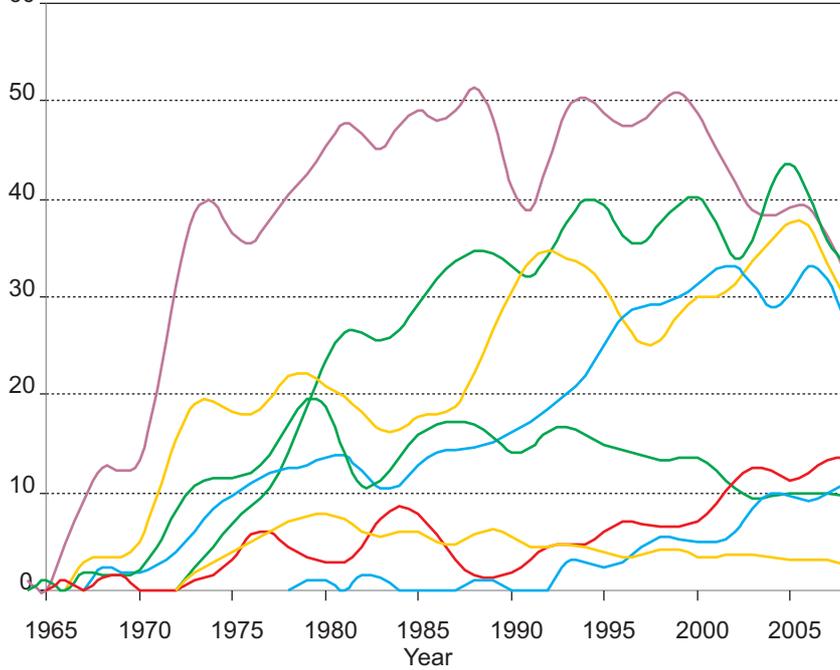


Report 2008

Kidney transplantations / year

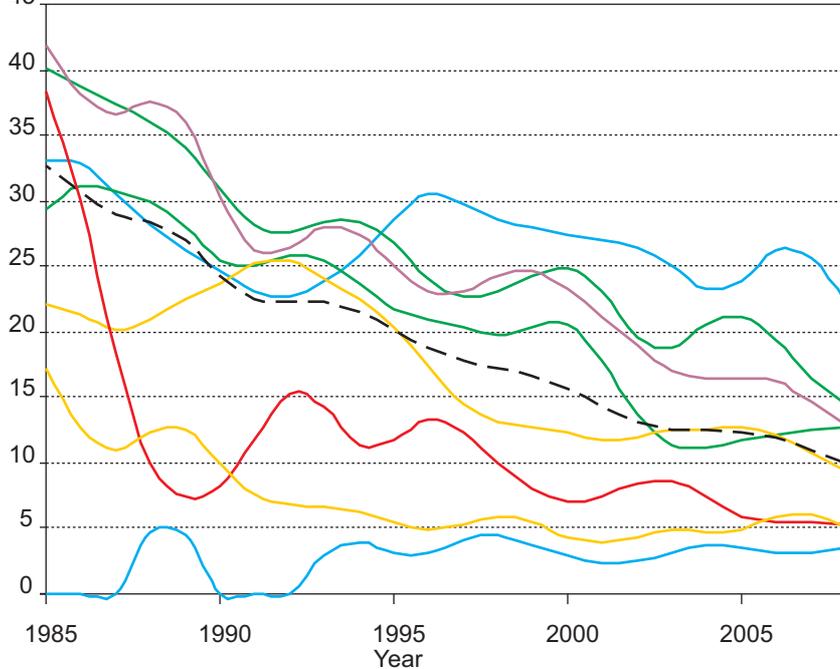


Type 1 diabetes
 Glomerulonephritis
 Other defined diagnosis*
 Polycystic degeneration

Undefined kidney disease
 Type 2 diabetes
 Pyelonephritis
 Amyloidosis

*Nephrosclerosis, other systemic diseases, urinary tract obstruction, congenital diseases, and tubulointerstitial nephritis, among others

Kidney transplantations /100 patient-years in dialysis



Polycystic degeneration

Type 1 diabetes
 Glomerulonephritis
 Pyelonephritis
 All diagnoses
 Other defined diagnosis*
 Undefined kidney disease
 Amyloidosis
 Type 2 diabetes

*Nephrosclerosis, other systemic diseases, urinary tract obstruction, congenital diseases, and tubulointerstitial nephritis, among others



Finnish Registry for Kidney Diseases – Report 2008

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Finnish Registry for Kidney Diseases – Report 2008

Report 2008 is the 17th annual report of the Finnish Registry for Kidney Diseases. Each year, the report gives the newest data on incidence and prevalence of renal replacement therapy (RRT), i.e. dialysis and kidney transplantation. RRT patients' mortality has been reported since 2002. In addition to epidemiological trends, the reports have presented various special analyses of causes of death, laboratory tests, comorbidity, variables affecting survival prognosis, treatment standards, immunosuppressive treatment, and function of kidney grafts, among others. This year, the proportion of the annual report that changes slightly each year is not presented. This will be presented at regular intervals in the future. The Finnish Registry for Kidney Diseases is estimated to cover 97–99% of all Finnish patients receiving RRT since 1964. At the end of 2008, the registry contained data on 11 357 patients, 4 081 of whom were still alive.

The number of new RRT patients had increased constantly until the year 1999, after which the incidence has stabilized at 95 new patients per million inhabitants. The incidence of types 1 and 2 diabetes, glomerulonephritis, and polycystic degeneration patients on RRT increased constantly until the end of the 1990s. Thereafter, the incidence has remained stable. The incidence of patients with amyloidosis and pyelonephritis receiving RRT has decreased.

The prevalence of RRT has increased each year because the number of deaths among RRT patients is lower than the number of patients entering RRT. Prevalence among healthcare districts varied widely from 579 to 1081 RRT patients per million inhabitants in 2008. This reflects differences in populations between healthcare districts, but probably also differences in RRT standards. The most common diagnosis of RRT patients is glomerulonephritis, although its proportion is decreasing.

RRT patients' mortality has dropped in recent years. With age standardization, the decreased mortality is even more evident. On pages 13 and 14, mortality is presented in two five-year time intervals, 1999–2003 and 2004–2008. Mortality has decreased by 7% in the entire country. Because the mean age of RRT patients has increased, the decrease in mortality is greater (17%) with age and gender standardization. Decreased mortality is apparently the result of advancements in RRT and other matters related to disease treatment and public health.

This year's special analysis concerns kidney transplantations. The number of kidney transplantations has remained virtually the same for 20 years, averaging

169 transplantations per year. The number of patients on RRT is constantly increasing, which has led to longer periods on dialysis before the first kidney transplantation and a decreased relative number of transplantations according to patient-years in dialysis. As the mean age of RRT patients is rising, transplantations are performed on increasingly older patients. Nevertheless, survival of transplant recipients and grafts is consistently improving.

The Finnish Registry for Kidney Diseases is a national healthcare registry maintained by the Finnish Kidney and Liver Association and financed by Finland's Slot Machine Association (RAY). Statistics in this report were updated using data obtained from the Registry for Follow-up of Kidney Transplantation Patients, which is maintained by the Kidney Transplantation Unit of Helsinki University Central Hospital. The Board of the Finnish Registry for Kidney Diseases thanks all supporters and participating hospitals for excellent cooperation.

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Table 1. The Finnish population and its distribution in healthcare districts.
Finnish Registry for Kidney Diseases 1998–2008

Healthcare district (1000 inhabitants)	Year					Change (%) 1998–2008
	1998	2003	2006	2007	2008	
1 Helsinki-Uusimaa	1356	1423	1460	1477	1495	10.2
3 Varsinais-Suomi	447	456	461	463	465	4.0
4 Satakunta	237	231	229	228	228	-3.9
5 Kanta-Häme	165	167	170	171	173	4.9
6 Pirkanmaa	440	456	469	473	477	8.5
7 Päijät-Häme	209	210	211	211	212	1.4
8 Kymenlaakso	185	181	180	179	179	-3.6
9 Etelä-Karjala	130	129	128	128	128	-2.1
10 Etelä-Savo	114	110	109	108	107	-6.0
11 Itä-Savo	58	55	54	53	52	-9.4
12 Pohjois-Karjala	178	174	172	171	170	-4.6
13 Pohjois-Savo	257	251	249	249	248	-3.3
14 Keski-Suomi	265	268	270	271	272	2.6
15 Etelä-Pohjanmaa	203	199	199	199	199	-2.2
16 Vaasa	162	161	162	163	164	1.4
17 Keski-Pohjanmaa	79	77	77	78	78	-1.6
18 Pohjois-Pohjanmaa	365	376	384	387	390	6.7
19 Kainuu	88	83	81	80	80	-9.3
20 Länsi-Pohja	70	67	66	66	66	-6.3
21 Lappi	127	120	119	119	118	-6.5
22 Åland	26	26	27	27	27	7.1
Region South	1671	1733	1769	1784	1801	7.7
Southwest	709	714	717	718	720	1.4
West	1179	1192	1210	1218	1225	3.9
East	872	858	853	851	850	-2.5
North	728	723	727	729	731	0.4
Entire country	5160	5220	5277	5300	5326	3.2

On 31 December 2008, there were 5.326 million inhabitants in Finland (Table 1, Source: Statistics Finland). During the past ten years the population for the country overall has increased by 3.2%. The fastest increase has occurred in the southern region. In the eastern region, the population has decreased, and in the northern region it has remained virtually unchanged. Since 1998, the populations have increased in nine healthcare districts and decreased in twelve. The decrease has been especially fast, almost 10%, in the healthcare districts of Kainuu and Itä-Savo. The population has increased the most in the healthcare district of Helsinki-Uusimaa.

The numbers in Figure 1 refer to the healthcare districts listed in Table 1. In this report, “region” refers to a university hospital region.

