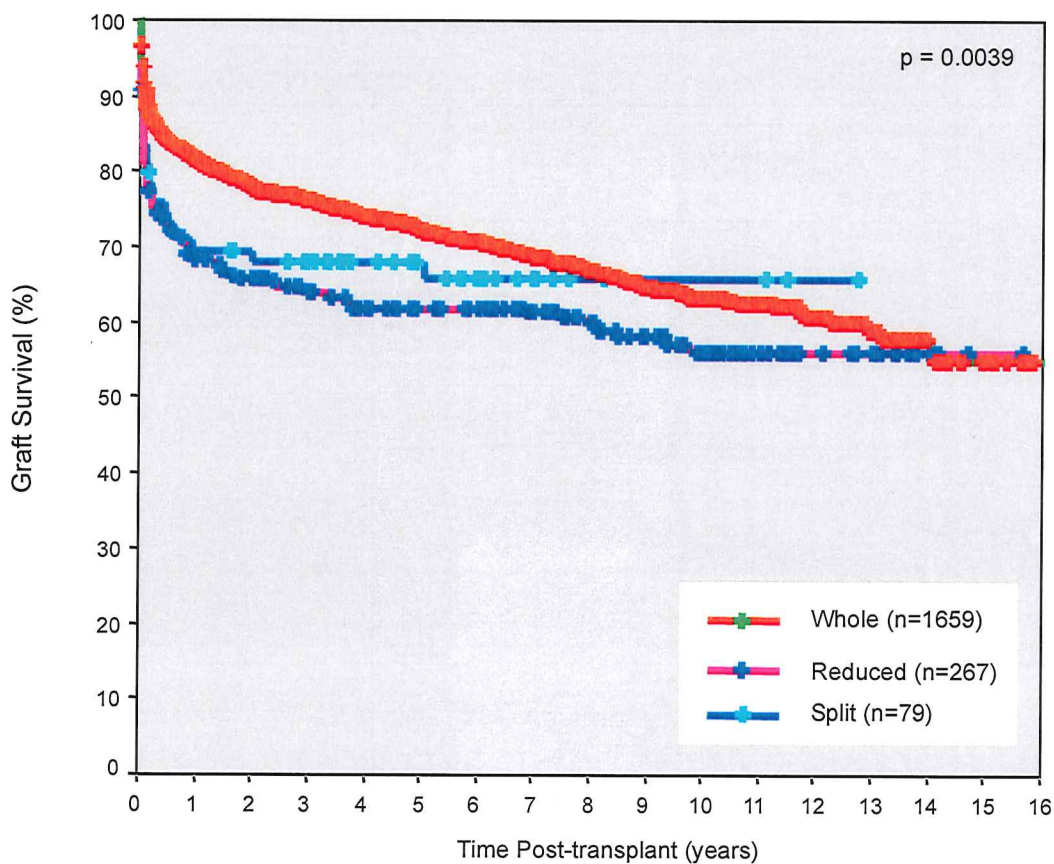
Graft Outcome



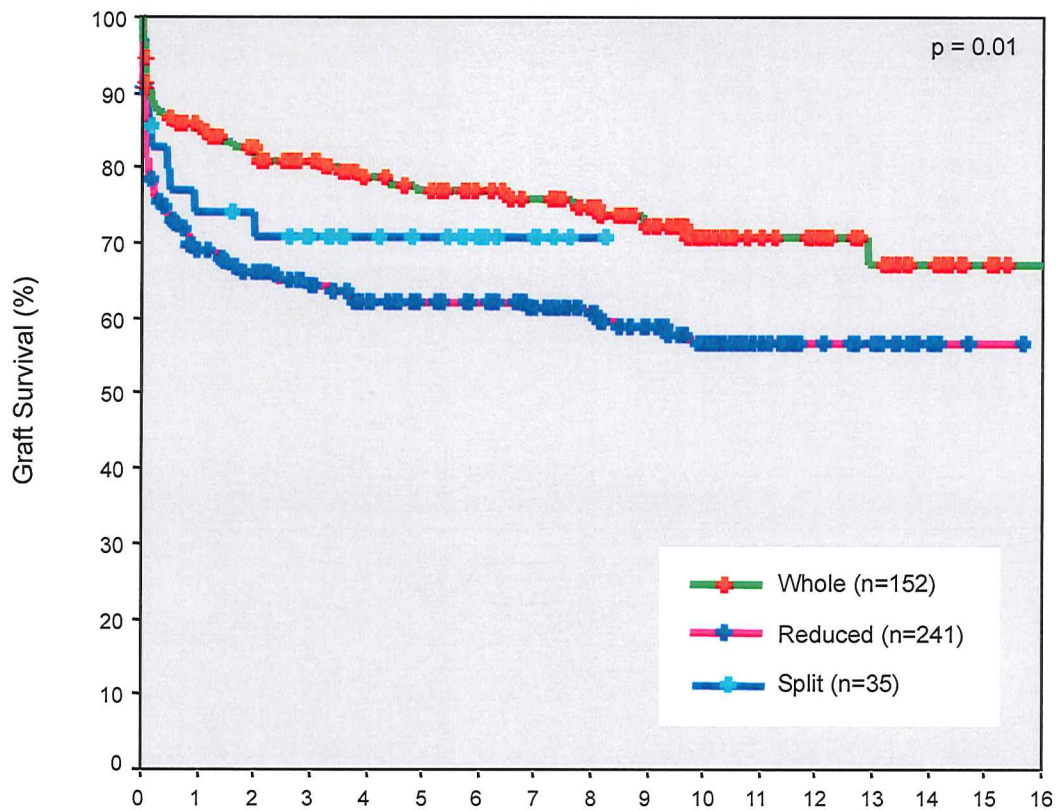
All Grafts - n=2005



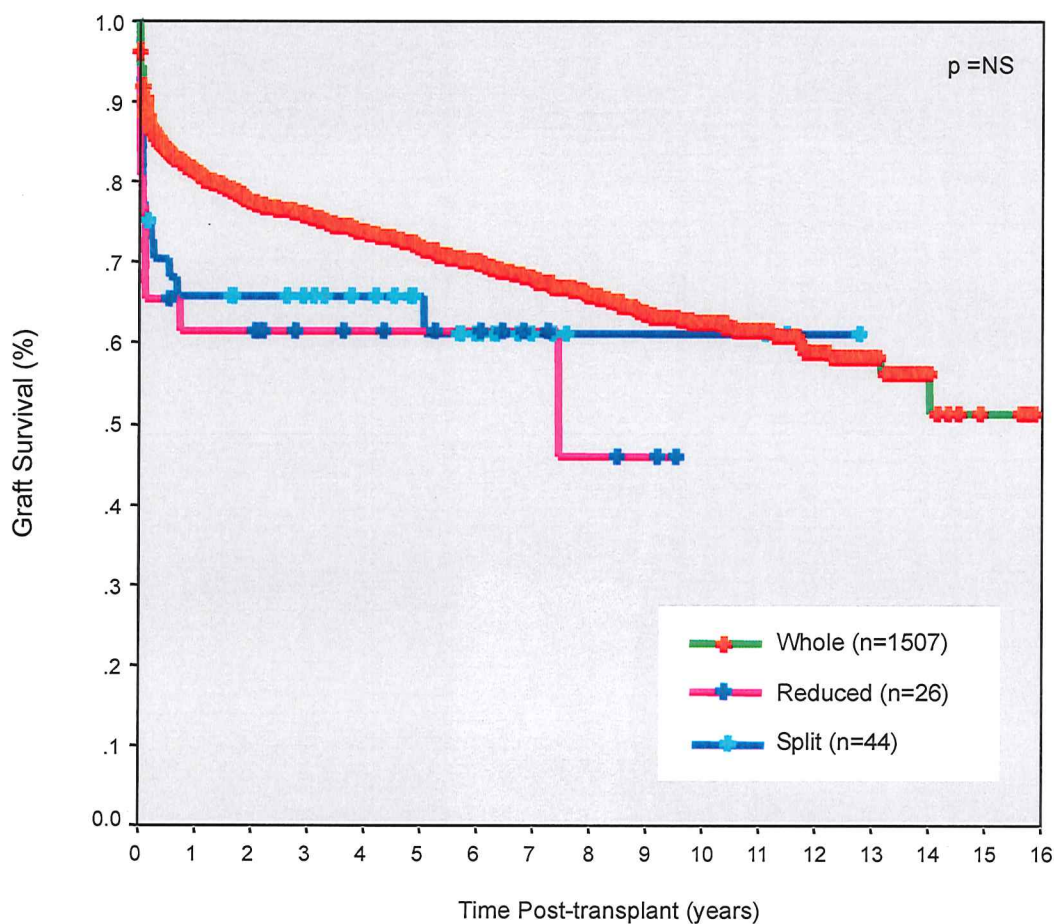
