

Liver Transplantation

at

Australian National Liver Transplantation Unit

Data to 31 December 2009



The University of Sydney

the
children's
hospital at Westmead

The Australian National Liver Transplantation Unit, Royal Prince Alfred Hospital, Sydney, Australia is a combined facility of the Sydney South West Area Health Service, University of Sydney and The Children's Hospital, Westmead.

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Preface

In 2009, 56 new and 3 secondary orthotopic liver transplant procedures were performed within the ANLTU (12 – Paediatric; 47 – Adult). This included the ongoing usage of split liver allografts and the use of extended criteria donor liver allografts, which maximise the limited donor resources available.

The staff within the ANLTU would like to thank the staff within Royal Prince Alfred Hospital and Sydney South West Area Health Service who have helped contribute to the success of the program in the past year. This includes Staff in Haematology, Biochemistry, other Laboratory services, Blood Bank, Department of Pathology, Department of Renal Medicine, Intensive Care Unit, Operating Room, Department of Psychiatry, Department of Cardiology, Department of Respiratory Medicine, Dietetic Department, Department of Social work, Department of Anaesthesia, the Casemix unit and all the other people who have not been specifically mentioned.

We would also like to thank the other departments within the Children's Hospital at Westmead, who have helped contribute to the success of the paediatric programme. These include staff of Department of Anaesthesia, the Intensive Care Unit, Laboratory services staff, Department of Social Work, Department of Nutrition and other medical departments.

Finally, without the generosity of the deceased organ donors and their families, liver transplantation would not be able to proceed at this level. Hence we give our thanks to them as well as to the staff of the Organ Donation Network NSW/ACT organ procurement agency of the ARCBS and more recently Donate Life NSW.

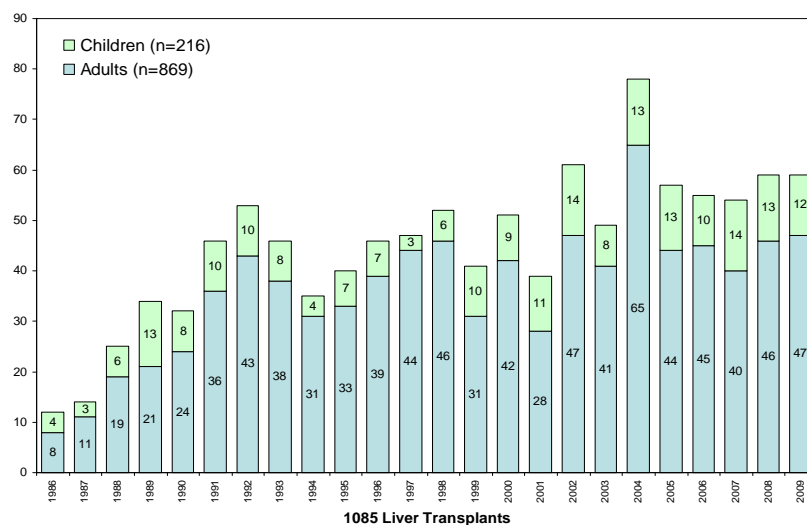
Professor Geoff McCaughan
Dr Deborah Verran
Dr Michael Crawford
Pamela Dilworth
Carol Tse

Summary

There are several key issues to report

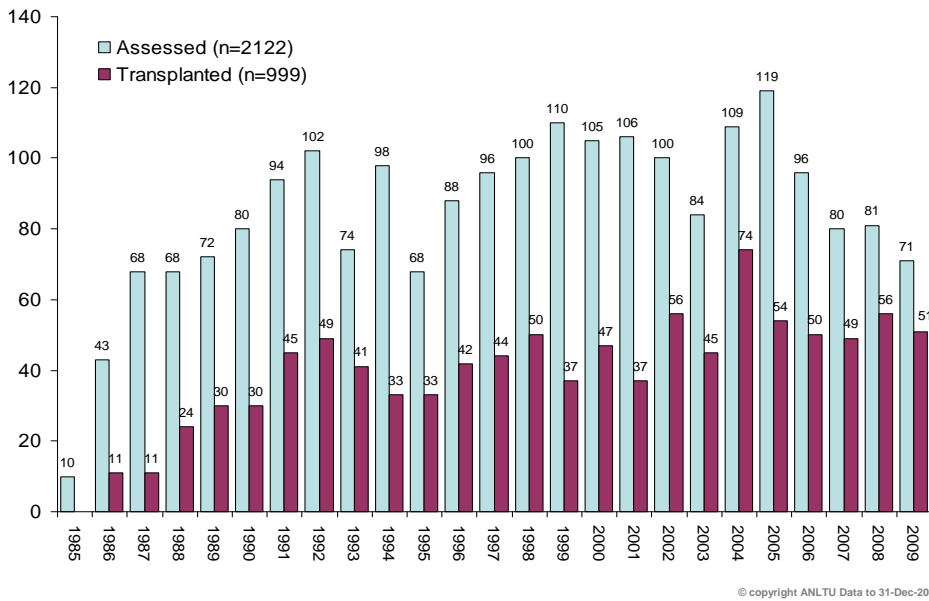
1. From January 1986 to December 2009, 1085 liver transplants were performed on 999 patients, of which 810 and 189 recipients were adults and children, respectively.
2. The number of transplants per year continues to be related to the deceased donor rate.
3. In 2009, two (2) paediatric live donor liver transplants were performed.
4. In 2009, 19 patients (14%) on the waiting list were subsequently withdrawn due to advanced and/or extra-hepatic disease. Eight (6%) patients improved whilst on the waiting list. During this period, there were 59 liver transplantation operative procedures of which 51 patients received primary grafts.
5. The movement of patients on and off the waiting list continues to be dynamic.
6. The average waiting time for adults in all blood groups remains variable depending on blood group.
7. The median deceased donor age is now 44 years compared to a median donor age of 39.5 years 10 years ago. Also there is an increasing number of donation after cardiac death donor liver offers.
8. HCV infection has been an increasing indication for liver transplantation in adults with 45% of adults having this diagnosis in recent years.
9. Hepatocellular carcinoma has also become an increasingly common indication for liver transplantation, with 31% of the adult recipients having a diagnosis of HCC from 2005-2009 .
10. The overall patient survival rates over the past 2 years was 93% at one year.

Australian National Liver Transplantation Unit

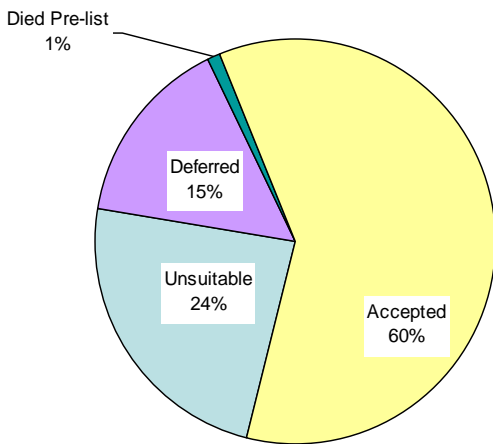


ASSESSMENT INFORMATION

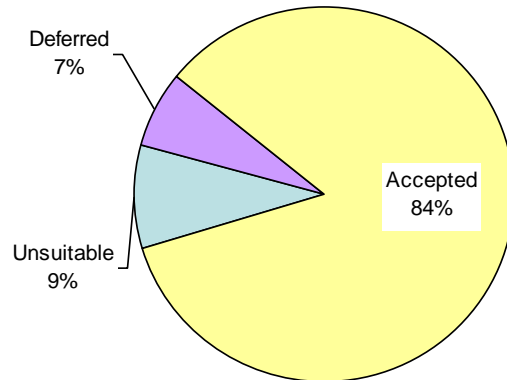
Assessments and Transplant Operations



Allocation of Assessed Adults n = 1841



Allocation of Assessed Children n = 281

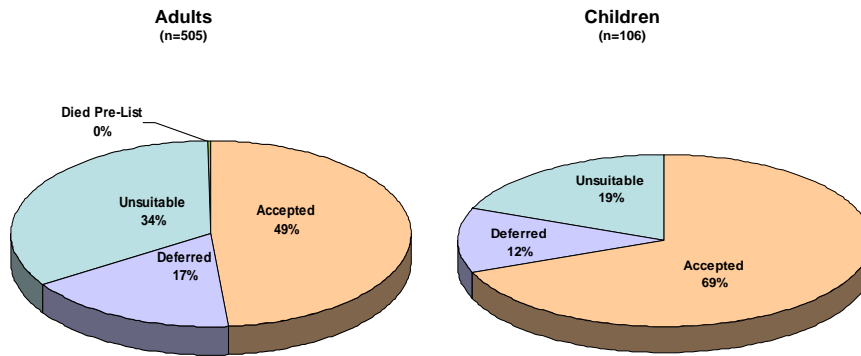


Patients Considered Unsuitable for Transplantation (1841 Adults have been assessed since 1985)

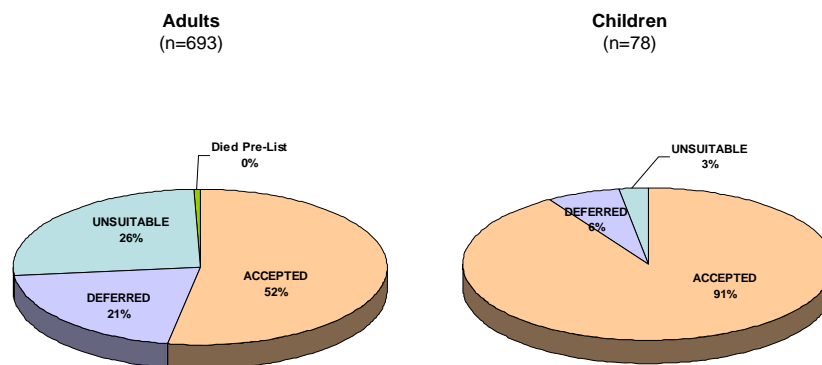
Reason	Adults	
Too Advanced + extrahepatic disease	160	(37%)
Tumour (extra-hepatic spread)	66	(15%)
Psychological	62	(14%)
Good Prognosis	63	(14%)
Alcohol	55	(13%)
Patient's (parent's) wish	23	(5%)
Age	4	(1%)
Alternative therapy	2	(0%)
Logistics	1	
Total	436	(21%)

Comparison Over Time of Patients Assessed

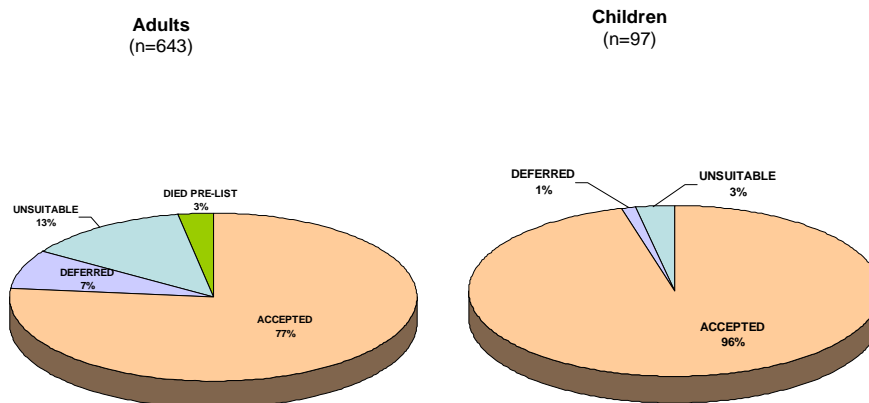
1986 - 1993



1994 - 2001



2002 - 2009



Adult patient acceptance rate has increased from 52% in the period of 1994 - 2001 to 77% in 2002-2009.

Children patient acceptance rate has increased from 91% in the period of 1994 – 2001 to 96% in 2002 -2009.

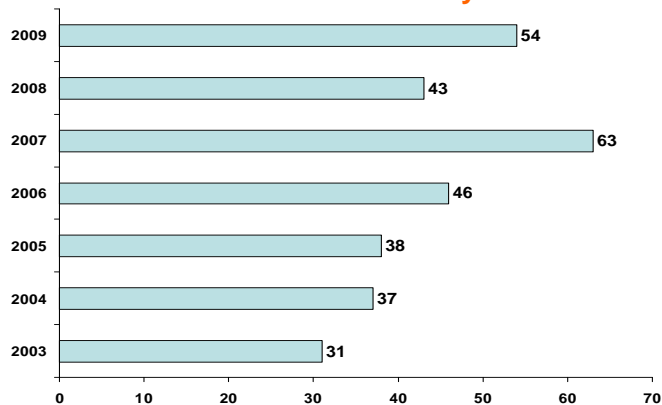
Waiting List Activity

Year		Listed at Start of Year	New Listings	Total	Tx	Died Pre Tx	Withdrawn		Total Withdrawn /Mortality	Improved	Listed at End of Year
							Tumour Progressed	Other*			
2003	n	35	69	104	49	5	8	8	21	3	31
	%				47	4.8	7.7	7.7	20	2.9	
2004	n	31	101	130	78	7	0	2	12	3	37
	%				60	5.4	0	1.5	9	2.3	
2005	n	37	83	120	54	10	1	6	17	3	38
	%				45	8.3	0.8	5	14	2.5	
2006	n	38	83	121	55	6	3	0	9	6	46
	%				45	5	2.5	0	7.4	5	
2007	n	46	95	141	54	19	2	2	23	2	63
	%				38	13	1	1	16	1	
2008	n	63	76	139	59	25	2	5	32	5	43
	%				42	18	1	3.5	23	3.5	
2009	n	43	97	140	59	11	3	5	19	8	54
	%				42	8	2	3.5	13.6	5.7	

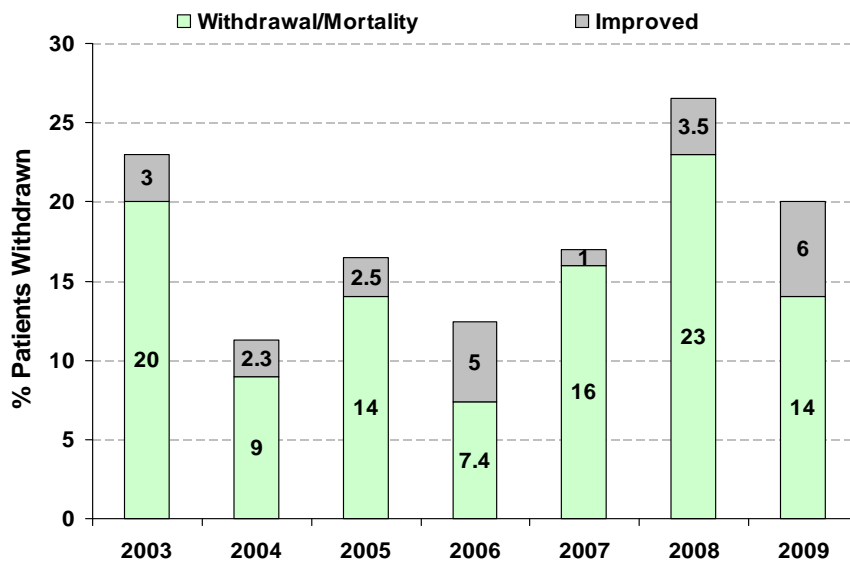
* Advanced and/or extra-hepatic disease

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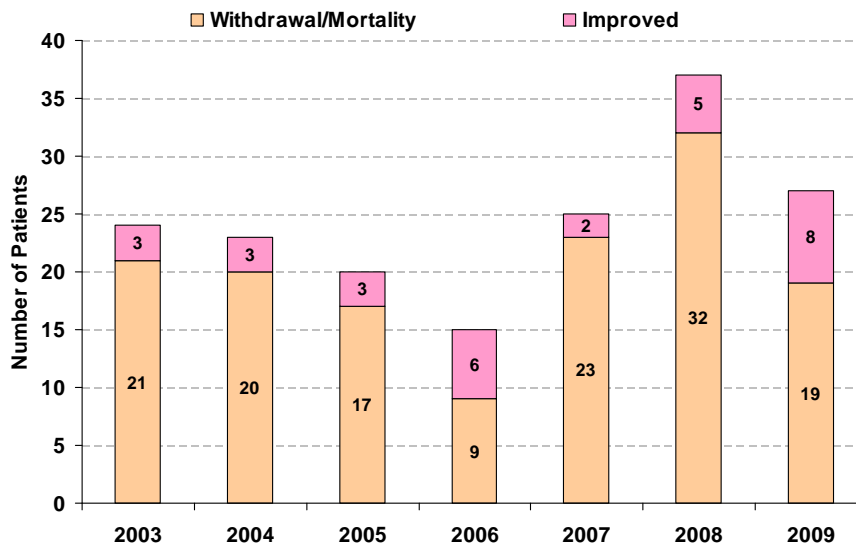
Patients on Waiting List at end of calendar year



% Patients Withdrawn from Waiting List



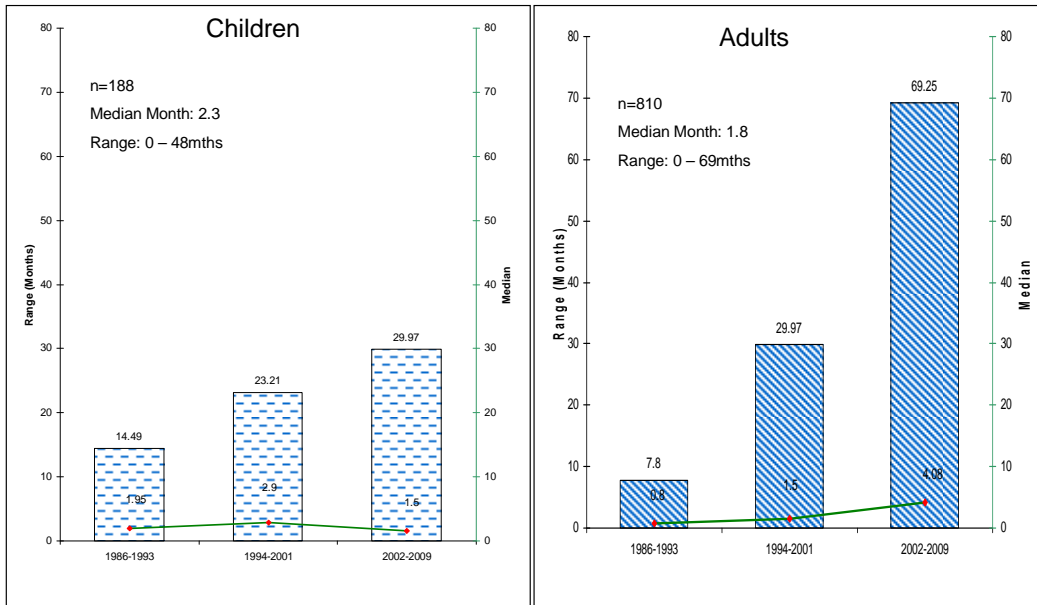
No of Patients Withdrawn from Waiting List



