

# Liver Transplantation

at

## Australian National Liver Transplantation Unit

Data to 31 December 2008



*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 2008, 56 new and 3 secondary orthotopic liver transplant procedures were performed within the ANLTU (11 – Paediatric; 45 – 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.

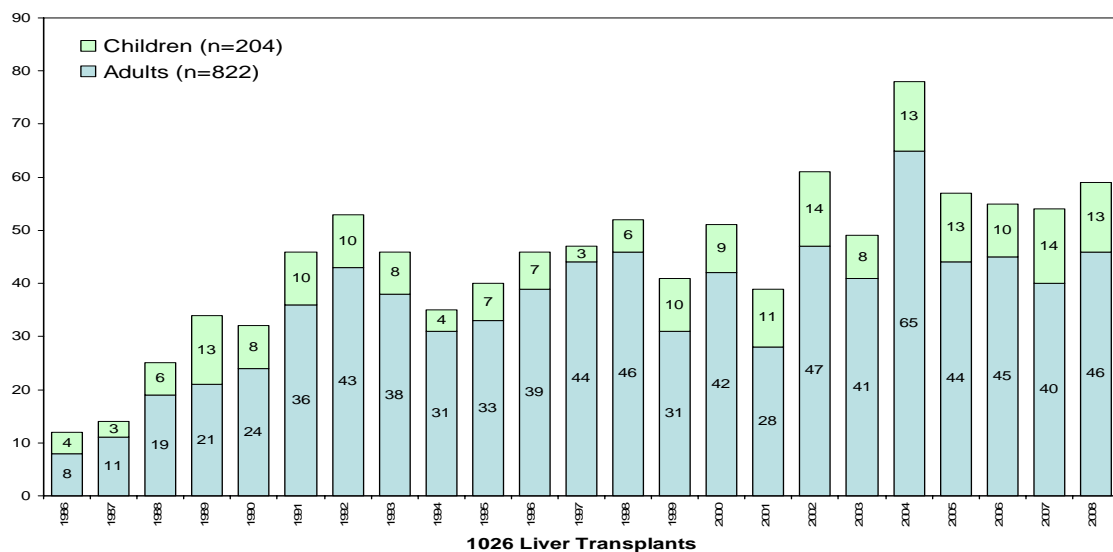
Professor Geoff McCaughan  
Dr Deborah Verran  
Pamela Dilworth  
Patrick Tang  
Carol Tse

# Summary

There are several key issues to report

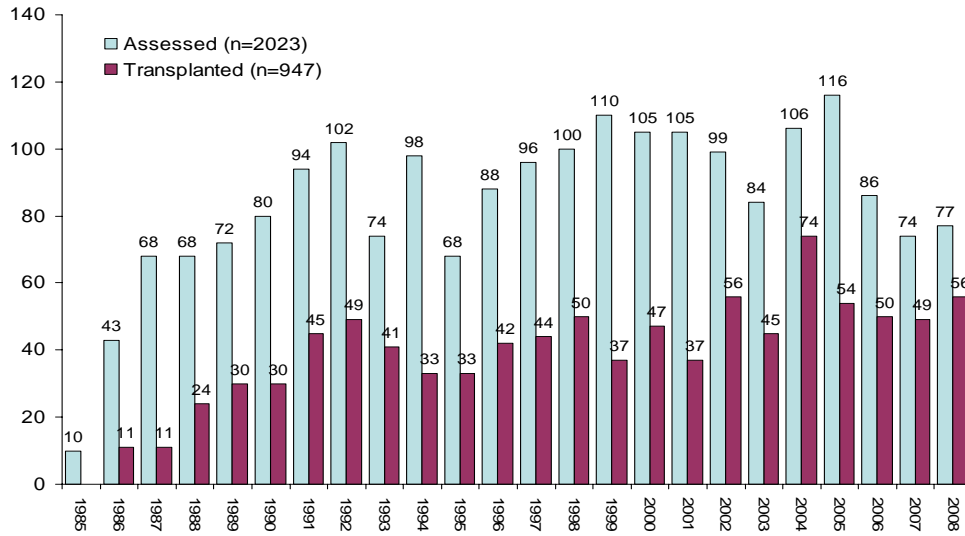
1. From January 1986 to December 2008, 1026 liver transplants were performed on 947 patients, of which 769 and 178 recipients were adults and children, respectively.
2. The number of transplants per year continues to be related to the deceased donor rate.
3. In 2008, three (3) paediatric live donor liver transplants were performed.
4. In 2008, 32 patients (23%), the highest number ever, on the waiting list were subsequently withdrawn due to advanced and/or extra-hepatic disease. Five (3.5%) patients improved whilst on the waiting list. During this period, there were 59 liver transplantation operations, in which 56 patients had 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. HCV infection was present in 26% of adults recipients since 1986.
8. The overall patient survival rates over the past 2 years was 97% at one year.

## Australian National Liver Transplantation Unit

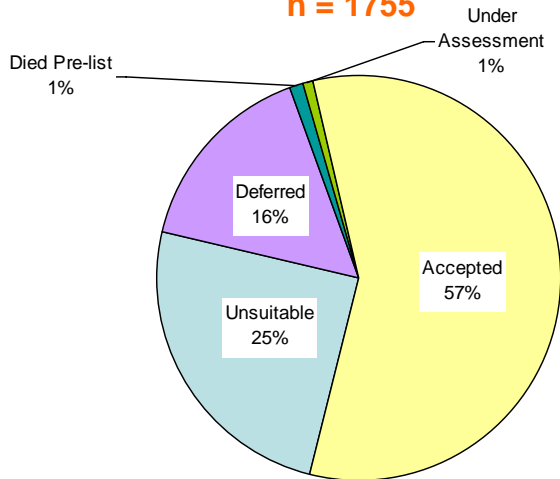


# ***ASSESSMENT INFORMATION***

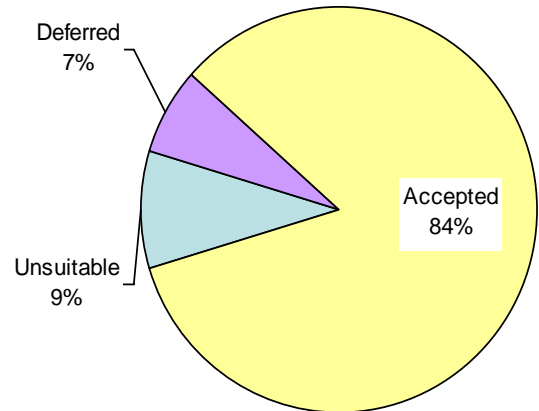
### Assessments and Transplant Operations



### Allocation of Assessed Adults n = 1755

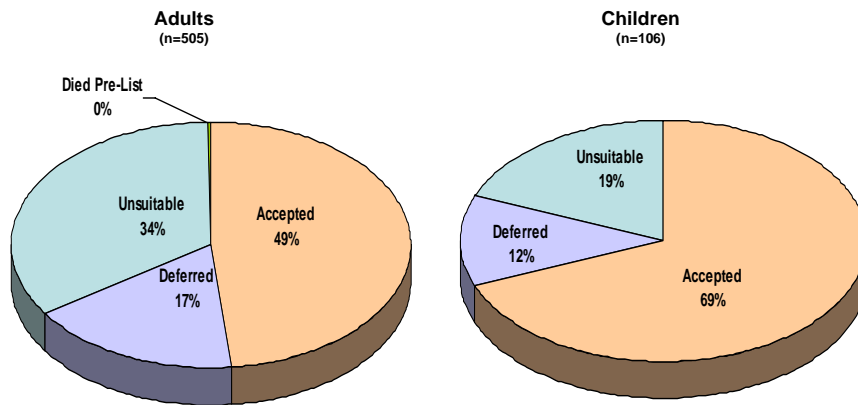


### Allocation of Assessed Children n = 268

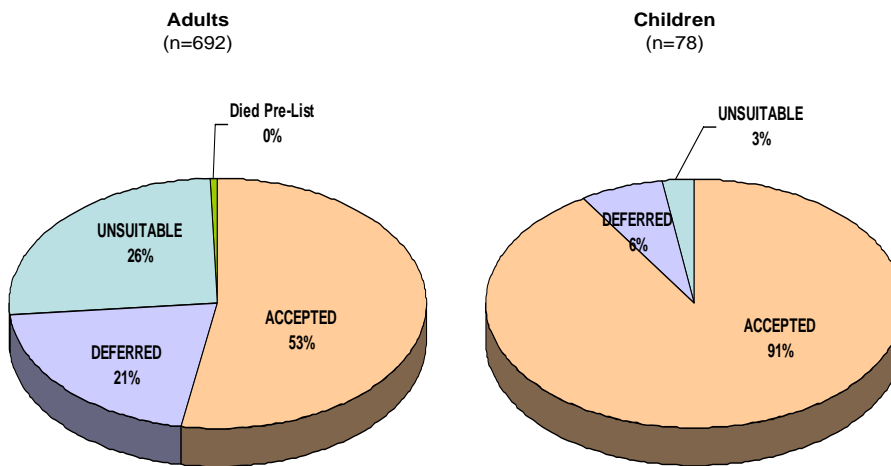


## Comparison Over Time of Patients Assessed

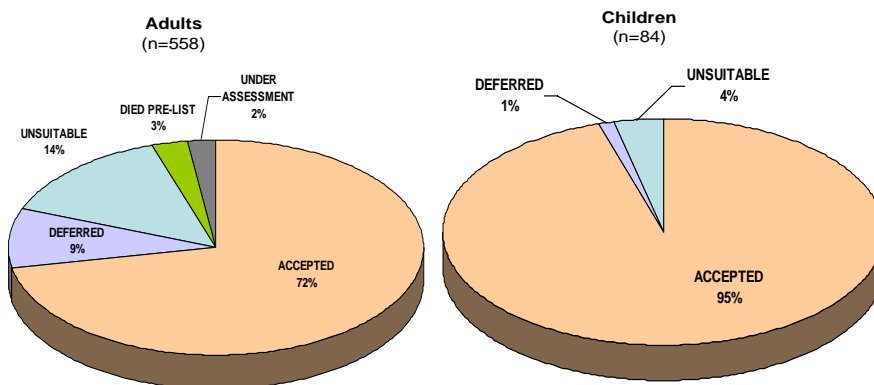
1986 - 1993



1994 - 2001



2002 - 2008



Adult patient acceptance rate has increased from 53% in the period of 1994 - 2001 to 72% in 2002-2008.

Children patient acceptance rate has increased from 91% in the period of 1994 – 2001 to 95% in 2002 -2008.

## Patients Considered Unsuitable for Transplantation (1755 Adults have been assessed since 1985)

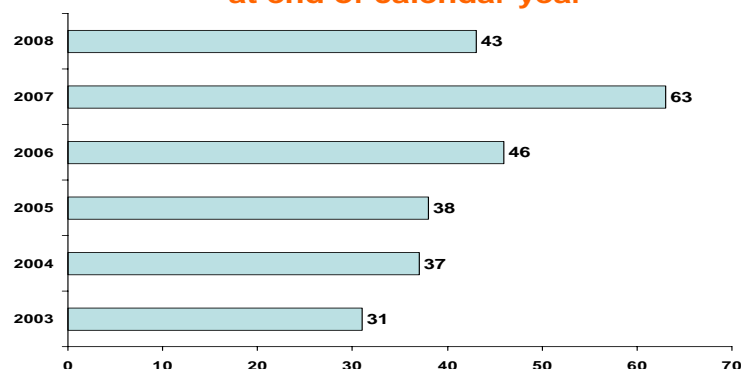
Reason	Adults	
Too Advanced + extrahepatic disease	156	(36%)
Tumour (extra-hepatic spread)	68	(16%)
Psychological	59	(14%)
Good Prognosis	62	(14%)
Alcohol	55	(13%)
Patient's (parent's) wish	20	(5%)
Age	4	(1%)
Alternative therapy	7	(2%)
Logistics	1	
<b>Total</b>	<b>432</b>	<b>(25%)</b>

### Waiting List Activity

Year		Listed at Start of Year	New Listings	Tot alt	Transplanted	Died Pre Tx	Withdrawn		Total Withdrawal 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	

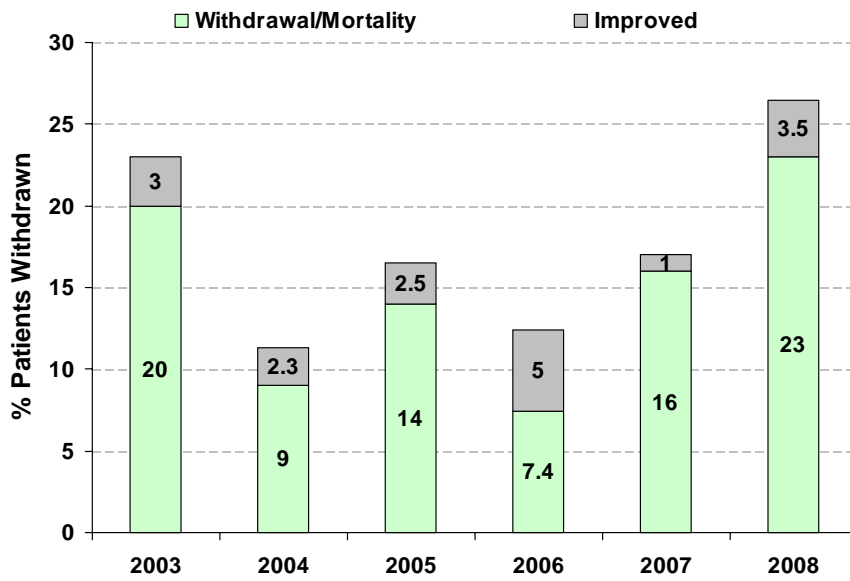
- Advanced and/or extra-hepatic disease

### Patients on Waiting List at end of calendar year





### % Patients Withdrawn from Waiting List



### No of Patients Withdrawn from Waiting List

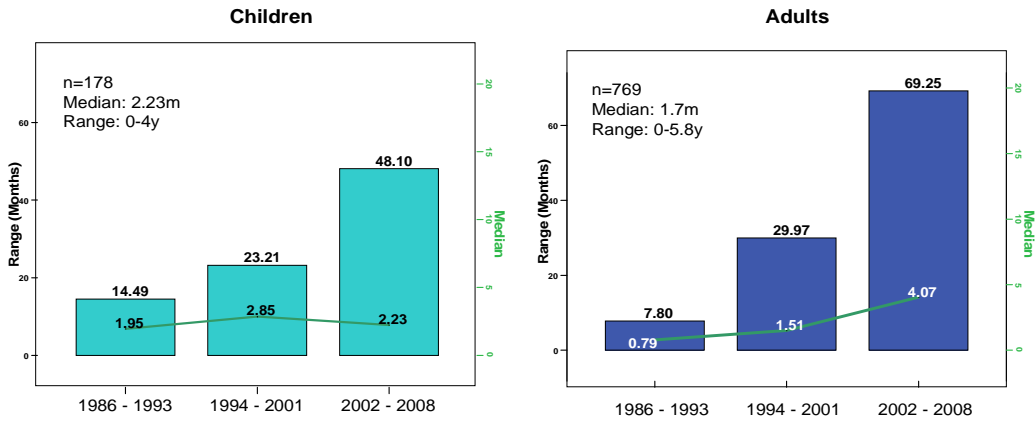


### Urgent Listings 2008

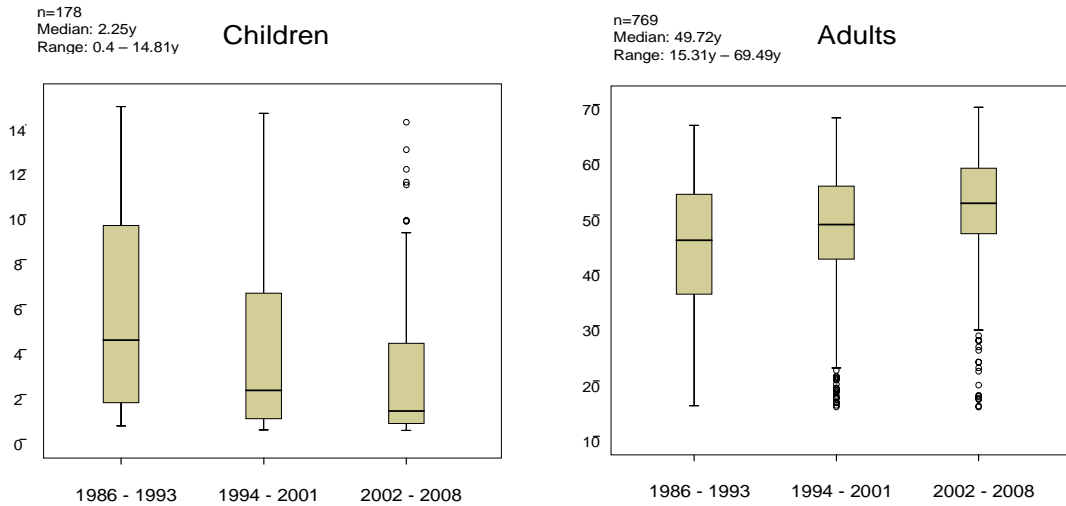
<b>Number of patients listed as URGENT</b>	<b>9</b>
Transplanted	4
Died on Waiting List	3
Improved - withdrawn	2

