

THE NORDIC LIVER TRANSPLANT REGISTRY ANNUAL REPORT 2003

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Nordic liver transplant registry - 2003

As of December 31, 2003 the registry comprised data on 2859 patients of whom 2437 had received a first liver allograft. The registry comprises complete data on all patients listed for liver transplantation during the period 1990-2003; 2637 patients. The remaining 222 patients received a liver allograft prior to 1990, waiting list data are not available for these patients.

Transplantation activity 2003

The total number of patients receiving a first liver allograft during 2002 was 217, an additional 31 retransplants (25 second, 5 third and one fourth transplants) were performed. The total number of liver transplants performed was thus 248. This figure represents a considerable increase as compared to previous years.

Median and mean waiting times (electively listed patients) have decreased slightly to 37 and 80 days respectively. Median waiting time for blood type 0 recipients in 2003 was 74 days and did not increase from 2002. The number of deaths on the waiting list is unchanged. A total of 14 patients died while waiting for a liver allograft during 2003.

During 2003 primary sclerosing cholangitis (n=41) followed by acute hepatic failure (n=32) and alcoholic liver cirrhosis (n=28) were the most frequent indications for being listed for a liver transplantation.

As many as 43 recipients (first liver allografts) were above 60 years of age (20%), comparable to the figures for 2000 and 2001.

Donor age has increased steadily during the nineties, was stable during 2000-2002 but increased to a mean donor age of 48 years in 2003.

Survival rates following liver transplantation are still increasing and for the last 3-year period the 1-year patient survival is above 85%.

A total of 243 patients were listed for a first liver transplantation in 2003. Of these, 180 received a first liver allograft. Ten of the 243 patients died while being active on the waiting list, seven while waiting for a first liver allograft while three died waiting for a second allograft. Fifteen were permanently withdrawn from the waiting list without receiving a liver allograft. Forty-two patients of these 243 were active on the waiting list as of December 31st. In addition 3 patients were waiting for a second or third liver transplant as of December 31st 2003.

Maintenance of the registry

Most centres are as of today relatively up-to-date as concerns the completeness of data. Data on number of patients, dates of transplantation, diagnosis and status dead/alive are complete.

The results presented in this report are based on the data in the registry as of March 20, 2004.

Acknowledgements - financial support

The maintenance of the software has been performed by Scandiatransplant. We greatly acknowledge the help and support from Niels Grunnet, Melvin Madsen, Christian Mondrup and Frank Pedersen in Aarhus. Without their help and support it would not have been possible to maintain the registry. Without the day-to-day assistance we have received from Christian Mondrup and Frank Pedersen it would not have been possible to tie up a large number of loose ends and develop the registry further.

Transplant nurses and transplant coordinators at the individual centres have made an enormous effort in updating and maintaining the registry. The existence of the registry depends completely on their work and dedication.

The registry received partial financial support from Roche, Fujisawa and Novartis during 2003. This support has been of great help. All financial support has been given without any obligations and the registry has no commitments to any pharmaceutical company.

Organisation and data ownership

It should be emphasised that the registry (software) is the property of Scandiatransplant while the data in the registry is the property of the Nordic Liver Transplantation Group. Utilisation of data should be censored by the latter. The data presented here should not be used without permission from the Nordic Liver Transplantation Group. The contact person for each centre is listed below:

Copenhagen	Preben Kirkegaard
Gothenburg	Styrbjörn Friman
Helsinki	Krister Höckerstedt
Oslo	Inge Bjørn Brekke
Stockholm	Bo-Göran Ericzon

This complete report is distributed to a limited number of persons at each centre, further copies can be delivered on request. A preliminary report has been sent to the contact persons for comments.

Oslo April 2004

Kristian Bjørø

NB

Patients listed and receiving liver allografts in Uppsala prior to 2000 are recorded as Stockholm-patients.

ACTIVITY 2003

Table 1

Activity during 2003 – total number of transplantations, first transplantations, retransplantations, deaths on waiting list and permanent withdrawals – irrespective of time of listing.

	Total tx	First liver tx			ReTx	DEA	PW
		CDT	LDT Living related	LDT Domino			
Copenhagen	39	34	2		3	1	6
Gothenburg	69	57	4 [§]	2	7	4	5
Helsinki	43	40			3	2	1
Oslo	39	30		1	8	1	2
Stockholm	50	36	1	4	9	5	7
Uppsala	8	7			1	0	1
Total	248 [§]	204	7 [§]	7	31 [§]	13*	21 [¶]

[§] One patient received a living donor allograft as a second transplant

* four patients died while waiting for a retransplantation

¶ four patients permanently withdrawn while awaiting second transplantation

DEA - dead while active on waiting list

PW - permanently withdrawn

CDT - cadaveric donor transplants

LDT - living donor transplants (includes domino liver)

Comment Table 1

The number of first liver transplantations is by far the highest ever. The number of retransplantations is slightly higher than previous years. All centres have had a high activity