Figure 1. Healthcare districts and regions in Finland.
Finnish Registry for Kidney Diseases 2008

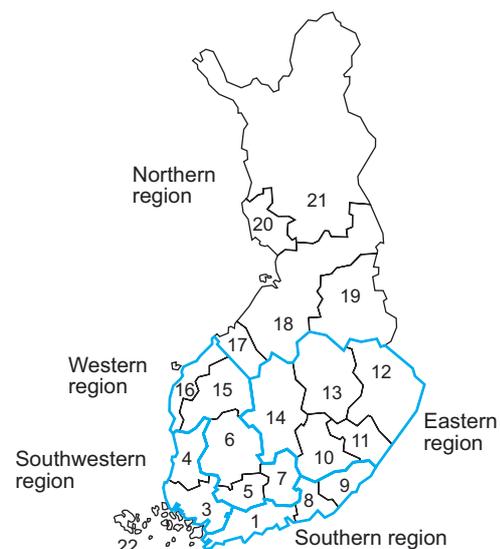


Table 2. The Finnish population according to region, age group, and gender.
Finnish Registry for Kidney Diseases 1998–2008

Region	1998					2008				
	0– 19 y (%)	20– 64 y (%)	65– 74 y (%)	≥ 75 y (%)	Entire country	0– 19 y (%)	20– 64 y (%)	65– 74 y (%)	≥ 75 y (%)	Entire country
South										
Men	206 (26)	522 (65)	51 (6)	26 (3)	804 (100)	210 (24)	560 (64)	64 (7)	39 (4)	873 (100)
Women	198 (23)	536 (62)	69 (8)	64 (7)	867 (100)	203 (22)	571 (62)	78 (8)	76 (8)	928 (100)
Total	404 (24)	1057 (63)	120 (7)	90 (5)	1671 (100)	413 (23)	1130 (63)	142 (8)	115 (6)	1801 (100)
Southwest										
Men	86 (25)	215 (62)	28 (8)	16 (5)	344 (100)	81 (23)	215 (61)	32 (9)	23 (6)	351 (100)
Women	82 (22)	211 (58)	37 (10)	35 (10)	366 (100)	77 (21)	213 (58)	37 (10)	42 (11)	369 (100)
Total	167 (24)	426 (60)	65 (9)	51 (7)	709 (100)	158 (22)	429 (60)	69 (10)	64 (9)	720 (100)
West										
Men	148 (26)	354 (62)	46 (8)	26 (4)	574 (100)	143 (24)	369 (61)	52 (9)	37 (6)	602 (100)
Women	141 (23)	344 (57)	61 (10)	58 (10)	604 (100)	137 (22)	356 (57)	61 (10)	69 (11)	623 (100)
Total	289 (25)	698 (59)	107 (9)	84 (7)	1179 (100)	281 (23)	725 (59)	113 (9)	106 (9)	1225 (100)
East										
Men	110 (26)	264 (62)	37 (9)	18 (4)	429 (100)	95 (23)	257 (61)	40 (9)	28 (7)	419 (100)
Women	105 (24)	250 (56)	47 (11)	41 (9)	443 (100)	92 (21)	243 (56)	45 (10)	51 (12)	430 (100)
Total	215 (25)	513 (59)	84 (10)	59 (7)	872 (100)	187 (22)	500 (59)	85 (10)	78 (9)	850 (100)
North										
Men	105 (29)	220 (60)	27 (7)	13 (3)	365 (100)	95 (26)	221 (60)	30 (8)	20 (6)	367 (100)
Women	101 (28)	204 (56)	32 (9)	26 (7)	364 (100)	91 (25)	206 (56)	34 (9)	34 (9)	364 (100)
Total	206 (28)	424 (58)	59 (8)	39 (5)	728 (100)	186 (25)	426 (58)	64 (9)	55 (8)	731 (100)
Entire country										
Men	654 (26)	1574 (63)	189 (8)	99 (4)	2516 (100)	625 (24)	1621 (62)	218 (8)	147 (6)	2612 (100)
Women	627 (24)	1545 (58)	247 (9)	225 (8)	2644 (100)	599 (22)	1589 (59)	255 (9)	272 (10)	2715 (100)
Total	1281 (25)	3119 (60)	435 (8)	323 (6)	5160 (100)	1224 (23)	3210 (60)	473 (9)	419 (8)	5326 (100)

Table 2 shows the distribution of the Finnish population according to region, age, and gender at the end of 1998 and 2008. The proportion of inhabitants older than 65 years in the entire country has increased from 15% to 17%. In the southern region, the proportion of inhabitants older than 65 years is the smallest (14%) and the proportion of 20–64-year-olds is the largest (63%). In the northern region, the proportion of 0–19-year-olds is the largest (25%). The age of the Finnish population has increased considerably during the past ten years. The number of inhabitants younger than 20 years has decreased by 4%, whereas the number of inhabitants older than 75 years has increased by 30%, or by 95 803 persons.

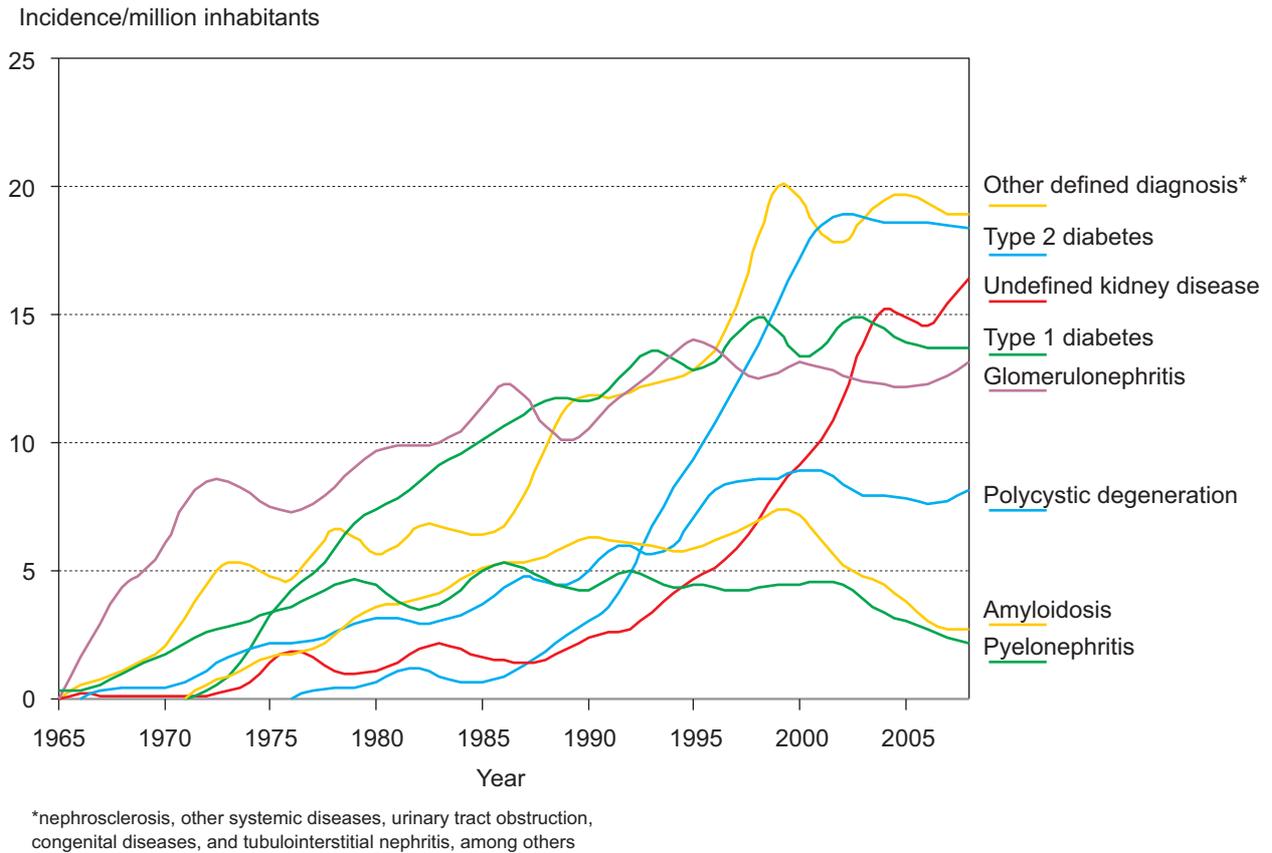
Table 3. Number of new RRT patients and incidence of RRT by healthcare district and region.
Finnish Registry for Kidney Diseases 1998–2008

Healthcare district	Number of new RRT patients						Incidence of RRT/million inhabitants						
	1998	2003	2006	2007	2008	2004–2008 on average	1998	2003	2006	2007	2008	2004–2008 on average	
1	Helsinki-Uusimaa	125	131	89	98	117	105	92	92	61	66	78	72
3	Varsinais-Suomi	42	51	47	44	56	46	94	112	102	95	121	100
4	Satakunta	20	19	22	30	24	24	84	82	96	131	105	105
5	Kanta-Häme	16	16	8	14	16	16	97	96	47	82	92	94
6	Pirkanmaa	49	37	57	62	40	49	111	81	122	131	84	105
7	Päijät-Häme	14	31	20	21	27	26	67	148	95	99	127	123
8	Kymenlaakso	12	20	22	28	23	23	65	110	122	156	129	128
9	Etelä-Karjala	11	20	12	15	22	18	84	155	94	117	172	140
10	Etelä-Savo	13	5	10	10	5	8	114	45	92	93	47	74
11	Itä-Savo	13	7	10	4	5	6	225	128	187	76	96	112
12	Pohjois-Karjala	14	12	14	17	14	17	78	69	82	99	82	99
13	Pohjois-Savo	34	24	22	30	26	24	132	95	88	121	105	96
14	Keski-Suomi	21	18	22	23	28	25	79	67	82	85	103	93
15	Etelä-Pohjanmaa	15	18	19	17	12	15	74	90	96	85	60	75
16	Vaasa	17	18	7	17	15	15	105	112	43	104	91	92
17	Keski-Pohjanmaa	7	8	10	4	6	8	89	103	129	51	77	103
18	Pohjois-Pohjanmaa	22	30	30	31	38	36	60	80	78	80	98	94
19	Kainuu	6	9	14	10	4	12	68	109	173	125	50	148
20	Länsi-Pohja	4	8	11	7	15	9	57	120	166	106	229	136
21	Lappi	8	13	9	7	6	8	63	108	76	59	51	67
22	Åland	1	2	1	2	5	2	39	76	37	74	182	74
Region	South	148	171	123	141	162	146	89	99	70	79	90	82
	Southwest	63	72	70	76	85	73	89	101	98	106	118	102
	West	111	120	111	131	110	121	94	101	92	108	90	100
	East	95	66	78	84	78	80	109	77	91	99	92	94
	North	47	68	74	59	69	74	65	94	102	81	94	102
Entire country		464	497	456	491	504	494	90	95	86	93	95	94
	Children <15 y	9	9	7	11	3	8	9	10	8	12	3	9

The number of new RRT patients and the incidence of RRT are presented according to healthcare district and region in Table 3. In 2008, the incidence was 3% higher than in 2007 and was close to the average of the last five years. Since 1998, the incidence has increased by 9%. In 2004–2008,

the average incidence was largest in the southwestern and northern regions and smallest in the southern region. In the healthcare districts, the average incidence in 2004–2008 was 67–148 new RRT patients/ million inhabitants, which implies rather large regional differences.

