우리나라 신대체 요법의 현황

– 인산 민병석 교수 기념 말기 신부전 환자 등록사업 2009 –

Current Renal Replacement Therapy in Korea

-Insan Memorial Dialysis Registry 2009-

대한신장학회 등록위원회

ESRD Registry Committee, Korean Society of Nephrology

Oct. 2010

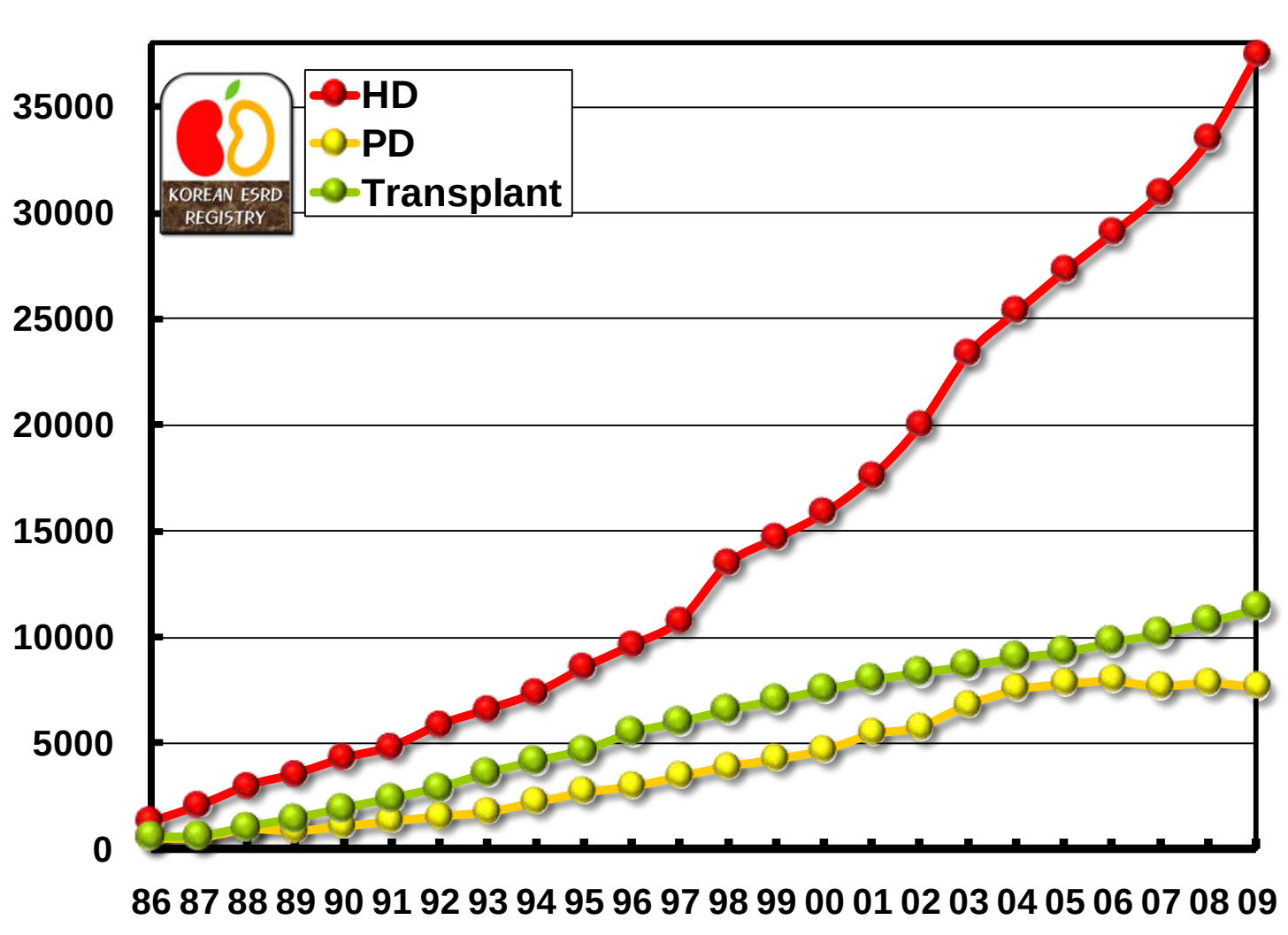
KOREAN ESRD REGISTRY

Prevalence of Renal Replacement Therapy

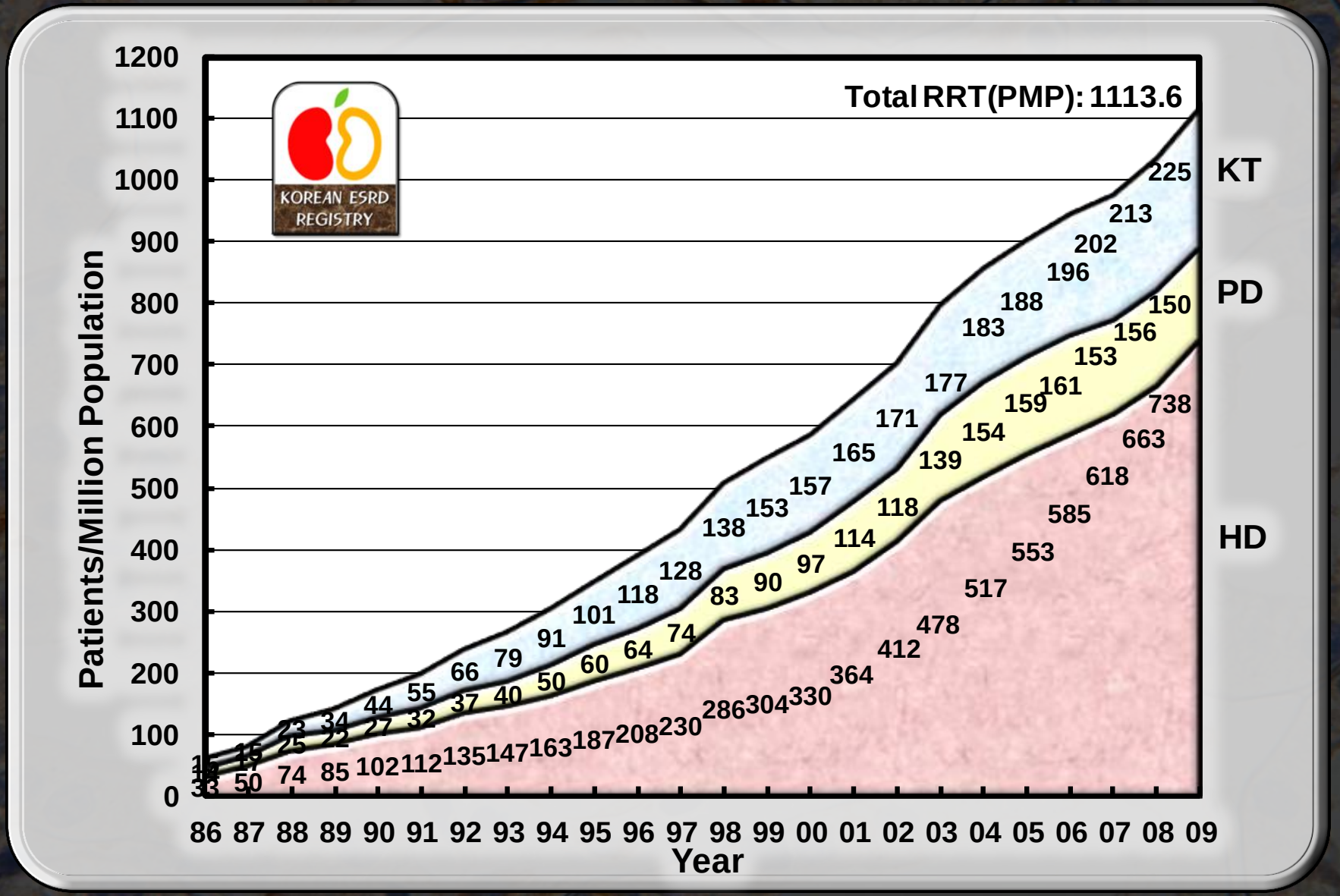
Year	HD		PD		Transplant		Total	
1986	1,335	(32.6)	573	(13.9)	621	(15.1)	2,534	(61.7)
1988	3,012	(74.0)	1,058	(25.2)	982	(23.4)	5,142	(122.7)
1990	4,311	(101.8)	1,130	(26.7)	1,866	(44.1)	7,307	(172.6)
1992	5,890	(135.3)	1,599	(36.7)	2,862	(65.8)	10,351	(237.8)
1994	7,387	(162.7)	2,284	(50.3)	4,116	(90.6)	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)
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)

( ): number of patients per million population, Population in Korea at the end of 2009: 50,643,781.