All Grafts - n = 2005



Children - n = 428

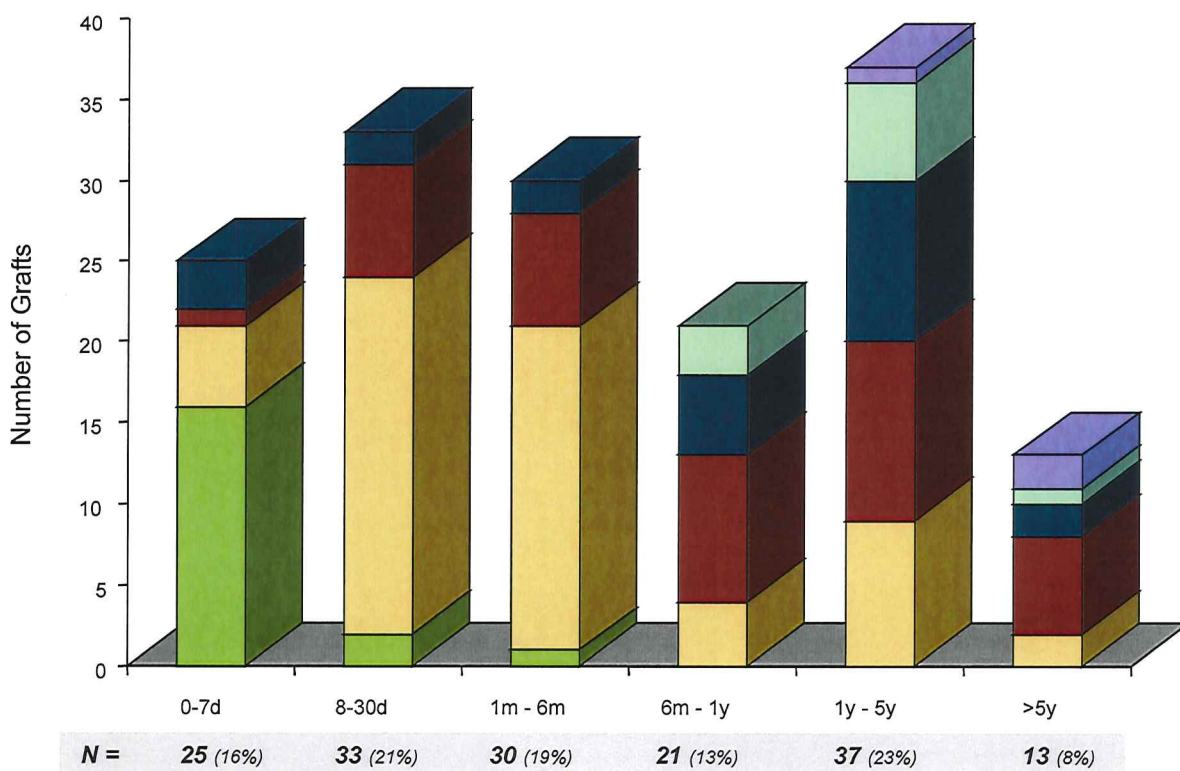
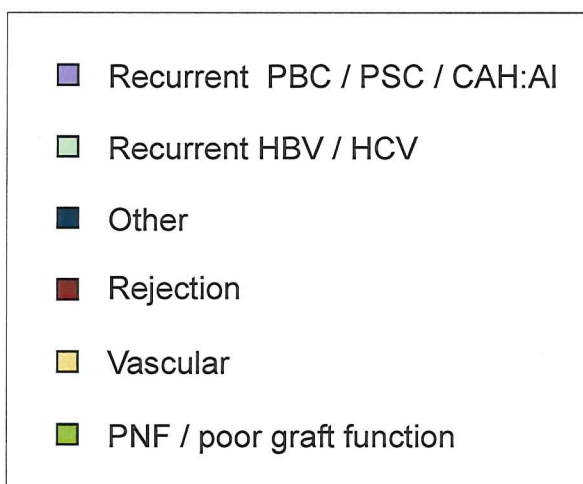
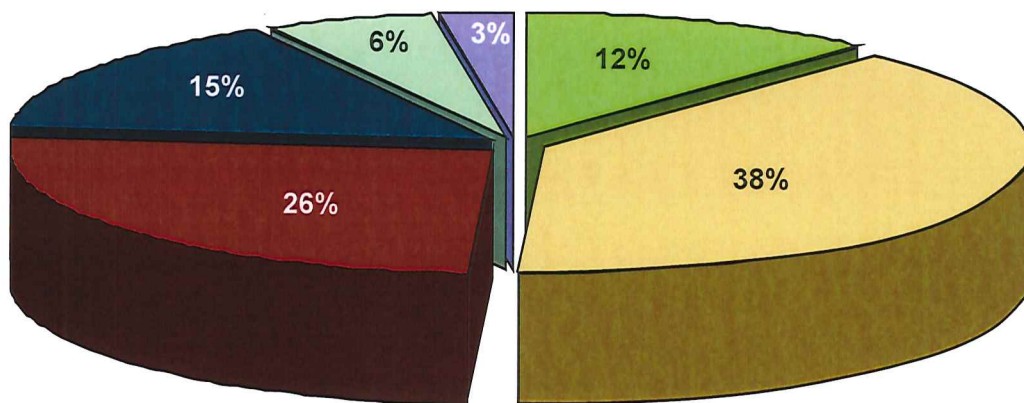