Figure 2. Incidence of RRT according to diagnosis.
Finnish Registry for Kidney Diseases 1965–2008



The incidence of RRT according to diagnosis is shown as smoothed averages in Figure 2. Types 1 and 2 diabetes and glomerulonephritis are the most common diseases causing chronic uremia. The number of patients entering RRT due to type 2 diabetes increased rapidly during the 1990s, but in the 2000s the increase ceased. In the group

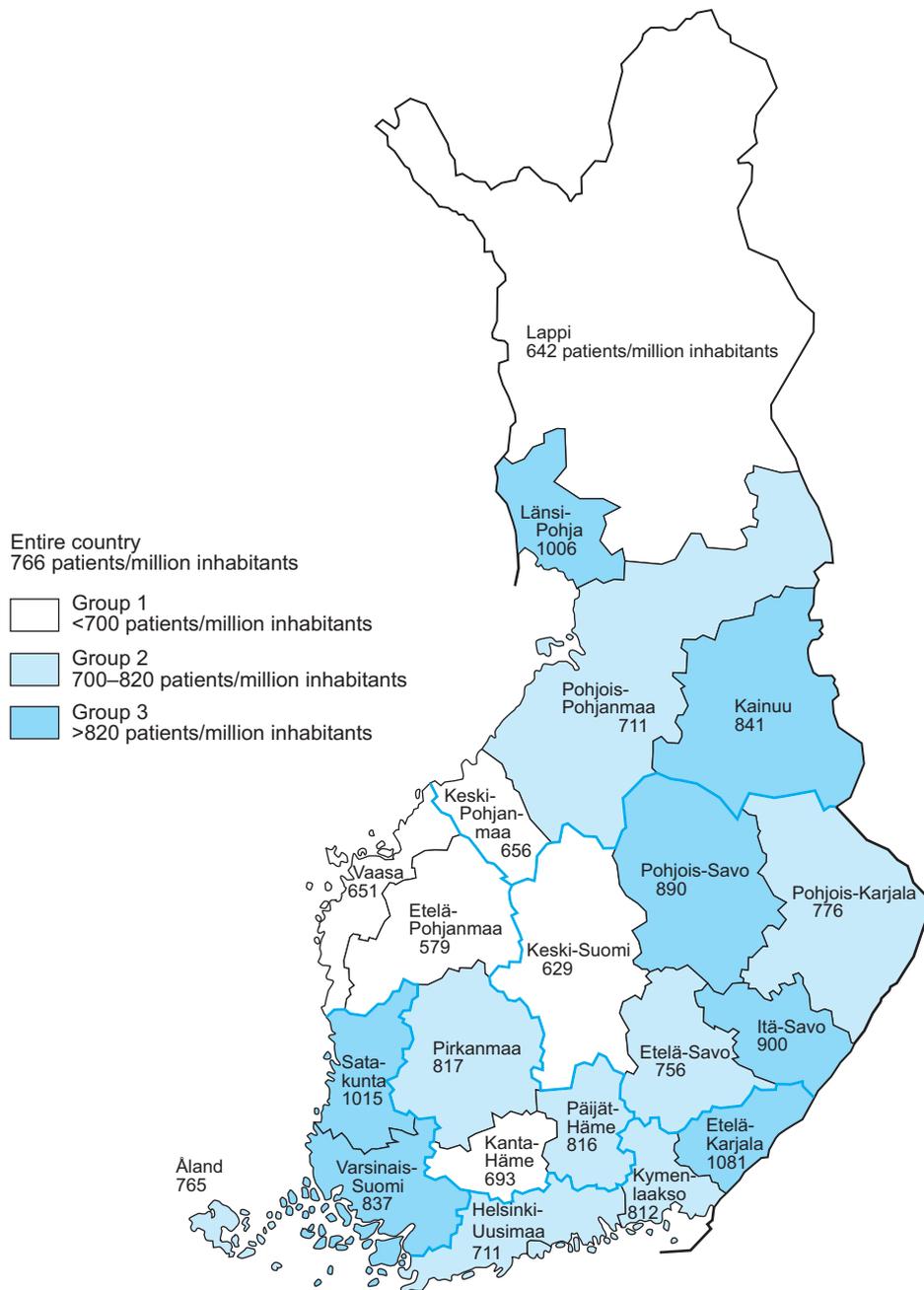
“other defined diagnosis”, the most usual diagnosis in 2008 was nephrosclerosis, with an incidence of 6 new cases/million inhabitants. The numbers of amyloidosis and pyelonephritis patients entering RRT have clearly decreased since 2000.

Table 4. Patients in RRT at end of year according to healthcare district and region.
Finnish Registry for Kidney Diseases 1998–2008

Healthcare district		Number of RRT patients					Prevalence of RRT/million inhabitants				
		1998	2003	2006	2007	2008	1998	2003	2006	2007	2008
1	Helsinki-Uusimaa	726	941	1011	1027	1063	536	661	692	695	711
3	Varsinais-Suomi	240	319	352	368	389	537	700	763	795	837
4	Satakunta	130	188	207	219	231	548	813	903	959	1015
5	Kanta-Häme	65	96	112	115	120	394	576	659	671	693
6	Pirkanmaa	260	323	352	382	390	591	709	751	807	817
7	Päijät-Häme	104	133	164	164	173	498	634	779	776	816
8	Kymenlaakso	93	115	122	134	145	502	634	678	747	812
9	Etelä-Karjala	60	98	127	126	138	460	759	990	986	1081
10	Etelä-Savo	50	65	75	81	81	439	589	690	752	756
11	Itä-Savo	35	40	50	50	47	607	731	934	946	900
12	Pohjois-Karjala	94	115	131	136	132	527	663	763	796	776
13	Pohjois-Savo	186	224	217	221	221	724	891	870	888	890
14	Keski-Suomi	119	143	155	165	171	449	534	575	610	629
15	Etelä-Pohjanmaa	82	101	110	111	115	404	507	554	558	579
16	Vaasa	85	93	98	105	107	525	577	603	643	651
17	Keski-Pohjanmaa	27	36	51	49	51	342	465	659	631	656
18	Pohjois-Pohjanmaa	155	239	273	269	277	425	636	710	695	711
19	Kainuu	41	58	73	73	67	467	701	904	910	841
20	Länsi-Pohja	30	48	58	58	66	429	717	875	881	1006
21	Lappi	63	76	78	78	76	497	633	657	658	642
22	Åland	16	17	15	16	21	624	645	557	589	765
Region	South	879	1154	1260	1287	1346	526	666	712	721	747
	Southwest	386	524	574	603	641	544	734	800	840	891
	West	596	746	836	877	905	506	626	691	720	739
	East	484	587	628	653	652	555	684	736	767	767
	North	316	457	533	527	537	434	632	733	723	735
Entire country		2661	3468	3831	3947	4081	516	664	726	745	766

The number of RRT patients and the prevalence of RRT on 31 December 1998–2008 are presented in Table 4. In the entire country, the prevalence has increased by 48% since 1998 and by 15% since 2003. On 31 December 2008, the prevalence was higher in the southwestern region than in the other regions. Since 1998, the prevalence has increased the most (69%) in the northern region and the least (38%) in the eastern region. In healthcare districts, the prevalence increase has varied markedly (23–135%) during the past ten years.

Figure 3. Prevalence of RRT in healthcare districts on 31 December 2008.
Finnish Registry for Kidney Diseases 2008



The healthcare districts shown on the map are grouped according to the prevalence of RRT at the end of 2008 (Figure 3). The prevalence was <700 in six districts, 700–820 in eight districts, and >820 patients/million inhabitants in seven districts. The borders of the regions are indicated with thick lines.

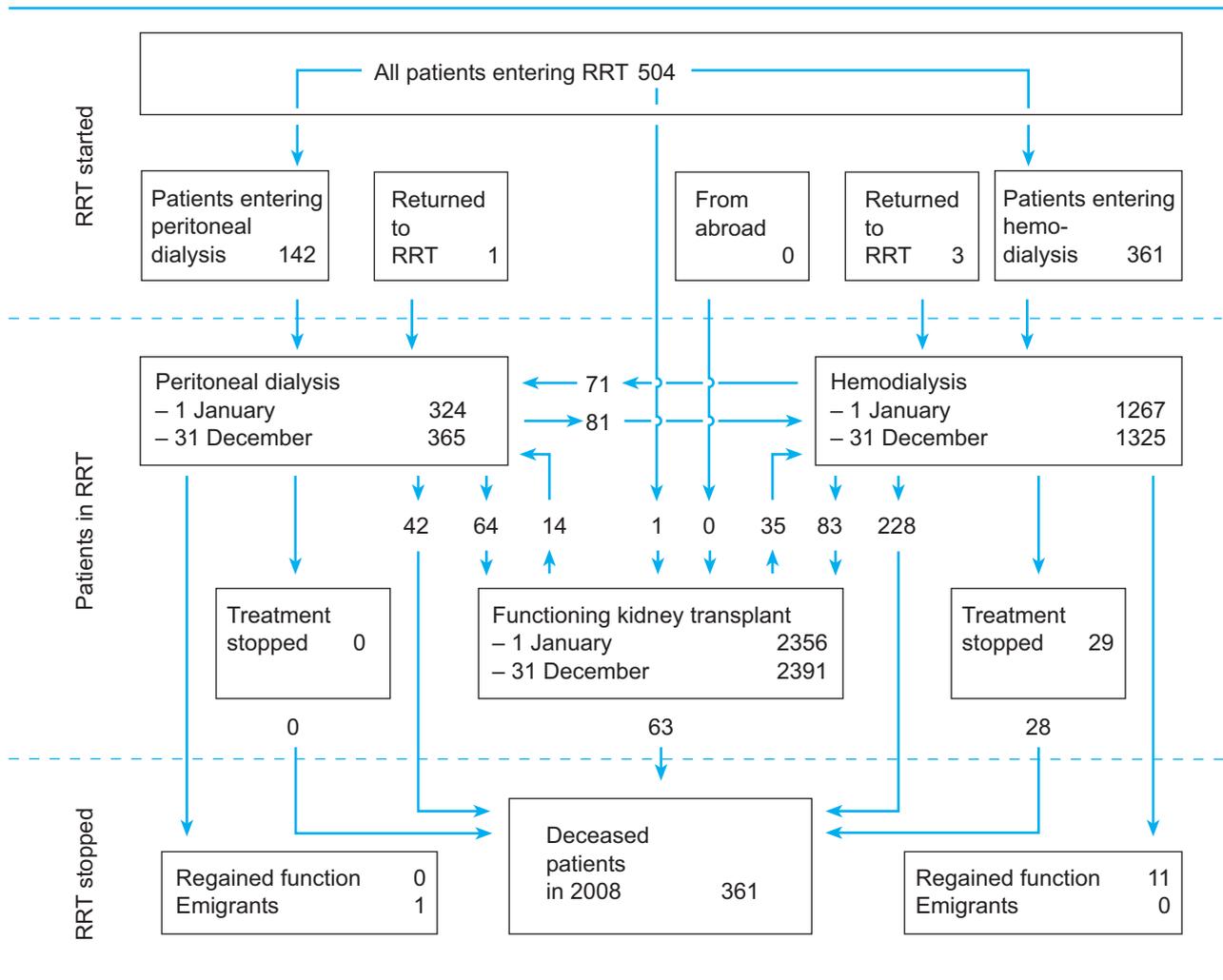
Table 5. Number of patient-years of all RRT patients according to diagnosis and type of treatment.
Finnish Registry for Kidney Diseases 1998–2008