Table 2

Annual total number of liver transplantations, 1996-2003

	2003	2002	2001	2000	1999	1998	1997	1996
Tx no 1	217	190	192	169	164	175	161	141
Tx no 2	25	21	15	19	16	28	17	20
Tx no 3	5	0	2	3	3	1	0	5
Tx no 4	1	1	0	0	0	0	0	2
Tx no 5	0	1	0	0	0	0	0	0
Total	248	213	209	191	183	204	178	168

Table 3

Number of liver transplantations per centre, 1996-2003

	1.liver transplantations							Retransplantations*						
	2003	2002	2001	2000	1999	1998	1997	2003	2002	2001	2000	1999	1998	1997
Copenhagen	36	32	26	20	26	37	37	3	8	6	4	5	6	1
Gothenburg	62	42	50	40	41	54	46	7	11	4	8	5	5	2
Helsinki	40	44	37	28	28	33	23	3	3	1	3	2	6	5
Oslo	31	25	32	25	23	19	16	8	0	5	5	5	6	2
Stockholm	41	43	46	56	46	41	39	9	1	1	49	1	6	5
Uppsala	7	4	1					1						
Total	217	190	192	169	164	175	161	31	23	17	22	18	29	15

* includes all retransplants - second, third and fourth

Table 4
Diagnoses of patients receiving a first liver transplant 1996-2003

	2003	2002	2001	2000	1999	1998	1997	1996
Primary sclerosing cholangitis	37	31	37	28	21	24	31	25
Acute hepatic failure	26	17	33	16	20	18	24	15
Hepatitis C cirrhosis	23	22	10	16	17	17	11	5
Primary biliary cirrhosis	17	8	10	18	16	16	14	13
Metabolic diseases	9	9	9	11	14	15	6	6
Alcoholic cirrhosis	24	29	21	21	13	28	21	14
Malignant diseases	17	15	15	17	12	19	9	5
Autoimmune cirrhosis*	7	10	5	6	10	1	5	9
Biliary atresia	9	6	11	7	9	8	3	9
Hepatitis B cirrhosis	5	8	4	6	7	5	5	4
Cryptogenic cirrhosis	10	5	5	9	4	4	9	6
Budd Chiari syndrome*	1	4	5	0	3	5	6	6
Other cholestatic diseases	0	2	4	0	1	6	9	9
Other	31	22	23	14	17	7	8	19
Total	217	190	192	169	164	175	161	141

*Patients with Budd Chiari syndrome, autoimmune hepatitis and HBV may be recorded as acute hepatic failure if listed as urgent, the figures given for Budd Chiari in this table exclude patients listed as acute hepatic failure

Primary sclerosing cholangitis has been the leading indication for liver transplantation in the Nordic countries for several years, HCV cirrhosis is increasing, the number of patients with primary biliary cirrhosis receiving a liver allograft is far lower than 10 years ago.

Table 5
Duration of time on waiting list, patients receiving 1. liver allograft 1996-2003
(excluding highly urgently listed patients)

	2003	2002	2001	2000	1999	1998	1997	1996
median (days)	37	52	42	43	30	21	23	27
mean (days)	80	89	85	75	55	53	63	64

Blood type A

	2003	2002	2001	2000	1999	1998	1997	1996
median (days)	27	26	30	35	19	11	13	13
mean (days)	43	64	61	65	31	22	29	12

Blood type 0

	2003	2002	2001	2000	1999	1998	1997	1996
median (days)	74	102	52	71	73	46	67	63
mean (days)	144	118	72	99	102	93	105	112

The waiting time is not increasing, mean and median waiting times have been stable during the last 4 years. The median waiting time for 2003 was actually the shortest in this millenium.

Table 6
Centrewise mean and median waiting times patients receiving first liver allografts 2000-2003 (excluding highly urgently listed patients)

Blood type A

	CP	GO	HE	OS	ST	UP
Median (days)	27	25	14	38	44	34
Mean (days)	67	59	26	49	79	51

Blood type 0

	CP	GO	HE	OS	ST	UP
Median (days)	58	52	48	46	148	61
Mean (days)	140	101	68	95	145	76

There are significant differences in waiting time between centers. Waiting times in Helsinki are in particular shorter than in the other centers while patients listed in Stockholm tend to wait longest.

Table 7
Age distribution of patients receiving a first liver transplant in 1996-2003 (age at transplantation)

age - year	2003	2002	2001	2000	1999	1998	1997	1996
<1	7	5	10	2	7	6	2	4
1-2	3	0	1	4	2	2	6	3
2-10	5	7	5	2	10	8	4	6
11-20	10	8	6	5	7	4	8	4
21-30	10	16	19	19	7	6	12	12
31-40	28	24	21	14	18	23	17	14
41-50	39	44	40	50	38	48	44	33
51-60	72	63	50	56	50	53	42	47
>60	43	23	40	26	23	23	24	18

The number of recipients above 51 years of age has increased considerably and accounts for the increased total number of first liver transplantations performed

Table 8
**Recipient age – centrewise 1996-2003 (8-year period)*
 (first liver allografts)**

	Mean age	Median age	Per cent of recipients being > 60 years
Copenhagen	46.2	50.7	13%
Gothenburg	49.6	51.8	22%
Helsinki	47.2	49.4	16%
Oslo	44.4	46.0	8%
Stockholm	46.0	49.3	15%
Uppsala	45.2	46.9	15%

*excluding patients <5 years of age

Table 9

**Total number of young children receiving a liver allograft (1996-2003)
(first liver allografts)**

	No of recipients < 5 years	Per cent recipients being < 5 years
Copenhagen	14	6%
Gothenburg	17	5%
Helsinki	12	5%
Oslo	25	13%
Stockholm	18	6%

The marked difference between Oslo and the other centers is due to a high number of children with cholestatic liver disease.