Adults - n = 1577



Indication for Retransplantation

n = 159

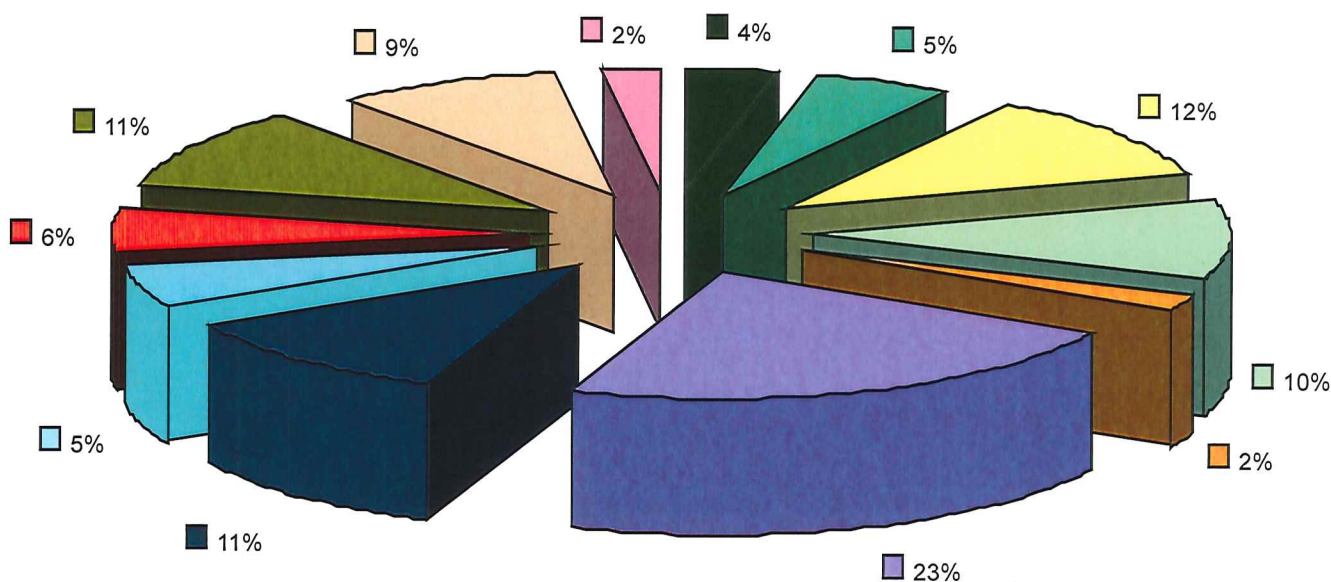
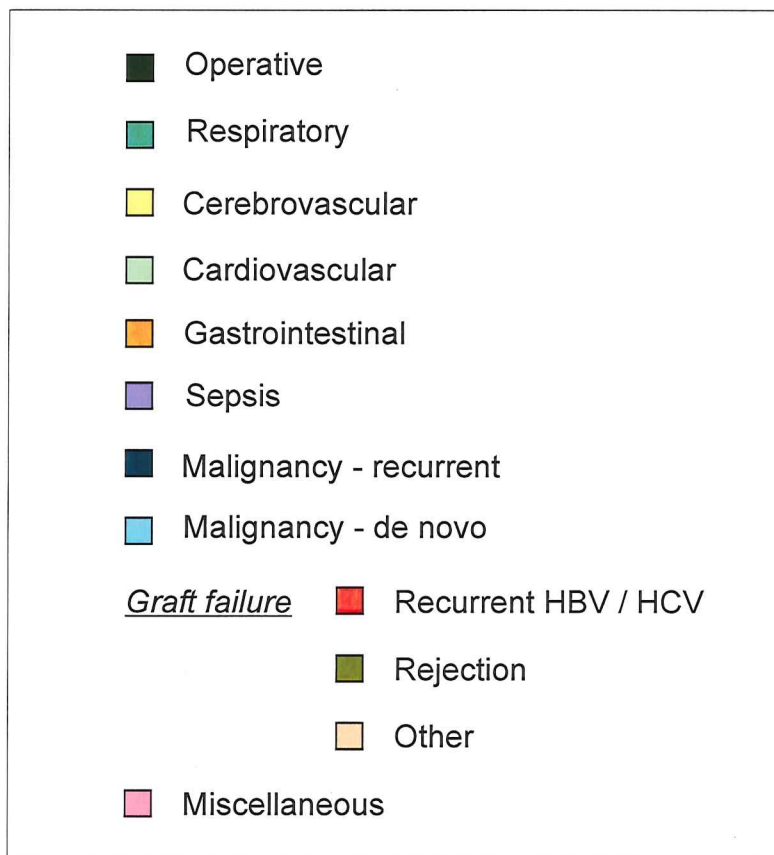


