등록사업보고

우리나라 신대체 요법의 현황

-인산 민병석교수 기념 말기신부전 환자 등록사업 2015-

대한신장학회 등록위원회

Current Renal Replacement Therapy in Korea

- Insan Memorial Dialysis Registry, 2015 -

ESRD Registry Committee, Korean Society of Nephrology*

=Abstracts=

The registry committee of Korean Society of Nephrology has collected data about dialysis in Korea through on-line registry program in KSN internet web site. The status of renal replacement therapy in Korea at the end of 2015 was as follows:

1) The total number of patients with renal replacement therapy (RRT) was 87,014 (hemodialysis: HD 62,634, peritoneal dialysis: PD 7,352, functioning kidney transplant: KT 17,028). Prevalence of RRT was 1,689 patients per million population(pmp). The proportion of RRT was HD 72%, PD 8%, and renal transplant 20%.

2) New RRT patients in 2015 were 14,756 (HD 12,011, PD 854, KT 1,891). Incidence rate was 286.4 pmp in 2015.

3) The most common primary cause of end stage renal diseases was diabetic nephropathy (48.4%), hypertensive nephrosclerosis (20.2%) and chronic glomerulonephritis (8.5%), in order.

4) The number of RRT centers was 846 and total number of HD machines was 22,750. Dialysis patients' individual data were collected from 67.1% of overall RRT centers.

5) Mean age of HD patient was 61.6 years old, of PD was 55.7 years old. Proportion of patients on HD more than 5 years' maintenance was 45%. Mean blood pressure was 99.6mmHg in HD and 98.2mmHg in PD patients. Pulse pressure was 65.9 mmHg in HD and 53.6 mmHg in PD patients. Mean hemoglobin of HD patient was 10.5 g/dL (hematocrit 31.8%), PD was 10.3 g/dL. Mean urea reduction ratio was 69.3% in male HD patients and 75.3% in female HD patients. Mean single pool Kt/V was 1.434 in male patient, 1.708 in female patients.

7) Common causes of death were unknown cause or not uremia associated cardiac arrest (15.0%), uremia associated cardiac arrest (13.1%), sepsis (11.0%), pulmonary infection (8.9%) and myocardial infarction (8.0%) in 2015. Overall patient survival of male dialysis patient in 5 years was 60.4%, female patients was 63.3%. HD patient's 5 year survival was 61.8% and PD was 60.3%. Five year survival of diabetic dialysis patients was 53.0%, chronic glomerulonephritis patients 78.0%, hypertensive nephrosclerosis patients 69.8%, respectively.

8) Survey on rehabilitation status of dialysis patients showed that 22% of HD patients have full time job and 9% have part time job. 36% of PD patients have full time job, and 13% have part time job.

9) The number of kidney transplantation was 1,891 (deceased donor 901) in 2015.

10) Survey on elderly dialysis patients showed that over 50% of elderly (over 65-year-old) patients had underlying diabetic nephropathy and 20.6% elderly patients had hypertensive nephrosclerosis. About the vascular access, lower proportion of elderly HD patients had native vessel arteriovenous fistula than young (under 65-year-old) HD patients (69% vs 80%). The serum creatinine level of elderly HD patients was 7.74mg/dl but that of young HD patients was 10mg/dl, also phosphorus level was lower in elderly HD patient, 4.3 and 5.3mg/dl, respectively. Although the small surface area dialyzer were used for elderly HD patients, the urea reduction ratio and Kt/V were better in elderly HD patients than young patients. Prevalence of complication was much higher in elderly dialysis patients than in young dialysis patients, especially cardiac and infectious complications.

Key words: renal replacement therapy, hemodialysis, peritoneal dialysis, prevalence, incidence, survival, dialysis adequacy

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Part 1. Prevalence and Incidence of ESRD (1)

Table 1-1. Prevalence of renal replacement therapy.

	HD		PD		Transplant		Total	
1980	198	(4.9)	30	(0.7)	-	-	228	(6.0)
1986	1,335	(32.6)	573	(13.9)	621	(15.1)	2,534	(61.7)
1988	3,012	(74.0)	1,058	(25.2)	982	(23.4)	5,142	(122.7)
1990	4,311	(101.8)	1,130	(26.7)	1,866	(44.1)	7,307	(172.6)
1992	5,890	(135.3)	1,599	(36.7)	2,862	(65.8)	10,351	(237.8)
1994	7,387	(162.7)	2,284	(50.3)	4,116	(90.6)	13,787	(303.6)
1996	9,635	(207.5)	2,976	(64.1)	5,461	(117.6)	18,072	(389.2)
1998	13,473	(285.6)	3,912	(82.9)	6,515	(138.1)	23,900	(506.7)
2000	15,853	(330.4)	4,671	(97.4)	7,522	(156.8)	28,046	(584.5)
2001	17,568	(363.8)	5,489	(113.7)	7,957	(164.8)	31,014	(642.3)
2002	20,010	(412.4)	5,712	(117.7)	8,271	(170.5)	33,993	(700.6)
2003	23,348	(478.2)	6,807	(139.4)	8,635	(176.9)	38,790	(794.5)
2004	25,335	(516.5)	7,569	(154.3)	8,987	(183.2)	41,891	(854.0)
2005	27,246	(553.0)	7,816	(158.6)	9,271	(188.2)	44,333	(899.8)
2006	29,031	(585.0)	7,990	(161.0)	9,709	(195.7)	46,730	(941.7)
2007	30,907	(617.7)	7,649	(152.9)	10,119	(202.2)	48,675	(972.8)
2008	33,427	(663.3)	7,840	(155.6)	10,722	(212.8)	51,989	(1031.6)
2009	37,391	(738.3)	7,618	(150.4)	11,387	(224.8)	56,396	(1113.6)
2010	39,509	(768.1)	7,309	(142.1)	12,042	(234.1)	58,860	(1144.4)
2011	42,596	(823.6)	7,694	(148.8)	13,051	(252.4)	63,341	(1224.8)
2012	48,531	(935.4)	7,552	(145.6)	14,128	(272.3)	70,211	(1353.3)
2013	52,378	(1006.1)	7,540	(144.8)	15,124	(290.5)	75,042	(1441.5)
2014	57,256	(1115.3)	7,423	(144.6)	15,995	(311.6)	80,674	(1571.5)
2015	62,634	(1215.5)	7,352	(142.7)	17,028	(330.5)	87,014	(1688.6)

( ): Number of patients per million population. Rep. of Korea's population at the end of 2015: 51,529,338.

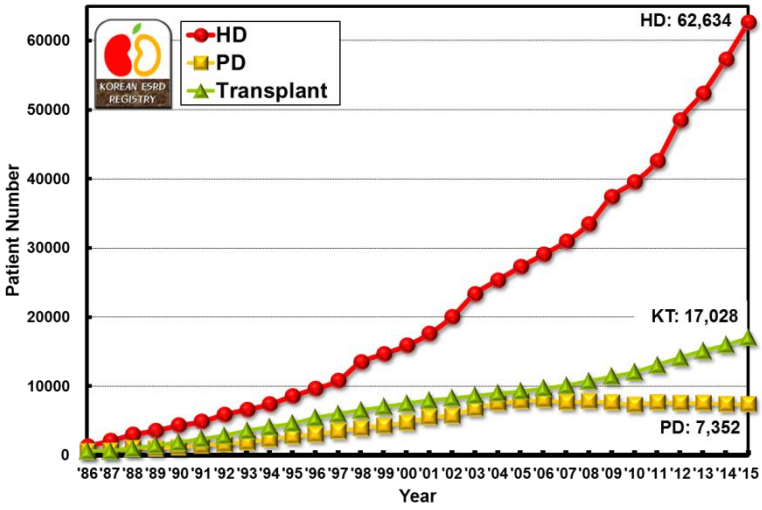


Fig.1-1. Patient numbers of renal replacement therapy at the end of each year.

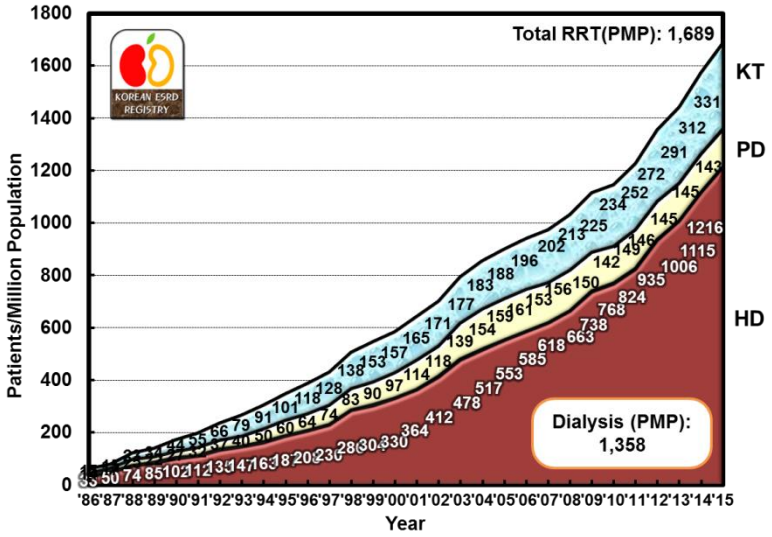


Fig.1-2. Point prevalence of renal replacement therapy (Patients numbers per million population, HD; hemodialysis, PD; peritoneal dialysis, KT; kidney transplantation).

Part 1. Prevalence and Incidence of ESRD (2)

Table 1-2. Number of new renal replacement therapy patients.

	HD		PD		Transplant		Total	
1986	670	(16.3)	287	(7.0)	221	(5.4)	1,173	(28.7)
1988	1,516	(36.2)	375	(8.9)	428	(10.2)	2,319	(55.3)
1990	2,418	(57.1)	530	(12.5)	624	(14.7)	3,572	(84.3)
1992	3,083	(70.8)	705	(16.2)	765	(17.6)	4,553	(104.6)
1994	2,999	(66.0)	907	(19.9)	685	(15.1)	4,591	(101.1)
1996	3,670	(79.0)	1,388	(29.9)	919	(19.8)	5,977	(128.7)
1998	2,463	(52.2)	753	(15.9)	994	(21.1)	4,210	(89.3)
2000	2,736	(57.0)	1,021	(21.3)	683	(14.2)	4,440	(92.5)
2001	3,373	(69.9)	1,279	(26.5)	848	(17.6)	5,500	(113.9)
2002	3,878	(79.9)	1,666	(34.3)	739	(15.2)	6,283	(129.5)
2003	4,769	(97.7)	1,866	(38.2)	806	(16.5)	7,441	(152.4)
2004	5,279	(107.6)	2,246	(45.8)	853	(17.4)	8,378	(170.8)
2005	5,400	(109.6)	2,381	(48.3)	762	(15.5)	8,543	(173.4)
2006	5,694	(114.7)	2,568	(51.7)	935	(18.8)	9,197	(185.3)
2007	6,193	(123.8)	2,062	(41.2)	928	(18.5)	9,183	(183.5)
2008	6,415	(127.3)	1,619	(32.1)	1,145	(22.7)	9,179	(182.1)
2009	6,540	(129.1)	1,125	(22.2)	1,241	(24.5)	8,906	(175.9)
2010	7,204	(140.1)	867	(16.9)	1,264	(24.6)	9,335	(181.5)
2011	8,057	(155.8)	920	(17.8)	1,639	(31.7)	10,616	(205.3)
2012	8,811	(169.8)	923	(17.8)	1,738	(33.5)	11,472	(221.1)
2013	9,543	(183.3)	884	(17.0)	1,756	(33.7)	12,183	(234.0)
2014	10,594	(206.4)	867	(16.9)	1,680	(32.7)	13,141	(256.0)
2015	12,011	(233.1)	854	(16.6)	1,891	(36.7)	14,756	(286.4)

( ): Number of patients per million population. Rep. of Korea's population at the end of 2015: 51,529,338.

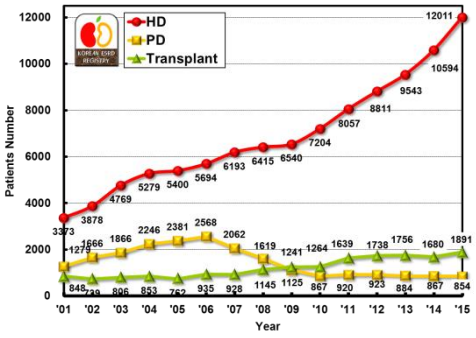


Fig.1-3. New renal replacement therapy patients number in each year.

Table 1-3. Causes of end stage renal disease in new patients.