Table 10

**Donor age* (years) – centrewise (1996-2003)
(first liver allografts)**

	Mean	Median	Per cent donors being > 60 years
Copenhagen	40.8	44	9%
Gothenburg	45.1	48	13%
Helsinki	39.6	43	4%
Oslo	39.3	43	7%
Stockholm	45.9	50	21%

*donor age is missing in approximately 3-5% of cases

Table 11

Total number of patients accepted on liver tx waiting list (1. acceptance): 243

Outcome of patients *listed* during 2003:

	total	DEA	PW	CDT	LDT	Active
Copenhagen	46		5	28	1	12
Gothenburg	69	3	3	50	3	10
Helsinki	39	1	1	32	0	5
Oslo	32	1	1	26	1	3
Stockholm	52	3	2	31	4	12
Uppsala	5			5		
Total 2003	243	8	12	172	9	42

Table 12**Diagnoses of patients accepted on waiting list 1996-2003 (1. acceptance):**

	2003	2002	2001	2000	1999	1998	1997	1996
Acute hepatic failure [@]	32	24	43	24	28	26	28	19
Primary sclerosing cholangitis	41	35	36	38	27	25	32	25
Malignant diseases	24	19	20	18	21	23	10	7
Primary biliary cirrhosis	18	13	10	16	20	17	17	16
Hepatitis C cirrhosis	25	23	14	20	20	20	11	10
Alcoholic cirrhosis	28	30	27	25	18	30	23	15
Metabolic diseases	12	9	9	11	16	16	5	6
Biliary atresia	7	11	11	11	11	10	4	7
Autoimmune cirrhosis*	8	13	7	7	9	3	4	11
Cryptogenic cirrhosis	9	6	6	8	8	3	7	7
Hepatitis B cirrhosis*	9	7	8	6	7	6	7	3
Budd Chiari syndrome*	2	2	6	0	3	5	2	6
Other cholestatic diseases	1	0	5	2	2	7	6	8
Other	27	23	23	14	23	11	20	24
Total	243	215	225	202	213	202	176	164

* Patients with autoimmune hepatitis, HBV and Budd Chiari may be recorded as acute hepatic failure if listed as urgent, the figures given for these diagnoses in this table exclude patients listed as acute hepatic failure.

[@]NB A few patients with the diagnosis acute hepatic failure were not listed for a highly urgent liver transplantation, i.e. they were listed for an elective liver transplantation.

The number of patients with hepatitis C cirrhosis and primary sclerosing cholangitis is increasing. The number of patients with alcoholic cirrhosis increased during the late nineties, but has been stable during the last 4 years.

Table 13**Retransplantation rates 1990-2003**

Comprises data on patients receiving a 1. liver allograft during 1990-2003. The percentage of patients receiving a second allograft will partially depend on the patient population.

	1. LTX	2.LTX	%- 2.LTX
Copenhagen	409	53	12.9%
Gothenburg	557	58	10.1%
Helsinki	414	34	8.2%
Oslo	276	35	12.7%
Stockholm	544	46	8.5%

Table 14
Retransplantations according to diagnosis – 1990-2003

	NO. OF 1. LIVER TX	NO. OF 2. LIVER TX	TIME FROM 1. TO 2. LTX		% OF 2. LTX WITHIN 3 WEEKS
			Mean	Median	
Acute hepatic failure	281	39 (14%)	537	125	41%
Alcoholic cirrhosis	241	11 (4%)	1207	806	9%
Autoimmune cirrhosis	85	8 (9%)	573	48	50%
Biliary atresia	105	17 (16%)	344	14	65%
Hepatocellular carcinoma	111	9 (8%)	560	33	33%
Hepatitis C cirrhosis	144	14 (10%)	229	72	21%
Primary biliary cirrhosis	254	21 (8%)	531	873	19%
Prim. scler.cholangitis	336	37 (11%)	611	891	14%

Children with biliary atresia run a higher risk of needing a second transplantation, the majority of these within a few weeks. The number of retransplantation among patients with primary sclerosing cholangitis is increasing – most of the patients needing a late retransplantation. A remarkable low number of retransplantations were performed in patients with alcoholic cirrhosis.

