

우리나라 신대체 요법의 현황

— 인산 민병석 교수 기념 말기 신부전 환자 등록사업 2007 —

Current Renal Replacement Therapy in Korea

-Insan Memorial Dialysis Registry 2007-



대한신장학회 등록위원회

ESRD Registry Committee, Korean Society of Nephrology

Prevalence of Renal Replacement Therapy

Year	HD		PD		Transplant		Total	
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)

(): number of patients per million population

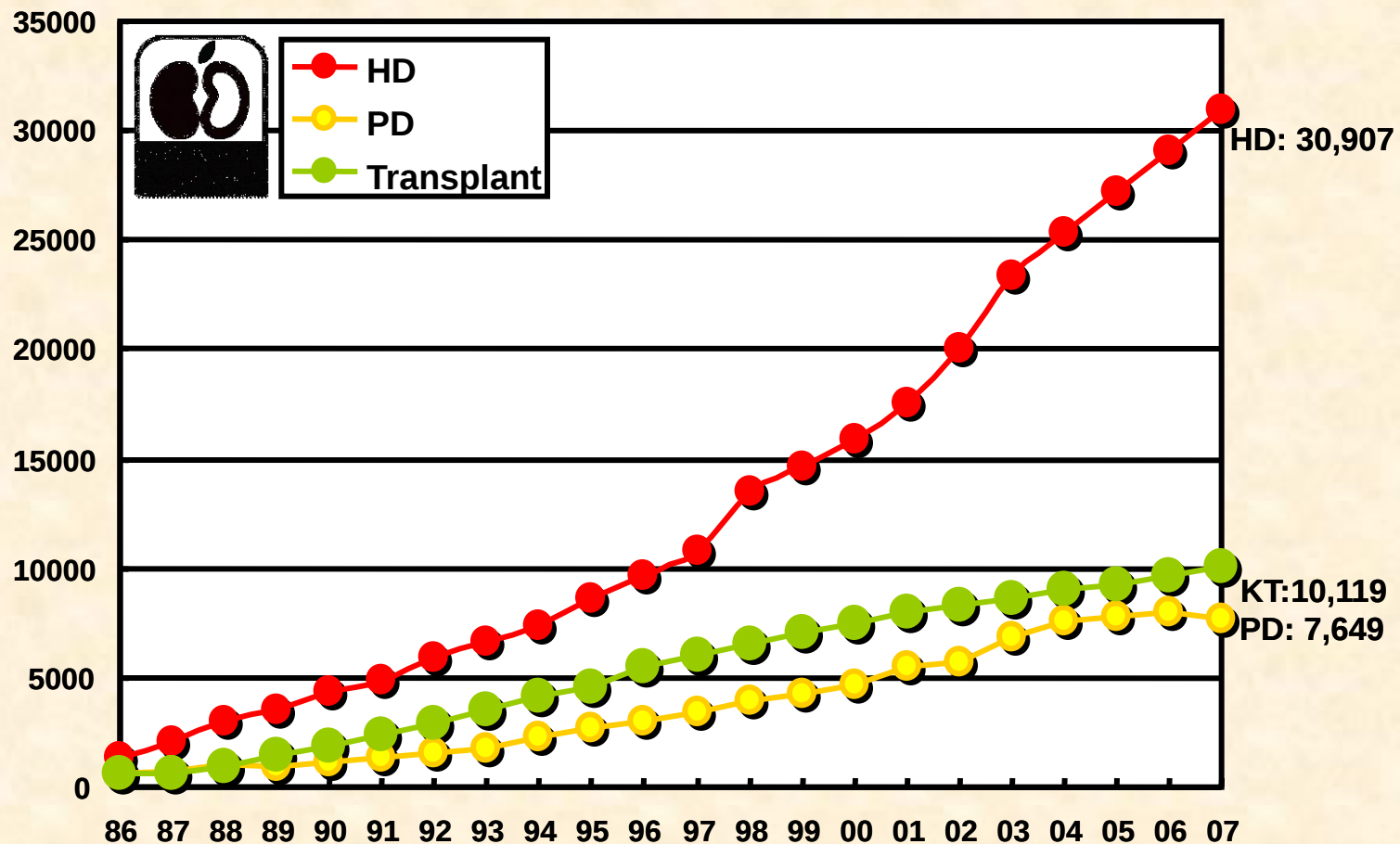
건강보험 심사평가원 자료

대한신장학회 자료
(2007년 12월 기준)

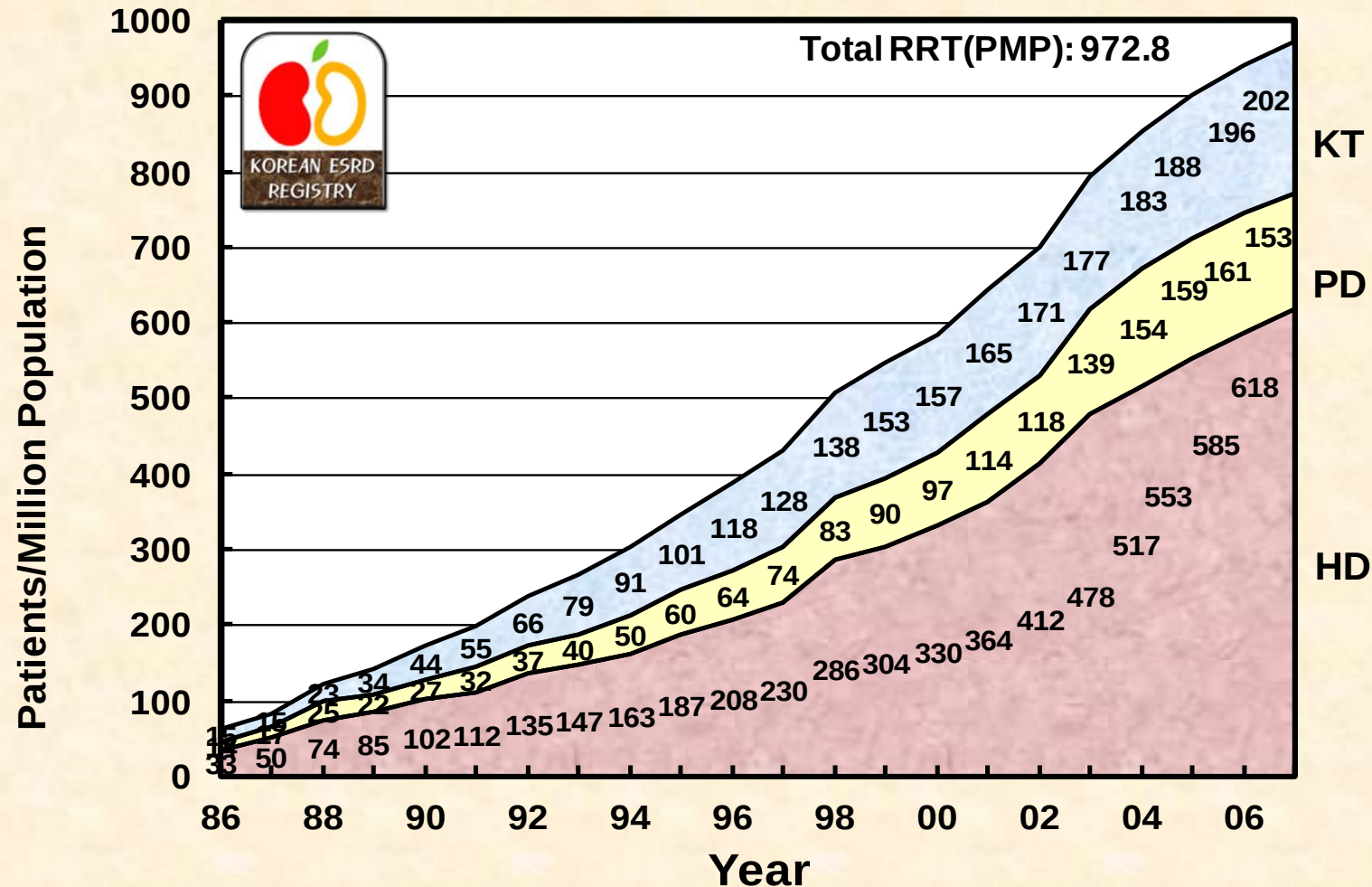
HD : 30,907
PD : 7,649

2007년 10월	입원	HD	1,310
		PD	324
	외래	HD	31,314
		PD	5,978
2007년 11월	입원	HD	1,250
		PD	313
	외래	HD	31,443
		PD	5,920
2007년 12월	입원	HD	1,222
		PD	297
	외래	HD	31,688
		PD	5,743

Patient Number of RRT



Point Prevalence of RRT

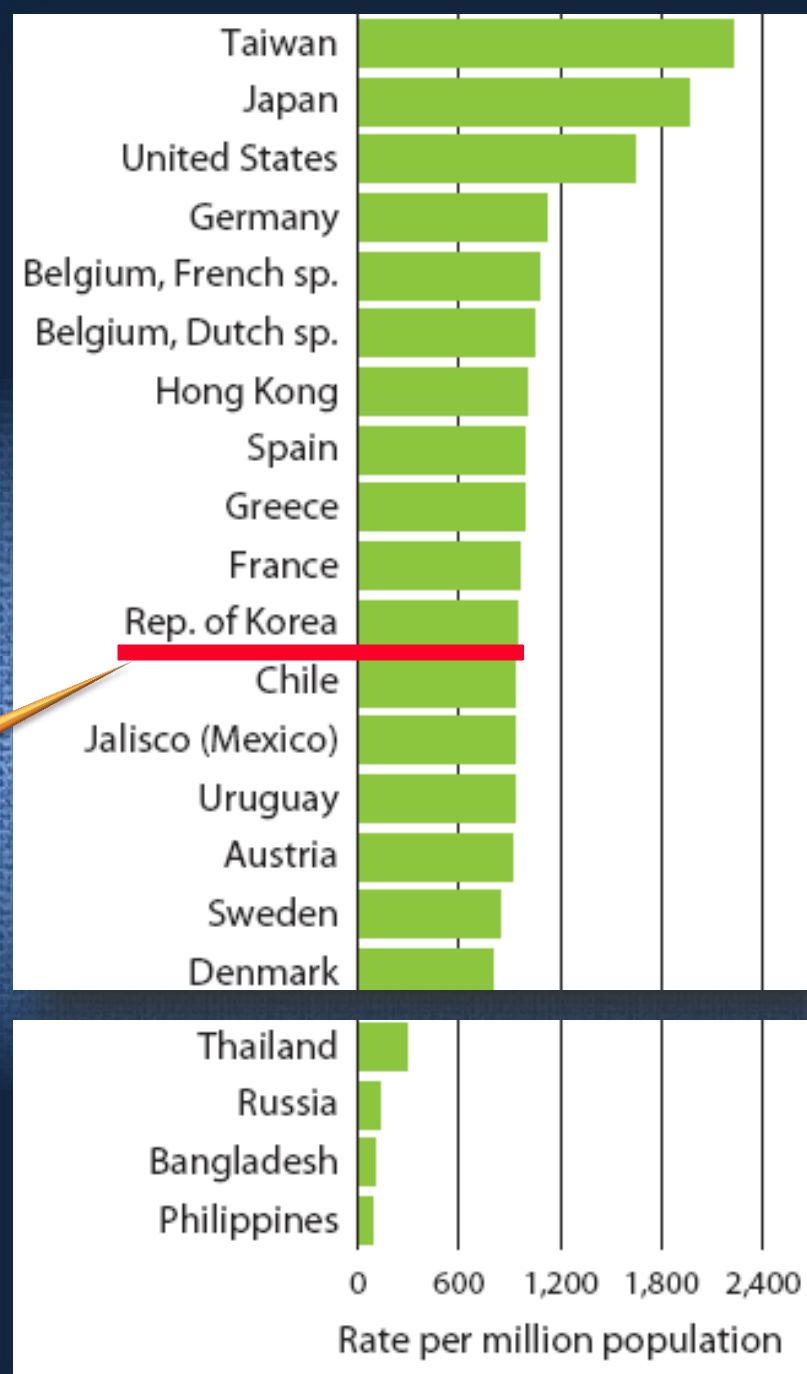


Prevalence of ESRD

United States
Renal Data System
2008 Annual Data Report

International Comparison In USRDS 2008

941.7 PMP
End of 2006

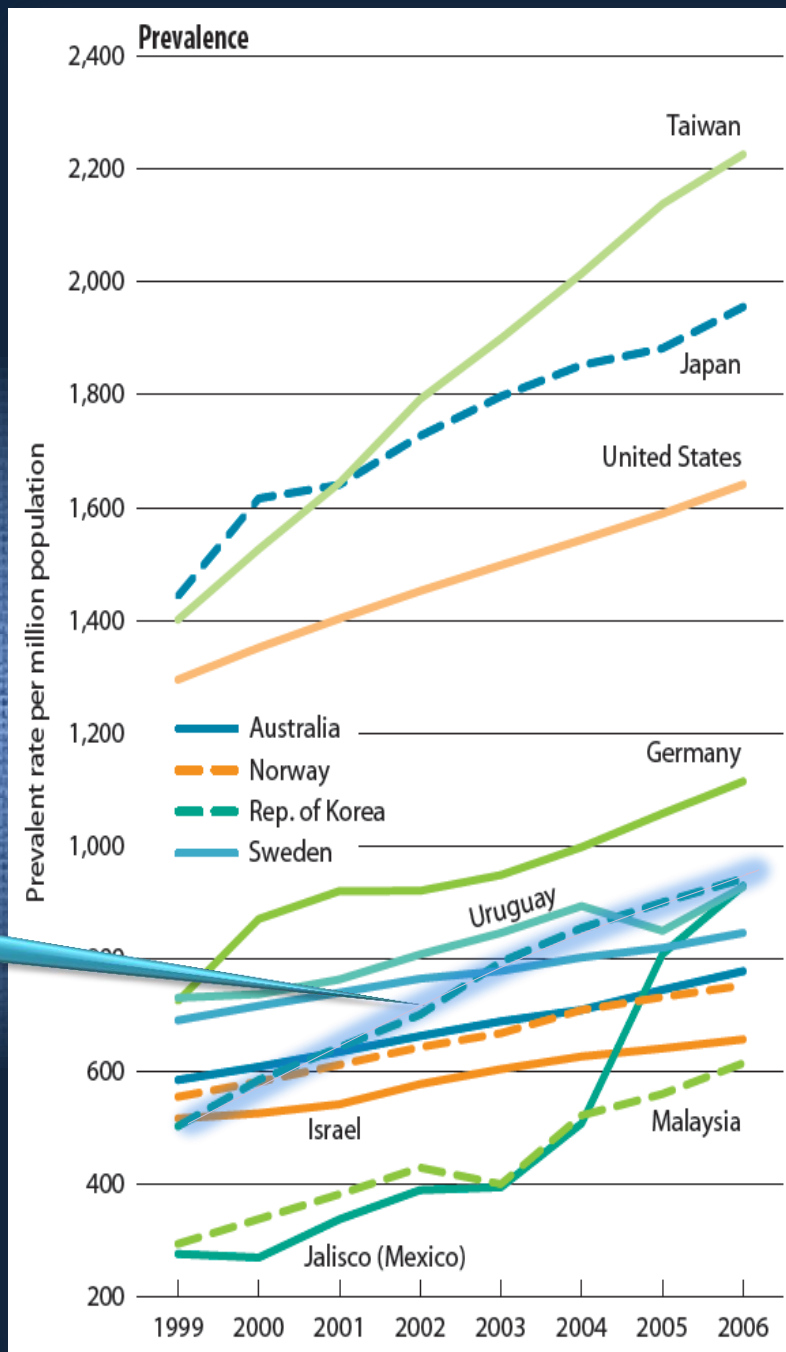


Changes of ESRD Prevalence

United States
Renal Data System
2008 Annual Data Report

International Comparison In USRDS 2008

941.7 PMP
2006



Number of New RRT Pts

Year	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)

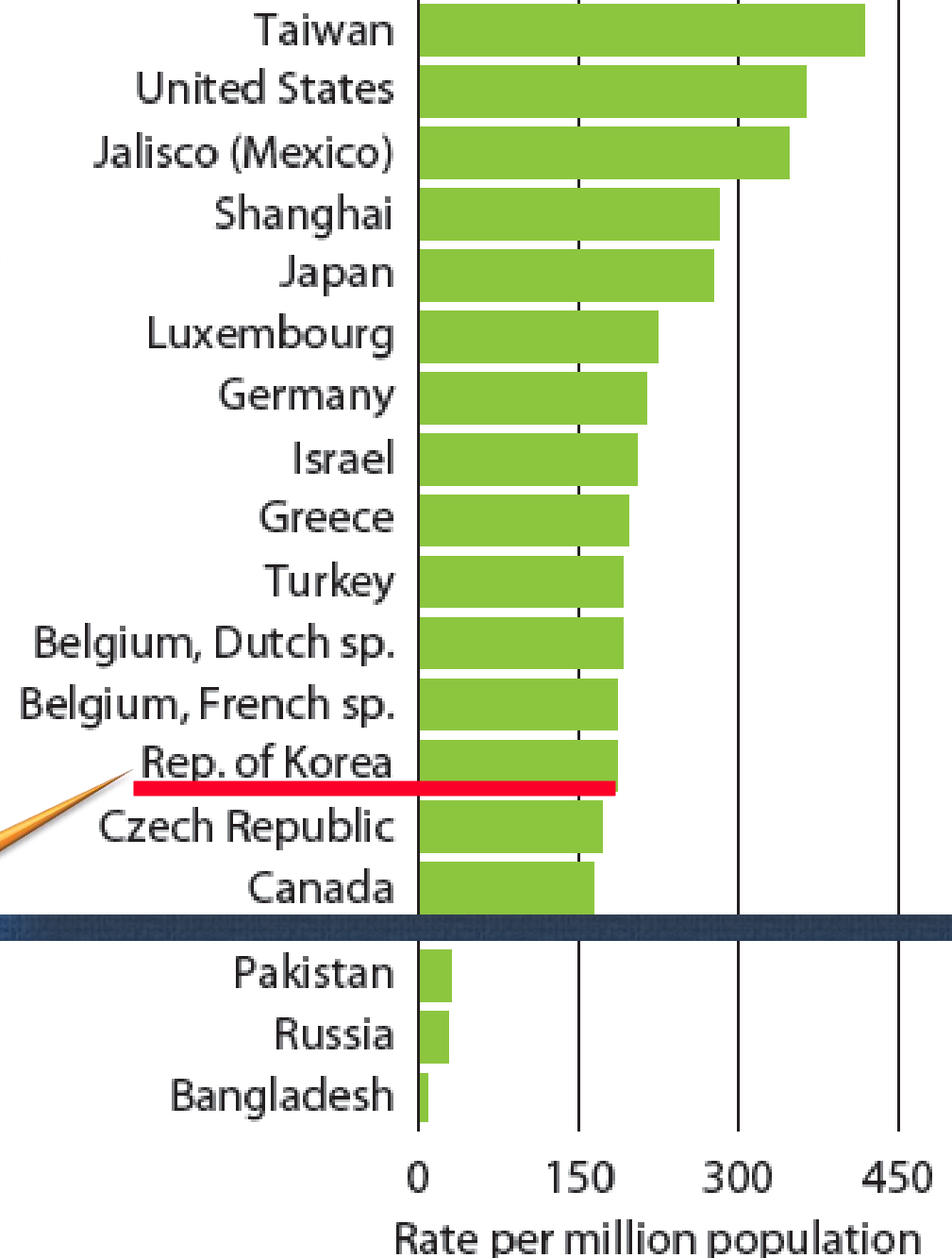
(): number of patients per million population

Incidence of ESRD

United States
Renal Data System
2008 Annual Data Report

International Comparison In USRDS 2008

185.3 PMP
2006



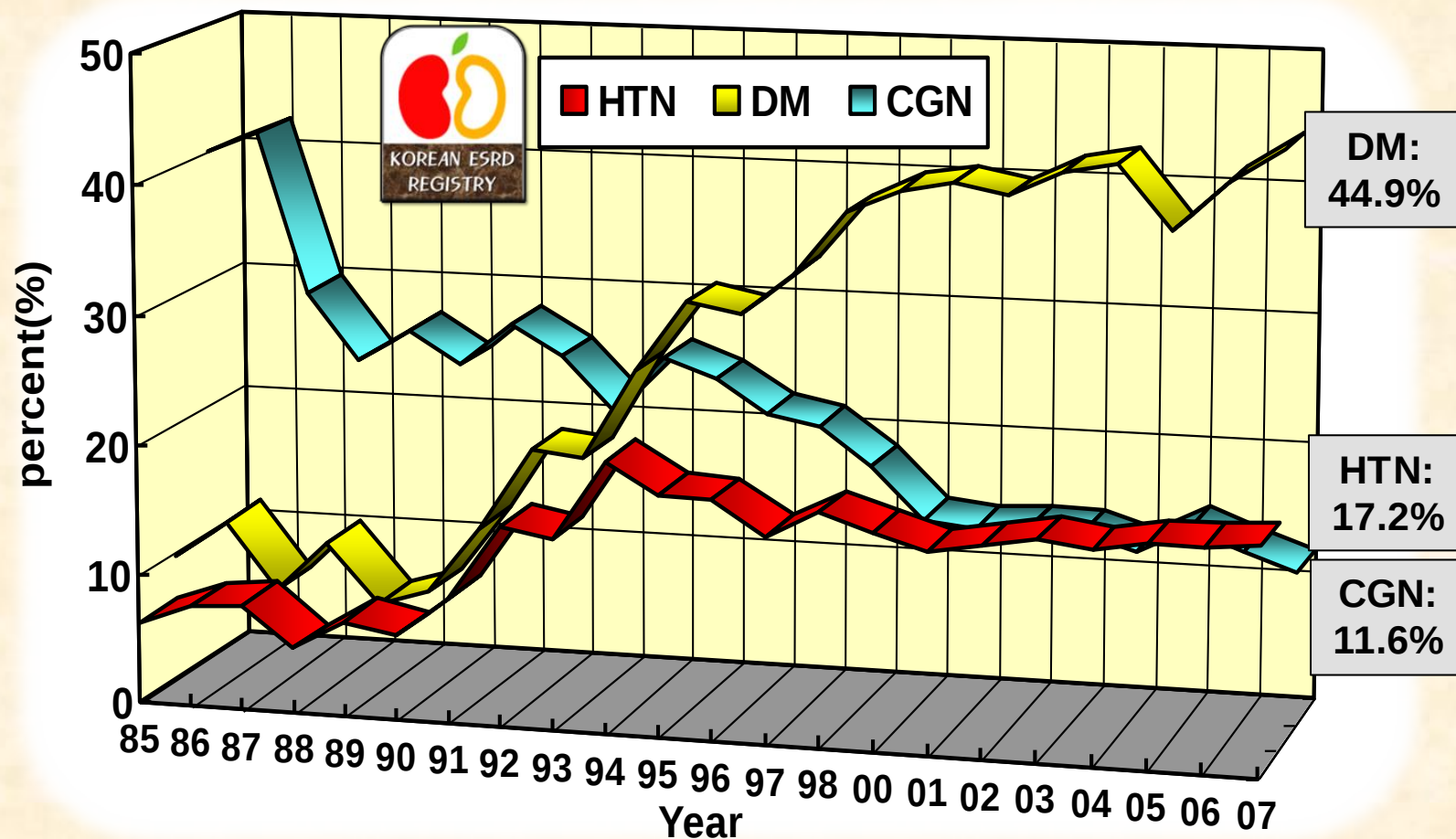
Causes of ESRD in New Pts

9

Causes	Percent(%)									
	1992	1994	1996	1998	2000	2002	2004	2005	2006	2007*
Chronic Glomerulonephritis	25.3	25.5	21.6	17.9	14.0	13.9	12.5	14.5	13.0	11.6
Not Histologically confirmed	19.7	20.4	16.7	13.6	10.6	10.0	8.6	10.1	9.0	8.3
Histologically confirmed	5.6	5.0	4.9	4.3	3.4	3.9	3.9	4.4	3.9	3.3
Diabetic nephropathy	19.5	26.1	30.8	38.9	40.7	40.7	43.4	38.5	42.3	44.9
Hypertensive nephrosclerosis	15.4	20.8	18.3	17.8	16.6	16.0	16.2	16.9	16.9	17.2
Cystic kidney disease	2.1	2.2	1.8	1.7	2.2	1.6	1.4	1.9	1.7	1.7
Renal tuberculosis	1.1	1.5	1.2	0.5	0.4	0.5	0.3	0.3	0.3	0.3
Pyelo/interstitial nephritis	1.3	1.1	0.7	1.0	0.8	0.6	0.6	0.5	0.6	0.5
Drugs or nephrotoxic agents	1.3	0.1	0.6	0.3	0.3	0.4	0.2	0.2	0.3	0.2
Lupus nephritis	0.8	0.7	1.0	0.5	0.9	0.8	0.6	0.7	0.6	0.6
Gouty nephropathy	0.7	0.7	0.6	0.5	0.7	0.4	0.5	0.5	0.3	0.3
Hereditary nephropathy	0.3	0.7	0.4	0.2	0.1	0.2	0.3	0.4	0.3	0.2
Kidney tumor	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.1
Other	4.1	2.7	2.8	3.9	3.0	5.6	5.9	7.5	6.0	5.1
Uncertain	28.6	17.8	15.9	16.6	20.2	19.0	17.8	17.8	17.5	17.2