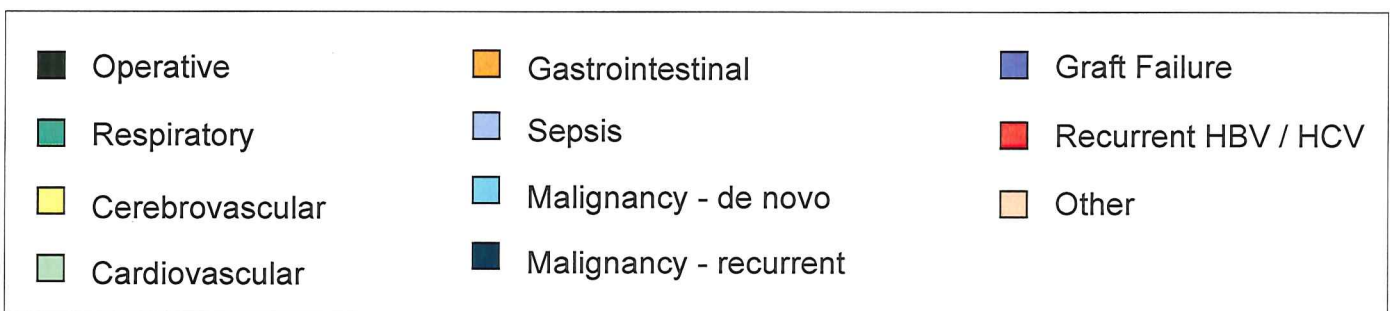
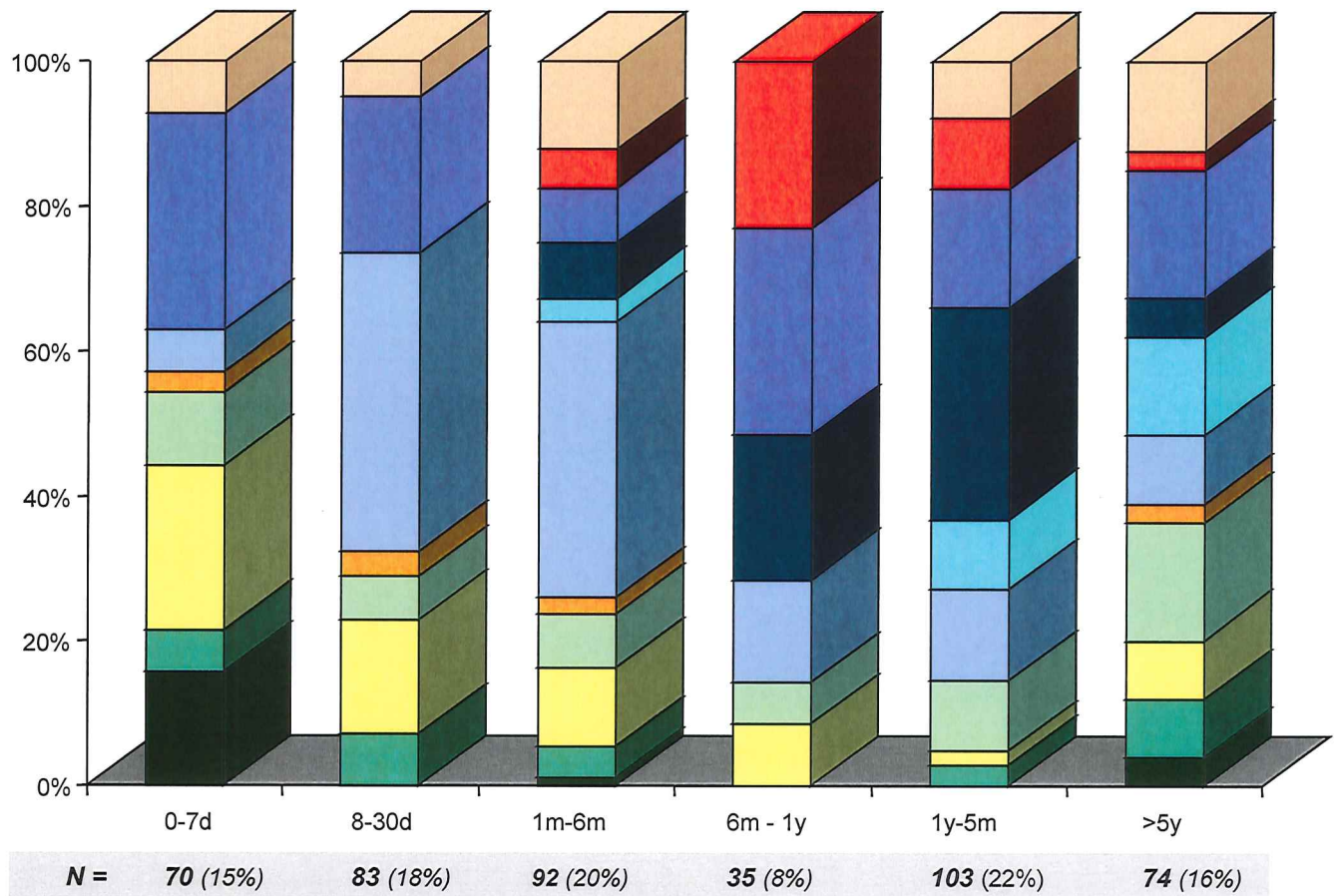
Section 5

Cause of Patient Death



All Patients n = 457 (24.7%)