Causes	Percent (%)												
	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010	2012	2014	2015
Chronic Glomerulonephritis	25.3	25.5	21.6	17.9	14	13.9	12.5	13.0	12.1	11.3	8.1	8.2	8.5
Not Histologically confirmed	19.7	20.4	16.7	13.6	10.6	10	8.6	9.0	8.2	7.7	4.5	4.4	4.2
Histologically confirmed	5.6	5	4.9	4.3	3.4	3.9	3.9	3.9	3.8	3.6	3.6	3.8	4.3
Diabetic nephropathy	19.5	26.1	30.8	38.9	40.7	40.7	43.4	42.3	41.9	45.2	50.6	48.0	48.4
Hypertensive nephrosclerosis	15.4	20.8	18.3	17.8	16.6	16	16.2	16.9	18.7	19.2	18.5	21.2	20.2
Cystic kidney disease	2.1	2.2	1.8	1.7	2.2	1.6	1.4	1.7	1.7	1.7	1.8	1.8	1.9
Renal tuberculosis	1.1	1.5	1.2	0.5	0.4	0.5	0.3	0.3	0.2	0.2	0.0	0.1	0.1
Pyelo/interstitial nephritis	1.3	1.1	0.7	1	0.8	0.6	0.6	0.6	0.5	0.4	0.5	0.8	0.3
Drugs or nephrotoxic agents	1.3	0.1	0.6	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.4	0.2	0.6
Lupus nephritis	0.8	0.7	1	0.5	0.9	0.8	0.6	0.6	0.6	0.5	0.6	0.5	0.3
Gouty nephropathy	0.7	0.7	0.6	0.5	0.7	0.4	0.5	0.3	0.3	0.4	0.3	0.3	0.4
Hereditary nephropathy	0.3	0.7	0.4	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.4
Kidney tumor	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3
Other	4.1	2.7	2.8	3.9	3	5.6	5.9	6.0	5.8	5.1	6.8	6.1	6.3
Uncertain	28.6	17.8	15.9	16.6	20.2	19	17.8	17.5	17.6	15.3	11.4	12.1	12.3

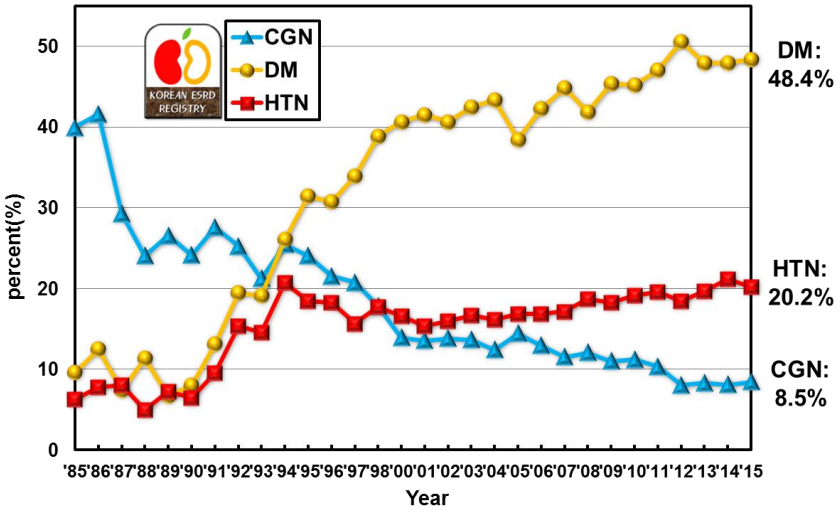


Fig.1-4. Three major causes of end stage renal disease patients who were initiated renal replacement therapy in each year. (DM: diabetic nephropathy, CGN: chronic glomerulonephritis, HTN: hypertensive nephrosclerosis). Note increase of DM and decrease of CGN.

Part 2. Renal Replacement Therapy Modalities

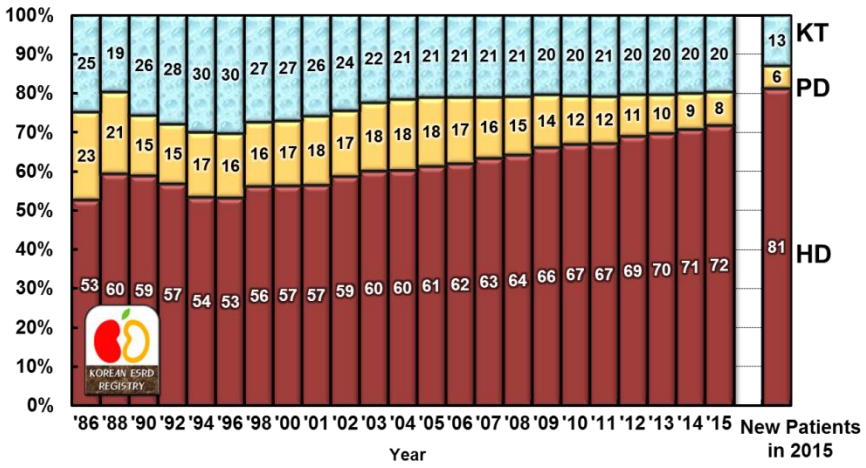


Fig. 2-1. Proportion of renal replacement modalities, annual prevalence and incidence. HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation.

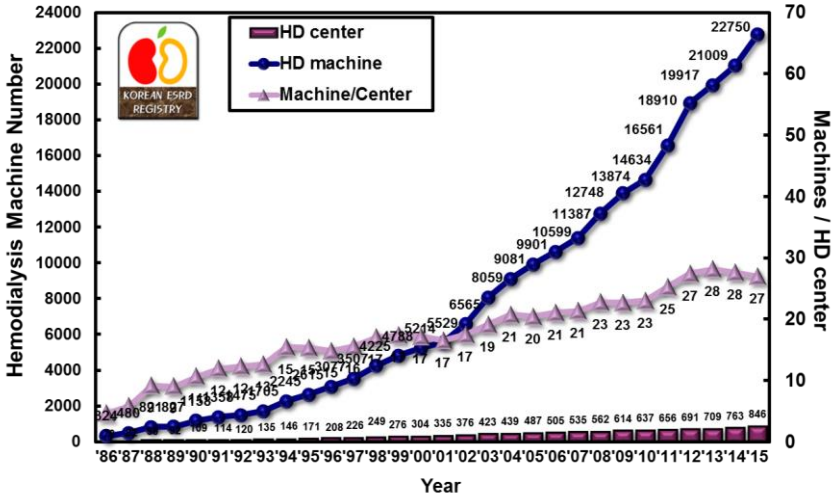


Fig. 2-2. Numbers of dialysis centers, hemodialysis (HD) machines and machine per each dialysis center in Korea.

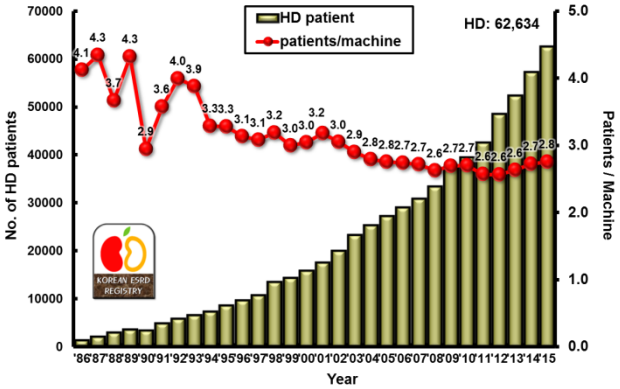


Fig. 2-3. Number of hemodialaysis (HD) patients and hemodialysis patients per hemodialysis machine.

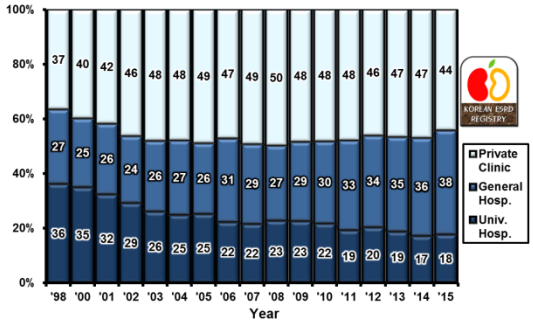


Fig. 2-4. Percentage of hemodialysis patients number according to dialysis center.

Part 3. Regional Distribution of Patients & Facilities

Table 3-1. Regional distribution of dialysis patients & hemodialysis machines.

	HD pts	PD pts	Total Dialysis pts	Dialysis pts. / Million pop.	Dialysis Centers	HD machines	HD pts./ HD machine
서울 Seoul	13,123	2,119	15,242	1,521	176	5,713	2.3
부산 Busan	4,726	873	5,599	1,593	57	2,061	2.3
대구 Daegu	3,864	713	4,577	1,840	43	1,502	2.6
인천 Incheon	3,335	349	3,684	1,259	41	1,546	2.2
광주 Gwangju	2,079	236	2,315	1,572	35	1,048	2.0
대전 Daejeon	1,119	347	1,466	965	19	601	1.9
울산 Ulsan	1,239	56	1,295	1,104	15	533	2.3
경기 Gyeonggi	12,944	1,345	14,289	1,141	182	5,963	2.2
강원 Gangwon	2,131	376	2,507	1,618	29	874	2.4
충북 Chungbuk	2,134	87	2,221	1,402	30	918	2.3
충남 Chungnam	2,732	90	2,822	1,233	41	1,156	2.4
전북 Jeonbuk	2,604	163	2,767	1,480	28	1,070	2.4
전남 Jeonnam	2,321	161	2,482	1,300	40	1,210	1.9
경북 Gyeongbuk	3,078	146	3,224	1,193	46	1,370	2.2
경남 Gyeongnam	4,245	215	4,460	1,326	53	1,847	2.3
제주 Jeju	960	76	1,036	1,659	11	338	2.8
Total	62,634	7,352	69,986	1,358	846	27,750	2.3

Table 3-2. Dialysis patients and machines according to life zone*.

	Population (%)	HD patients	PD patients	Total Dialysis patients	Dialysis pts /Million pop.	Dialysis centers	Dialysis machine	HD pts / HD machine
수도권 Capital Area (Seoul, Incheon, Gyeonggi)	25,470,602	29,402	3,813	33,215	1,304	399	13,222	2.2
	49.4%	46.9%	51.9%	47.5%		47.2%	47.6%	
충청권 Chungchung (Daejeon, Chungnam, Chungbuk)	5,391,260	5,985	524	6,509	1,207	90	2,675	2.2
	10.5%	9.6%	7.1%	9.3%		10.6%	9.6%	
호남권 Honam (Gwangju, Jeonnam, Jeonbuk)	5,250,906	7,004	560	7,564	1,441	103	3,328	2.1
	10.2%	11.2%	7.6%	10.8%		12.2%	12.0%	
영남권 Youngnam (Busan, Daegu, Gyeongnam, Gyeongbuk, Ulsan)	13,242,668	17,152	2,003	19,155	1,446	214	7,313	2.3
	25.7%	27.4%	27.2%	27.4%		25.3%	26.4%	
강원권 Gangwon	1,549,507	2,131	376	2,507	1,618	29	874	2.4
	3.0%	3.4%	5.1%	3.6%		3.4%	3.1%	
Total	51,529,338	62,634	7,352	69,986	1,358	846	27,750	2.3

* 제주 표시 제외. Data of Jeju-do is not shown.

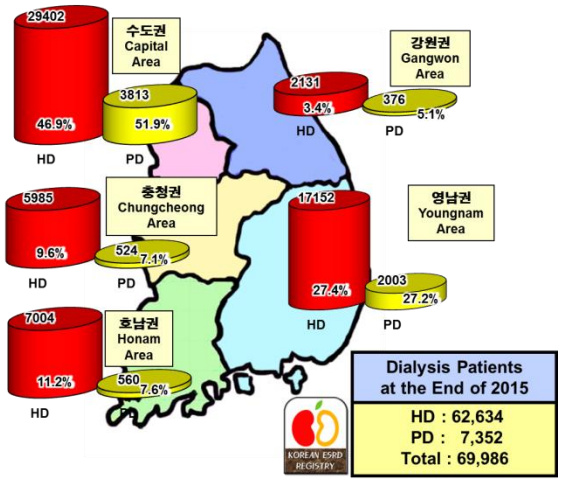


Fig. 3-1. Distribution of dialysis patients and machines according to life zone.

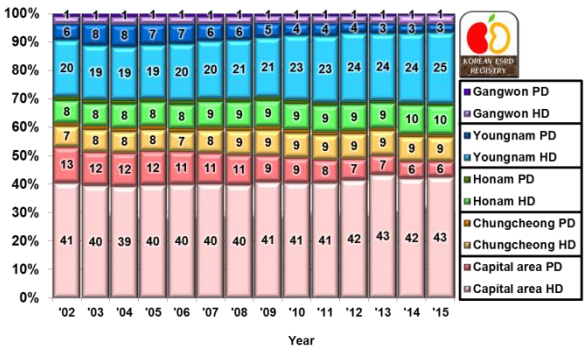


Fig. 3-2. Regional proportion of dialysis patient number in each year.

Part 4. Dialysis Patients Demographics (1)

Table 4-1. Percent of dialysis centers contributing individual patient data.