* n = 7,106

Three Major Causes of ESRD

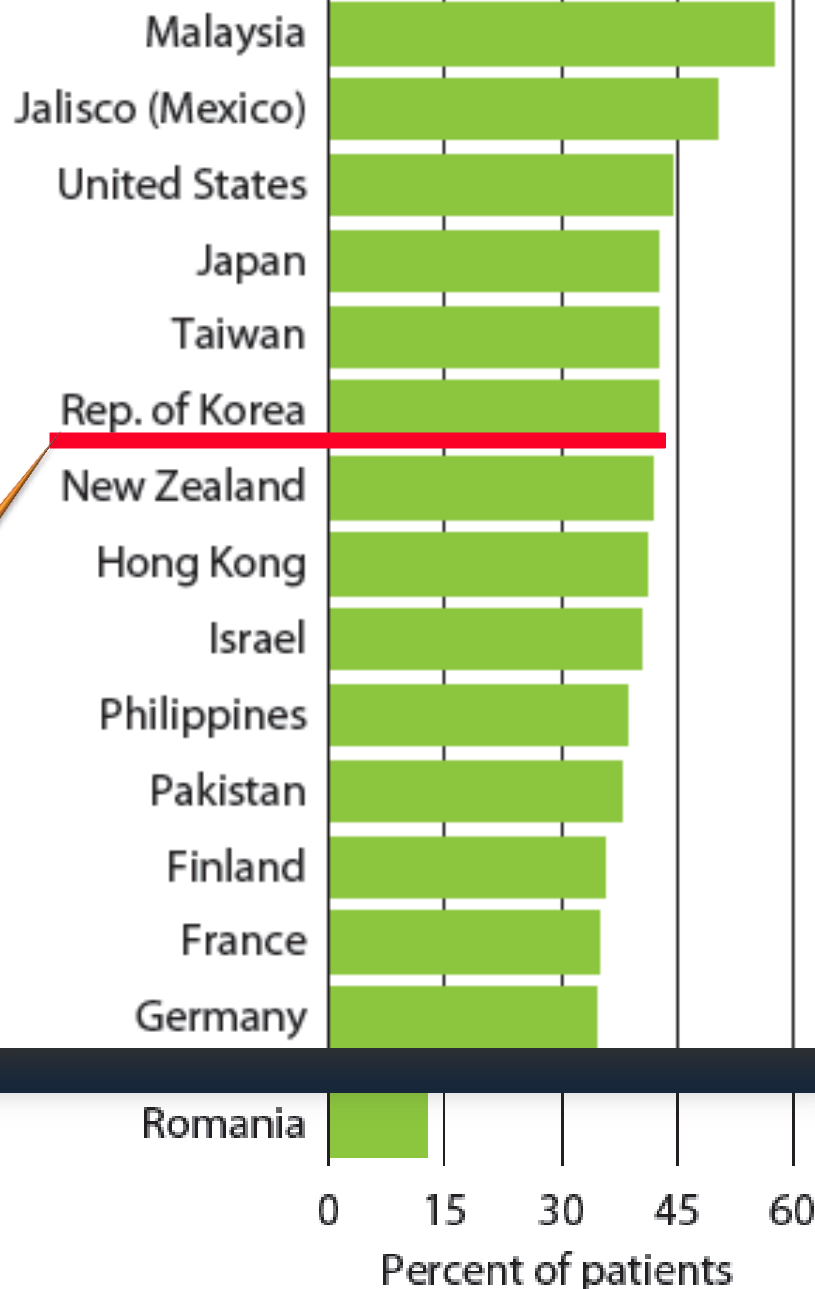


Diabetic ESRD

United States
Renal Data System
2008 Annual Data Report

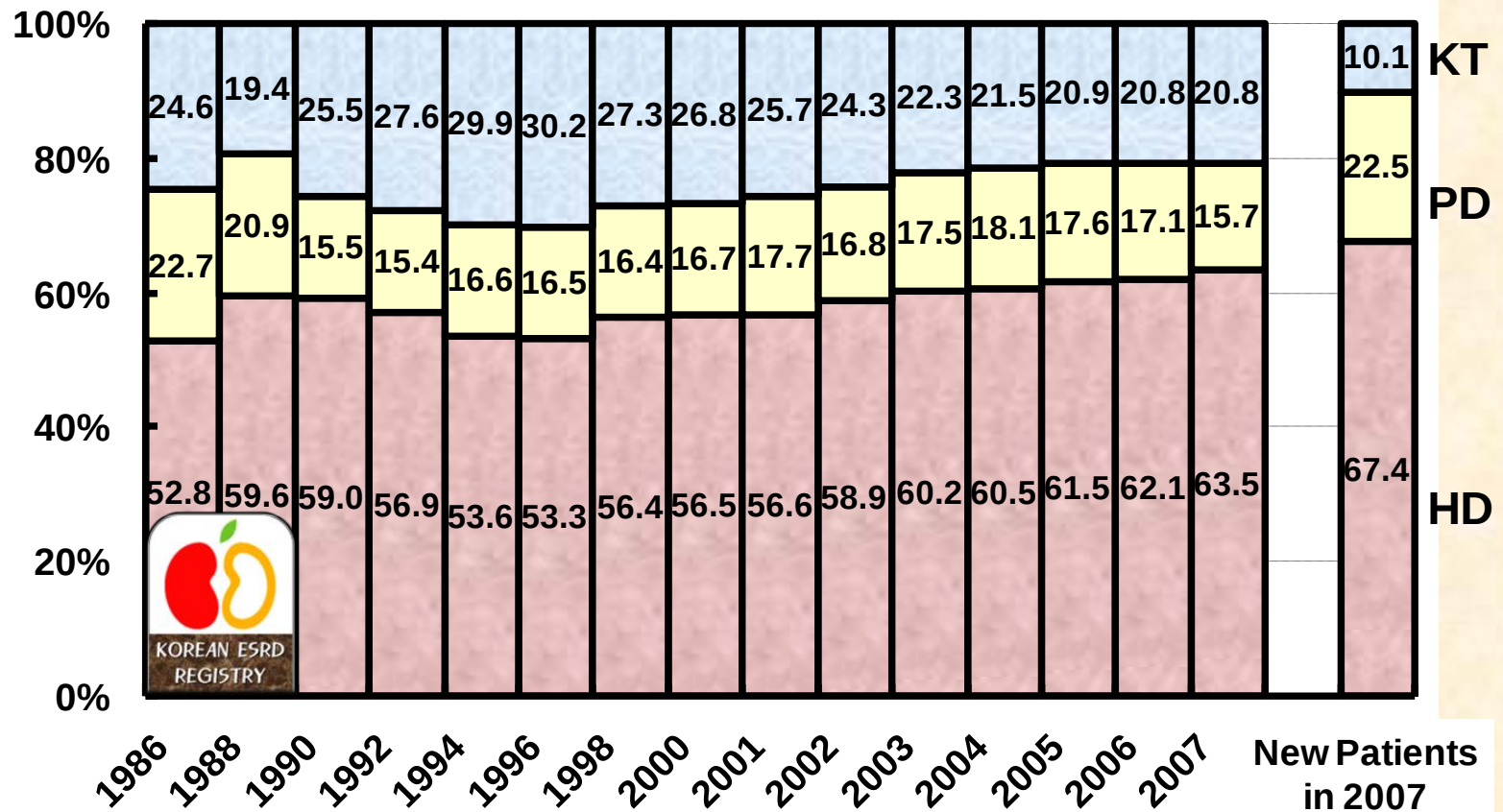
International Comparison In USRDS 2008

42.3%
2006



Proportion of RRT Modalities

- Annual Prevalence & Incidence -

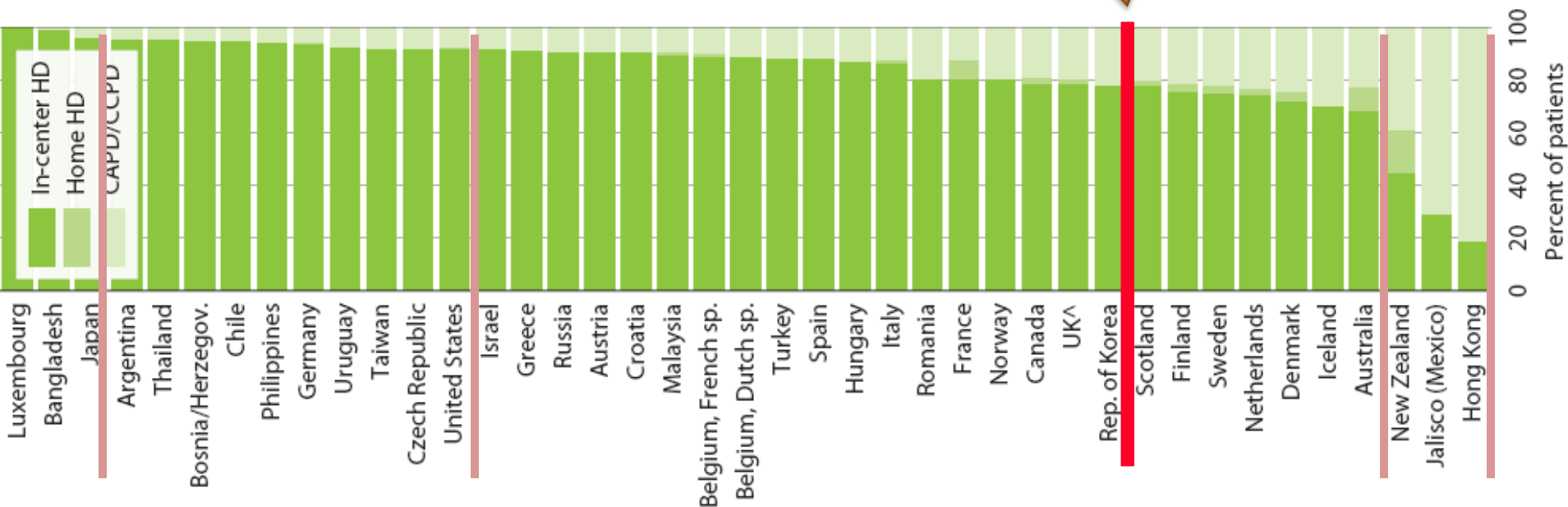


Percent Distribution of Dialysis Modalities

United States
Renal Data System
2008 Annual Data Report

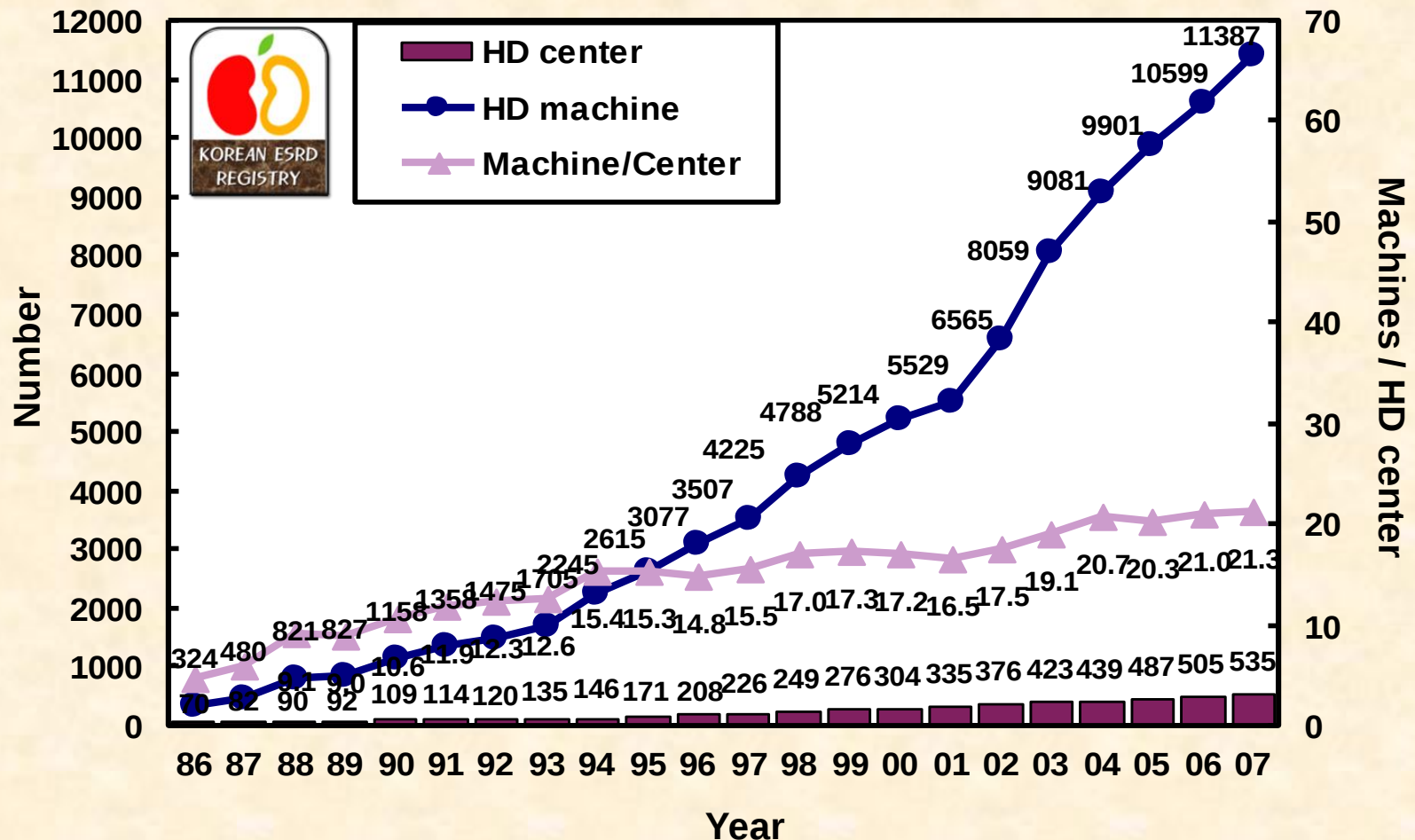
International Comparison In USRDS 2008

HD:PD = 80.2% : 19.8%
End of 2006

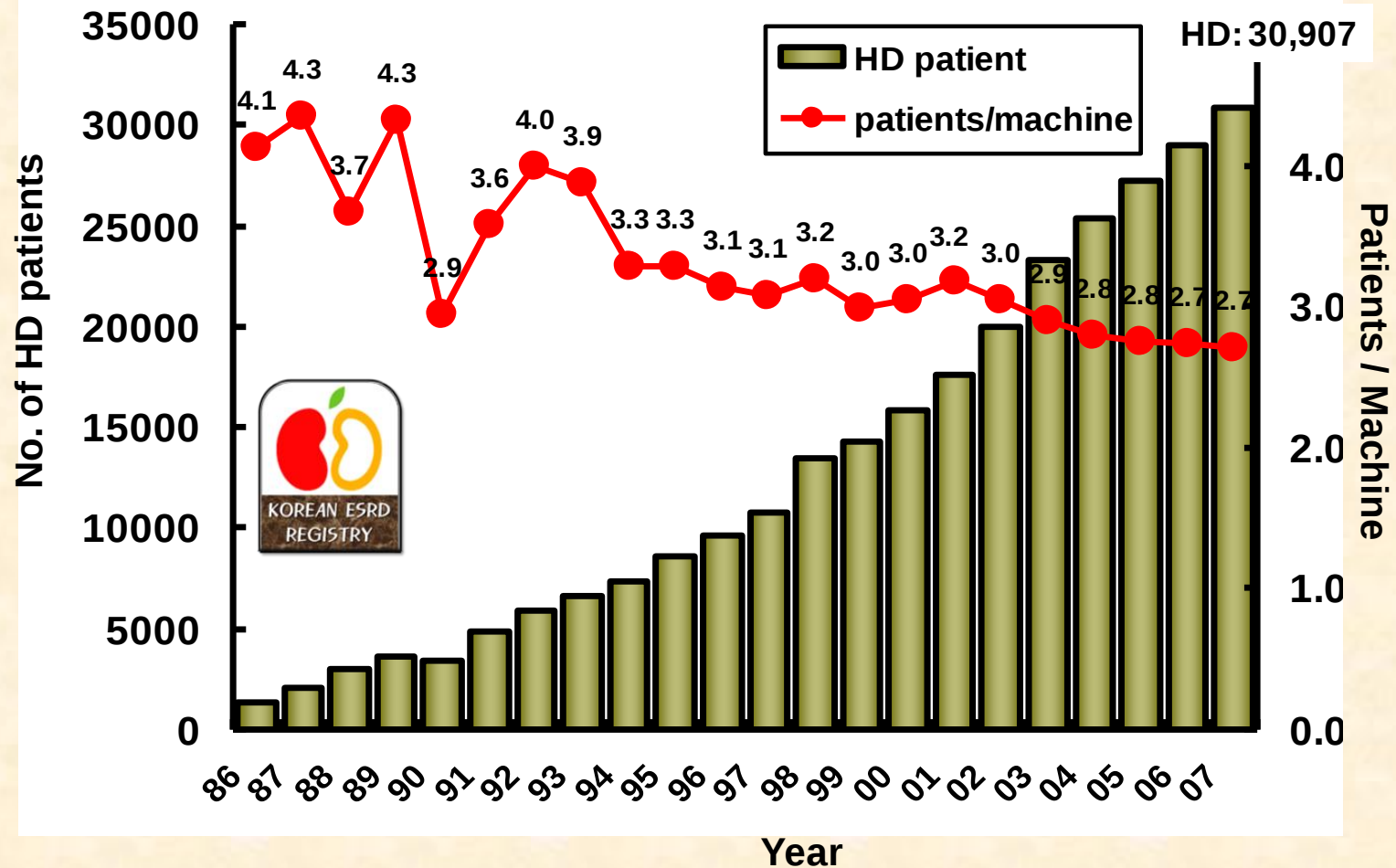


Number of HD Centers & HD Machines

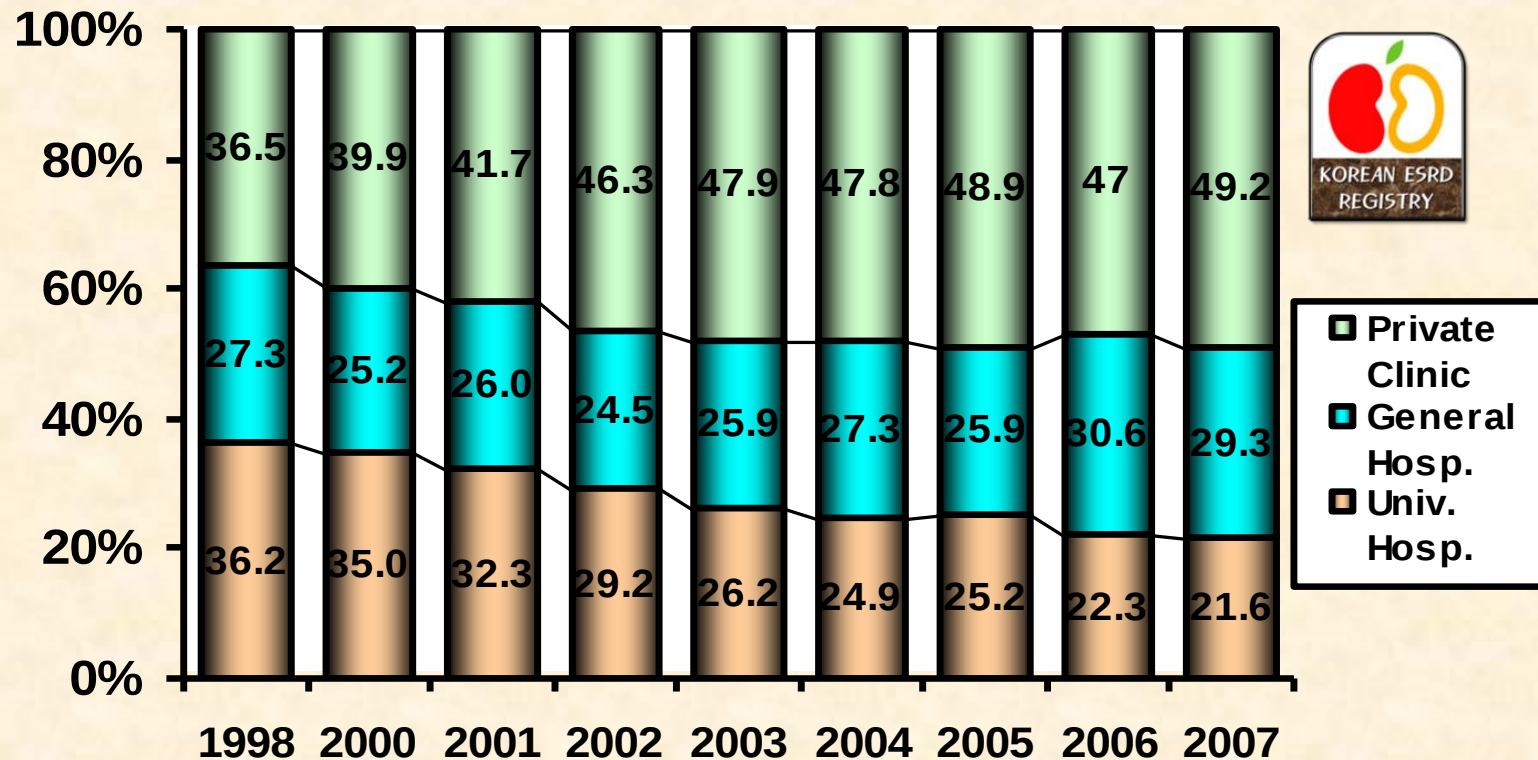
5



Ratio of HD Machine & HD Pts



Percent of HD Pts, Dialysis center



행정구역별 투석환자 및 혈액투석기 분포

(2007년 12월 말 기준)

	HD pts	PD pts	Total Dialysis pts	Dialysis pts. / Million pop.	Dialysis Centers	HD machines	HD pts./ HD machine
서울 Seoul	7,875	2,525	10,400	998	121	2,690	2.9
부산 Busan	2,496	863	3,359	929	37	928	2.7
대구 Daegu	1,708	852	2,560	1,019	28	578	3.0
인천 Incheon	1,504	423	1,927	711	20	497	3.0
광주 Gwangju	1,151	203	1,354	951	26	519	2.2
대전 Daejeon	914	268	1,182	794	18	443	2.1
울산 Ulsan	520	65	585	526	10	214	2.4
경기 Gyeonggi	5,964	1,163	7,127	628	105	2,339	2.5
강원 Gangwon	976	368	1,344	887	20	384	2.5
충북 Chungbuk	961	90	1,051	688	20	360	2.7
충남 Chungnam	1,176	70	1,246	615	22	387	3.0
전북 Jeonbuk	1,201	125	1,326	706	14	337	3.6
전남 Jeonnam	1,026	89	1,115	573	22	408	2.5
경북 Gyeongbuk	1,213	220	1,433	528	27	452	2.7
경남 Gyeongnam	1,745	270	2,015	622	36	681	2.6
제주 Jeju	477	55	532	944	9	170	2.8
Total	30,907	7,649	38,556	771	535	11,387	2.7

생활권역별 투석기 및 투석환자 분포

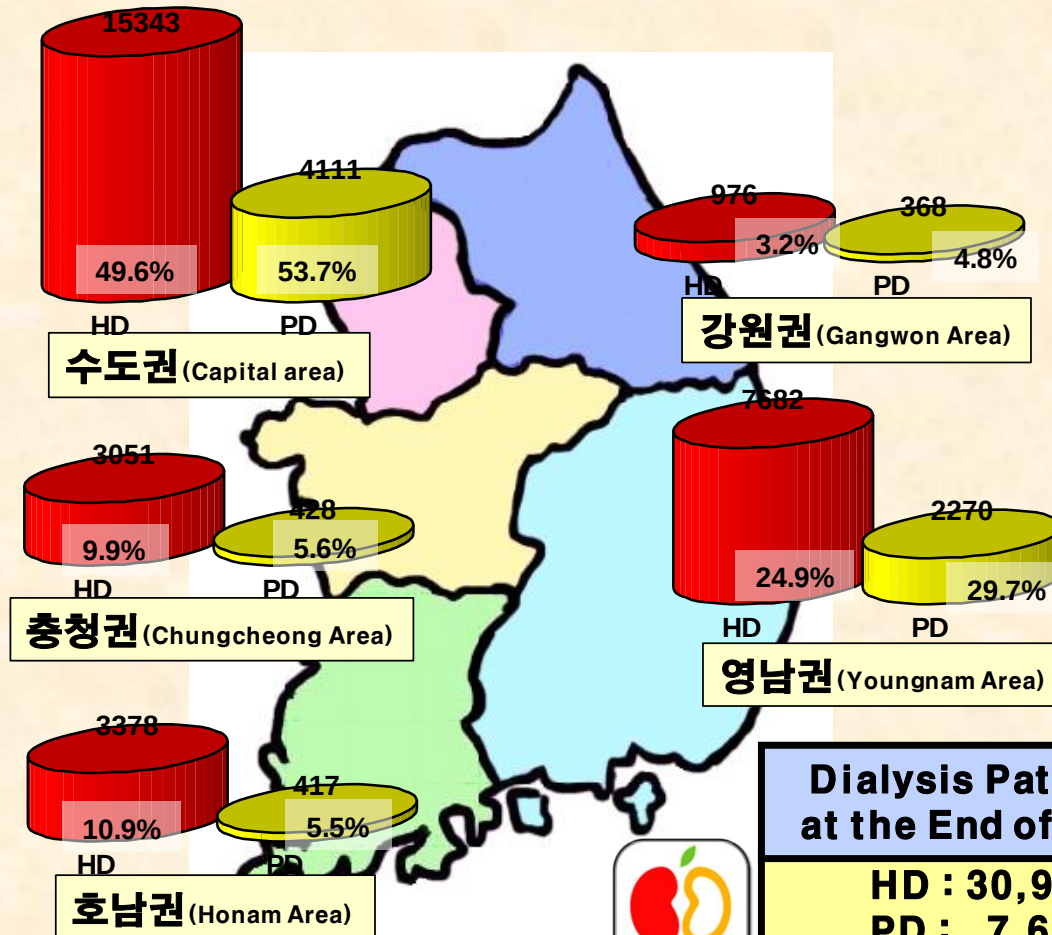
(2007년 12월 말 기준)

	Population (%)	HD patients	PD patients	Total Dialysis patients	Dialysis pts / Million pop.	Dialysis centers	Dialysis machine	HD pts / HD machine
수도권 (Capital area)	24,472,063	15,343	4,111	19,454	795	246	5,526	2.8
(Seoul, Incheon, Gyeonggi)	48.9%	49.6%	53.7%	50.5%		46.0%	48.5%	
충청권 (Chungchung)	5,041,259	3,051	428	3,479	690	60	1,190	2.6
(Daejeon, Chungnam, Chungbuk)	10.1%	9.9%	5.6%	9.0%		11.2%	10.5%	
호남권 (Honam)	5,246,850	3,378	417	3,795	723	62	1,264	2.7
(Gwangju, Jeonnam, Jeonbuk)	10.5%	10.9%	5.5%	9.8%		11.6%	11.1%	
영남권 (Youngnam)	13,194,997	7,682	2,270	9,952	754	138	2,853	2.7
(Busan, Daegu, Gyeongnam, Gyeongbuk, Ulsan)	26.4%	24.9%	29.7%	25.8%		25.8%	25.1%	
강원권 (Gangwon)	1,515,800	976	368	1,344	887	20	384	2.5
	3.0%	3.2%	4.8%	3.5%		3.7%	3.4%	
Total	50,034,357	30,907	7,649	38,556	771	535	11,387	2.7