## Age, Sex and Waiting time of Transplant Recipients (Primary Grafts)

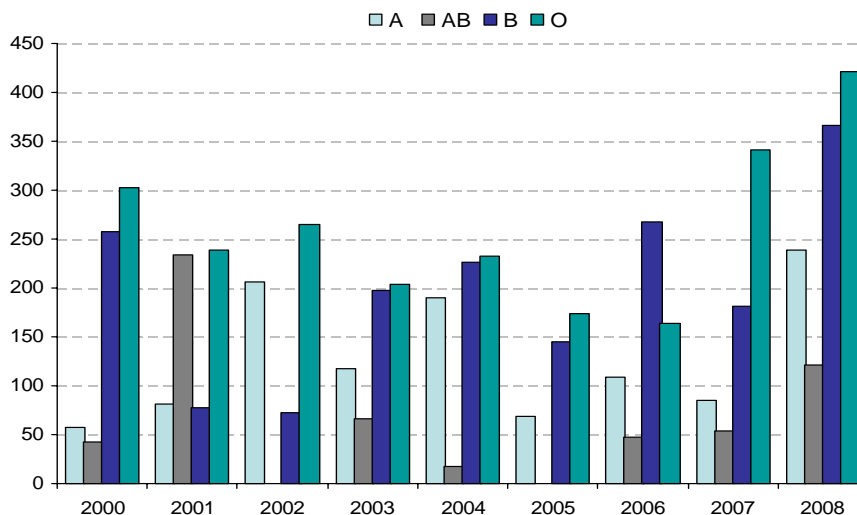
### Waiting time of Transplant Recipients (Primary Grafts)



### Age of Transplant Recipients (Primary Grafts)



### Adult Mean Days Waiting for Primary Liver Transplantation vs ABO (2000-2008)



# ***DONOR INFORMATION***

## 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
<b>TOTAL</b>		<b>12</b>

## Deceased Donor Offers

Donor Type	State	1986-1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
<b>BDD</b>	ACT	43	5	4	6	5	6	7	4	2	3	<b>85</b>
	NSW	800	62	53	52	47	66	44	48	45	47	<b>1264</b>
	NT	11	1	3		1	1		1		2	<b>20</b>
	NZ	194	7	2	3	4	5	4	7	2	4	<b>232</b>
	QLD	160	3	9	7	9	5	4	2	8	10	<b>217</b>
	SA	115	9	11	13	5	13	3	5	6	6	<b>186</b>
	TAS	19			3				2	1	3	<b>28</b>
	VIC	227	6	6	8	7	8	8	6	5	12	<b>293</b>
WA	54	7	4	3	4	7	5	4	3	2	<b>93</b>	
<b>DCD</b>	NSW									6	16	<b>22</b>
<b>Total</b>		<b>1623</b>	<b>100</b>	<b>92</b>	<b>95</b>	<b>82</b>	<b>111</b>	<b>75</b>	<b>79</b>	<b>78</b>	<b>105</b>	<b>2440</b>
<b>Used</b>		<b>522</b>	<b>50</b>	<b>39</b>	<b>57</b>	<b>43</b>	<b>68</b>	<b>52</b>	<b>48</b>	<b>43</b>	<b>49</b>	<b>971</b>

## BDD Donor Offers Refused 2008

	Refused at Offer	Refused at Hepatectomy
Abnormal LFT's	2	
Known liver disease	1	
Logistics	4	
Not suitable for designated recipient	10	
Offer waived	4	
Preservation injury		1
Steatosis	2	8
Unsuitable donor	7	3
<b>TOTAL</b>	<b>30</b>	<b>12</b>

## DCD Donor Offers Refused 2008

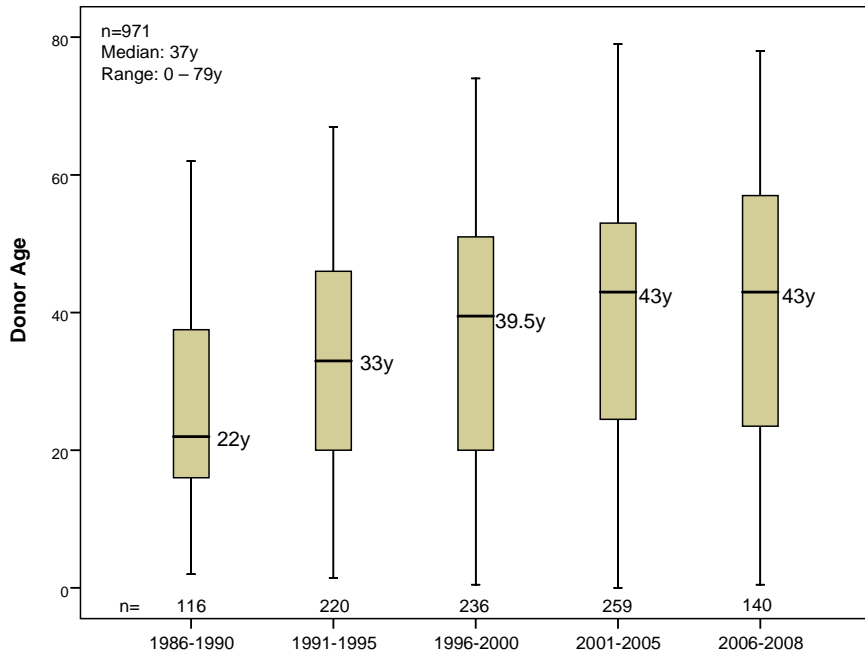
	Refused at Offer	Refused at Hepatectomy
Abnormal LFT's	2	
Did not proceed to hepatectomy	4	
Logistics		1
Outside DCD acceptance criteria	6	
Perfusion failure		1
<b>TOTAL</b>	<b>12</b>	<b>2</b>

## Allocation of Accepted and Used Deceased Donor Livers – 2008

1st Recipient Allocation		Total
<b>BD D</b>	Alternative patient selected due to logistical constraints	1
	ECD liver to stable recipient	2
	Sickest	29
	Split paediatric recipient	7
	Split right lobe recipient (size/blood group match)	1
	Tumour	1
	Urgent Category 1	1
	Urgent Category 2	5
<b>DC D</b>	ECD liver to stable recipient	2
<b>Total</b>		<b>49</b>

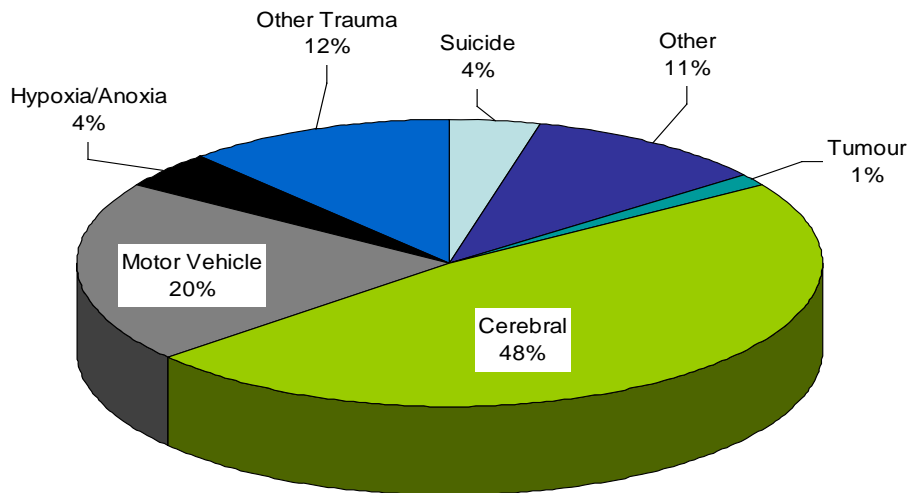
2nd Recipient Allocation		Total
<b>BD D</b>	Split right lobe recipient (size/blood group match)	7
<b>Total</b>		<b>7</b>

### Deceased Donor Age by Era



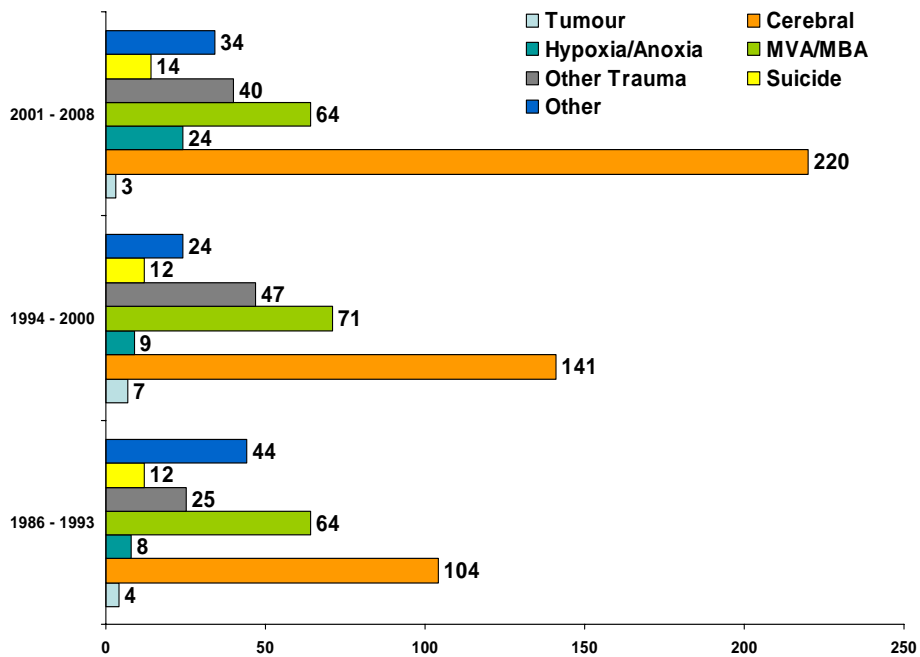
### Deceased Donor Cause of Death

(n=971)



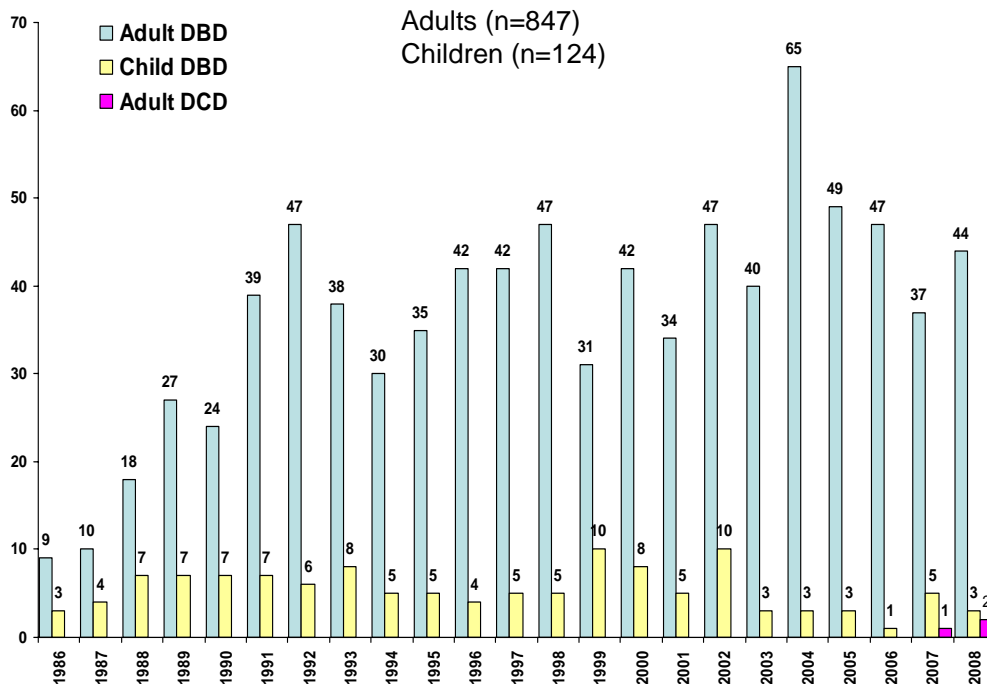
The majority of donors died due to cerebral haemorrhage (465 or 48%) and motor vehicle accident (199 or 20%).

## Deceased Donor Cause of Death by Era



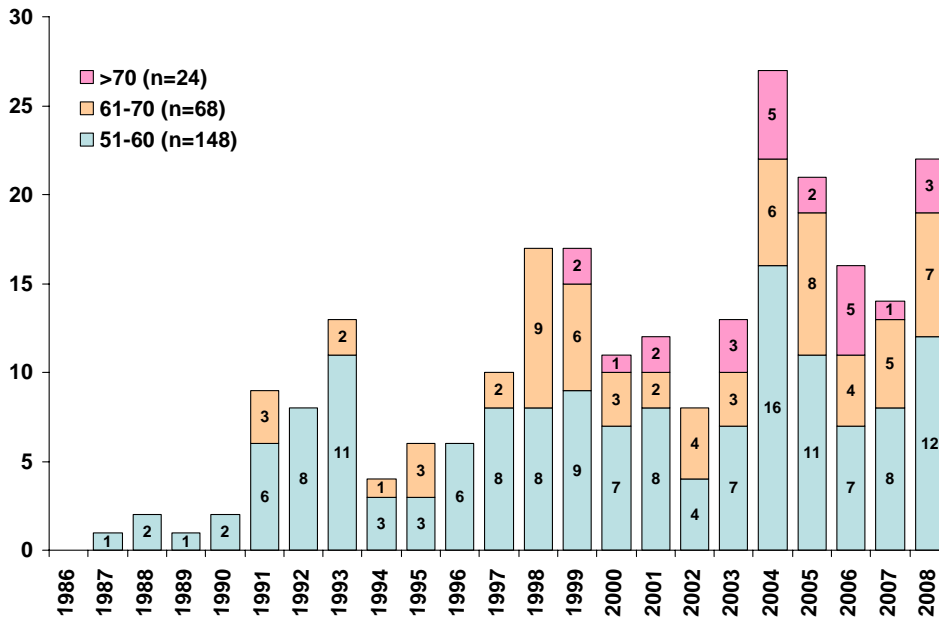
Deaths due to trauma were 34%, 38% and 26% within the above year groups, respectively. In these same time periods, deaths due to cerebrovascular disease (CVD) were 40%, 45% and 55%.

## (Deceased) Adult vs Paediatric Donors By Year



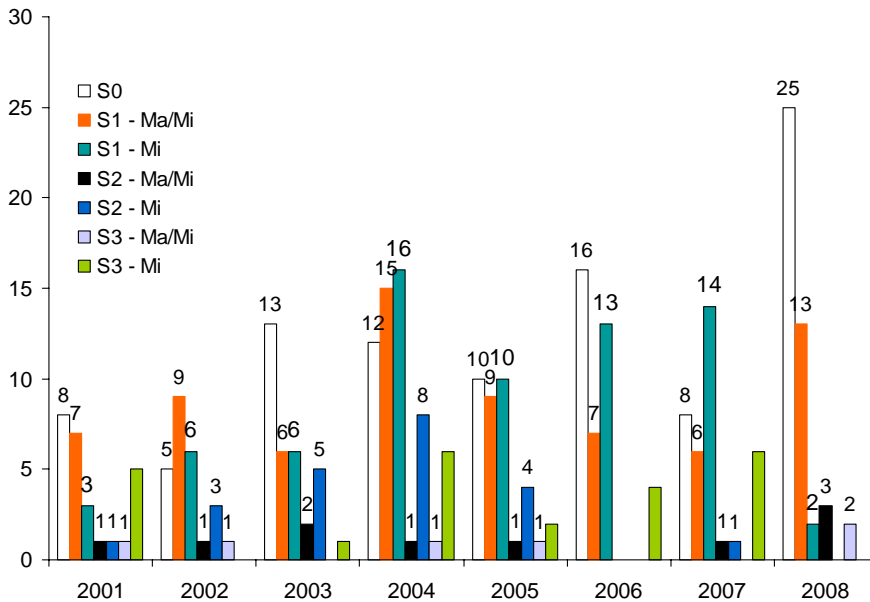
87% of liver donors were adult (>=15yrs) and 13% were children.

