Vedlegg 1

ANNUAL REPORT 2005

The Norwegian Renal Registry

(Norsk Nefrologiregister)

This report will also be available on:
http://www.nephro.no/registry.html

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Preface

The Norwegian Renal Registry (Norsk Nefrologiregister) was formally constituted in 1994 as collaboration between The Norwegian Renal Association (Norsk Nyremedisinsk Forening) and Rikshospitalet University Hospital, with the latter as the formal owner. National data on renal replacement therapy (RRT) had been collected within The Renal Association since 1980 in a less formalised manner, and the transplant centre had stored data on transplanted patients since the sixties. Further, Norwegian renal units had reported to the ERA-EDTA-registry since the late sixties.

During the recent years a process of transition from a pure epidemiological registry into a quality-oriented registry has been initiated. Some results from this have appeared in the latest annual reports. With the present way of collecting and processing quality data, they can not be collected in time to be included in the annual report. They will instead be the theme for yearly quality-seminars and for special reports.

National organisation and policy

Norway has 4.621 mill. inhabitants (July 2005) and 19 counties with populations ranging from 73000 to 533000. Each county, except one, has a central renal unit and some have additional unit(s) run in close contact with the central unit. There is only one transplant centre (two during 1963-83). Pre-transplant work-up, as well as post-transplant follow-up beyond 3 months, is handled by the county-centres.

The county-centres are responsible for reporting data from day 1 on all patients receiving renal replacement therapy (RRT) for chronic renal failure within their area. Treatment of acute renal failure is not reported unless the failure turns out to be irreversible, in which case the whole treatment period is included. Minor changes of treatment modality, e.g. from HD to HDF or between CAPD and APD, are not reported. Similarly, temporary changes to HD for PD-patients are not reported. At intervals, cross-checking for unreported deaths is performed against official census data.

Transplantation has always been considered the treatment of choice, if possible with a living related donor. Since 1984, also unrelated donors have been used. Acceptance criteria for transplantation have been wide, strict age limits have not been applied. Over time, an increasing number of non-transplantable patients have also been offered life-long dialysis.

Incidence and prevalence calculations in this report are based on the national population data from July 2005, although this in some instances may be slightly misleading since population changes have not been uniform in all counties during the period.

Incidence figures for 2005

During 2005 a total of 459 new patients (in 2004: 462) entered renal replacement therapy (RRT), i.e. 99.3 per mill. inhabitants.

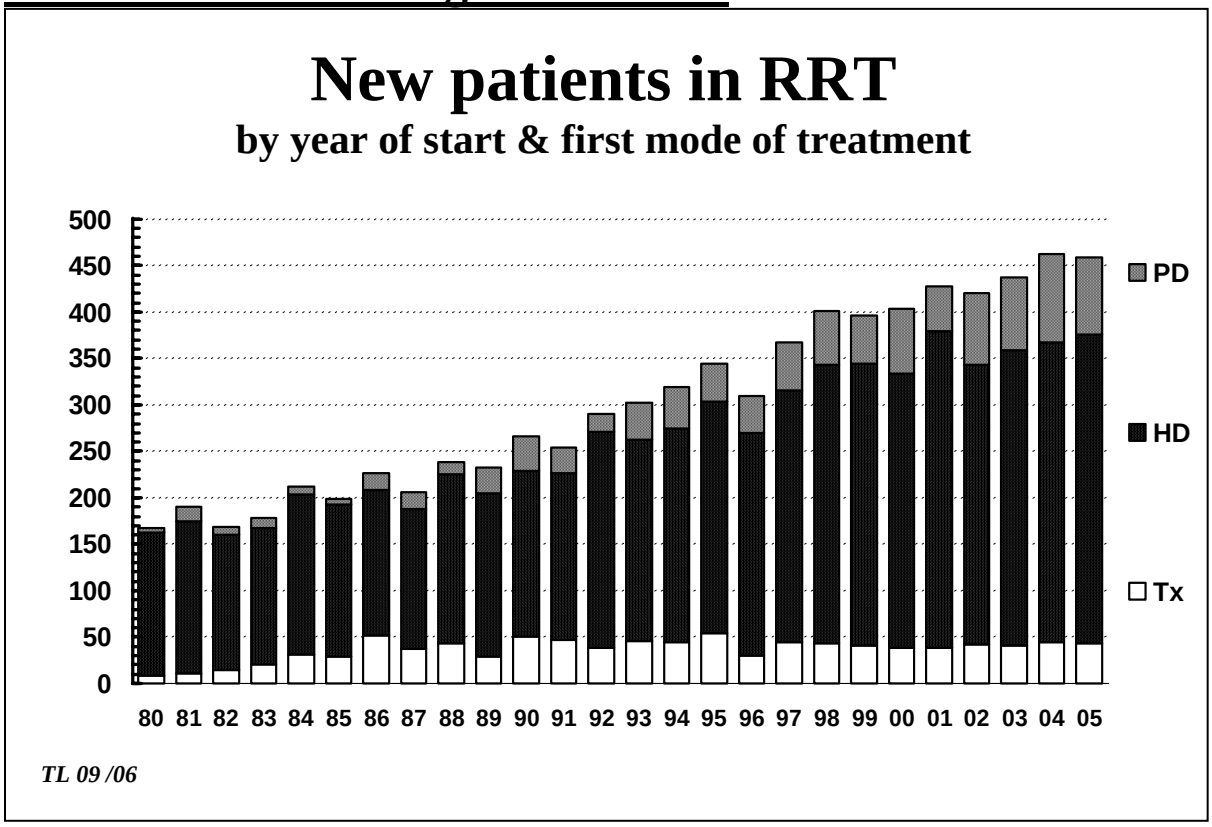
A majority of 69.1% were males and 30.9% females. Median age at start was 66.5 years, mean 62.0 years, ranging from nine days to 90 years.