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

생활권역별 투석기 및 투석환자 분포

(2007년 12월 말 기준)



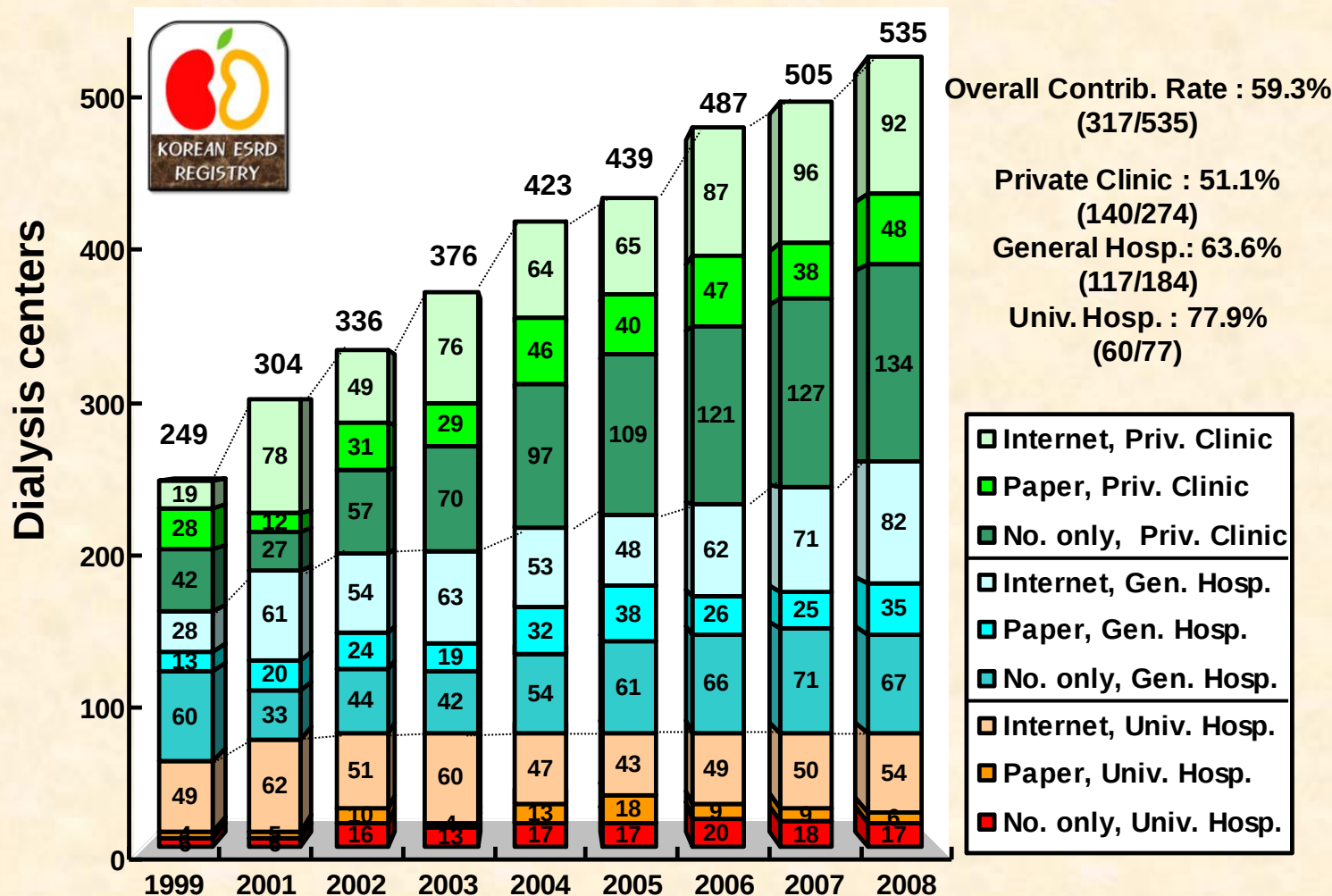
**Dialysis Patients
at the End of 2007**

HD : 30,907
PD : 7,649
Total : 38,556

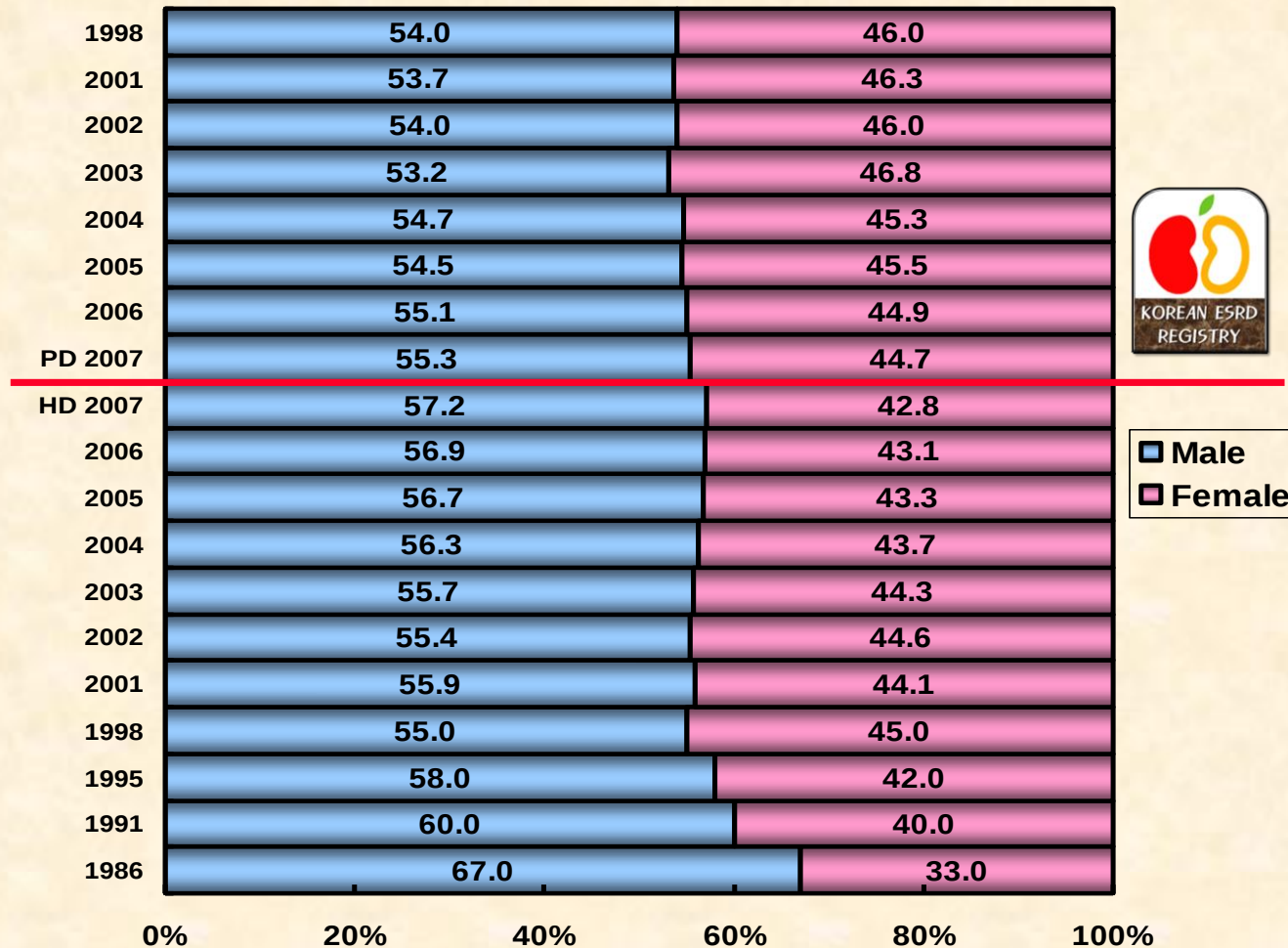
등록사업에 참여한 의료기관 수 및 응답률

	Dialysis centers	Internet Input	Paper data	Total contributed center	Contributing rate (%)
서울 Seoul	121	54	14	68	56.2
부산 Busan	37	19	4	23	62.2
대구 Daegu	28	16	4	20	71.4
인천 Incheon	20	9	0	9	45.0
광주 Gwangju	26	11	5	16	61.5
대전 Daejeon	18	8	1	9	50.0
울산 Ulsan	10	3	2	5	50.0
경기 Gyeonggi	105	32	25	57	54.3
강원 Gangwon	20	10	3	13	65.0
충북 Chungbuk	20	6	6	12	60.0
충남 Chungnam	22	8	5	13	59.1
전북 Jeonbuk	14	8	1	9	64.3
전남 Jeonnam	22	8	3	11	50.0
경북 Gyeongbuk	27	15	9	24	88.9
경남 Gyeongnam	36	15	7	22	61.1
제주 Jeju	9	6	0	6	66.7
Total	535	228	89	317	59.3

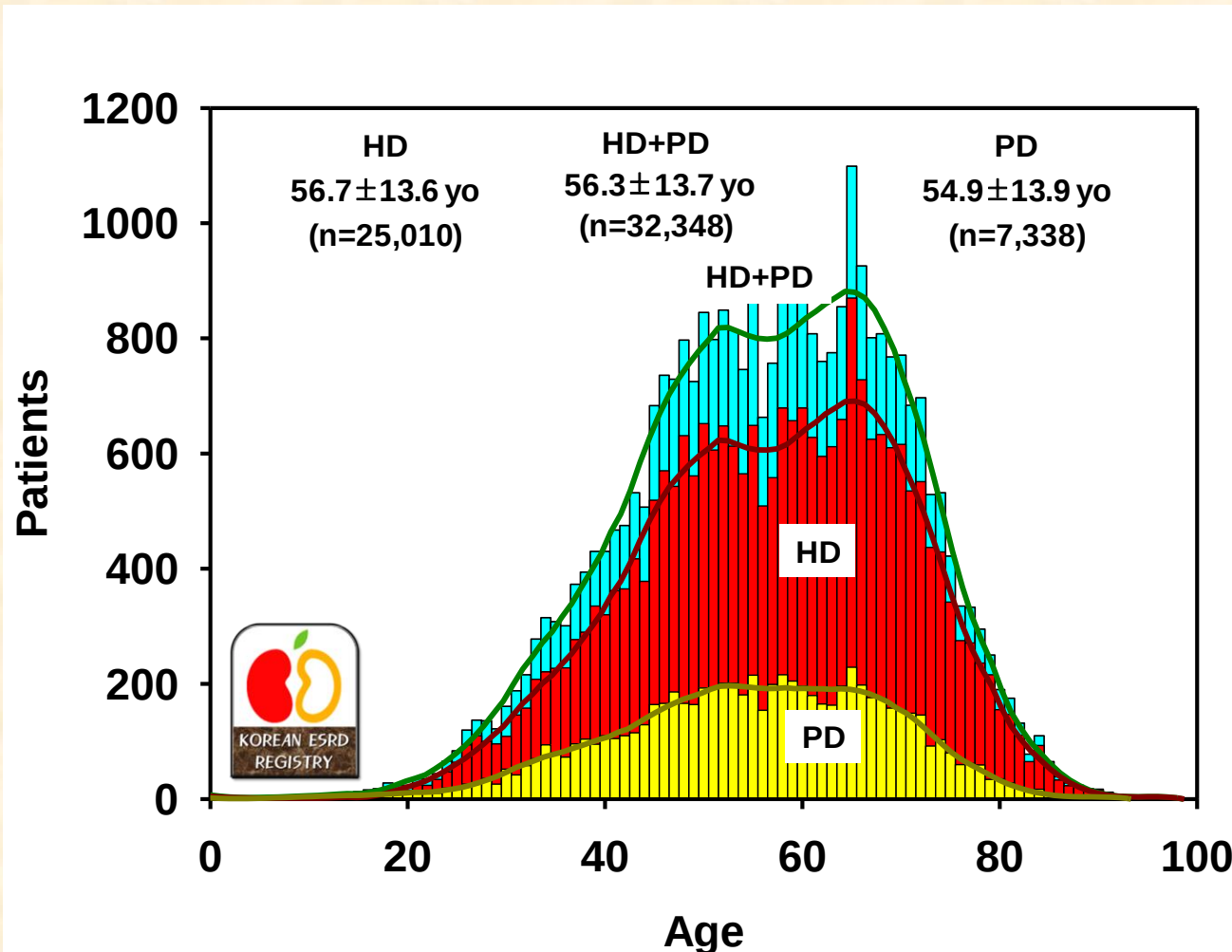
의료기관 증가와 의료기관별 등록률 추이



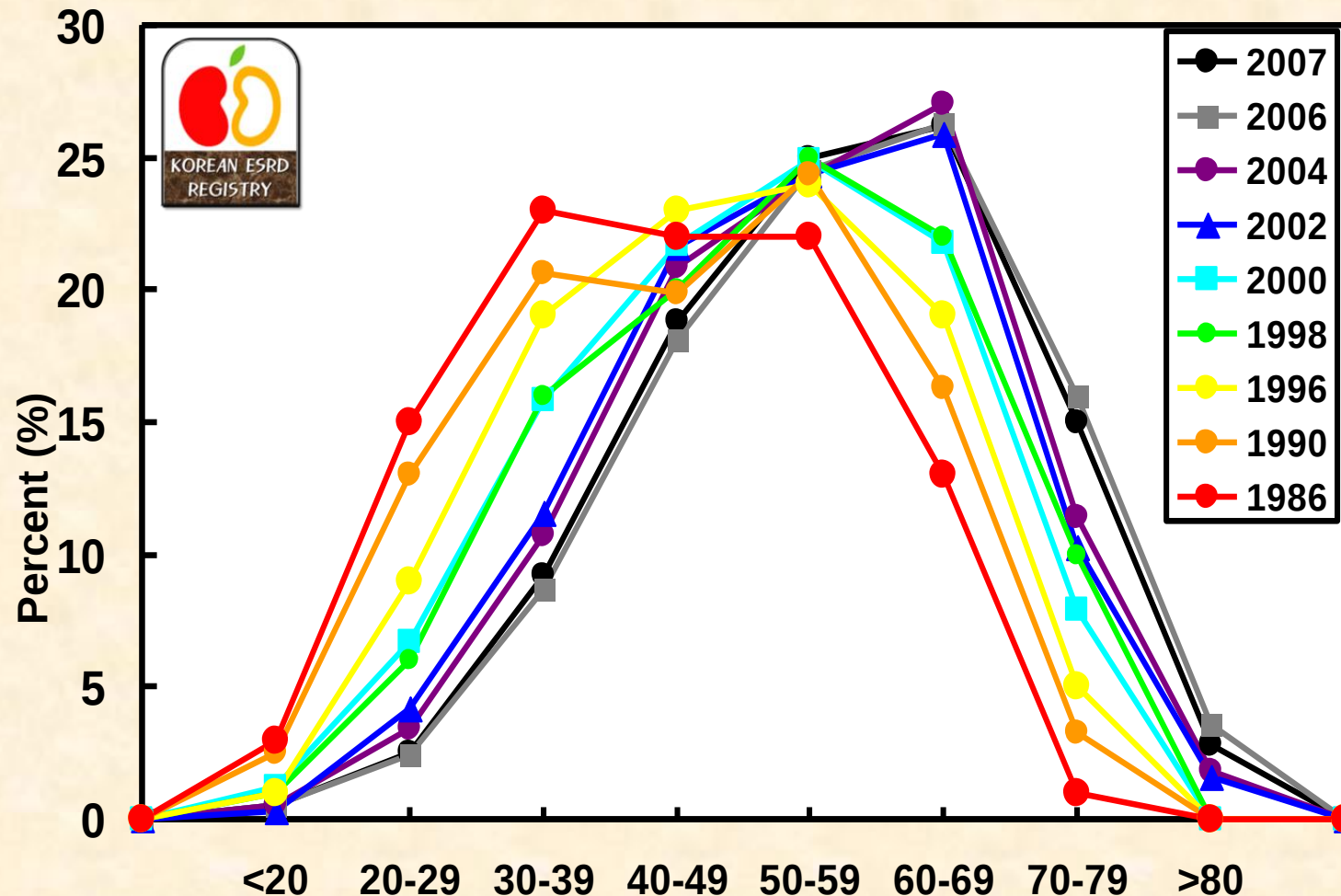
Sex Ratio of HD & PD Pts



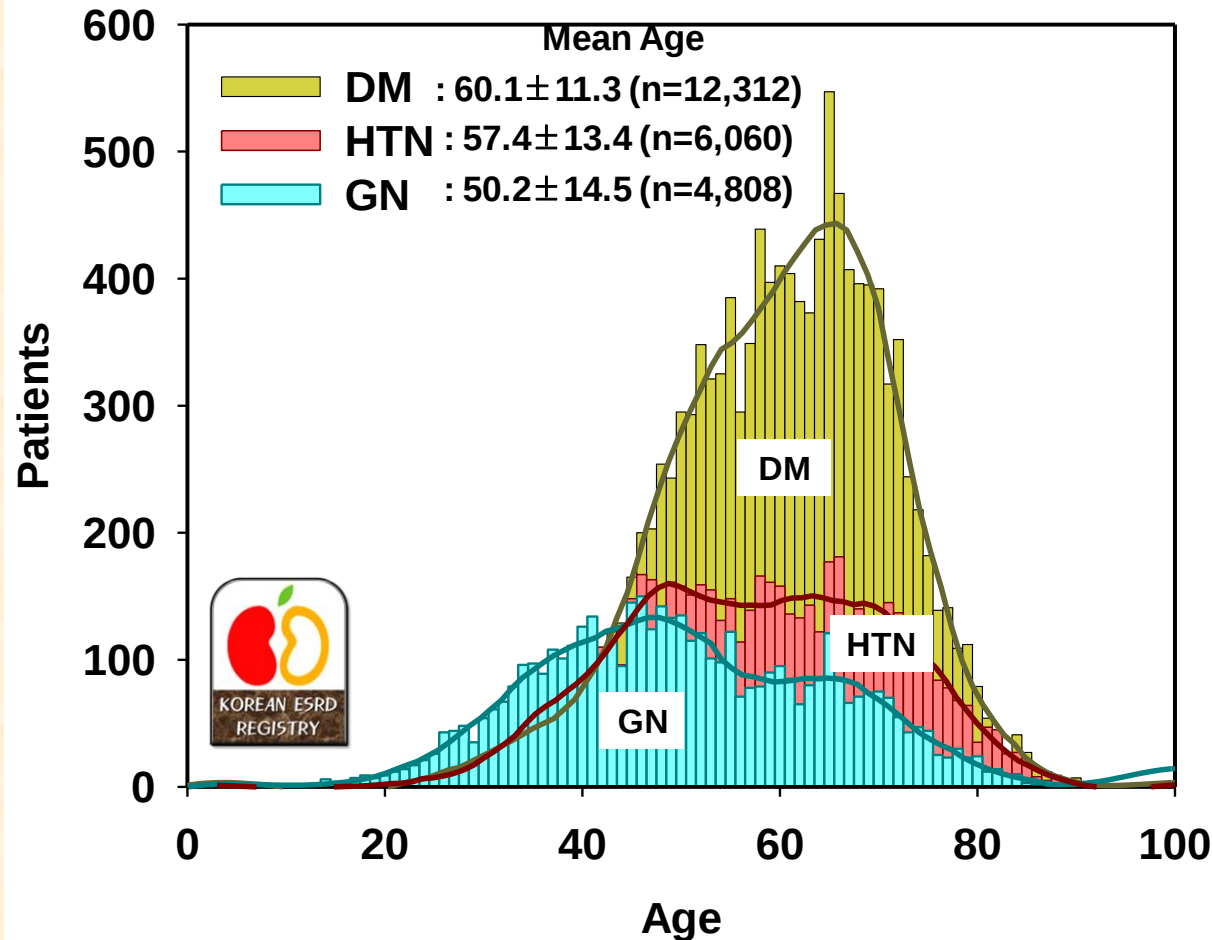
Age Distribution of Dialysis Pts



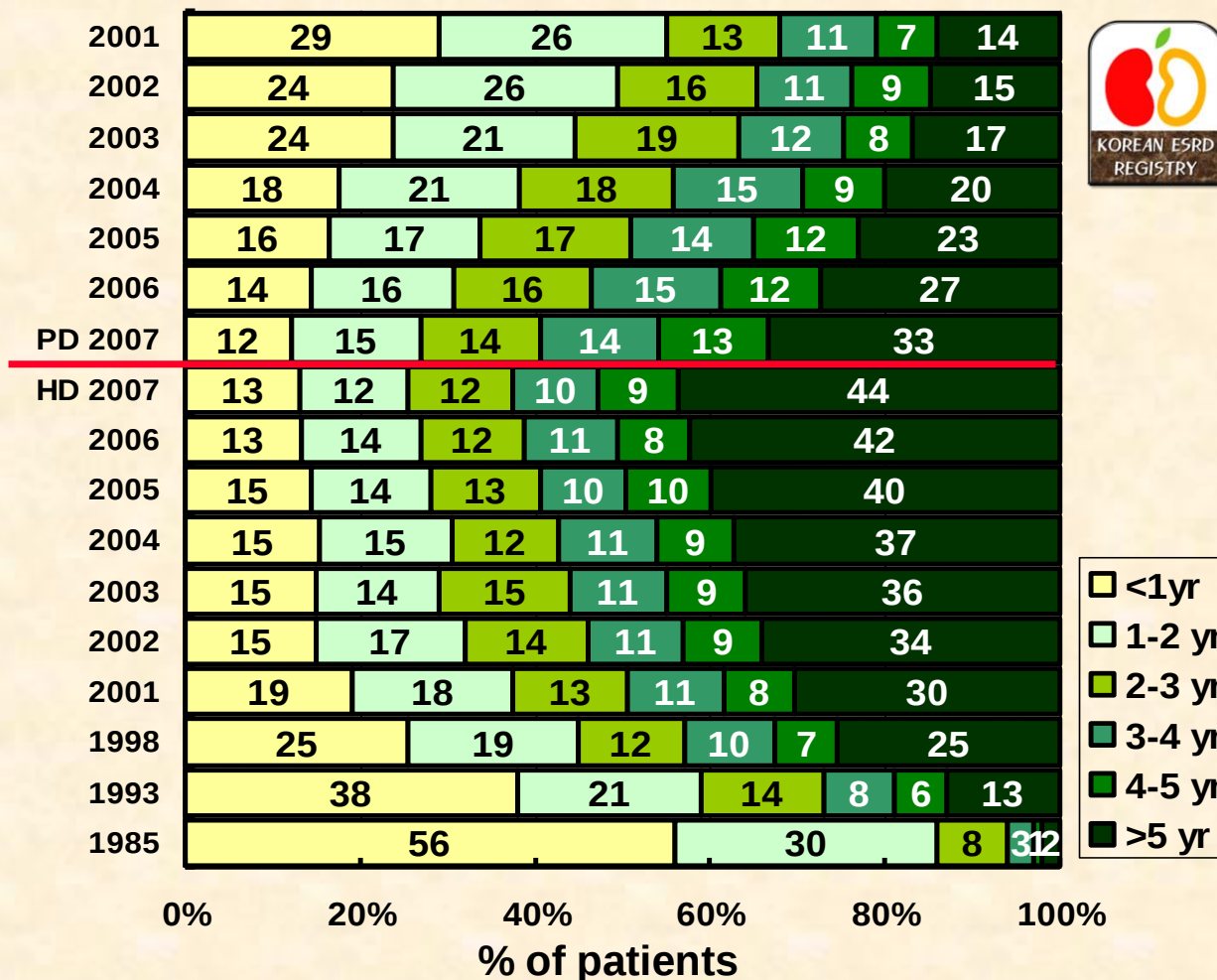
Age Distribution (%) of HD Pts According to Years



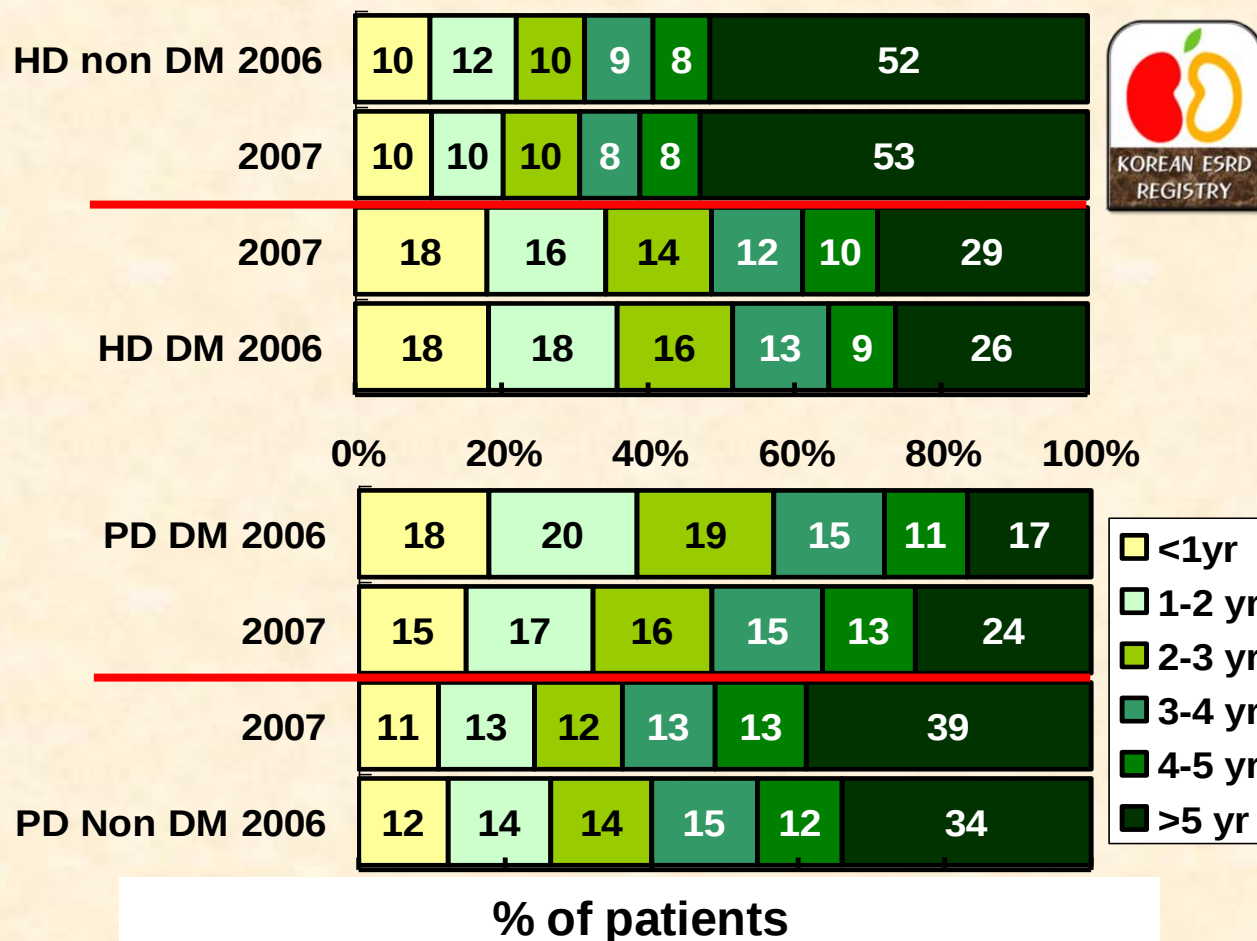
Age Distribution According to ESRD Causes