Urgent Listings 2009

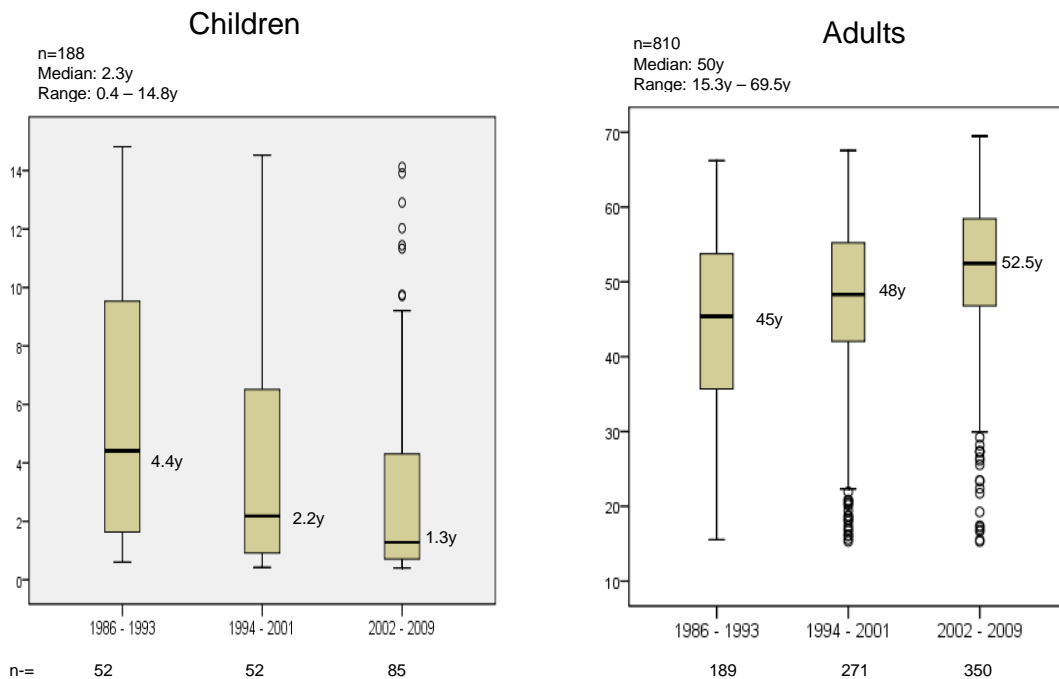
Number of patients listed as URGENT	11
Transplanted	7
Died on Waiting List	2
Improved - withdrawn	2

Waiting time of Transplant Recipients (Primary Grafts)



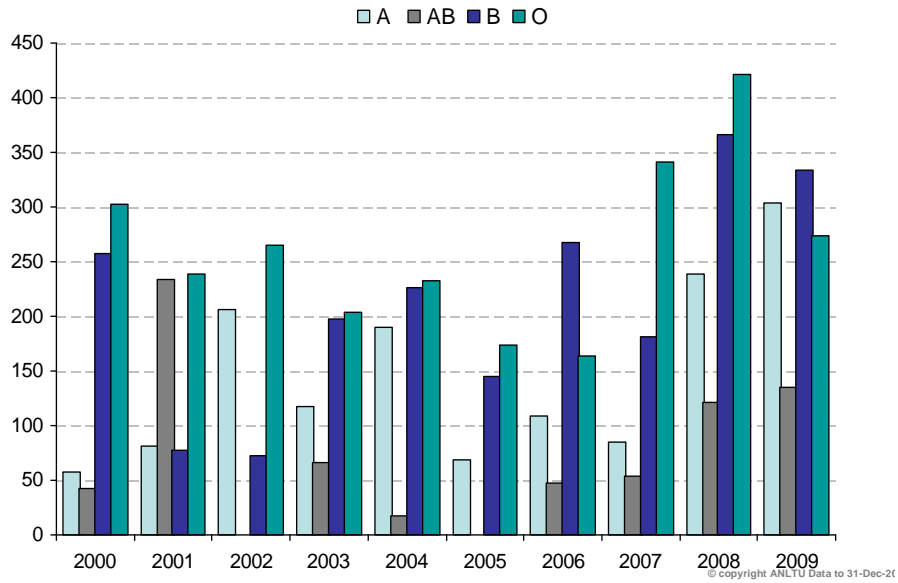
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Age of Transplant Recipients (Primary Grafts)



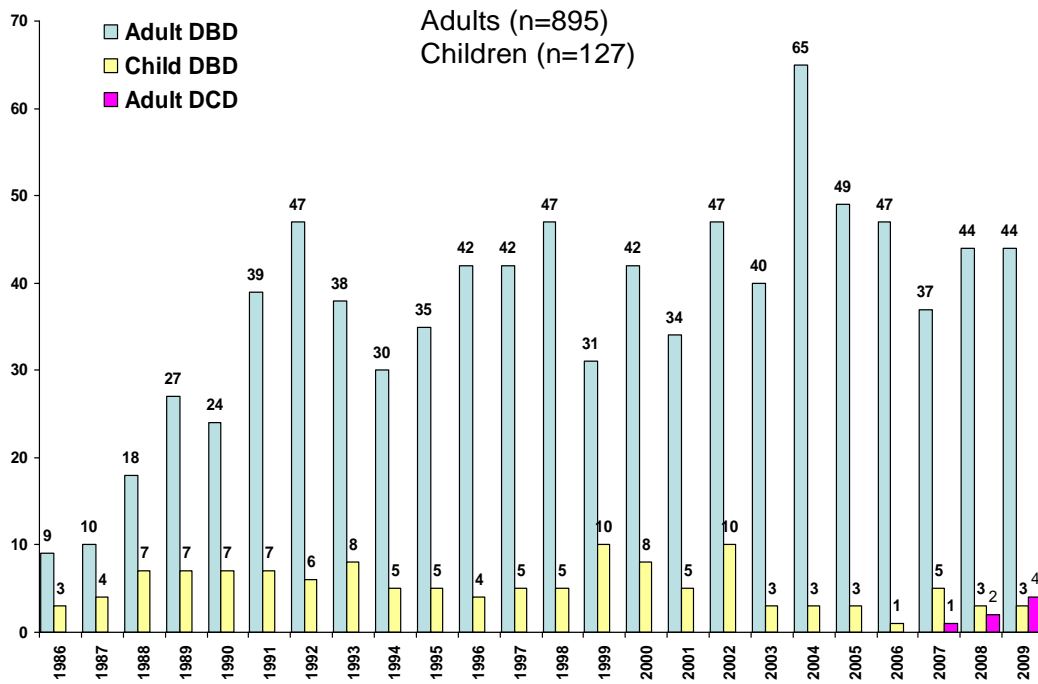
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Adult Mean Days Waiting for Primary Liver Transplantation vs ABO (2000-2009)



DONOR INFORMATION

(Deceased) Adult vs Paediatric Donors By Year



88% of liver donors were adult (>=15yrs) and 12% were children.

Deceased Donor Offers

Donor Type	State	1986-1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
DBD	ACT	43	5	4	6	5	6	7	4	2	3	7	92
	NSW	800	62	53	52	47	66	44	48	45	47	56	1320
	NT	11	1	3		1	1		1		2	1	21
	NZ	194	7	2	3	4	5	4	7	2	4	3	235
	QLD	160	3	9	7	9	5	4	2	8	10	5	222
	SA	115	9	11	13	5	13	3	5	6	6	3	189
	TAS	19			3				2	1	3		28
	VIC	227	6	6	8	7	8	8	6	5	12	2	295
	WA	54	7	4	3	4	7	5	4	3	2	3	96
DCD	ACT										3	3	6
	NSW									6	13	22	41
	VIC											1	1
Total		1623	100	92	95	82	111	75	79	78	105	106	2546
Used		522	50	39	57	43	68	52	48	43	49	51	1022

DBD Donor Offers Refused 2009

	Refused at Offer	Refused at Hepatectomy
Cirrhosis		1
Steatosis		6
Logistics	4	
Impaired perfusion / ischaemia		1
Offer waived	2	
Packaging issue	0	1
Unsuitable donor	3	
Donor malignancy – Extrahepatic	1	
Donor history	2	
No suitable ABO compatible Recipient	1	
Donor age	2	
Offer waived for urgent Tx elsewhere	5	
Interstate donor not suitable for directed recipient (urgent case)	2	
Positive Virology	1	
TOTAL	23	9

DCD Donor Offers Refused 2009

	Refused at Offer	Refused at Hepatectomy
Steatosis – Severe		1
Did not proceed to hepatectomy		5
Logistics	2	
Consent Withdrawn	1	
Donor history	3	
Outside DCD acceptance criteria	8	
Unsuitable donor		1
Impaired perfusion / ischaemia		1
TOTAL	14	8

Allocation of Accepted and Utilised Deceased Donor Livers – 2009

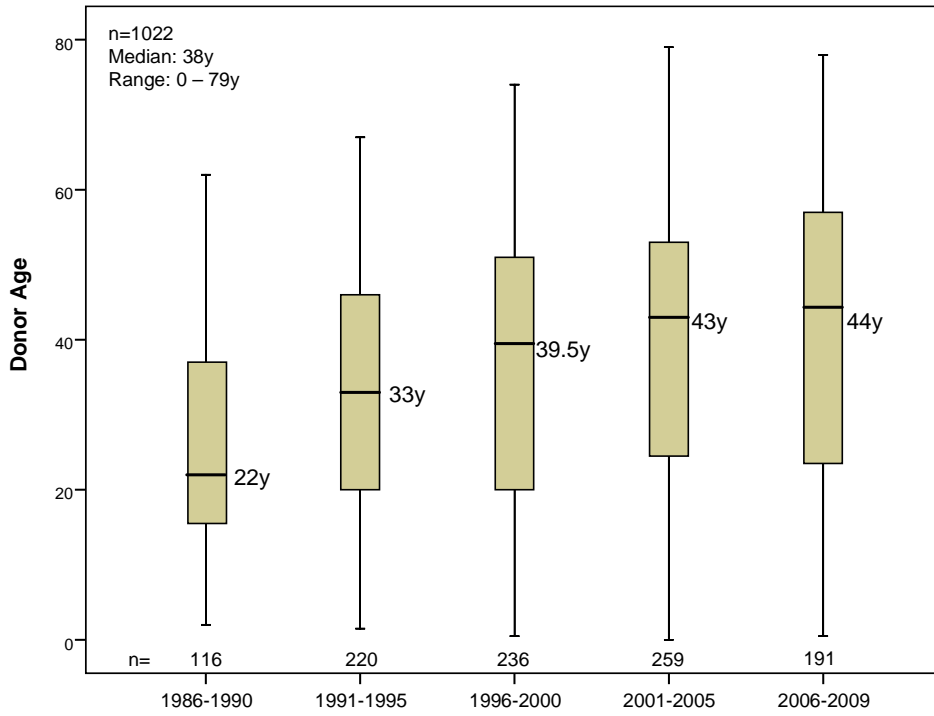
1st Recipient Allocation		Total
DBD	High risk donor on history for virus or tumour	1
	Highest prioritised patient suitable for this type of graft	30
	Sickest	8
	Split paediatric recipient	2
	Size of graft not suitable for higher priority patient(s)	1
	Marginal donor liver to stable recipient	2
	No prioritised patient in this ABO suitable for ECD graft	1
	Urgent Category 2	2
DCD	Highest prioritised patient suitable for this type of graft	2
	No prioritised patient in this ABO suitable for ECD graft	1
	Size of graft not suitable for higher priority patient(s)	1
Total		51

2nd Recipient Allocation		Total
DBD	Highest prioritised patient suitable for this type of graft	2
	Higher priority patient(s) medically unfit	1
	Logistical reasons not suitable for higher priority patients	1
	Split right lobe recipient (size/blood group match)	2
Total		6

Living Donor Procedures

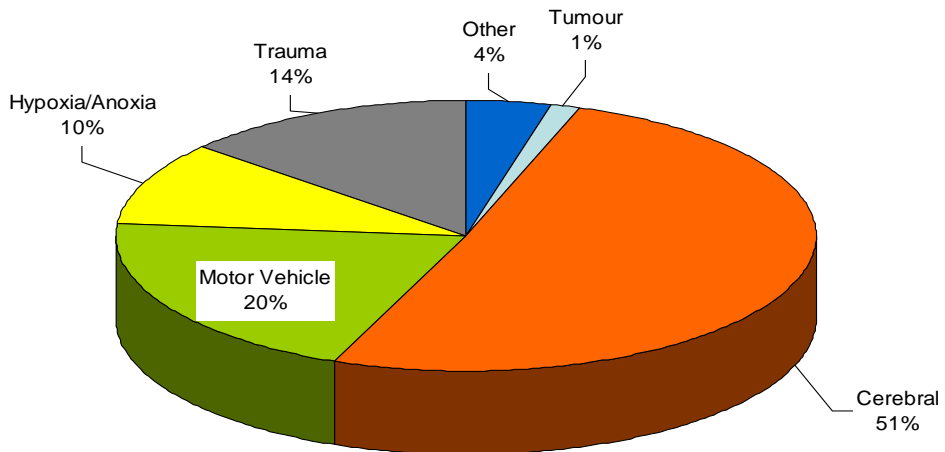
Year	Type	Total
1990	LRD	1
2002	LRD	1
2003	LUD	1
2004	LRD	1
2006	LRD	2
2007	LRD	3
2008	LRD	3
2009	LRD	2
TOTAL		14

Deceased Donor Age by Era



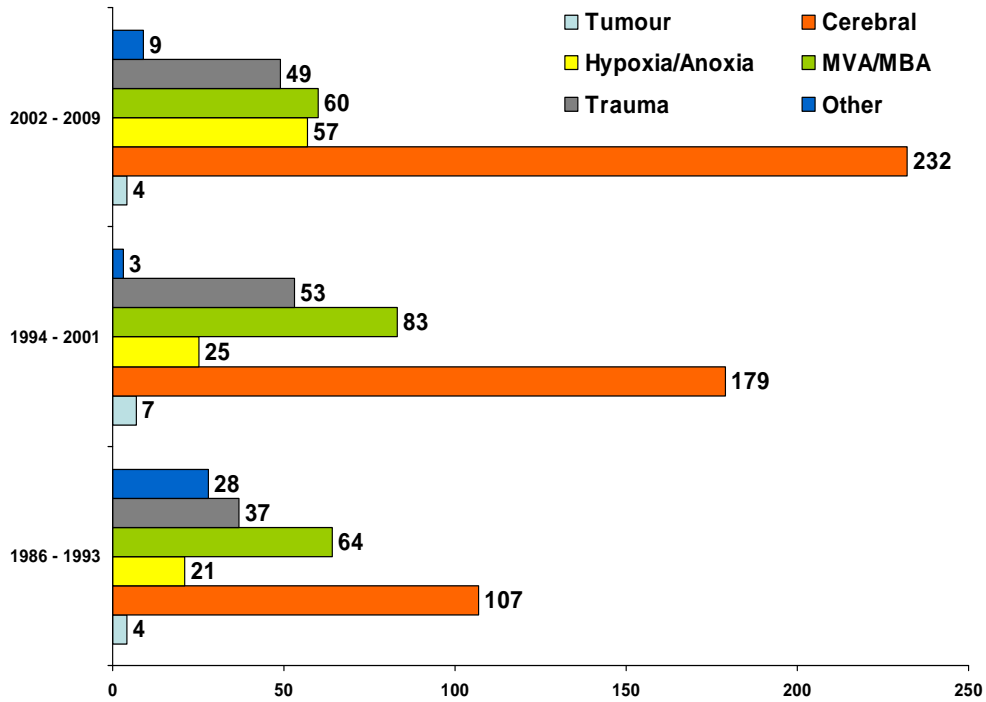
Deceased Donor Cause of Death

(n=1022)



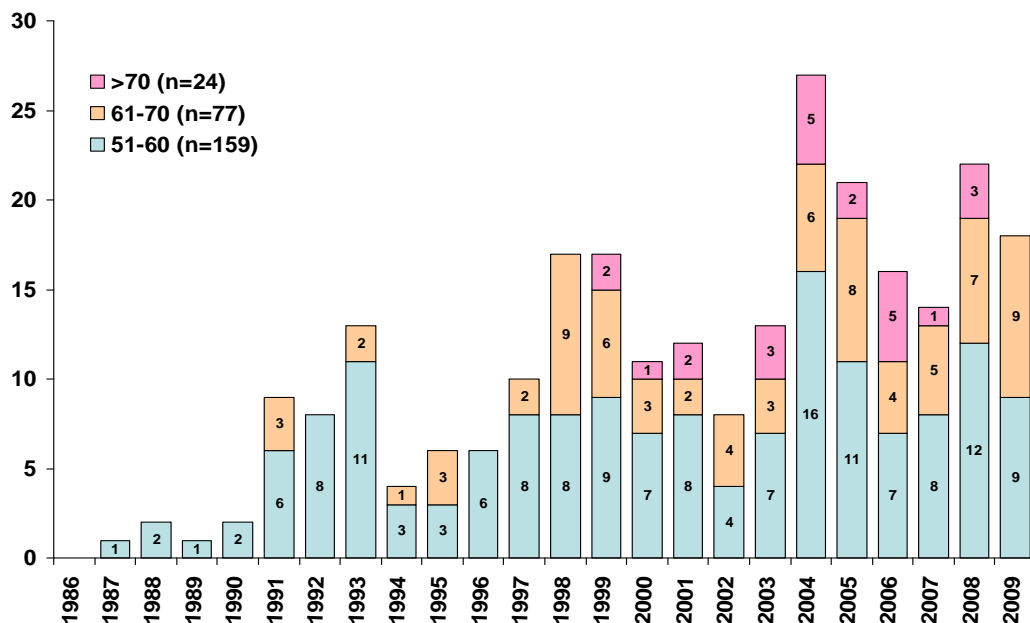
The majority of donors died due to cerebral haemorrhage (518 or 51%) and motor vehicle accident (207 or 20%).

Deceased Donor Cause of Death by Era



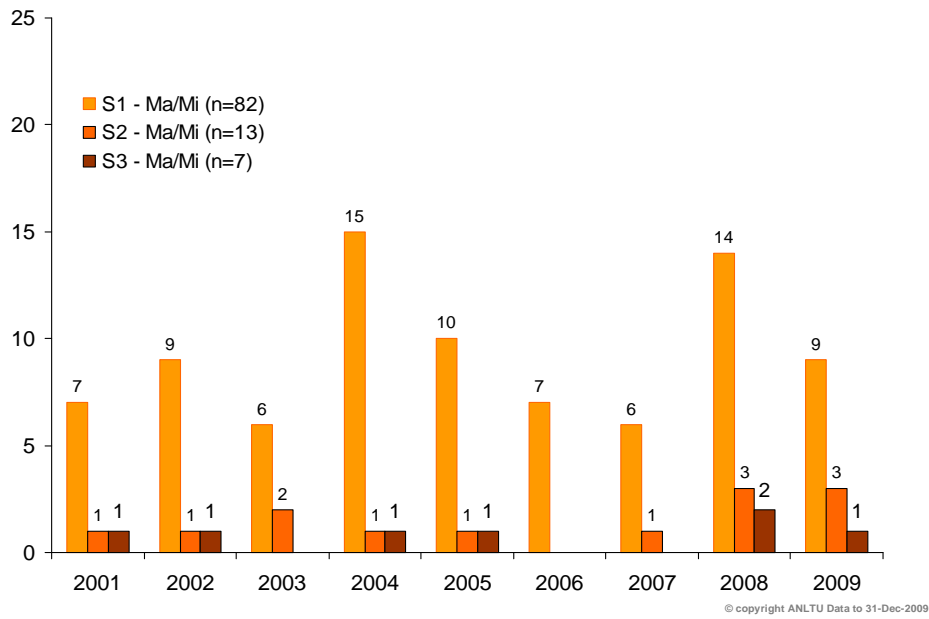
Deaths due to trauma were 39%, 39% and 27% within the above year groups, respectively. In these same time periods, deaths due to cerebrovascular disease (CVD) were 41%, 51% and 56%.