Table 15
Distribution of some of the major diagnoses (patients receiving a 1.liver allograft) – centerwise – 1995-2003

	Copenhagen	Gothenburg	Helsinki	Oslo	Stockholm	Uppsala
AHF	39	27	66	21	30	2
ALCI	69	60	29	17	21	1
AUCI	7	23	7	9	13	4
BIAT/CODI	19	17	10	31	29	
BCDI	4	7	8	5	5	1
CRCI/OCCI	25	24	24	12	13	
MEDI	12	13	6	9	49	3
PBCI	21	36	43	17	23	
PCYS	9	9	0	4	0	
PHCC	14	44	4	13	52	2
PHCB	4	24	0	4	15	1
SCCH	27	65	49	55	61	5
HCCA	2	13	17	3	44	1
SECA		8		1		
OTCA	6	12	5	3	3	

- AHF - acute hepatic failure
- ALCI - alcoholic cirrhosis
- AUCI - autoimmune hepatitis-cirrhosis
- BCDI - Budd Chiari (only chronic cases)
- BIAT - biliary atresia
- CRCI/OCCI – cryptogenic cirrhosis and cirrhosis other causes
- MEDI - metabolic diseases
- PBCI - primary biliary cirrhosis
- PCYS - polycystic liver disease
- PHCC - HCV cirrhosis
- PHCB - HBV cirrhosis
- SCCH – primary sclerosing cholangitis
- HCCA - hepatocellular carcinoma
- OTCA - all other cancers including cholangiocarcinoma, other primary hepatic cancers and secondary cancers

Table 16**Most frequent indications for acceptance on waiting list for 1. liver transplantation**

Copenhagen		Gothenburg		Helsinki		Oslo		Stockholm	
ALCI	100	SCCH	126	AHF	114	SCCH	85	SCCH	98
AHF	93	ALCI	83	PBCI	104	AHF	57	MEDI	97
SCCH	36	PBCI	78	SCCH	66	PBCI	48	HCCA	77
PBCI	33	AHF	61	ALCI	43	BIAT*	47	PHCC **	76
CRCI	30	PHCC**	54	BIAT*	28	MEDI	27	AHF	71
BIAT*	27	HCCA	44	HCCA	24	ALCI	22	PBCI	64
MEDI	25	PHCB	33	OCCI	22	PHCC**	18	BIAT*	51

*The figure includes patients with biliary atresia and other cholestatic disorders in children (CODI)

**The figure includes only patients with ÅHCC as a primary diagnosis, patients with other primary diagnosis, e.g. ALCI or HCCA are not included

Activity 1982-2003

A total of 2435 first liver transplantations and 302 retransplantations have been performed since 1982, the distribution among the centres is given below.

Survival curves for the total material, for different time periods and for major diagnostic groups are given. In addition survival curves for a limited number of diagnoses – primary sclerosing cholangitis, primary biliary cirrhosis, HCV and HBV are presented. The survival curves comprise data for all patients who have received a liver allograft as of March 20th 2003

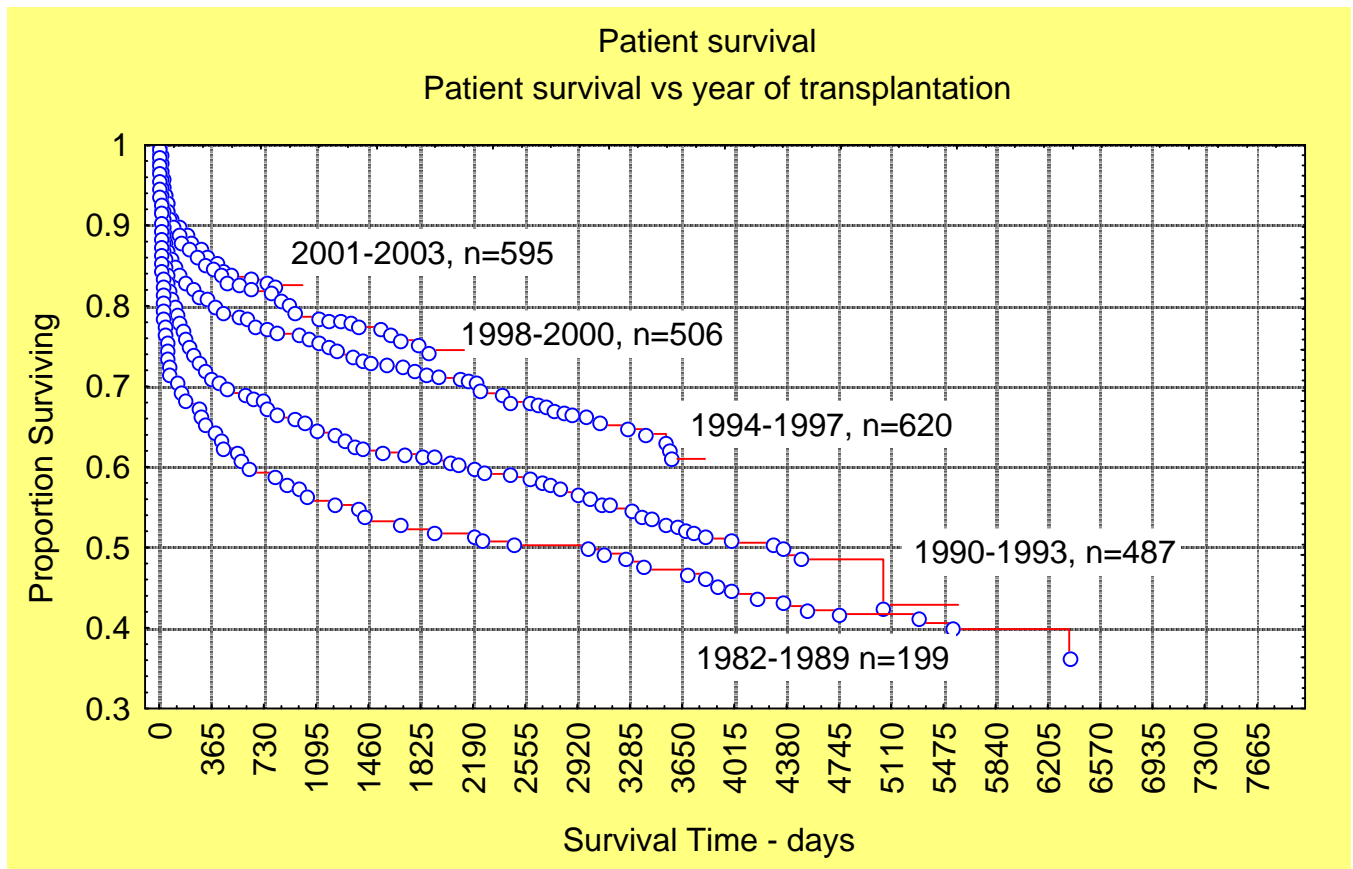
Table 17**Total number of first liver transplantations and retransplantations performed per centre**