Tabulated by first mode of treatment, and age at start of treatment:

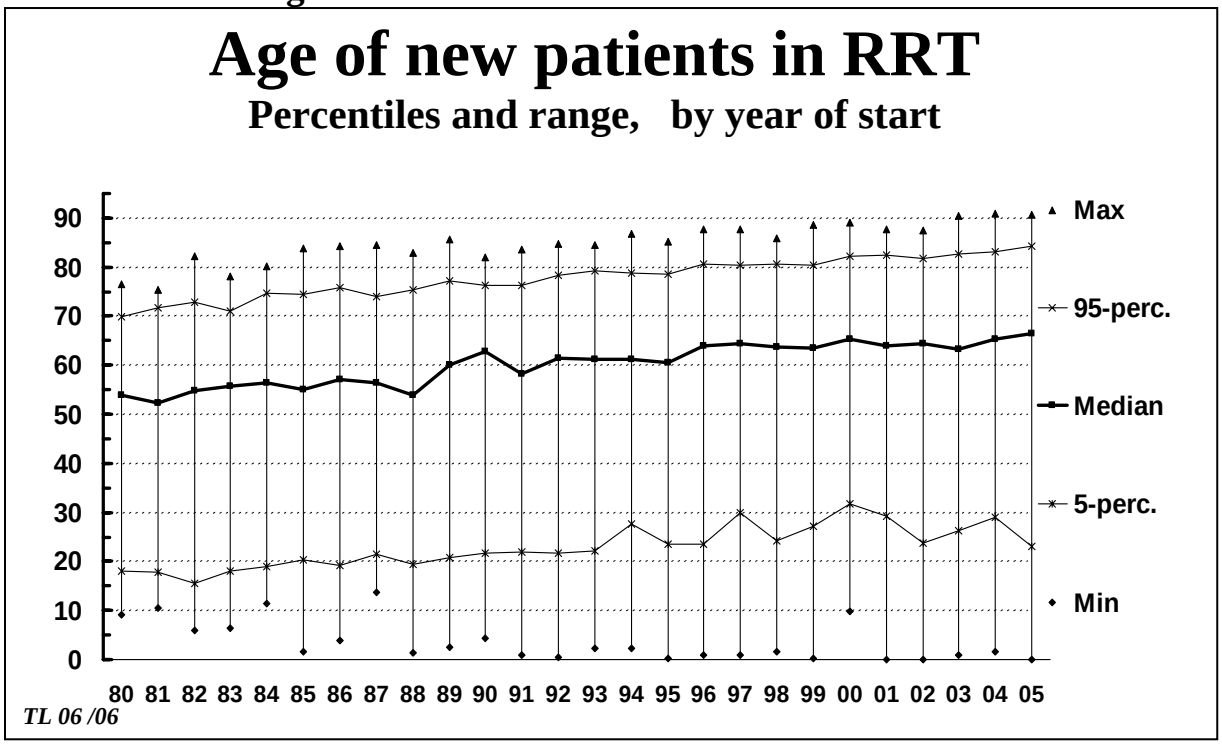
	< 15	15-24	25-34	35-44	45-54	55-64	65-74	75+	Total	in %
HD	4	8	14	24	31	52	81	119	333	72.5
PD	3	3	6	8	11	16	15	21	83	18.1
TX	5	1	4	8	5	9	11	0	43	9.4
Total	12	12	24	40	47	77	107	140	459	100
in %	2.6	2.6	5.2	8.7	10.2	16.8	23.3	30.5	100	

At start of treatment, 287 (62.5%) were considered by their nephrologist to be a potential candidate for transplantation, while 172 (37.5%) were accepted for life-long dialysis (constituting 43% of those starting with HD and 38% of those starting PD).
Among patients starting dialysis in 2005, 71% had been under control by the renal unit for at least four months, while 29% were previously unknown.

Incidence data: Changes 1980-2005



Incidence data: Age at start



Since registration started in 1980 there has been a continuous shift in patient age. Both the maximum and the median age at start of RRT have increased. Also the 5-percentile and 95-percentile values (i.e. including the majority of patients) have increased with a similar number of years. But also smaller children have been accepted; the youngest ever started PD in 2005 at age 13 days. The number of children below 15 years reached a new record of 12 in 2005, previously it has varied between two and ten per year.

Incidence data: Primary renal disease

	1980-84	1985-89	1990-94	1995-99	2000-04	2005
Glomerulonephritis	34%	36%	31%	24%	18%	19%
Pyelo/interstitial nephr.	17%	15%	11%	11%	11%	8%
Polycystic diseases	10%	10%	9%	9%	9%	7%
Diabetic nephropathy	13%	12%	12%	11%	15%	13%
Amyloidosis	7%	6%	6%	4%	3%	2%
Vascular/hypertensive	5%	8%	18%	25%	29%	32%
Immune/systemic	4%	5%	4%	5%	4%	3%
Kidney tumour	1%	1%	1%	1%	1%	1%
Myelomatosis	3%	2%	2%	2%	3%	3%
Other defined	3%	4%	4%	3%	4%	6%
Unknown	3%	3%	3%	4%	4%	6%
N:	912	1106	1418	1817	2149	459

The main change over time has been an increase of vascular/hypertensive nephropathy and a relative reduction of glomerulonephritis. Whether this only reflects changed coding practice or a true shift is not known.

Diabetic nephropathy has contributed 10-15% per year. Until 1995 sub-classification was not reliably registered. In 2005, 24 were registered as having Type I and 35 as Type II diabetes. In addition 50 patients with other types of primary renal disease were recorded having diabetes as a co-morbid factor (one was Type I and 49 Type II), thus 24% of new patients were diabetics.
The time from onset of diabetes to start of RRT differed considerably. For the 24 with Type I diabetes the mean time was 30.4 years, for the 35 with Type II diabetic nephropathy the mean time was 16.9 years. Type II diabetics judged to have a primary renal disease other than diabetic nephropathy in mean had 8.9 years of diabetes duration.