Deceased Donors over 50 years (n=257)



Donor age ranged from 0 to 79 years, with a mean value of 36 ± 18 years.

Adult Graft Steatosis 2001-2009

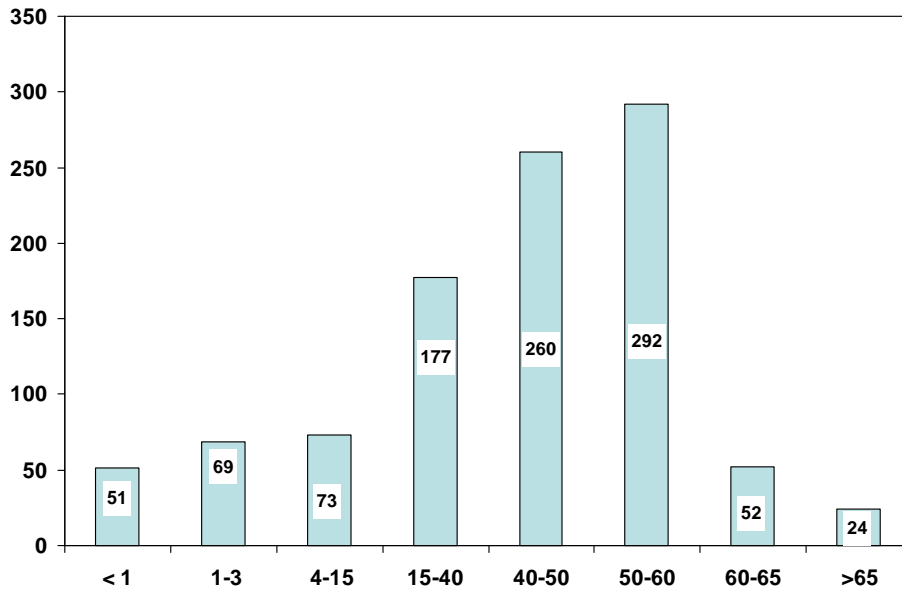


Steatosis Scoring:

- S0 - less than 5% steatosis in biopsy [either macro or micro] (Not shown in chart)
- S1 Ma/Mi- 5-29% Macrovesicular steatosis on biopsy combined with varying degrees of Micro
- S2 Ma/Mi- 30<60% Macrovesicular steatosis on biopsy combined with varying degrees of Micro
- S3 Ma/Mi- 60+% Macrovesicular steatosis on biopsy combined with varying degrees of Micro

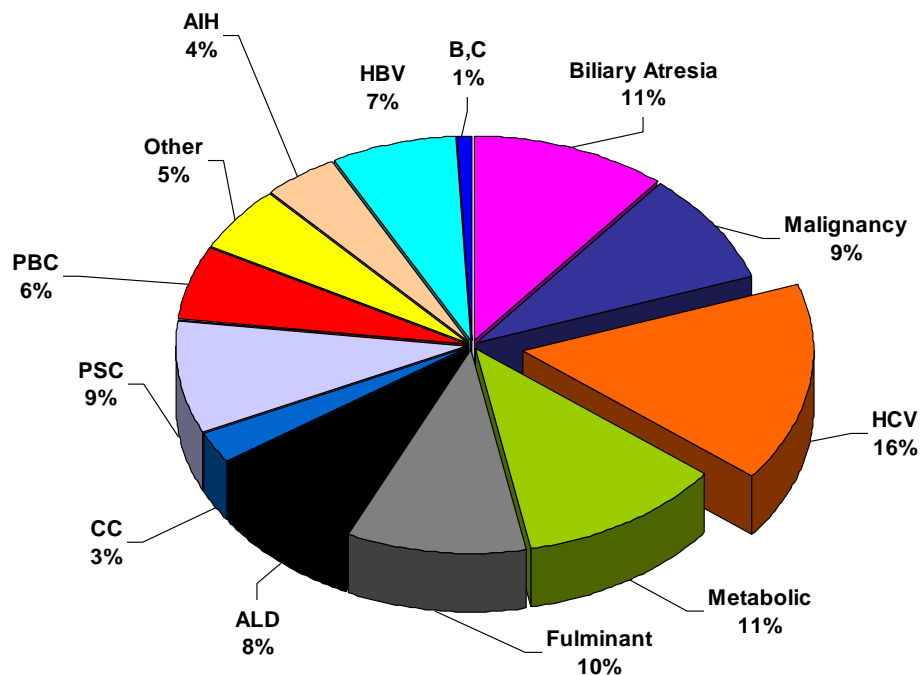
RECIPIENT DEMOGRAPHICS

Breakdown of Patient Age at Primary Transplant n=998



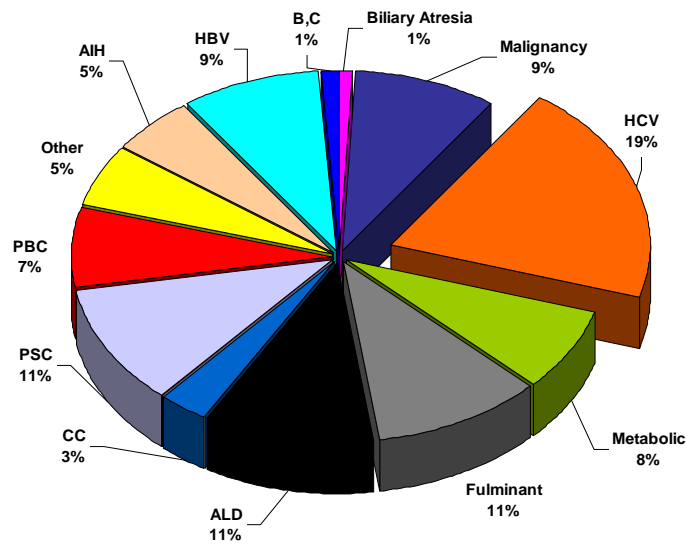
The modal group was in the age range 51-60 years (29%).

Primary Disease – All Patients n=998



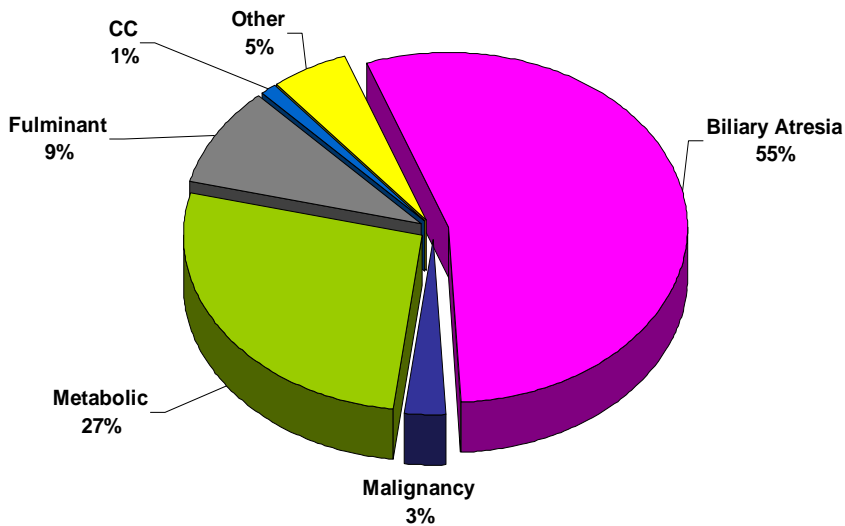
The most common indications for transplantation are Chronic Hepatitis C (159,16%), Metabolic disease (112, 11%), Biliary Atresia (109, 11%) and Fulminant Liver Failure (101, 10%).

**Primary Disease – Adults
n = 810**



Hepatitis C was the most common indication of transplantation in adults (160, 20%), followed by Primary Sclerosing Cholangitis (PSC 87, 11%), Fulminant Hepatic Failure (84, 11%), Alcoholic Liver Disease (ALD 84, 10%) and Hepatitis B (68, 8%).

**Primary Disease – Children
n = 188**

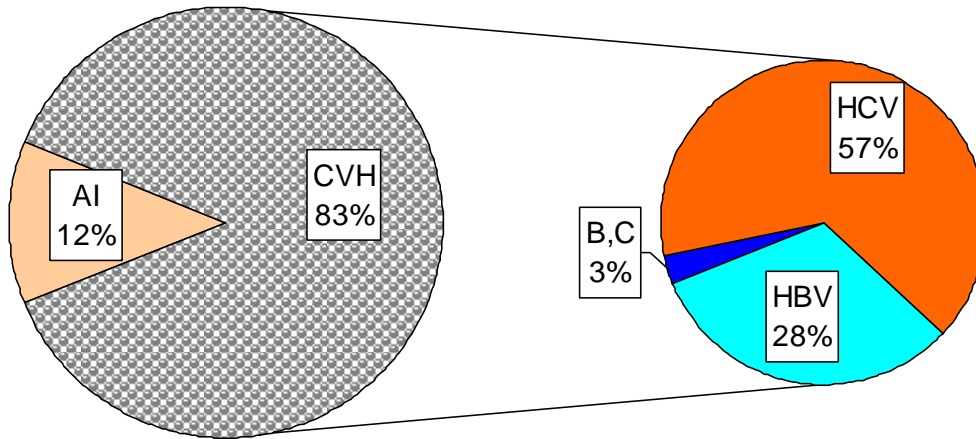


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The most common indication for transplantation in children was Biliary Atresia (103, 55%), followed by Metabolic disease (51, 27%) and Fulminant Hepatic Failure (17, 9%).

Chronic Viral and Auto-immune Hepatitis (Primary and Secondary)

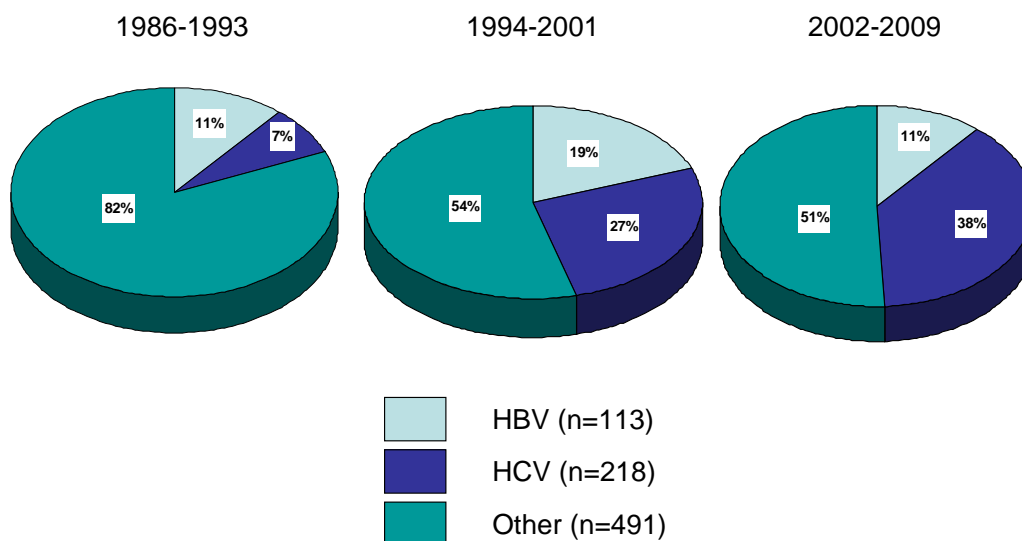
n = 363 (45% of Adults)



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Autoimmune hepatitis (AI) comprised 12% of cases, the remainder (88%) being viral in origin (CVH). Of the cases of viral hepatitis, the most common is Hepatitis C (HCV) (57%), followed by Hepatitis B (HBV) (28%) and HBV/HCV co-infection (3%).

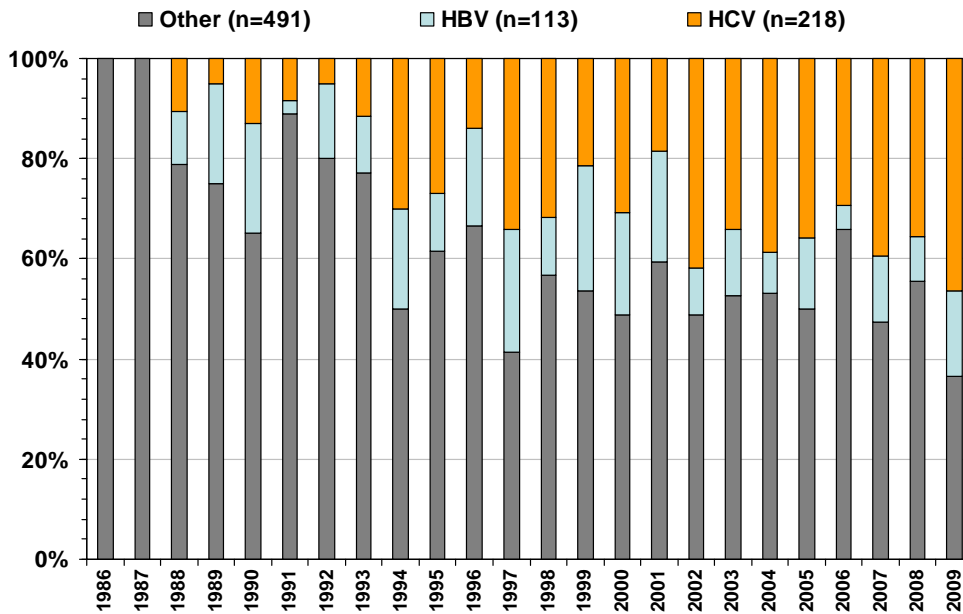
Chronic Viral Hepatitis (Primary and Secondary) Adults by Era



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The number of patients requiring transplantation due to HCV has steadily increased over the three time periods.

% Adults with Chronic HBV or HCV (Primary and Secondary)



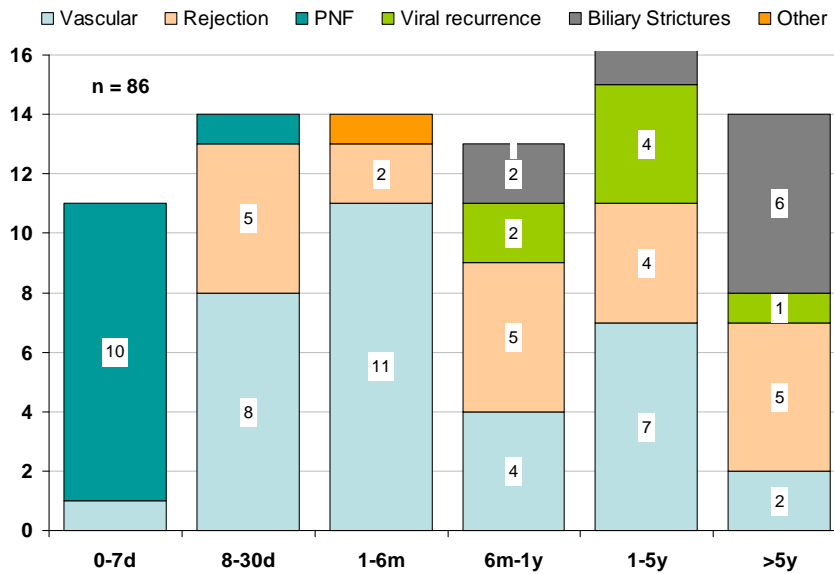
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Chronic HCV infection comprises 27% of adults transplanted, and is expected to continue to rise in the future.

Fulminant Hepatic Failure Treated by Liver Transplantation

Aetiology	No. of Patients	No. of Tx	Outcome	
			Alive	Dead
Idiopathic	44	47	30	14
Drug induced	15	16	10	5
Wilson's Disease	11	13	9	2
Viral Hepatitis				
Hep B	22	23	12	10
Hep C	1	1	1	0
Hep A	3	3	0	3
Hep E	1	1	0	1
Auto Immune Hepatitis	2	2	1	1
Budd-chiari	1	1	0	1
Other	1	1	1	0
Totals	101	108	64 (63% Pts)	37 (37% Pts)

Indication for Secondary Transplantation

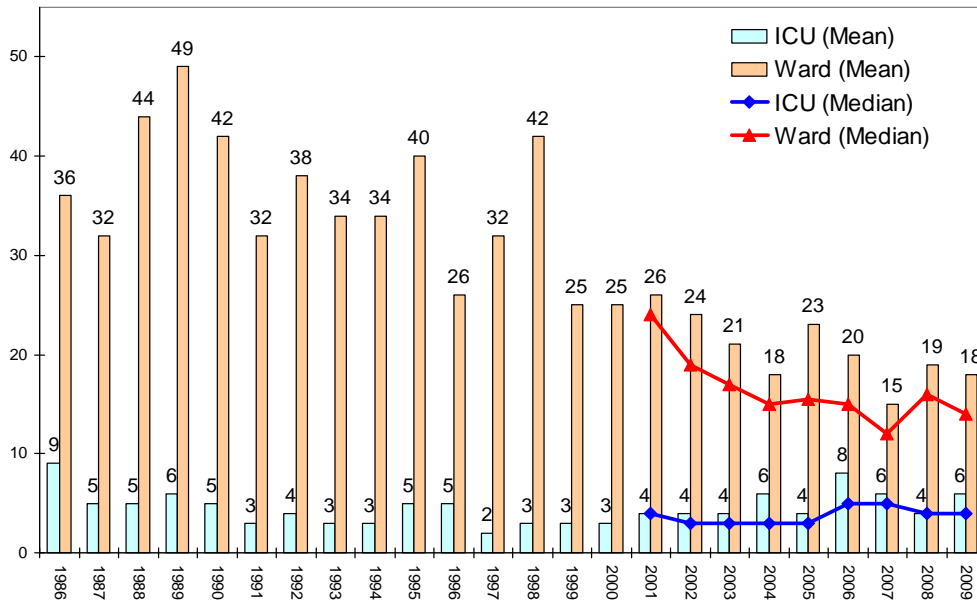


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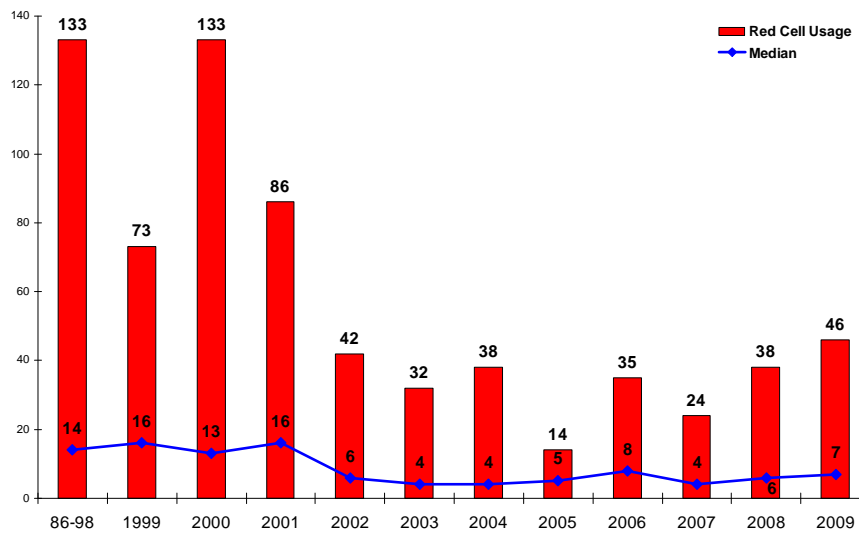
Primary non function (PNF) is the sole indication for re-transplantation in the first 7 days. Rejection and vascular indications are prominent indications for re-transplantation in all other time periods.