### Deceased Donors over 50 years (n=240)



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

### Adult Graft Steatosis 2001-2008



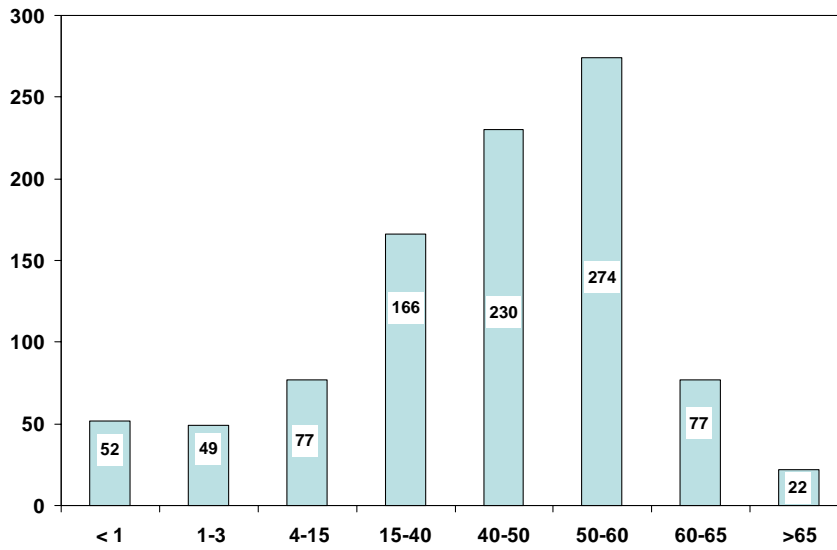
#### Steatosis Scoring:

- S0 - less than 5% steatosis in biopsy [either macro or micro]
- S1 Mi- less than 5% Macrovesicular steatosis and 5-29% microvesicular steatosis
- S2 Mi- less than 5% Macrovesicular steatosis and 30-60% microvesicular steatosis
- S3 Mi- less than 5% Macrovesicular steatosis and 60+% microvesicular steatosis
- 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



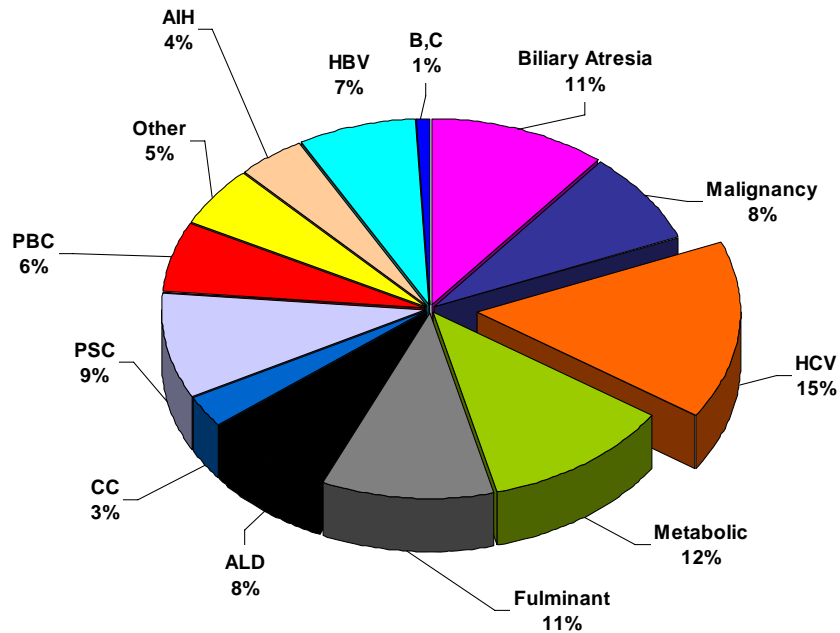
# ***RECIPIENT DEMOGRAPHICS***

### Breakdown of Patient Age at Primary Transplant n=947



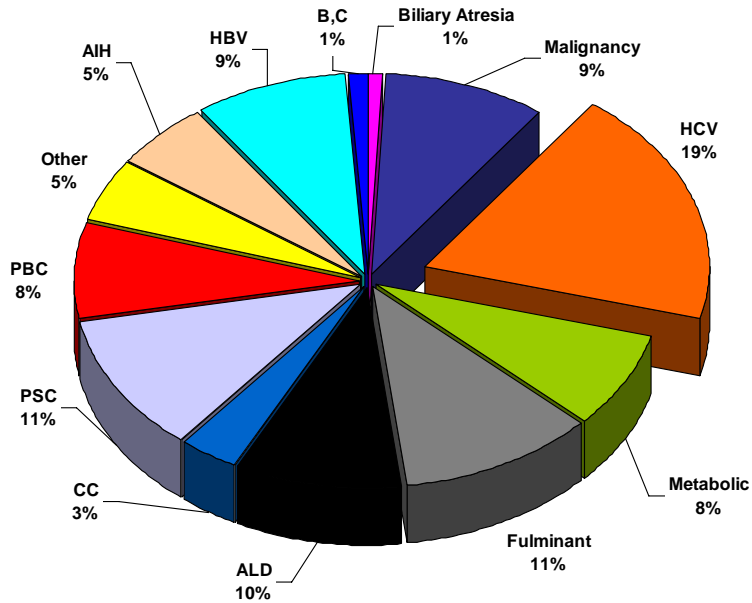
The modal group was in the age range 51-60 years (29%).

### Primary Disease – All Patients



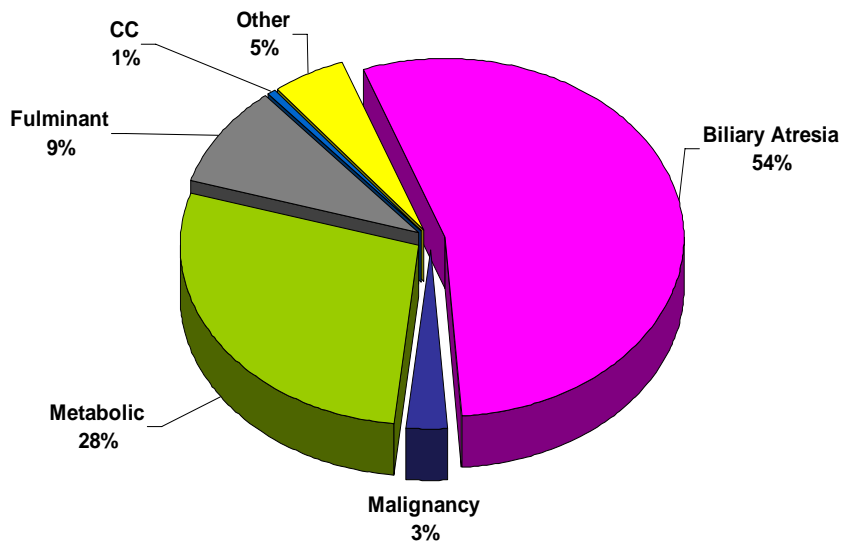
The most common indications for transplantation are Chronic Hepatitis C (148,15%), Metabolic disease (110, 12%), Biliary Atresia (103, 11%) and Fulminant Liver Failure (100, 11%).

**Primary Disease – Adults**  
n = 769



Hepatitis C was the most common indication of transplantation in adults (148, 19%), followed by Primary Sclerosing Cholangitis (PSC 87, 11%), Fulminant Hepatic Failure (84, 11%), Alcoholic Liver Disease (ALD 74, 10%) and Hepatitis B (64, 9%).

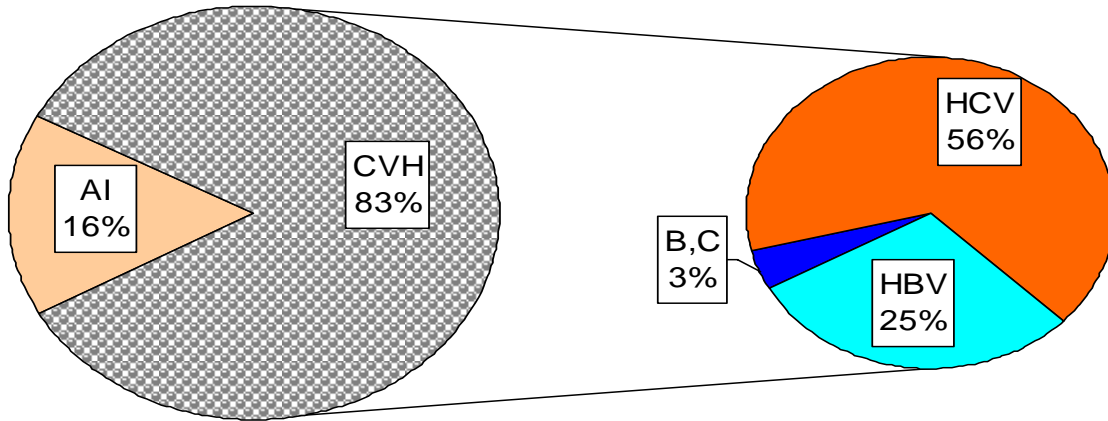
**Primary Disease – Children**  
n = 178



The most common indication for transplantation in children was Biliary Atresia (97, 54%), followed by Metabolic disease (50, 28%) and Fulminant Hepatic Failure (16, 9%).

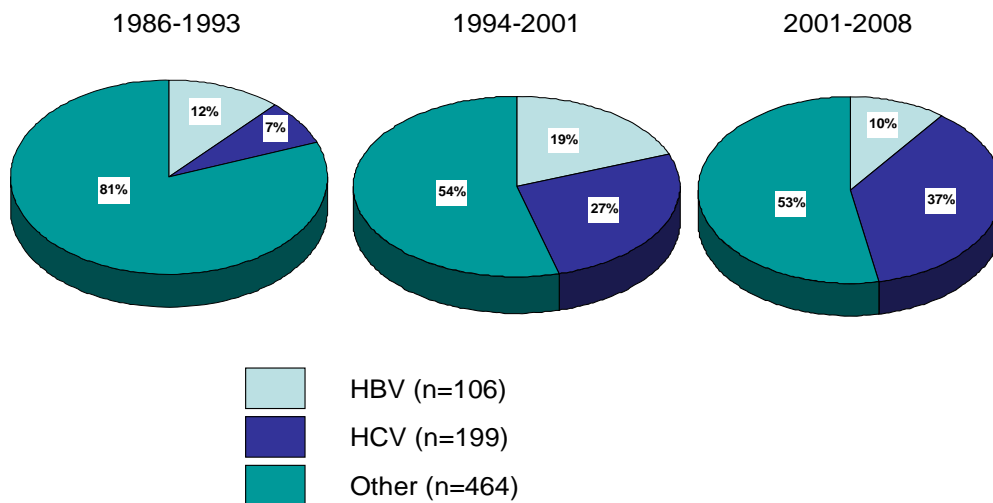
## Chronic Viral and Auto-immune Hepatitis

n = 265 (34.5% of Adults)



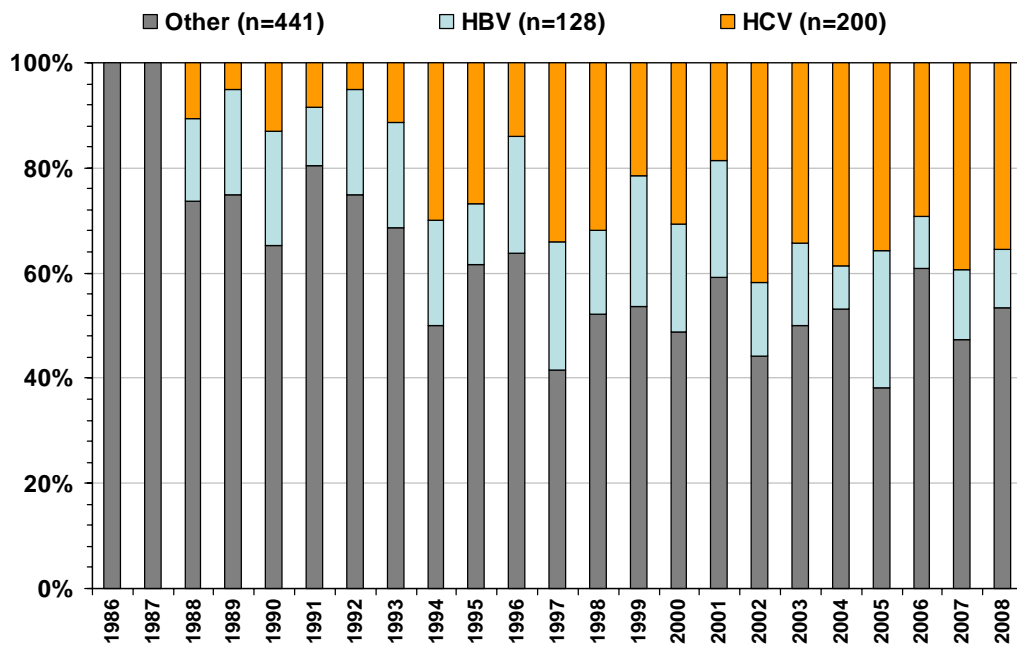
Autoimmune hepatitis (AI) comprised 16% of cases, the remainder (83%) being viral in origin (CVH). Of the cases of viral hepatitis, the most common is Hepatitis C (HCV) (56%), followed by Hepatitis B (HBV) (25%) and HBV/HCV co-infection (3%).

### Chronic Viral Hepatitis (Primary and Secondary) in Adult Patients by Era



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

## % Adults with HBV or HCV at Transplantation

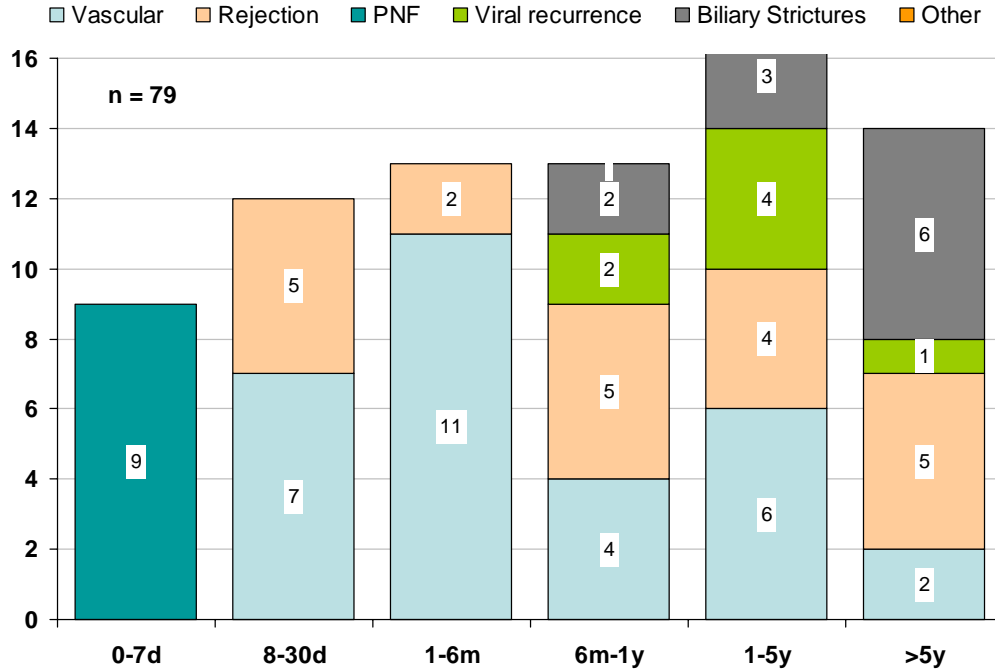


HCV infection comprises 25% of adults transplanted, and is expected to continue to rise in the future.

## Fulminant Hepatic Failure Treated by Liver Transplantation

Aetiology	No. of Patients	No. of Tx	Outcome	
			Alive	Dead
<b>Idiopathic</b>	43	46	30 (70%)	13
<b>Drug induced</b>	15	16	10 (67%)	5
<b>Wilson's Disease</b>	11	13	10 (91%)	1
<b>Viral Hepatitis</b>				
Hep B	22	23	12 (55%)	10
Hep C	1	1	1 (100%)	0
Hep A	3	3	0	3
Hep E	1	1	0	1
<b>Auto Immune Hepatitis</b>	2	2	1 (50%)	1
<b>Budd-chiari</b>	1	1	0 (0%)	1
<b>Other</b>	1	1	1 (100%)	0
<b>Totals</b>	<b>100</b>	<b>107</b>	<b>65</b> 65% Pts	<b>35</b> 35% Pts

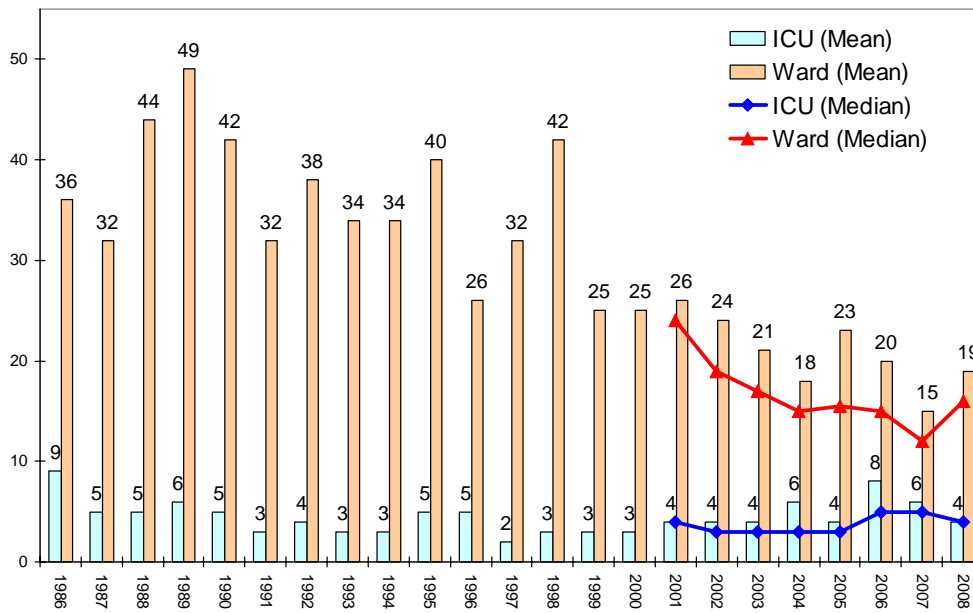
## Indication for Secondary Transplantation



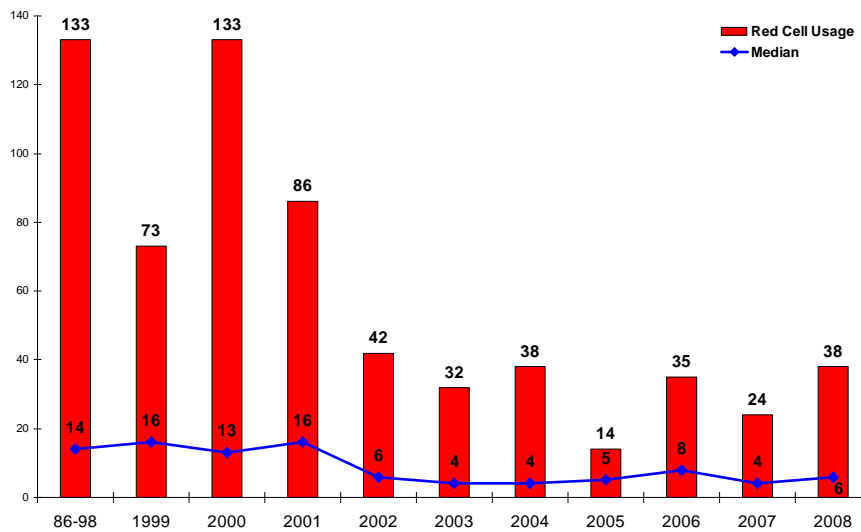
Primary non function (PNF) is the sole indication for re-transplantation in the first 7 days. Rejection and vascular indications are prominent indications for re-transplantation in all other time periods.