	Dialysis Centers*	Internet Input	Paper Data	Total Contributed Center	Contributing Rate (%)
서울 Seoul	159	110	6	116	73.0
부산 Busan	52	36	1	37	71.2
대구 Daegu	39	24	1	25	64.1
인천 Incheon	37	22	2	24	64.9
광주 Gwangju	32	18	2	20	62.5
대전 Daejeon	17	8	0	8	47.1
울산 Ulsan	14	8	0	8	57.1
경기 Gyeonggi	165	93	5	98	59.4
강원 Gangwon	26	21	0	21	80.8
충북 Chungbuk	27	16	3	19	70.4
충남 Chungnam	37	26	1	27	73.0
전북 Jeonbuk	25	16	0	16	64.0
전남 Jeonnam	36	20	1	21	58.3
경북 Gyeongbuk	41	32	2	34	82.9
경남 Gyeongnam	49	33	2	35	71.4
제주 Jeju	10	5	0	5	50.0
Total	766	488	26	514	67.1

* 투석의료기관 수에서 비윤리 의료기관 및 소수 환자 의료기관 (약 80개소)은 제외함.

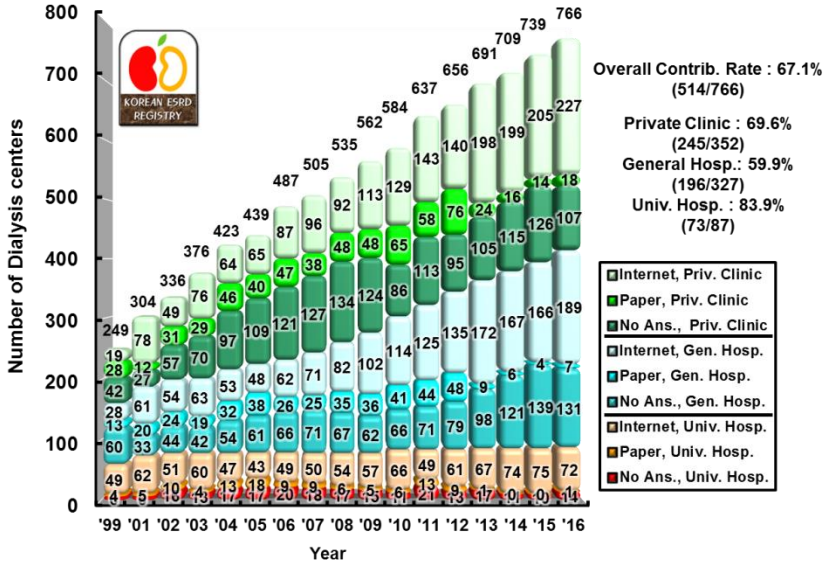


Fig.4-1. Individual patients data contributing rate of dialysis centers according to hospital classification in each year.

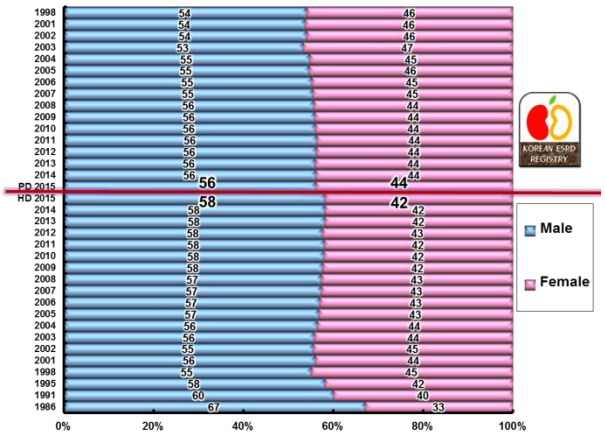


Fig.4-2. Gender ratio of HD & PD patients according to years.

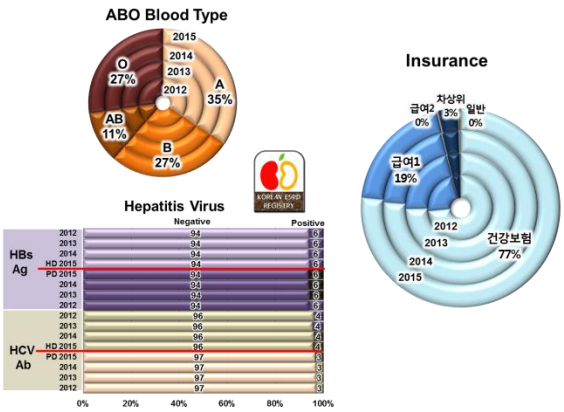


Fig.4-3. ABO blood type and hepatitis virus, medical insurance of HD & PD patients.

Part 4. Dialysis Patients Demographics (2) - Age

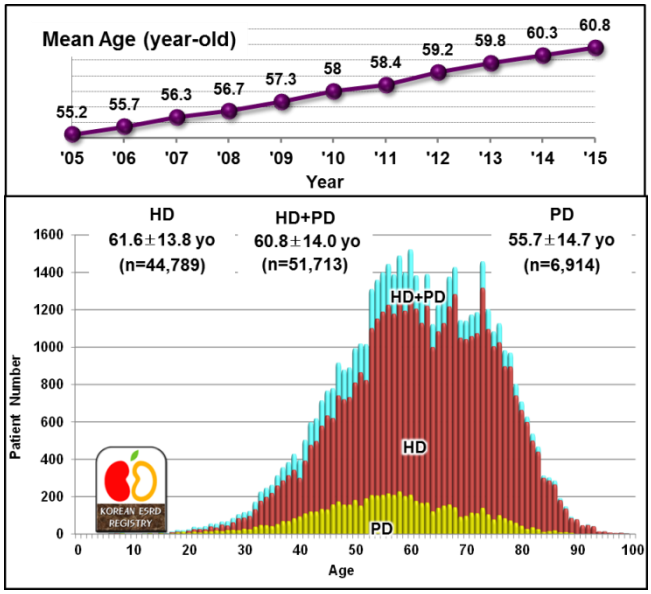


Fig.4-4. Age distribution of dialysis patients according to dialysis modalities.

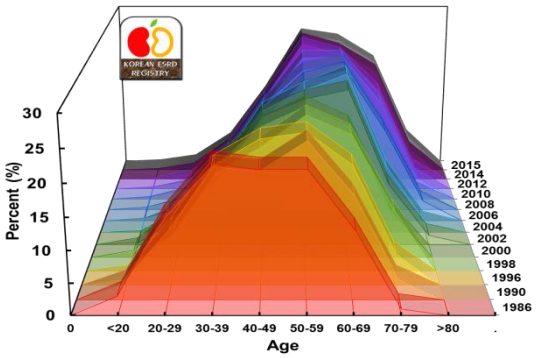


Fig.4-5. Age distribution of dialysis patients according to years. Note the peak age was shift to old age.

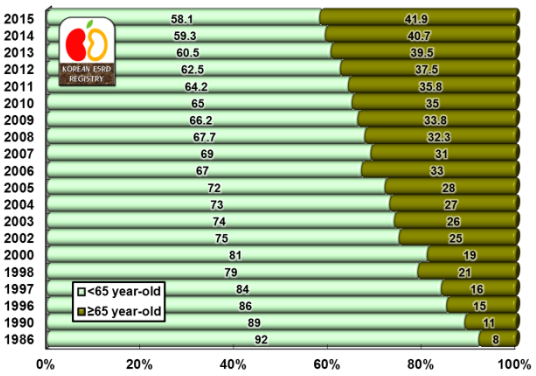


Fig.4-6. Elderly dialysis patient (over 65 year-old) proportion according to year.

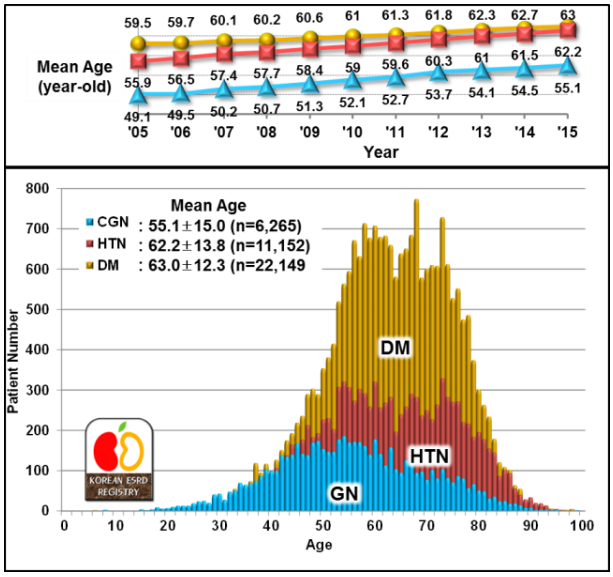


Fig.4-7. Age distribution of dialysis patients according to underlying diseases, diabetic patients (DM), hypertensive nephrosclerosis (HTN) and glomerulonephritis (GN). Note the difference of peak age between GN and DM.

Part 4. Dialysis Patients Demographics (3) – Dialysis Duration

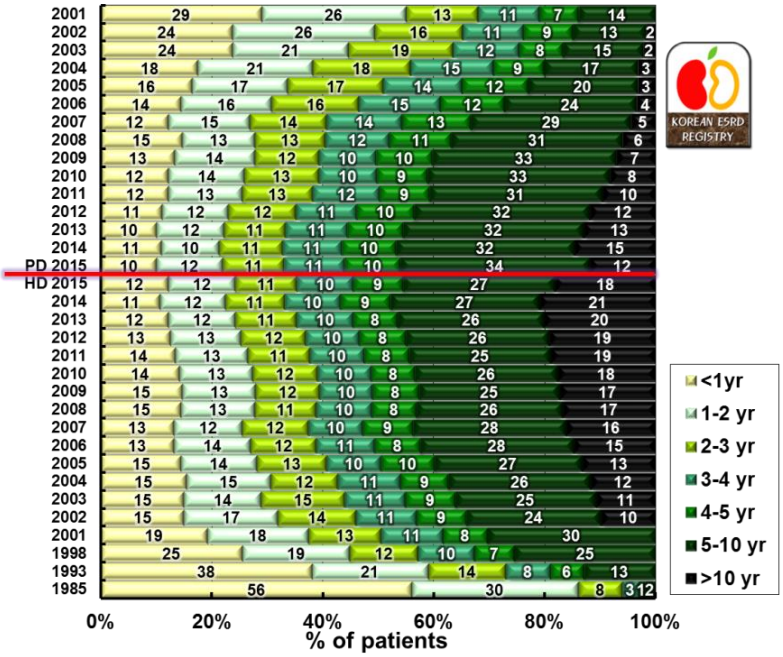


Fig.4-8. Duration of maintenance hemodialysis and peritoneal dialysis. Percent of estimated patient number according to year.

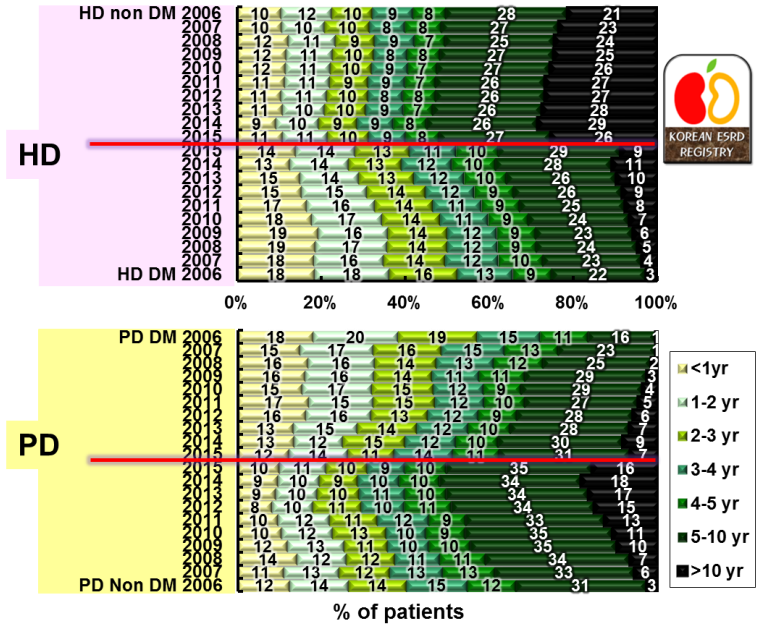


Fig.4-9. Diabetic and non-diabetic patient's duration of dialysis maintenance.

Part 4. Dialysis Patients Demographics (4) – BMI & BP

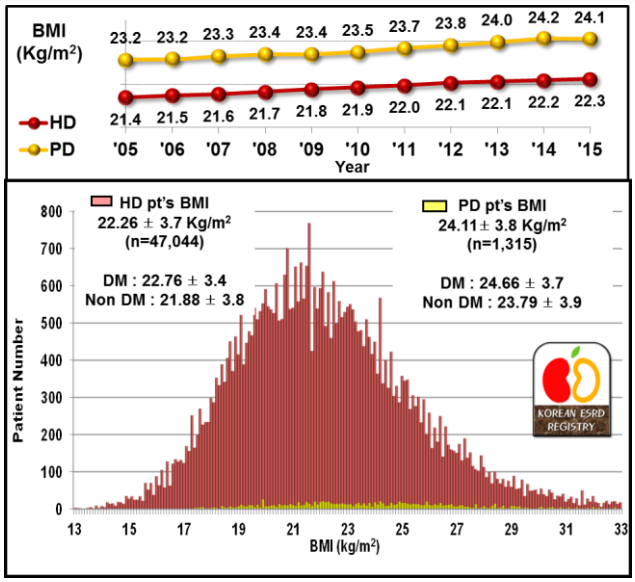


Fig.4-10. Distribution of body mass index (BMI) in hemodialysis (HD) and peritoneal dialysis (PD) patients.