	1.liver transplants	Retransplants [¤]	Total number
Helsinki	457	49	506
Stockholm	604*	61	665*
Gothenburg	619	77	696
Copenhagen	409	60	469
Oslo	313	47	360
Uppsala	34*	3*	33
Aarhus	19	2	22
total	2437*	299	2736*

[¤] Includes both 2nd, 3^d, 4th and 5th transplantations

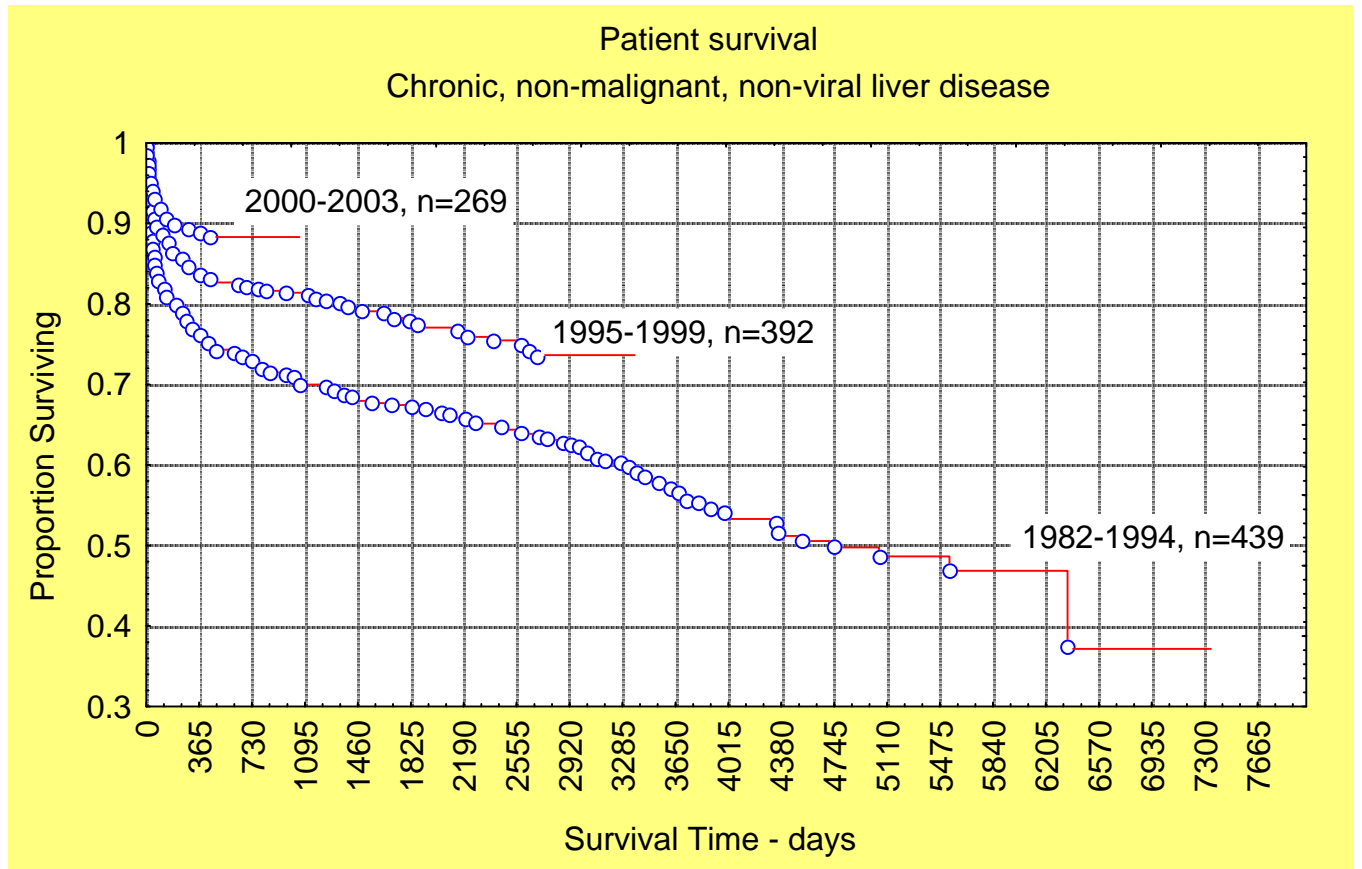
*Patients receiving a liver allograft in Uppsala during the period 1994-1998 are included in both the Stockholm and the Uppsala figures.