Cardiovascular disease is often present at start of RRT. Symptomatic heart disease was reported in 130 (28%); three out of these had a previous heart transplant. Left ventricular hypertrophy was reported in 97 (21%). Cerebrovascular disease was reported in 64 (14%) and peripheral arteriosclerotic disease in 95 patients (21%).

Prevalence data: Status by 31.dec. 2005.

By the end of 2005, 3383 patients in Norway received renal replacement therapy, i.e. 732.0 per million inhabitants. This represents an increase of 128 patients or 4 % since 2004.
Gender: 64.5% males and 35.5% females.

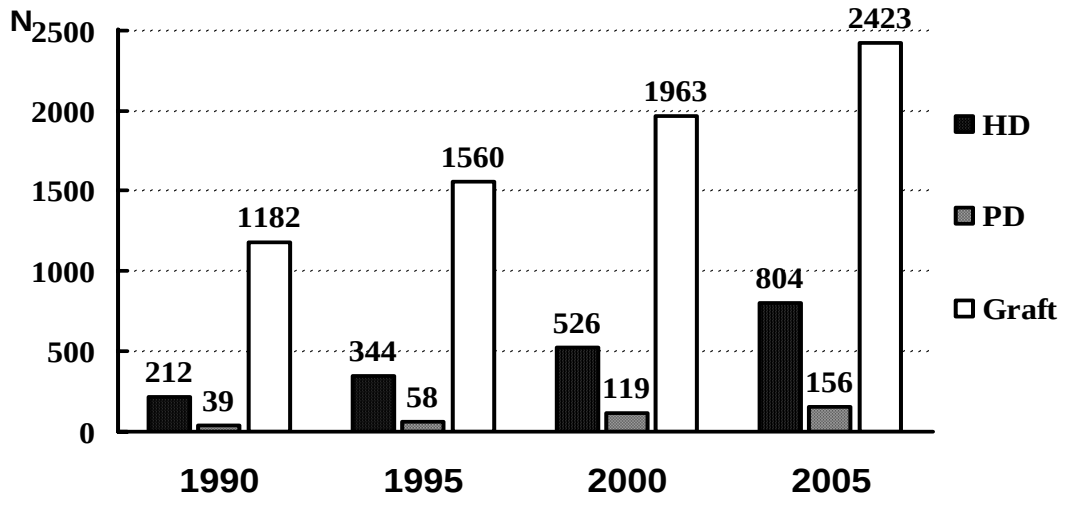
Median age by the end of the year was 57.7 years, mean 56.4 years and range 12 days-92.2 years.

Tabulated by last mode of treatment, and age by end of 2005:

	< 15	15-24	25-34	35-44	45-54	55-64	65-74	75+	Total	in %
HD	1	12	41	67	83	141	165	294	804	23.8
PD	2	3	8	13	19	30	25	56	156	4.6
TX	40	76	206	385	516	645	391	164	2423	71.6
Total	43	91	255	465	618	816	581	514	3383	100
In %	1.3	2.7	7.5	13.7	18.3	24.1	17.2	15.2	100	

Renal replacement therapy in Norway

Prevalence of treatment modes in 1990, -95, 2000 and 2005.



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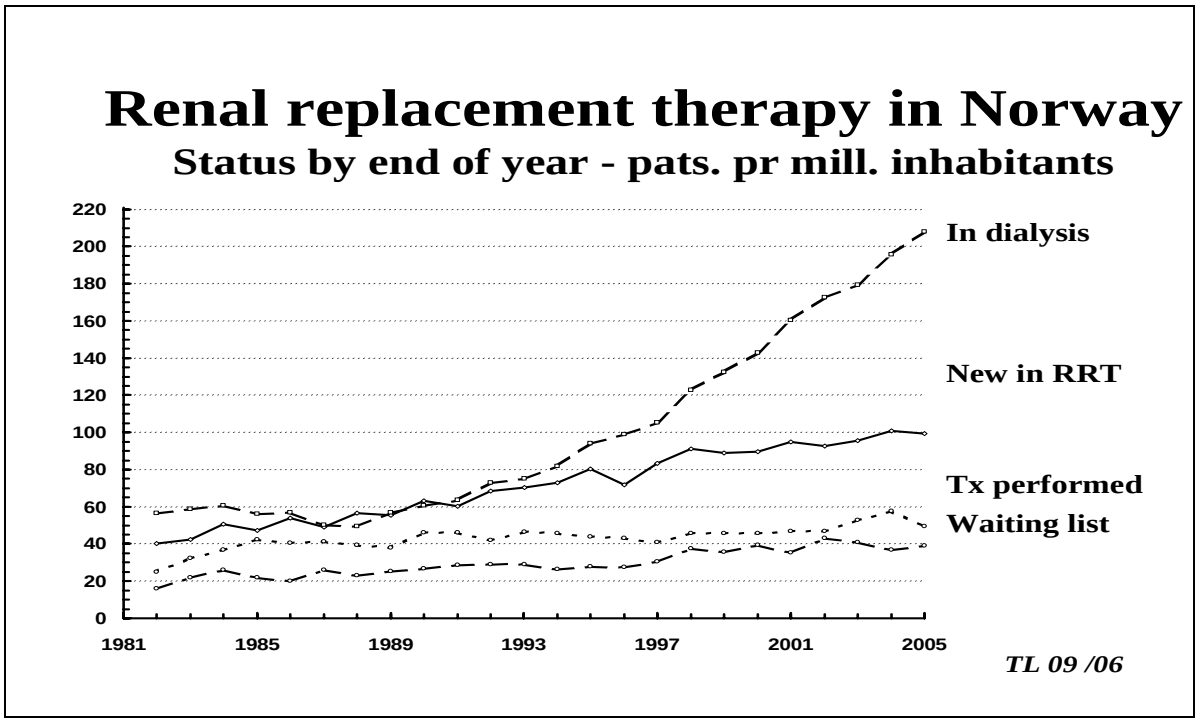
Transplantation and waiting lists:

A total of 229 renal transplants were performed at Rikshospitalet University Hospital in 2005, i.e. 49.6 per million inhabitants. In 87 (38%) the graft came from a living donor (LD), 23 of those were biologically unrelated to the recipient (13 were spouses). Among the LD-graft recipients 25 out of 75 first graft recipients were grafted pre-emptively, six out of 12 re-graft recipients did not receive dialysis. 142 patients received a deceased donor (DD) graft, 18 out of the 116 first graft recipients were pre-emptively transplanted (16 %), while six out of 26 had a re-graft without entering dialysis. There were 191 first grafts (75 LD and 116 DD), 33 were second grafts (9 LD, 24 DD), 4 third grafts (3 LD, 1 DD), and one fourth graft (DD). Simultaneous kidney + pancreas transplantation was performed in ten. Among patients with a functioning kidney graft four received one or more doses of isolated Langerhans Islet cells and one received a whole pancreas ("dyssynchroneous").

In principle, transplantation is offered to all patients considered to profit from it, with no strict upper or lower age limit. The age of the 116 first DD-graft recipients in 2005 ranged from 8 to 80 years, with a mean age of 56.5 y. Out of these, 32 % were above the age of 65 and 6 % were 75 or older. The 75 recipients of a first LD-graft were from 2 to 75 years, mean 44.7 y. Regraft recipients (n=38) were from 15 to 70 years, mean 44.4 y.

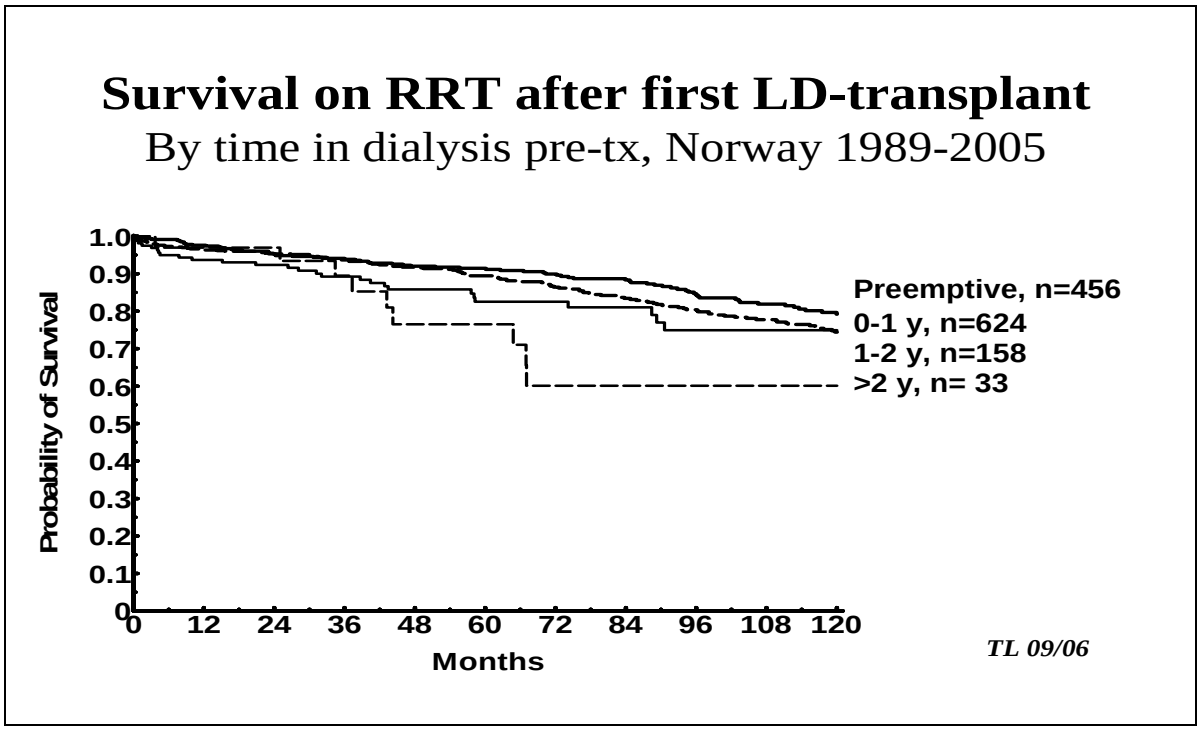


By end 2005, 180 patients (39.0 per mill.) were on the active waiting list for a DD renal graft. This represented an increase of 11 patients (7%) since 2004. Among those waiting by Dec.31, median time on the list was 8 months. 38 % had waited less than 6 months, 65 % less than one year and 11 % more than two years. The 142 recipients given a DD-graft in 2005 had a median waiting time of 8 months and a maximum of 68 months at the time of grafting. Among the 960 patients in dialysis treatment by Dec.31, 455 (47.4 %) were for various reasons not considered candidates for a new renal graft.