# ***PERIOPERATIVE DATA***

### Mean/Median Hospital Stay (days) Adults Only



### Red Cell Usage (Units of Packed Cells)

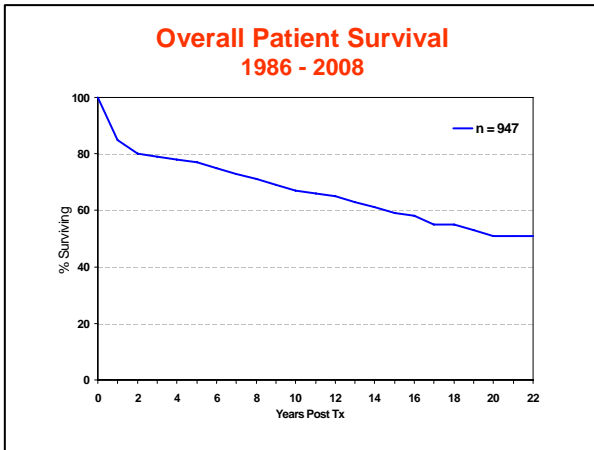


### Graft Ischaemic Time, Operation Duration and Red Cell Utilisation

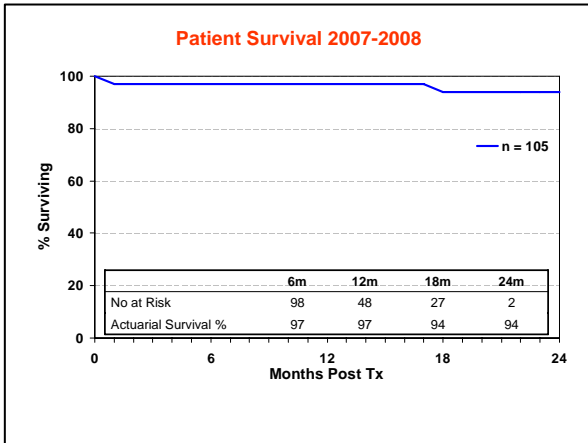
	1986 - 1993	1994 - 2000	2000 - 2008
Mean graft ischaemic time	9Hrs 4 Mins	9Hrs 35 Mins	9Hrs 4 Mins
Mean operation duration	7Hrs 49 Mins	8Hrs 26 Mins	6Hrs 40 Mins
No. packed cells utilised	1 - 133 Mean 20 / Median 15	2 - 133 Mean 21 / Median 17	0 - 86 Mean 7 / Median 4



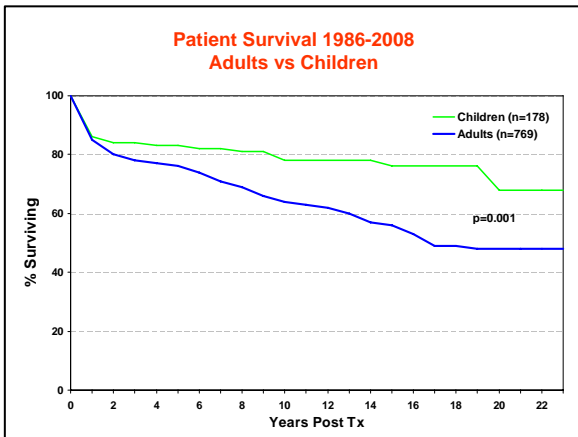
# ***OUTCOME DATA***



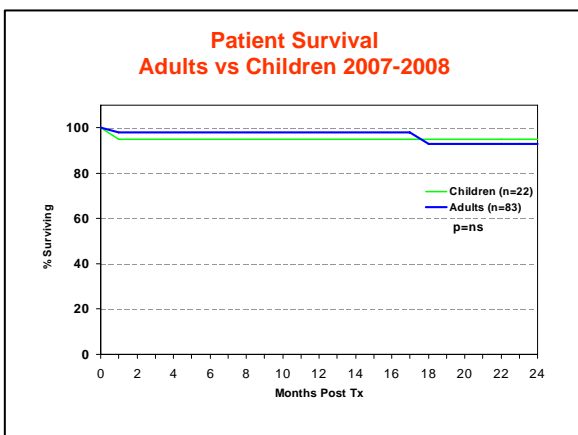
	1y	5y	10y	15y	20y
No at Risk	755	497	262	124	16
Actuarial Survival %	85	77	67	59	51



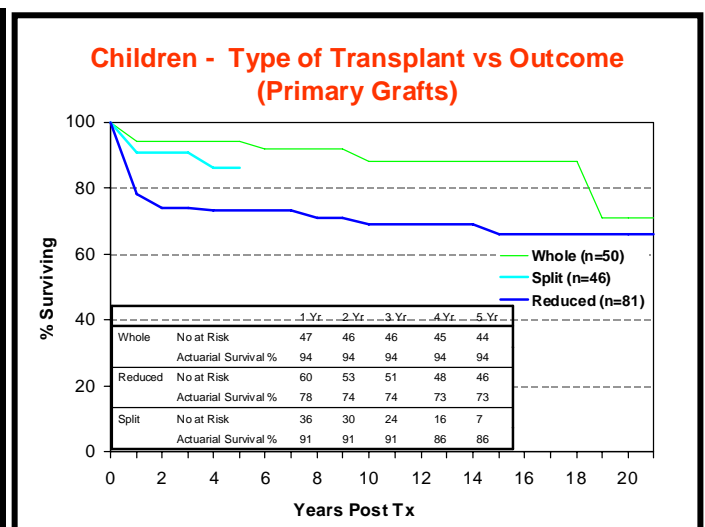
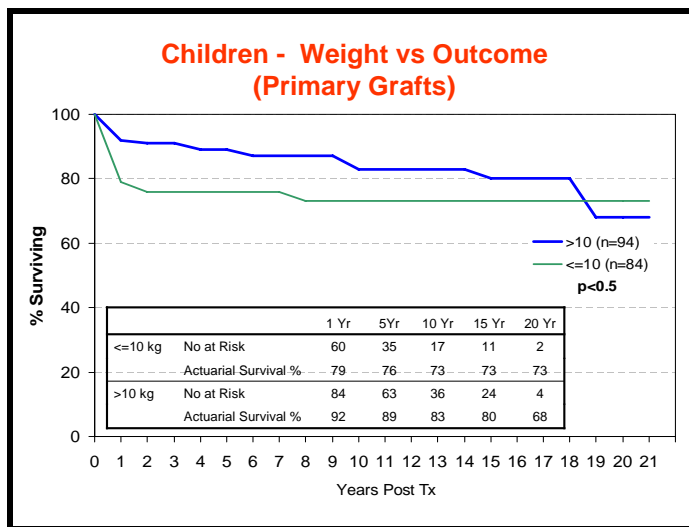
	6m	12m	18m	24m
No at Risk	72	48	27	2
Actuarial Survival %	97	97	94	94



		1y	5y	10y	15y	20y
Adult	No at Risk	611	399	209	89	10
	Actuarial Survival %	85	76	64	56	48
Child	No at Risk	144	98	53	35	6
	Actuarial Survival %	86	83	78	76	68



		6m	12m	18m	24m
Adult	No at Risk	58	37	19	1
	Actuarial Survival %	98	98	93	93
Child	No at Risk	14	11	8	1
	Actuarial Survival %	95	95	95	95



## Paediatric Transplants

		Survival			
		Patients (alive with these grafts)		Grafts (still function)	
<b>Reduced liver grafts*</b>	< 10 Kg	22/39	56%	19/42	46%
	> 10 Kg	28/36	78%	27/41	68%
	Subtotal	49/74	66%	46/83	57%
<b>Split liver grafts</b>	< 10 Kg	22/25	88%	22/25	90%
	> 10Kg	22/25	88%	20/28	76%
	Subtotal	44/50	88%	42/53	82%
<b>Whole liver grafts*</b>	< 10 Kg	14/15	93%	13/15	87%
	> 10 Kg	32/38	84%	30/42	73%
	Subtotal	46/53	87%	43/57	77%
<b>Living Donor Graft</b>	< 10 Kg	6/6	100%	6/6	100%
	> 10 Kg	4/5	80%	4/5	80%
	Subtotal	10/11	91%	10/11	91%
<b>TOTAL</b>		<b>144/179</b>	<b>80%</b>	<b>141/204</b>	<b>79%</b>

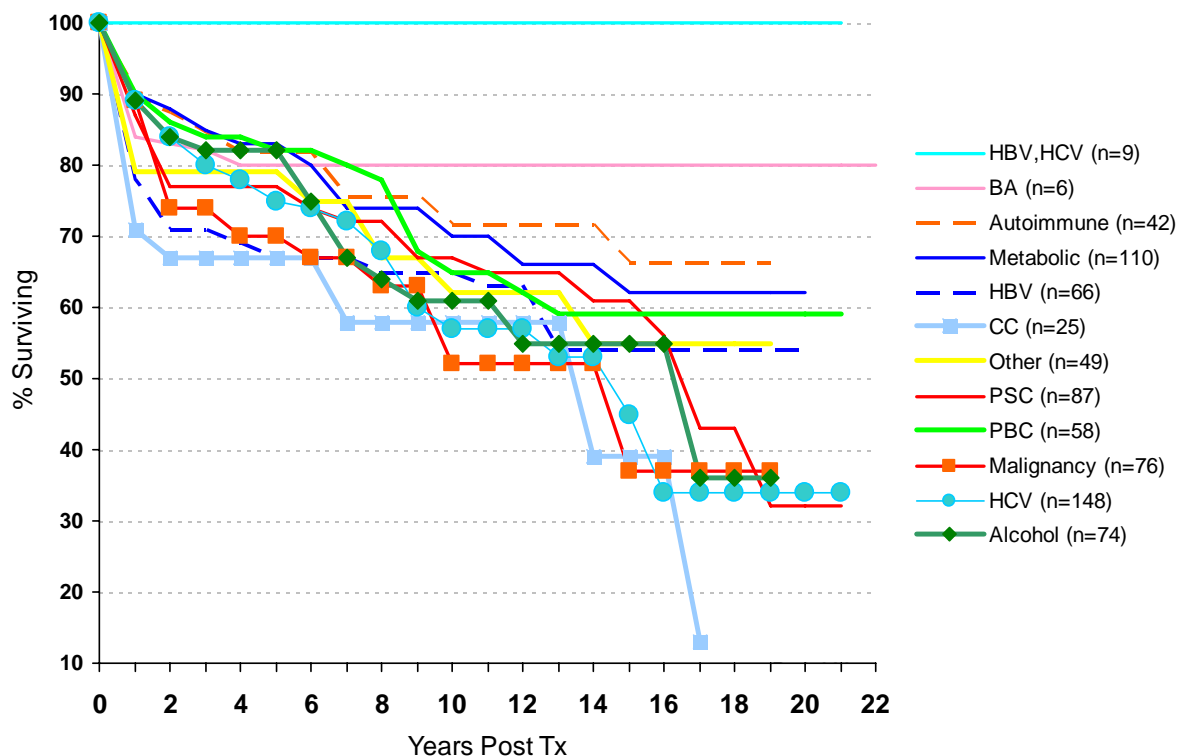
Note:

- 2 children who had failed primary whole grafts, went on to have a reduced graft
- 3 children survive with a second transplant as an adult
- 2 children survive with re-transplant in other unit

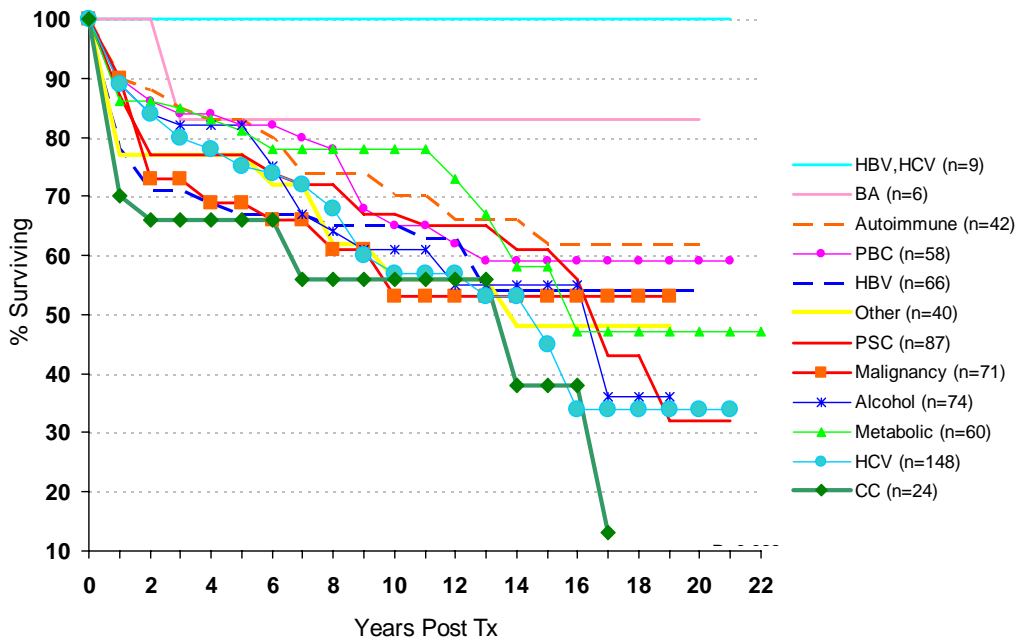
### Primary Disease and Outcome

Disease	No of patients	1 year survival %	5 year survival %	10 year survival %	15 year survival %	20 year survival %
ALCOHOLIC CIRRHOSIS	74	89	82	61	55	
BILIARY ATRESIA	103	84	80	80	80	80
AUTOIMMUNE	41	90	83	70	62	62
CHRONIC VIRAL HEPATITIS	223	86	74	64	53	
HEPATITIS B POSITIVE	66	78	67	65	54	
HEPATITIS B & C POSITIVE	9	100	100	100	100	100
HEPATITIS C POSITIVE	148	86	75	57	45	34
CRYPTOGENIC CIRRHOSIS	25	71	67	58	39	
FULMINANT HEPATIC FAILURE	100	74	72	65	59	41
MALIGNANCY	76	89	70	52	52	
METABOLIC	110	88	82	76	66	
OTHER	49	79	79	62	55	
PRIMARY SCLEROSING CHOLANGITIS	87	87	77	67	61	32
PRIMARY BILIARY CIRRHOSIS	58	90	82	65	59	
TOTAL	947	85	77	67	59	51

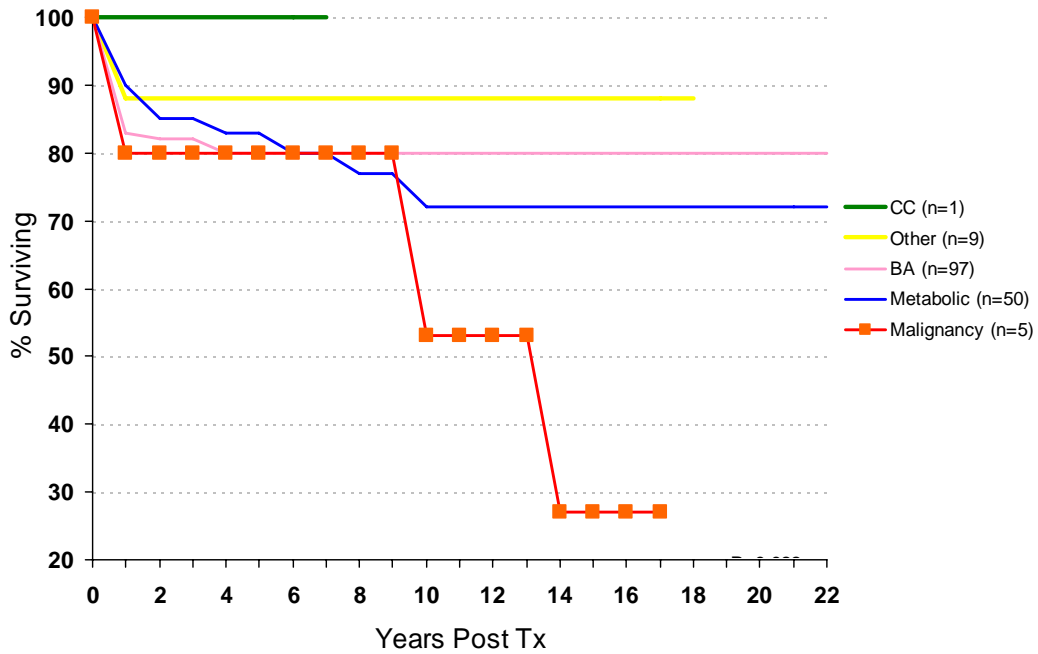
### Primary Disease vs Outcome Adults and Children