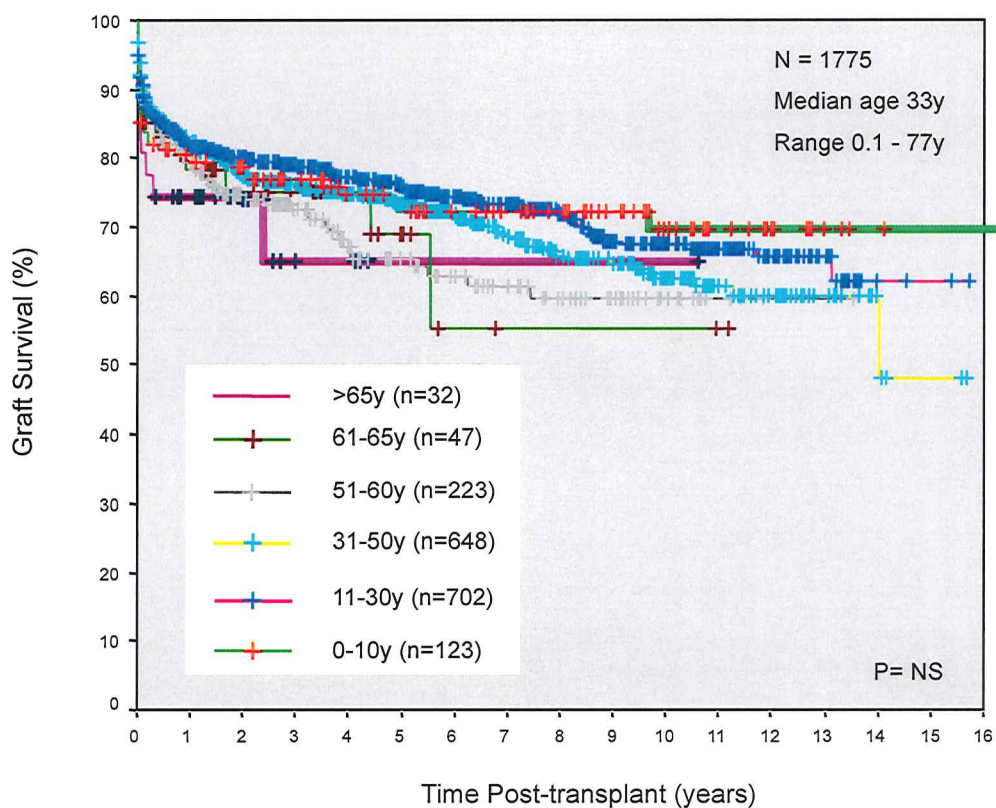


Section 6

Donor Information



Donor Age vs Survival



Donation by Year

	QLD	NSW	VIC/TAS	SA/NT	WA	NZ	TOTAL
1990	22	27	16	5		7	77
1991	29	35	20	6	8	11	109
1992	43	32	18	9	8	24	134
1993	28	40	25	12	6	16	127
1994	29	39	23	12	10	21	134
1995	29	44	24	17	8	21	143
1996	26	37	19	17	10	24	133
1997	31	49	19	19	8	22	148
1998	29	44	27	22	13	27	162
1999	15	31	31	29	11	27	144
2000	26	51	26	24	12	34	173
2001	37	40	26	14	9	29	155
2002 (June)	18	17	18	9	5	14	81

Section 7

Liver Transplantation and Cancer



Types of Cancer in Liver Transplant Recipients

n = 1846

AT Tx		
PRIMARY LIVER CA	61	(3%)
INCIDENTAL CA	130	(7%) 132 (Ca)
TOTAL	191	(10%)
POST Tx		
RECURRENT CA	46	(2.5% of all Pts , 24% of pts with Ca at Tx)
DE NOVO CA	62	(3%) 64 (Ca)
SKIN CA	146	(8%) 714 (Ca)
TOTAL	252	(14%)
MULTIPLE CA	22	(12% of pts with Ca)

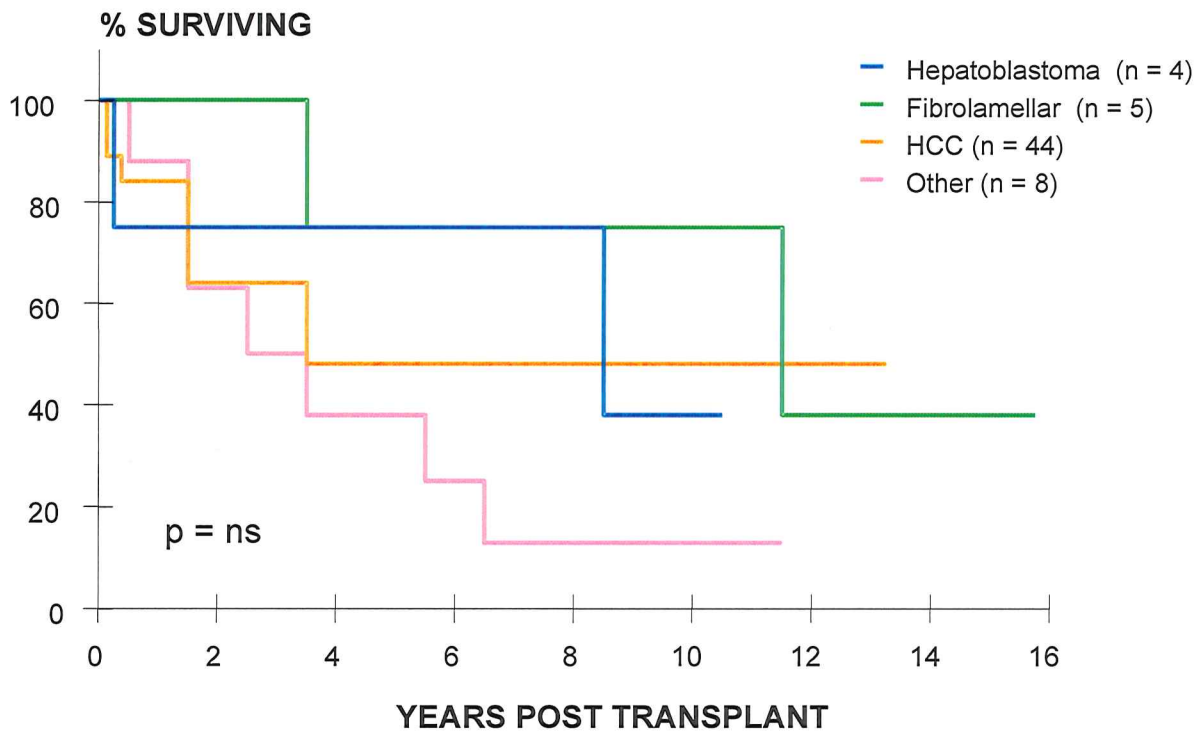
Primary Liver Malignancy

n = 1846

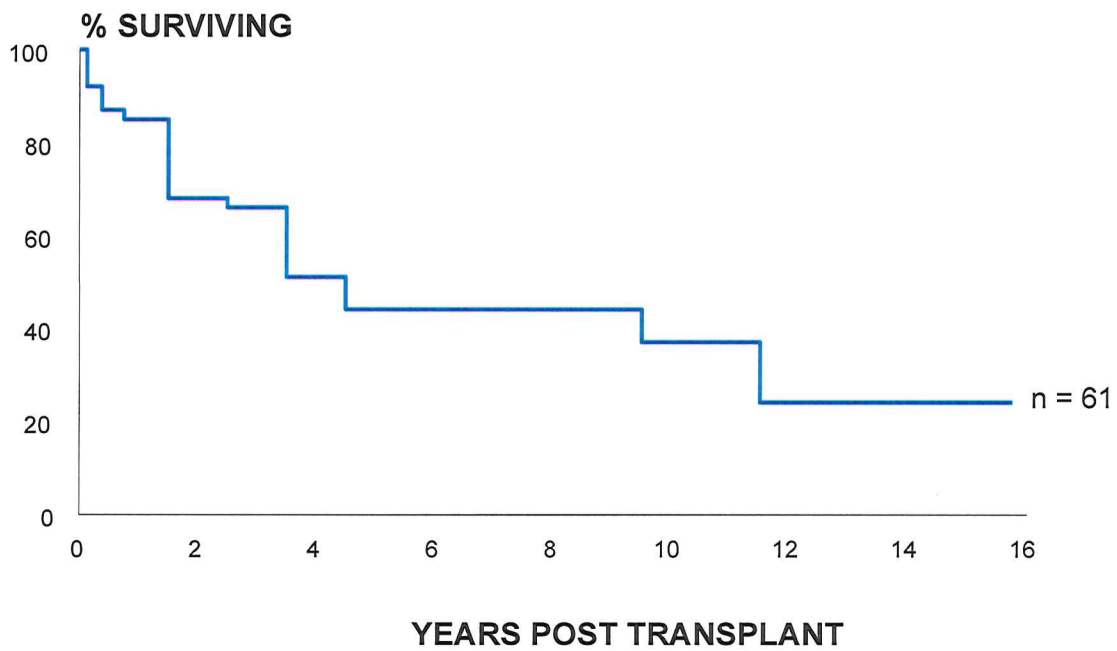
n = 61 (3% with cancer)