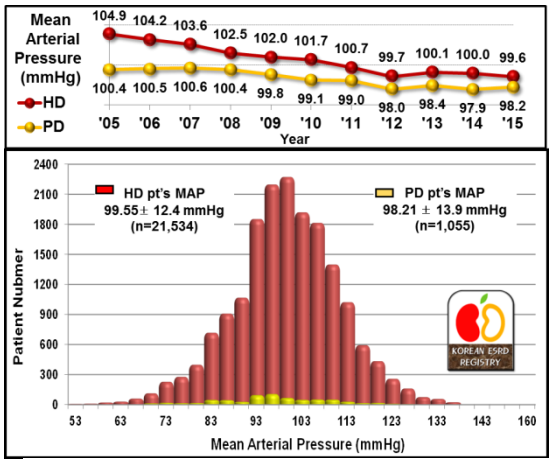


Fig.4-11. Distribution of mean blood pressure (MBP) in hemodialysis and peritoneal dialysis patients. Blood pressure of HD patients was higher than PD patients' BP.

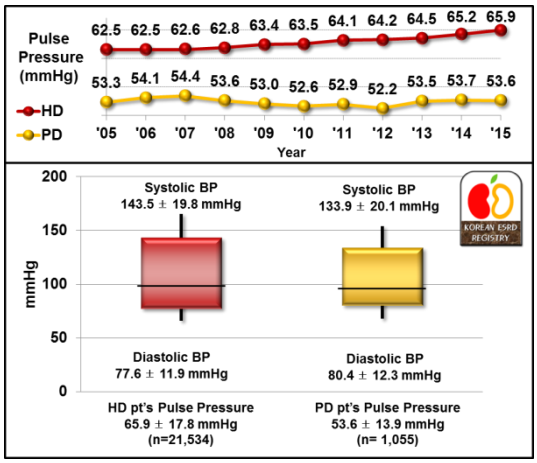


Fig.4-12. Systolic and diastolic blood pressure with pulse pressure in HD and PD patients. Note the difference of pulse pressure between HD and PD patients.

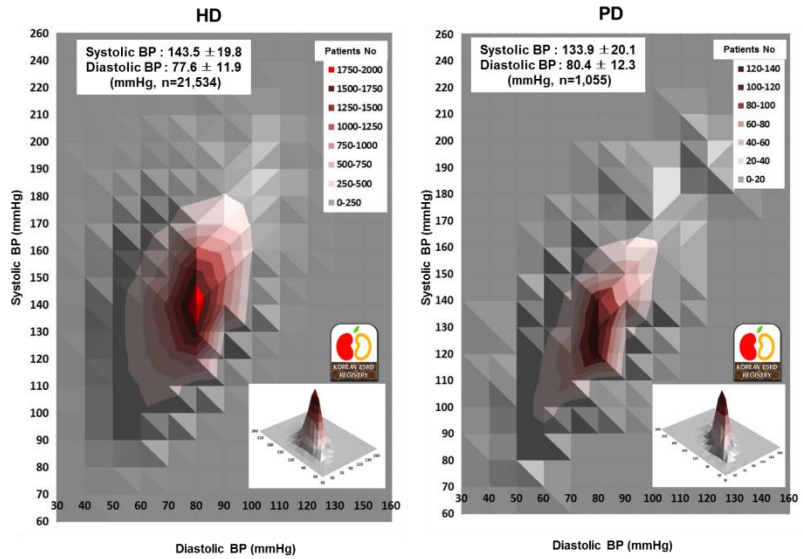


Fig.4-13. HD and PD patients' number distribution according to systolic and diastolic blood pressure.

Part 5. Dialysis Therapy (1) – HD & Vascular Access

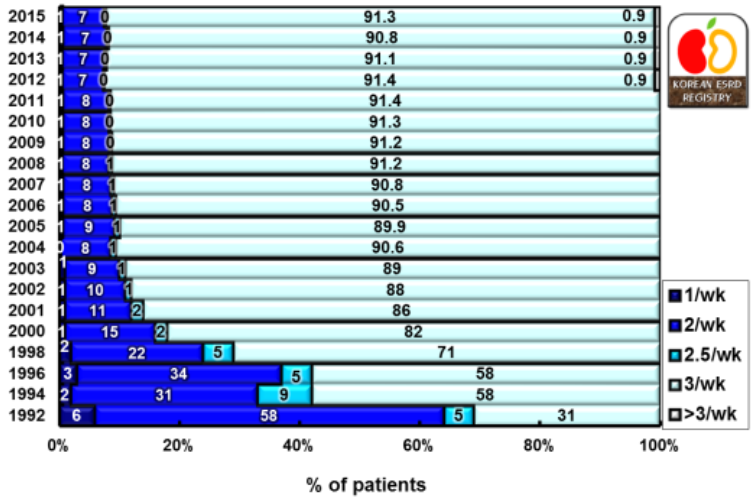
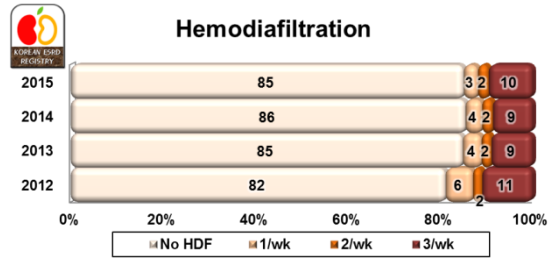
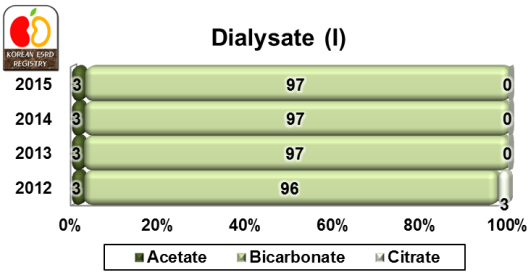


Fig.5-1. Frequency of HD per week.





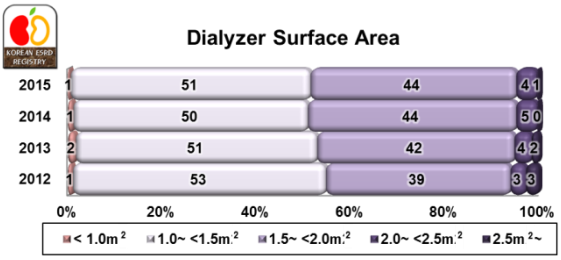


Fig. 5-2. Percent of hemodiafiltration (HDF) applied patients and dialyzer membrane surface area.

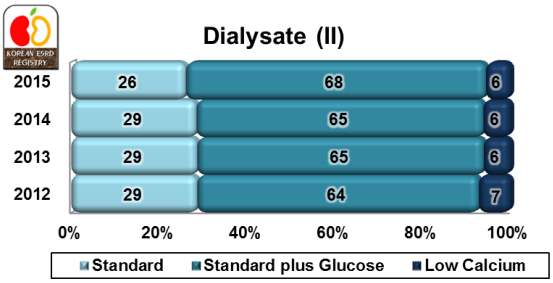


Fig.5-3. HD dialysate.

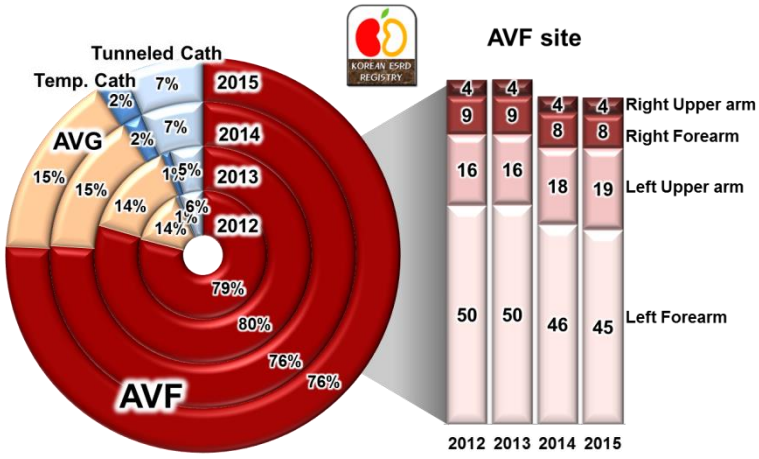


Fig.5-4. Vascular access for hemodialysis.

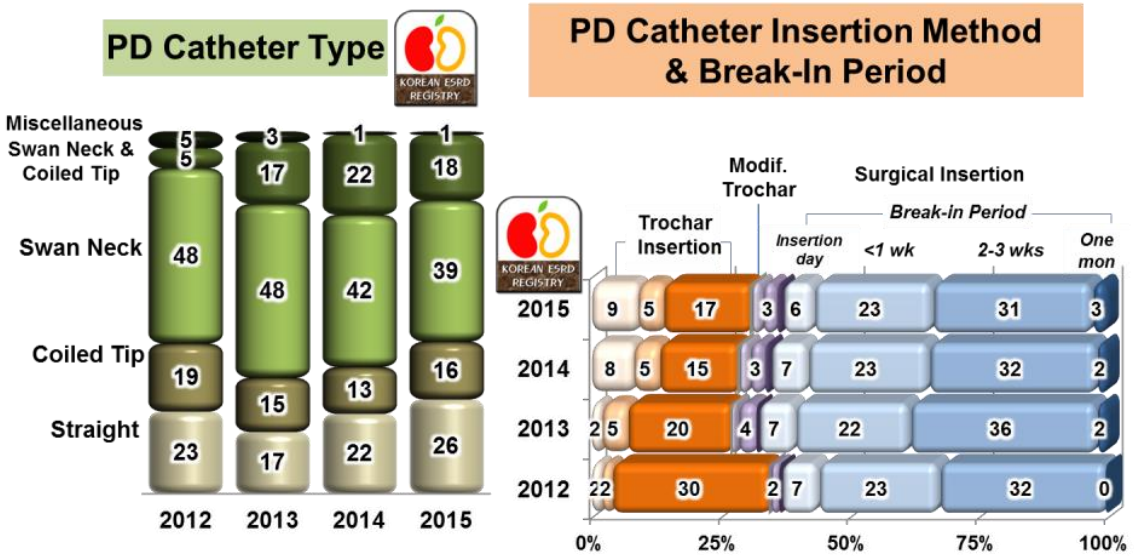


Fig.5-5. PD catheter type and PD catheter insertion methods.

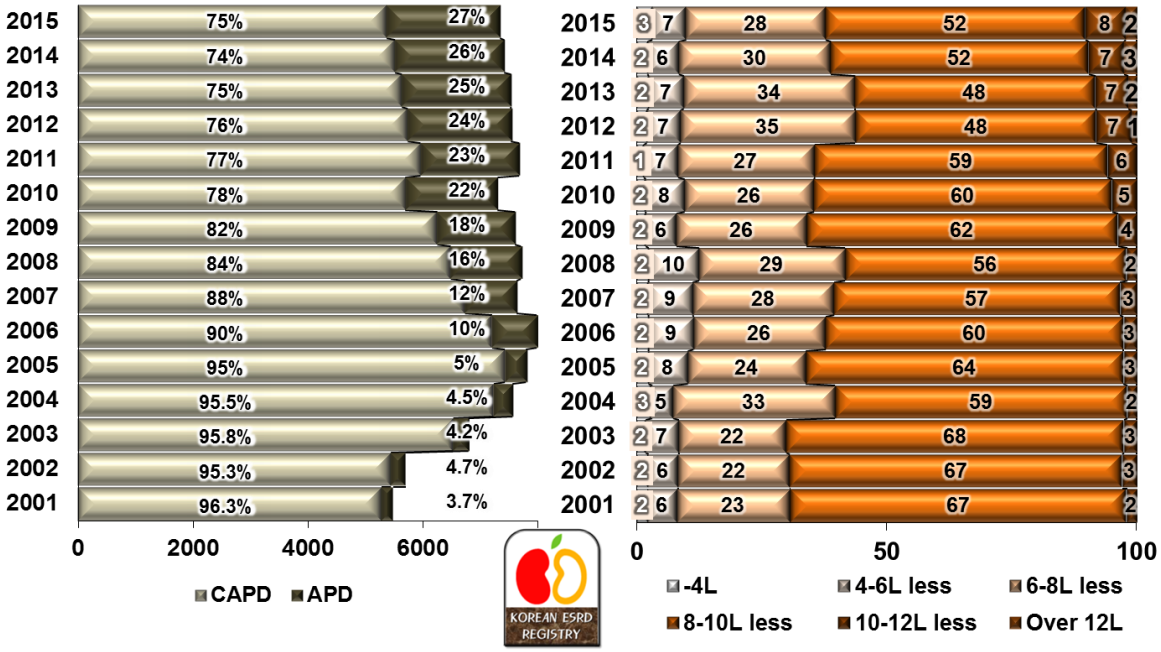


Fig.5-6. Percent distribution of PD type and dialysate doses according to year.