Patient Number of RRT



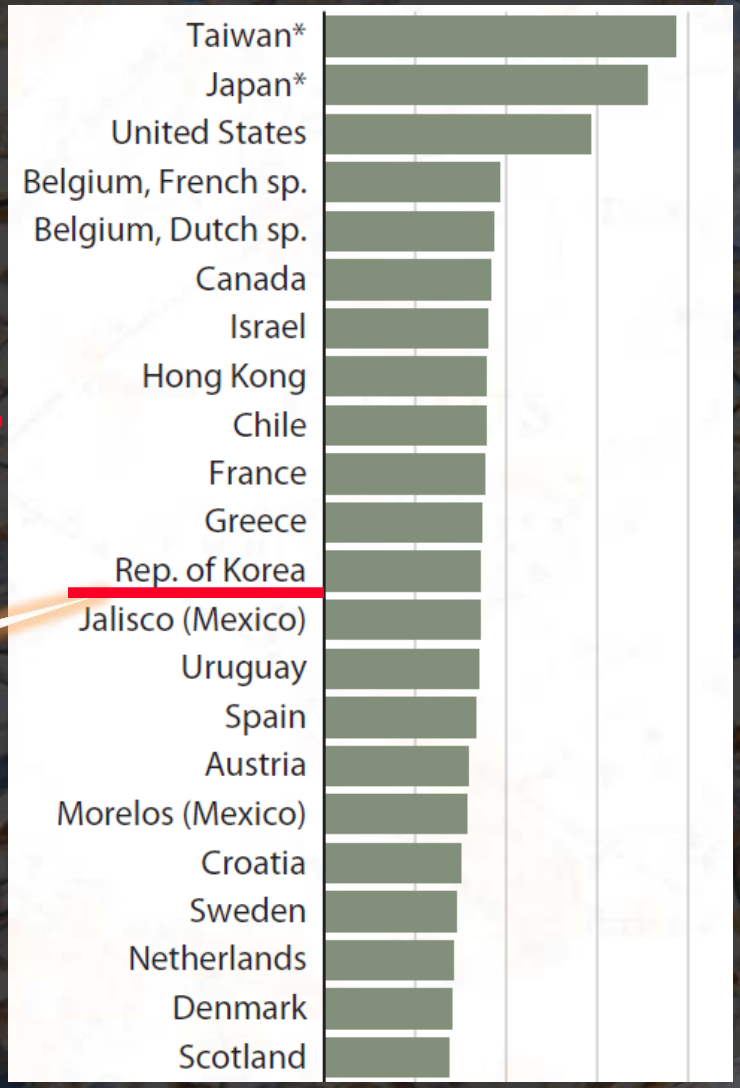
Point Prevalence of RRT

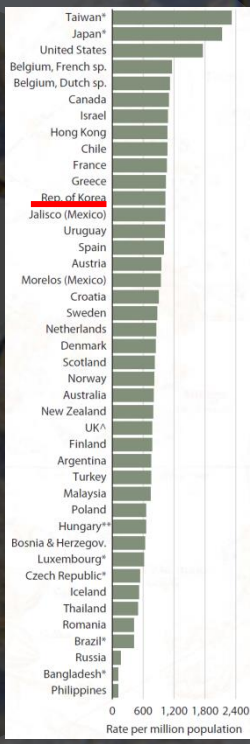


KOREAN ESRD REGISTRY

Prevalence of ESRD

1031.6 PMP
End of 2008





UNITED STATES RENAL DATA SYSTEM
2010 Annual Data Report

U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010.