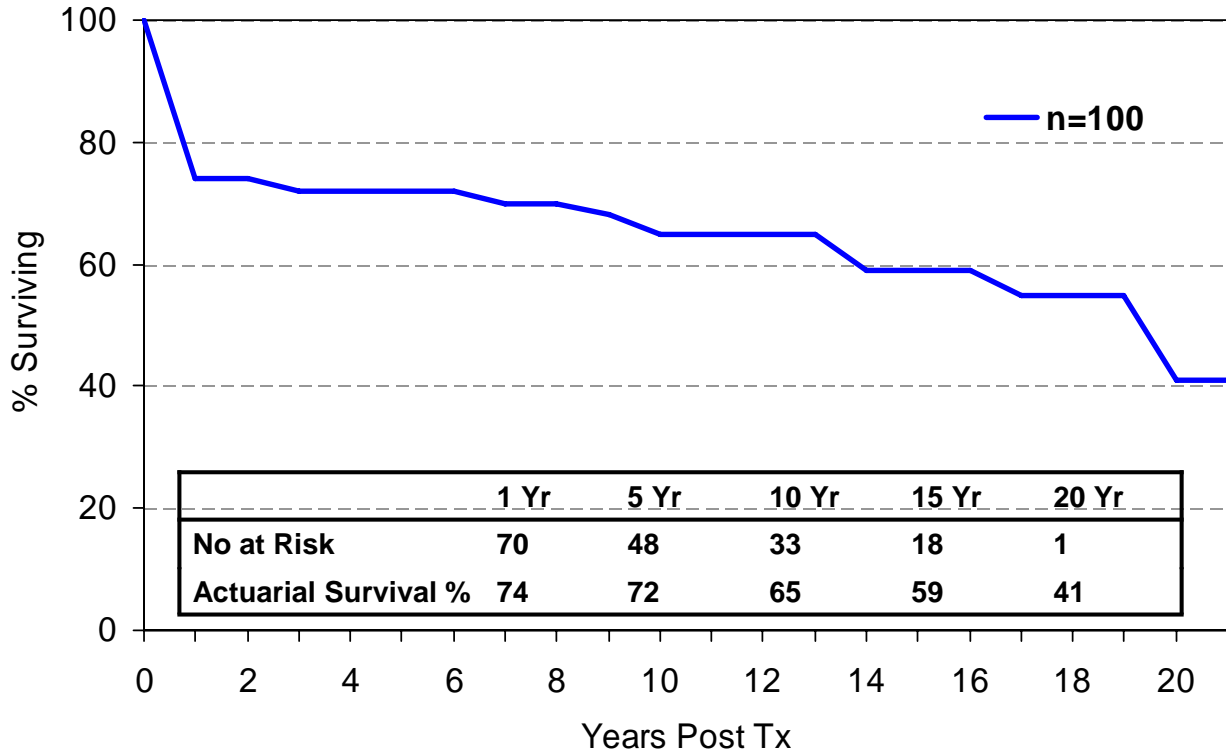
### Primary Disease vs Outcome Adults



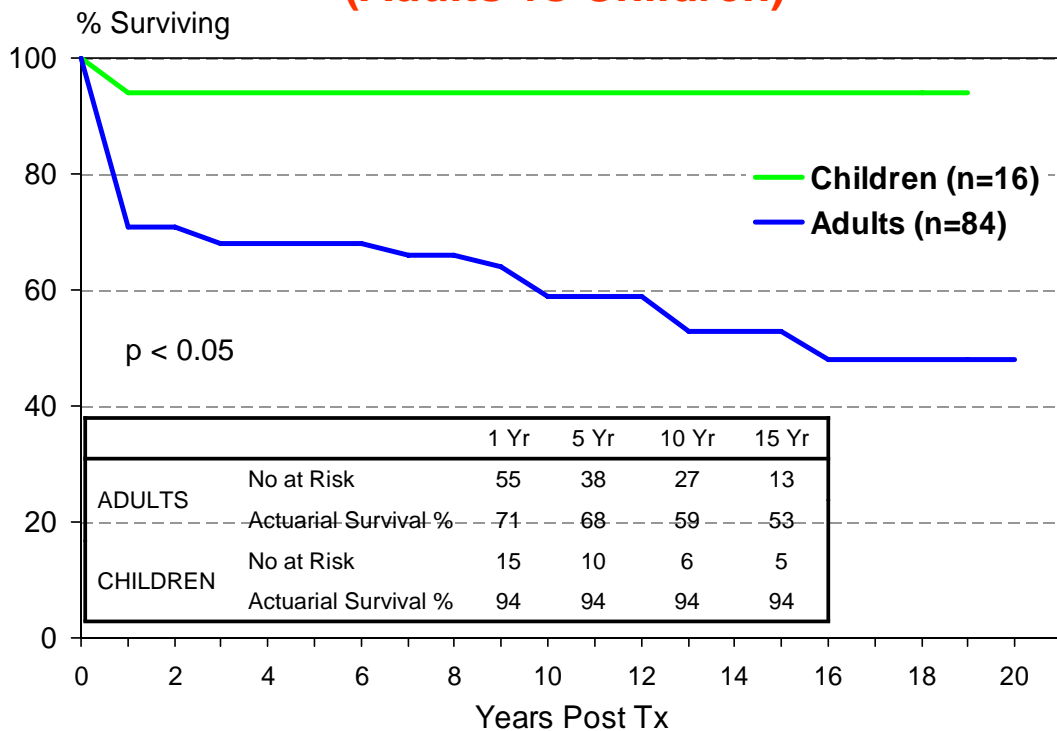
### Primary Disease vs Outcome Children



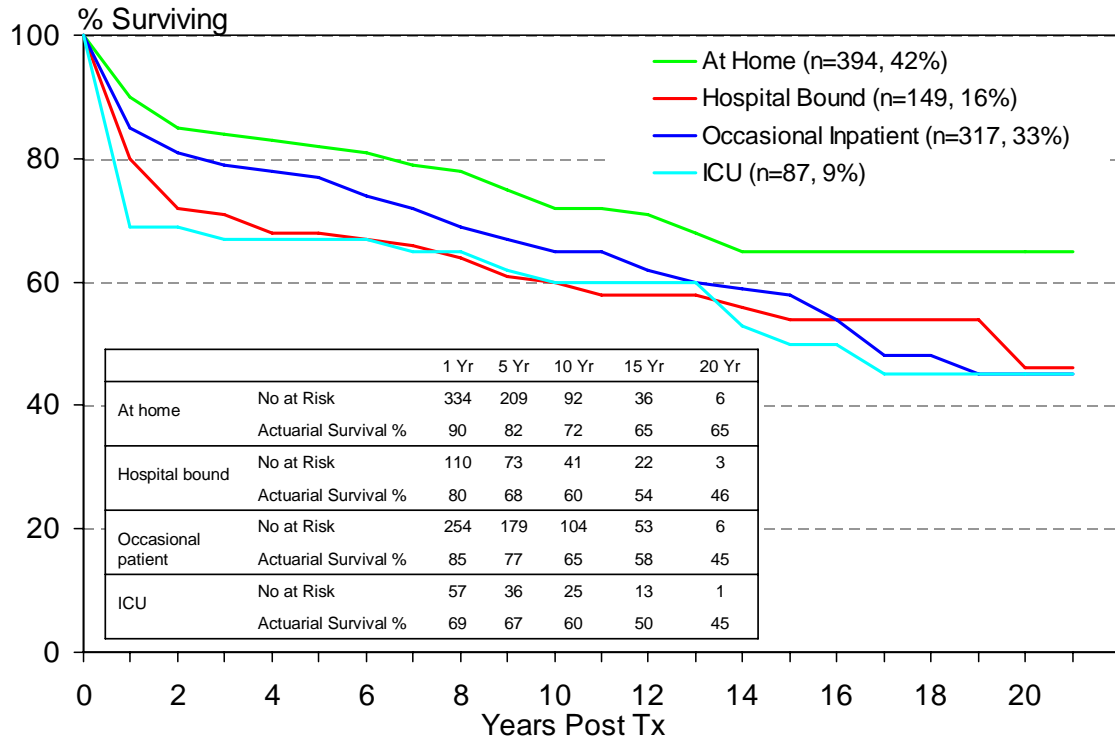
## Fulminant Disease vs Outcome (Adults and Children)



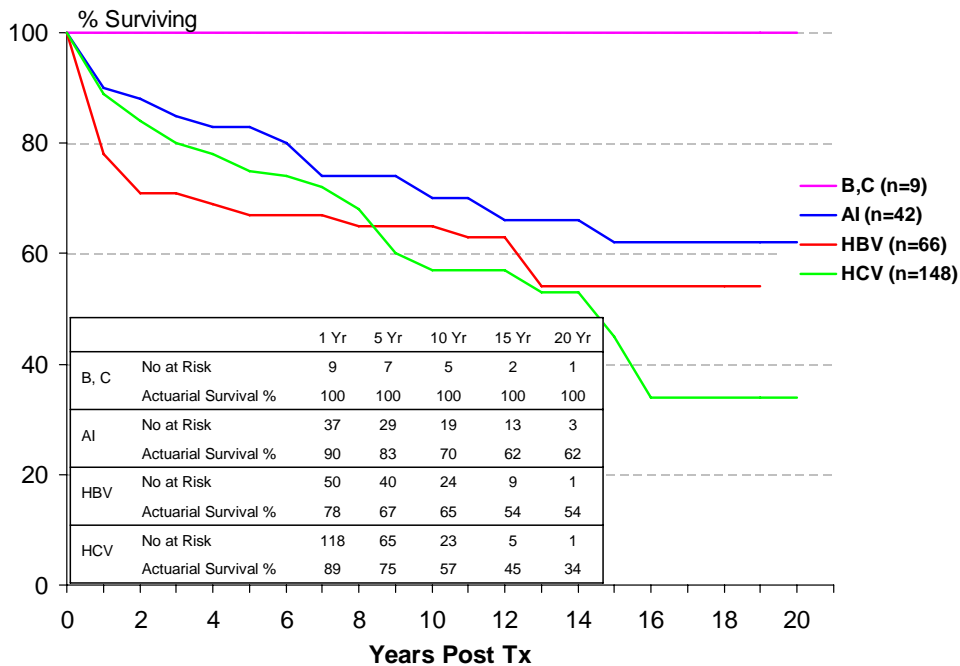
## Fulminant Disease vs Outcome (Adults vs Children)



## Status vs Outcome (Adults and Children - Primary Grafts)

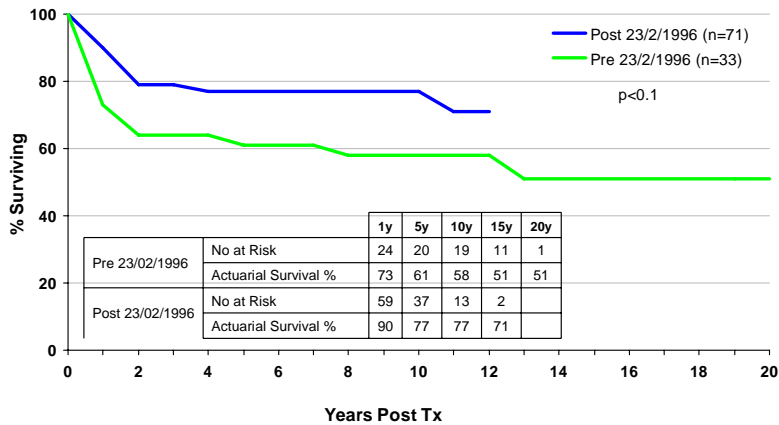


## Chronic Viral, Autoimmune Disease vs Outcome (Primary Grafts)



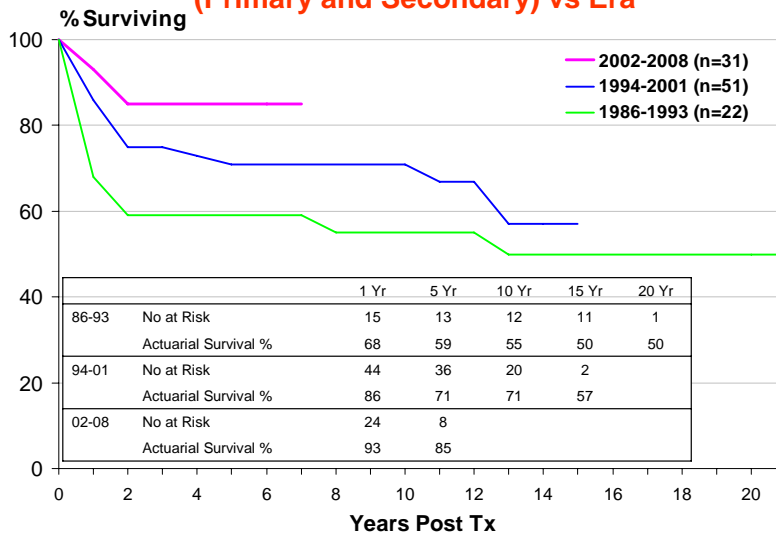
HBV/HCV co-infection demonstrated superior patient survival at 100%, as compared to HCV infection alone.