Part 6. Laboratory Data & Drugs (1) – Anemia & Erythropoietin

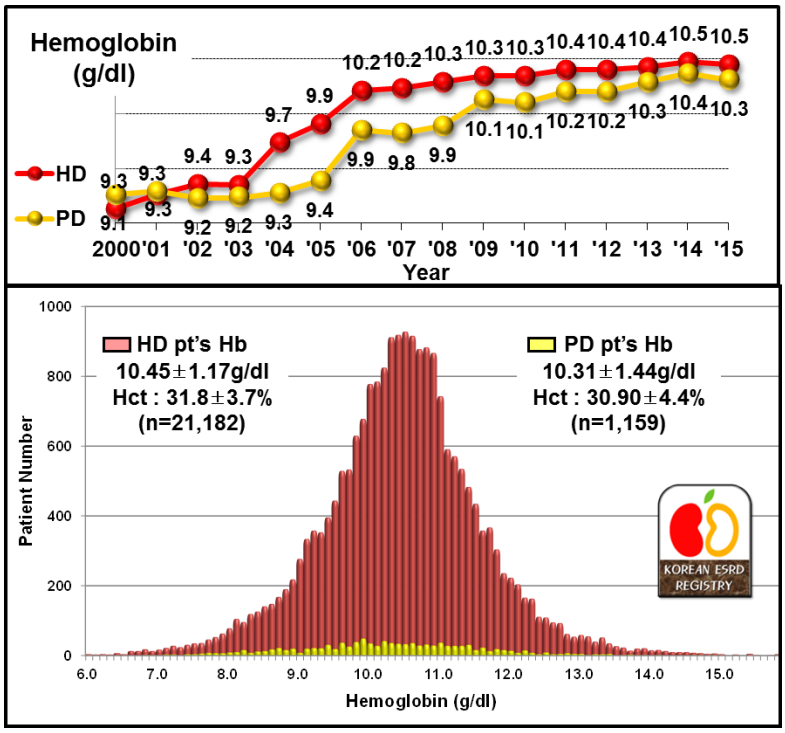


Fig.6-1. Distribution of hemoglobin levels in HD and PD patients.

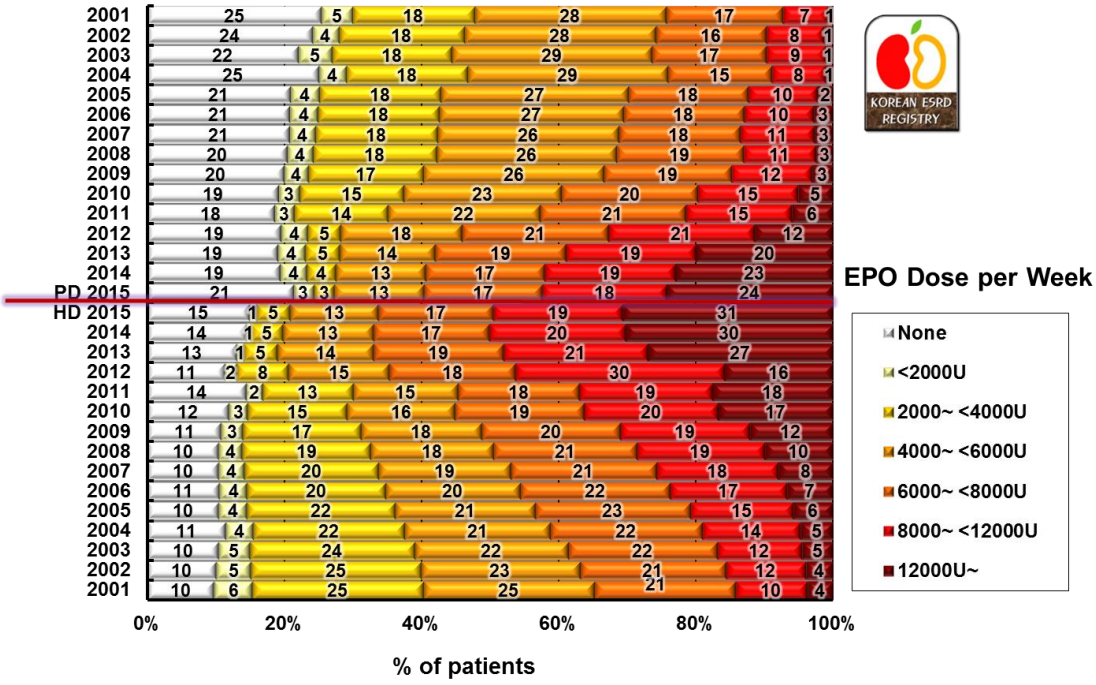


Fig.6-2. Percent distribution of prescribed erythropoietin doses for HD and PD patients.

Part 6. Laboratory Data & Drugs (2) – Calcium & Phosphorus

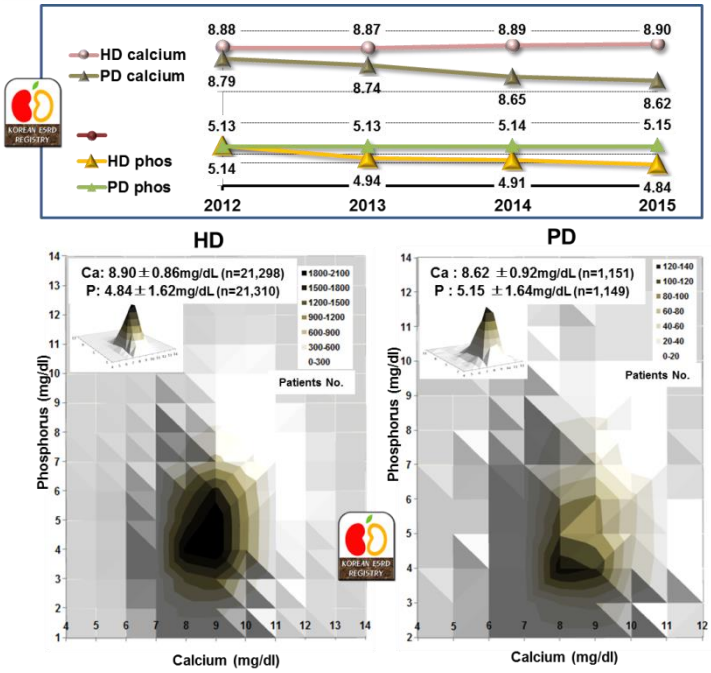


Fig.6-3. Distribution of patients numbers according to calcium and phosphorus level.

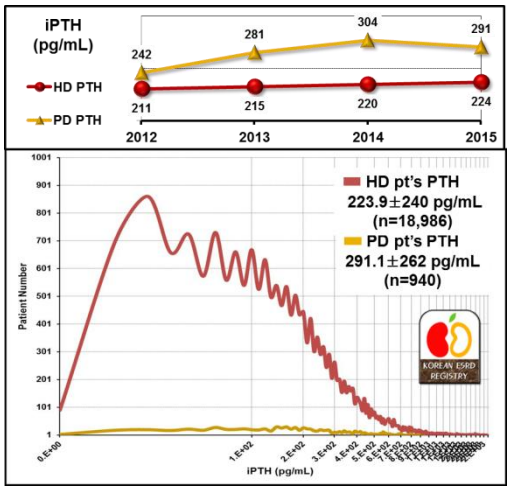


Fig.6-4. PTH level of HD and PD patients. (x-axis is on logarithmic scale.)

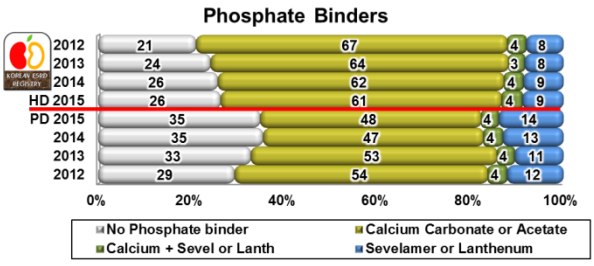


Fig.6-5. Phosphate binders.

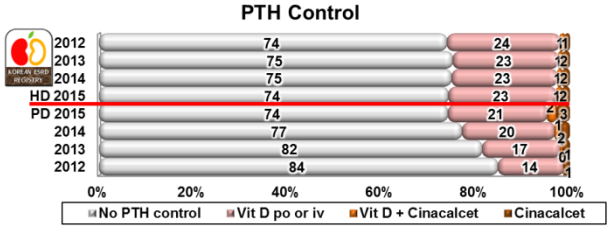


Fig.6-6. Medications for PTH control.

Part 6. Laboratory Data & Drugs (3) – Miscellaneous Lab Data

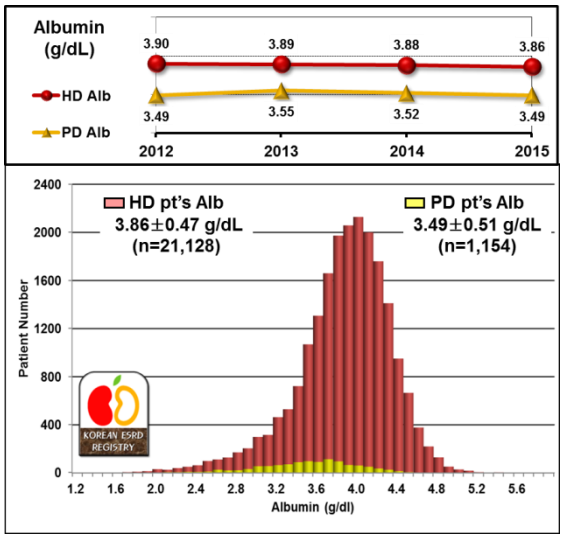


Fig. 6-7. Albumin level of HD and PD patients.

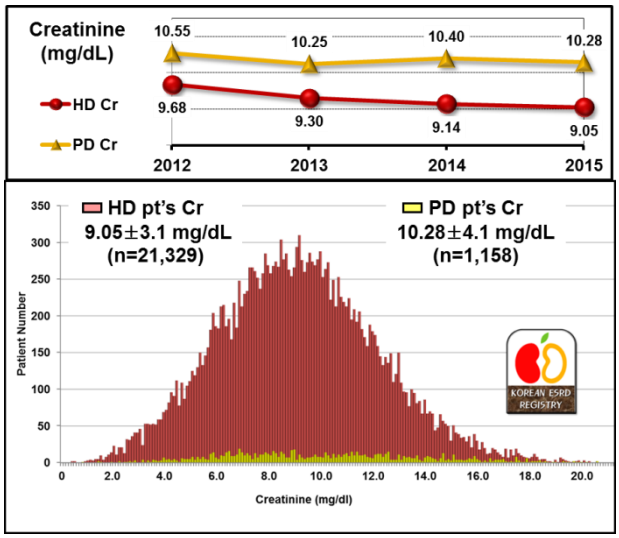


Fig. 6-8. Creatinine level of HD and PD patients.

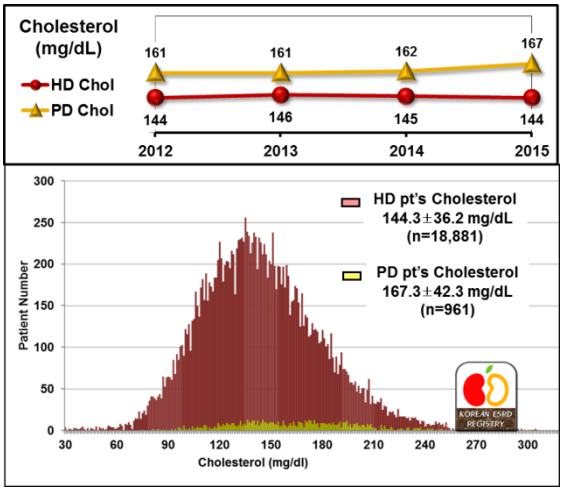


Fig. 6-9. Total cholesterol level of HD and PD

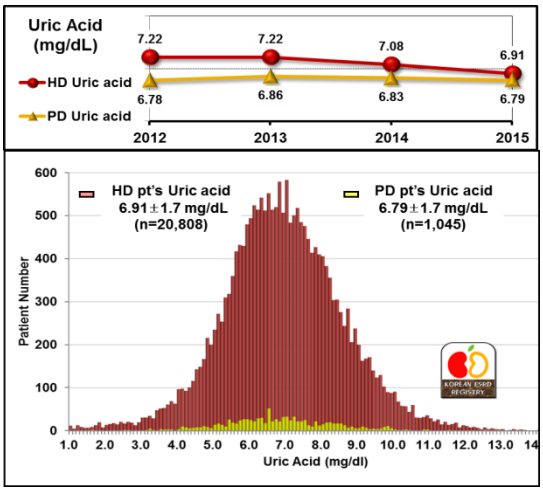


Fig. 6-10. Uric acid level of HD and PD patients.