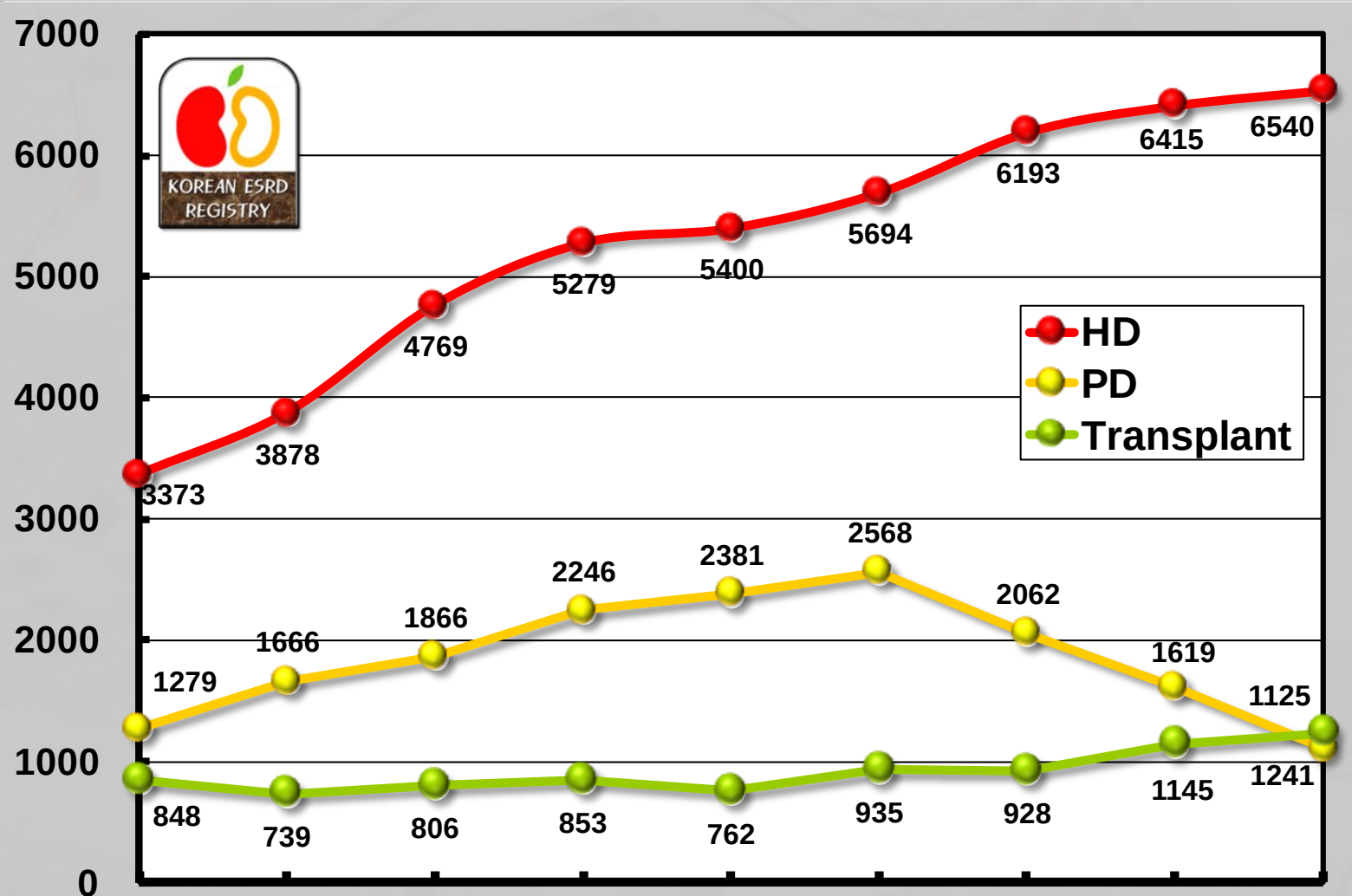
KOREAN ESRD REGISTRY

Number of New RRT Patients

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)
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)

( ): number of patients per million population (Population in Korea at the end of 2009: 50,643,781)

Number of New RRT Patients



KOREAN ESRD REGISTRY

Incidence of ESRD

182.1 PMP
End of 2008

UNITED STATES RENAL DATA SYSTEM
2010 Annual Data Report

U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010.