Diagnosis	Number of patient-years in 1998 (%)				Number of patient-years in 2008 (%)			
	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total
Glomerulonephritis	50 (19.3)	154(21.3)	501 (31.7)	705(27.5)	59 (16.7)	196 (15.1)	638 (27.0)	893(22.2)
Type 1 diabetes	78 (30.3)	85(11.8)	308 (19.5)	472(18.4)	88 (25.1)	154 (11.8)	450 (19.0)	691(17.2)
Polycystic degeneration	15 (5.6)	90(12.5)	206 (13.1)	311(12.2)	17 (4.9)	106 (8.2)	394 (16.6)	517(12.9)
Type 2 diabetes	22 (8.4)	102(14.2)	14 (0.9)	139(5.4)	56 (16.0)	261 (20.1)	53 (2.2)	370(9.2)
Undefined kidney disease	10 (3.8)	54(7.5)	36 (2.3)	101(3.9)	46 (13.0)	209 (16.1)	103 (4.3)	358(8.9)
Pyelonephritis	22 (8.4)	47(6.4)	180 (11.4)	248(9.7)	14 (3.9)	59 (4.5)	198 (8.4)	271(6.7)
Nephrosclerosis	17 (6.4)	47(6.5)	34 (2.1)	98(3.8)	23 (6.5)	85 (6.5)	66 (2.8)	174(4.3)
Other systemic diseases	7 (2.6)	27(3.8)	47 (2.9)	81(3.1)	17 (4.7)	64 (4.9)	73 (3.1)	154(3.8)
Urinary tract obstruction	7 (2.7)	20(2.7)	62 (3.9)	89(3.5)	7 (2.0)	39(3.0)	94 (4.0)	140(3.5)
Congenital diseases	6 (2.2)	5(0.6)	70 (4.4)	80(3.1)	7 (2.0)	15 (1.2)	98 (4.1)	120(3.0)
Amyloidosis	11 (4.1)	56(7.7)	38 (2.4)	104(4.1)	4 (1.1)	44 (3.4)	39 (1.7)	87(2.2)
Congenital nephrosis, Finnish type	5 (2.0)	1(0.1)	40 (2.5)	46(1.8)	3 (1.0)	4 (0.3)	66 (2.8)	73(1.8)
Tubulointerstitial nephritis	4 (1.6)	16(2.2)	32 (2.0)	52(2.0)	1 (0.2)	15 (1.2)	39 (1.7)	55(1.4)
Other kidney diseases	4 (1.6)	5(0.8)	6 (0.4)	16(0.6)	4 (1.2)	12 (0.9)	35 (1.5)	52(1.3)
Malignancies	2 (0.9)	11(1.5)	0 (0.0)	14(0.5)	4 (1.1)	33 (2.6)	6 (0.3)	43(1.1)
Metabolic diseases	0 (0.0)	3(0.4)	6 (0.4)	9(0.3)	2 (0.7)	4 (0.3)	13 (0.5)	19(0.5)
All	259 (100)	723(100)	1581 (100)	2563(100)	352 (100)	1300 (100)	2366 (100)	4018(100)

Table 5 shows the number of patient-years according to diagnosis of kidney disease and type of treatment in 1998 and 2008. The number of patient-years indicates patients' time in RRT during the year. Overall, the number of patient-years has increased by 57% since 1998. In hemodialysis, the number of patient-years has increased the most, 80%. Glomerulonephritis was the most common diagnosis in both 1998 and 2008 among all RRT patients and among kidney transplantation patients. The proportion of patient-years due to glomerulonephritis has, however, decreased, now 22%. The proportion of type 1 diabetes has remained virtually

unchanged and is the most common diagnosis in peritoneal dialysis patients. The proportion of type 2 diabetes has almost tripled in ten years, and in 2008 type 2 diabetes was the most common diagnosis among hemodialysis patients and the third most common diagnosis among peritoneal dialysis patients. Among kidney transplantation patients, type 2 diabetes is a rare cause of kidney failure. The proportion of patient-years due to "undefined kidney disease" has nearly quadrupled. Amyloidosis is the only diagnosis for which the number of patient-years has decreased (by 17%) since 1998.

Figure 4. Net changes in type of treatment.
Finnish Registry for Kidney Diseases 2008



During 2008, 504 new patients entered RRT (Figure 4). In addition, four patients returned to RRT. In all, 3947 patients were receiving RRT at the beginning of the year. During 2008, number of patients on peritoneal dialysis increased 13 %, patients on hemodialysis 5 % and transplant recipients 1.5 %. Altogether 361 patients died and dialysis for 11 patients was discontinued because patients' own kidney function resumed. Of those who died, 63 had a functioning transplant, 42 were receiving peritoneal dialysis, and 228

were on hemodialysis. The RRT of 29 uremic patients was discontinued, 28 of whom died the same year. A kidney transplant was received by 150 patients, a combined liver and kidney transplantation by three patients, a combined lung and kidney transplantation by one patient, and a combined heart and kidney transplantation by one patient. Nine kidney transplants came from living donors. (source: Kidney Transplantation Unit, Helsinki University Central Hospital).

Table 6. Mortality of RRT patients in healthcare districts and regions
Finnish Registry for Kidney Diseases 1999–2008

Healthcare district		Number of deaths/1000 patient-years		Number of deaths/1000 patient-years ¹⁾	
		1999–2003	2004–2008	1999–2003	2004–2008
under 100 000 inhabitants	S	97 (7–388)	77 (2–355)	103 (7–412)	54 (1–252)
	T	148 (44–320)	88 (24–226)	180 (54–388)	82 (22–209)
	N	141 (40–321)	101 (29–231)	165 (46–377)	102 (29–232)
	A	88 (21–232)	108 (35–230)	111 (26–292)	92 (30–195)
	E	140 (58–278)	145 (66–263)	170 (70–337)	145 (66–262)
100 000–200 000 inhabitants	J	79 (20–184)	50 (12–131)	260 (64–605)	55 (13–144)
	C	80 (30–166)	84 (40–154)	93 (35–193)	82 (39–151)
	U	123 (54–224)	93 (44–167)	136 (60–247)	81 (38–146)
	O	106 (39–214)	100 (38–194)	126 (46–255)	106 (40–207)
	R	107 (46–211)	109 (52–193)	115 (50–226)	111 (53–196)
	G	109 (54–187)	111 (59–182)	134 (66–230)	112 (60–183)
	H	144 (75–240)	128 (70–214)	222 (114–368)	147 (80–246)
	P	127 (65–214)	133 (75–213)	128 (66–216)	123 (69–197)
	L	83 (44–142)	76 (42–122)	93 (50–159)	74 (41–118)
over 200 000 inhabitants	K	82 (63–103)	78 (61–97)	95 (74–120)	84 (66–105)
	M	105 (70–148)	91 (62–128)	113 (75–160)	87 (59–122)
	B	110 (75–154)	94 (64–130)	120 (82–168)	92 (62–127)
	D	92 (56–144)	100 (65–145)	108 (65–169)	112 (73–163)
	I	101 (62–152)	114 (73–167)	110 (68–167)	116 (74–169)
	Q	142 (82–219)	116 (68–181)	150 (87–233)	111 (65–173)
	F	150 (88–241)	117 (69–182)	184 (107–294)	118 (70–183)
	Region	South	86 (69–106)	84 (69–102)	98 (79–121)
	Southwest	97 (70–129)	85 (63–112)	105 (76–140)	82 (60–108)
	West	123 (97–152)	104 (83–129)	136 (108–169)	102 (81–125)
	East	113 (86–145)	105 (80–132)	125 (96–160)	103 (79–130)
	North	105 (75–141)	107 (80–139)	124 (89–167)	111 (83–145)
Entire country		103 (92–115)	95 (86–105)	115 (102–128)	95 (86–105)

¹⁾Age-, and gender-adjusted number of deaths

Table 6 shows the mortality of RRT patients in healthcare districts and regions using average mortality in five-year intervals in 1999–2008. Ninety-five percent confidence intervals are included. Randomized, blinded letter codes were assigned to healthcare districts. The population in 2004–2008 was used as the standard population in age and gender adjustment.

Mortality of the entire country has diminished by 7% from 1999 to 2008. Adjusted mortality has decreased by 17%. The greater decrease in adjusted mortality is the result of an increase in mean age of RRT patients. Mortality was lowest in the southwestern and southern regions and highest in the northern region within the last five years.

Table 7. Mortality of RRT patients in healthcare districts and regions, patients who died more than 90 days after start of RRT
Finnish Registry for Kidney Diseases 1999–2008

Healthcare district		Number of deaths/1000 patient-years		Number of deaths/1000 patient-years ¹⁾		
		1999–2003	2004–2008	1999–2003	2004–2008	
under 100 000 inhabitants	S	97 (7–388)	77 (2–355)	103 (7–412)	54 (1–252)	
	T	120 (30–280)	79 (19–210)	152 (38–353)	74 (17–195)	
	N	135 (40–321)	93 (23–216)	160 (47–381)	94 (23–218)	
	A	73 (15–214)	100 (30–217)	91 (19–267)	86 (26–185)	
	E	125 (46–253)	142 (66–263)	142 (52–286)	143 (66–263)	
100 000–200 000 inhabitants	J	72 (20–184)	50 (12–131)	250 (68–641)	55 (13–144)	
	C	72 (27–157)	79 (34–143)	84 (31–182)	77 (34–140)	
	U	121 (54–224)	93 (44–167)	133 (60–247)	81 (38–146)	
	O	93 (34–203)	97 (38–194)	115 (42–250)	103 (40–206)	
	R	107 (46–211)	105 (49–186)	115 (50–226)	106 (49–188)	
	G	99 (47–175)	111 (59–182)	118 (56–208)	112 (60–183)	
	H	129 (67–226)	109 (56–191)	179 (93–313)	122 (63–213)	
	P	125 (65–214)	125 (69–203)	125 (65–214)	116 (64–188)	
	L	79 (40–134)	76 (42–122)	86 (43–146)	74 (41–118)	
over 200 000 inhabitants	K	79 (61–100)	76 (60–95)	92 (71–116)	82 (64–102)	
	M	96 (63–138)	88 (60–125)	103 (67–149)	84 (57–119)	
	B	98 (65–138)	91 (62–127)	107 (71–151)	89 (60–124)	
	D	89 (52–138)	99 (65–145)	103 (61–162)	111 (73–163)	
	I	92 (55–141)	112 (71–164)	102 (61–157)	114 (72–167)	
	Q	128 (73–205)	114 (68–181)	136 (78–218)	110 (65–173)	
	F	136 (74–219)	116 (69–182)	167 (91–268)	117 (70–183)	
	Region	South	83 (66–102)	81 (66–98)	95 (75–116)	86 (69–104)
		Southwest	90 (64–122)	83 (61–110)	97 (69–131)	80 (59–106)
West		113 (88–141)	100 (80–124)	124 (98–156)	97 (78–120)	
East		102 (77–132)	103 (79–131)	113 (85–146)	101 (77–128)	
North		97 (68–132)	104 (78–136)	115 (82–157)	108 (81–141)	
Entire country	95 (85–107)	92 (83–103)	106 (95–119)	92 (83–103)		

¹⁾Age-, and gender-adjusted number of deaths

Table 7 shows the mortality of RRT patients in healthcare districts and regions using average mortality in five-year intervals in 1999–2008. Ninety-five percent confidence intervals are included. Patients who died within 90 days of the start of RRT were excluded from the analysis. Randomized, blinded letter codes were assigned to healthcare districts (see previous page). The population in

2004–2008 was used as the standard population in age and gender adjustment. Mortality of the entire country has diminished by 3% from 1999 to 2008. Adjusted mortality has decreased by 13%. The lower decrease in mortality compared with the overall mortality discussed on the previous page is caused by a greater decrease in early mortality. The regional trend is the same as for overall mortality.