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

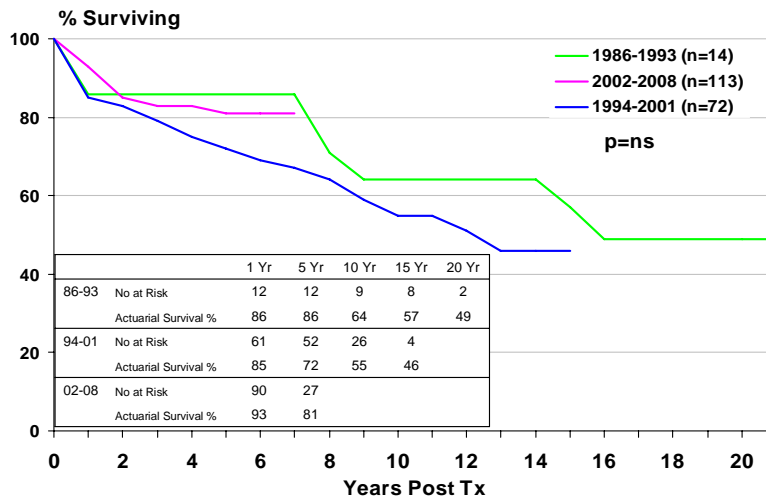


\*oral nucleos(t)ide therapy + low dose monthly IMI HBIG

### Chronic HBV (Primary and Secondary) vs Era

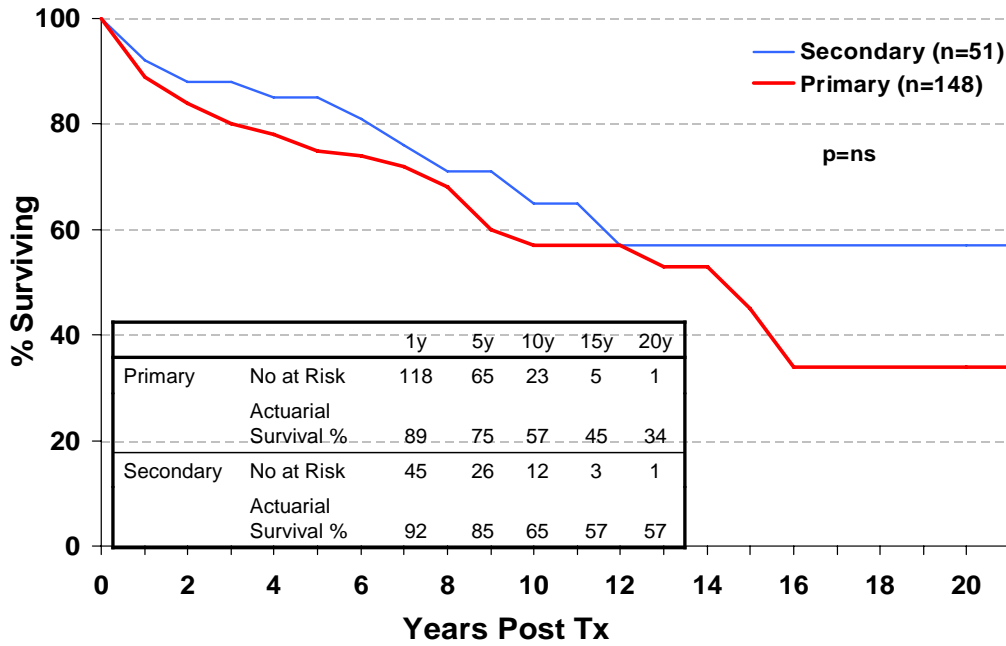


### Chronic HCV (Primary and Secondary) vs Era

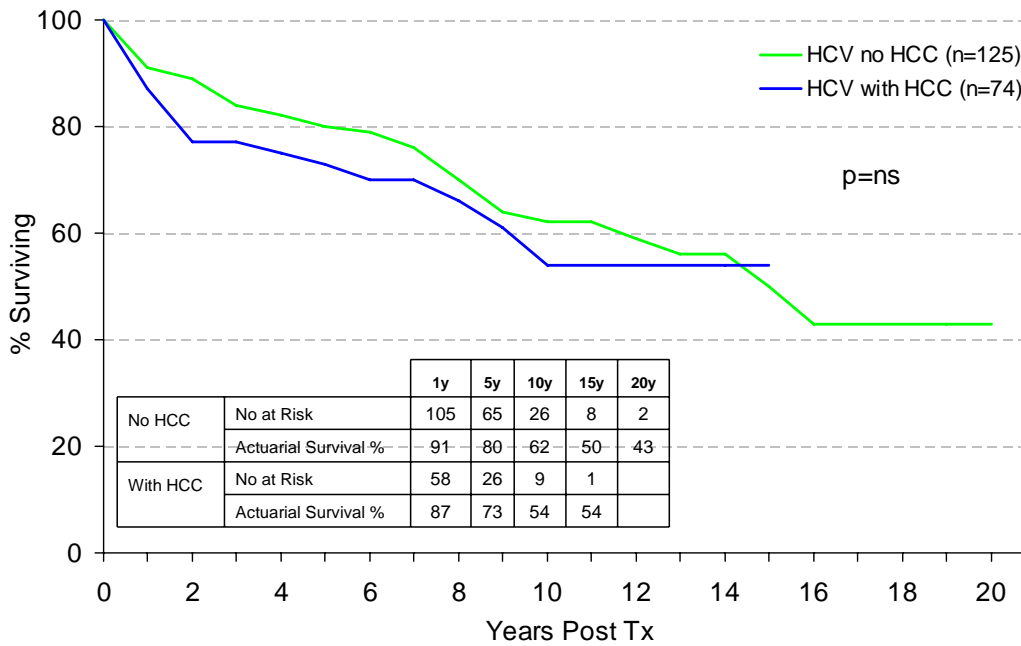


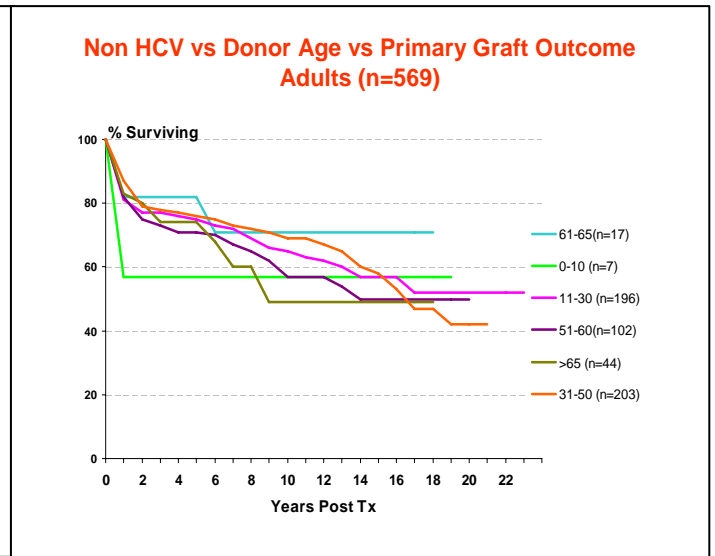
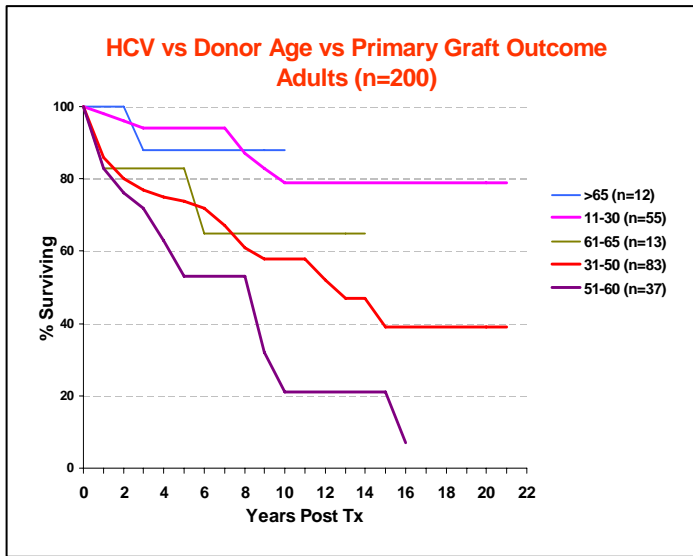


### Chronic HCV Primary vs Secondary Indication



### Chronic HCV (Primary & Secondary) vs Associated HCC

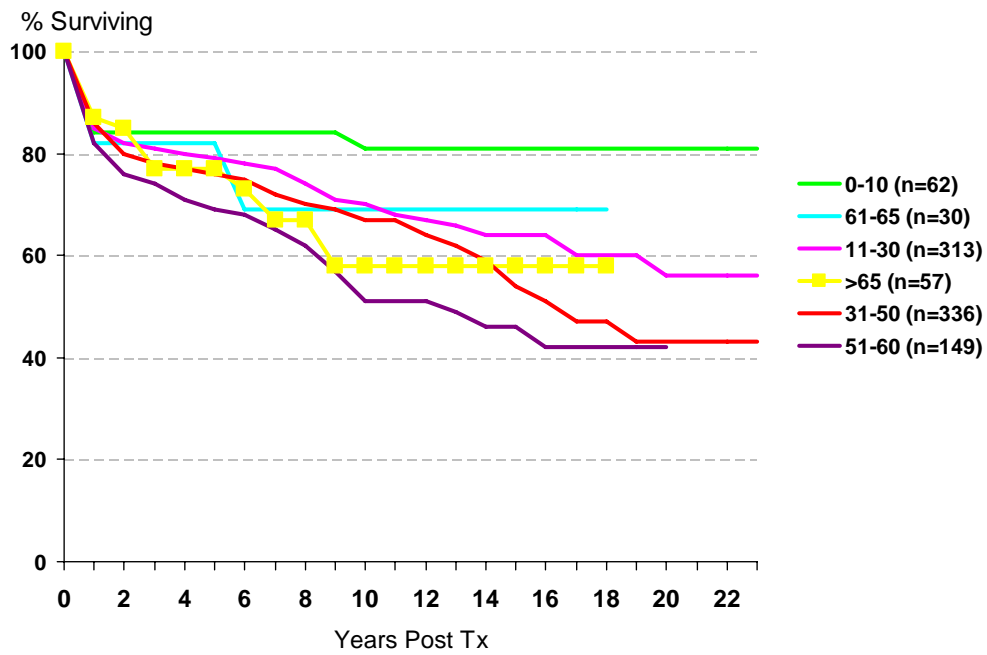




	1y	5y	10y	15y	20y
11 - 30 No at Risk	52	37	18	3	1
Actuarial Survival %	98	94	79	79	79
31 - 50 No at Risk	66	38	14	4	1
Actuarial Survival %	86	74	58	39	39
51 - 60 No at Risk	27	8	2	2	
Actuarial Survival %	83	53	21	21	
61 - 65 No at Risk	9	5	2		
Actuarial Survival %	83	83	65		
> 65 No at Risk	10	4	1		
Actuarial Survival %	100	88	88		

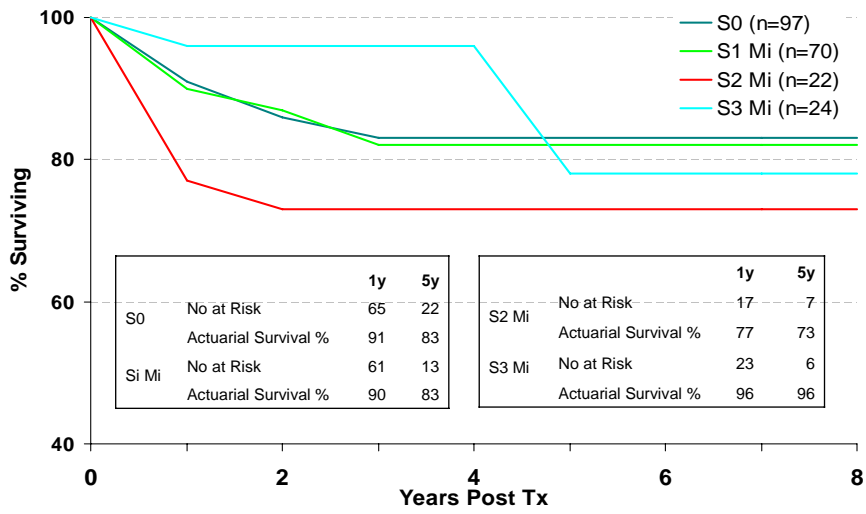
	1y	5y	10y	15y	20y
0 - 10 No at Risk	4	4	4	2	
Actuarial Survival %	57	57	57	57	
11 - 30 No at Risk	152	120	76	37	5
Actuarial Survival %	81	75	65	57	52
31 - 50 No at Risk	170	114	67	27	3
Actuarial Survival %	87	76	69	58	42
51 - 60 No at Risk	76	48	21	12	1
Actuarial Survival %	82	71	57	50	50
61 - 65 No at Risk	13	8	3	1	
Actuarial Survival %	82	82	71	71	
> 65 No at Risk	32	13	2	1	
Actuarial Survival %	83	74	49	49	

## Donor Age vs Primary Graft Outcome

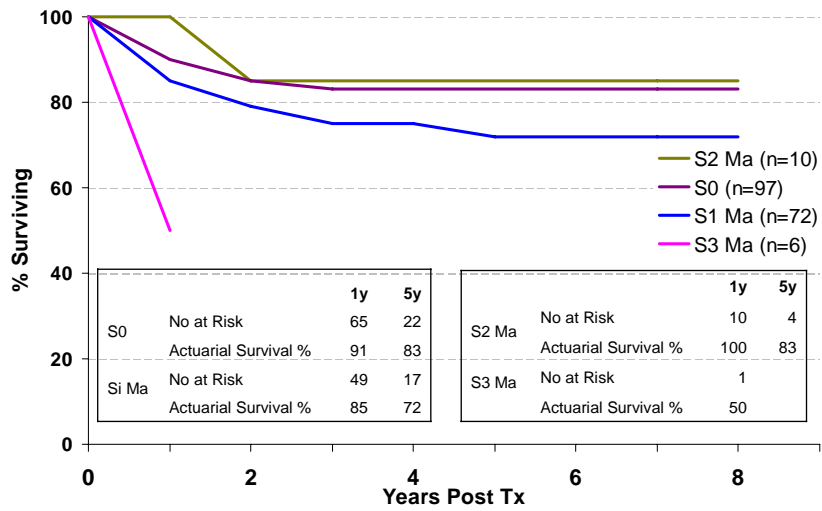


		1y	5y	10y	15y	20y
0 - 10	No at Risk	51	47	25	15	2
	Actuarial Survival %	84	84	81	81	81
11 - 30	No at Risk	253	188	112	56	8
	Actuarial Survival %	85	79	70	64	56
31 - 50	No at Risk	275	171	92	35	6
	Actuarial Survival %	86	76	67	54	43
51 - 60	No at Risk	111	60	25	15	1
	Actuarial Survival %	82	69	51	46	42
61 - 65	No at Risk	22	13	5	1	1
	Actuarial Survival %	82	82	69	69	69
> 65	No at Risk	43	18	3	2	
	Actuarial Survival %	87	77	58	58	

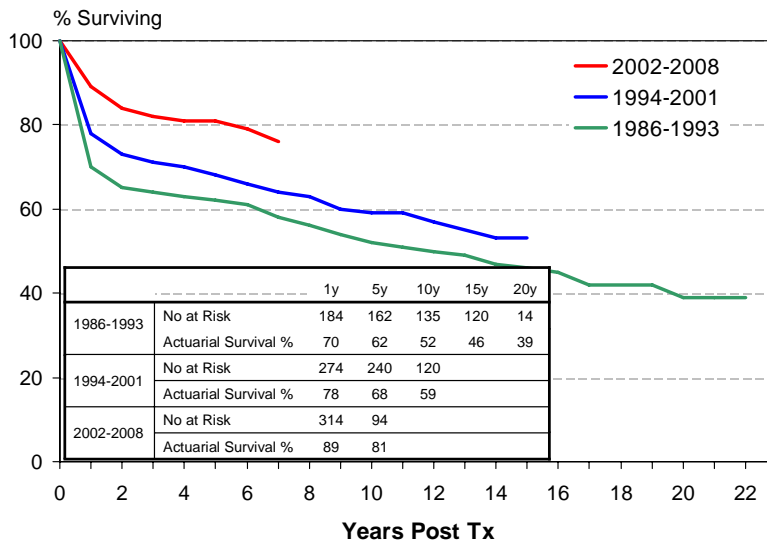
### Steatosis (Micro) vs Graft Outcome (Adults) 2001 – 2008



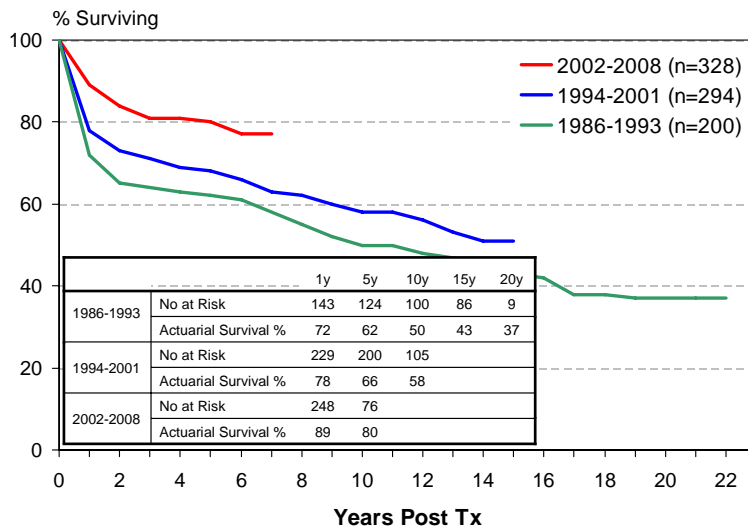
### Steatosis (Macro) vs Graft Outcome (Adults) 2001 – 2008



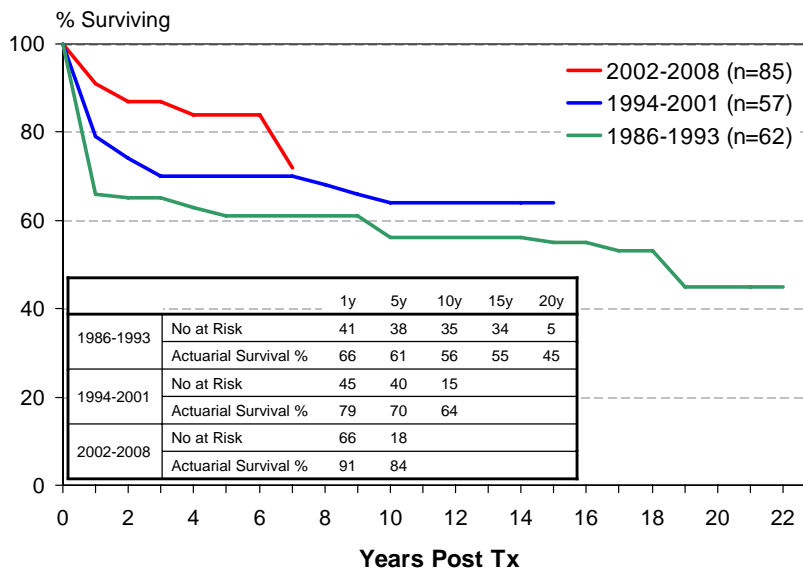
### Graft Survival by Era



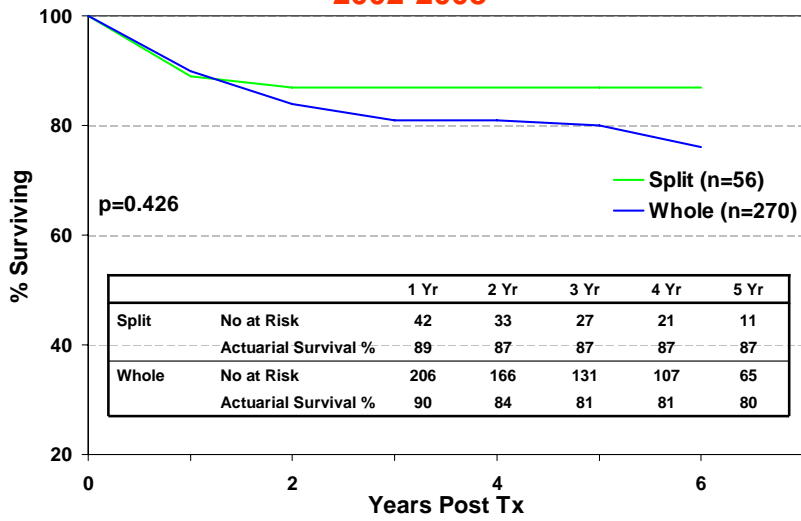
### Graft Survival by Era Adults



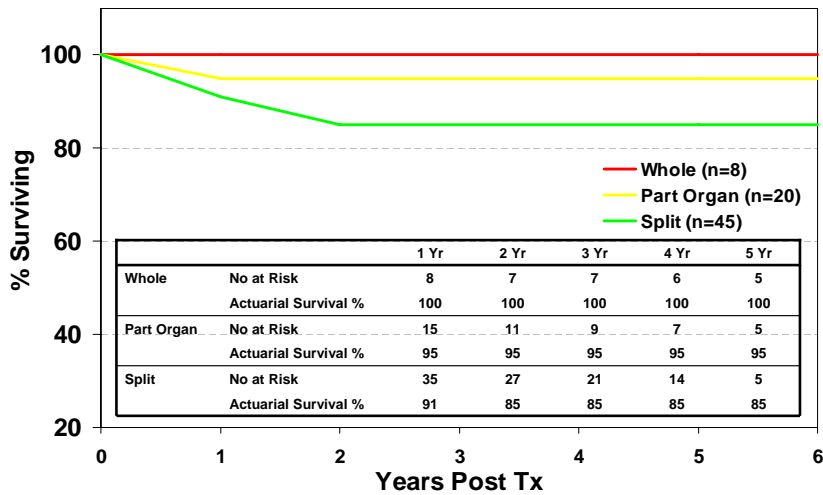
### Graft Survival by Era Children



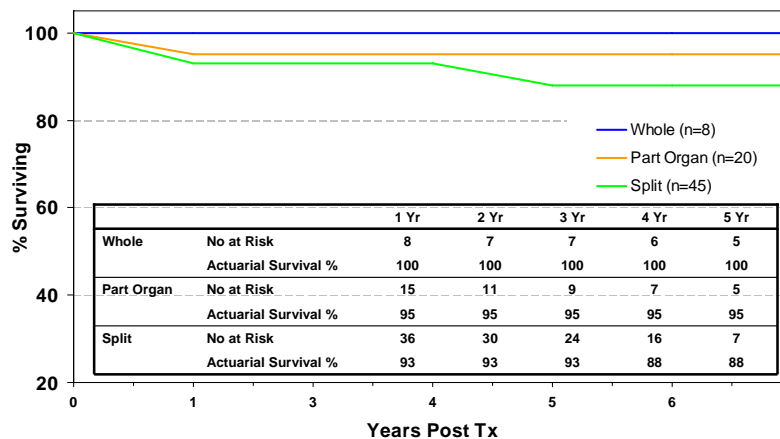
### Split vs Whole Grafts (Adults) 2002-2008