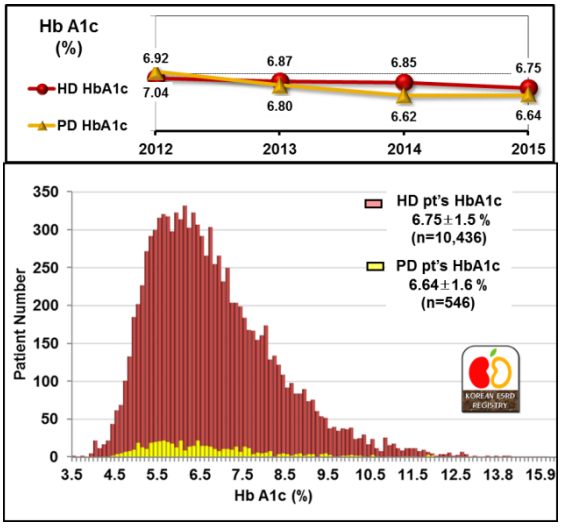


Fig. 6-11. HbA1c level of diabetic HD and PD patients.patients.

Part 7. Dialysis Adequacy

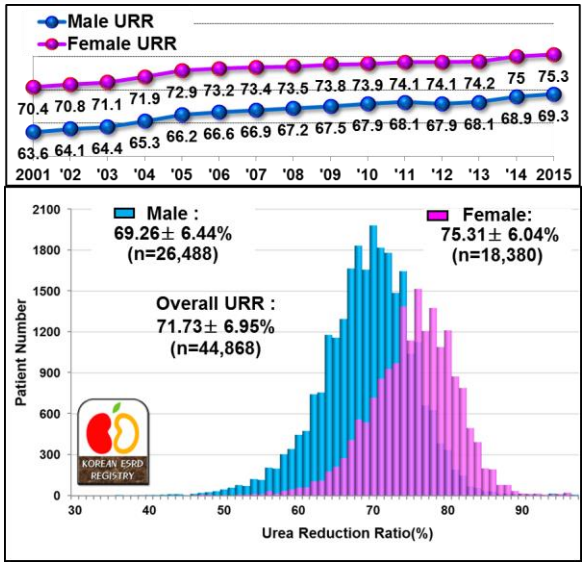


Fig.7-1. Distribution of urea reduction ratio (URR) of hemodialysis patients. Note the difference between male and female.

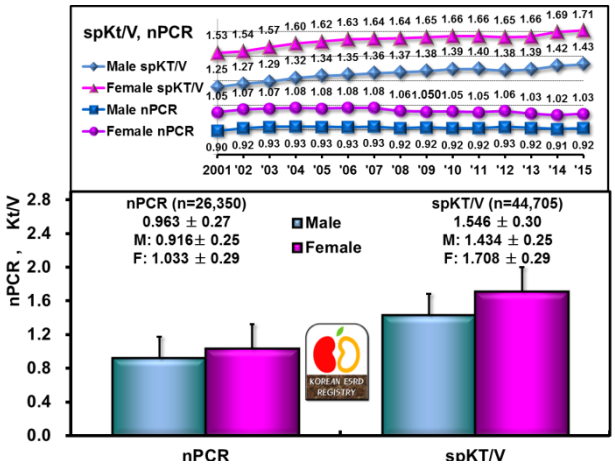


Fig.7-2. Dialysis adequacy parameters (nPCR & KT/V) of hemodialysis patients.

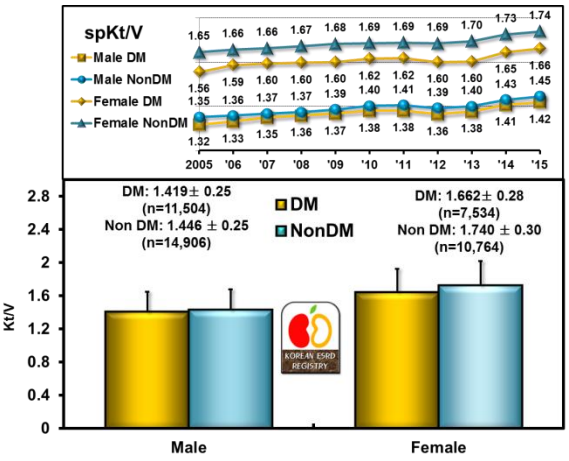


Fig.7-3. Dialysis adequacy parameters (Kt/V) of diabetic and non-diabetic hemodialysis patients.

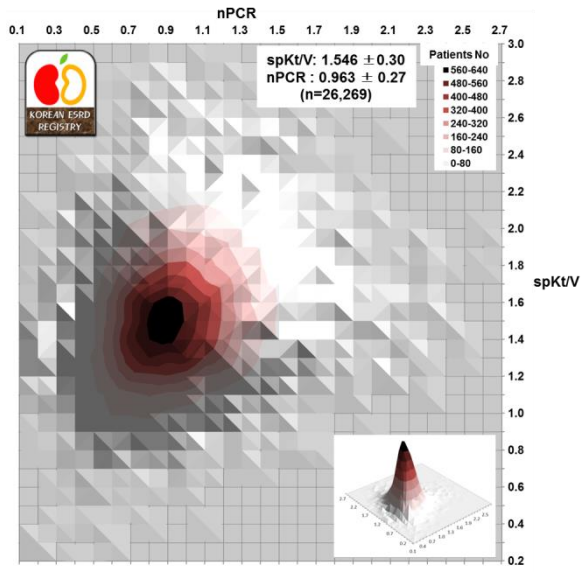


Fig.7-4.Distribution of patients number according to nPCR and single pool Kt/V in hemodialysis patients.

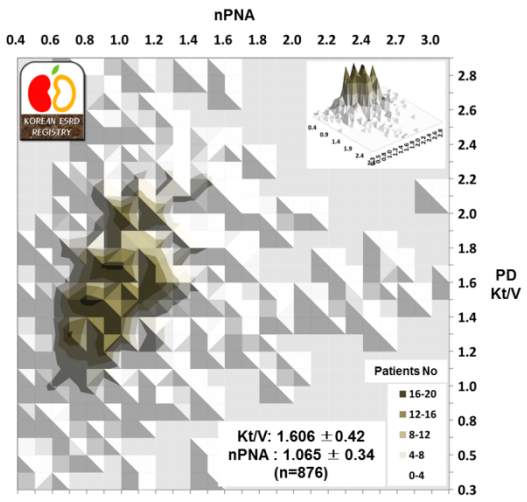


Fig.7-5. Distribution of patients number according to nPNA and PD Kt/V in peritoneal dialysis patients.

Part 8. Rehabilitation Status of Dialysis Patients

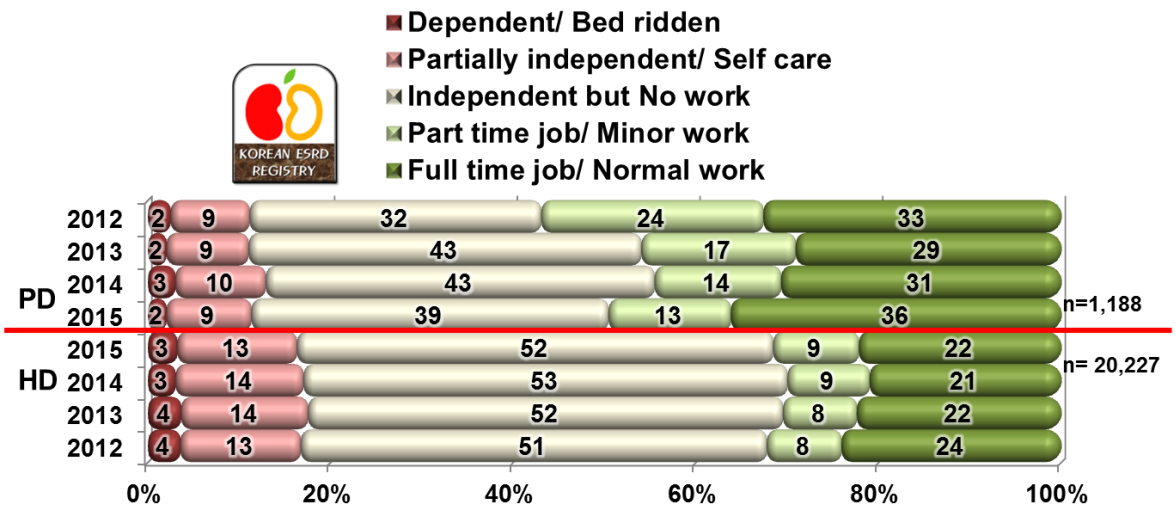


Fig.8-1. Rehabilitation status of HD and PD patients.

Part 9. Co-morbidity of Dialysis Patients

Table 9-1. Co-morbidity of dialysis patients in 2015*. Relative percent of reported comorbidity.

	HD (%, n=30,262)		PD (%, n=2,281)	
Cardiac	**16.7**		**25.0**	
Coronary Artery Disease		9.0		6.8
Congestive Heart Failure		4.3		16.0
Pericardial Effusion		0.3		0.5
Arrythmia		3.1		1.7
Vascular	**48.3**		**54.1**	
Cerebrovascular accident		3.1		4.0
Hypertension		43.4		49.7
Other vascular disease		1.8		0.3
Infection	**5.5**		**8.5**	
Pneumonia		1.4		1.0
Tuberculosis		0.6		1.0
Peritonitis		0.2		4.5
Herpes zoster		0.3		0.2
Access/ exit site infection		0.8		1.0
Other Infection		2.1		0.8
Liver disease	**6.1**		**3.7**	
Hepatitis B		3.5		2.5
Hepatitis C		2.2		1.2
Congestive Liver		0.1		0.0
Hemochromatosis		0.0		0.0
Other liver diseases		0.3		0.0
Gastrointestinal	**16.2**		**4.5**	
Gastric Ulcer		1.5		0.7
Duodenal Ulcer		0.2		0.0
Constipation		5.6		0.8
Other Gastrointestinal Diseases		8.7		3.0
Miscellaneous	**7.3**		**4.2**	
Malnutrition (Alb<2.5g/dl)		0.1		0.5
Malignancy		1.1		0.8
Hypertensive Retinopathy		0.4		0.3
Uremic Dermatitis		1.7		0.7
Uremic Neuritis		0.7		0.2
Uremic Dementia		0.2		0.3
Uremic Ascites / Pleural Effusion		0.3		0.2
Osteodystrophy		0.6		0.2
COPD & other pulm disease		0.4		0.5
Decubitus ulcer/ DM foot		1.8		0.5

Part 10. Causes of Death in Dialysis Patients

Table 7-1. Causes of death (%) in dialysis patients, 1994-2015*

	1994-96	1998	2001	2003	2005	2007	2009	2011	2012	2013	2014	2015
Cardiac	**27.4**	**27.4**	**26.9**	**31.7**	**30.7**	**31.7**	**29.5**	**32.7**	**33.9**	**35.8**	**32.5**	**36.1**
Myocardial infarction	6.4	6.4	7.7	7.4	8	7.5	8.0	6.6	6.8	7.5	5.7	8.0
Cardiac arrest, uremia associated	13.7	13.7	11.2	11.7	10.4	10.8	8.5	11.0	11.1	14.2	14.1	13.1
Cardiac arrest, other cause	7.2	7.2	8.1	12.5	12.4	13.3	13	15.0	16.0	14.2	12.6	15.0
Vascular	**17.2**	**17.2**	**22.7**	**19.5**	**17**	**17.8**	**15.9**	**14.1**	**13.0**	**13.3**	**13.2**	**11.8**
Cerebrovascular accident	14.3	14.3	15.1	14.5	12.3	13	11	8.7	7.9	8.7	8.5	6.5
Pulmonary embolus	0.2	0.2	0.5	0.1	0.6	0.5	0.2	0.2	0.3	0.2	0.2	0.9
Gastrointestinal hemorrhage	1.7	1.7	2.7	3.2	1.7	2.7	2.3	2.2	2.3	1.2	1.7	1.4
Gastrointestinal embolism	0.1	0.1	0.1	0	0.5	0.1	0.5	0.1	0.6	0.2	0.2	0.7
Other vascular disease	0.9	0.9	4.3	1.6	1.9	1.6	1.9	3.0	1.9	3.0	2.6	2.4
Infection	**13.5**	**13.5**	**17.8**	**20.5**	**20.1**	**20.2**	**21.9**	**23.1**	**24.5**	**23.5**	**26.8**	**24.6**
Pulmonary infection	2.5	2.5	4.5	3.6	4.5	4.4	5.9	8.4	10.8	8.4	9.0	8.9
Septicemia	6.6	6.6	6.9	9.7	9.6	11.7	10.4	9.7	8.9	11.9	13.6	11.0
Tuberculosis	0.3	0.3	0.8	0.2	0.3	0.2	0.3	0.1	0.7	0.1	0.1	1.1
Peritonitis	2.1	2.1	1.1	2	1.4	1.1	0.8	1.0	1.0	0.5	0.7	1.1
Other Infection	2	2	4.5	4.9	4.3	2.9	4.5	4.0	3.0	2.7	3.4	2.4
Liver disease	**3.4**	**3.4**	**2.6**	**2.8**	**2.7**	**2.2**	**3.1**	**2.1**	**2.8**	**2.4**	**2.2**	**2.6**
Liver failure due to hepatitis B	1.8	1.8	1.6	1.8	1.5	1.3	2.2	1.0	1.4	1.3	1.0	1.1
Liver failure due to other cause	1.6	1.6	1	1	1.2	0.8	0.9	1.1	1.3	1.1	1.2	1.5
Social	**6.2**	**6.2**	**6.3**	**4.4**	**5.4**	**3.3**	**2.5**	**3.3**	**2.2**	**2.8**	**2.5**	**2.0**
Patient refused further treatment	2.9	2.9	2.1	1	1.1	1.1	0.5	0.4	0.6	0.3	0.3	0.3
Suicide	2.5	2.5	3.3	2.3	3.3	1.5	1.3	1.4	1.4	1.3	1.6	1.0
Therapy ceased for other reason	0.8	0.8	0.9	1	1	0.7	0.8	1.5	0.3	1.2	0.7	0.8
Miscellaneous	**32**	**32**	**23.7**	**21.3**	**24**	**24.8**	**27.1**	**24.7**	**23.6**	**22.2**	**22.9**	**23.0**
Cachexia	2.9	2.9	8.1	6.6	4	4.4	3.3	2.7	2.1	1.6	1.5	1.4
Malignant disease	2.1	2.1	4.4	3.5	6.4	5.7	5.7	6.0	6.7	5.7	6.0	5.8
Accident	1.2	1.2	0.9	1.1	1.4	1.2	1.3	1.6	1.4	1.4	2.0	1.0
Uncertain	25.8	25.8	10.3	10.1	12.3	13.4	16.8	14.5	13.3	13.4	13.4	14.8