Figure 5. Number of kidney transplantations
Finnish Registry for Kidney Diseases 1965–2008

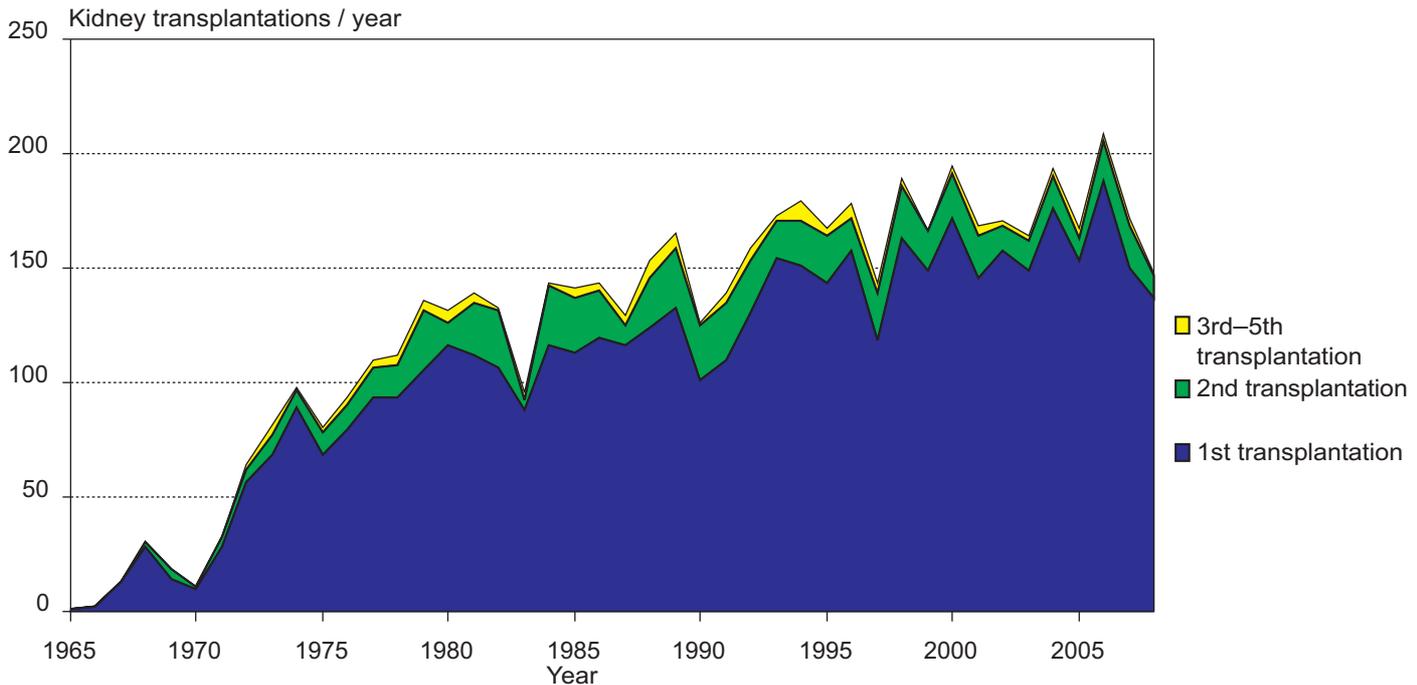


Figure 6. Time elapsed before first kidney transplantation after start of RRT
Finnish Registry for Kidney Diseases 1965–2008

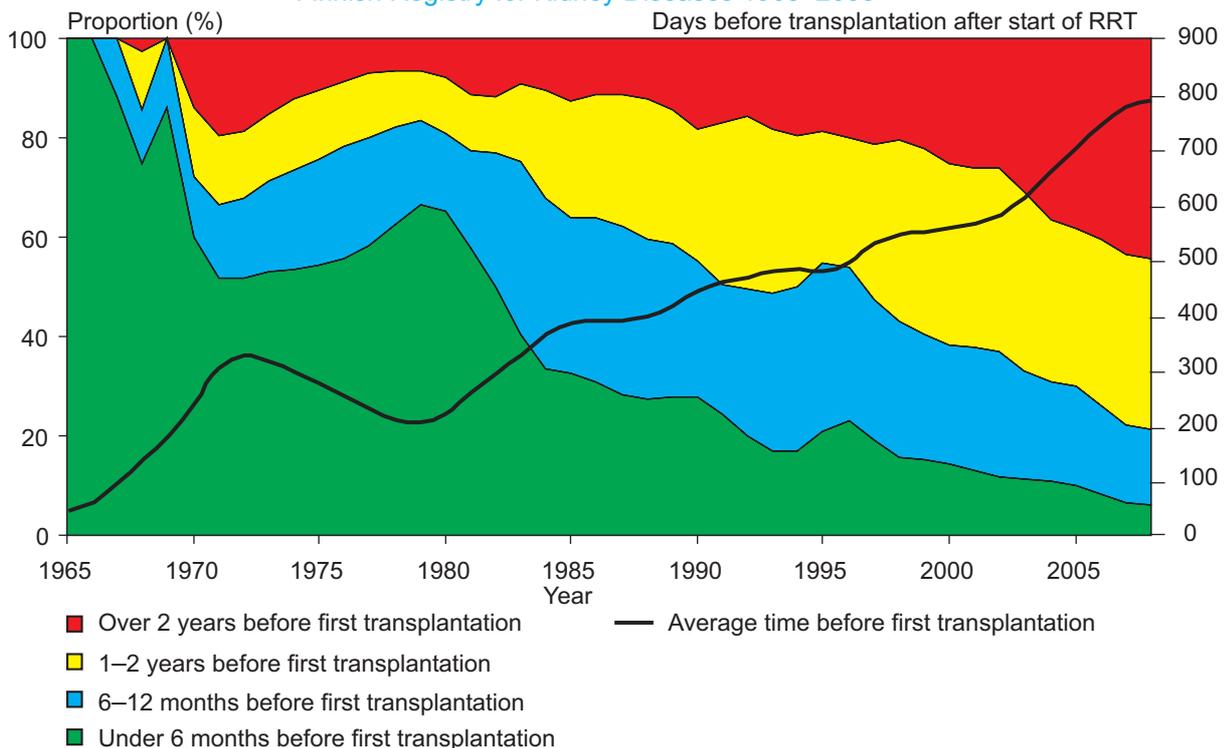


Figure 5 shows the annual number of kidney transplantations. Also shown is the ordinal number of transplantations undergone by patients. Altogether 5 466 kidney transplantations have been performed in Finland. The annual number of transplantations has remained about the same for 20 years. Most transplantations have been the first for the patient (86%); this portion has slightly increased over time. Twelve percent received their second kidney transplant and 2% their third. The proportion of patients receiving a fourth transplant was under 1% and only two patients

received five transplants.

Figure 6 shows time elapsed before first kidney transplantation divided in to groups as smoothed averages. Time before first transplantation has continued to increase. Average time before first transplantation was 45% longer in the 1990s and 93% longer in the 2000s than in the 1980s. Forty-four percent of patients receiving their first kidney transplant in 2008 had been in dialysis treatment for more than two years.

Figure 7. Kidney transplant recipients according to age and gender during different time intervals
Finnish Registry for Kidney Diseases 1965–2008

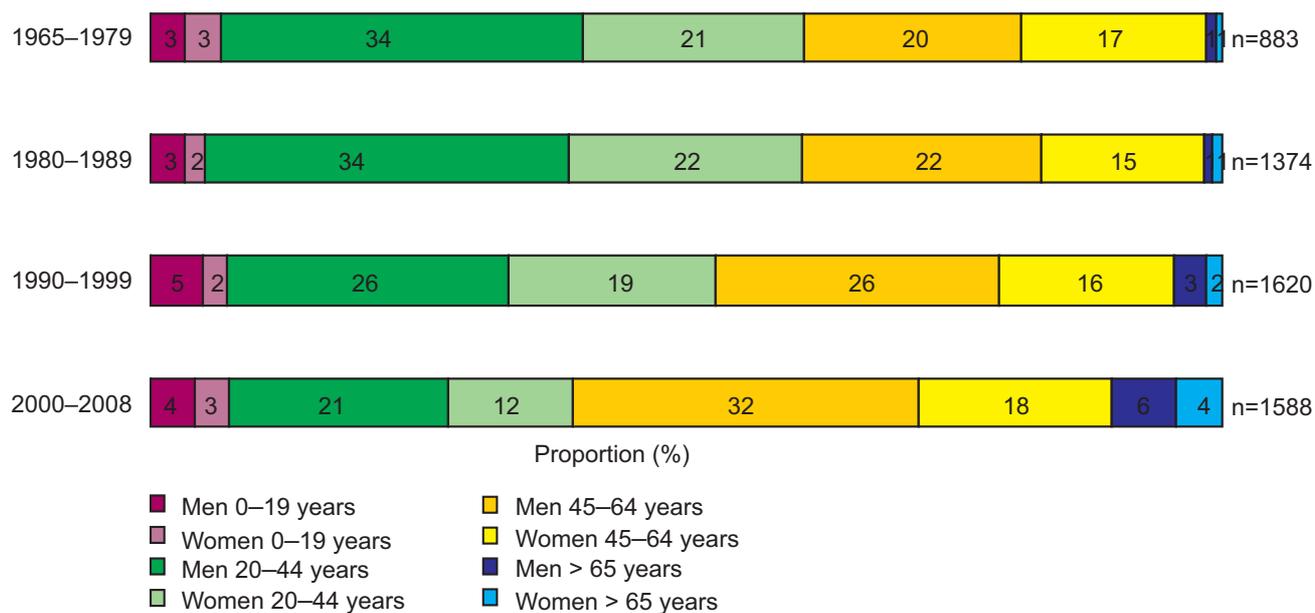


Figure 7 shows the proportions of kidney transplantations performed according to age groups and gender during different time intervals. The proportion of kidney transplantation recipients aged over 45 years has increased markedly. However, the proportion of recipients under 20 years has remained almost the same. The average age during kidney transplantation was 47.3 years in the last five years, and 61% of recipients were men.