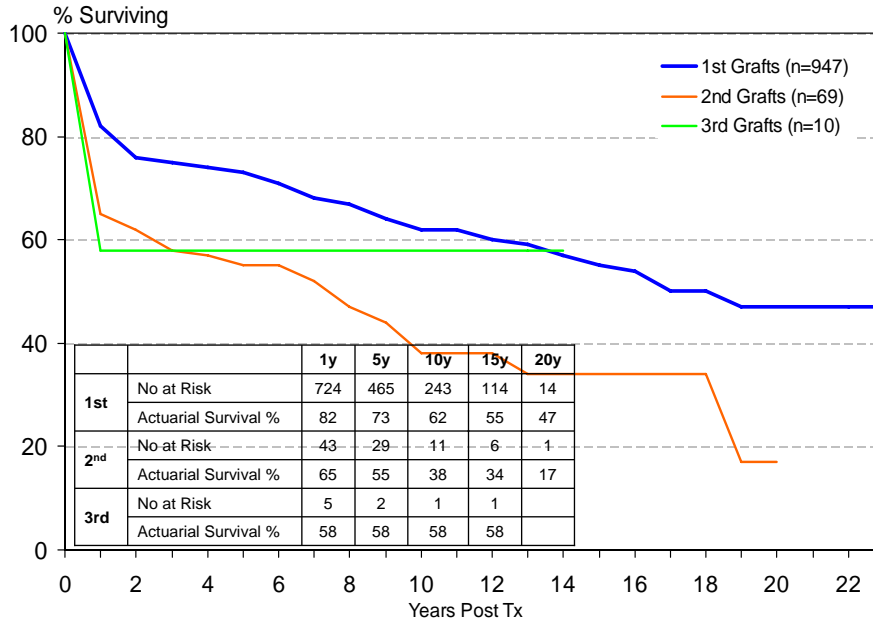
### Split vs Reduced vs Whole Graft Outcome (Children) - 2002-2008 Primary Grafts



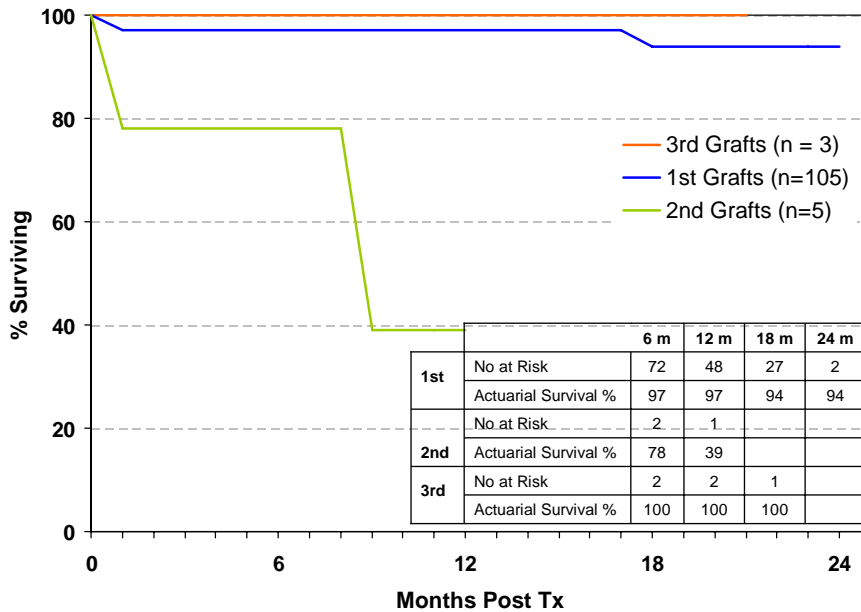
### Split vs Part Organ vs Whole Graft Outcome (Children) – 2002-2008 Patient Outcome



### Graft Number vs Outcome



### Graft Survival 2007-2008



### Survival of Special Groups

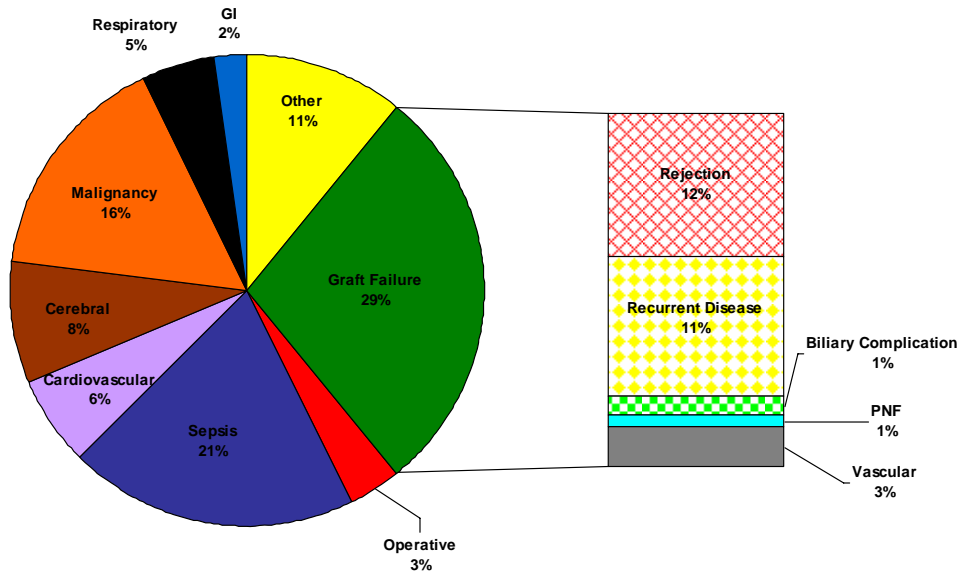
	Patients				Grafts			
	Adults		Children		Adults		Children	
Multiple grafts	27/51	53%	13/24	54%	28/58	48%	12/24	46%
Reduction hepatectomy	2/6	33%	49/74	66%	2/6	33%	46/83	55%
Split liver	51/57	90%	44/50	88%	49/57	86%	42/53	79%
Living donor tx	1/1	100%	10/11	91%	1/1	100%	10/11	91%
Fulminant hepatic failure	51/84	61%	14/16	88%	51/90	57%	14/17	82%
ABO incompatible	12/15	80%	4/7	57%	12/15	80%	4/7	57%
A2 – O (1999-2007)	5/6	83%	1/1	100%	5/6	83%	1/1	100%
Hepatic malignancy								
Primary indication	49/71	69%	2/5	40%	49/74	66%	2/5	40%
Secondary indication	52/81	64%			52/82	63%		



## Cause of Death

<b>Graft Failure</b>	<b>81 (28%)</b>
Rejection	
Acute	10
Chronic	23
Recurrent disease	
Hepatitis B	11
Hepatitis C	20
NASH	1
PNF	3
Biliary Complications	4
Vascular	9
<b>Sepsis</b>	<b>57 (20%)</b>
<b>Malignancy</b>	<b>45 (16%)</b>
Recurrent disease	18
De Novo	25
Transferred from donor	2
<b>Cerebral</b>	<b>24 (8%)</b>
<b>Cardiovascular</b>	<b>17 (6%)</b>
<b>Other</b>	<b>15 (5%)</b>
<b>Respiratory</b>	<b>15 (5%)</b>
<b>Operative</b>	<b>10 (4%)</b>
<b>Multi-organ Failure</b>	<b>5 (2%)</b>
<b>Vascular</b>	<b>5 (2%)</b>
<b>Gastrointestinal</b>	<b>6 (2%)</b>
<b>GVHD</b>	<b>4 (1%)</b>
<b>Renal Failure</b>	<b>2</b>
<b>TOTAL</b>	<b>286 (30% of all pts)</b>

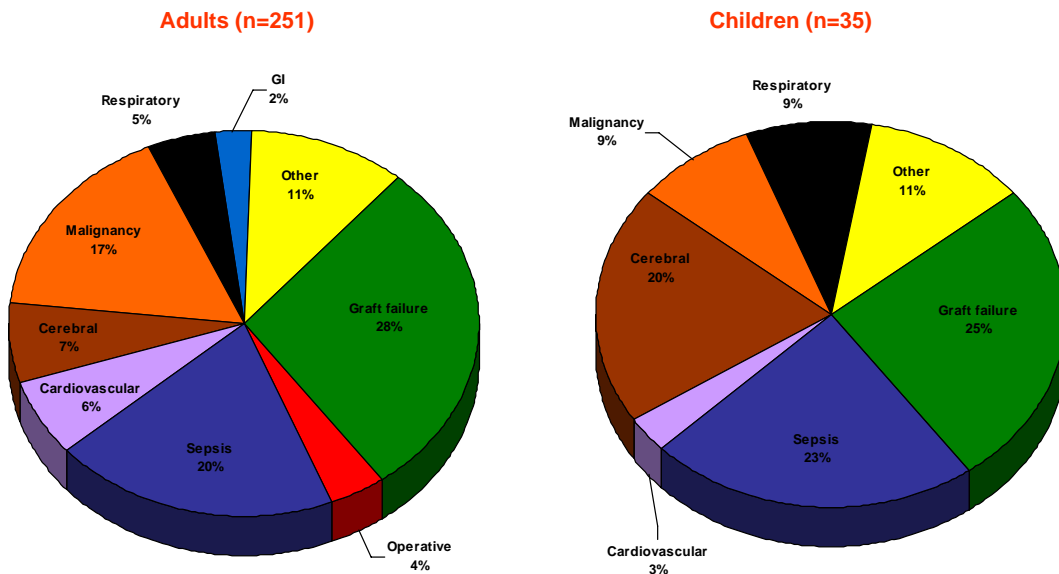
### Cause of Death (n=286)



286 patients, or 30% of all patients transplanted, have died. 57 (20%) have died due to sepsis and 81 (28%) from graft failure.

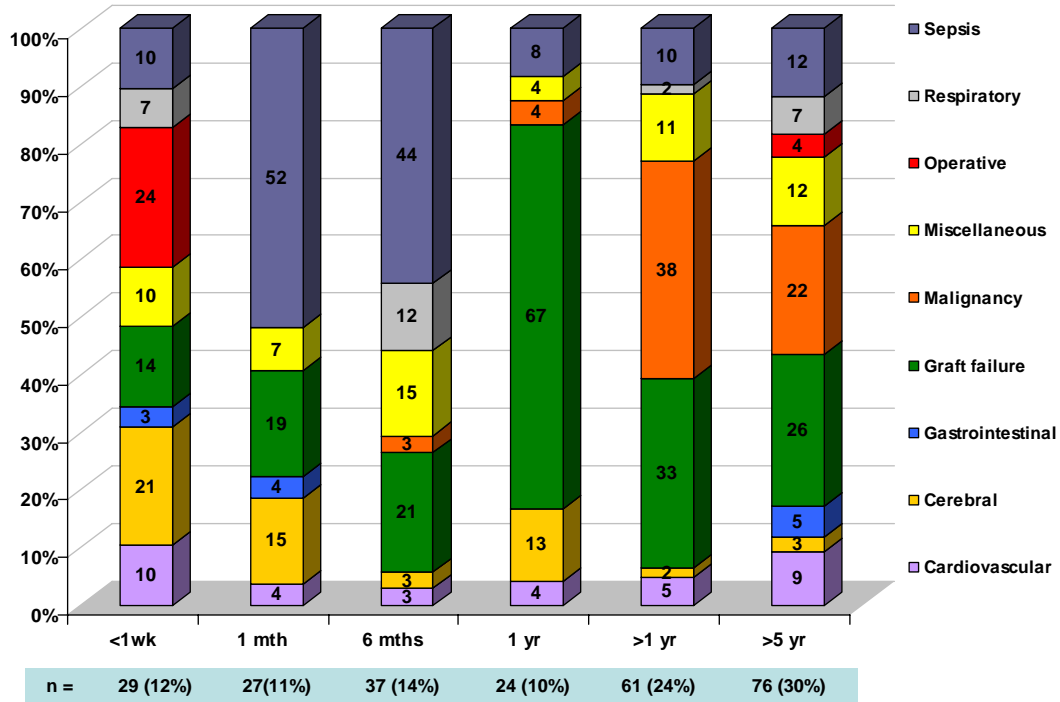
Of the 81 cases of death due to graft failure, 33 (12%) patients lost grafts due to rejection, 32(11%) from recurrent disease and 3 (1%) from primary non function (PNF).

### Cause of Death (n=286)

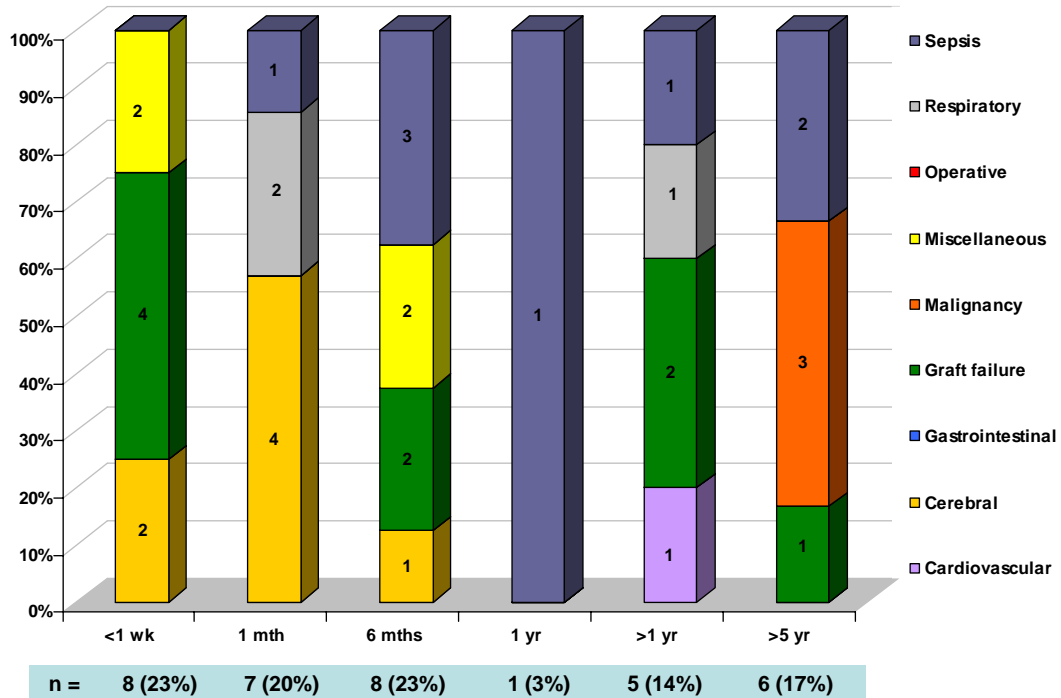


The majority of adult deaths were due to Graft Failure (72 or 28%), Sepsis (49 or 20%) and Malignancy (42 or 17%). The majority of child deaths were due to Sepsis (8 or 23%) or Graft Failure (9 or 25%) and Cerebrovascular accident (7 or 20%).