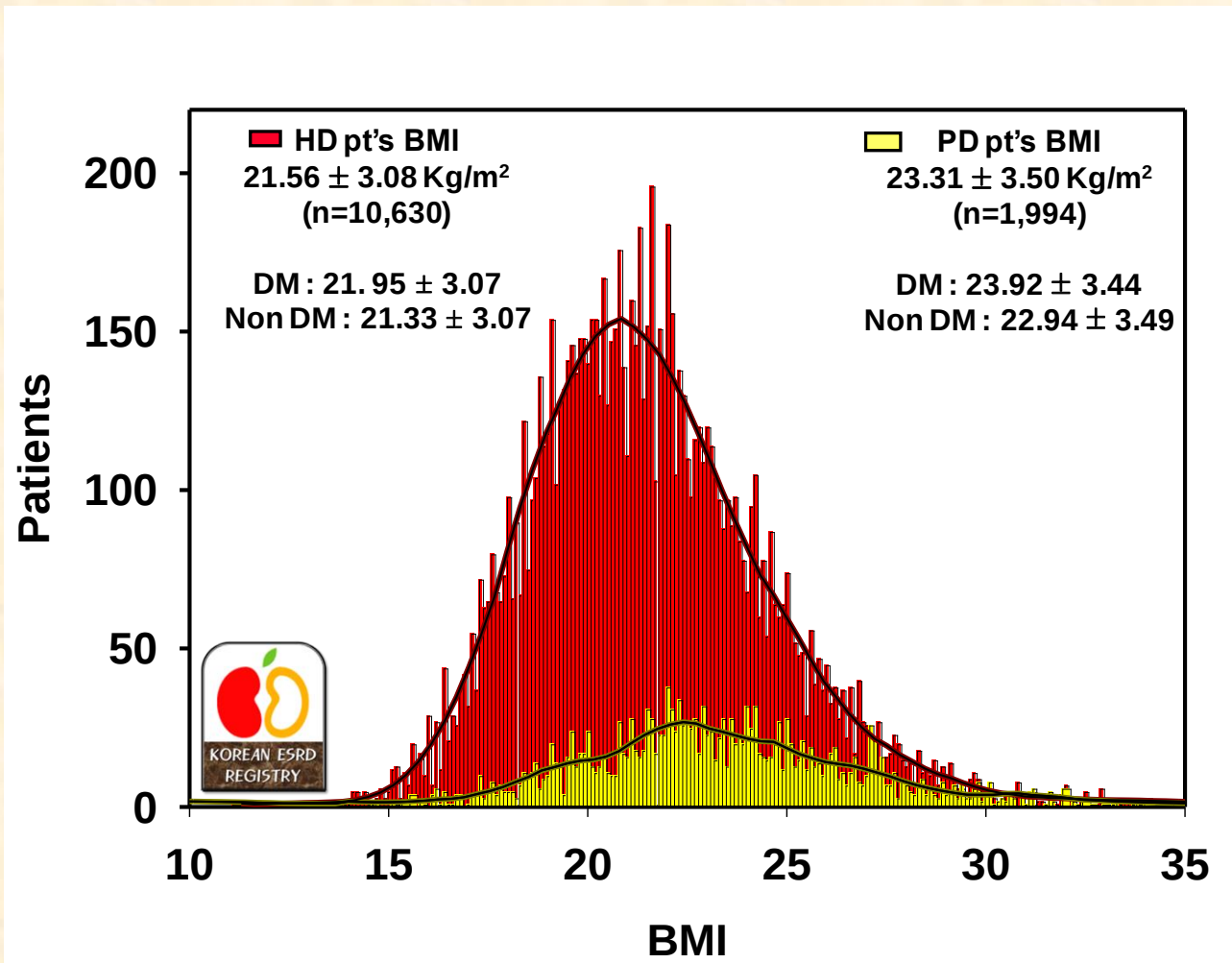
Duration of Dialysis Maintenance



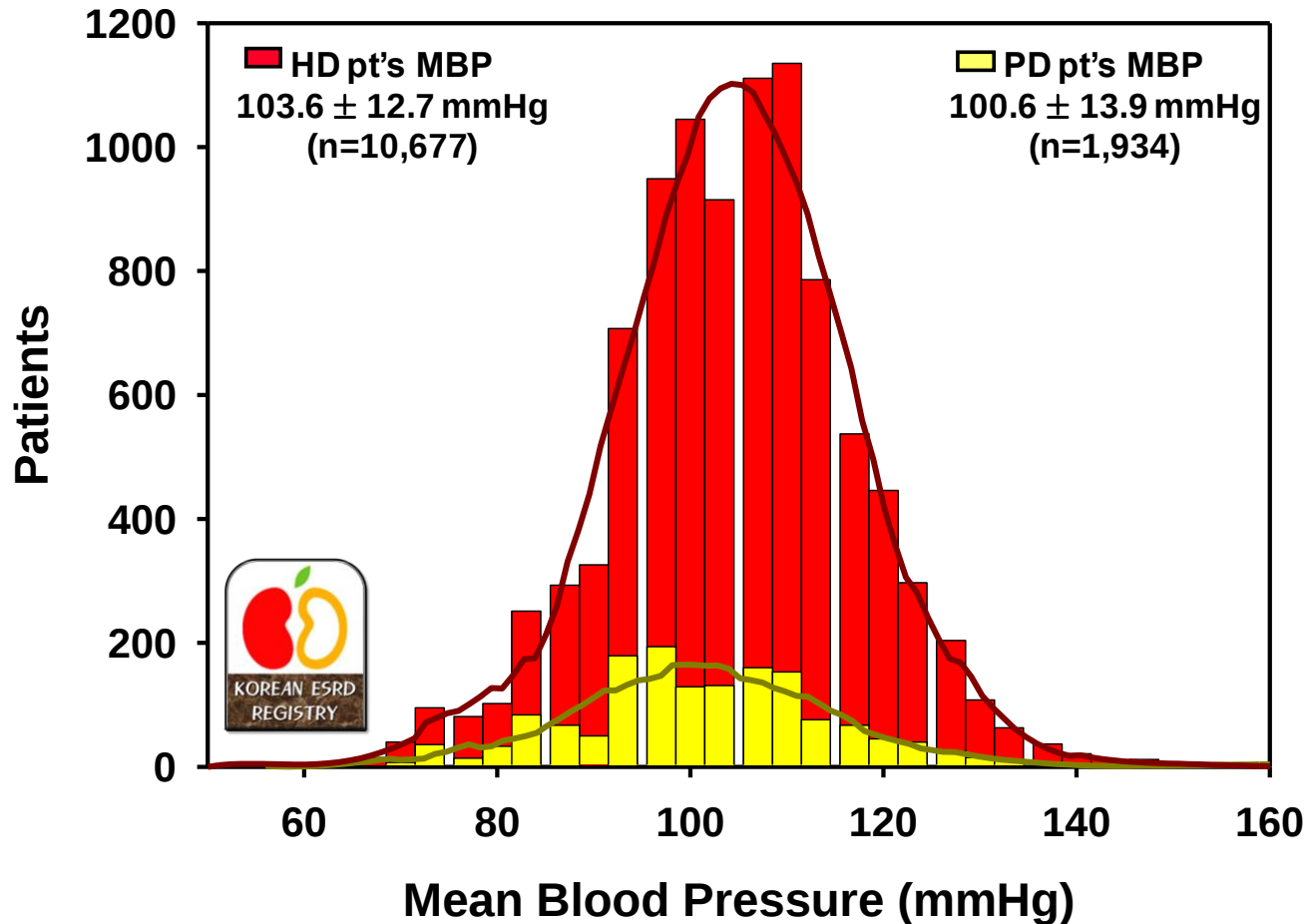
Duration of Dialysis : DM vs Non-DM



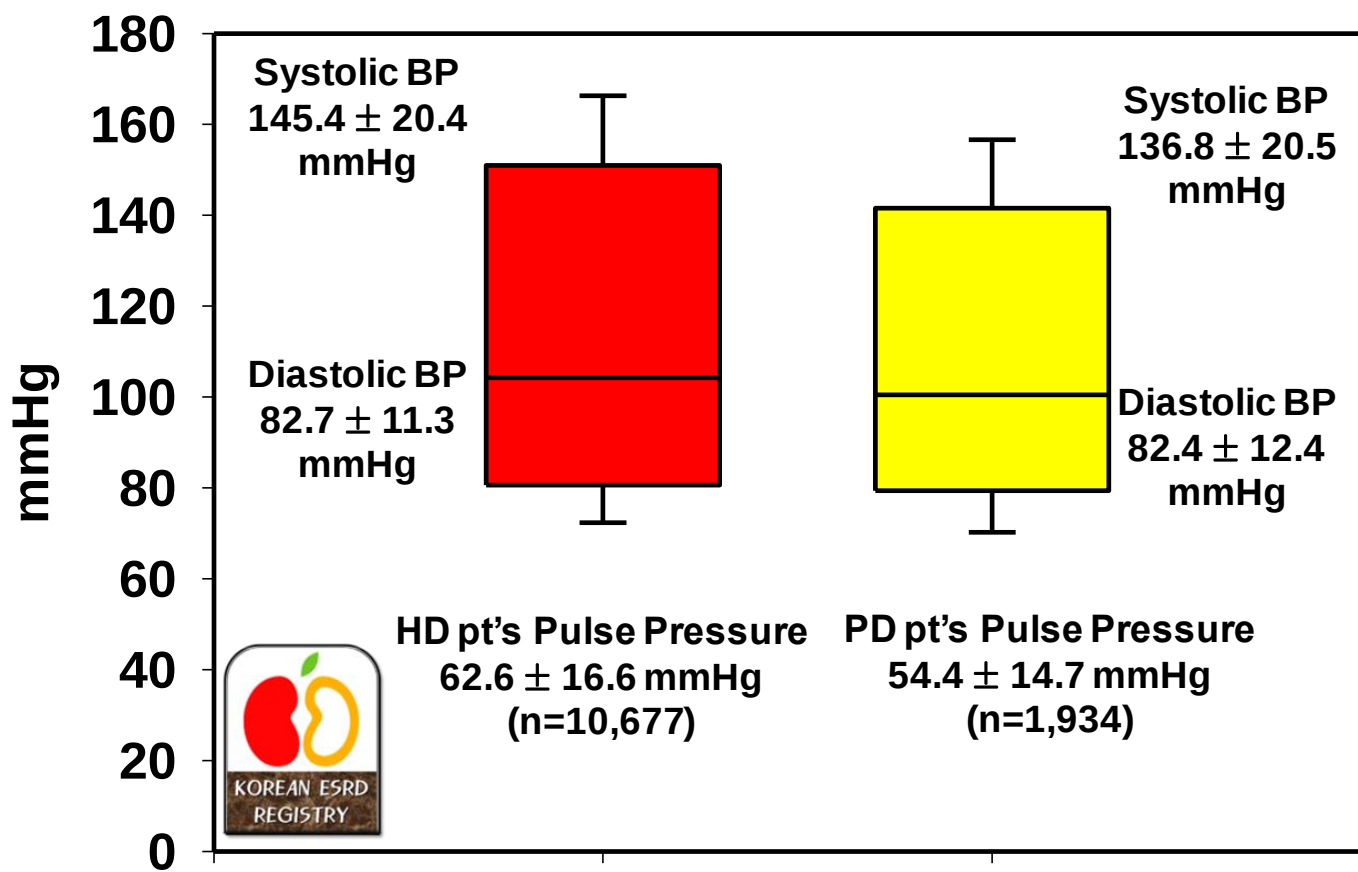
Body Mass Index



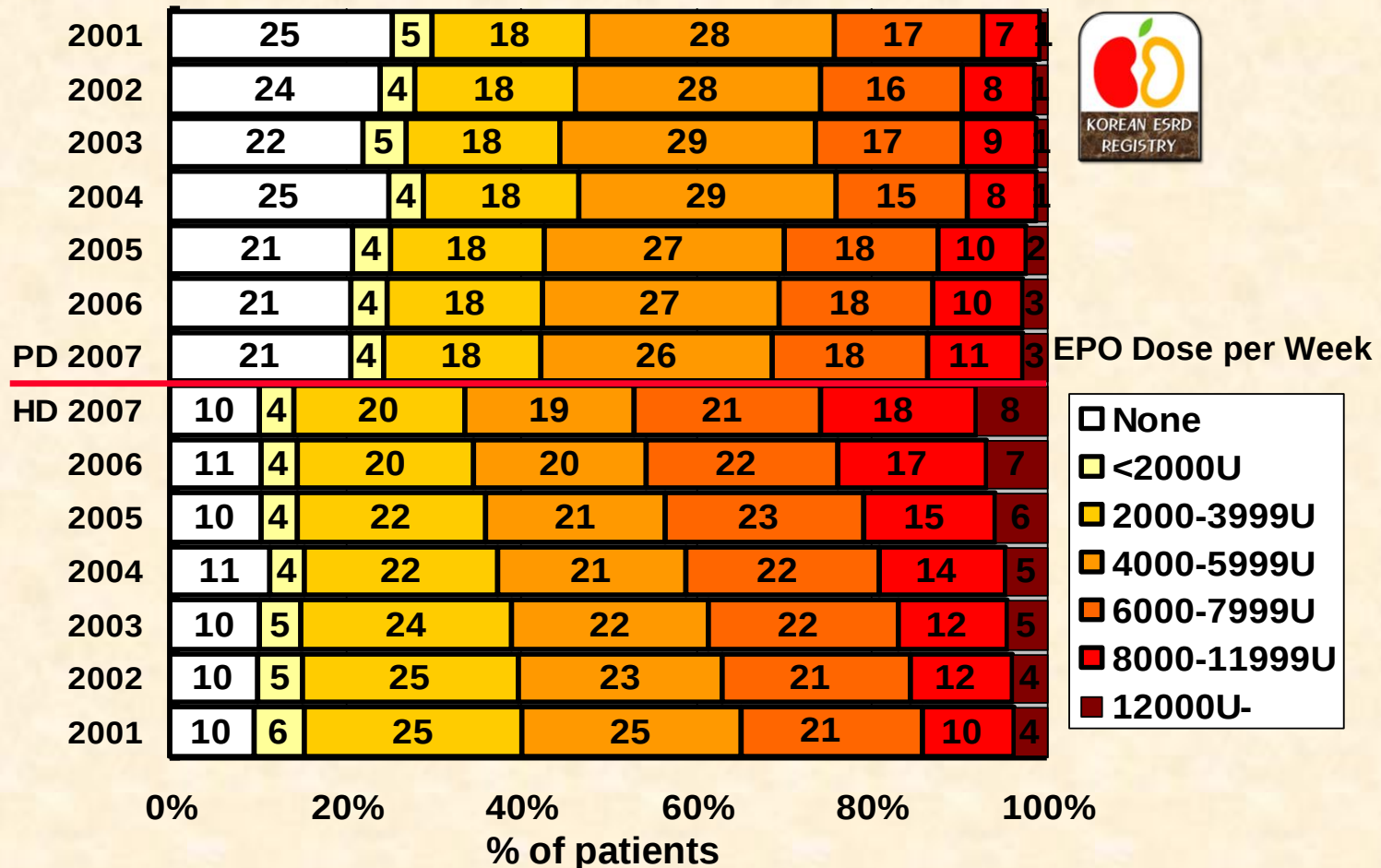
Mean Blood Pressure



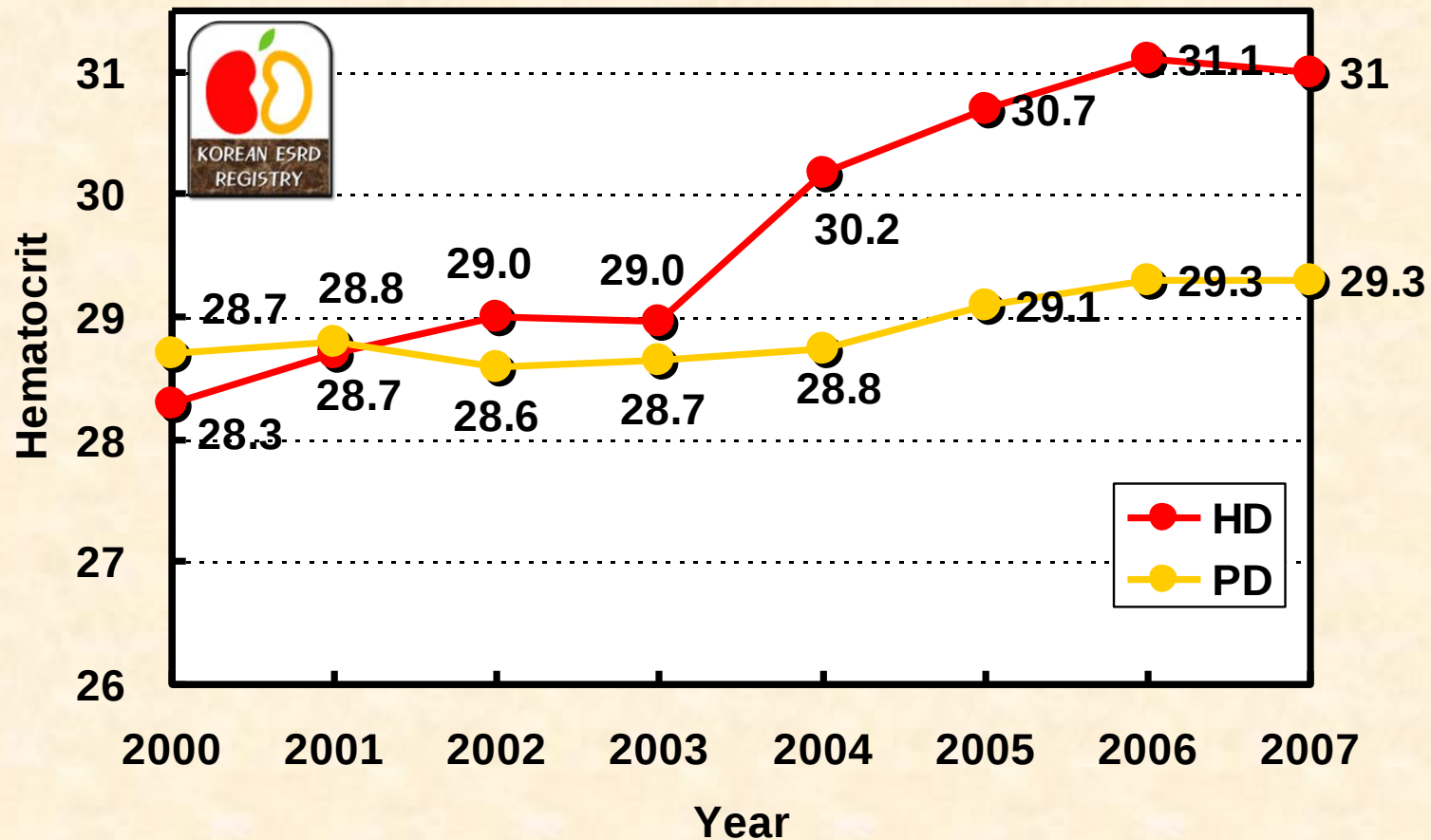
Pulse Pressure



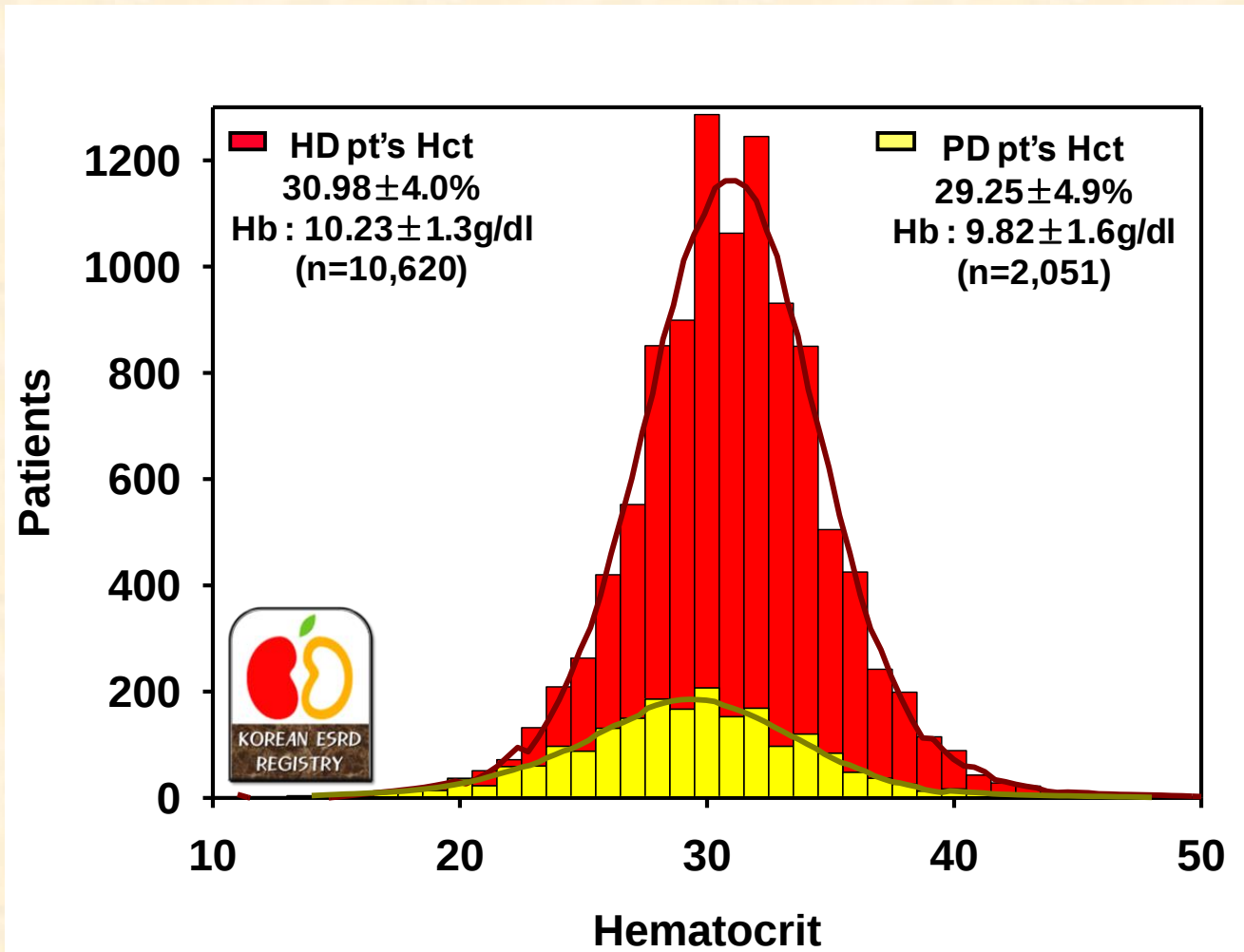
Erythropoietin Doses



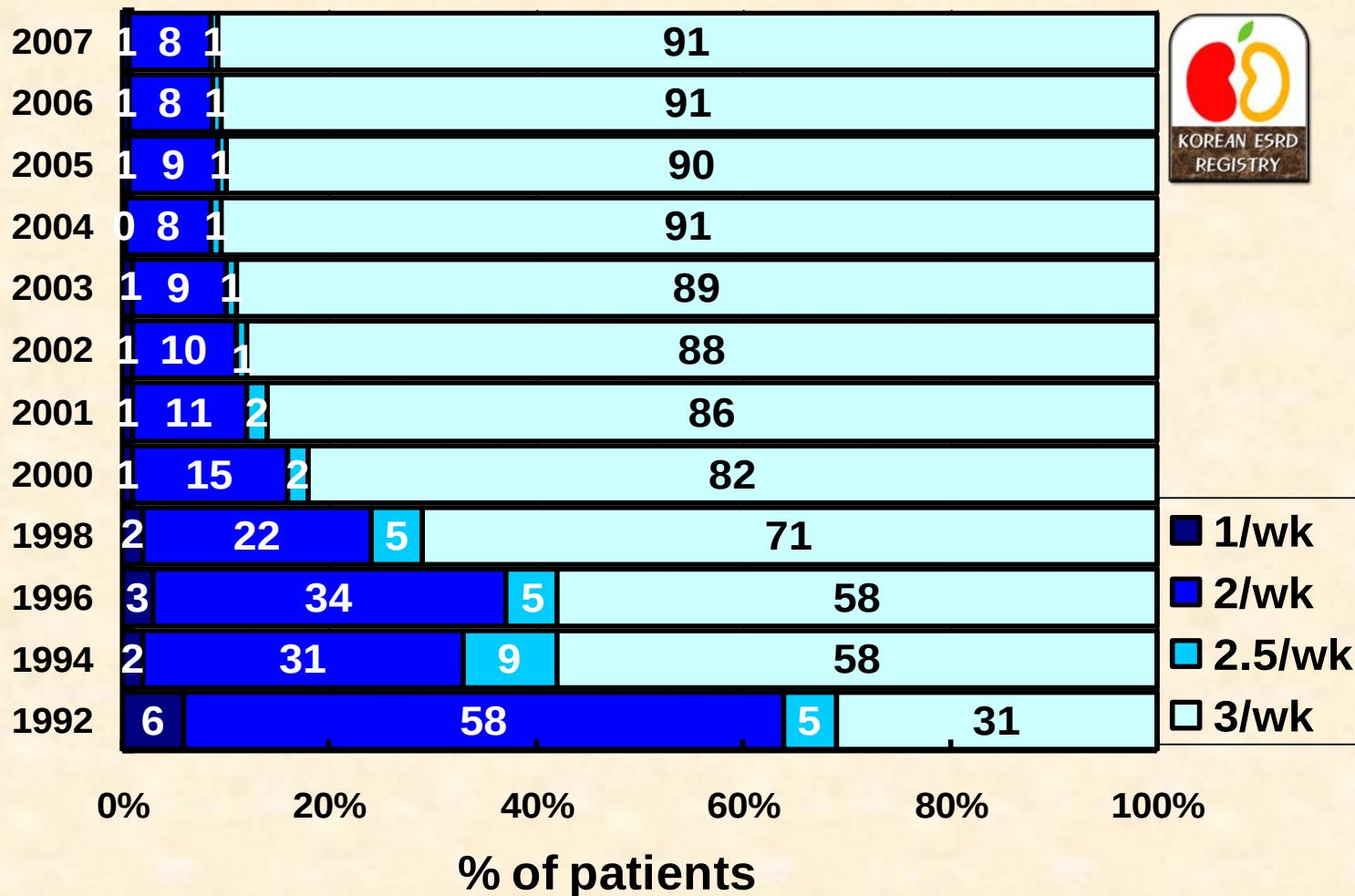
Changes of Hematocrit



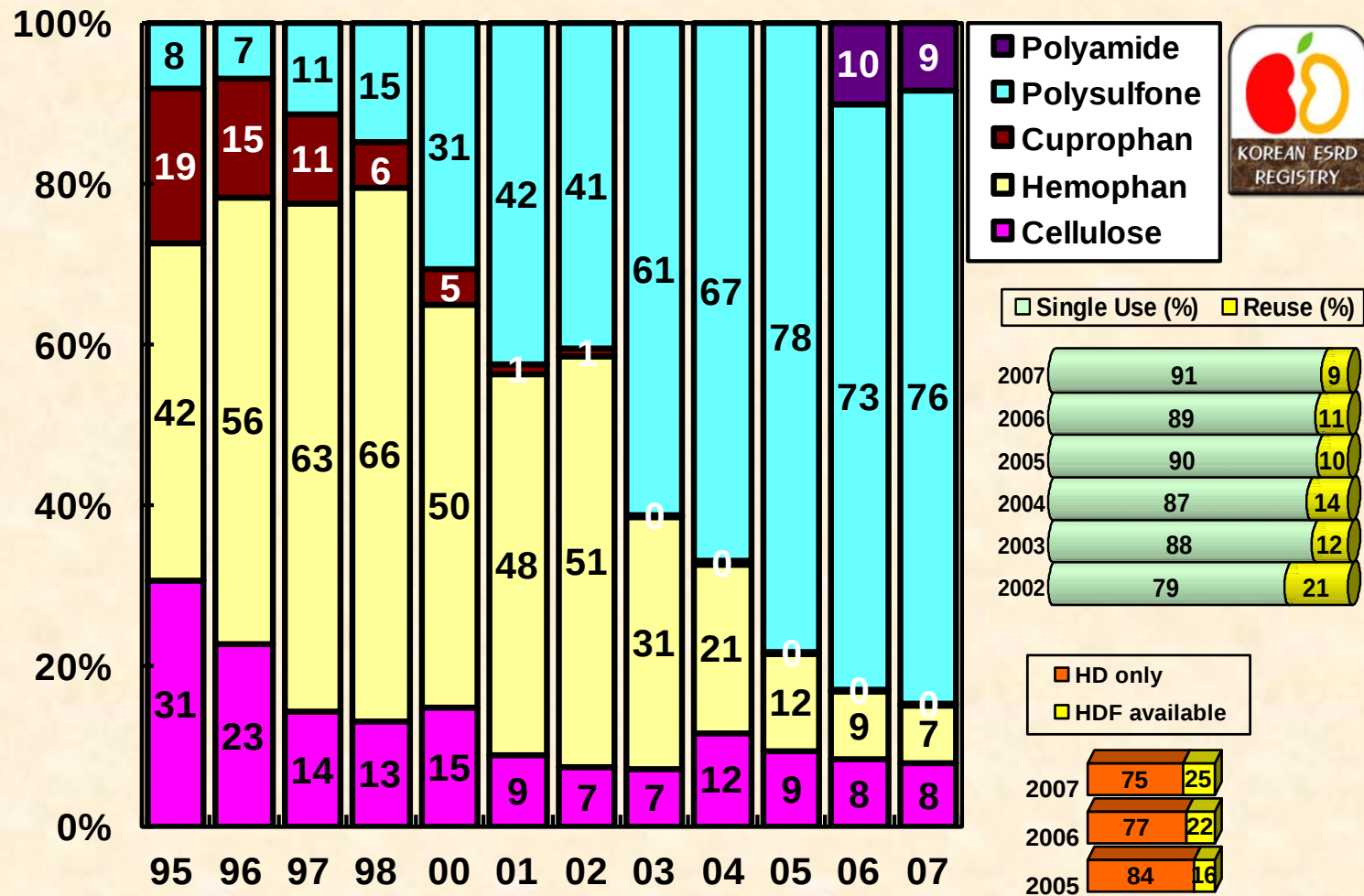
Hematocrit : HD vs PD



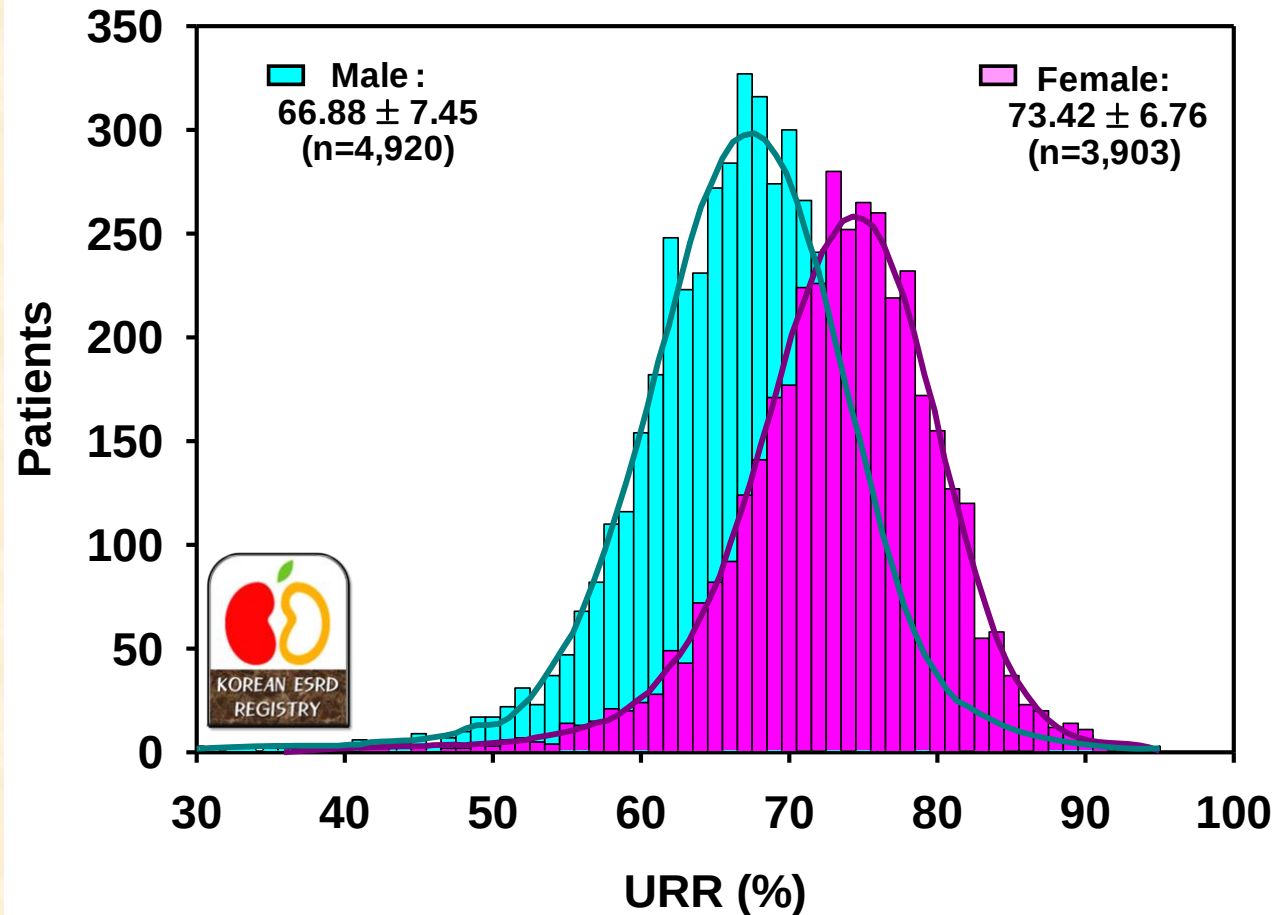
Frequency of HD per Week



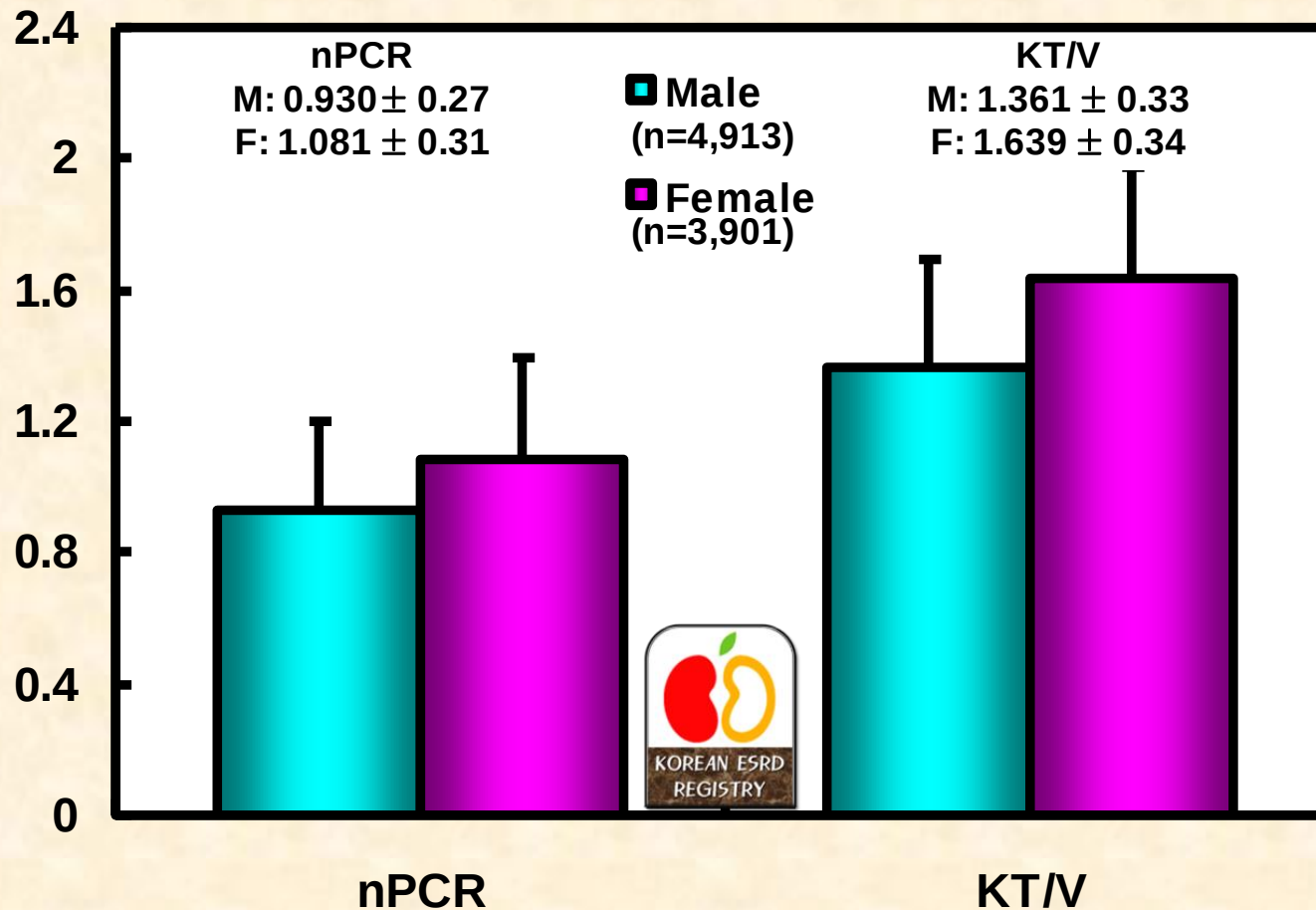
HD Membranes



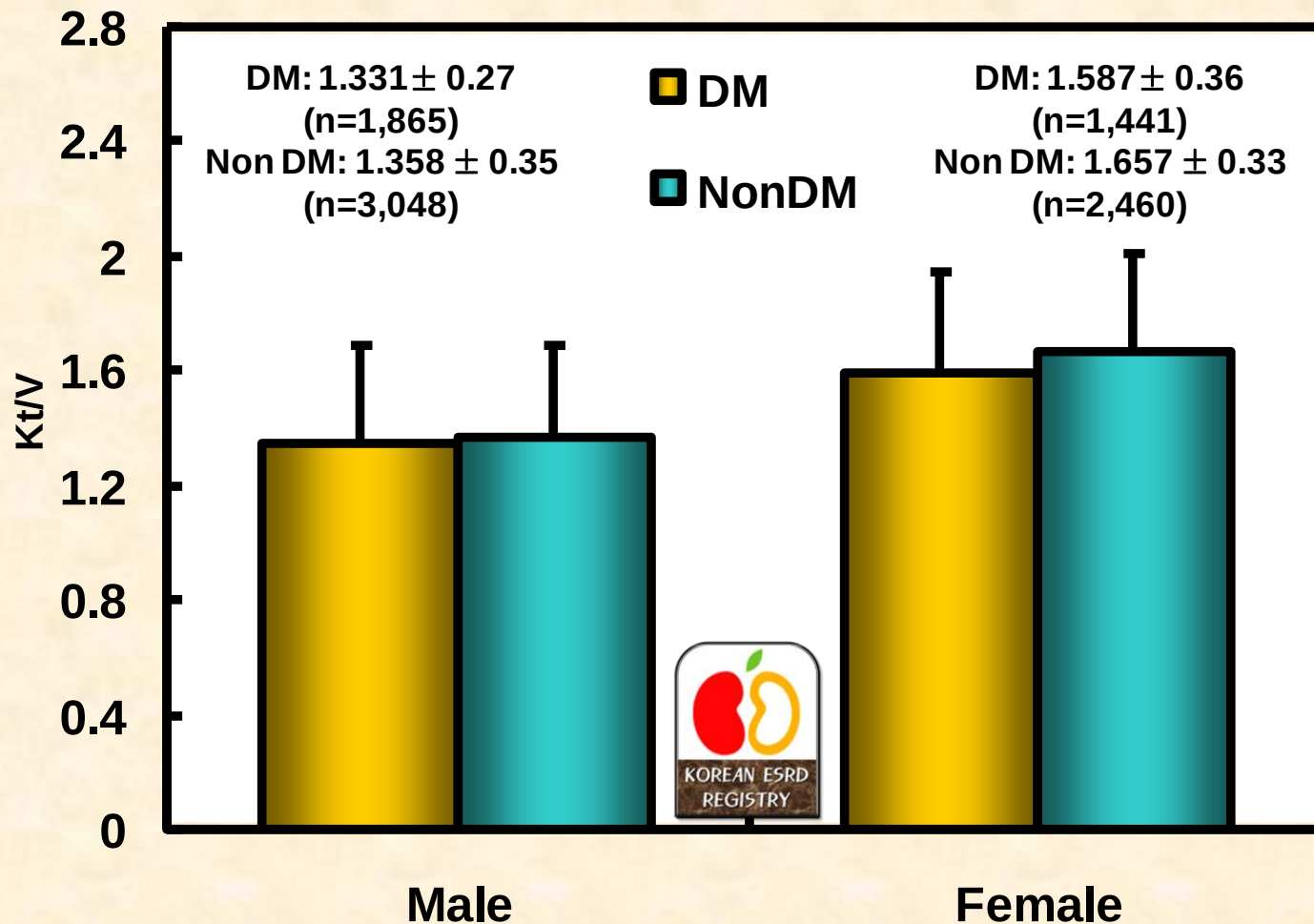
Urea Reduction Ratio of HD Pts



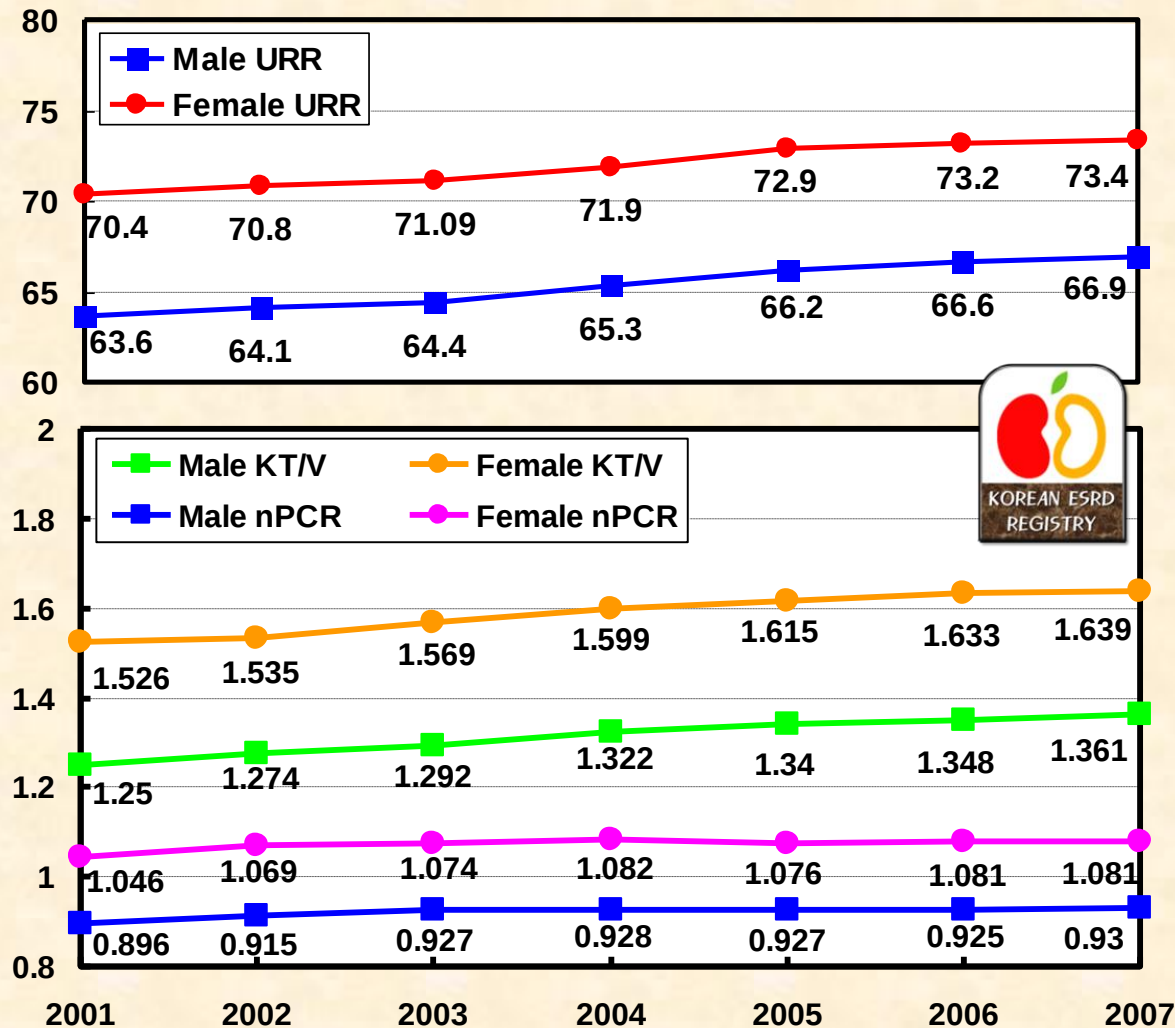
HD Adequacy



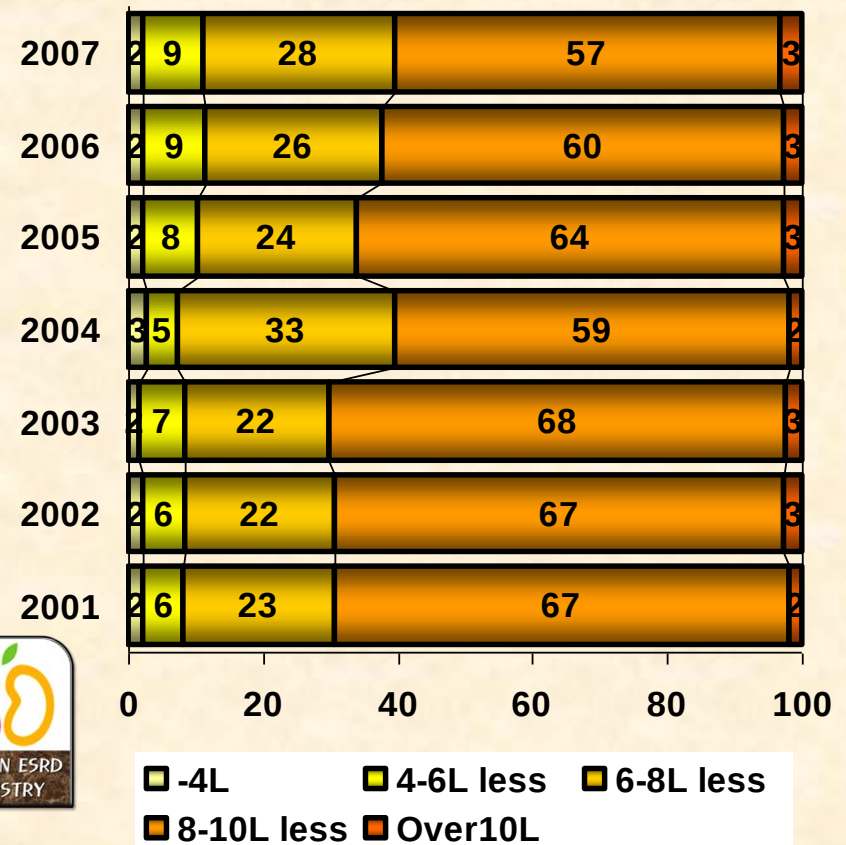
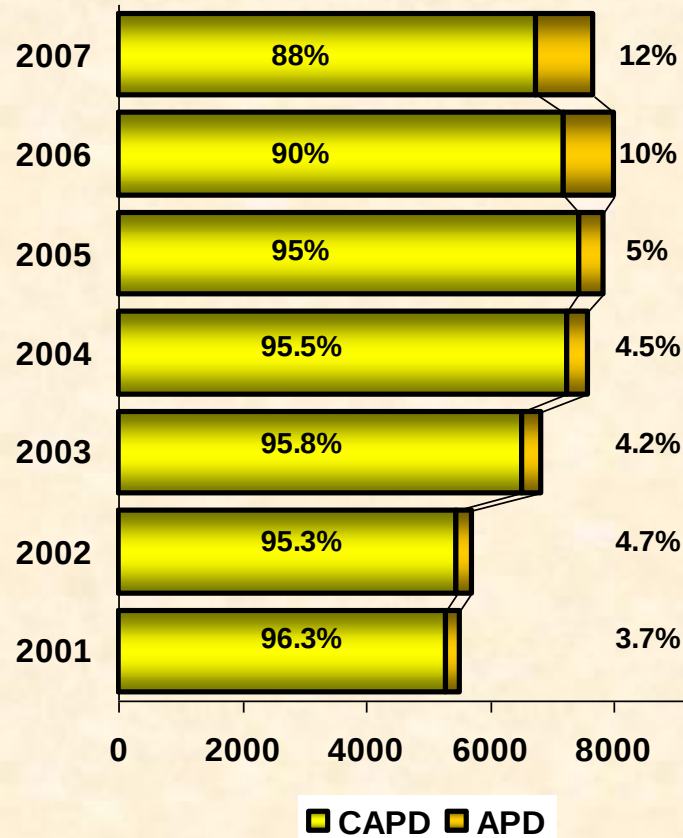
HD Adequacy : DM vs Non-DM