TYPE OF CA	No	DIED	DIED OF CA
HEPATOCELLULAR CA	44	18	13 (30%)
LAMELLAR VARIANT	5	2	1 (25%)
CARCINOID	4	4	3 (75%)
ENDOCRINE	2	2	2 (100%)
HEPATOBLASTOMA	4	2	1 (25%)
ANGIOSARCOMA	1	1	1 (100%)
EPITHELOID HAEMANGIOMA	1	0	0
TOTALS	61 (3% of pts)	29 (48% of those with Pca)	21 (34% of those with Pca)

Primary Liver Cancer
n = 1846



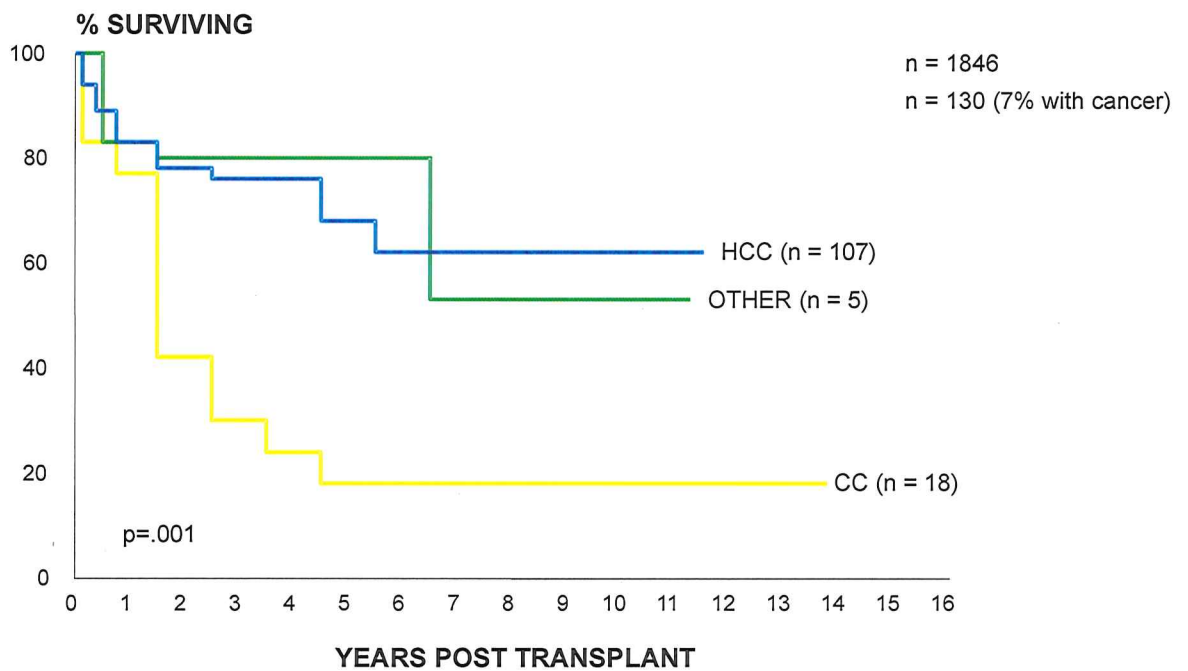
Primary Liver Cancer All Patients
n = 1846



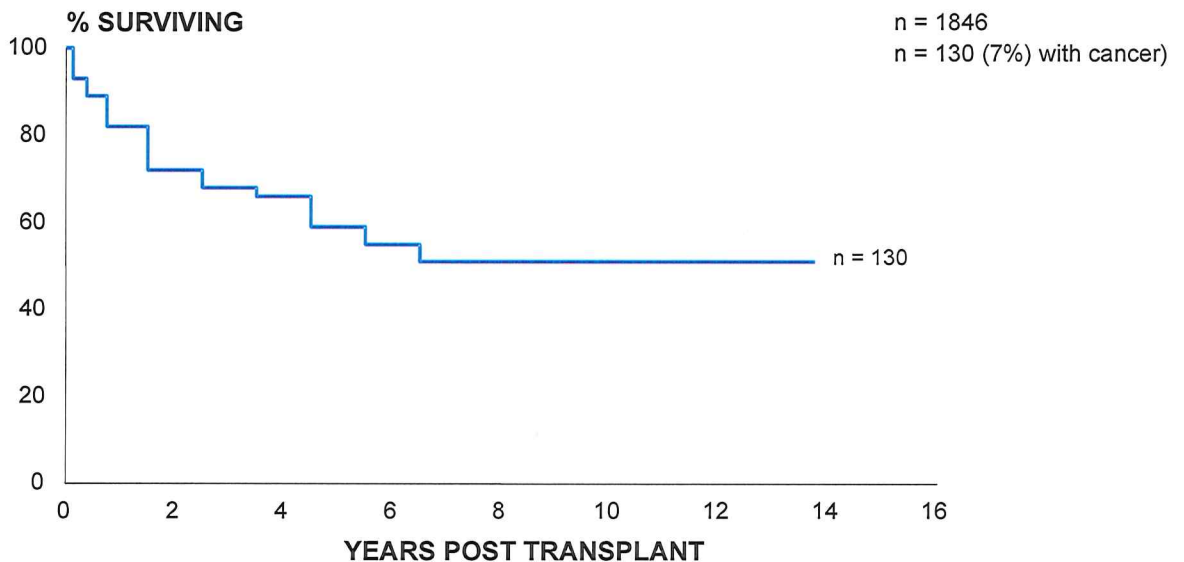
Incidental Cancer n = 1846

	NO	DIED	DIED OF CA
HEPATOCELLULAR CA*	107	25	11 (10%)
CHOLANGIO CA	18	14	11 (65%)
ANGIOSARCOMA	1	1	1 (100%)
ADENOCARCINOMA	2	1	0
HEPATOBLASTOMA*	2	1	0
FIBROLAMELLAR	1	0	0
TOTALS	131* in 130 (7% of pts)	42 (32%)	23 (18%)