PERIOPERATIVE DATA

Mean/Median Hospital Stay (days) Adults Only



Red Cell Usage (Units of Packed Cells)



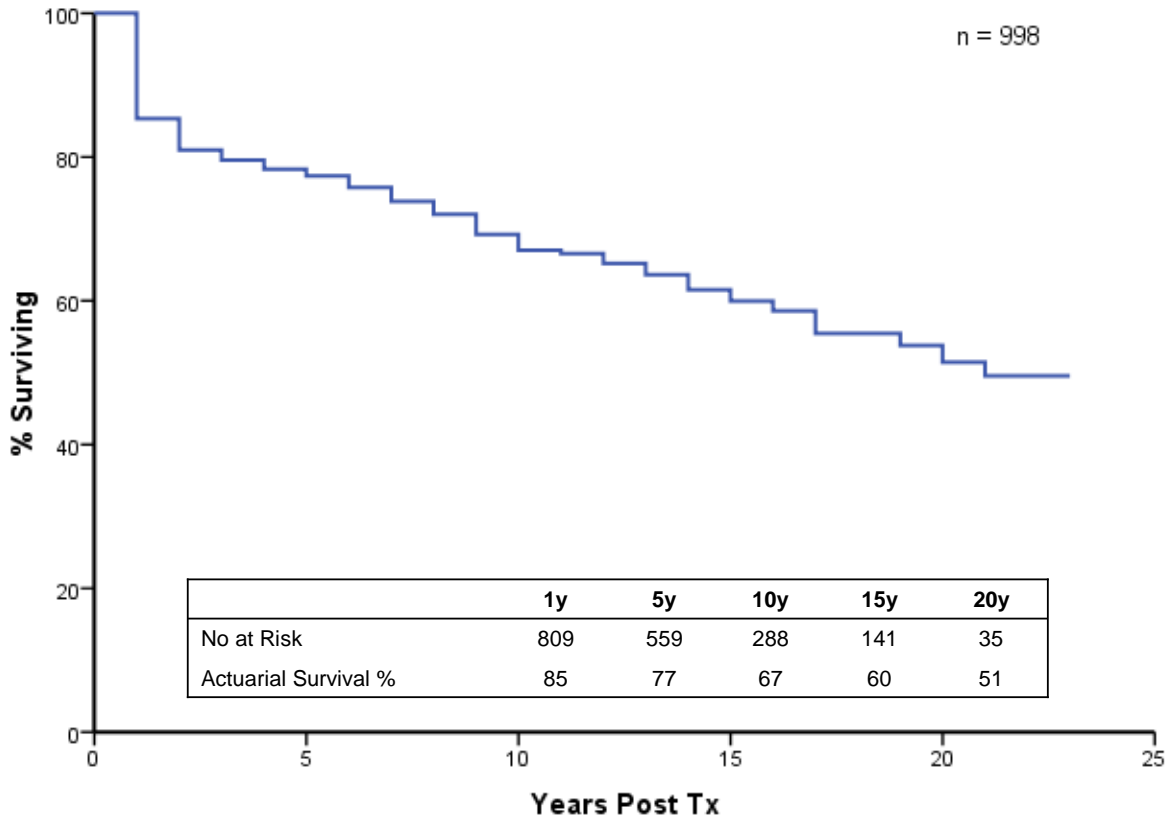
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Graft Ischaemic Time, Operation Duration and Red Cell Utilisation

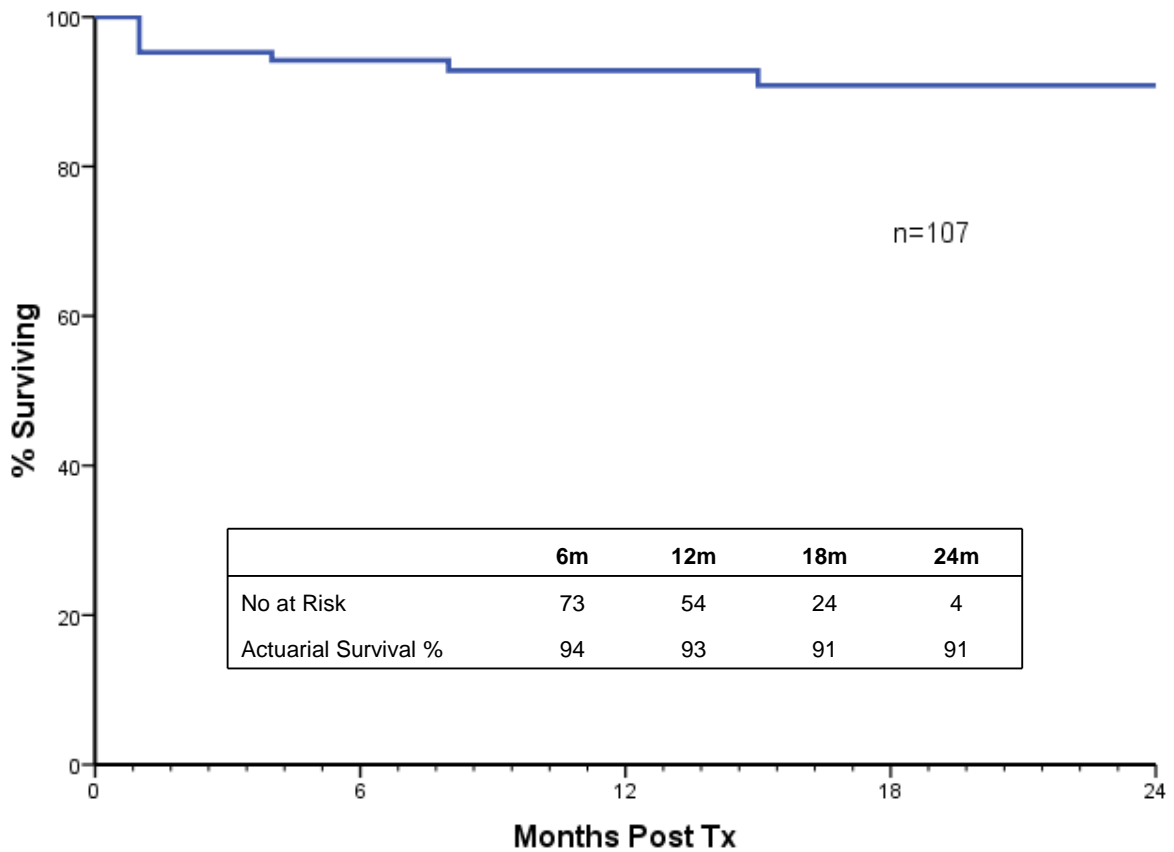
	1986 - 1993	1994 - 2001	2001 - 2009
Mean graft ischaemic time	9Hrs 4 Mins	9Hrs 31 Mins	8Hrs 44 Mins
Mean operation duration	7Hrs 49 Mins	8Hrs 22 Mins	6Hrs 7 Mins
No. packed cells utilised	1 - 133 Mean 20 / Median 15	1 - 133 Mean 21 / Median 17	0 - 86 Mean 7 / Median 4

OUTCOME DATA

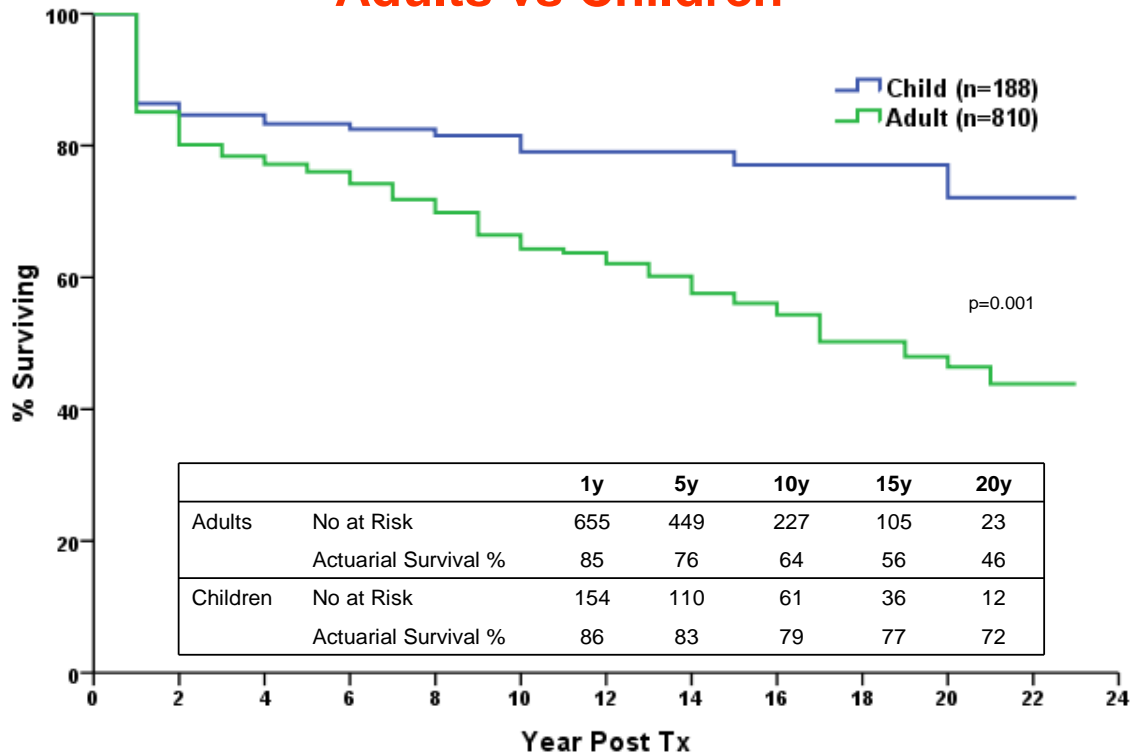
Overall Patient Survival 1986 - 2009



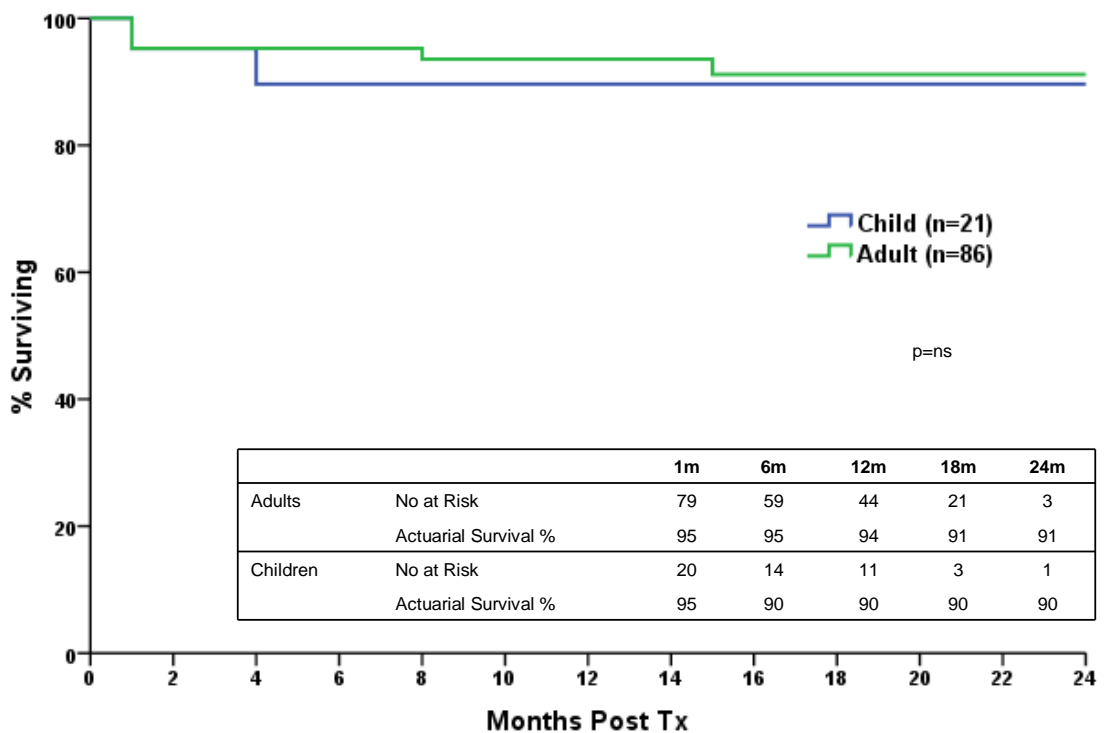
Patient Survival 2008-2009



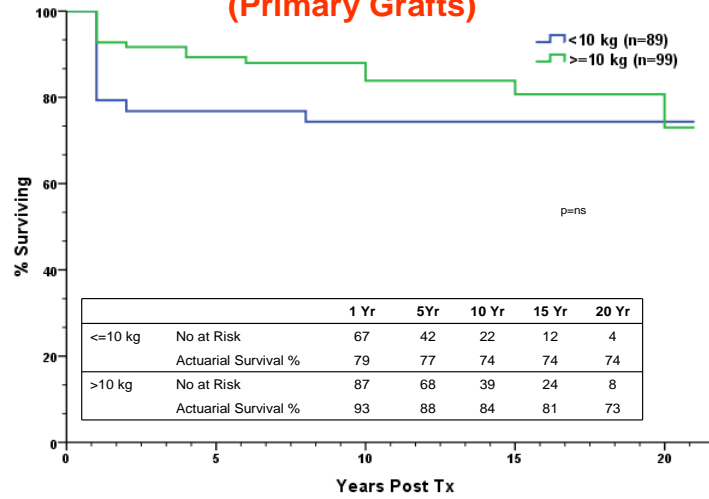
Patient Survival 1986-2009 Adults vs Children



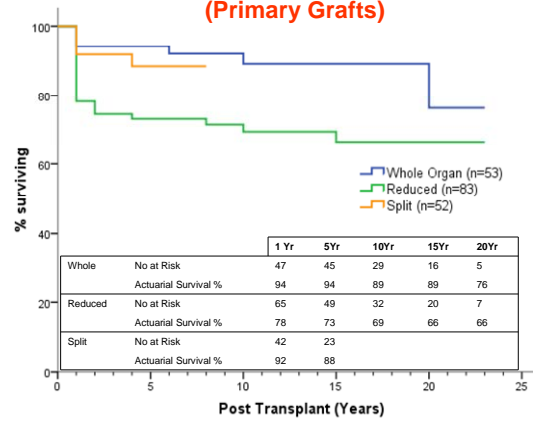
Patient Survival Adults vs Children 2008-2009



Children - Weight vs Outcome (Primary Grafts)



Children - Type of Transplant vs Outcome (Primary Grafts)

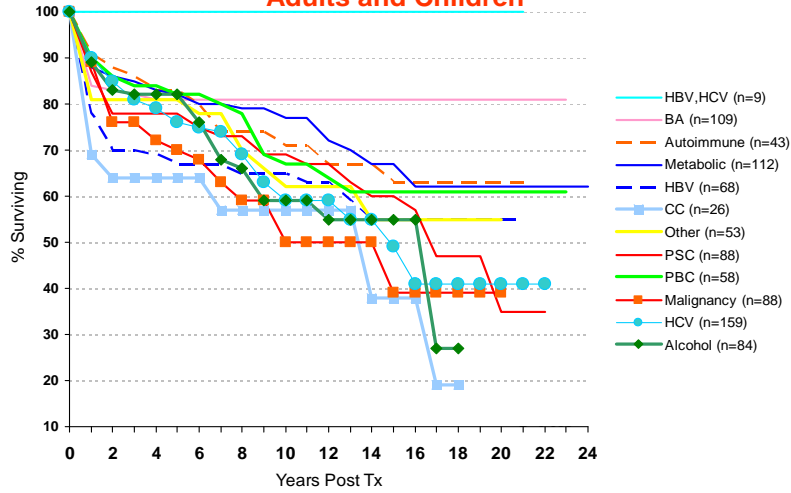


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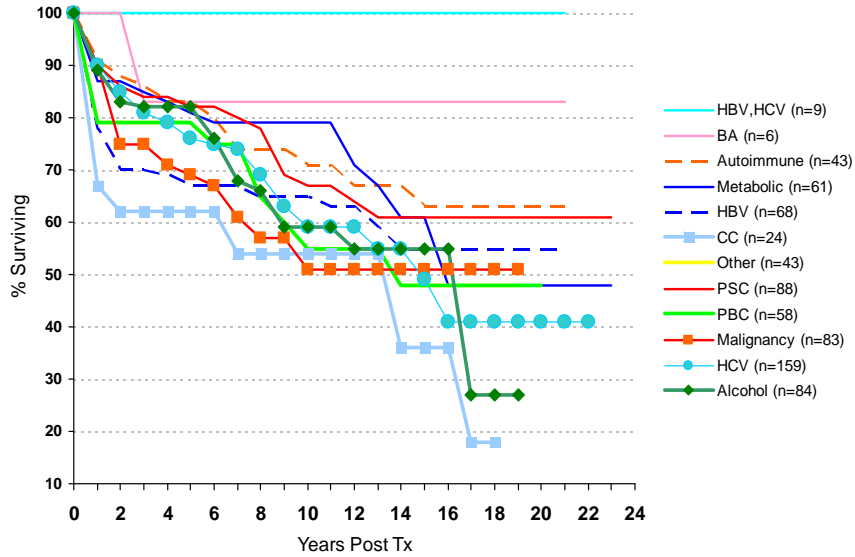
Primary Disease and Outcome

Disease	No of patients	1 year survival%	5 year survival%	10 year survival%	15 year survival %	20 year survival%
ALCOHOLIC CIRRHOSIS	84	89	82	59	55	
BILIARY ATRESIA	109	84	81	81	81	81
AUTOIMMUNE	43	91	83	71	63	63
CHRONIC VIRAL HEPATITIS	279	87	76	66	56	54
HEPATITIS B POSITIVE	68	78	67	65	55	55
HEPATITIS B & C POSITIVE	9	100	100	100	100	100
HEPATITIS C POSITIVE	159	90	76	59	46	39
CRYPTOGENIC CIRRHOSIS	26	69	64	57	38	
FULMINANT HEPATIC FAILURE	101	75	73	66	60	45
MALIGNANCY	88	89	70	50	39	
METABOLIC	112	88	82	77	67	62
OTHER	53	81	81	62	55	
PRIMARY SCLEROSING CHOLANGITIS	88	87	78	69	60	35
PRIMARY BILIARY CIRRHOSIS	58	90	82	67	61	61
TOTAL	998	85	77	67	60	51