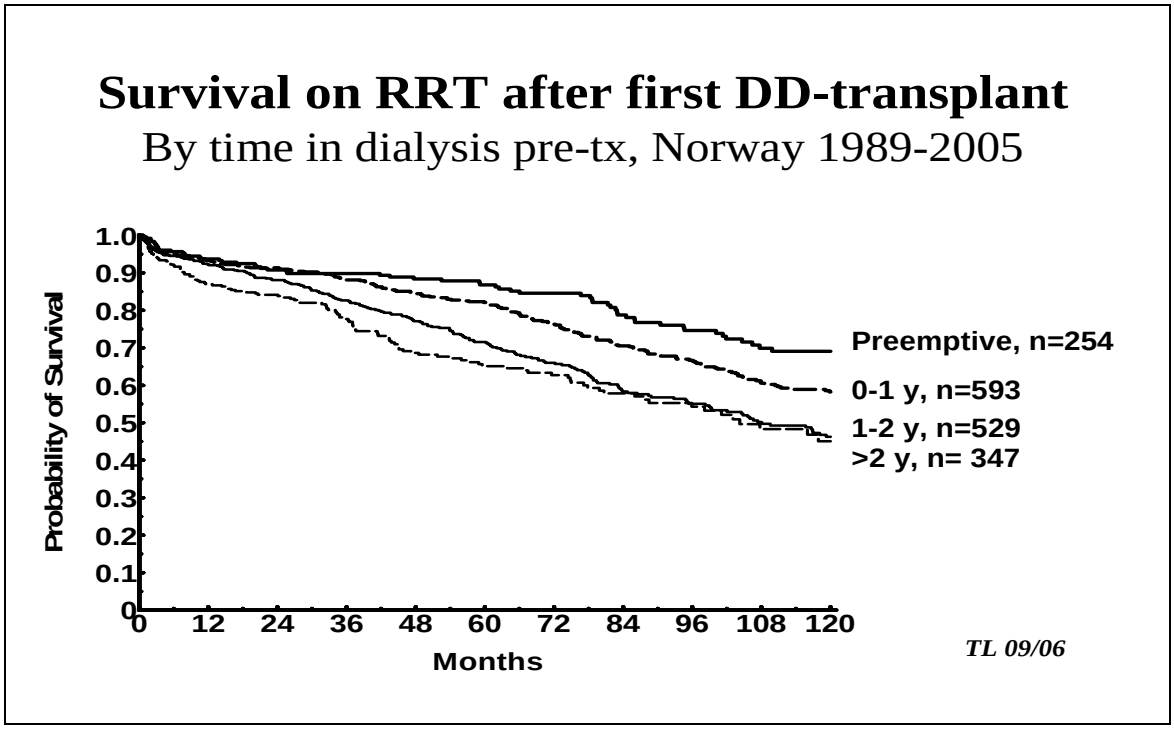
Effect of pretransplant dialysis on survival after Tx.

Since the start of an organised transplantation programme in Norway, pre-emptive transplantation has always been preferred. Pre-transplant dialysis time for first graft recipients has also been relatively short. To see whether time on dialysis influences post transplant patient survival in our transplanted population, we calculated patient survival by end of August 2006 for all patients receiving a first renal graft during 1989-2005 by Kaplan-Meier method, censoring only for date of emigration. Patients were grouped according to source of first graft (LD or DD) and time of pre-transplant dialysis.

In recipients of a first LD graft, 36% were transplanted pre-emptively, only 15% had been on dialysis for more than one year. As appears from the figure below, only those with more than two years of dialysis had an inferior ten-year survival. However, the patients with more than one year of dialysis had significantly higher mean age, and also a higher proportion with HLA-antibodies (PRA) pre-transplant, both factors well known to lead to reduced graft survival. When performing a Cox-analysis using recipient and donor age together with PRA positivity, HLA-DR mismatch and dialysis time as covariates, only the age of recipient and donor significantly influenced the ten-year patient survival. This was the case whether dialysis time was used as a continuous or a categorical variable.
So while there are several arguments in favour of pre-emptive LD-transplantation, we can not substantiate that pre-transplant dialysis is a significant risk factor.



Among recipients of a first deceased donor graft, 15% were pre-emptively transplanted, 51% had more than one year and 20% more than two years of dialysis. Here we could see a significant survival advantage from avoiding dialysis, further those with dialysis time of less than one year had significantly better 10 year survival than those with longer dialysis time. But also among the DD-graft recipients, the mean patient age and the PRA positive proportion was higher with increasing time on dialysis. Furthermore mean donor age was also higher in those with more than one year of dialysis.