Changes of HD Adequacy



PD Type & Doses



Co-Morbidity of Dialysis Pts

Complications		HD (%)	PD (%)
Cardiac	Coronary Artery Disease	16.1	15.5
	Congestive Heart Failure		
	Pericardial Effusion		
	Arrhythmia		
Vascular	Cerebrovascular accident	47.6	56.9
	Hypertension		
	Other vascular disease		
Infection	Pneumonia	6.5	8.5
	Tuberculosis		
	Peritonitis		
	Herpes zoster		
	Other Infection		
Liver disease	Hepatitis B	8.8	3.1
	Hepatitis C		
	Congestive Liver		
	Hemochromatosis		
	Other liver diseases		
Gastrointestinal	Gastric Ulcer	11.4	5.4
	Duodenal Ulcer		
	Other Gastrointestinal Diseases		
	Malnutrition (Alb<2.5g/dl)		
Miscellaneous	Malignancy	9.5	10.6
	Hypertensive Retinopathy		
	Uremic Dermatitis		
	Uremic Neuritis		
	Uremic Dementia		
	Uremic Ascites / Pleural Effusion		
	Osteodystrophy		

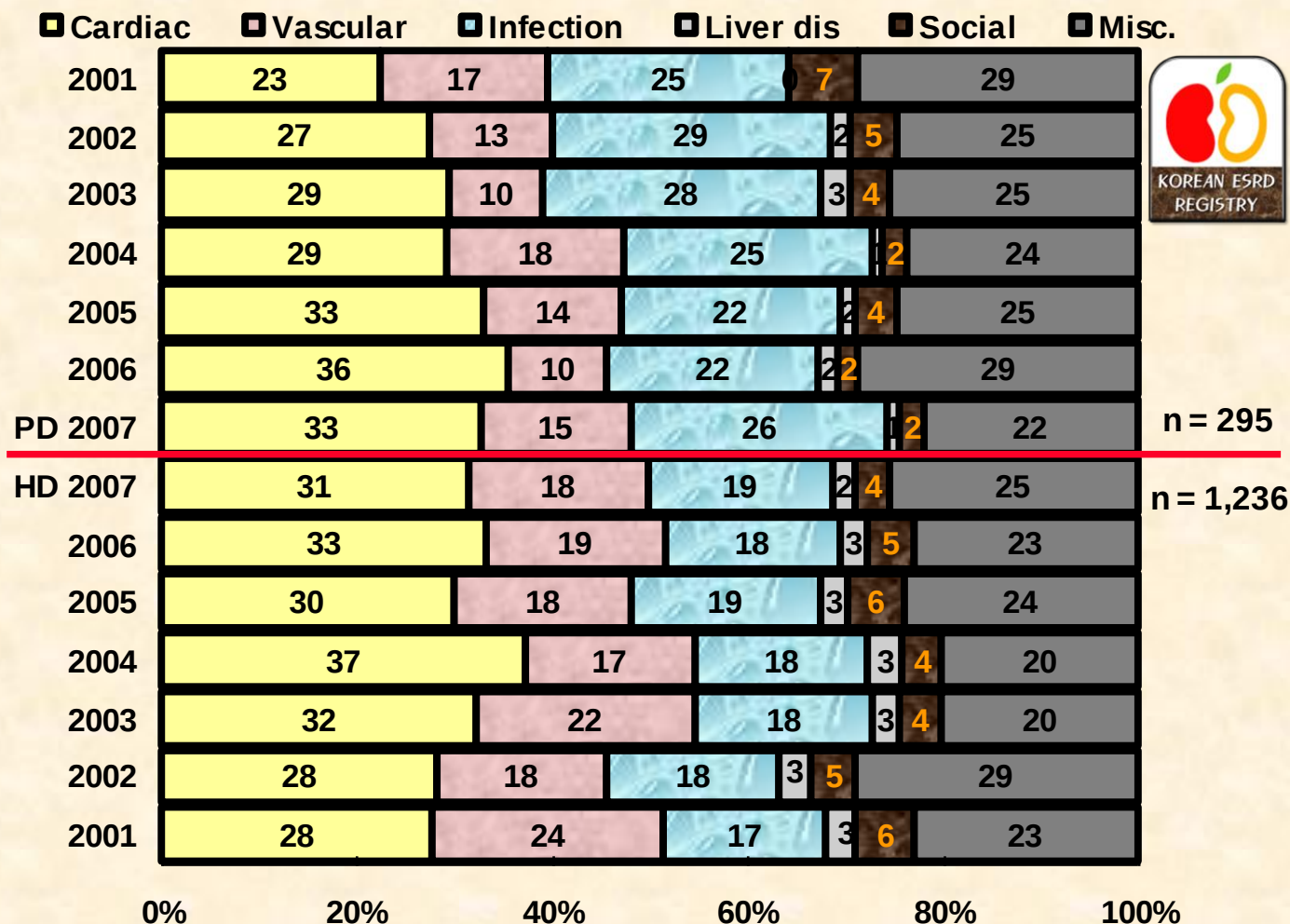
* Number of patients: Hemodialysis =3,239, Peritoneal dialysis=483.