Survival curves



Patient survival according to year of first transplantation.

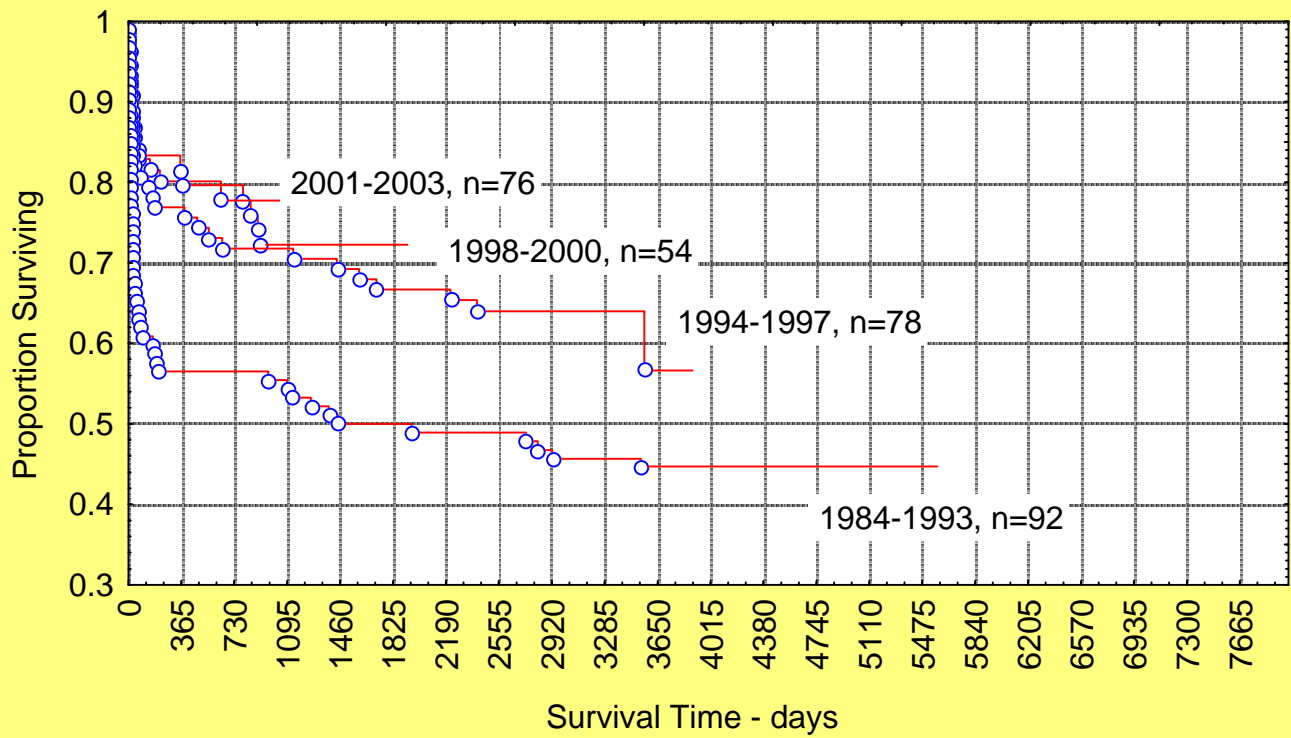
Comments: A significant improvement of 1, 3- and 5- year patient survival rates were observed through 1980 – 1998. Patients receiving a 1.liver allograft in 1998-2000 had the same 1- year patient survival when compared to patients receiving a 1. liver allograft during 2001-2003.



Patient survival - chronic non-malignant, non-viral liver disease – according to year of first transplantation.