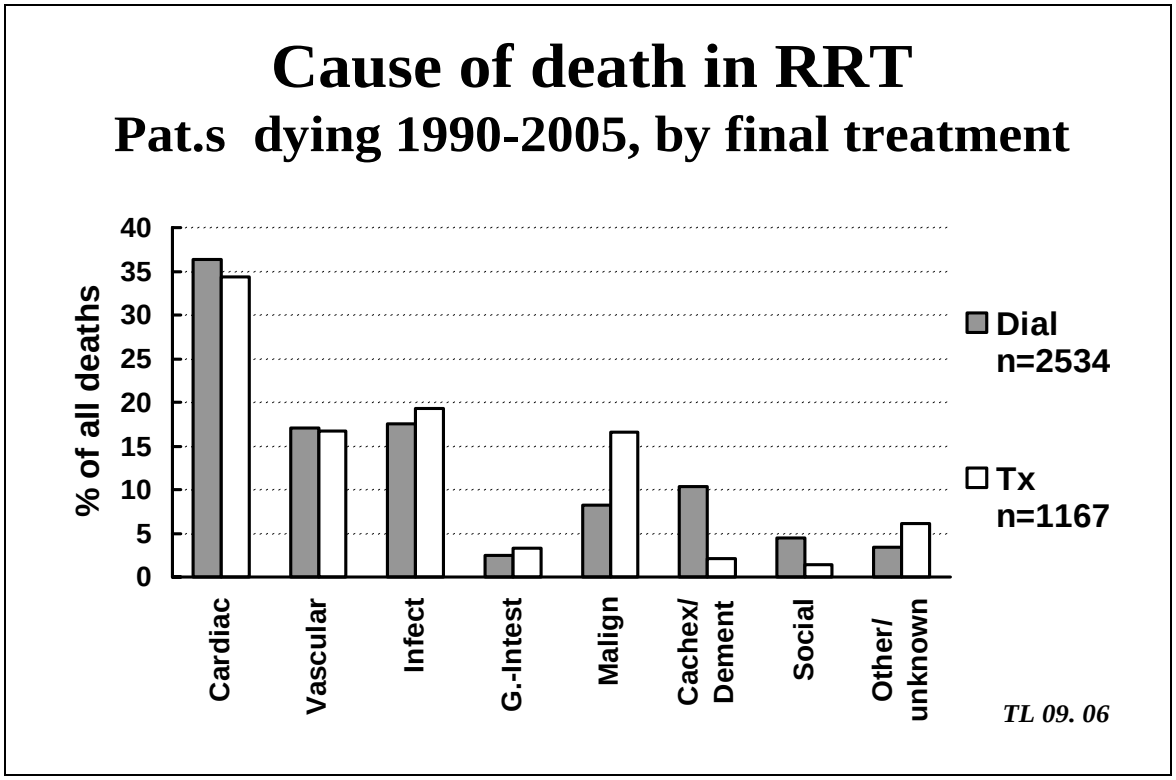


When performing a Cox-analysis using recipient and donor age together with PRA positivity, HLA-DR mismatch and dialysis time as covariates, the age of the recipient and the presence of HLA-DR mismatch had the strongest influence (both $p<0.0001$) on the ten-year patient survival. Also dialysis time used as a continuous variable was strongly correlated with reduced survival ($p=0.0001$), used as a categorical variable only time exceeding one year seemed significant. Also donor age was of importance ($p=0.006$), while an effect of PRA+ was not apparent in this analysis.

It is not clear whether the negative influence of pre-transplant dialysis time on patient survival in DD-recipients is caused by the dialysis treatment; it is likely that this older group also has more advanced cardiovascular disease.

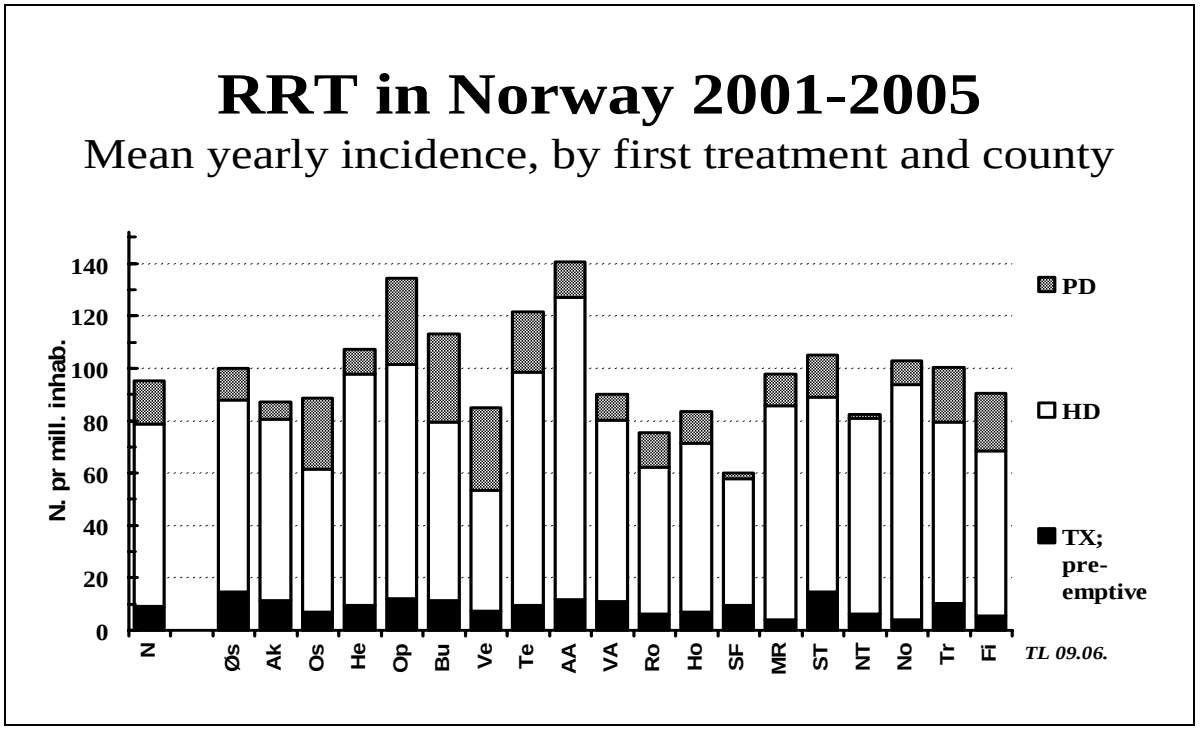
Death in RRT:

A total of 314 patients in renal replacement therapy died during 2005, i.e. 8.4 % out of the 3712 persons at risk. Among these, 66% were males and 34% females. Median age at death was 74 years, mean 71.0 years, and the range 22-92 years. Median time from start of RRT until death was 31 months, with a range spanning from six days to 34 years.
The final mode of treatment was HD for 211 patients and PD for 20, while 83 died with a more or less well-functioning graft. Six died within two months after graft loss; thus 89 deaths were termed 'TX-related'. Dialysis treatment was terminated and followed by death in 44 patients, seven of those because the patient refused further treatment.
As in previous years, cardiac (32%) complications were the most frequent causes of death, followed by infections (20%), malignant tumours (15%), and vascular complications (11%). The following figure illustrates the cumulated data from a 16 year period.



Regional differences within Norway.

Incidence:
During all the years since data collection was started, the number of patients reported has differed substantially between centres, also after correction for population size. Further the first mode of treatment (HD, PD or pre-emptive transplant) for new patients differs considerably. In the following figure, patients were grouped by county of domicile at RRT-start and the incidences were calculated as a yearly mean for the five-year period 2001-2005:



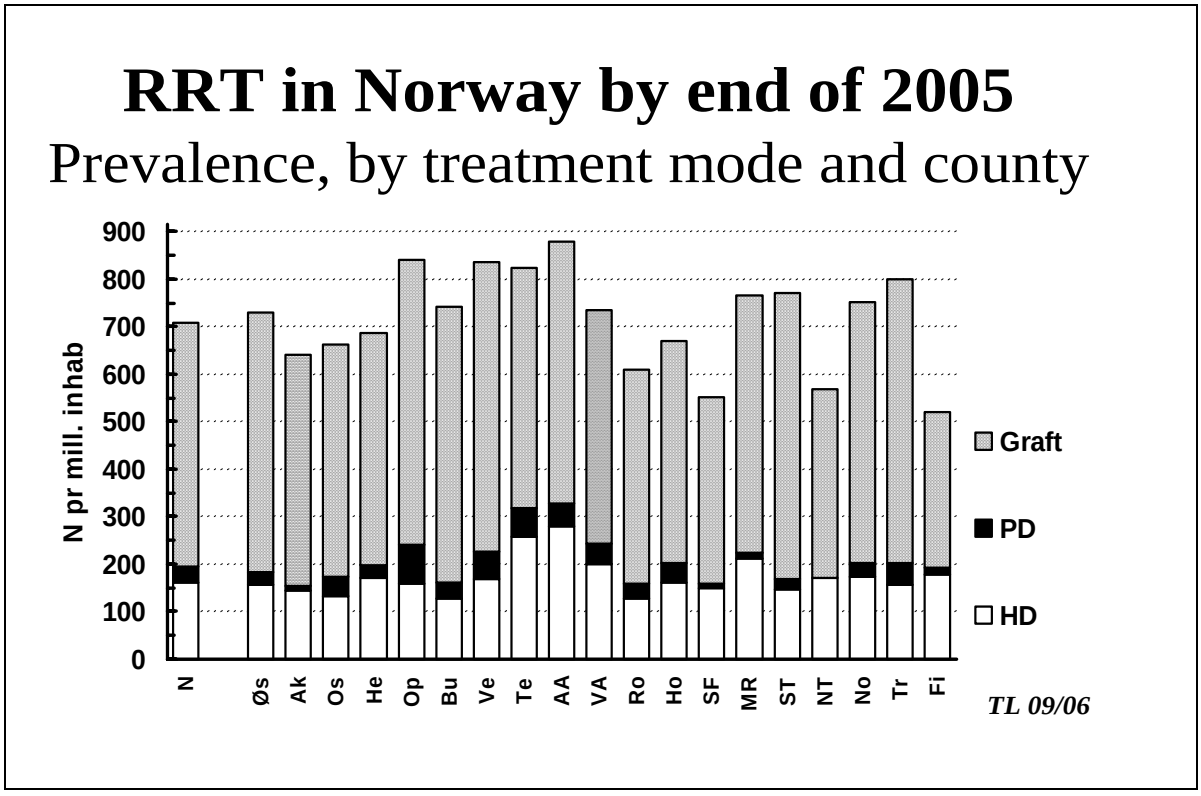
As appears, the mean yearly incidence of RRT-start varied from 60 to 141 pr. million. Noticeably, the county having the lowest incidence (Sogn og Fjordane) is also known to be where people live the longest and have the lowest general morbidity. Also noteworthy is that Aust-Agder which had the second lowest mean yearly incidence during the 90ies (55/mill) now is in lead with 141/mill.

Although there is national consensus that pre-emptive transplantation is preferable, this was only achieved in 10 %; in the individual counties this figure ranged from 4 % to 17 %.
In some counties PD is rarely used, in others up to 32 % of new patients have this as first treatment mode. 73 % received HD as first treatment mode, in the counties this ranged from 57 % to 92 %.

The proportion of the new patients in 2005 who started RRT without having been known by the renal unit for at least 4 months was 26 %, with wide variations between centres; from 10% in one centre and up to 67 % at highest. In the majority of these cases the diagnosis would imply that renal failure has developed gradually over years. Over the years, these figures seem not to have improved; thus in most counties it seems to be need for improved co-operation within the primary health service in order to achieve early referrals.

We have previously reported marked centerwise differences in the age distribution of incident patients. In 2005 mean age of new patients in the different counties ranged from 53 to 75 years. Huge variation in age-specific incidence between counties was shown last year and is not presented this year.

Prevalence:
Again, the data demonstrate great differences between the counties. In all counties the majority of patients have a functioning graft, constituting from 61% to 78% of the total RRT-population. The dialysis prevalence ranges from 155 to 329 per mill. inhabitants in the counties, indicating considerable differences in workloads and costs. In some counties, two out of three dialysis patients are not considered candidates for a new graft, in others this applies to 25-30 %. But counties with high dialysis prevalence do not necessarily have a high prevalence of 'non-transplantable' patients.