Causes of Death (%), 1994-2007

Causes	1994-1996	1998	2001	2002	2003	2004	2005	2006	2007
Cardiac	27.4	33.3	26.9	27.9	31.7	35.5	30.7	33.7	31.7
Myocardial infarction	6.4	6.6	7.7	5.5	7.4	8.3	8.0	9.1	7.5
Cardiac arrest, uremia associated	13.7	17.5	11.2	10.6	11.7	13.6	10.4	11.1	10.8
Cardiac arrest, other cause	7.2	8.1	8.1	11.8	12.5	13.6	12.4	13.5	13.3
Vascular	17.2	18.5	22.7	15.7	19.5	17.5	17.0	16.5	17.8
Cerebrovascular accident	14.3	16.6	15.1	11.6	14.5	12.8	12.3	11.5	13.0
Pulmonary embolus	0.2	0.1	0.5	0.4	0.1	0.2	0.6	0.7	0.5
Gastrointestinal hemorrhage	1.7	2.1	2.7	1.9	3.2	2.0	1.7	1.8	2.7
Gastrointestinal embolism	0.1	0.0	0.1	0.1	0.0	0.4	0.5	0.5	0.1
Other vascular disease	0.9	0.9	4.3	1.7	1.6	2.1	1.9	2.0	1.6
Infection	13.5	18.1	17.8	21.6	20.5	19.5	20.1	18.8	20.2
Pulmonary infection	2.5	3.4	4.5	4.9	3.6	3.7	4.5	4.2	4.4
Septicemia	6.6	10.8	6.9	9.2	9.7	9.4	9.6	8.9	11.7
Tuberculosis	0.3	0.8	0.8	0.5	0.2	0.1	0.3	0.1	0.2
Peritonitis	2.1	2.5	1.1	2.5	2.0	1.5	1.4	1.1	1.1
Other Infection	2.0	1.8	4.5	4.5	4.9	4.8	4.3	4.5	2.9
Liver disease	3.4	3.4	2.6	2.8	2.8	2.9	2.7	2.6	2.2
Liver failure due to hepatitis B	1.8	2.3	1.6	1.2	1.8	2.1	1.5	1.4	1.3
Liver failure due to other cause	1.6	1.3	1.0	1.6	1.0	0.9	1.2	1.1	0.8
Social	6.2	4.2	6.3	4.7	4.4	3.6	5.4	4.2	3.3
Patient refused further treatment	2.9	1.8	2.1	1.8	1.0	1.1	1.1	0.6	1.1
Suicide	2.5	0.9	3.3	1.9	2.3	2.0	3.3	3.0	1.5
Therapy ceased for other reason	0.8	1.9	0.9	1.0	1.0	0.5	1.0	0.6	0.7
Miscellaneous	32.0	19.7	23.7	27.4	21.3	21.0	24.0	24.2	24.8
Cachexia	2.9	3.3	8.1	6.8	6.6	6.1	4.0	3.9	4.4
Malignant disease	2.1	4.1	4.4	4.8	3.5	3.6	6.4	5.4	5.7
Accident	1.2	1.0	0.9	0.5	1.1	0.9	1.4	1.6	1.2
Uncertain	25.8	12.5	10.3	15.3	10.1	10.3	12.3	13.2	13.4

Number of patients :1994-1996=981, 1998=911, 2001=761, 2002=1,256, 2003=894, 2004=1,162, 2005=1,256, 2006=1,248, 2007=1,531.

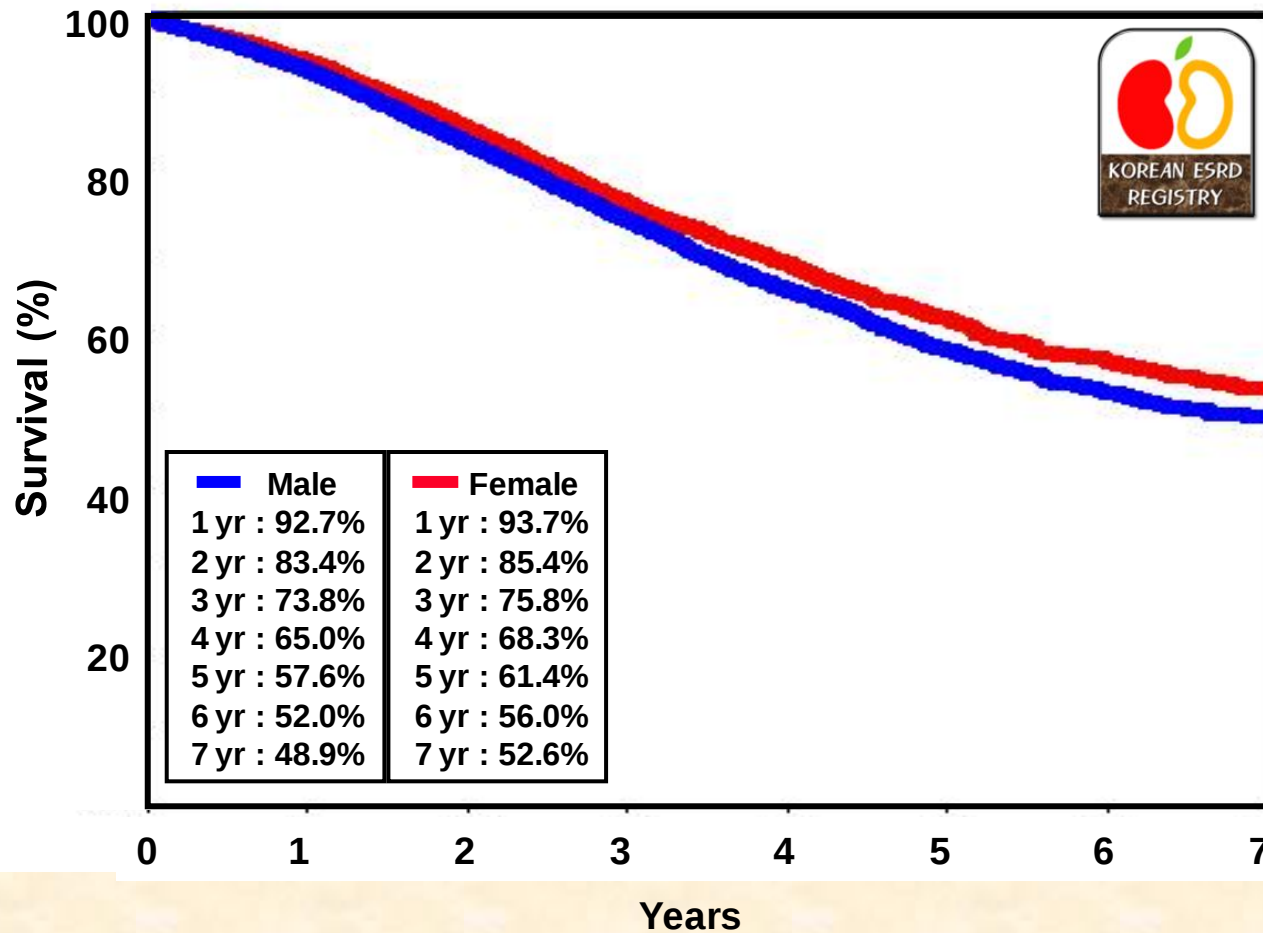
Death Causes, HD & PD





Overall Patient Survival

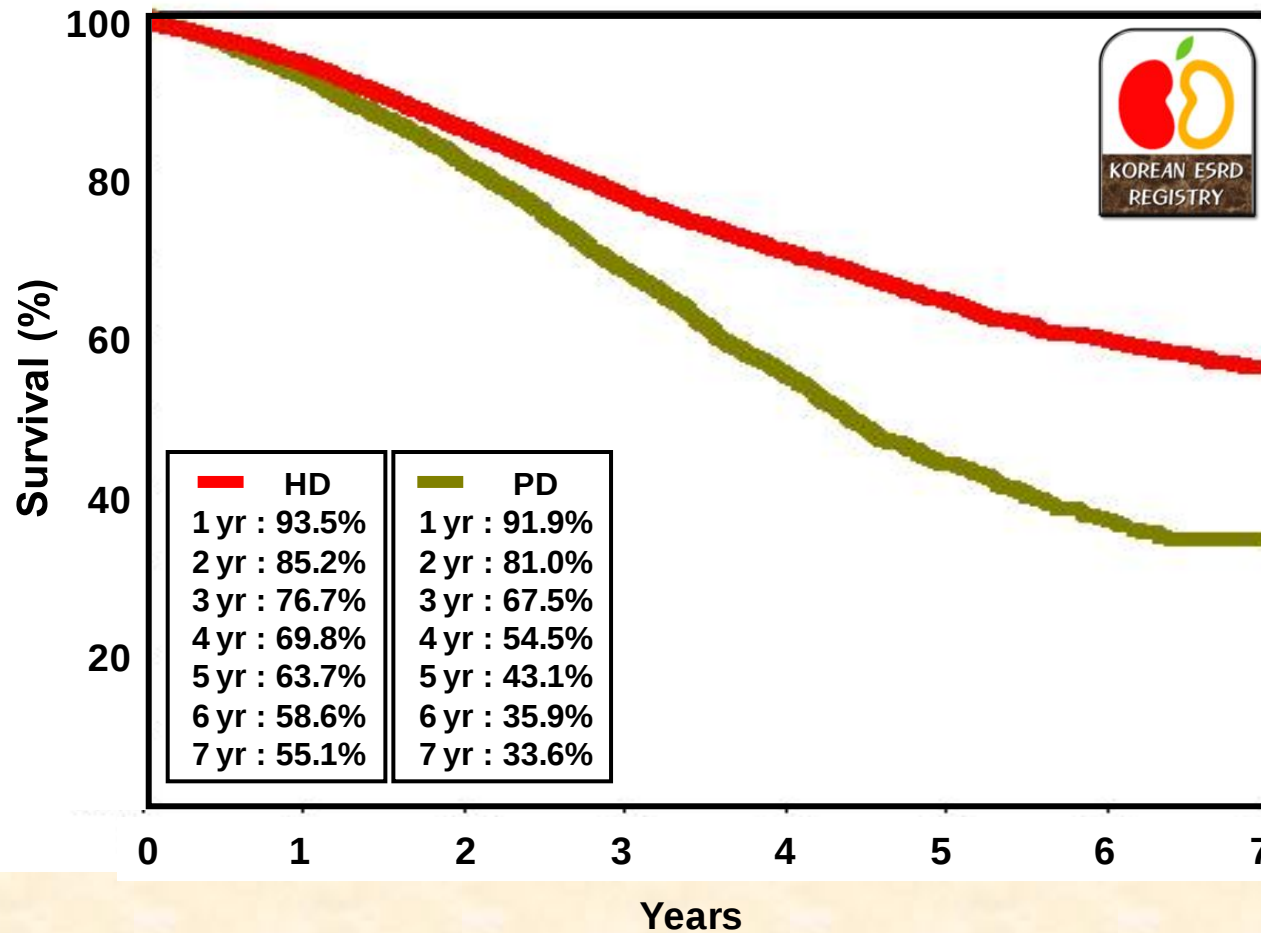
Registered dialysis patients since 2001





Patient Survival : HD vs PD

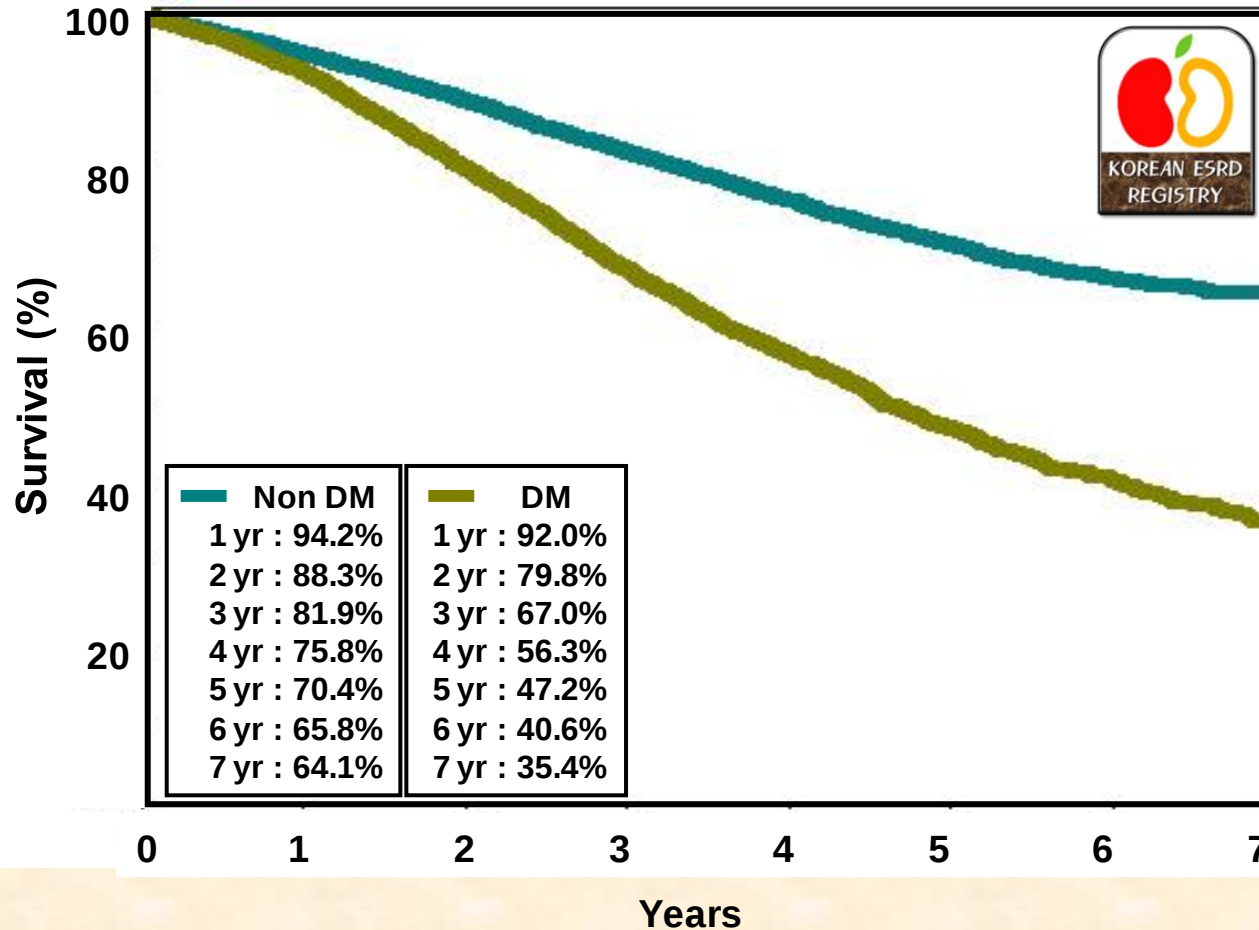
Registered dialysis patients since 2001





Patient Survival : DM vs Non-DM

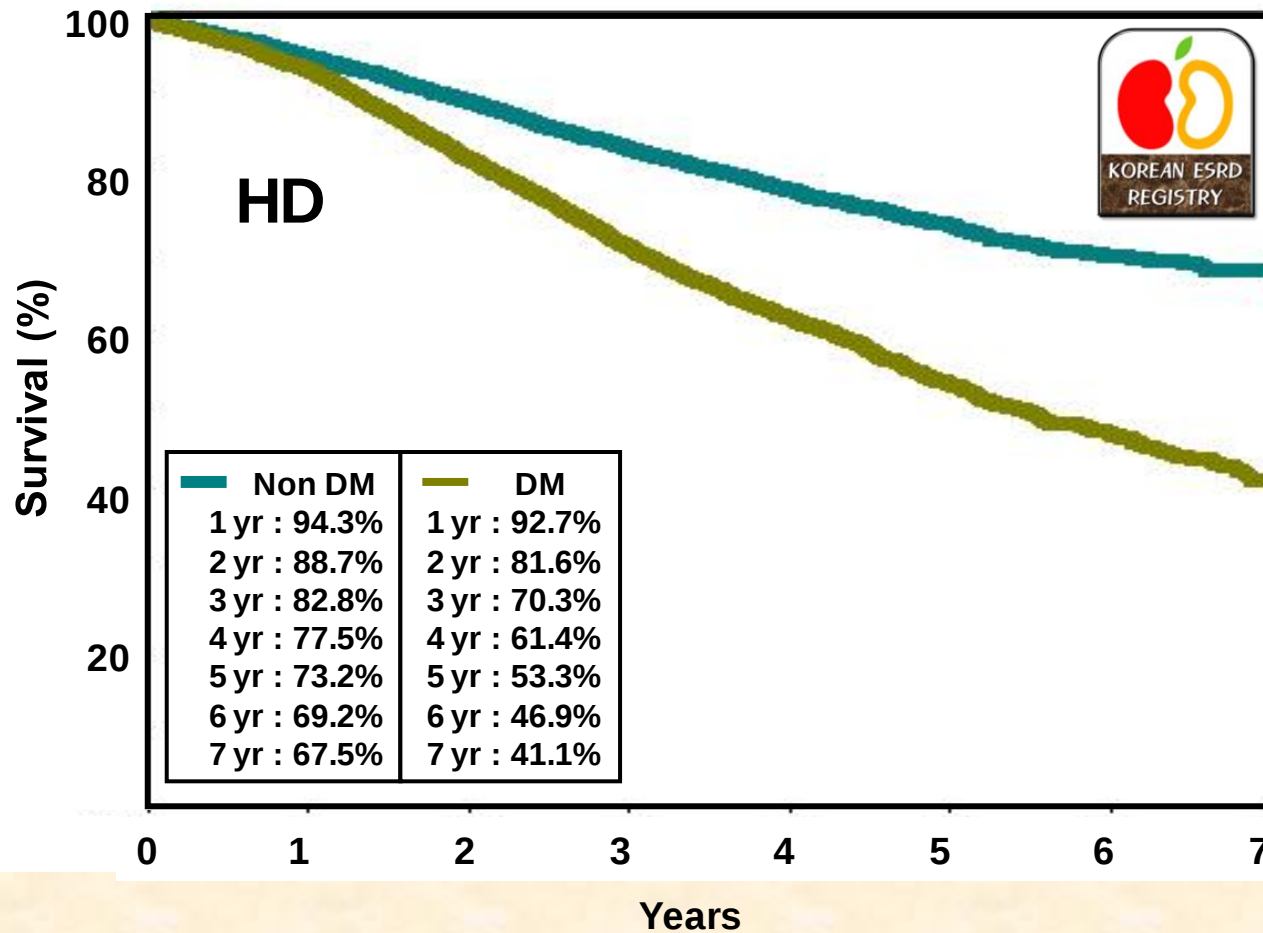
Registered dialysis patients since 2001





HD Pts Survival : DM vs Non-DM

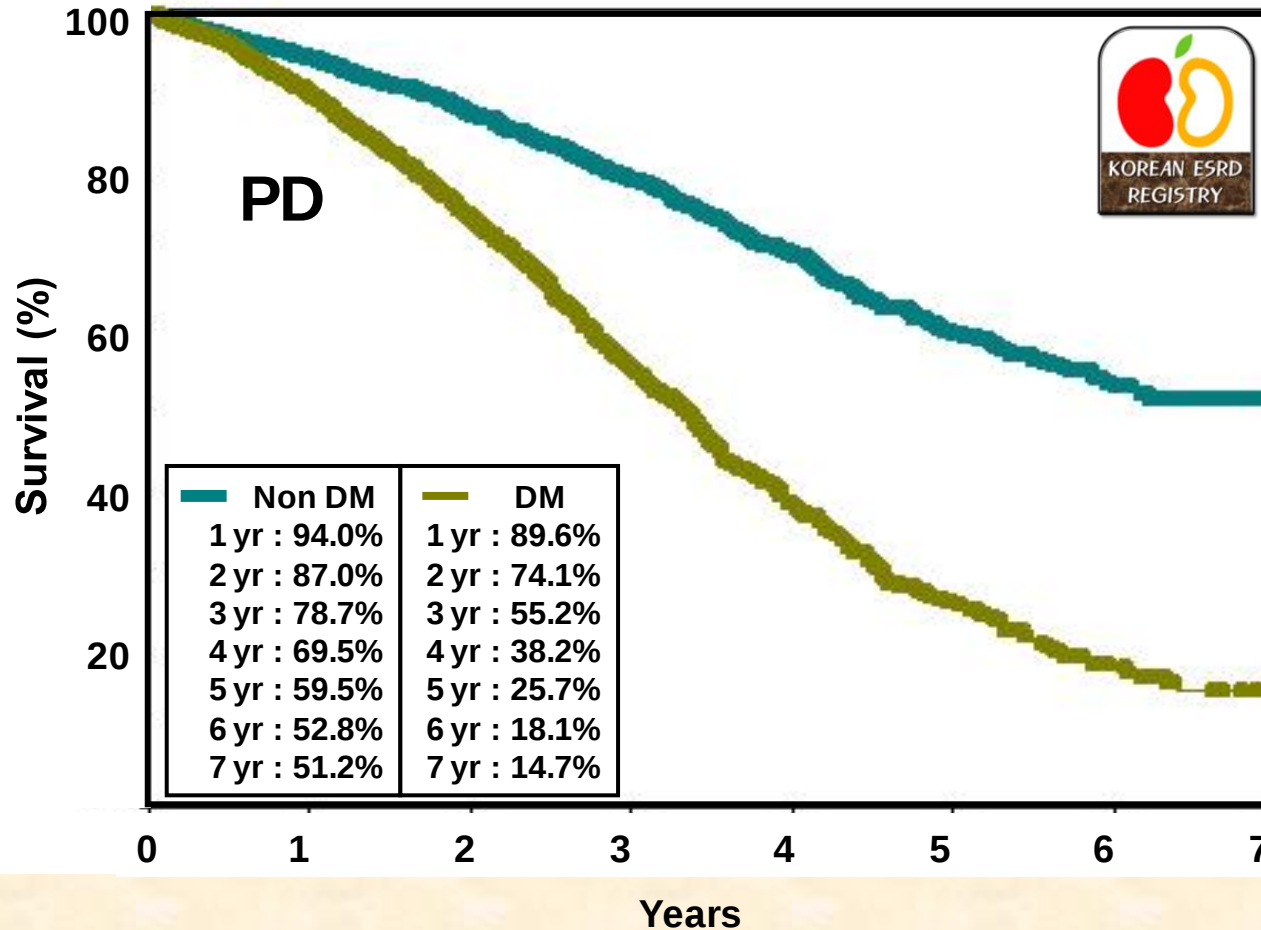
Registered dialysis patients since 2001





PD Pts Survival : DM vs Non-DM

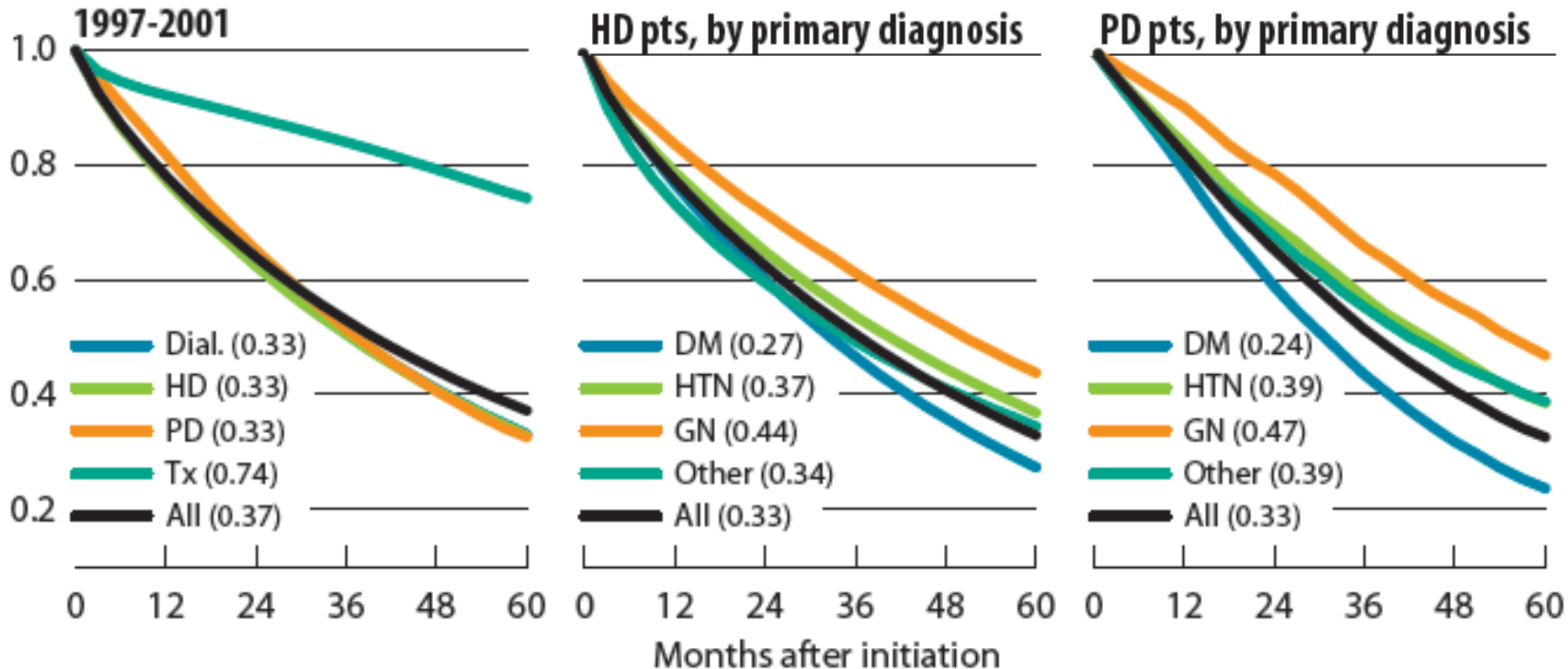
Registered dialysis patients since 2001



Survival of ESRD Pts, USRDS

USRDS 2008

United States
Renal Data System
2008 Annual Data Report



혈액투석 환자수 : 32만 8천명 (1053pmp)