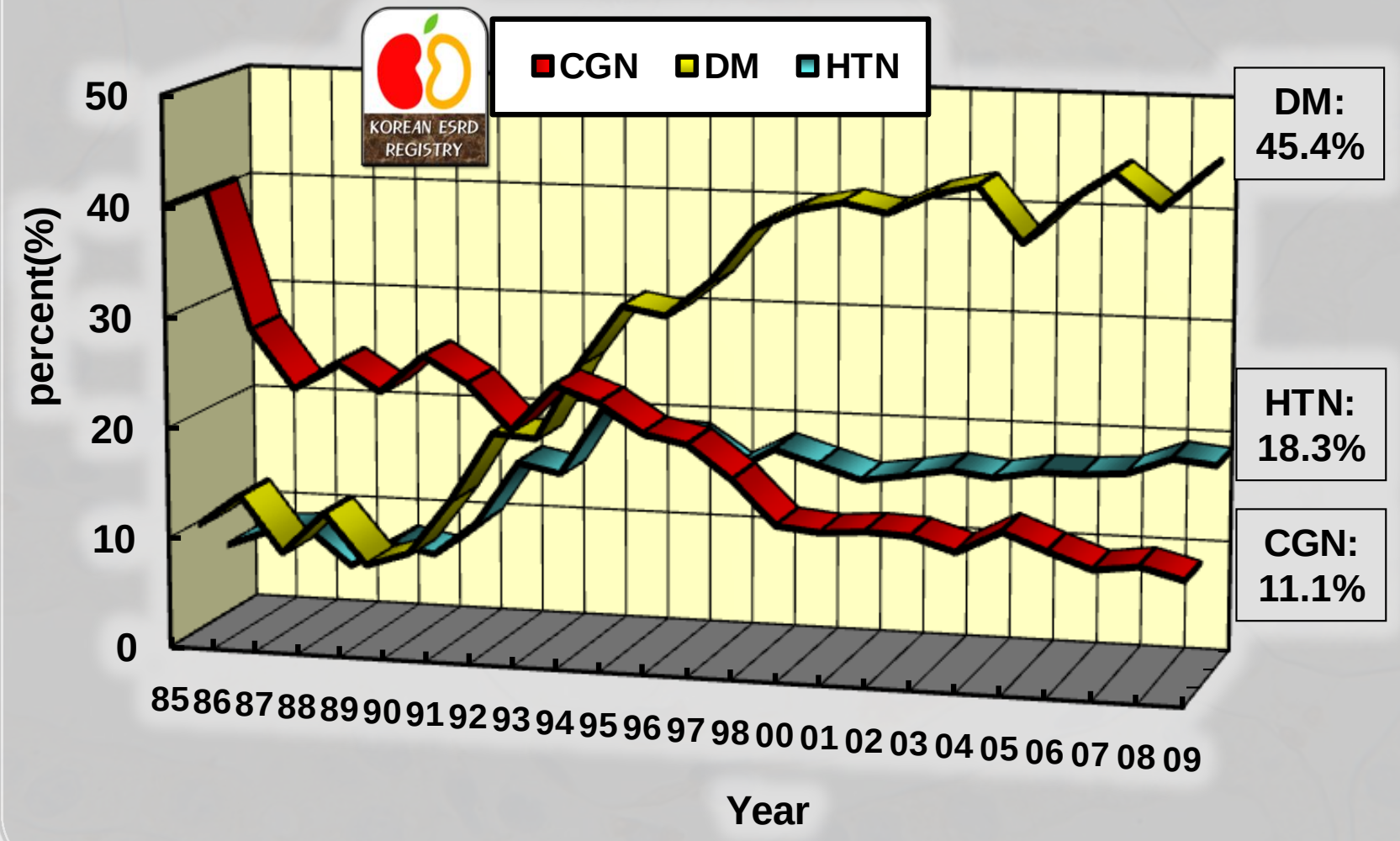
KOREAN ESRD REGISTRY

Causes of ESRD in New Patients

Causes	Percent (%)										
	1992	1994	1996	1998	2000	2002	2004	2006	2007	2008	2009*
Chronic Glomerulonephritis	25.3	25.5	21.6	17.9	14	13.9	12.5	13	11.6	12.1	11.1
Not Histologically confirmed	19.7	20.4	16.7	13.6	10.6	10	8.6	9	8.3	8.2	7.5
Histologically confirmed	5.6	5	4.9	4.3	3.4	3.9	3.9	3.9	3.3	3.8	3.6
Diabetic nephropathy	19.5	26.1	30.8	38.9	40.7	40.7	43.4	42.3	44.9	41.9	45.4
Hypertensive nephrosclerosis	15.4	20.8	18.3	17.8	16.6	16	16.2	16.9	17.2	18.7	18.3
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
Renal tuberculosis	1.1	1.5	1.2	0.5	0.4	0.5	0.3	0.3	0.3	0.2	0.2
Pyelo/interstitial nephritis	1.3	1.1	0.7	1	0.8	0.6	0.6	0.6	0.5	0.5	0.5
Drugs or nephrotoxic agents	1.3	0.1	0.6	0.3	0.3	0.4	0.2	0.3	0.2	0.3	0.3
Lupus nephritis	0.8	0.7	1	0.5	0.9	0.8	0.6	0.6	0.6	0.6	0.6
Gouty nephropathy	0.7	0.7	0.6	0.5	0.7	0.4	0.5	0.3	0.3	0.3	0.3
Hereditary nephropathy	0.3	0.7	0.4	0.2	0.1	0.2	0.3	0.3	0.2	0.3	0.2
Kidney tumor	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.2
Other	4.1	2.7	2.8	3.9	3	5.6	5.9	6	5.1	5.8	5.2
Uncertain	28.6	17.8	15.9	16.6	20.2	19	17.8	17.5	17.2	17.6	16.0