Figure 8. Proportion of dialysis patients who waited over two years for kidney transplantation of all dialysis patients on the transplantation waiting list according to age group
Finnish Registry for Kidney diseases 1995–2008

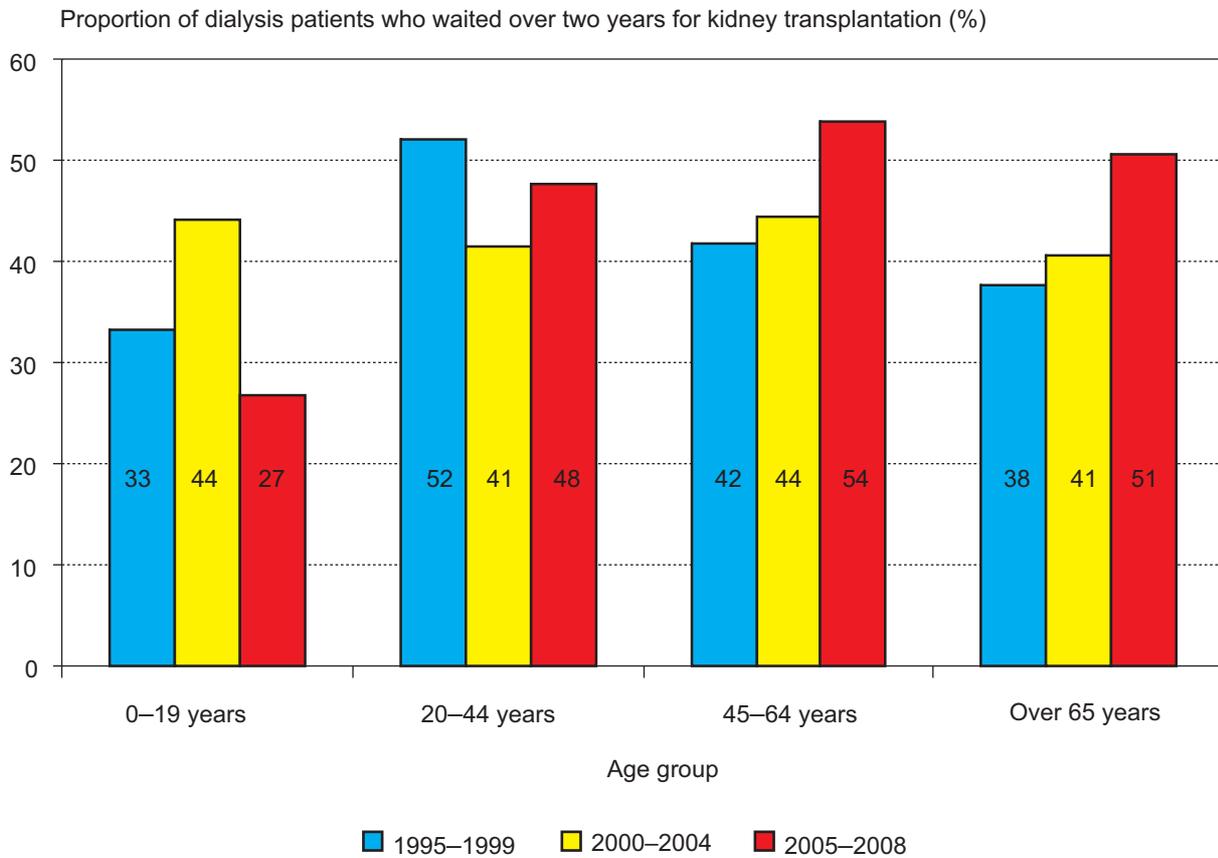


Figure 8 shows the proportion of dialysis patients who waited more than two years for kidney transplantation after the start of RRT of all dialysis patients on the kidney transplantation waiting list. Numbers are compared in age groups. Age did not have a significant effect on proportion of dialysis patients who waited a long time for transplantation, although the proportion is slightly smaller in the youngest age group. Although the mean age of transplantation recipients has increased and transplantations are performed on increasingly older patients, the proportion of under 20-year-old patients on the transplantation waiting list for over two years has not increased. In the oldest age groups, this proportion has increased slightly.

Figure 9. Kidney transplantations according to diagnosis
Finnish Registry for Kidney Diseases 1965–2008

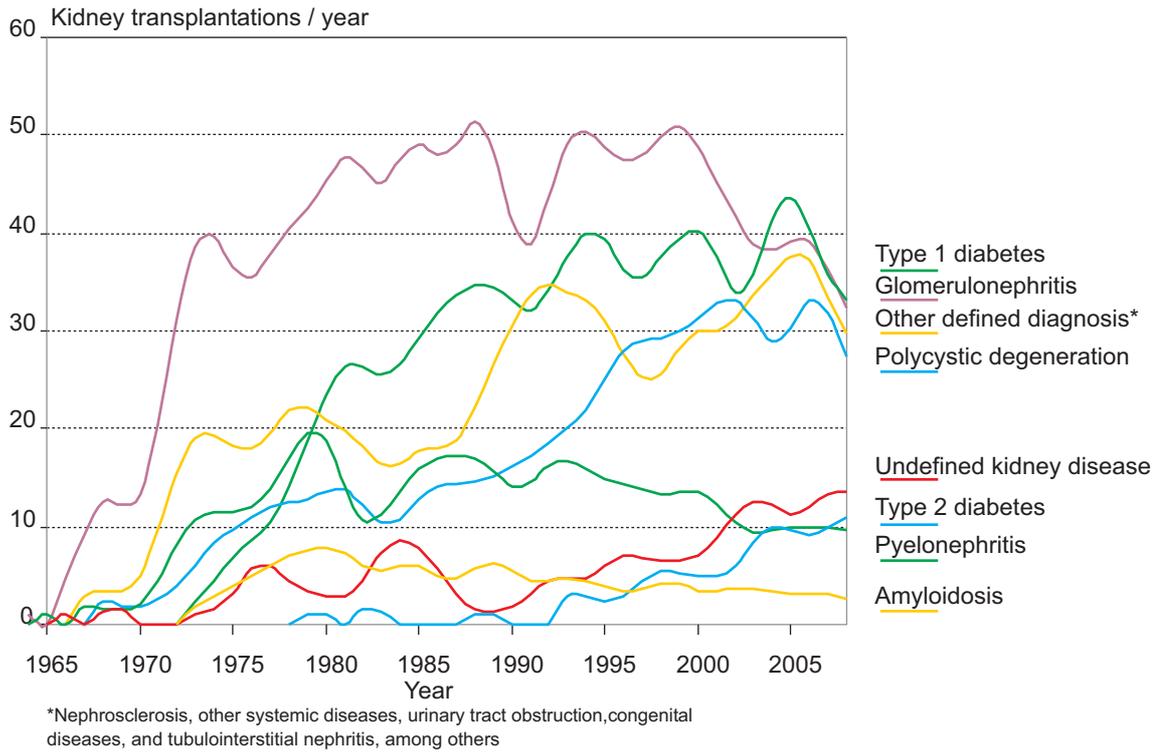


Figure 10. Kidney transplantations related to patient-years in dialysis according to diagnosis
Finnish Registry for Kidney Diseases 1985–2008

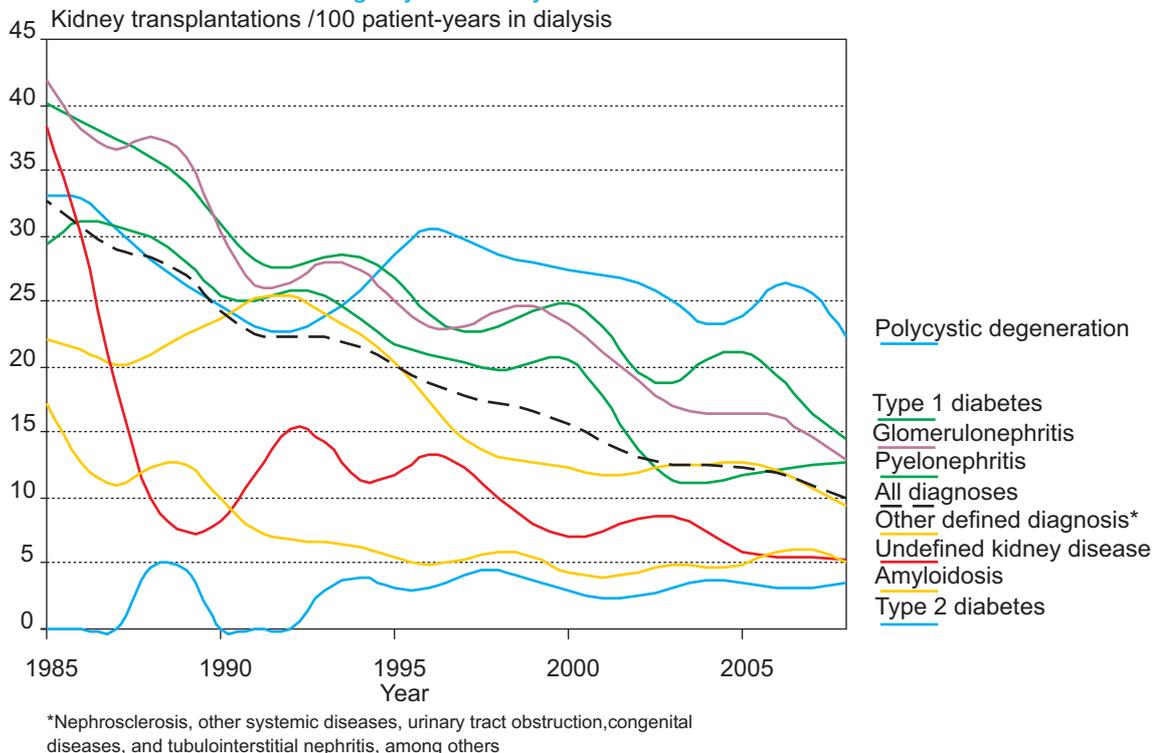


Figure 9 shows the number of kidney transplantations according to diagnosis as smoothed averages. On 31 December 2008, type 1 diabetes was the most common cause of kidney transplantation (21%). Glomerulonephritis was almost as common among transplant recipients. Figure 10 shows the number of kidney transplantations related to patient-years in dialysis according to diagnosis

as smoothed averages. Polycystic degeneration is the most common cause of kidney transplantation when the number is related to patient-years in dialysis. Persons with type 2 diabetes have the lowest probability of transplantation. Overall, the number of kidney transplantations related to patient-years in dialysis has decreased markedly.