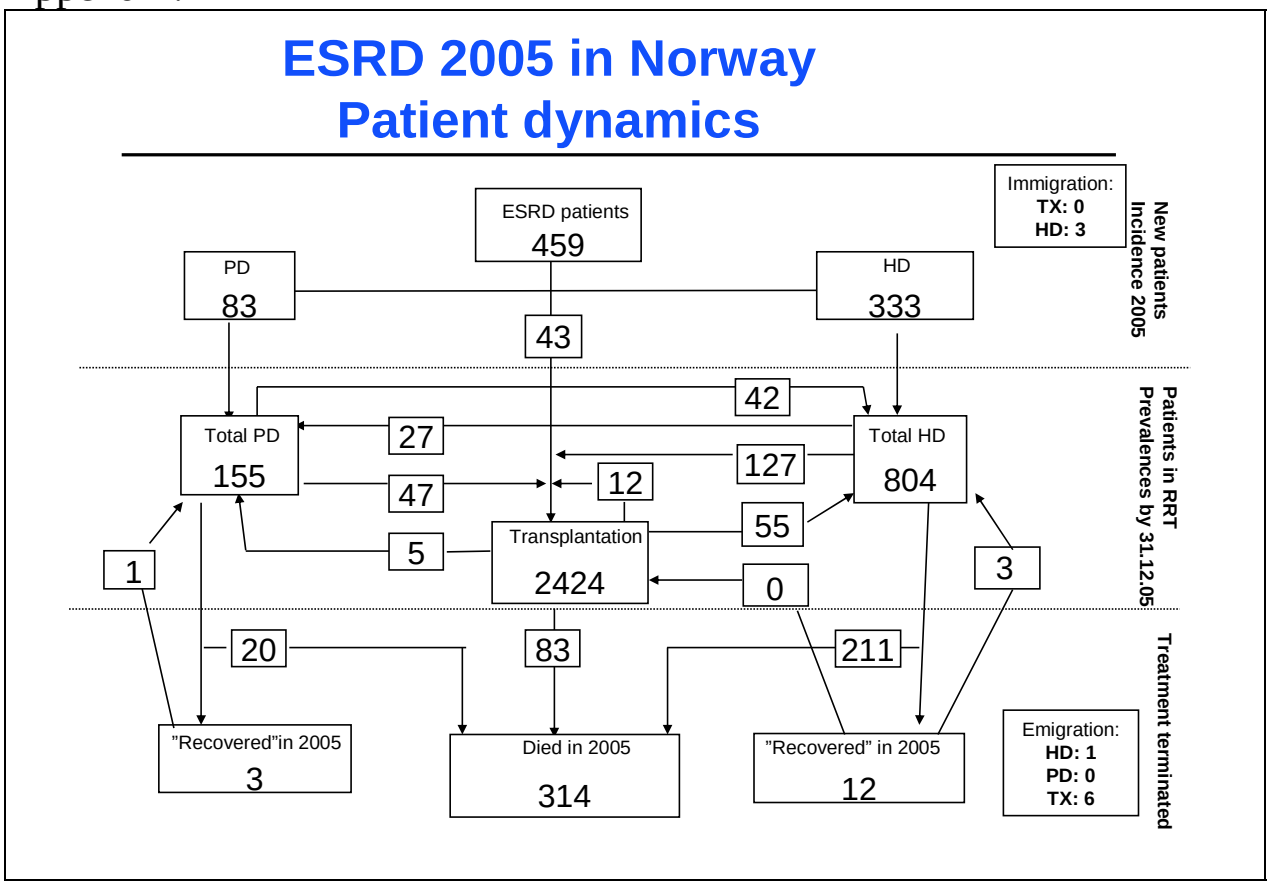
Concluding remarks:

The incidence of chronic renal failure is still rising, although the increase may seem to have levelled off. With the increased survival rates seen in the later years (see the 2004-report) a markedly increased prevalence of RRT-patients can be expected over the coming years. The marked county differences may indicate that in some areas there still is under-treatment, if so, we can still expect further increased national incidence. The high transplantation rates achieved in the later years may have retarded the yearly increase in dialysis prevalence somewhat. It is not obvious that the supply of organs for transplantation will rise further; in 2005 it fell by 14% compared to 2004 and it may even decrease further. Thus, the number of patients in dialysis will probably still rise and they will constitute an increasing proportion of the RRT-population.

Compared to the Swedish RRT-incidence, 118 per million in 2005, and prevalence, 815 per million, and the Danish figures of 121 and 768 respectively, Norwegian numbers still are low. There are no obvious reasons for such a difference between our nations that are so similar in most respects. Therefore, the Norwegian health service needs to prepare for accommodating a significantly increased number of RRT-patients in the coming years.

Report completed 26.09.2006
Torbjørn Leivestad M.D.

Appendix:



	New pat. in 2005				Pat. in RRT pr 01.01.2006				Dialyses etc. in 05			Died		
	HD/ HDF	PD	Pre-emp Tx	Totalt	HD/ HDF	PD	Graft	Tot	HDses-sions	Plasm. exch.	Other	Dial.pat.	Tx-pat.	Not tx-candidate
Tromsø	7	8	1	16	32	11	107	150	4572	108	0	7	1	10
Harstad	4	0	0	4	9	0	35	44	1446	0	0	2	2	7
Bodø	27	4	0	31	41	9	110	160	5181	25	99	20	3	15
Levanger	16	2	1	19	29	2	49	80	3923	65	0	8	0	19
Trondheim	29	4	5	38	63	6	174	243	9130	214	326	14	7	41
Ålesund	12	5	1	18	47	5	129	181	7219	25	0	10	7	38
Førde	5	0	1	6	18	1	35	54	2623	10	0	2	1	14
Bergen	26	5	3	34	68	15	204	287	10661	182	74	9	6	48
Fonna	8	0	0	8	24	5	49	78	3649	25	0	5	4	14
Stavanger	15	3	3	21	35	8	154	197	6151	90	51	12	7	18
Kristiansand	14	3	1	18	38	7	85	130	4962	31	0	10	3	21
Arendal	8	2	2	12	24	4	55	83	4192	10	0	10	2	14
Skien	16	5	2	23	36	12	94	142	5735	0	111	14	3	26
Tønsberg	4	2	2	8	32	6	130	168	4927	87	8	12	6	13
Drammen	16	13	2	31	45	11	135	191	4610	16	0	13	2	22
Lillehammer	15	6	1	22	32	17	106	155	5077	5	0	14	3	22
Elverum	15	2	2	19	29	3	84	116	*4131*	0	25	12	5	11
Fredrikstad	20	1	4	25	46	3	149	198	6568	60	0	8	6	23
AHUS	27	5	5	37	46	7	115	168	6755	0	0	15	3	23
Ullevål	40	11	4	55	91	20	222	333	12322	43	0	23	6	38
RH	9	2	3	14	19	4	202	225	3685	275	96	5	12	18
SUM	***333***	***83***	***43***	***459***	***804***	***156***	***2423***	***3383***	***117519***	*1271*	*790*	**225**	**89**	***455***
- Pr. mill inh.	*72,1*	*18,0*	*9,3*	*99,3*	*174,0*	*33,8*	*524,3*	*732,0*	*i.e.+ 9,5 %*					*98,5*

% of total	*72,5*	*18,1*	*9,4*	*100,0*	*23,8*	*4,6*	*71,6*	*100,0*	*from 2004*		*47,4*

Vedlegg 2

2000-2006 Hemodialysebehandlinger ved UUS