* 1 patient had 2 different incidental Ca

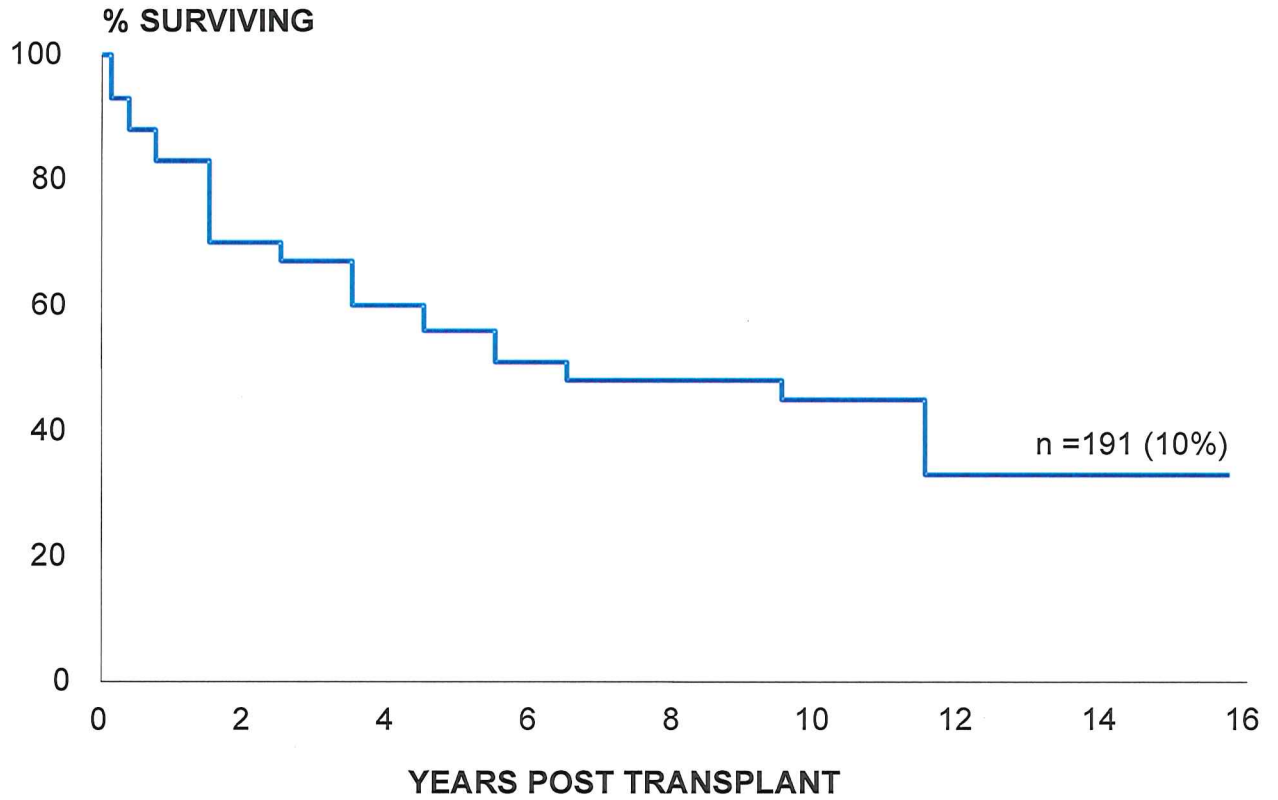


Incidental Liver Cancer All Patients



Pre-Transplant Liver Cancer (Primary and Incidental)