Primary Disease vs Outcome Adults and Children

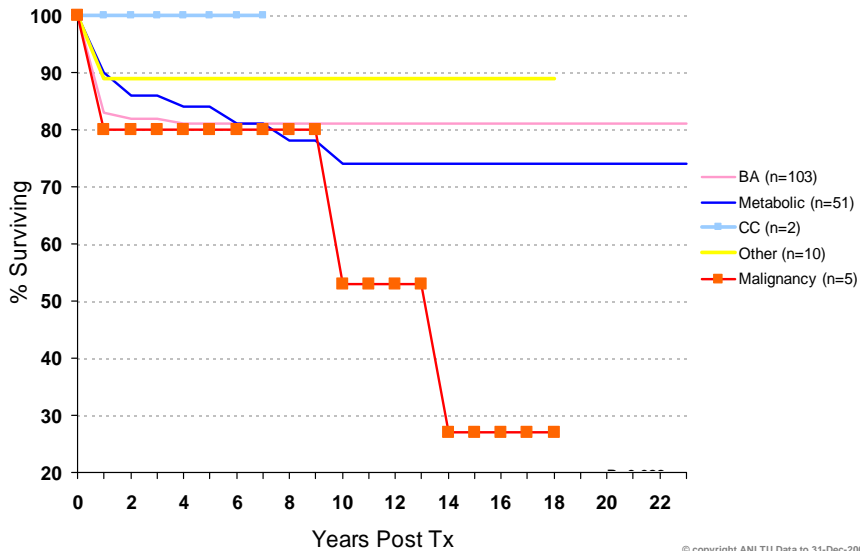


Primary Disease vs Outcome Adults



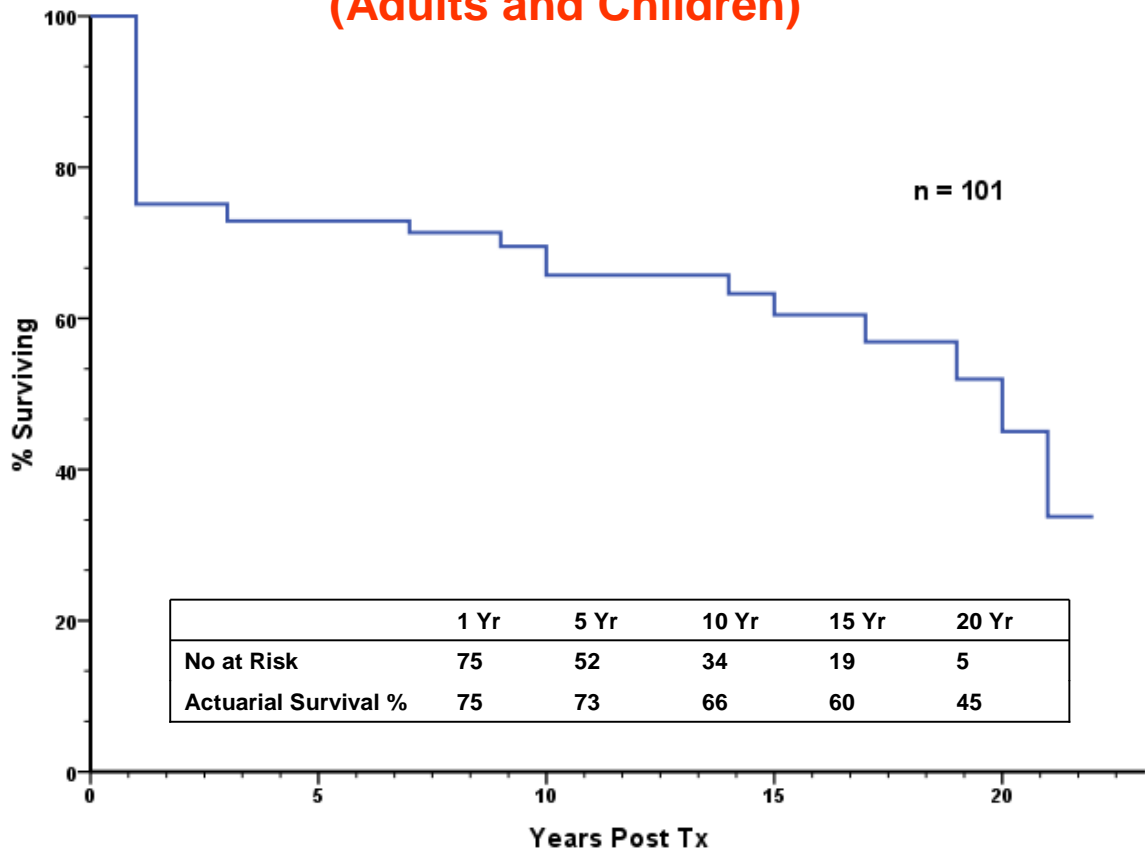
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Primary Disease vs Outcome Children

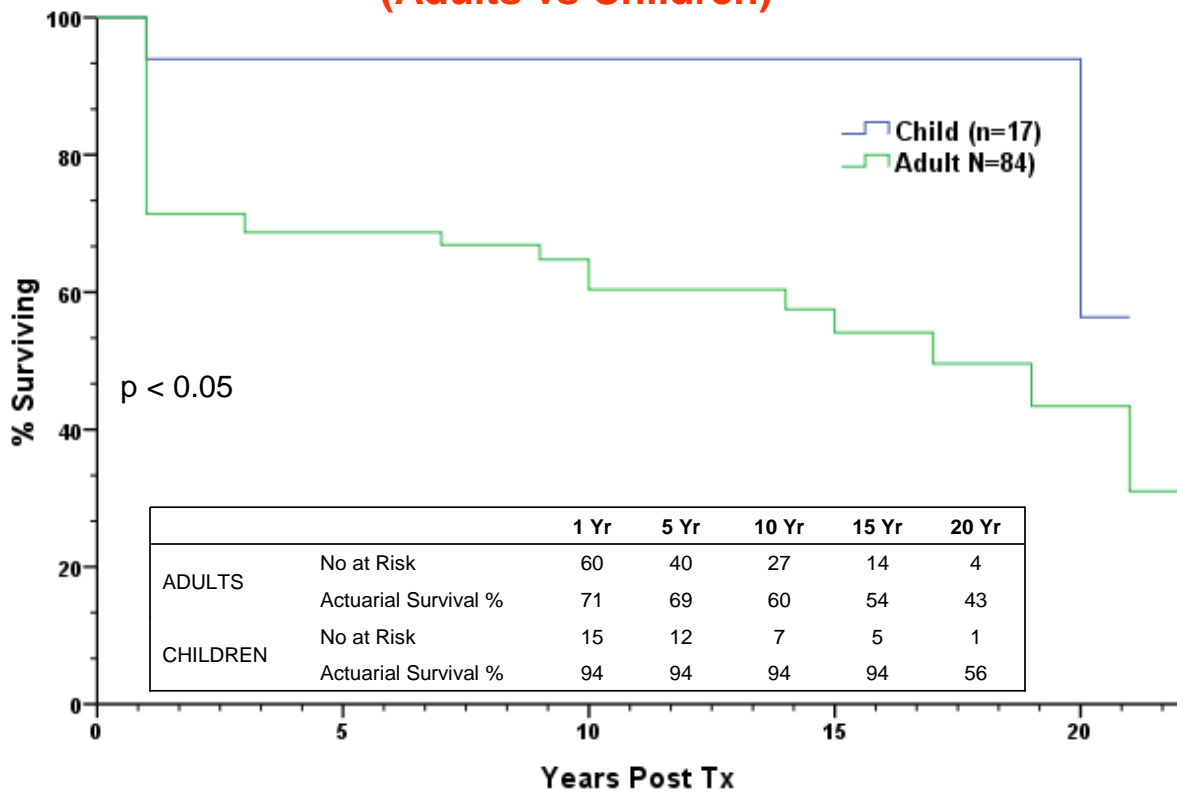


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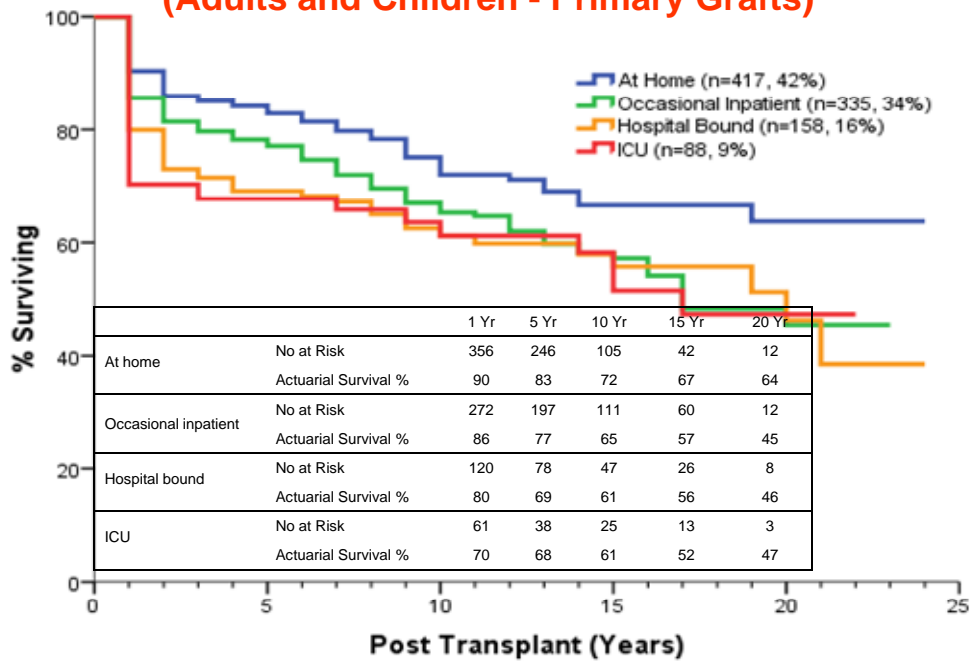
Fulminant Disease vs Outcome (Adults and Children)



Fulminant Disease vs Outcome (Adults vs Children)

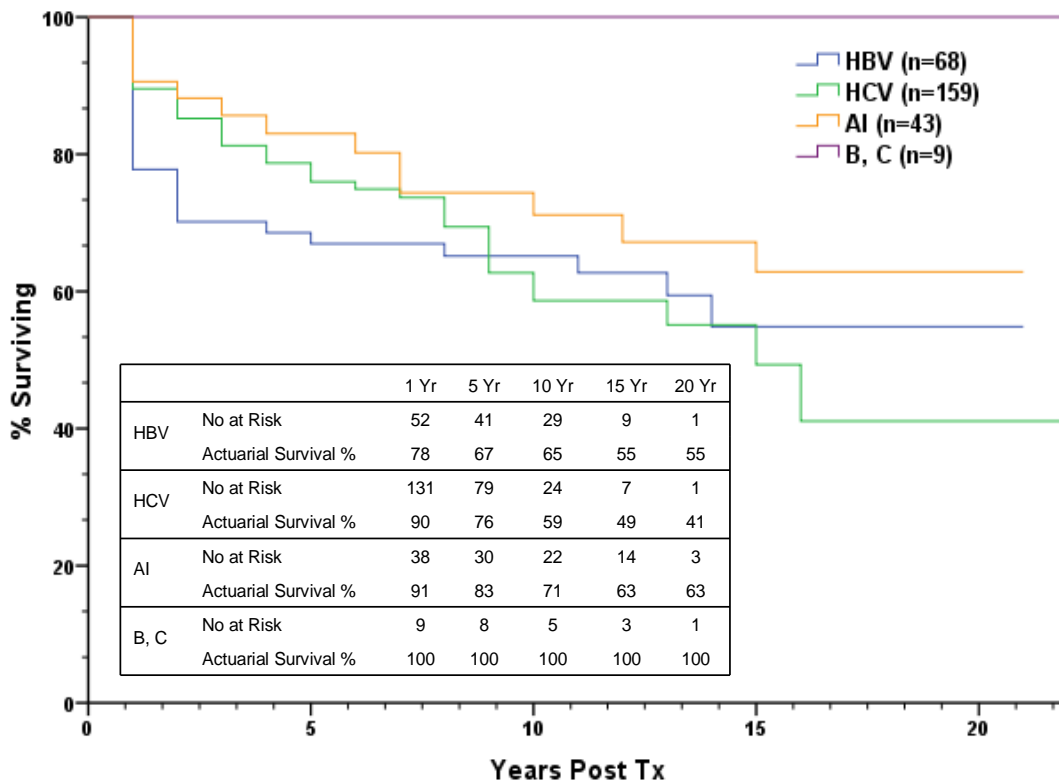


Status vs Outcome (Adults and Children - Primary Grafts)



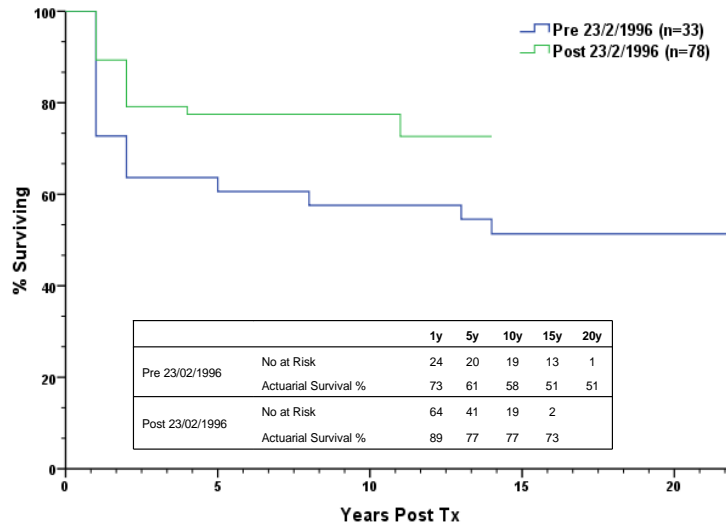
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Chronic Viral, Autoimmune Disease vs Outcome (Primary Grafts)



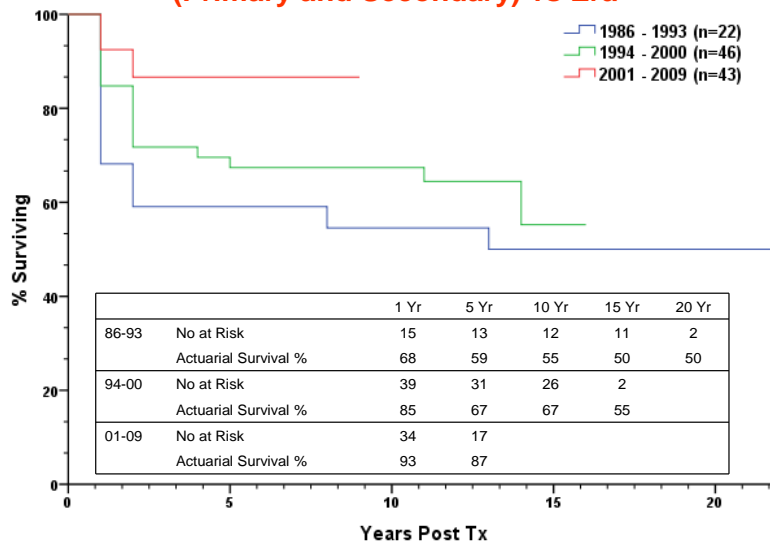
HBV/HCV co-infection demonstrated superior patient survival at 100%, as compared to HCV infection alone.

Chronic HBV Before and After Prophylaxis Protocol* (Primary and Secondary Indication)

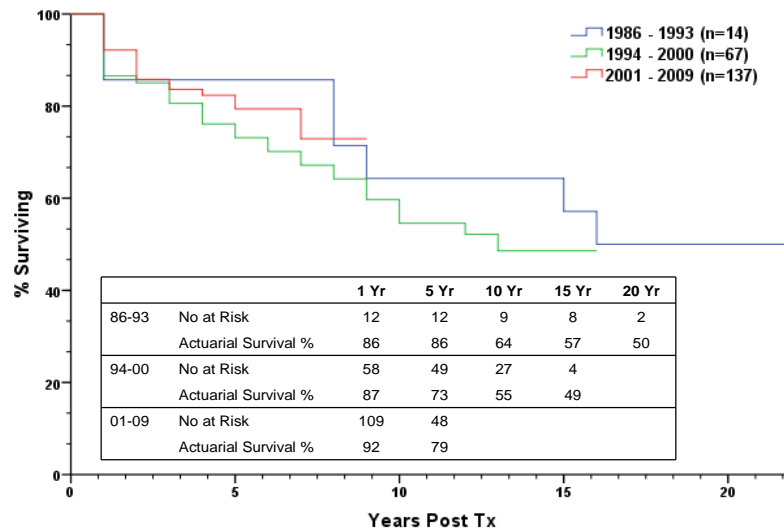


*oral nucleos(t)ide therapy + low dose monthly IMI HBIG

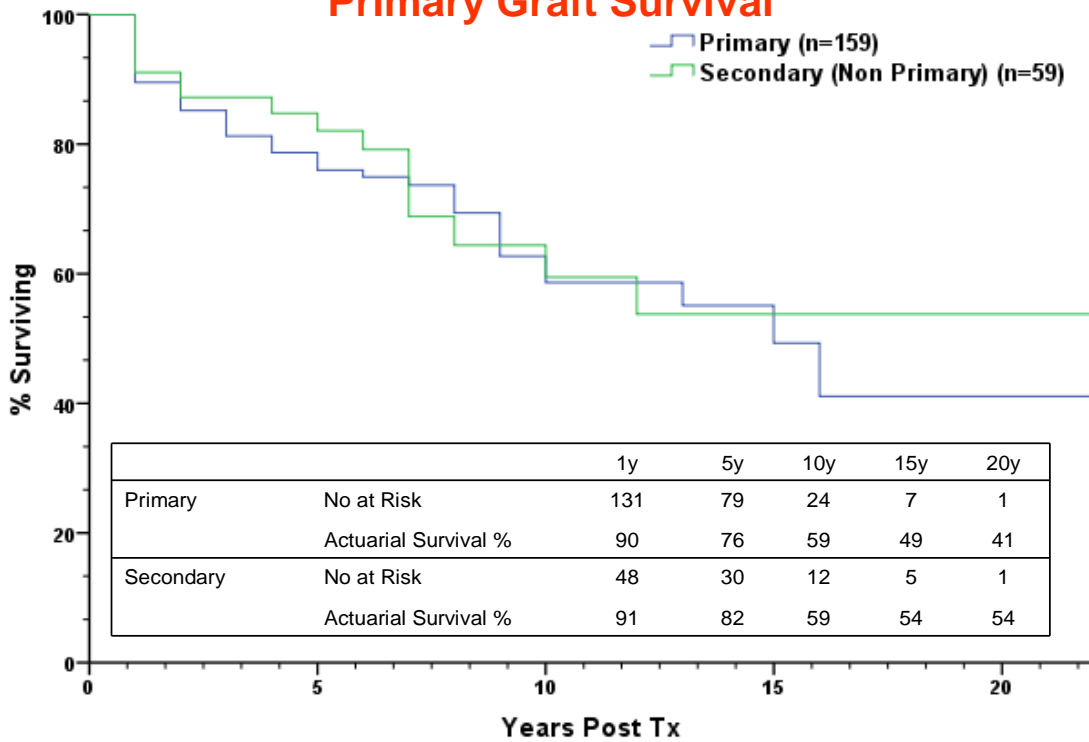
Chronic HBV (Primary and Secondary) vs Era