*Number of patients :1994-1996=981, 1998=911, 2001=761, 2003=894, 2005=1,256, 2007=1,531, 2009=1,727, 2011=1,828, 2012=1,745, 2013=1,604, 2014=1,534, 2015=891.

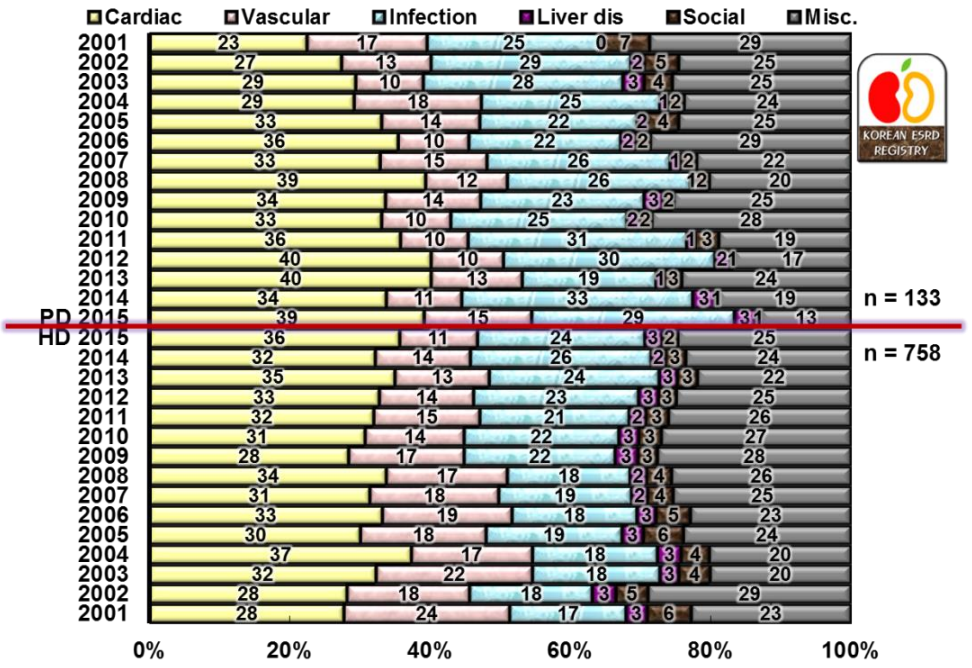


Fig.10-1. Comparison of death causes, hemodialysis versus peritoneal dialysis patients

Part 11. Survival Rate of Dialysis Patients

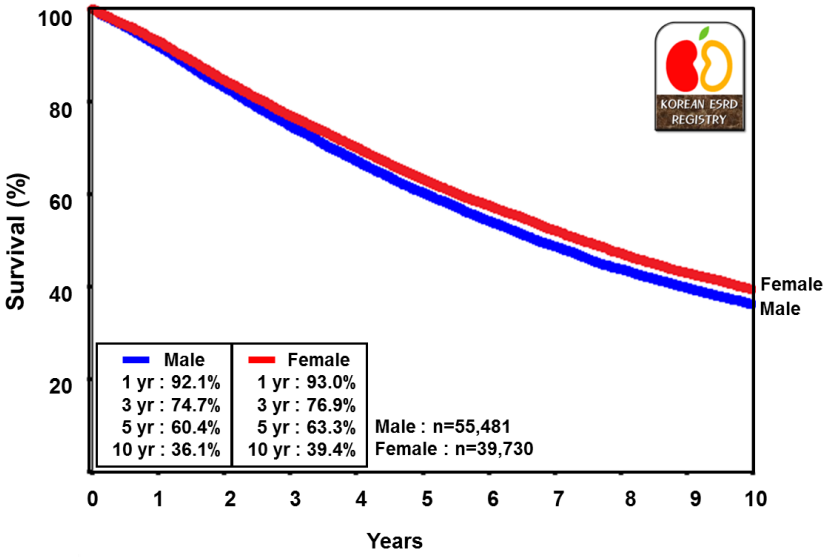


Fig.11-1. Survival rates of male and female dialysis patients. (Registered dialysis patients to Korean Society of Nephrology registry since 2001.).

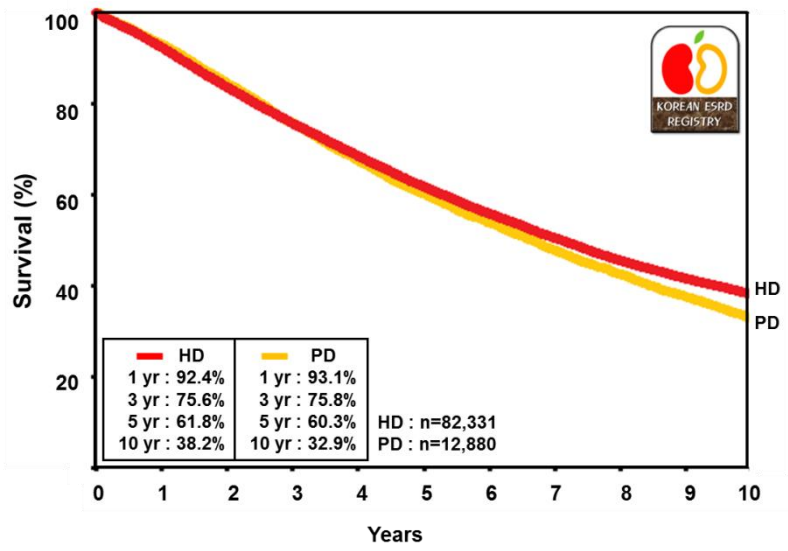


Fig.11-2. Survival rates of hemodialysis and peritoneal dialysis patients. (Registered dialysis patients to Korean Society of Nephrology registry since 2001.).

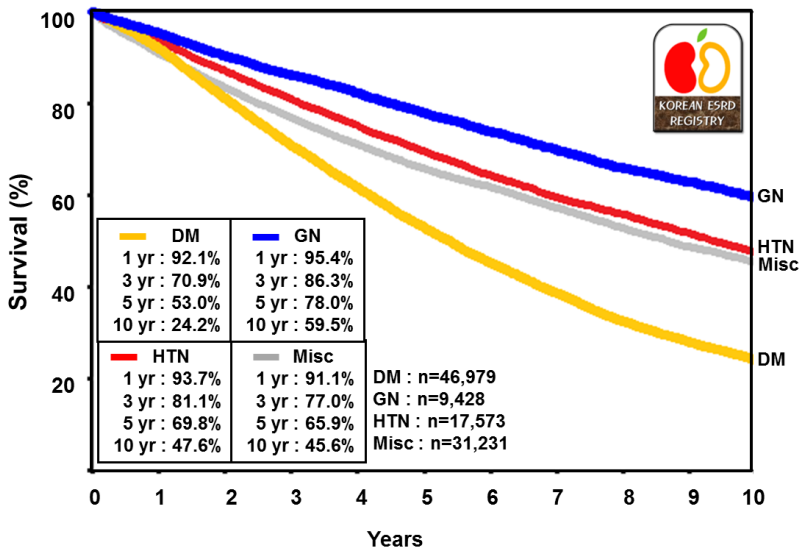


Fig.11-3. Patient survival rates according to underlying diseases (DM: diabetic nephropathy, GN: chronic glomerulonephritis, HTN: hypertension Misc: miscellaneous, Registered dialysis patients to Korean Society of Nephrology registry since 2001.)

Part 12. Kidney Transplantation

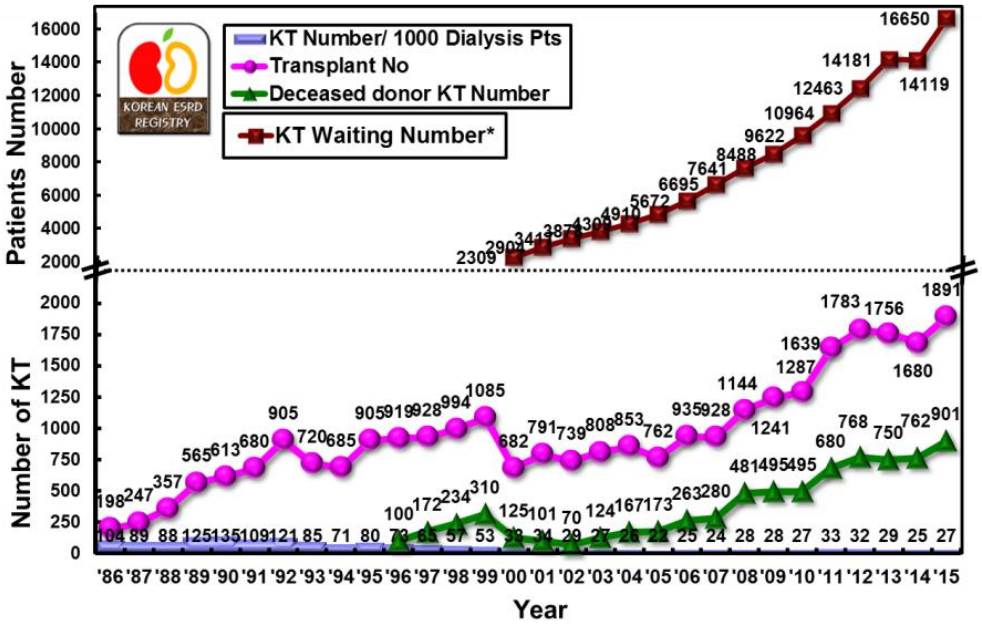


Fig.12-1. Annual number of kidney transplantation in Korea (including data from KONOS: Korean Network for Organ Sharing). *Survived kidney transplantation waiting patient number at the end of each year.

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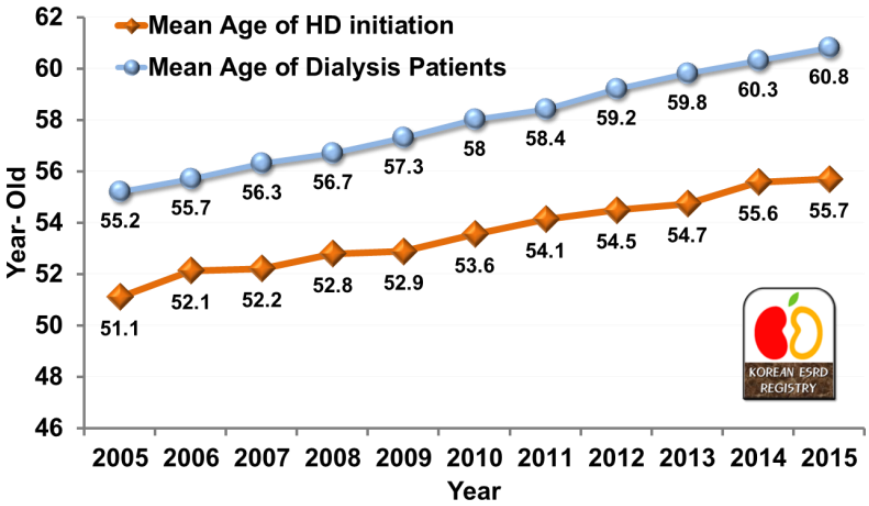

Fig.S-1.Mean age of hemodialysis initiation and current mean age of dialysis patients.