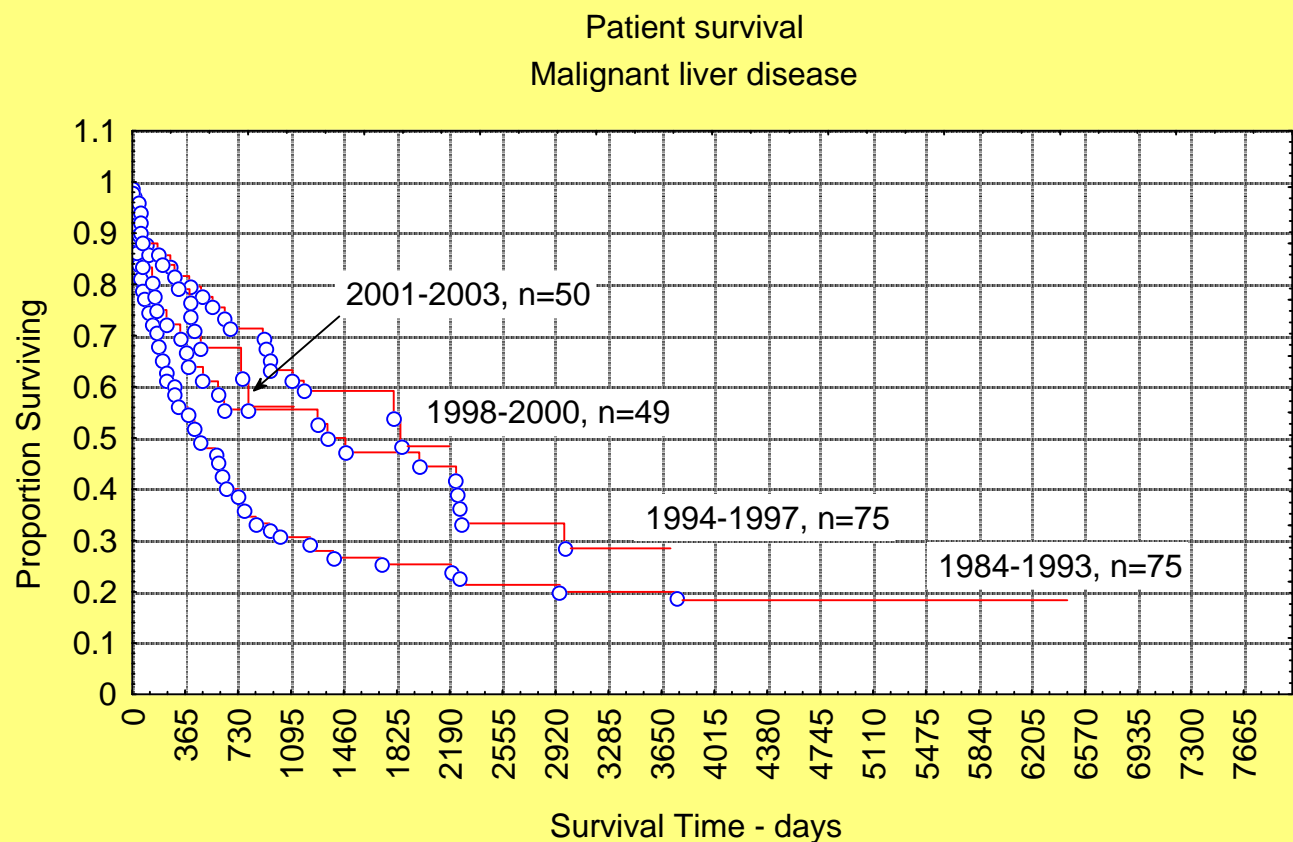
Comments: The main diagnoses are; primary sclerosing cholangitis, primary biliary cirrhosis, alcoholic liver cirrhosis, cryptogenic cirrhosis and autoimmune cirrhosis. Patient survival rates have improved and 1-year patient survival is close to 90%

Patient survival Fulminant hepatic failure



Patient survival – fulminant hepatic failure – according to year of transplantation.

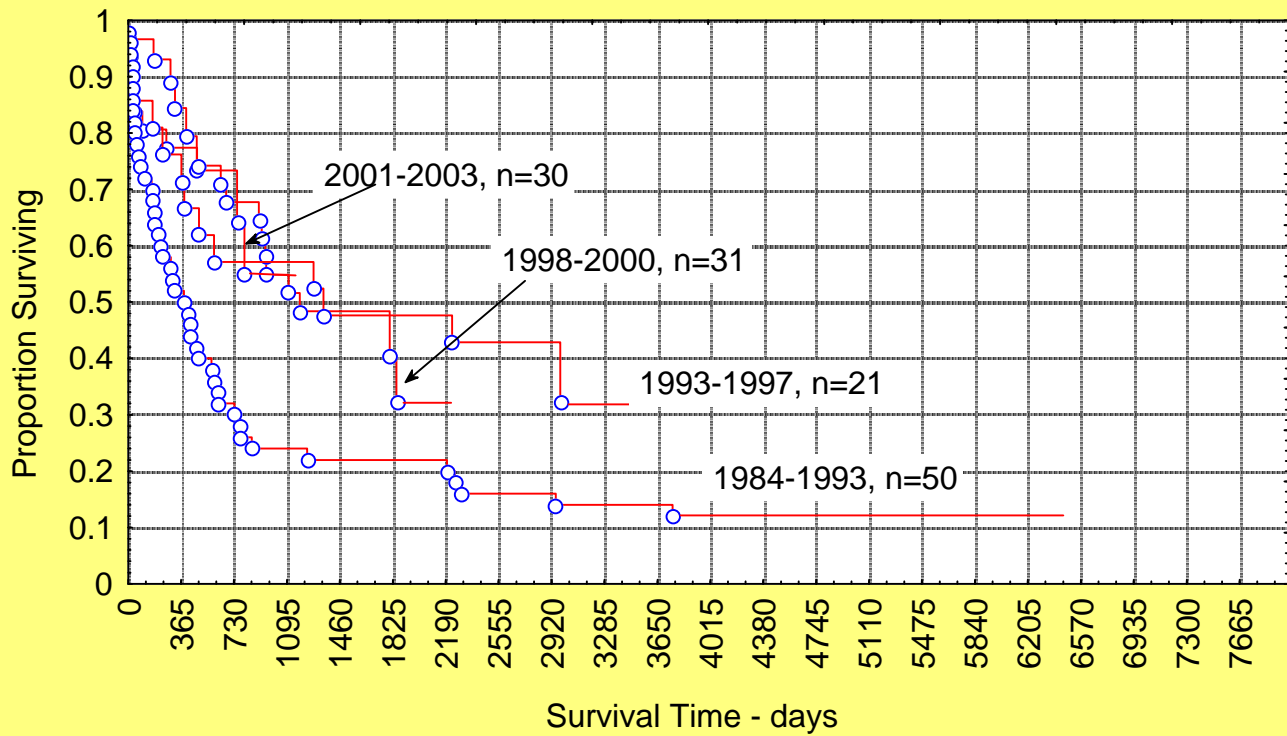
Comments: 1-year patient survival is approximately 80%, no significant changes during the period 1994 to 2003