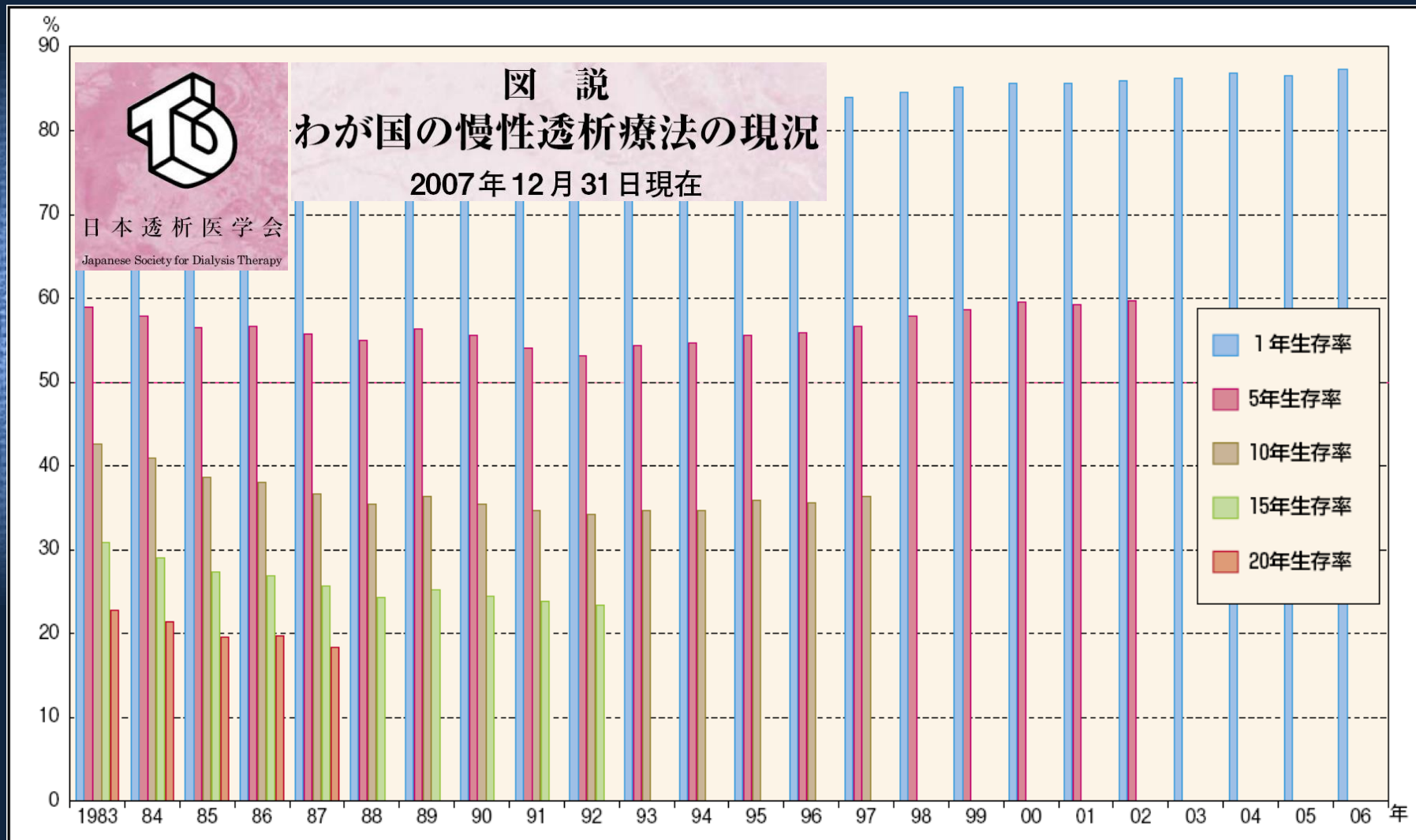
복막투석 환자수 : 2만6천명 (84pmp)

Medicare 2006 : \$23billion (환자 1명당 \$4300/month)

Survival of ESRD Pts, Japan

일본 투석의학회 (2007년말 현황)

투석 센터 : 4,050, 투석기: 10만8천대, 투석환자: 27만5천명 (2153 ppm), 복막 투석 3.4%



Survival : EDTA data

ERA-EDTA Registry Annual Report 2006

Figure A.5.1
Adjusted survival (cohort 1997-2001):
Incident dialysis patients and patients receiving
a first transplant (between 1997 and 2001)
from day 91, by modality,
adjusted for age, gender, and primary diagnosis

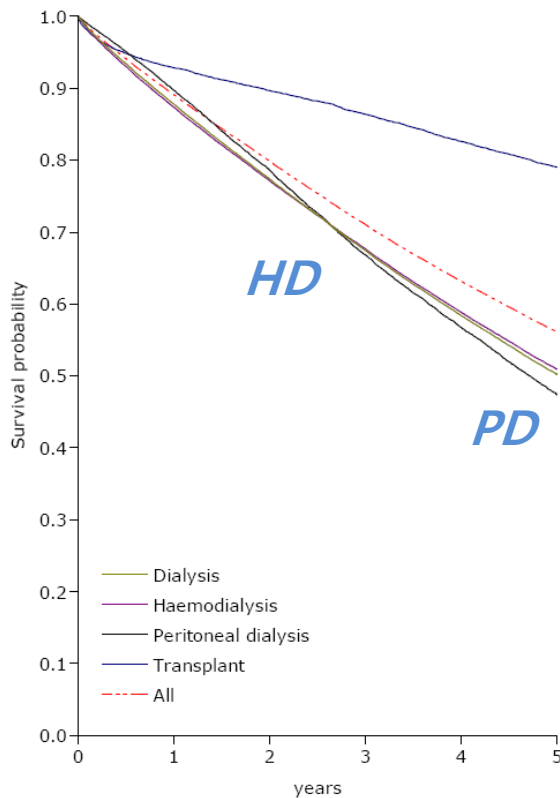


Figure A.5.2
Adjusted survival (cohort 1997-2001):
Incident haemodialysis patients
from day 91, by primary diagnosis,
adjusted for age and gender

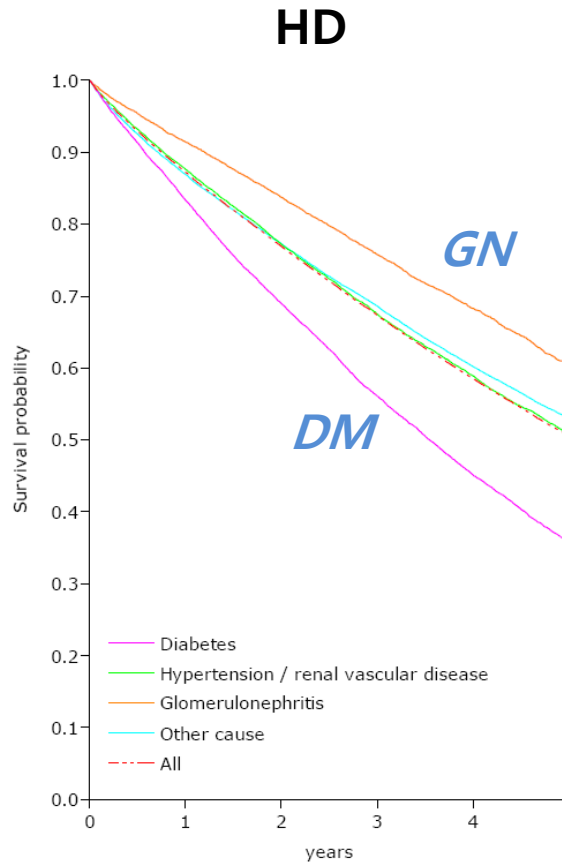
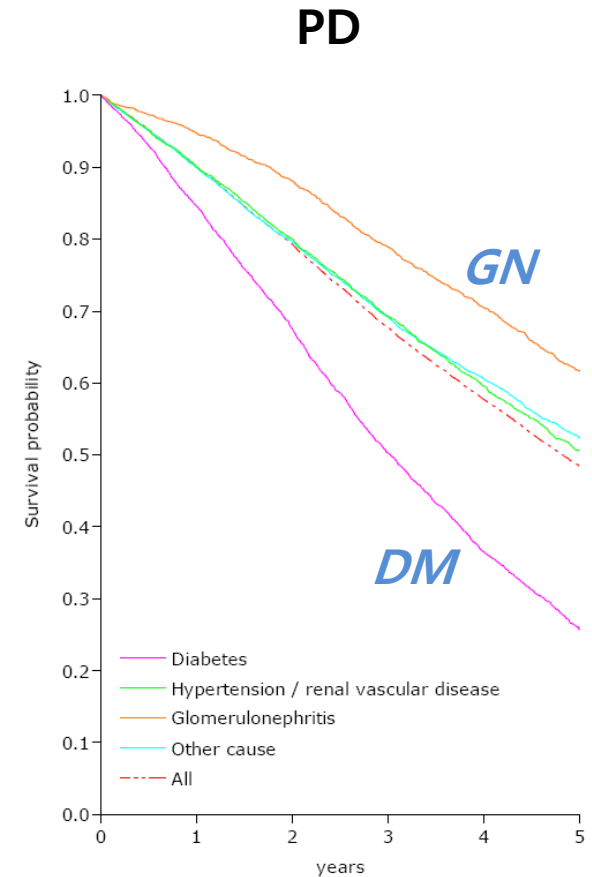
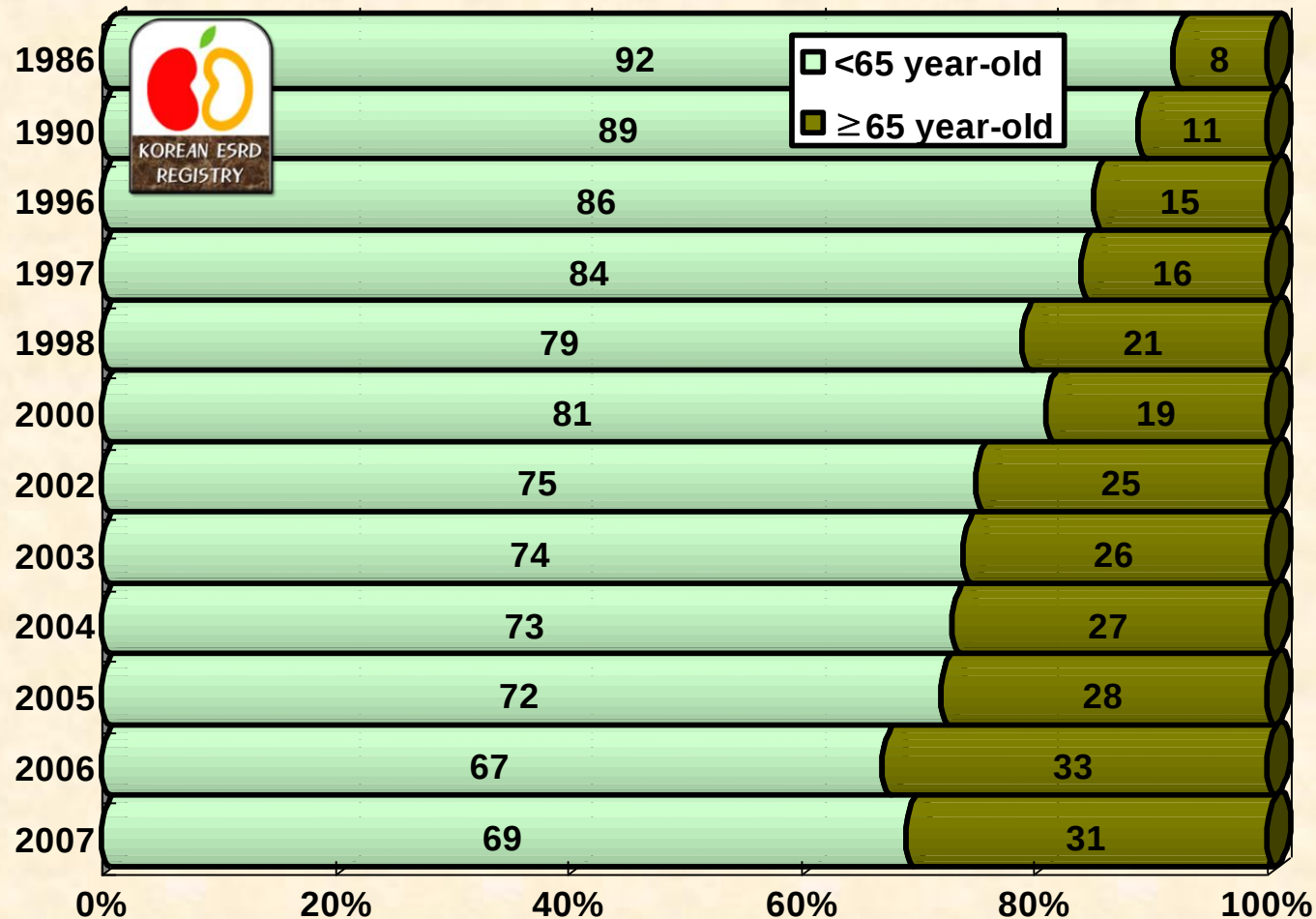


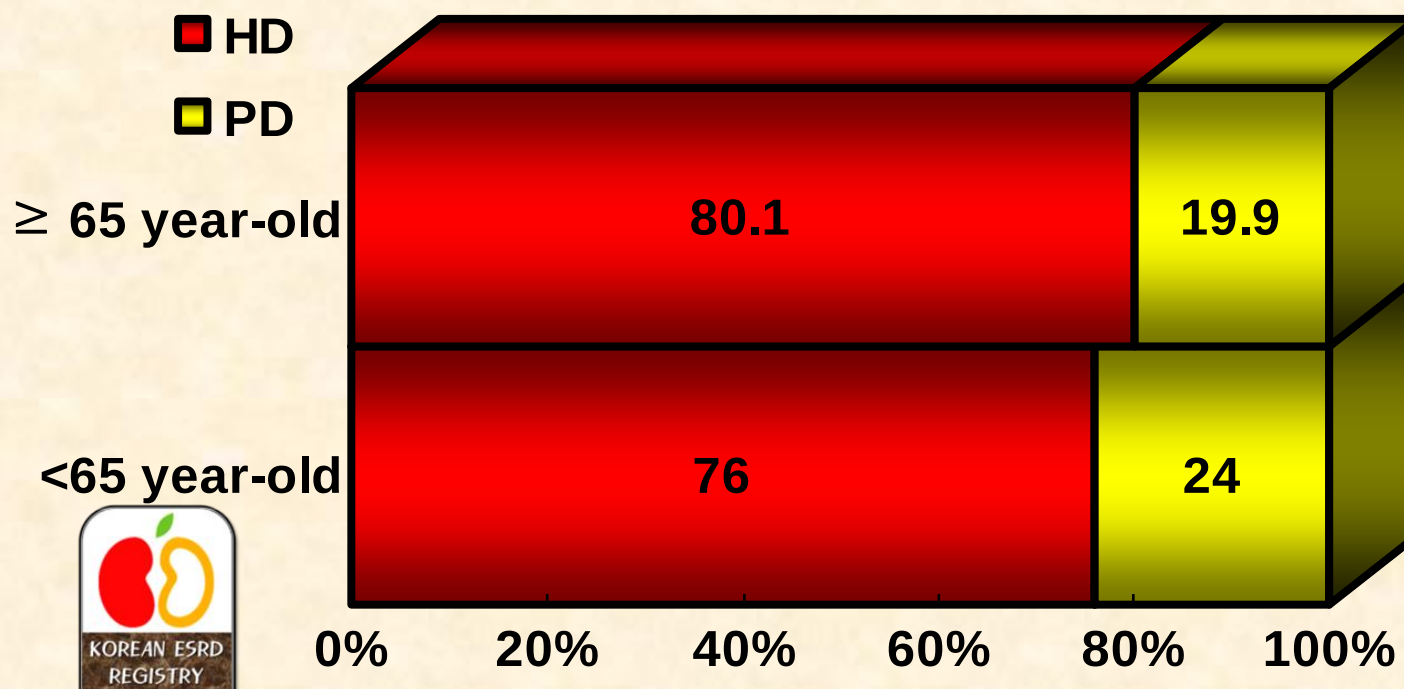
Figure A.5.3
Adjusted survival (cohort 1997-2001):
Incident peritoneal dialysis patients
from day 91, by primary diagnosis,
adjusted for age and gender



Percent of Elderly Dialysis Patients



Dialysis Modalities of Elderly ESRD Pts



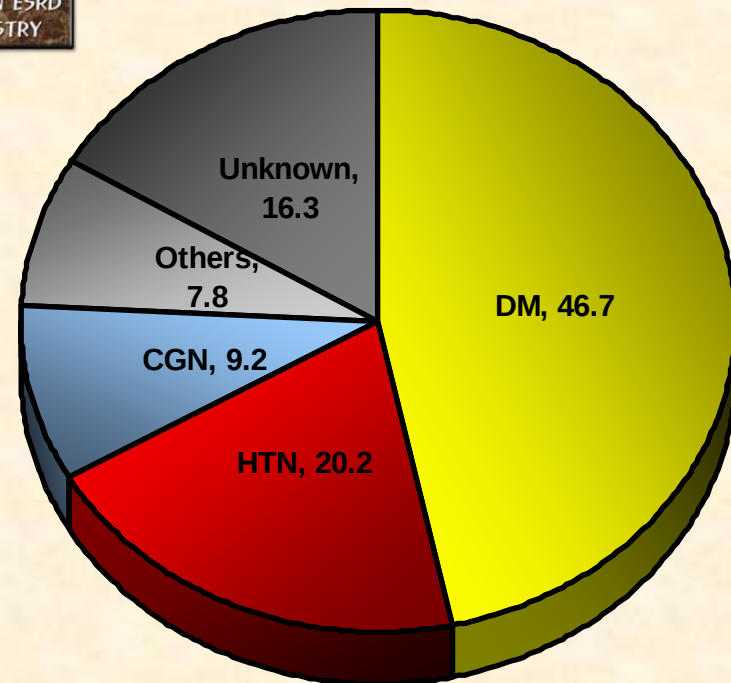
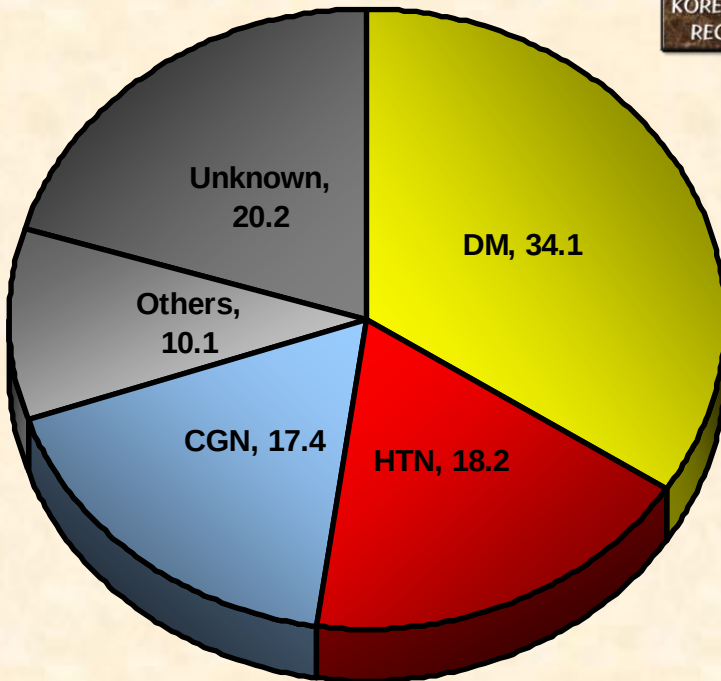
Underlying Causes of Elderly ESRD Pts