* n = 9,528

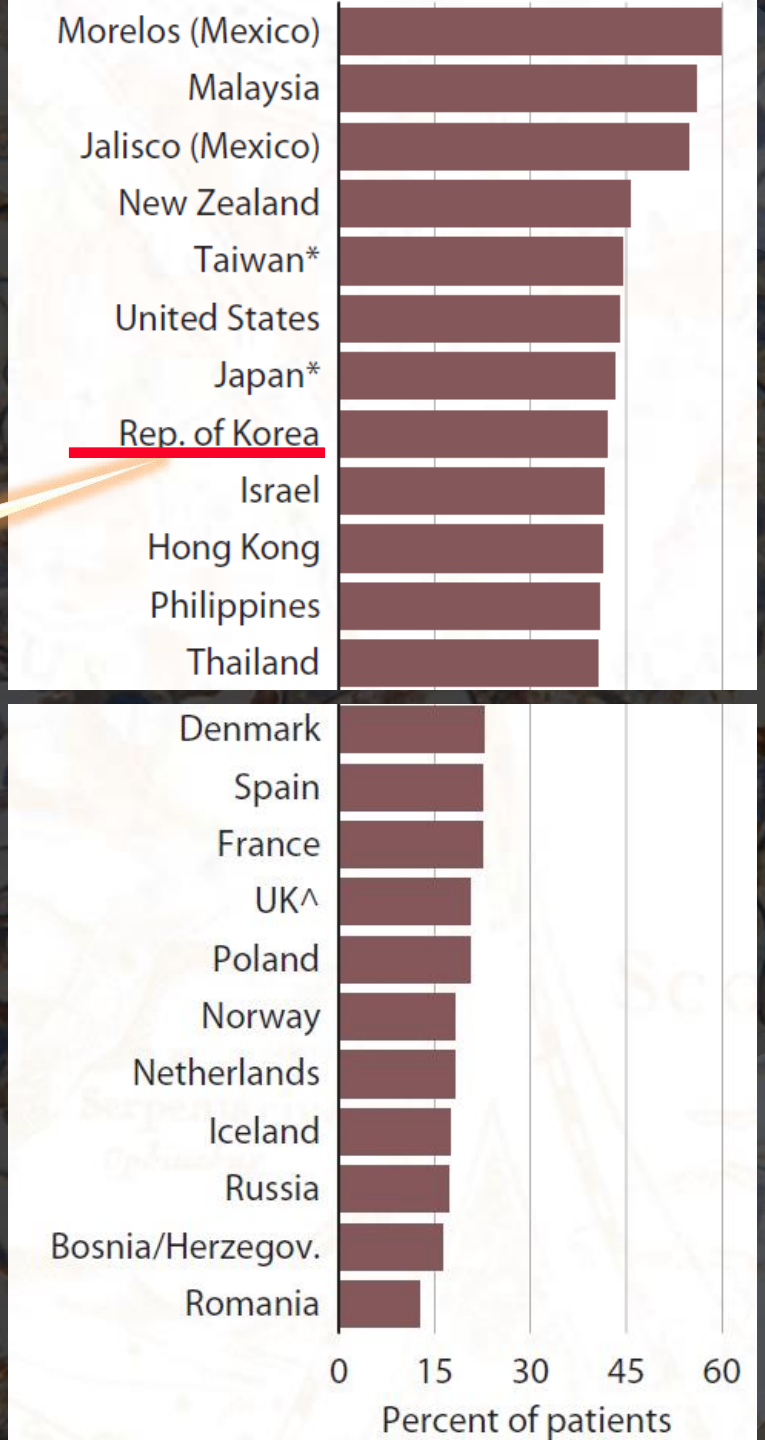
Three Major Causes of ESRD

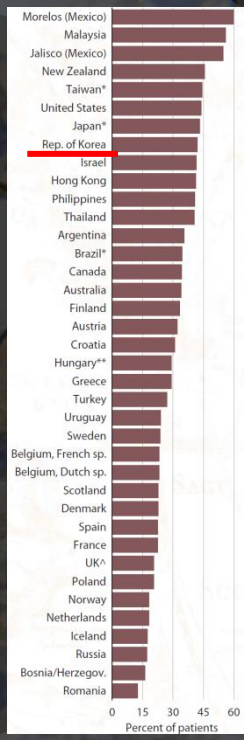


KOREAN ESRD REGISTRY

Diabetic ESRD

41.9%