Patient survival - malignant liver diseases – according to year. Only patients with a primary diagnosis of malignancy have been included (e.g. patients with incidentally detected tumours are not included).

Comments: No significant changes in patient survival during the period 1994 to 2003, 3 year patient survival is approximately 55-60%.

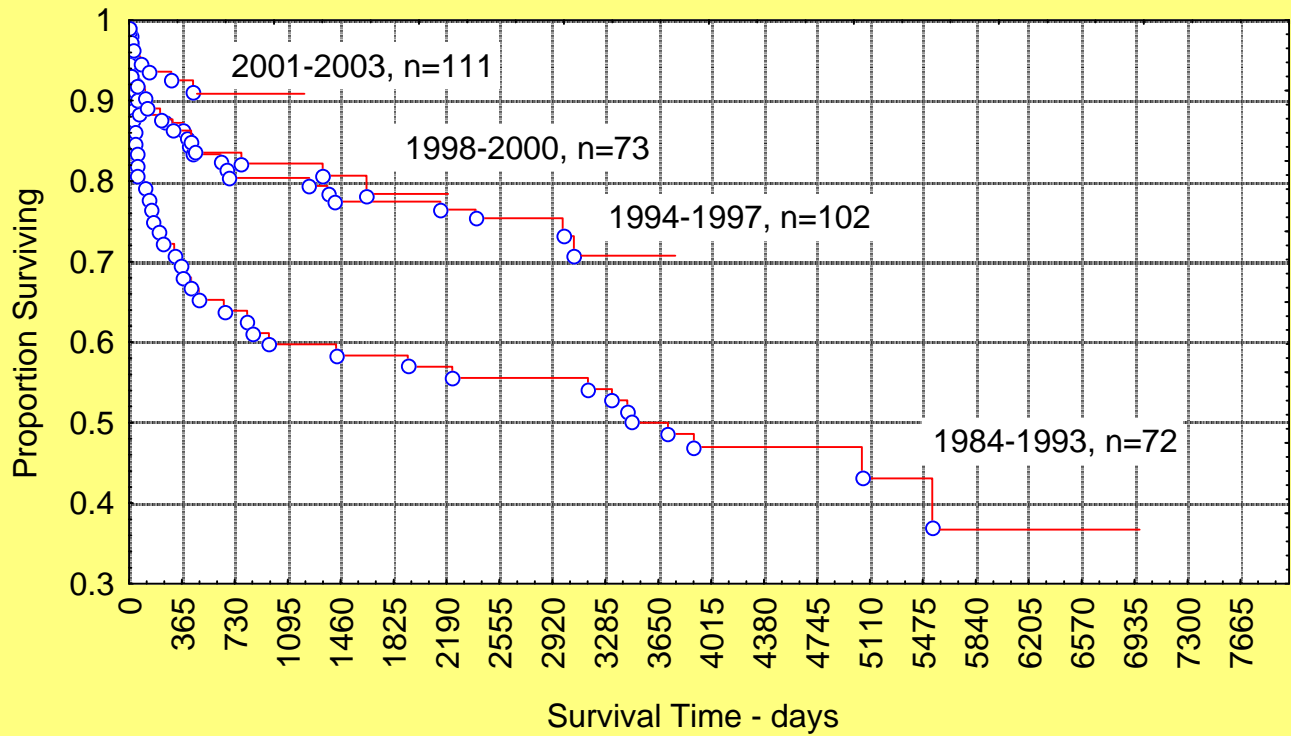
Patient survival
Hepatocellular carcinoma



Patient survival – hepatocellular carcinoma – according to year of transplantation. Only patients with hepatocellular carcinomas as a primary diagnosis have been included (i.e. patients with incidentally detected tumours are not included)

Comments: No changes in patient survival during the period 1993 to 2003, 3 year patient survival approximately 55%.

Patient survival
Primary sclerosing cholangitis



Patient survival rates – primary sclerosing cholangitis – according to year of first transplantation.

Comments: A significant improvement in survival rates can be seen – see ref 13.

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abstracts

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