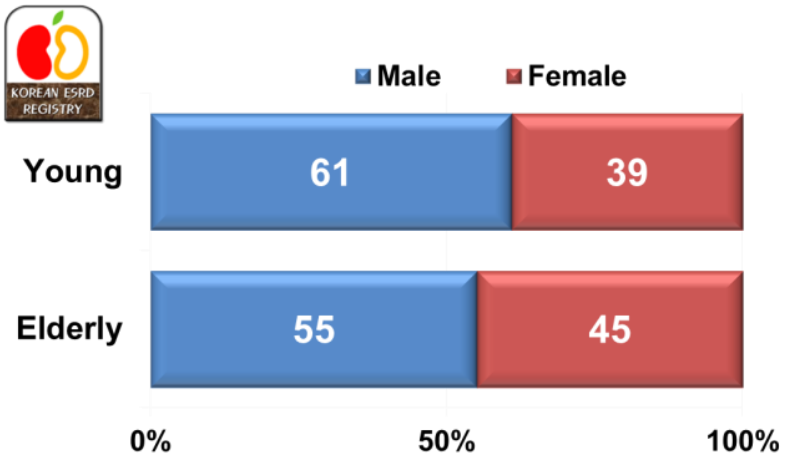

Fig.S-2.Gender ratio of elderly dialysis patients, compared to young patients. Young; <65 year-old, Elderly; ≥65 year-old

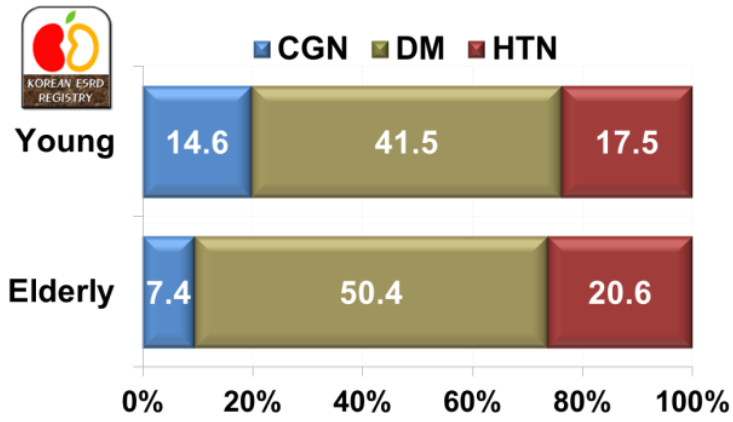

Fig.S-3. Causes of end stage renal disease. (CGN; chronic glomerulonephritis, DM; diabetic nephropathy, HTN; hypertensive nephrosclerosis,)

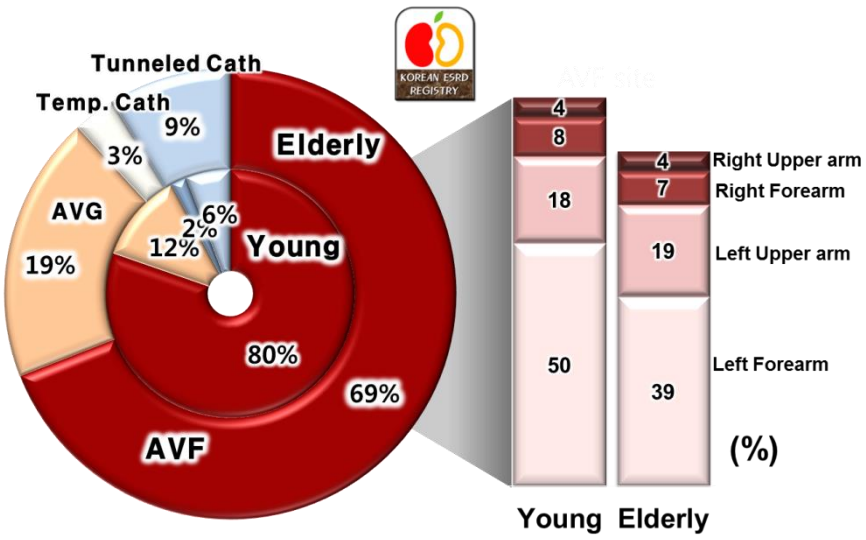

Fig.S-4. Vascular access of elderly hemodialysis patients.

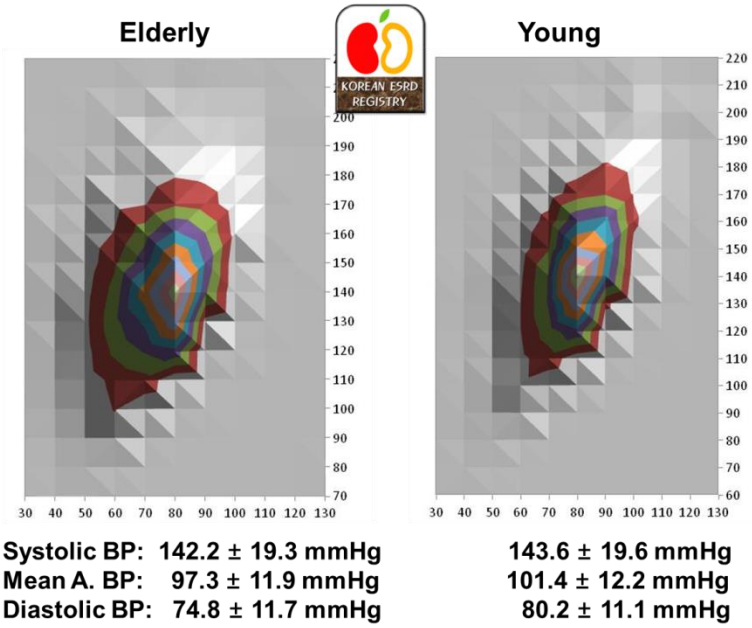

Fig.S-5. Blood pressure comparison of elderly and young dialysis patients. Note the wide pulse pressure of elderly dialysis patients.

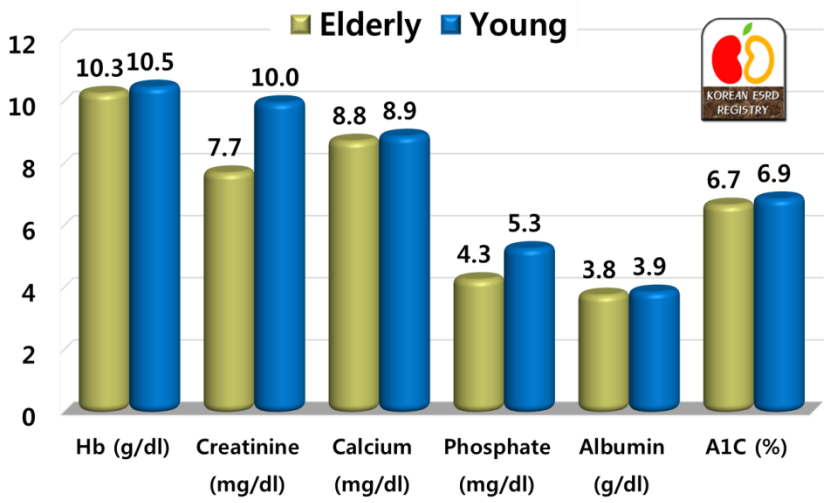

Fig.S-6. Various laboratory data comparison of elderly and young dialysis patients.

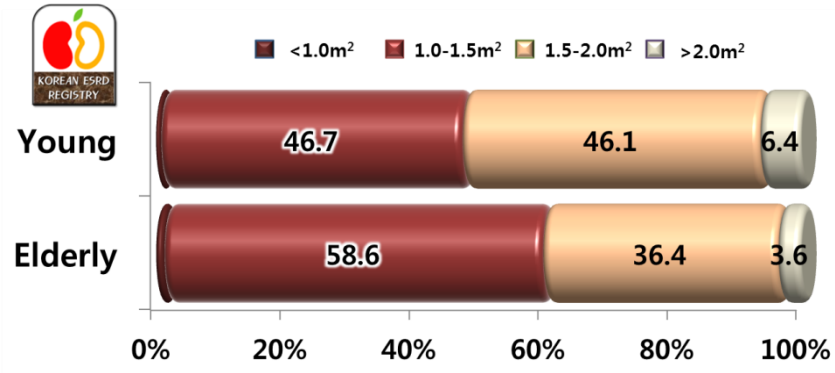

Fig.S-7. Dialyzer surface area of elderly and young hemodialysis patients.

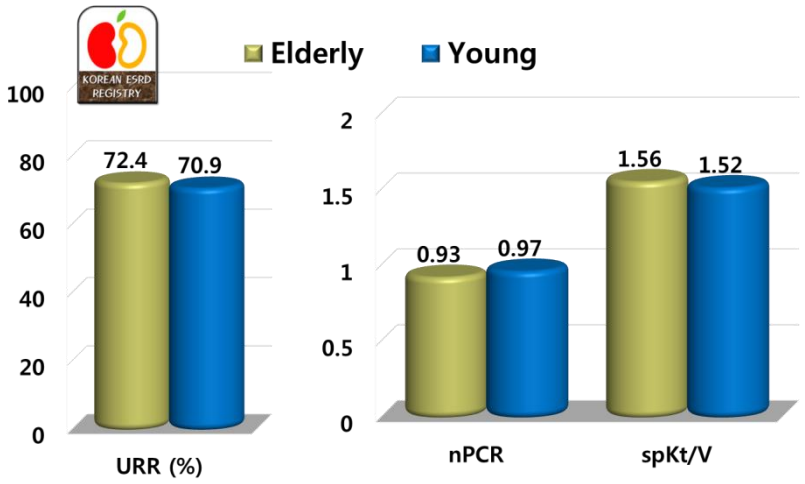

Fig.S-8. Hemodialysis adequacy comparison of elderly and young dialysis patients.
In spite of using small dialyzer, the dialysis adequacy of elderly patients was better than that of young patients.

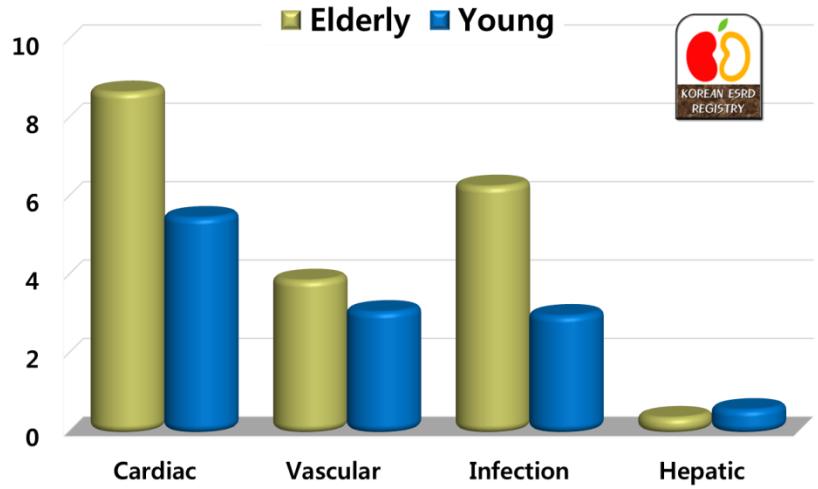

Fig.S-9. Complication prevalence rate comparison of elderly and young dialysis patients.

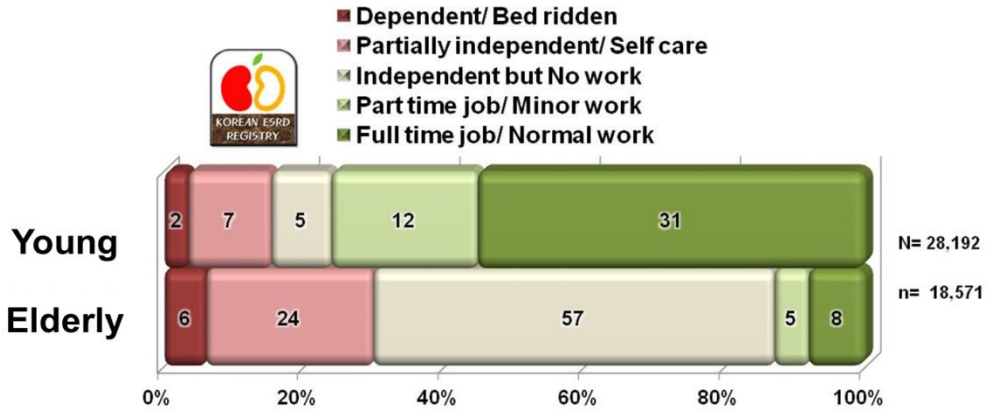

Fig.S-10. Rehabilitation status of elderly dialysis patients.

◆ Acknowledgements: We, ESRD registry committee of Korean Society of Nephrology, would like deeply thank to every dialysis centers' medical doctors and nurses for participation in this survey. The dialysis facility sales department of Baxter Korea and Fresenius Medical Care Korea were also shared their data.