1

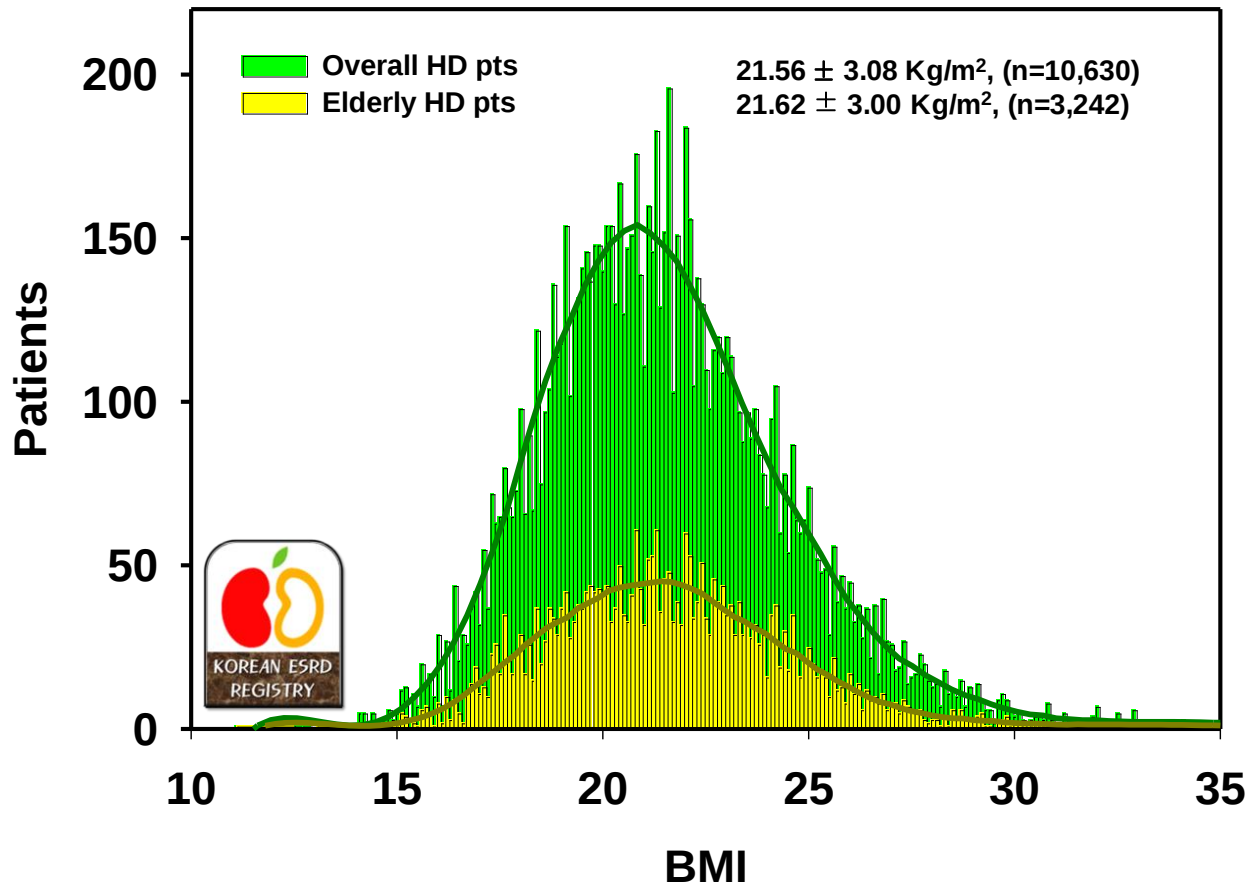
Under 65 year-old



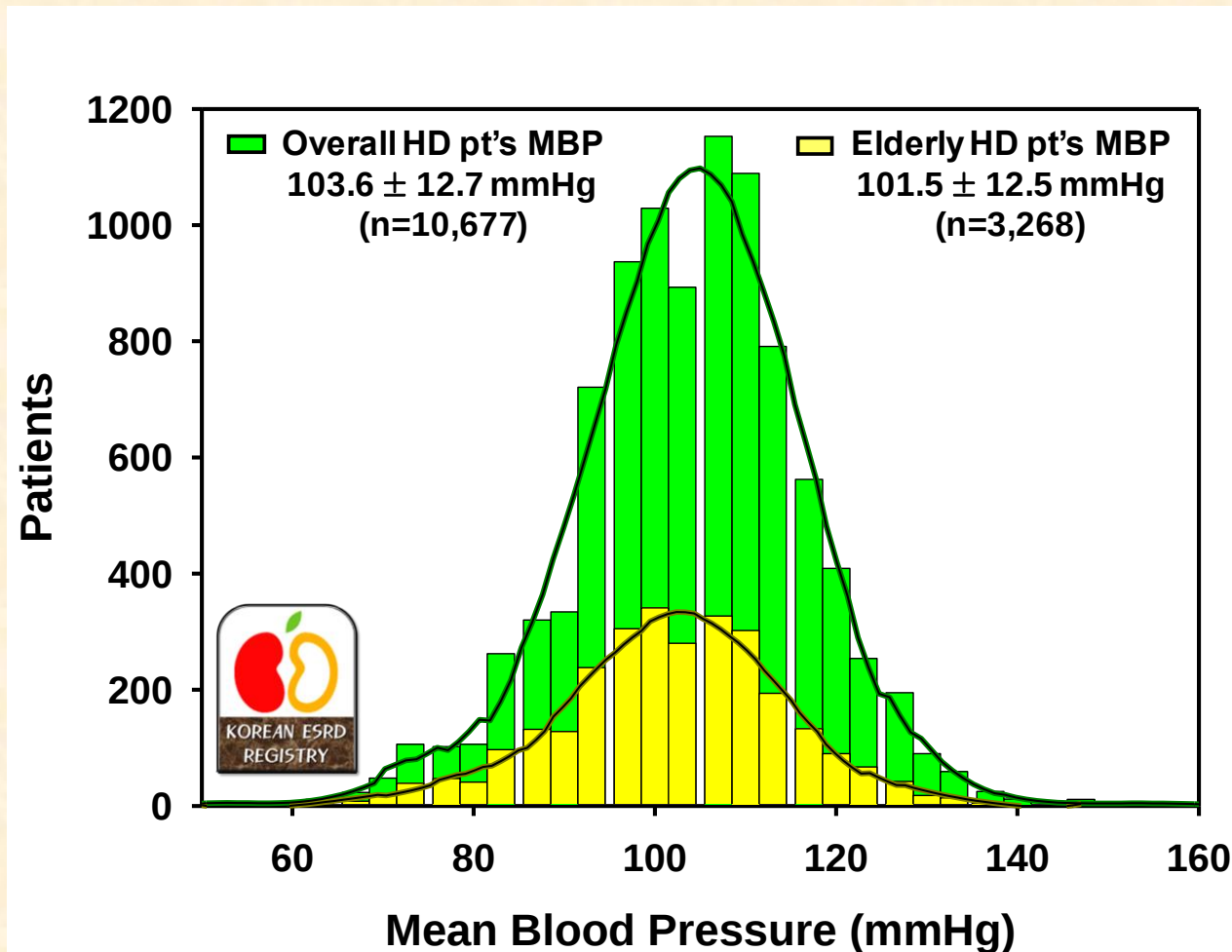
65 & Over 65 year-old



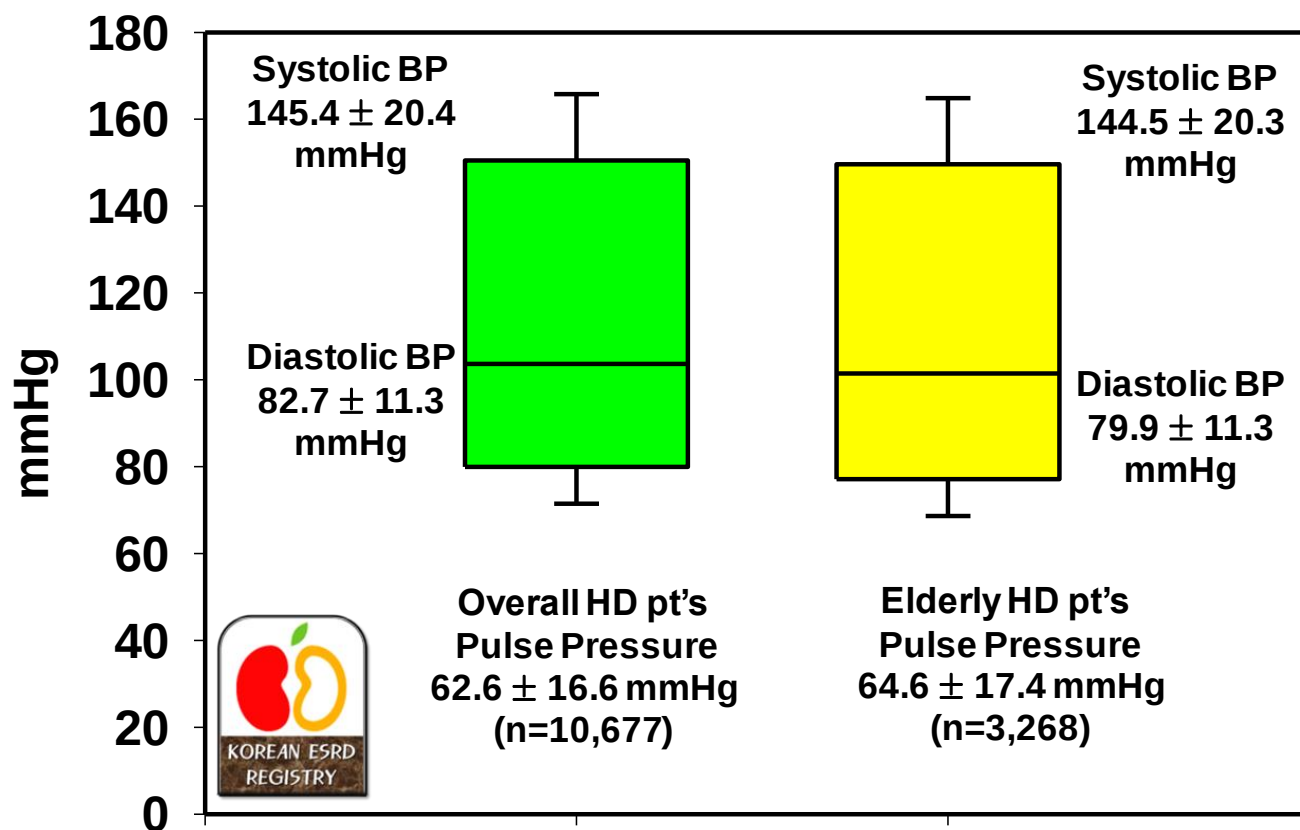
BMI of Elderly HD Pts



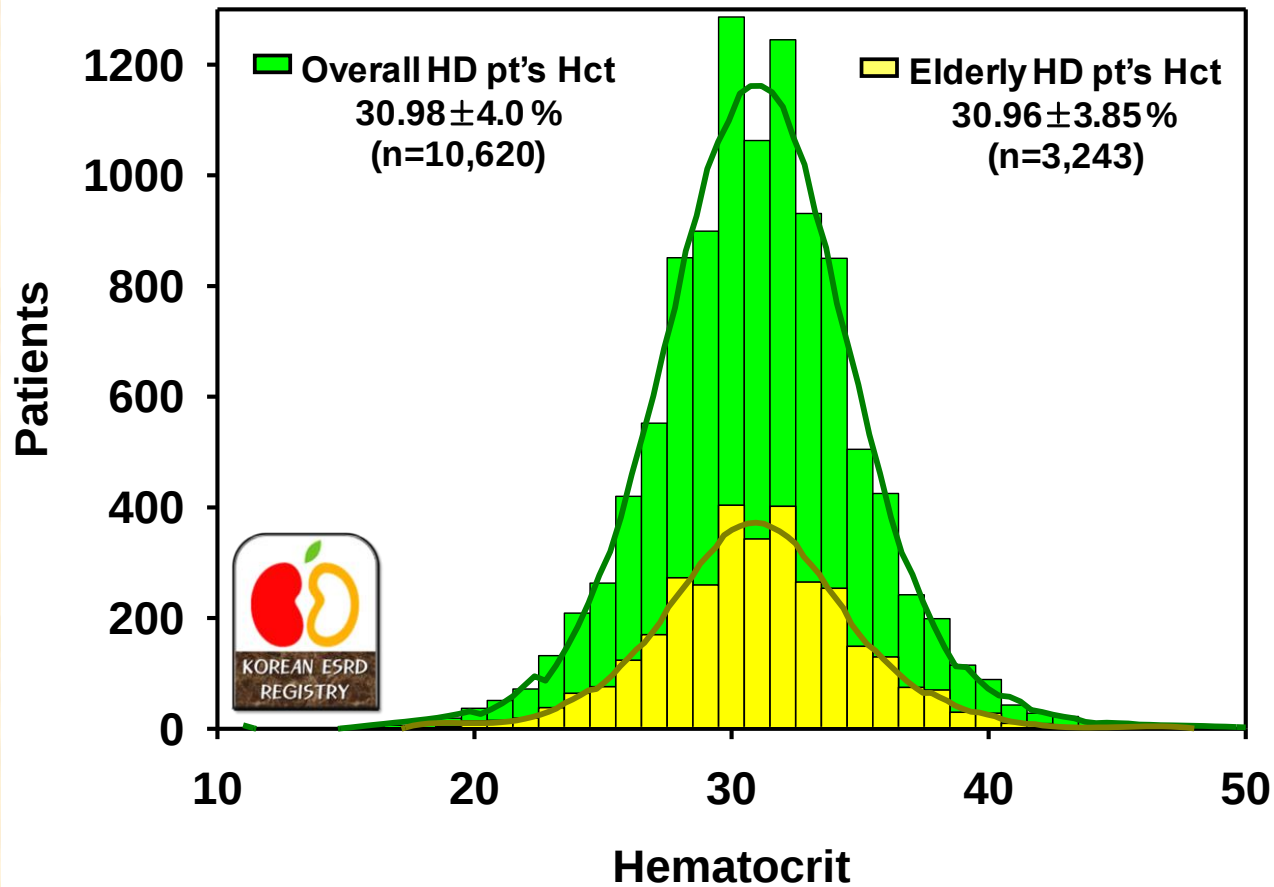
Blood Pressure of Elderly HD Pts



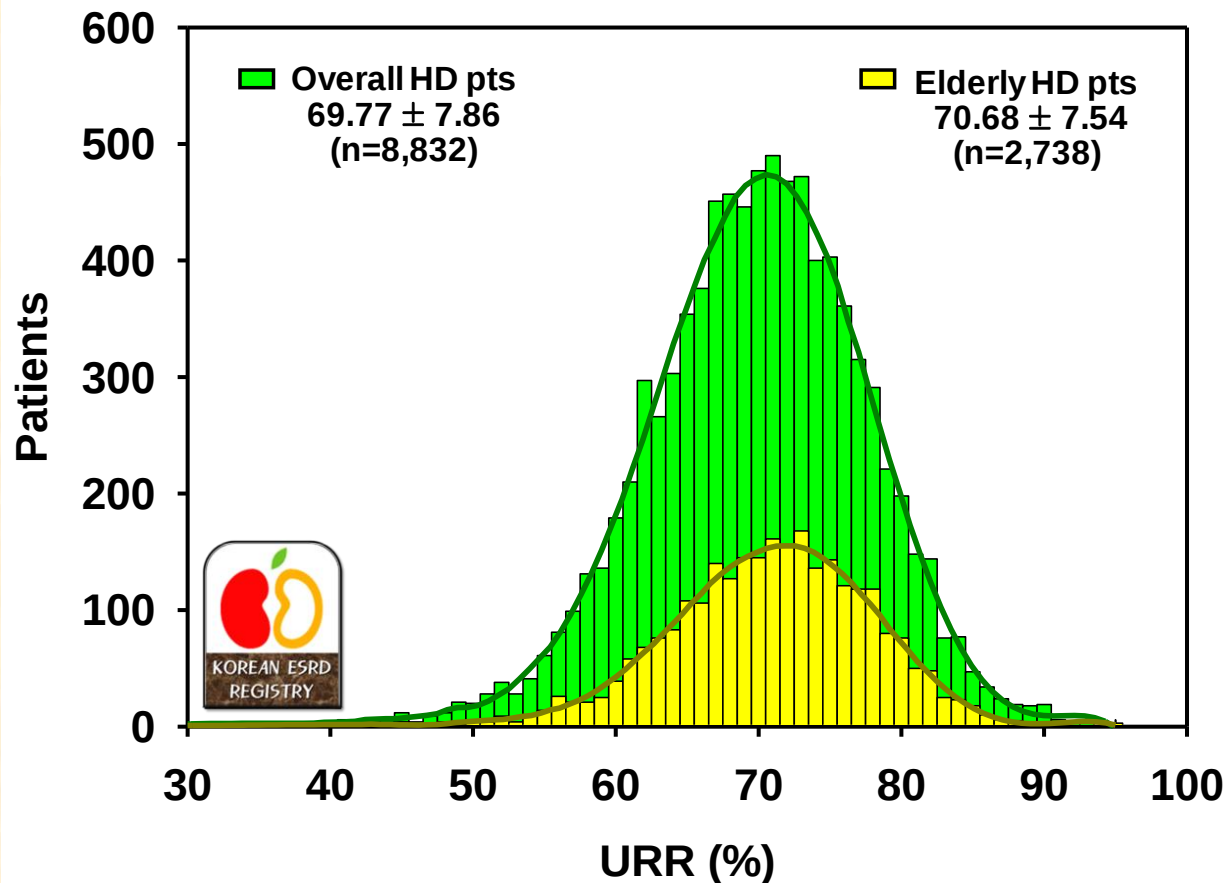
Pulse Pressure of Elderly HD Pts



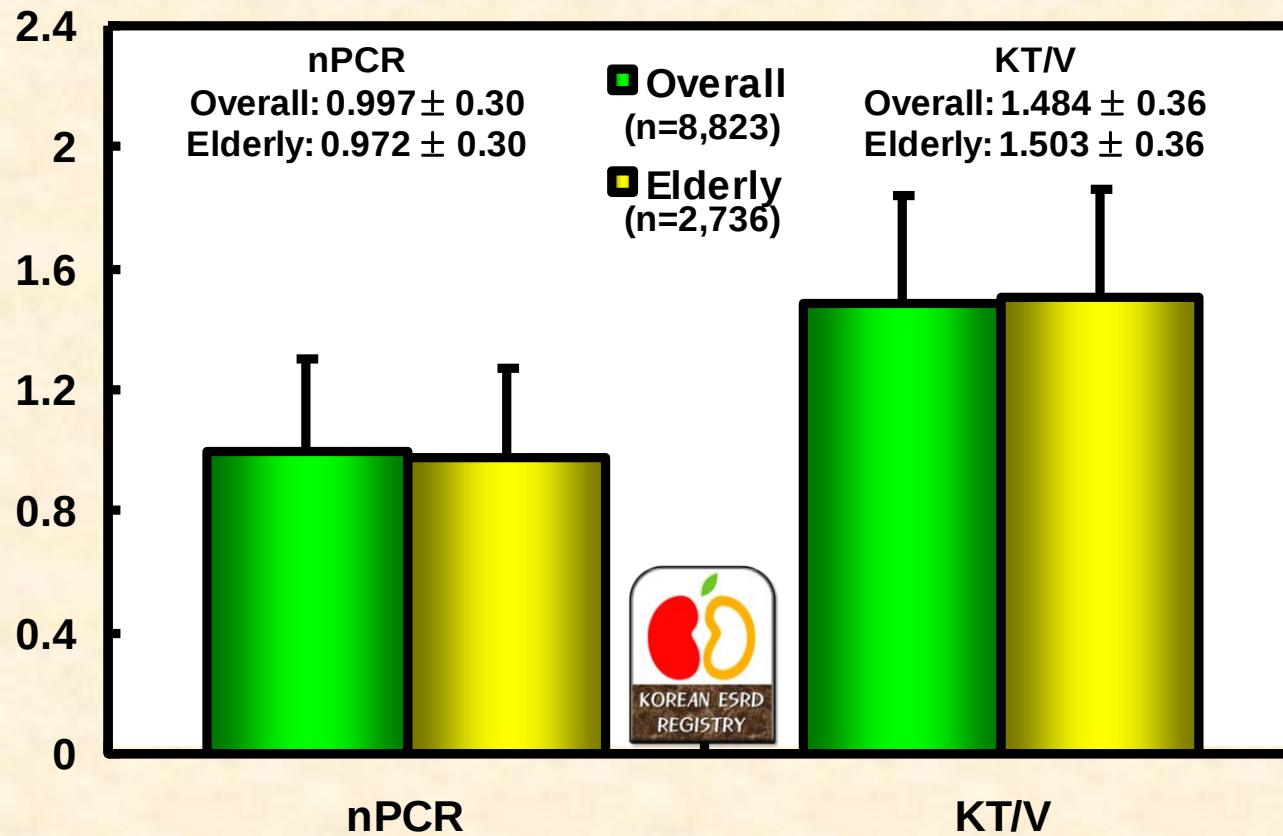
Hematocrit of Elderly HD Pts



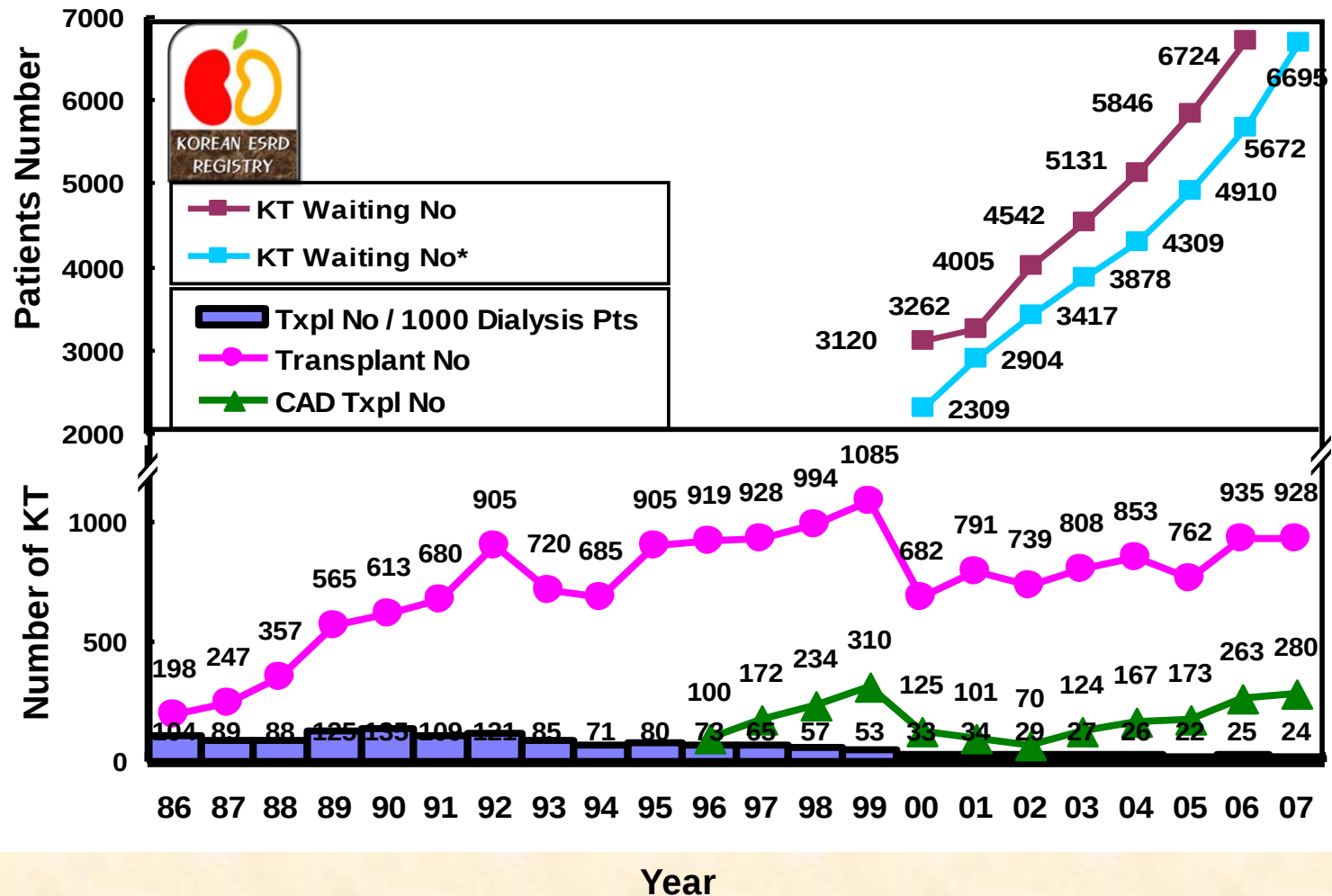
URR of Elderly HD Pts

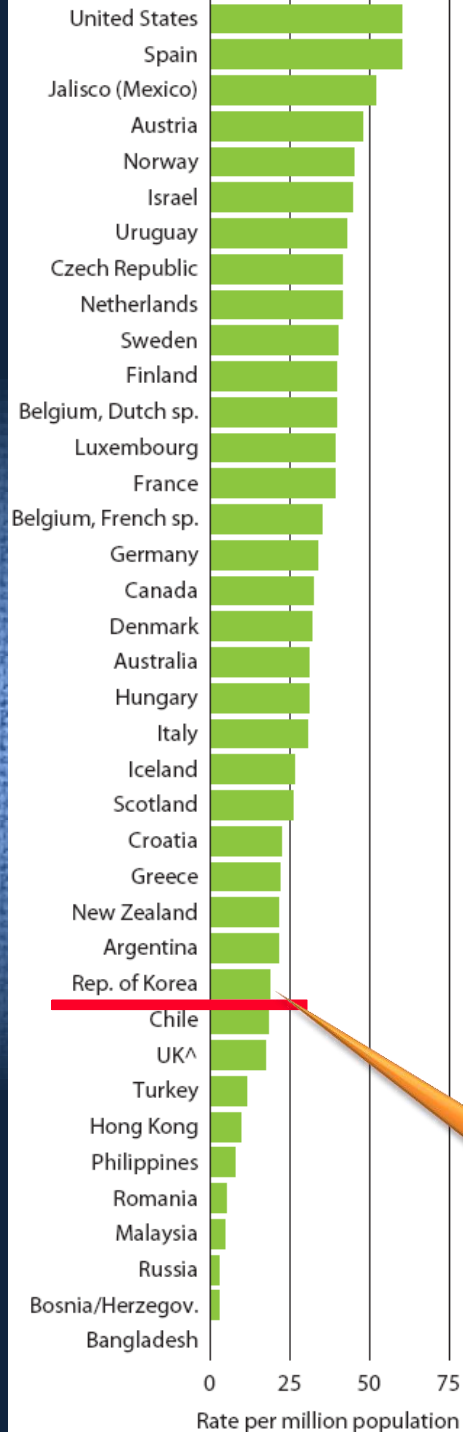


Adequacy of Elderly HD Pts



Kidney Transplantation





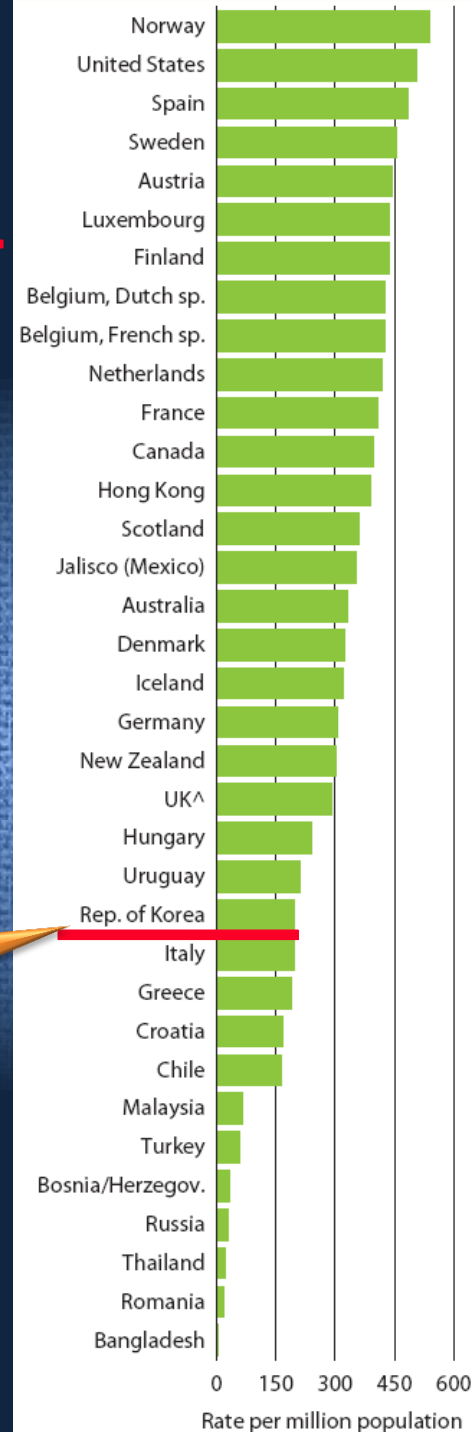
Kidney Transplantation

United States
Renal Data System
2008 Annual Data Report

International Comparison In USRDS 2008

Prevalence
195.7 PMP
2006

Incidence
18.8 PMP
2006



감사의 글

- 전국의 인공신장실 담당의료진
- 대한신장학회 사무국
- 투석용 의료물품 공급업체 :
(Fresenius Korea, Gambro Korea,
Baxter Korea, 보령제약)