Figure 11. Immunosuppressive medication of kidney transplant recipients at end of transplantation year
Finnish Registry for Kidney Diseases 1998–2008

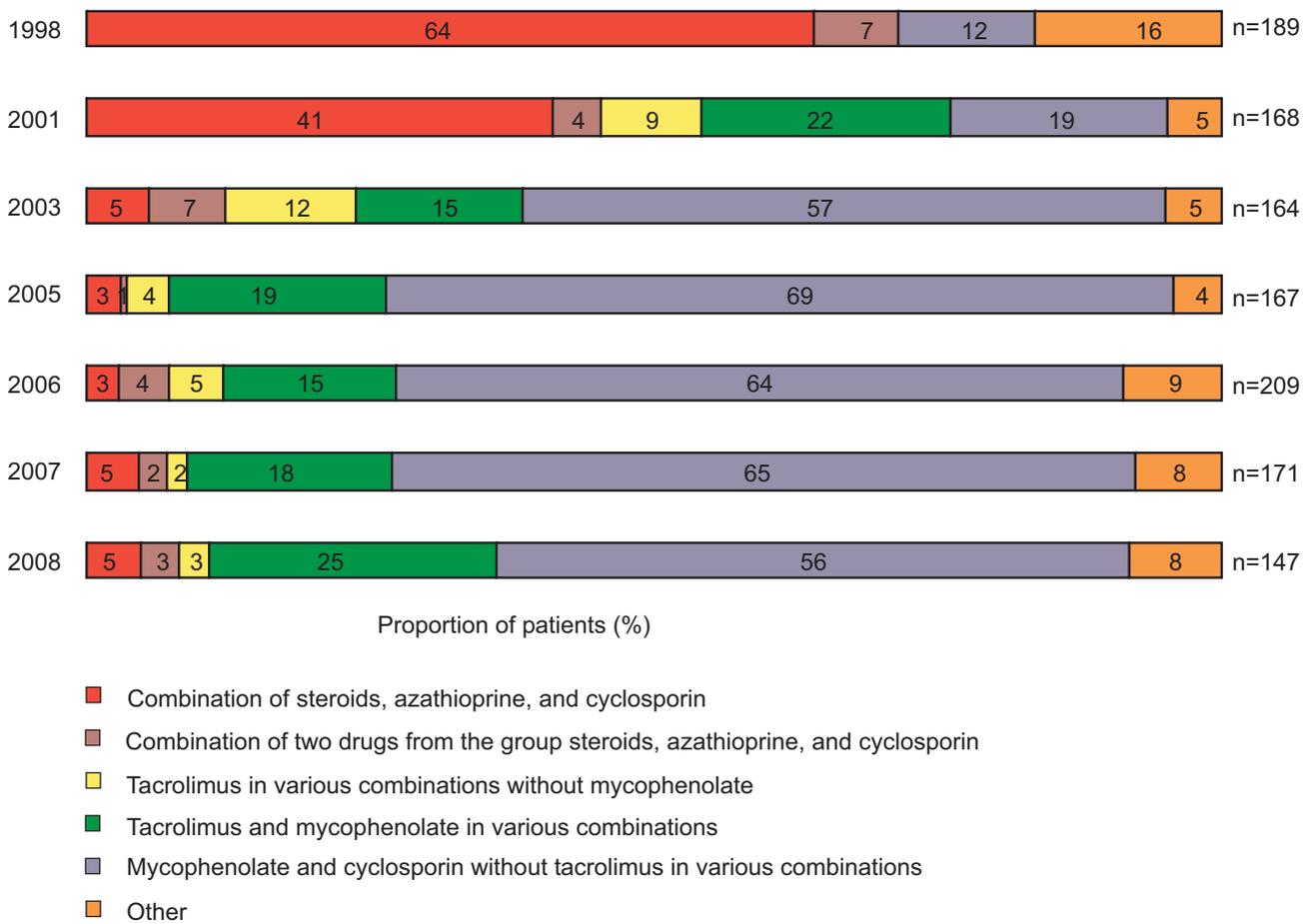


Figure 11 shows the immunosuppressive medication in use at the end of the year that kidney transplantation was performed. The combination of steroids, azathioprine, and cyclosporin was the most common medication until 2001. After 2002, mycophenolate has mostly replaced azathioprine. Over the last years, the most common immunosuppressive medication has been mycophenolate and cyclosporin without tacrolimus in various combinations. The single most common drug was steroids, used by 89%

of transplantation recipients. Although the use of steroids is still very common at the end of the transplantation year, the use of steroids has decreased considerably within all kidney transplant recipients; 90% of all kidney transplant recipients used steroids in 1998, but in 2008 this proportion had decreased to 57%. Eighty percent of patients who had a kidney transplantation in 2008 used steroids. This proportion is also decreasing.

Figure 12. Graft survival of first kidney transplantation according to transplantation period
Finnish Registry for Kidney Diseases 1965–2008

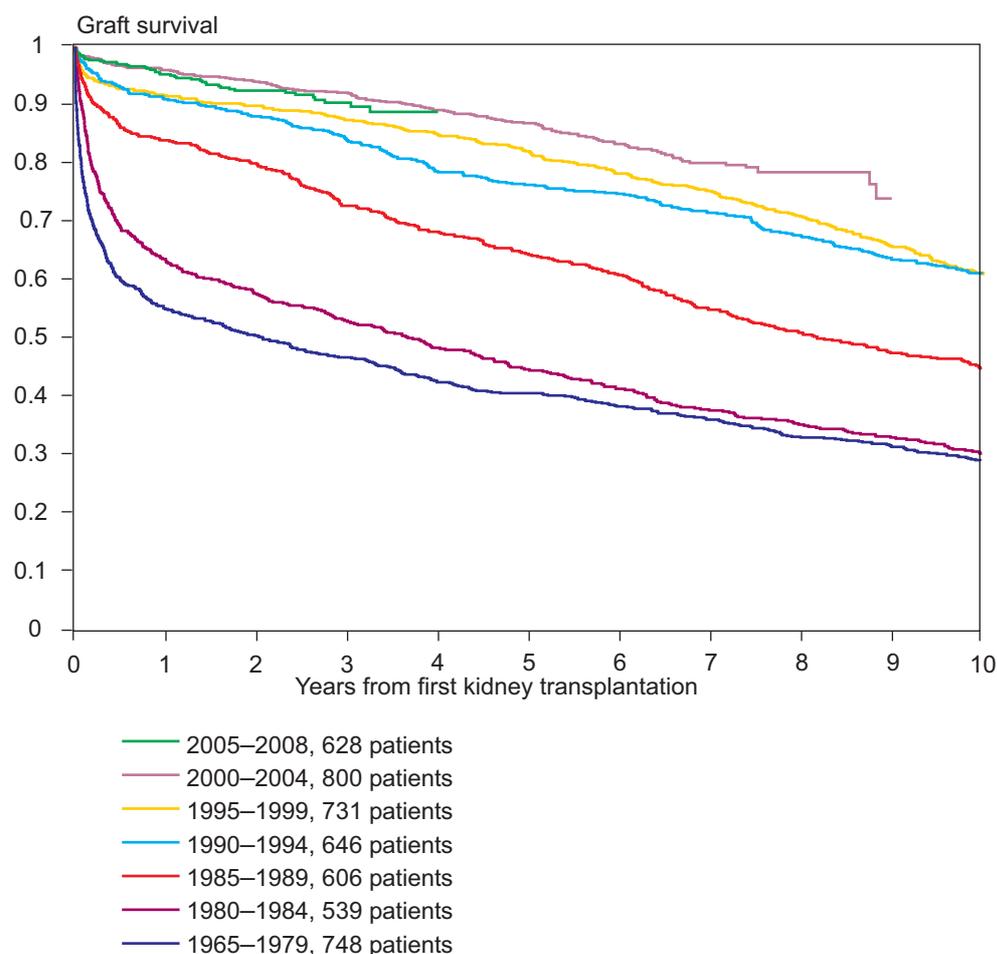


Table 8. First kidney transplant recipients' relative risk of graft loss according to transplantation period
Finnish Registry for Kidney Diseases 1965–2008

	Year						
	1965–1979	1980–1984	1985–1989	1990–1994	1995–1999	2000–2004	2005–2008
Crude risk	1	0.95	0.68	0.41	0.37	0.21	0.17
Age-, and gender-adjusted risk	1	0.90	0.64	0.39	0.33	0.18	0.14

Figure 12 shows graft survival after first kidney transplantation according to transplantation period in 1965–2008. End-points were patient death, dialysis treatment, or notification of graft loss. Follow-up continued until an end-point was reached or until the end of follow-up on 31 December 2008. Graft survival increased significantly ($p < 0.001$) during follow-up. However, within last two decades, changes in graft

survival were not as strong as during earlier periods. Table 8 shows first kidney transplant recipients' relative risk of graft loss. The risk is compared with that in 1965–1979 using Cox regression analysis. The risk of graft loss has significantly decreased over time, being 83% lower without adjustment and 86% lower with age and gender adjustment.

Figure 13. Survival of first kidney transplant recipients according to transplantation period
Finnish Registry for Kidney Diseases 1965–2008

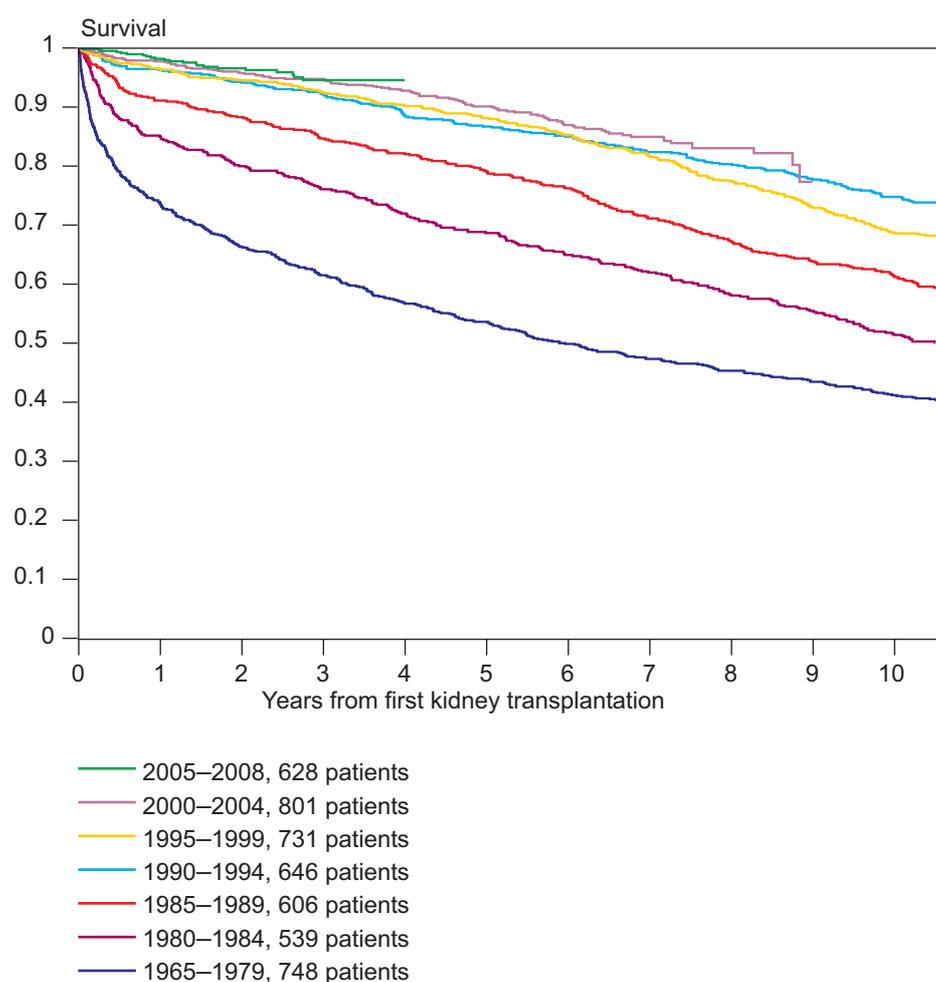


Table 9. First kidney transplant recipients' relative risk of death according to transplantation period
Finnish Registry for Kidney Diseases 1965–2008

	Year						
	1965–1979	1980–1984	1985–1989	1990–1994	1995–1999	2000–2004	2005–2008
Crude risk	1	0.81	0.67	0.43	0.44	0.27	0.15
Age-, and gender-adjusted risk	1	0.73	0.57	0.36	0.31	0.18	0.09

Figure 13 shows first kidney transplant recipients' survival according to transplantation period in 1965–2008. Follow-up continued until death or the end of follow-up on 31 December 2008. Survival significantly ($p < 0.001$) increased during follow-up. However, within the last two decades, changes in survival were not as strong as during earlier periods.