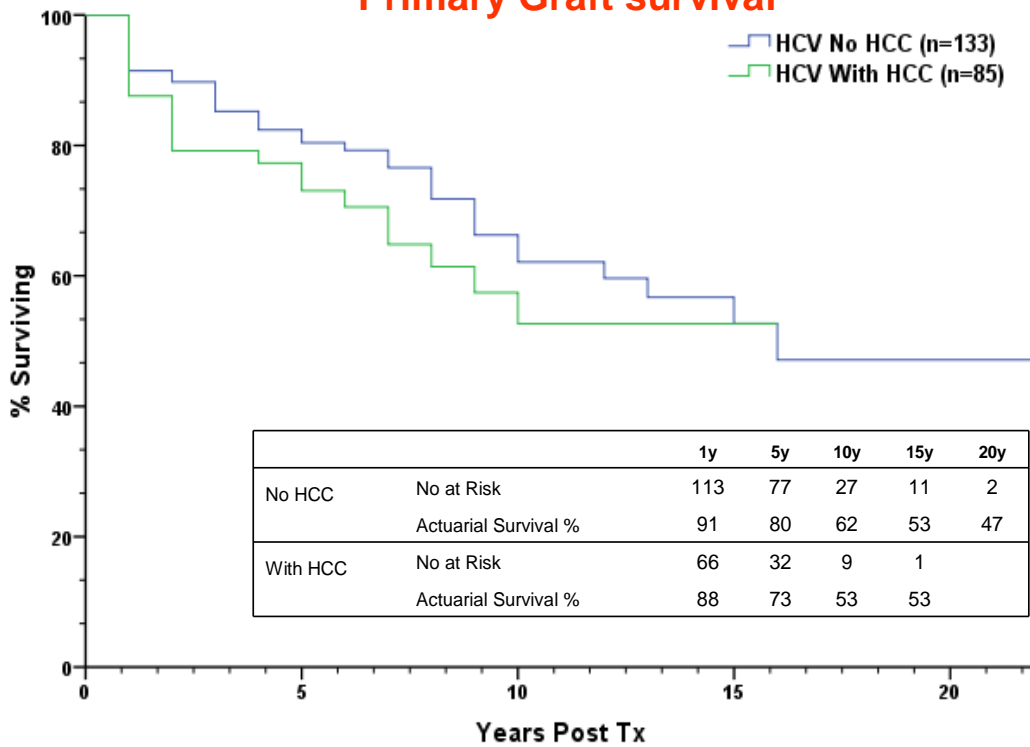
Chronic HCV (Primary and Secondary) vs Era



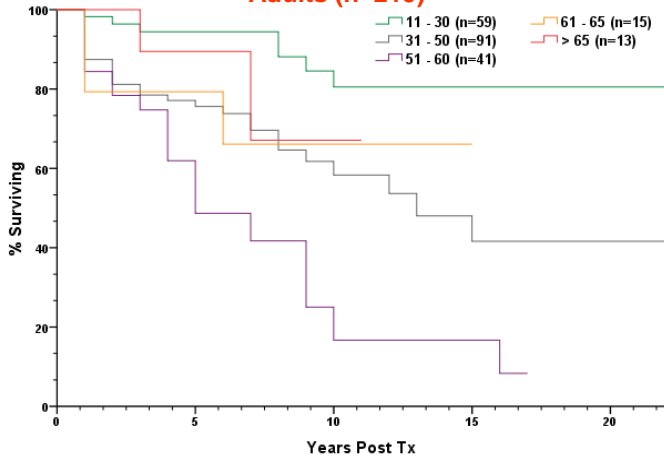
Chronic HCV Primary vs Secondary Indication Primary Graft Survival



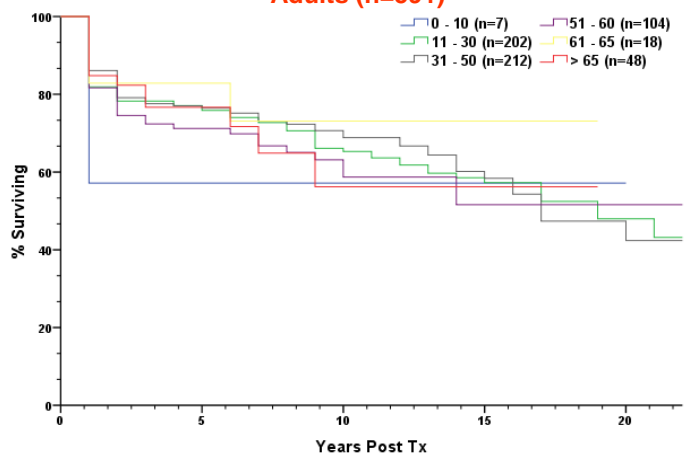
Chronic HCV (Primary & Secondary) vs Associated HCC Primary Graft survival



HCV vs Donor Age vs Primary Graft Outcome Adults (n=219)



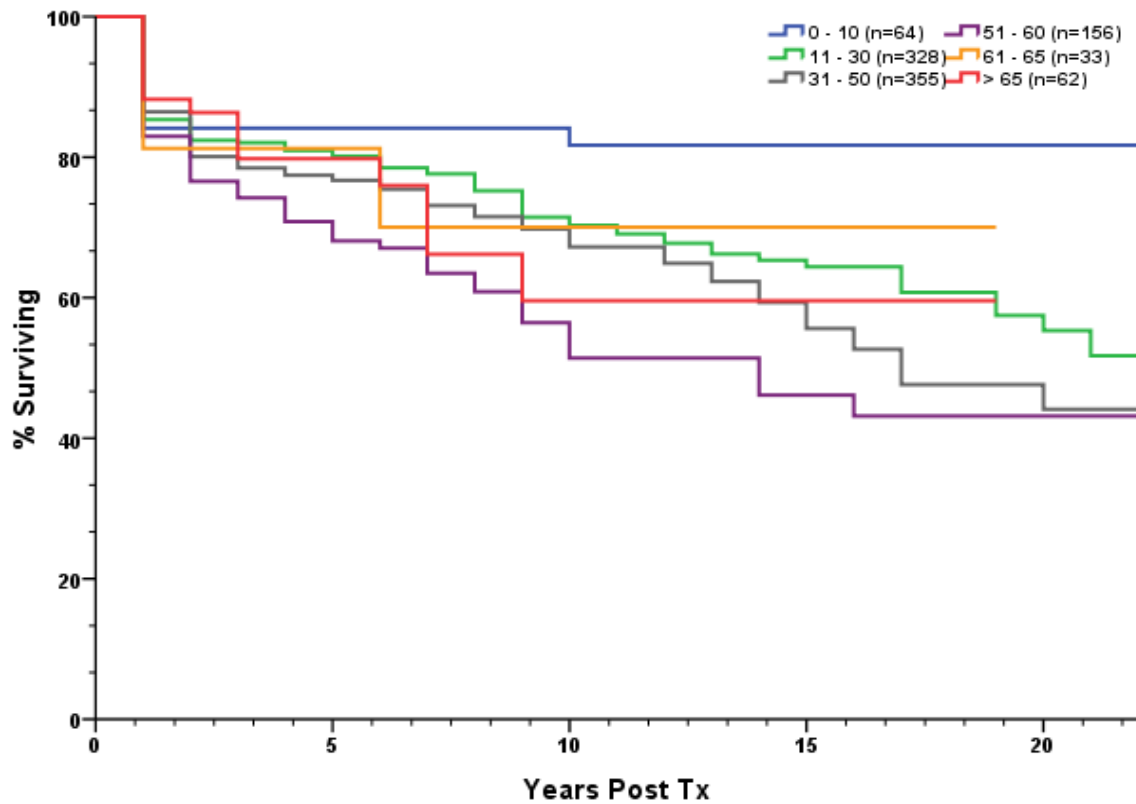
Non HCV vs Donor Age vs Primary Graft Outcome Adults (n=591)



		1y	5y	10y	15y	20y
11 - 30	No at Risk	54	40	18	5	1
	Actuarial Survival %	98	94	81	81	81
31 - 50	No at Risk	73	47	14	6	1
	Actuarial Survival %	87	76	58	42	42
51 - 60	No at Risk	30	11	2	2	
	Actuarial Survival %	84	49	17	17	
61 - 65	No at Risk	11	7	2		
	Actuarial Survival %	79	79	66		
> 65	No at Risk	12	5	1		
	Actuarial Survival %	100	89	67		

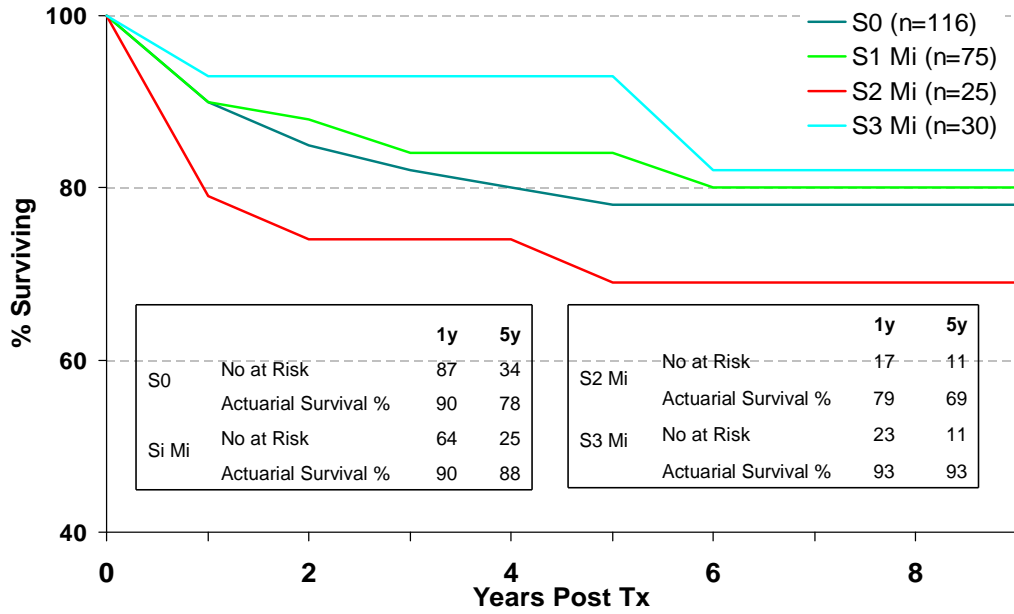
		1 Yr	5 Yr	10 Yr	15 Yr	20 Yr
0 - 10	No at Risk	4	4	4	3	
	Actuarial Survival %	57	57	57	57	
11 - 30	No at Risk	160	125	80	44	13
	Actuarial Survival %	82	76	65	57	48
31 - 50	No at Risk	176	127	72	30	7
	Actuarial Survival %	86	76	69	58	42
51 - 60	No at Risk	84	56	25	13	1
	Actuarial Survival %	82	71	59	52	52
61 - 65	No at Risk	14	9	6	1	
	Actuarial Survival %	83	83	73	73	
> 65	No at Risk	37	18	3	1	
	Actuarial Survival %	85	77	56	56	

Donor Age vs Primary Graft Outcome

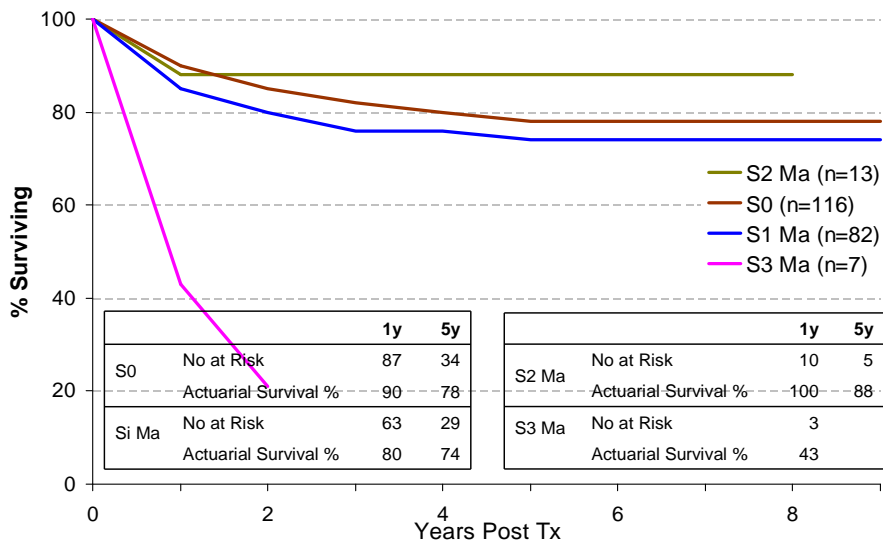


	1y	5y	10y	15y	20y
0 - 10 No at Risk	52	48	32	17	3
Actuarial Survival %	84	84	82	82	82
11 - 30 No at Risk	267	200	117	65	21
Actuarial Survival %	85	80	70	64	55
31 - 50 No at Risk	292	199	97	40	10
Actuarial Survival %	86	77	67	56	44
51 - 60 No at Risk	123	72	29	16	1
Actuarial Survival %	83	68	51	46	43
61 - 65 No at Risk	25	16	8	1	1
Actuarial Survival %	81	81	70	70	70
> 65 No at Risk	50	24	5	2	
Actuarial Survival %	88	80	60	60	

Steatosis (Micro) vs Graft Outcome (Adults) 2001 – 2009

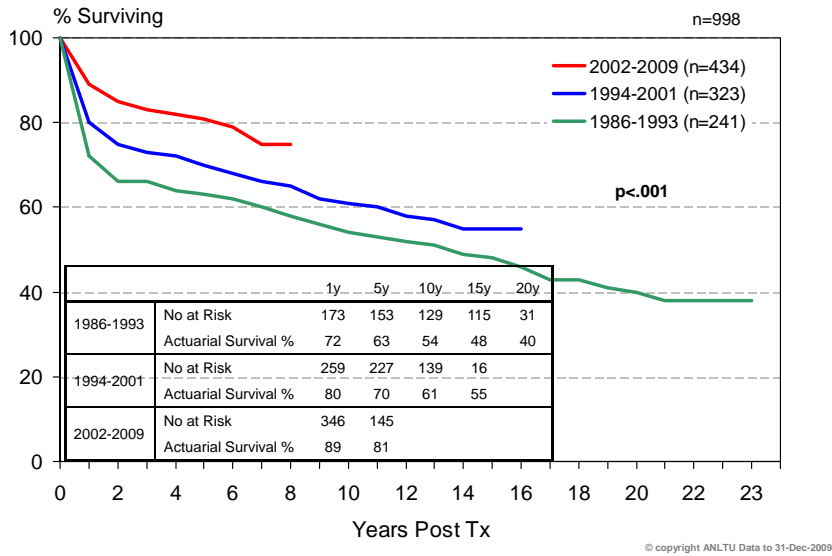


Steatosis (Macro) vs Graft Outcome (Adults) 2001 – 2009

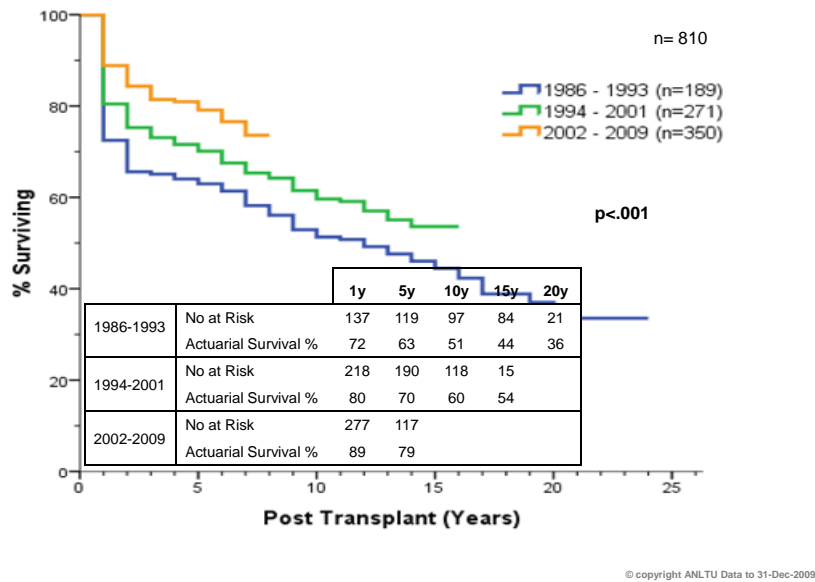


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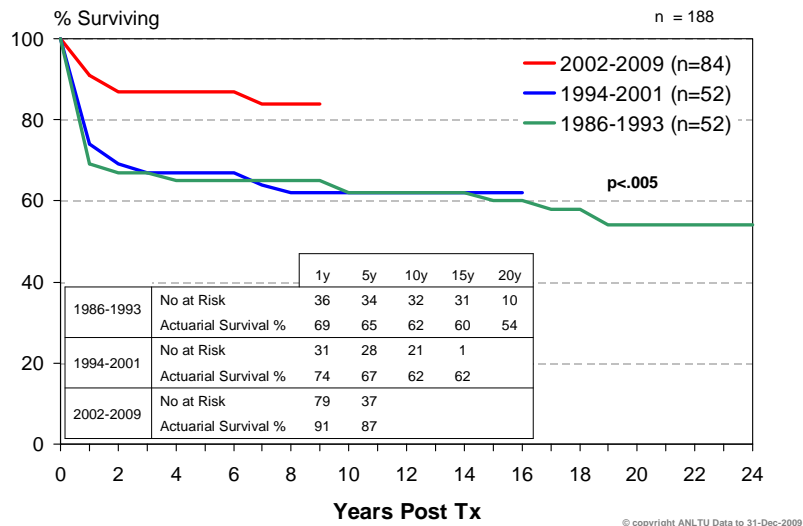
Primary Graft Survival by Era