in 2008

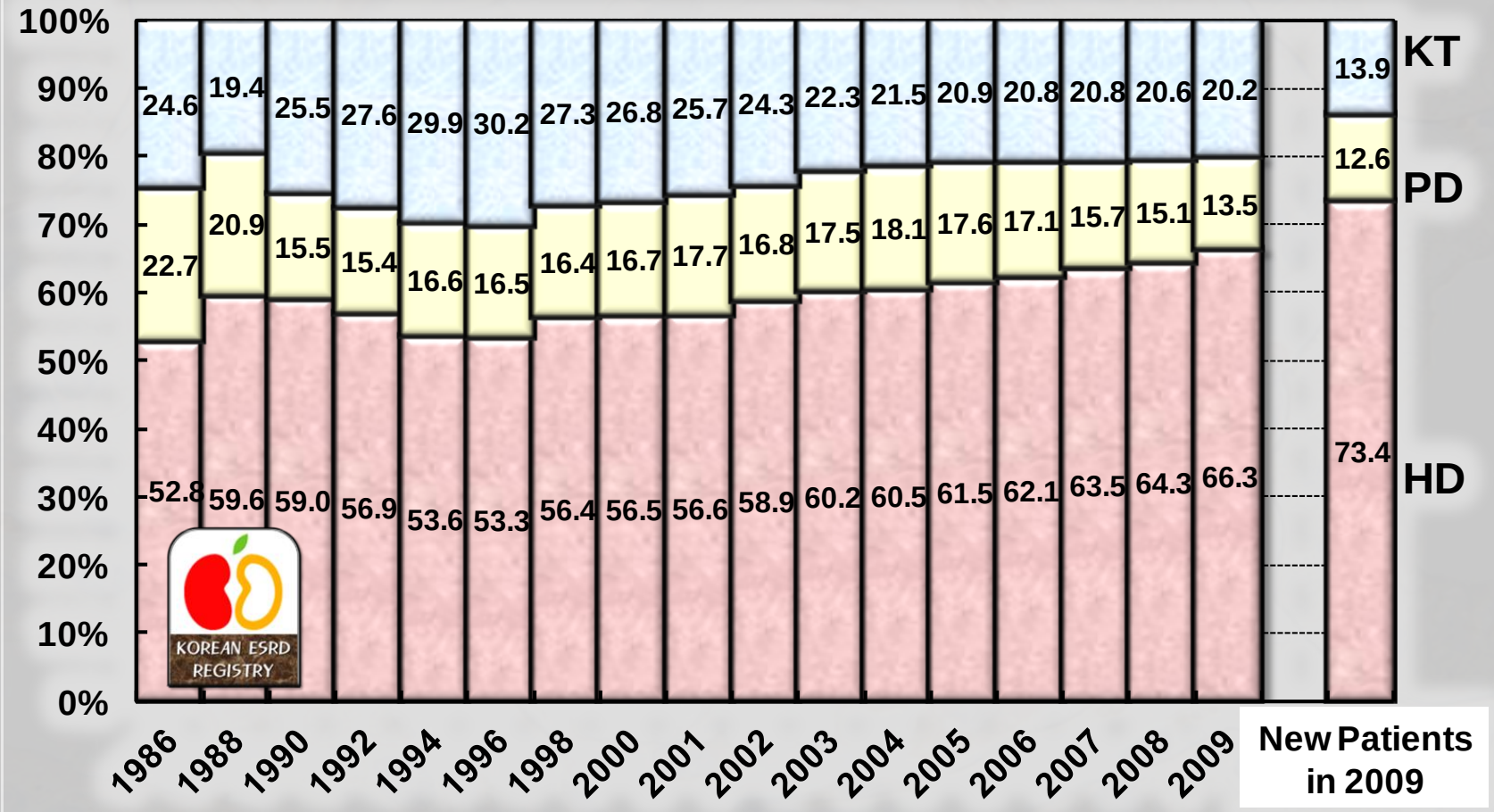




UNITED STATES RENAL DATA SYSTEM
2010 Annual Data Report

U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010.