### Cause of Death by Time – Adults (n=251)



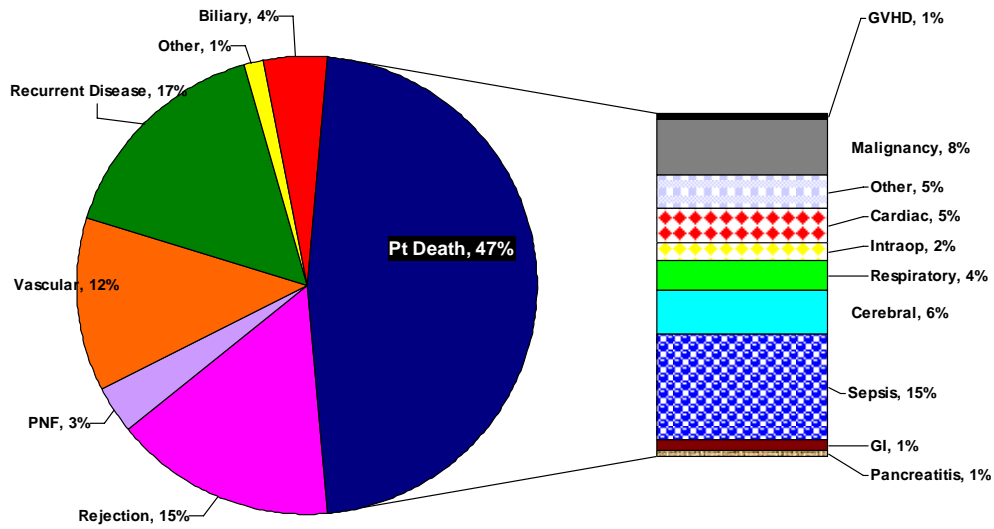
### Cause of Death by Time – Children (n = 35)



## Cause of Graft Failure

<b>Rejection</b>			<b>59 (16%)</b>
	Acute	15	
	Subacute	1	
	Chronic	35	
	ABO incompatibility	6	
<b>Vascular complications</b>	Hepatic artery		<b>45 (12%)</b>
	Thrombosis	30	
	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	
<b>Recurrent disease</b>			<b>59 (16%)</b>
	Hep B	13	
	Hep C	27	
	Malignancy	17	
	PSC	1	
	NASH	1	
<b>Primary non function</b>			<b>12 (3%)</b>
	Arterial thrombosis	1	
	Vena	1	
	Graft infarction	5	
	Profound hypotension	1	
	Preservation injury	1	
	Severe steatosis	3	
<b>Patient deaths</b>			<b>174(47%)</b>
	Sepsis	54	
	Cerebral	22	
	Other	17	
	Malignancy	28	
	Respiratory failure	15	
	Cardiovascular	17	
	Intraoperative	9	
	GI haemorrhage	5	
	GVHD	4	
	Pancreatitis	3	
<b>Biliary complications</b>			<b>16(4%)</b>
	Biliary strictures	14	
	Other	2	
<b>Other</b>			<b>5 (1%)</b>
<b>TOTAL</b>			<b>368 (36%) Of all grafts</b>

## Cause of Graft Failure

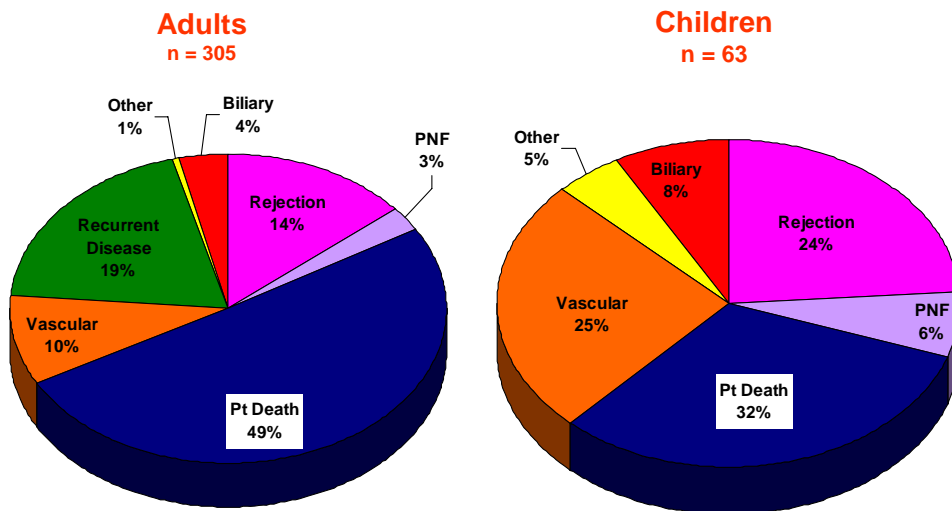


368 of 1026 grafts (36%) have failed.

174 grafts (46%) were lost due to patient deaths, 57 (15%) due to rejection and 59 (17%) due to disease recurrence.

Sepsis was the most significant cause of patient death (54 patients), followed by malignancy (28 patients) and cerebral catastrophe (22 patients).

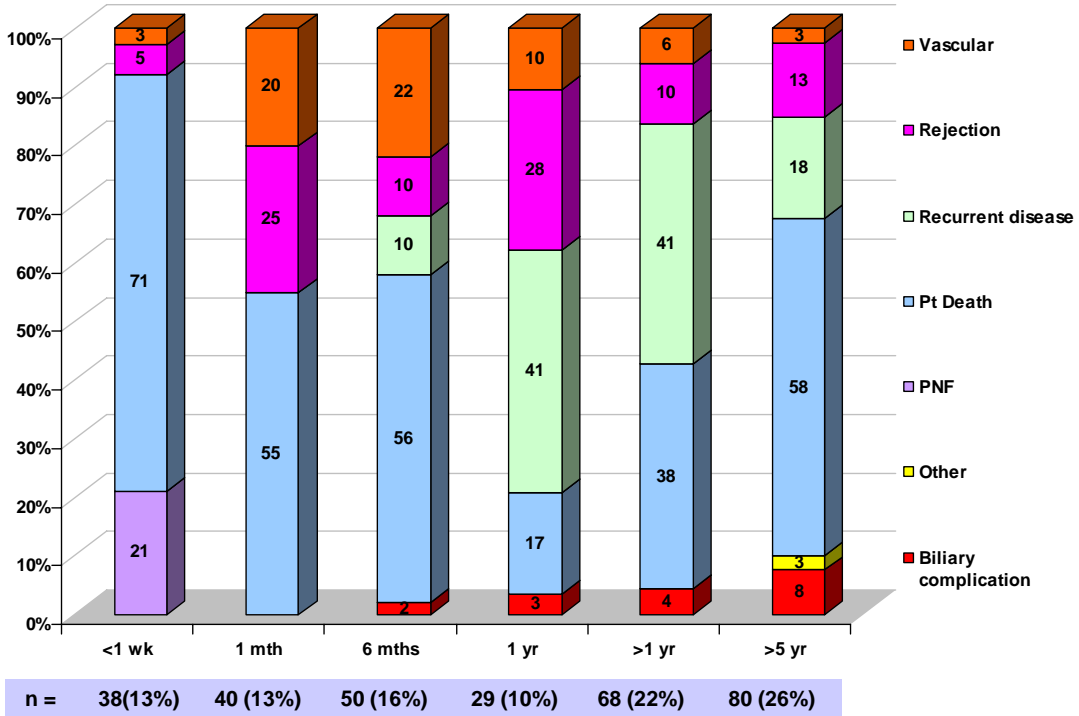
## Cause of Failure



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

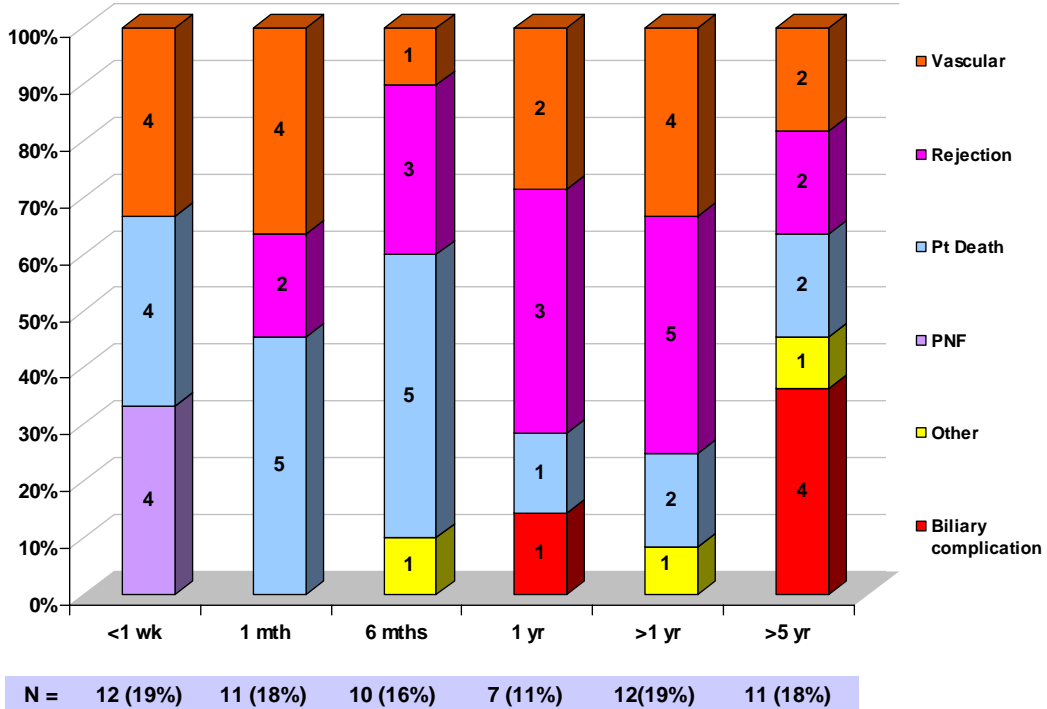
### Cause of Graft Failure by Time – Adults

(n = 305)

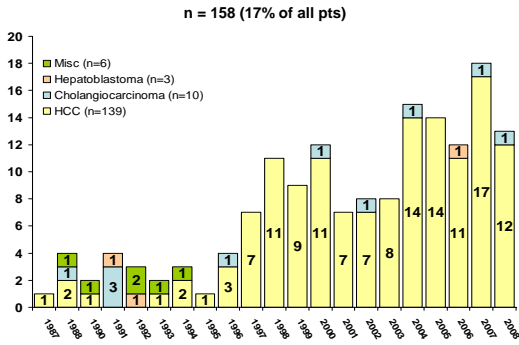


### Cause of Graft Failure by Time – Children

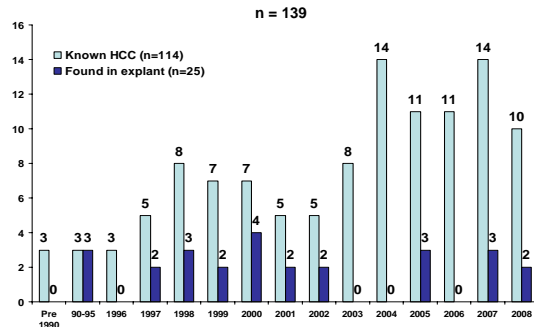
(n = 63)



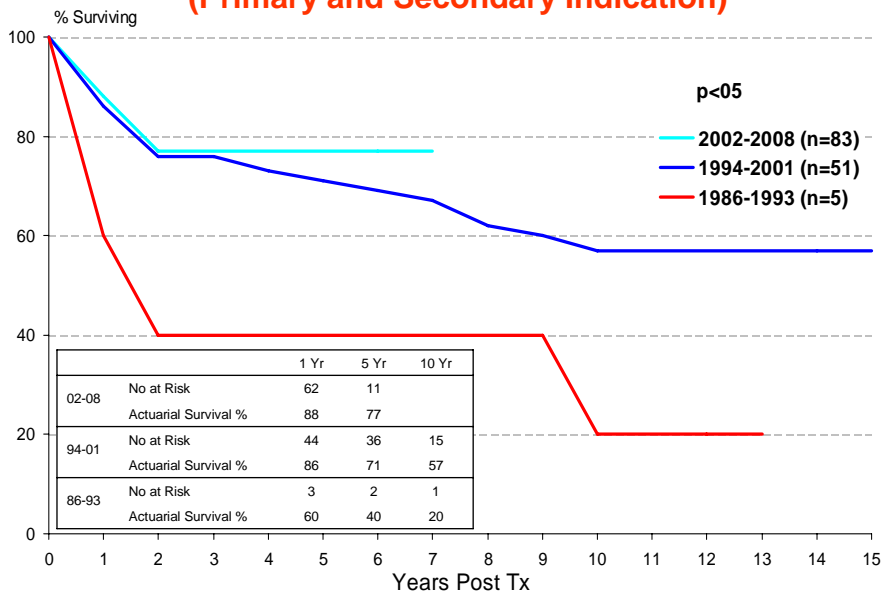
**Malignancy at Transplantation**



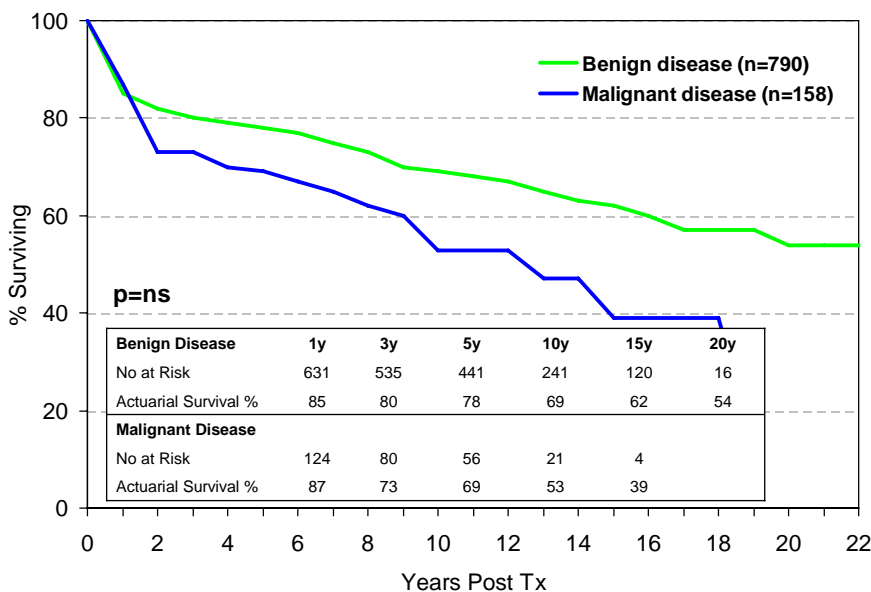
**HCC at Transplantation**



**HCC vs Era (Primary and Secondary Indication)**



**Benign Disease vs Malignancy**



# ***CANCER AFTER TRANSPLANTATION***



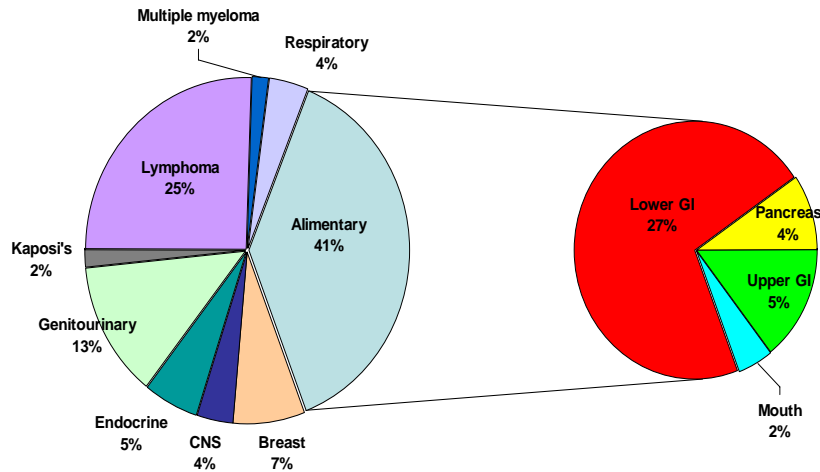
## De Novo Non Skin Cancer

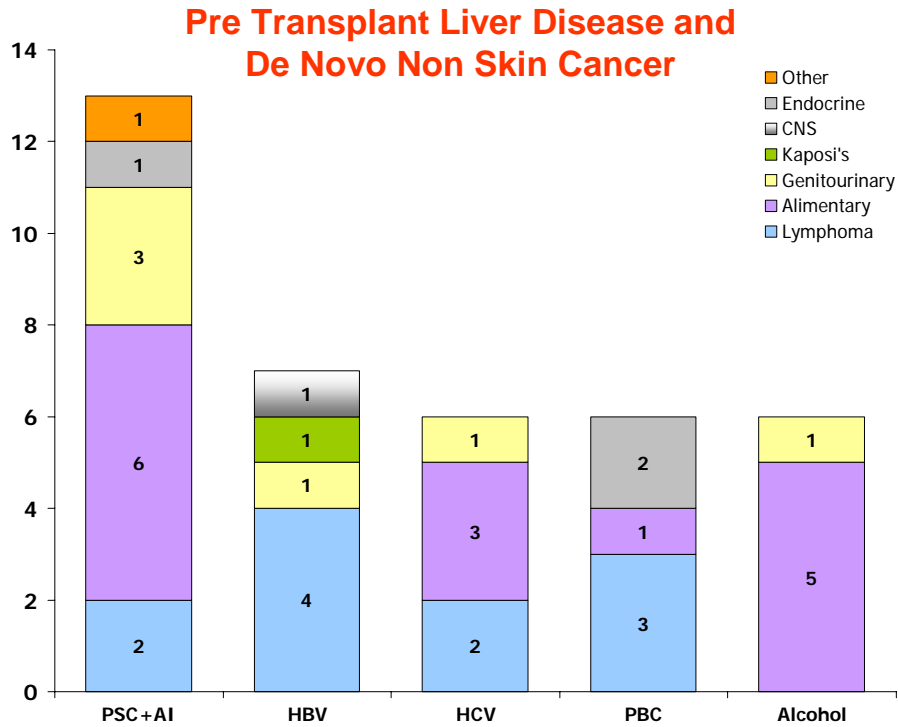
	No	Male	Female	Age of pts (yrs)	Time to diagnosis (mths)	Died of This Cancer	Died Other
Alimentary*	21	13	8	13 – 78 (m 58)	10 -217 (m 79)	12 (57%)	3
Lymphoma*	14	8	6	1.5 – 70 (m 41)	4 – 183 (m 67)	4 (29%)	3
Kaposi's	1	1	0	32	48	0	0
Genitourinary	7	5	2	39 – 66 (m 46)	2.3 – 165 (m 16)	0	1
Breast	4	0	4	30 – 45 (m 43)	50 – 205 (m 86)	2 (50%)	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
<b>Total</b>	<b>55</b>	<b>31</b>	<b>24</b>	<b>1.5 - 78 (m 51)</b>	<b>2.3 - 217 (m 73)</b>	<b>23 (42%)</b>	<b>7</b>

NB: m = median

## De Novo Non Skin Cancer

n=55 (6% pts transplanted)





### Cumulative Risk of Diagnosis of Cancer Following Liver Tx. 1986 - 2008