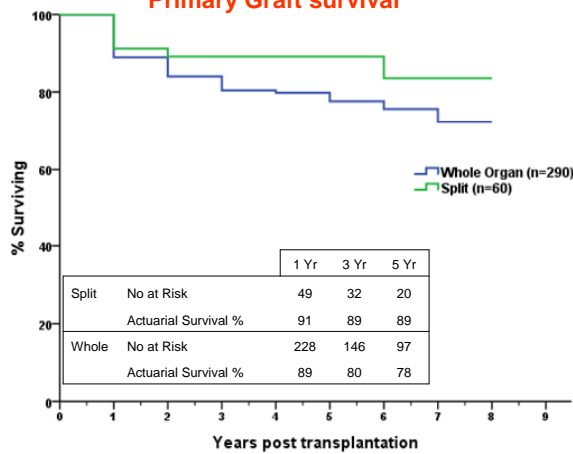
Primary Graft Survival by Era Adults



Primary Graft Survival by Era Children

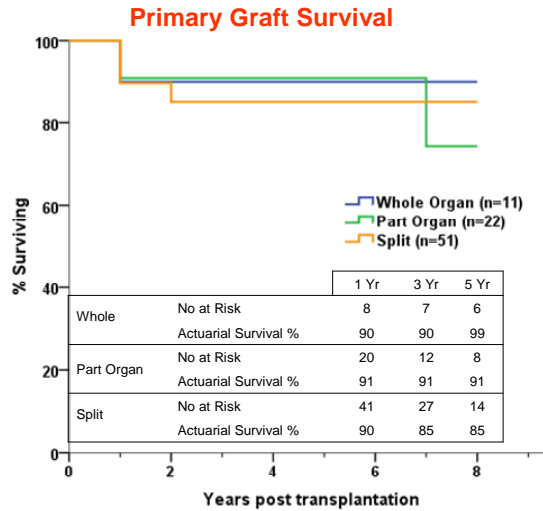


**Split vs Whole Grafts (Adults)
2002-2009
Primary Graft survival**



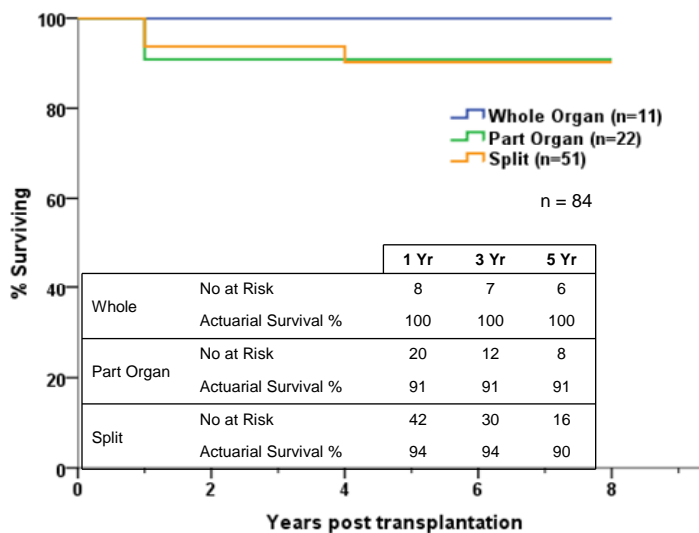
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**Split vs Reduced vs Whole Grafts (Children)
2002-2009
Primary Graft Survival**



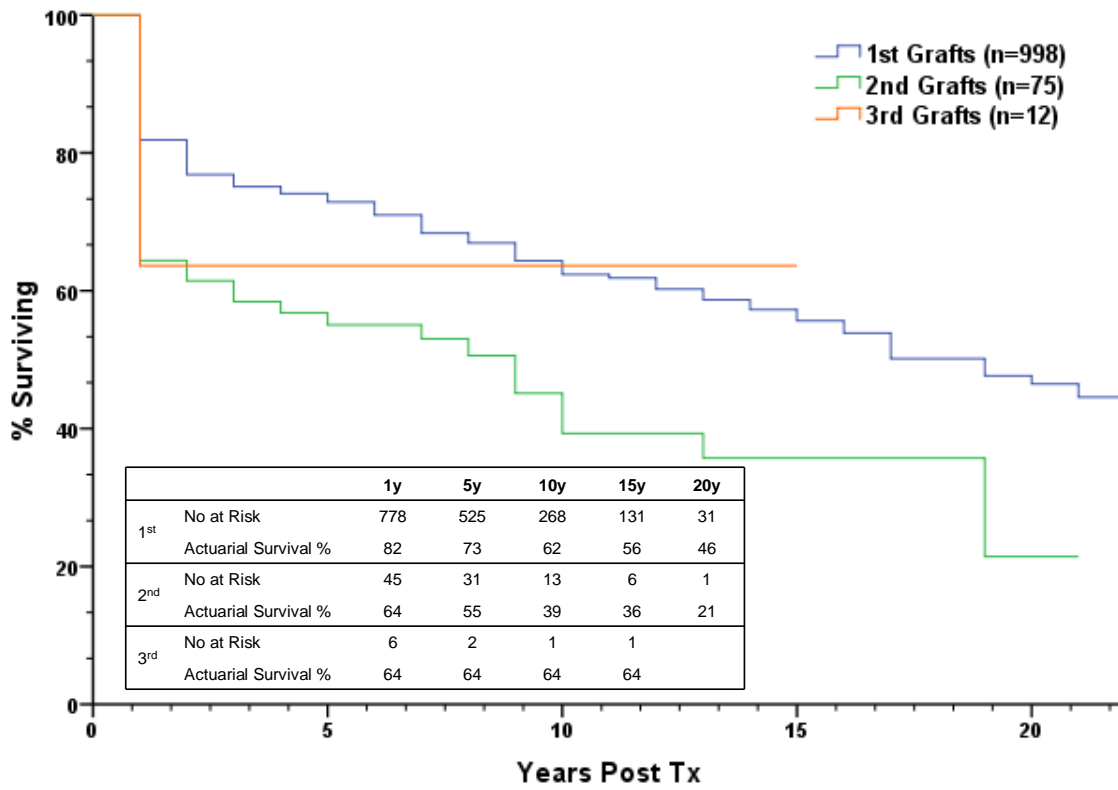
.TU Data to 31-Dec-2009

**Split vs Reduced vs Whole Grafts (Children)
2002-2009
Patient Survival**

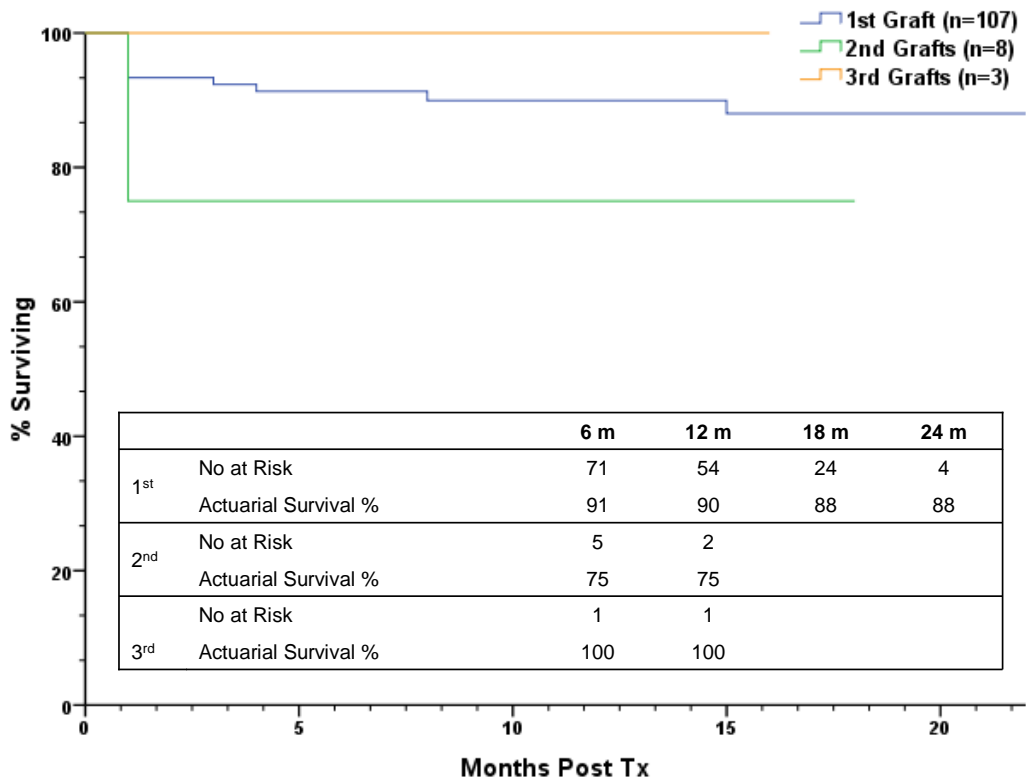


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Graft Number vs Graft survival



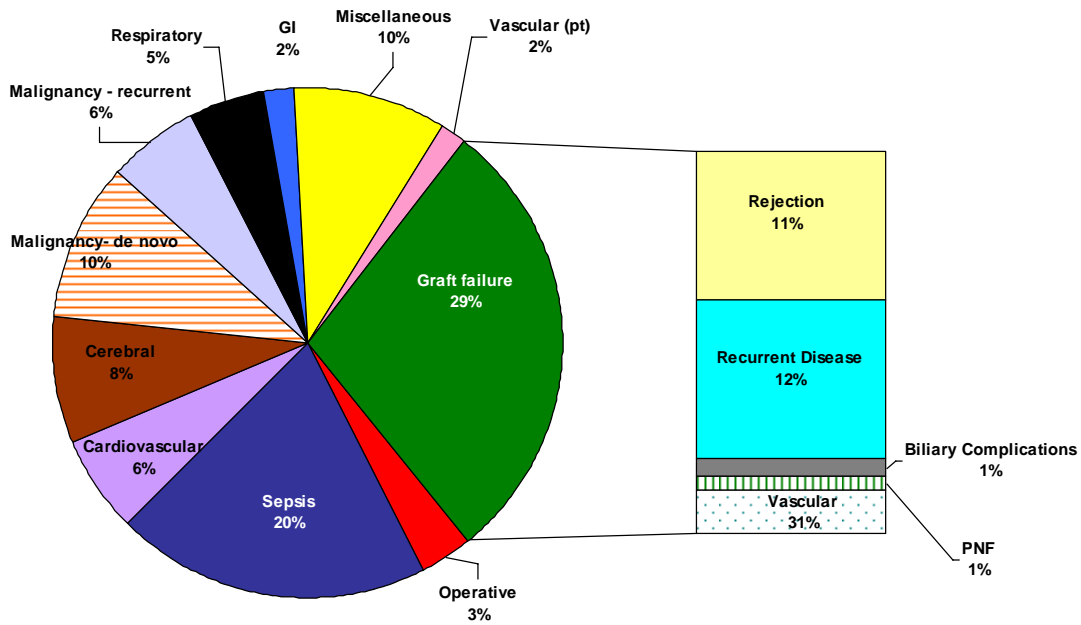
Graft Survival 2008-2009



Cause of Death

Graft Failure	87 (29%)
Rejection	
Acute	10
Chronic	24
Recurrent disease	
Hepatitis B	11
Hepatitis C	23
NASH	2
PNF	3
Biliary Complications	4
Vascular	10
Sepsis	60 (20%)
Malignancy	49 (16%)
Recurrent disease	18
De Novo	29
Transferred from donor	2
Cerebral	24 (8%)
Cardiovascular	19 (6%)
Other	17 (6%)
Respiratory	14 (6%)
Operative	10 (3%)
Multi-organ Failure	7 (2%)
Vascular	5 (2%)
Gastrointestinal	6 (2%)
GVHD	4 (1%)
Renal Failure	3
TOTAL	305 (31% of all pts)

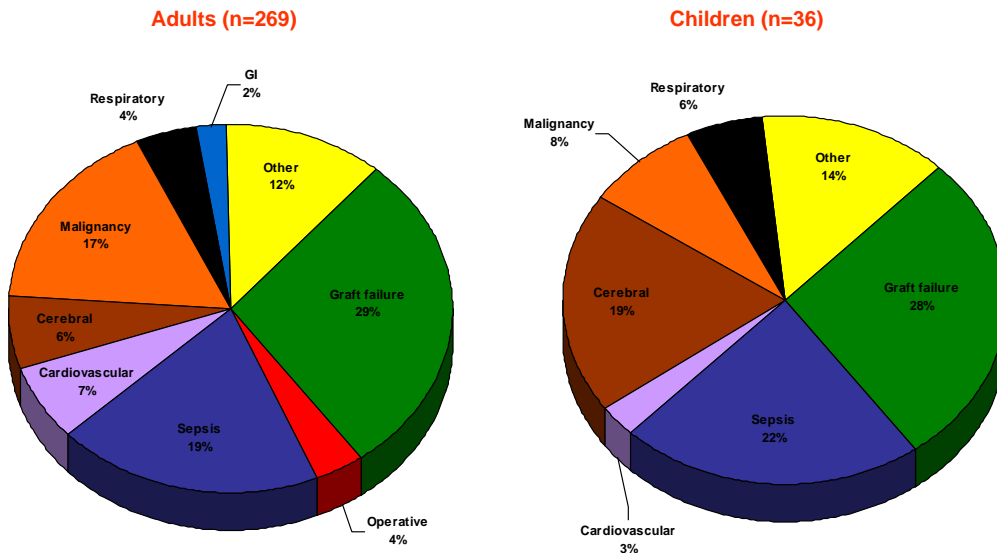
Cause of Death (n=305)



305 patients, or 31% of all patients transplanted, have died. 60 (20%) have died due to sepsis and 88 (29%) from graft failure.

Of the 88 cases of death due to graft failure, 37 (12%) patients lost grafts due to rejection, 34(11%) from recurrent disease and 3 (1%) from primary non function (PNF).

Cause of Death (n=305)

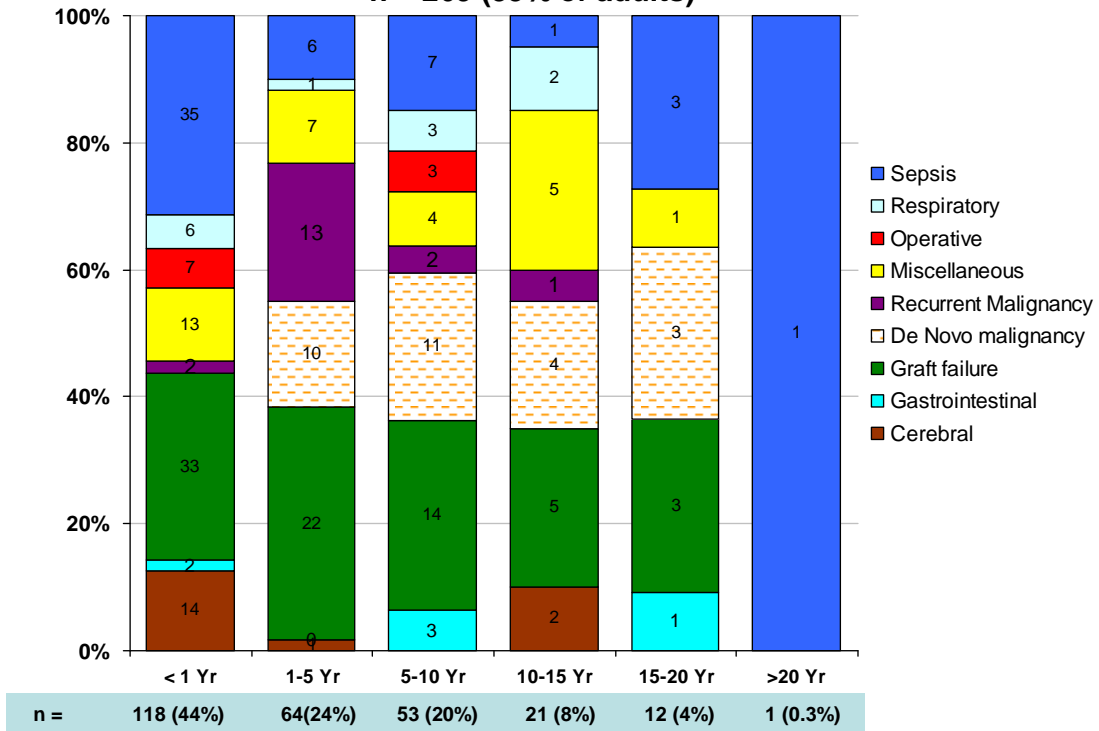


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The majority of adult deaths were due to Graft Failure (77 or 29%), Sepsis (52 or 19%) and Malignancy (46 or 16%). The majority of child deaths were due to Sepsis (8 or 22%) or Graft Failure (10 or 28%) and Cerebrovascular accident (7 or 19%).

Cause of Death by Time - Adults

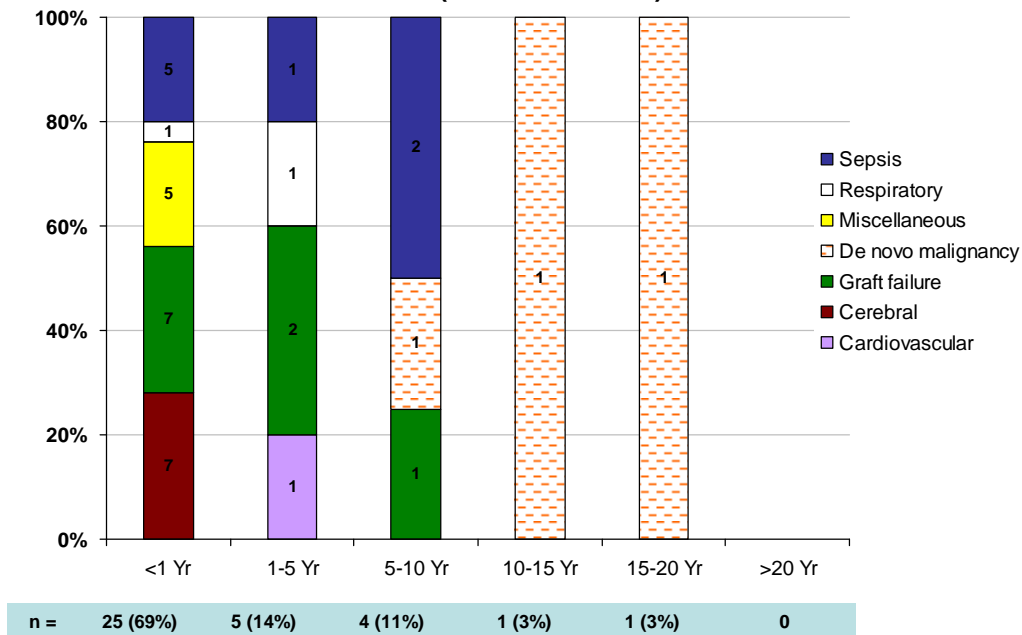
n = 269 (33% of adults)



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Cause of Death by Time - Children

n = 36 (19% of children)

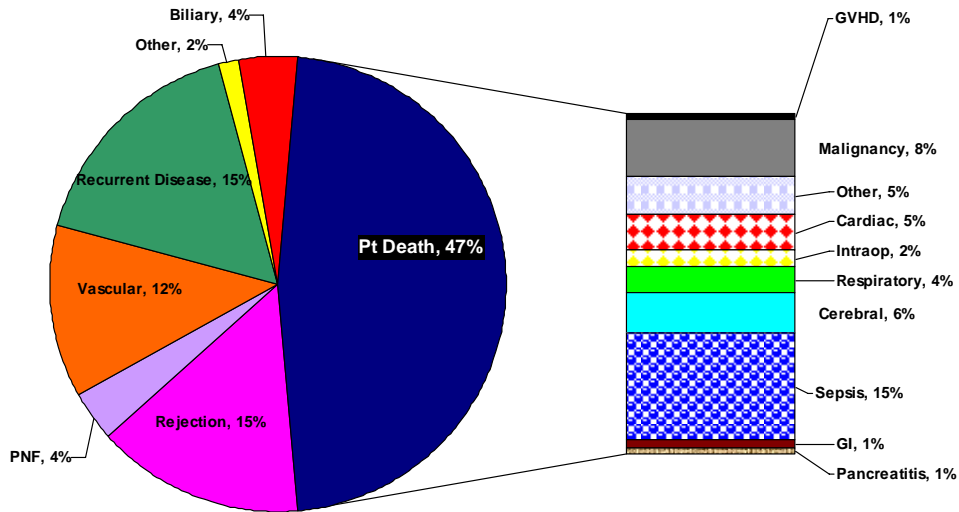


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Cause of Graft Failure

Rejection			58 (16%)
	Acute	15	
	Subacute	1	
	Chronic	36	
	ABO incompatibility	6	
Vascular complications	Hepatic artery		49 (12%)
	Thrombosis	34	
	Secondary haemorrhage	1	
	Rupture	1	
	Dissection in donor	1	
	Portal vein thrombosis	3	
	Portal vein erosion	1	
	Hepatic vein stenosis	1	
	Graft infarction	2	
	Vena Cava obstruction	1	
	Splenic aneurysm rupture	3	
	Graft compression	1	
Recurrent disease			65 (16%)
	Hep B	13	
	Hep C	31	
	Malignancy	18	
	PSC	1	
	NASH	2	
Primary non function			14 (3%)
	Arterial thrombosis	2	
	Vena	1	
	Graft infarction	6	
	Profound hypotension	1	
	Preservation injury	1	
	Severe steatosis	3	
Patient deaths			186(47%)
	Sepsis	58	
	Cerebral	22	
	Other	21	
	Malignancy	31	
	Respiratory failure	14	
	Cardiovascular	19	
	Intraoperative	9	
	GI haemorrhage	5	
	GVHD	4	
	Pancreatitis	3	
Biliary complications			17(4%)
	Biliary strictures	15	
	Other	2	
Other			6 (1%)
TOTAL			395 (36%) Of all grafts

Cause of Graft Failure



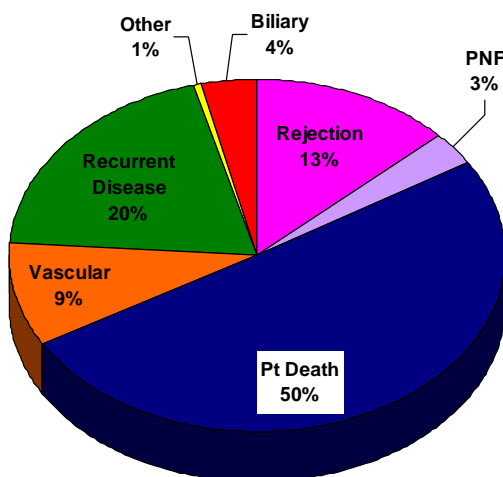
395 of 1085 grafts (36%) have failed.