n = 1846

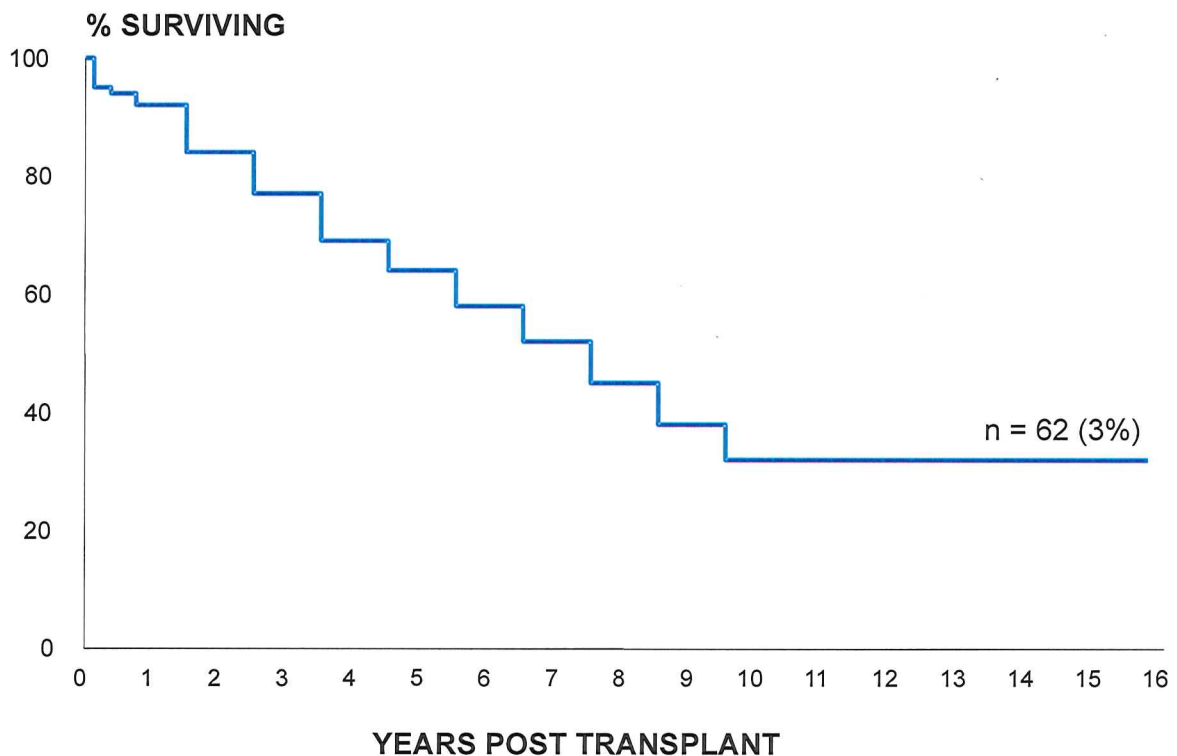


De Novo Non Skin Cancer Post Transplant

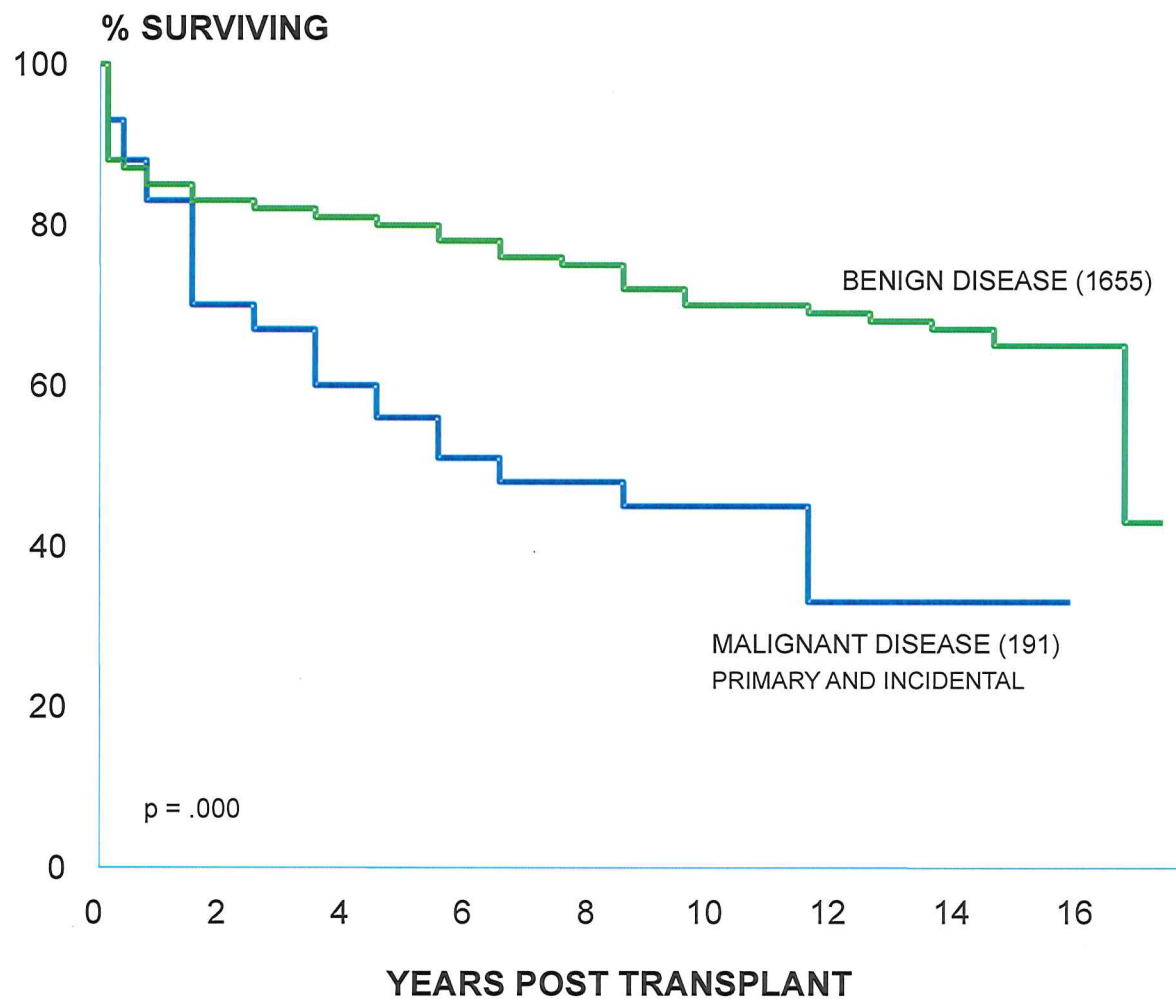
n = 1846

	NO	DIED	DIED THIS CA
NON HODGKINS LYMPHOMA	21 (35%)	15	11
KAPOSI SARCOMA	4	2	0
DIGESTIVE ORGANS	15	7	5
GLOTTIS	1	0	0
OESOPHAGUS	1	1	1
STOMACH	3	2	1
COLON	9	4	3
APPENDIX	1	0	0
GENITO-URINARY	6	4	1
BLADDER	2	2	1
TESTIS	1	1	0
KIDNEY	2	1	0
PROSTATE	1	0	0
RESPIRATORY	2	2	2
LEUKAEMIA	1	1	0
BREAST	2	0	0
ENDOCRINE	7	3	3
CERVIX	3	0	0
CEREBRAL	1	1	1
HEPATIC DUCTS	1	1	1
OVARY	1	1	1
TOTALS	64 in 62 (3%) pts	37 (60% of pts with Ca)	25 (40% of pts with Ca)

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



Patients with Benign Disease vs
Patients with Primary or Incidental Cancer



Appendix

Liver Transplant Units of Australia and New Zealand

<p>Australian National Liver Transplant Unit Royal Prince Alfred Hospital Missenden Road CAMPERDOWN NSW 2050 Email: anltu@cs.nsw.gov.au http://www.cs.nsw.gov.au/Gastro/LiverTransplant/default.htm</p>	<i>and</i>	<p>The New Children's Hospital Hawkesbury Road WESTMEAD NSW 2145</p>
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<p>Liver Transplant Unit The Austin Studley Road HEIDELBERG VIC 3084</p>	<i>and</i>	<p>Royal Children's Hospital Flemington Road PARKVILLE VIC 3052</p>
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<p>Queensland Liver Transplant Service Princess Alexandra Hospital Ipswich Road WOOLLOONGABBA QLD 4102</p>	<i>and</i>	<p>Royal Children's Hospital Bowen Bridge Road HERSTON QLD 4029</p>
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<p>South Australian Liver Transplant Unit Flinders Medical Centre Flinders Drive BEDFORD PARK SA 5042 http://www.flinders.sa.gov.au/flinders_centre_for_digestive_health/default.asp?NAVGRP=2135</p>	<i>and</i>	<p>Royal Children's Hospital Bowen Bridge Road HERSTON QLD 4029</p>
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Park Road
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[Http://www.nzliver.org](http://www.nzliver.org)