Table 9 shows first kidney transplant recipients' relative risk of death according to transplantation period. Risk is compared with that in 1965–1979 using Cox regression analysis. Risk of death has significantly decreased over time, being 85% lower without adjustment and 91% lower when adjusted for age and gender.

Figure 14. Proportion of deaths within 90 days of kidney transplantation
Finnish Registry for Kidney Diseases 1975–2008

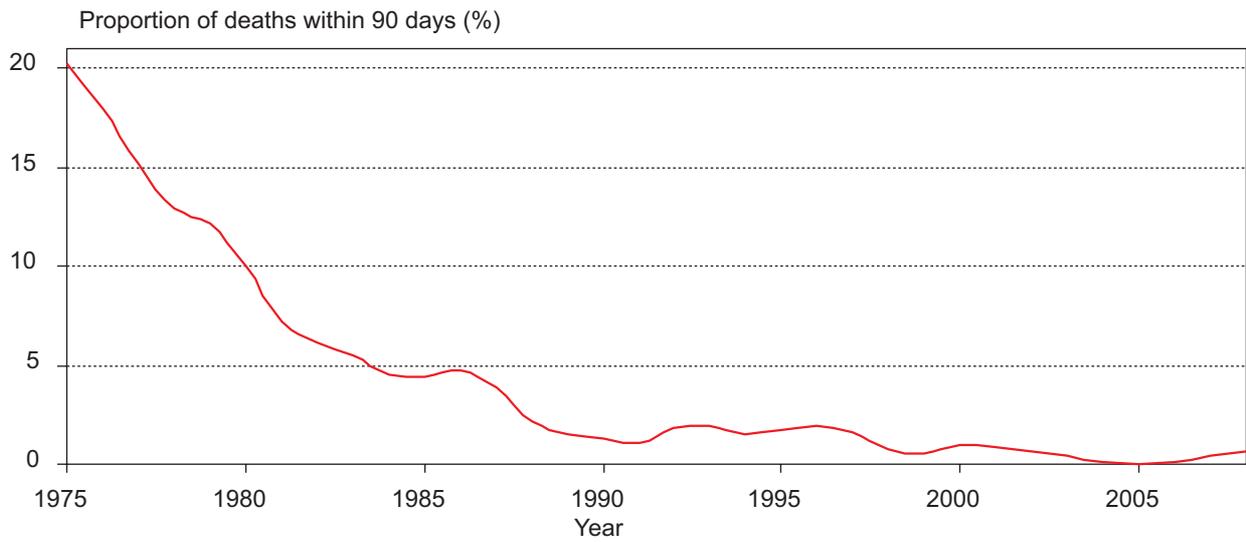


Figure 14 shows the proportions of kidney transplant recipients who died within 90 days of transplantation in 1975–2005 as smoothed averages. Before the 1980s, more than 10% of patients died within three months of transplantation. Over the last years, early deaths have been rare. On average, only 0.5% of patients have died within 90 days of transplantation since the year 2000.

Figure 15. Causes of death among RRT patients according to treatment group
Finnish Registry for Kidney Diseases 1980–2008

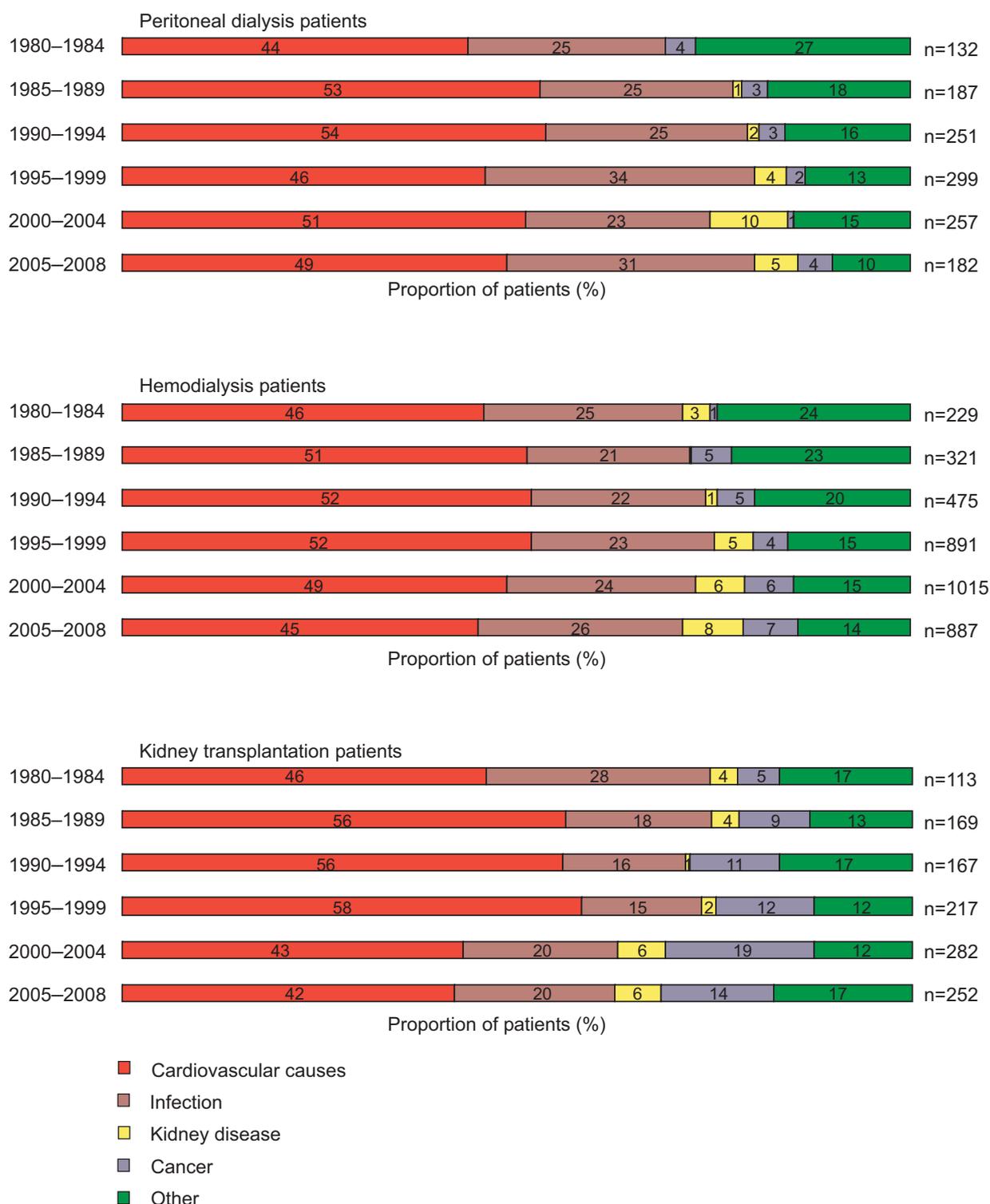


Figure 15 shows causes of death among RRT patients according to treatment group. Cardiovascular causes are the most common among all treatment groups, being the cause of death in approximately half of the cases. Regardless of immunosuppression, infections are a rarer cause of death among transplantation patients than among dialysis patients. Among kidney disease group, a disease causing kidney failure was a reported cause of death.

The proportion of cancer as a cause of death among transplantation patients has increased from 5% at the beginning of the 1980s to 14% in recent years. Among dialysis patients, the corresponding proportions are significantly lower, 2% and 7%. This increase in time among transplantation patients and the difference compared with dialysis patients are statistically significant also with age and gender standardization.

Age

- at end of year 1999:10, 2000:11, 2001:7, 2002:7, 2005:18
- effect on survival 2002:14–16
- of new RRT patients 1998:8, 2000:9,12, 2001:4, 2007:10
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Body mass index 1999:12, 2002:15

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- type of treatment 2000:18, 2008:23

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- angina pectoris 2001:18, 2007:24
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Vascular access types 2003:19

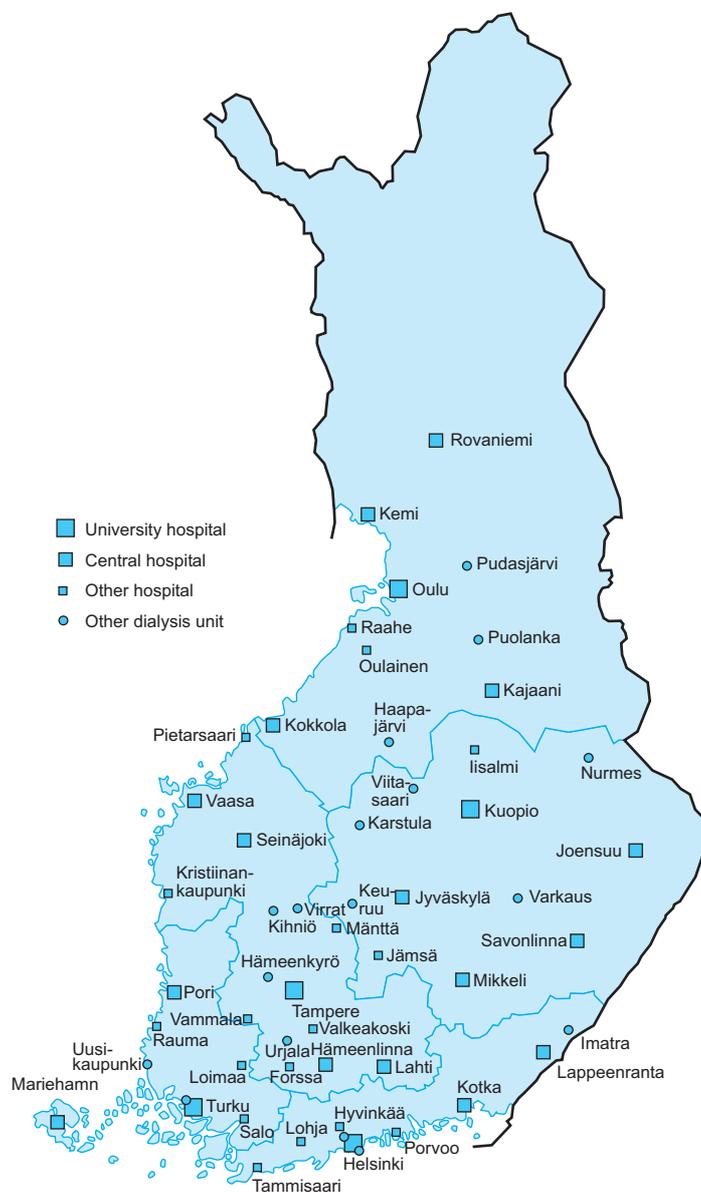
Vitamin D treatment 1999:14–15

Wegener's granulomatosis 2006:7

Weight 2002:15

Finnish Registry for Kidney Diseases

Report 2008



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