191 grafts (48%) were lost due to patient deaths, 58 (15%) due to rejection and 64 (16%) due to disease recurrence.

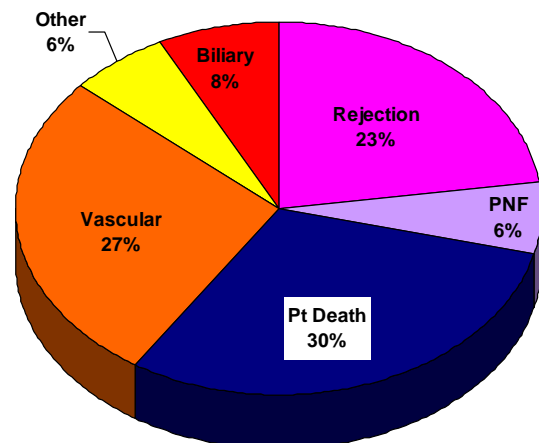
Sepsis was the most significant cause of patient death (60 patients), followed by malignancy (49 patients) and cerebral catastrophe (24 patients).

Cause of Failure

Adults
n = 329



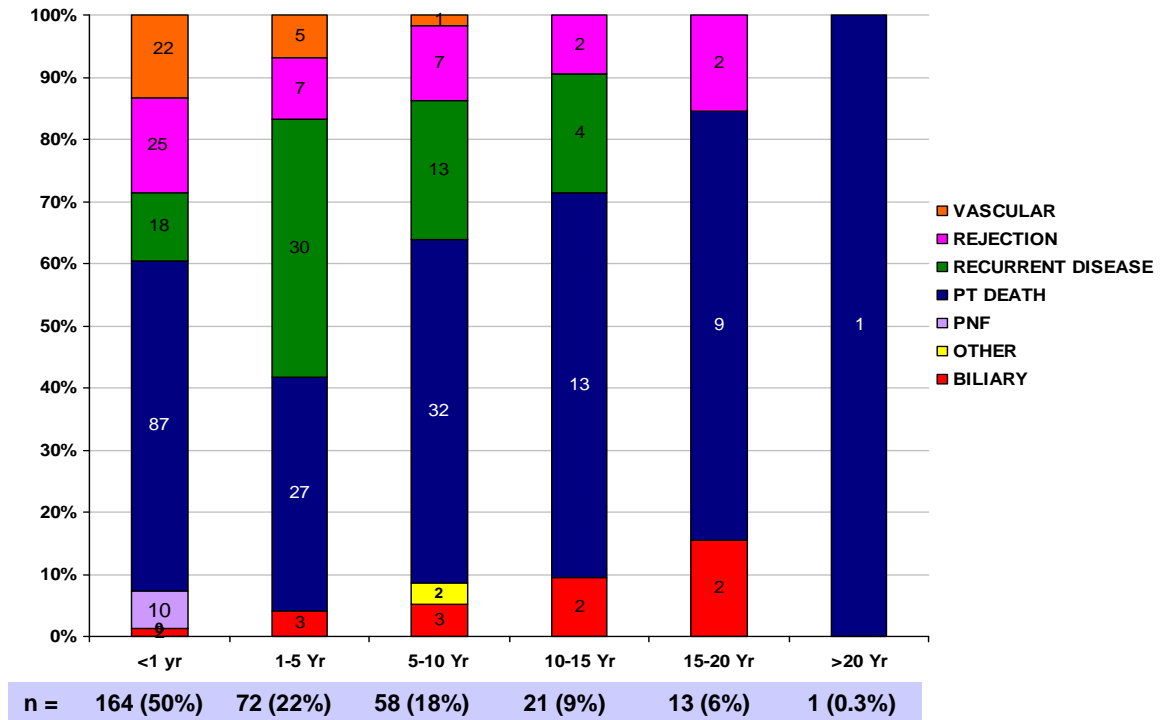
Children
n = 66



Patient death was the most significant cause of graft failure, followed by rejection.

Cause of Graft Failure by Time - Adults

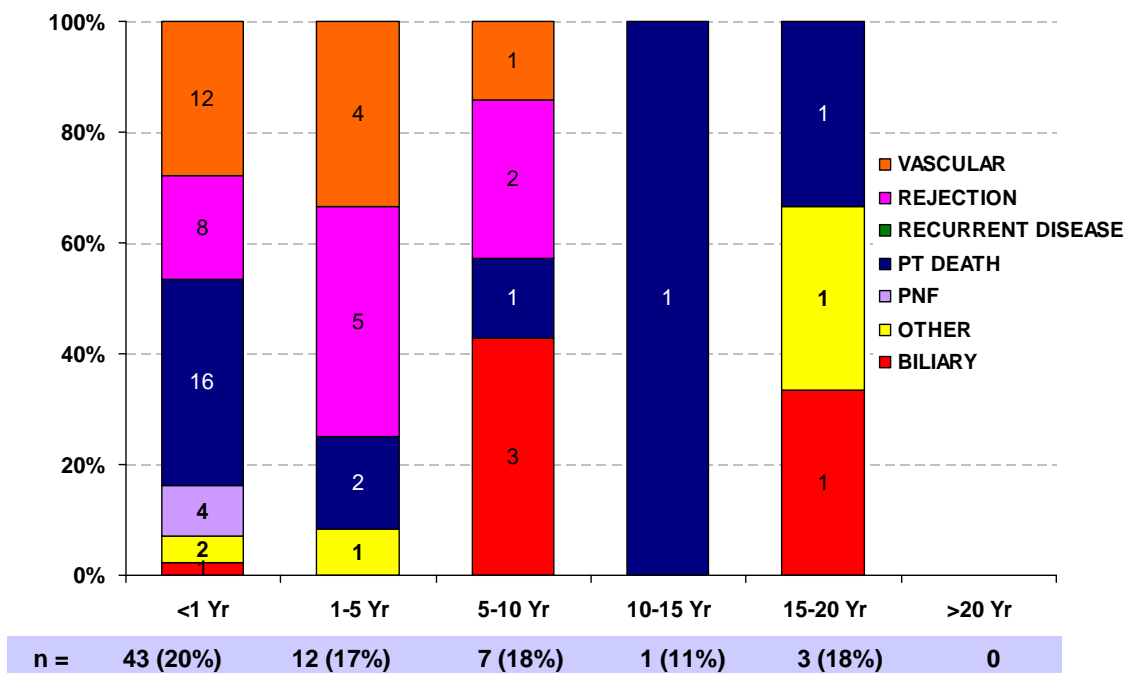
n = 329 (38% of all adults grafts)



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Cause of Graft Failure by Time - Children

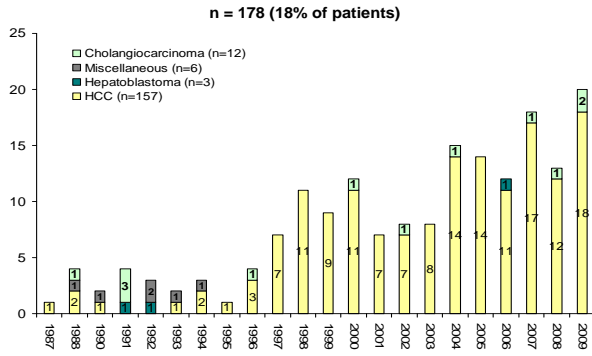
n = 66 (31% of grafts)



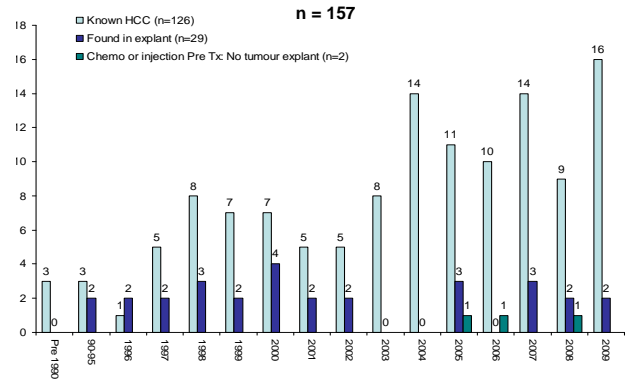
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Cancer aND transplantation

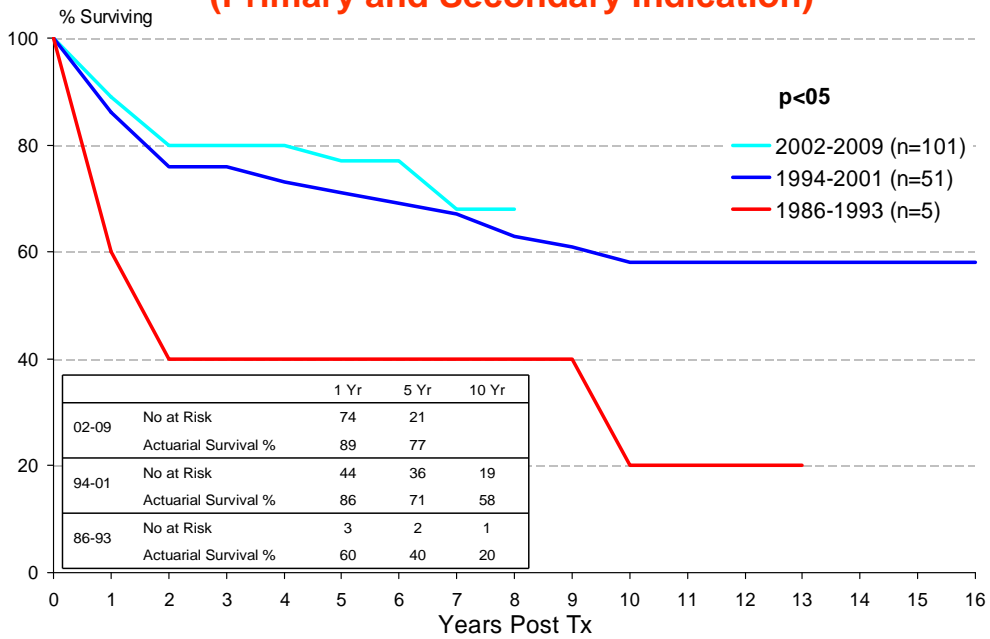
Malignancy at Transplantation



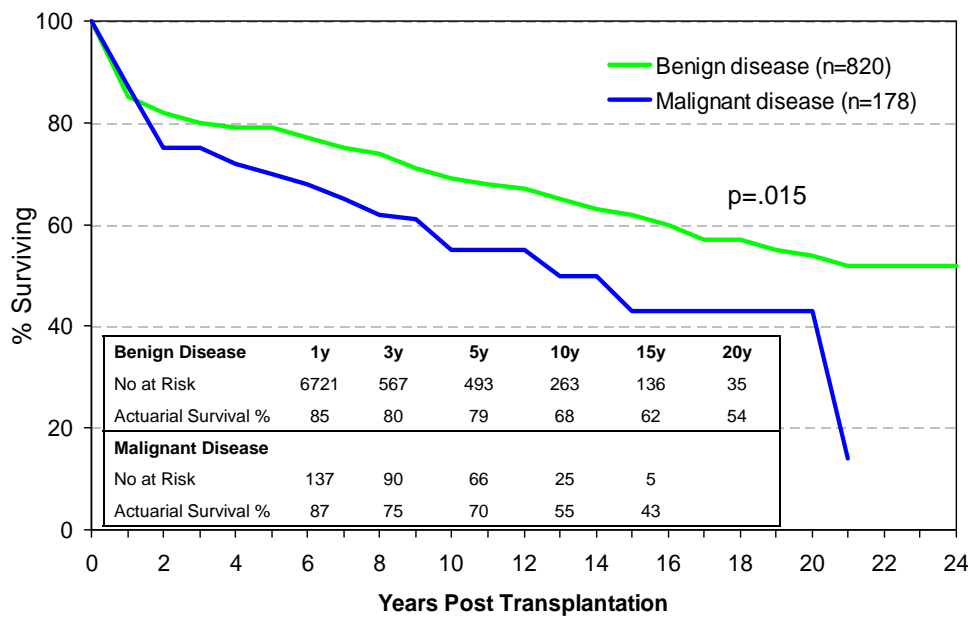
HCC at Transplantation



HCC vs Era (Primary and Secondary Indication)



Benign Disease vs Malignancy



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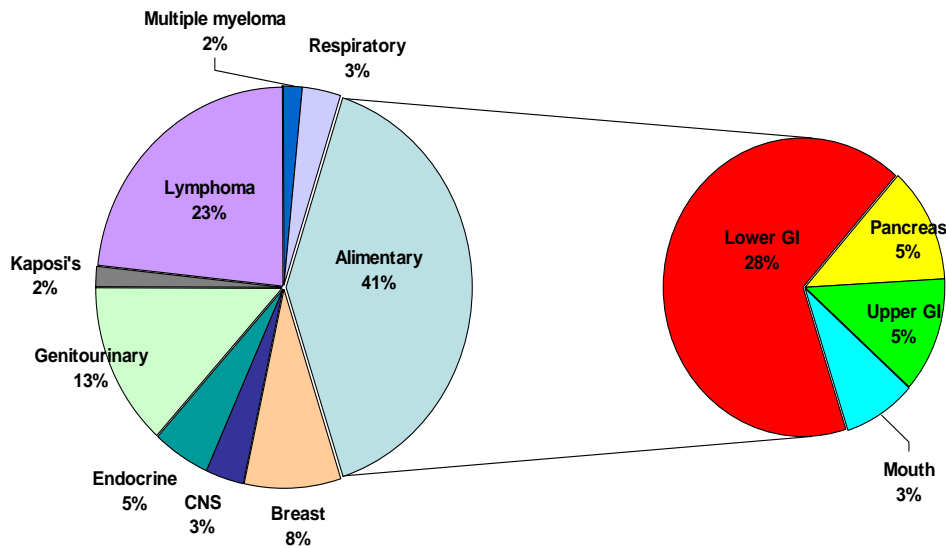
De Novo Non Skin Cancer

	No	Male	Female	Age of pts (yrs)	Time to diagnosis (mths)	Died of This Cancer	Died Other
Alimentary	24	16	8	13 – 78 (m 58)	10 -217 (m 77)	15 (63%)	3
Lymphoma	14	8	6	1.5 – 70 (m 41)	4 – 183 (m 67)	4 (29%)	3
Kaposi's	1	1	0	32	48	0	0
Genitourinary	8	6	2	39 – 74 (m 54)	2.3 – 193 (m 37)	2 (25%)	1
Breast	5	0	5	30 – 51 (m 44)	50 – 241 (m 95)	2 (40%)	0
Endocrine	3	1	2	36 – 70 (m 63)	47 – 145 (m 99)	1 (33%)	0
Respiratory	2	2	0	29-46 (m 37)	34 - 170 (m 102)	2 (100%)	0
CNS	2	1	1	66 – 75 (m 70)	14 – 93 (m=53)	2 (100%)	0
Multiple Myeloma	1	0	1	67	5.6	0	0
Total	60	35	25	1.5 - 78 (m 55)	2.3 - 241 (m 73)	28 (47%)	7

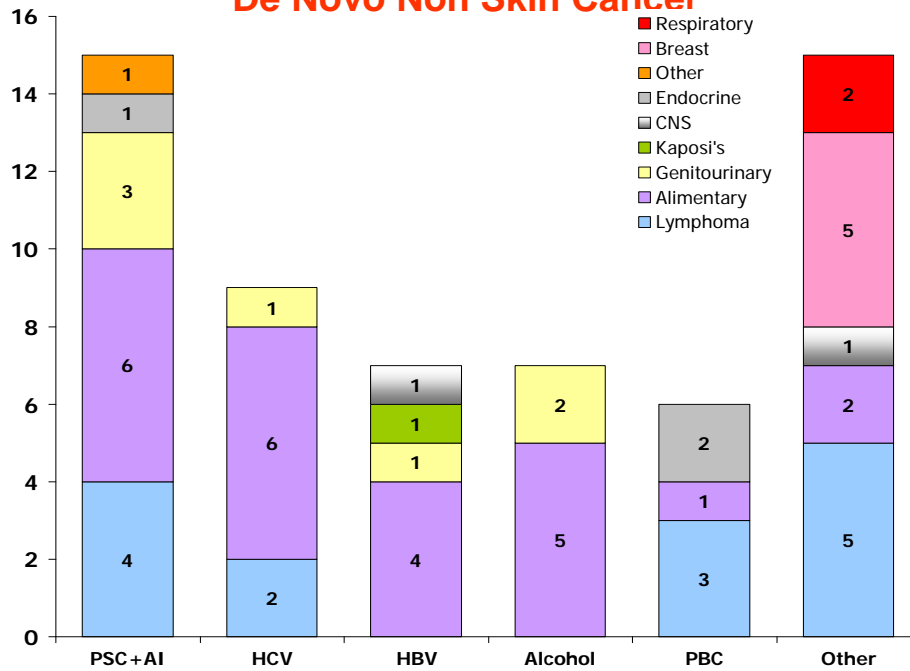
NB: m = median

De Novo Non Skin Cancer

n=60 (6% pts transplanted)



Pre Transplant Liver Disease and De Novo Non Skin Cancer



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Cumulative Risk of Diagnosis of Cancer Following Liver Tx. 1986 - 2009