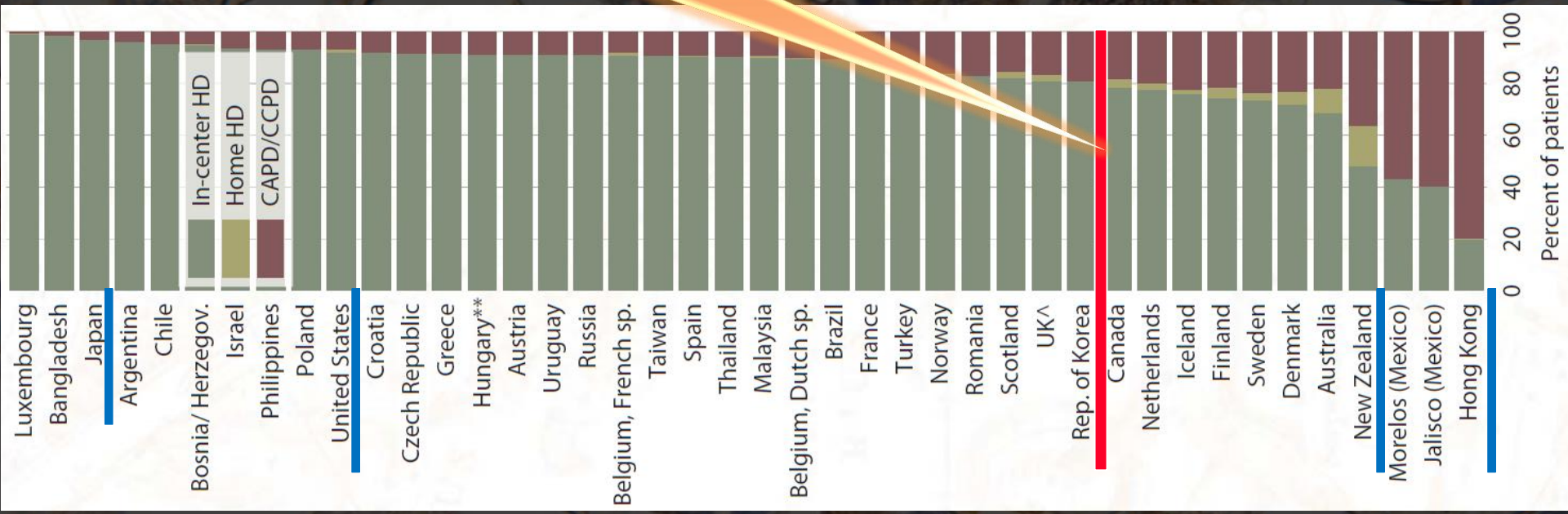
Proportion of RRT Modalities



KOREAN ESRD REGISTRY

Percent Distribution of Dialysis Modalities

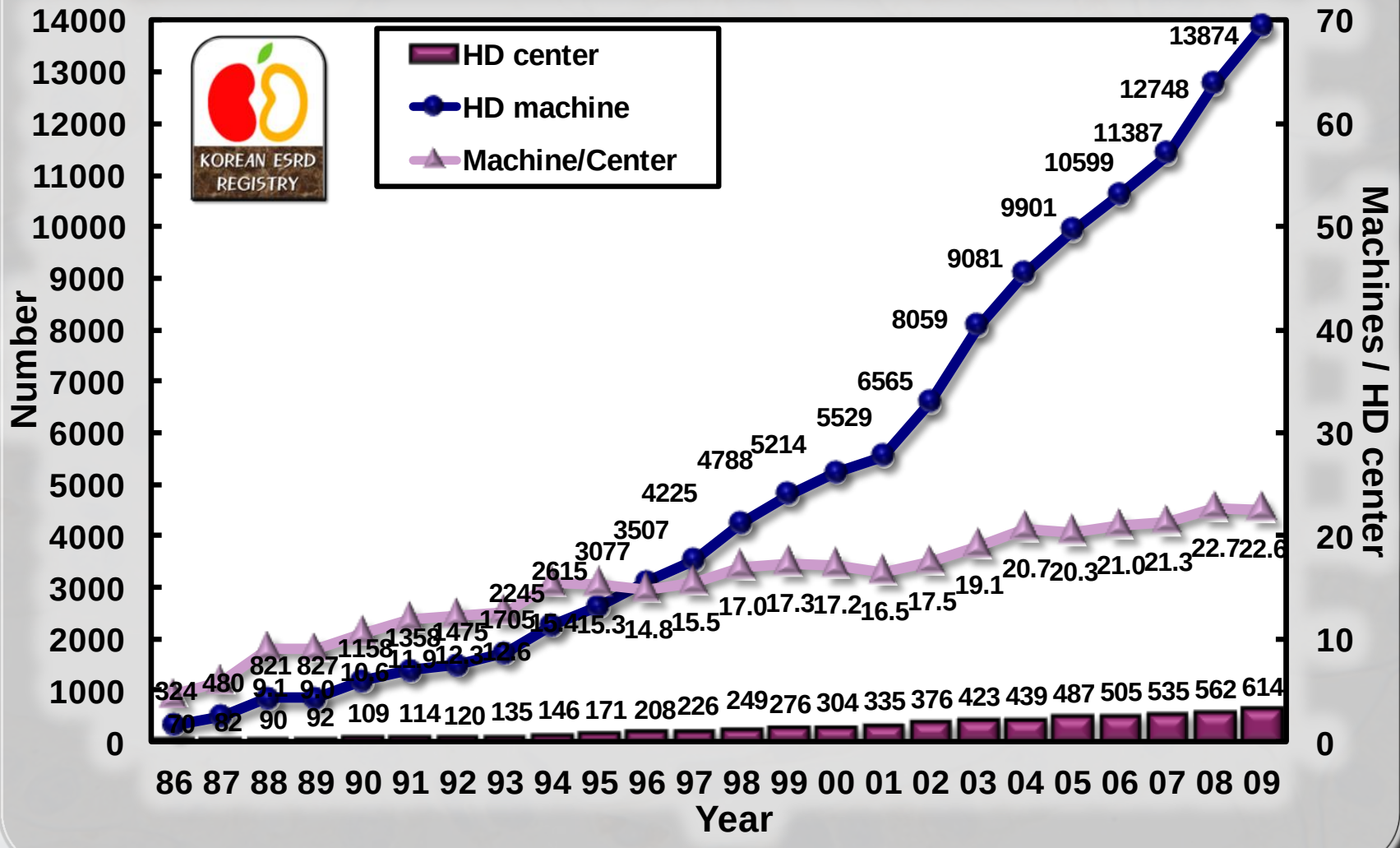
HD:PD = 83.1% : 16.9%
End of 2007



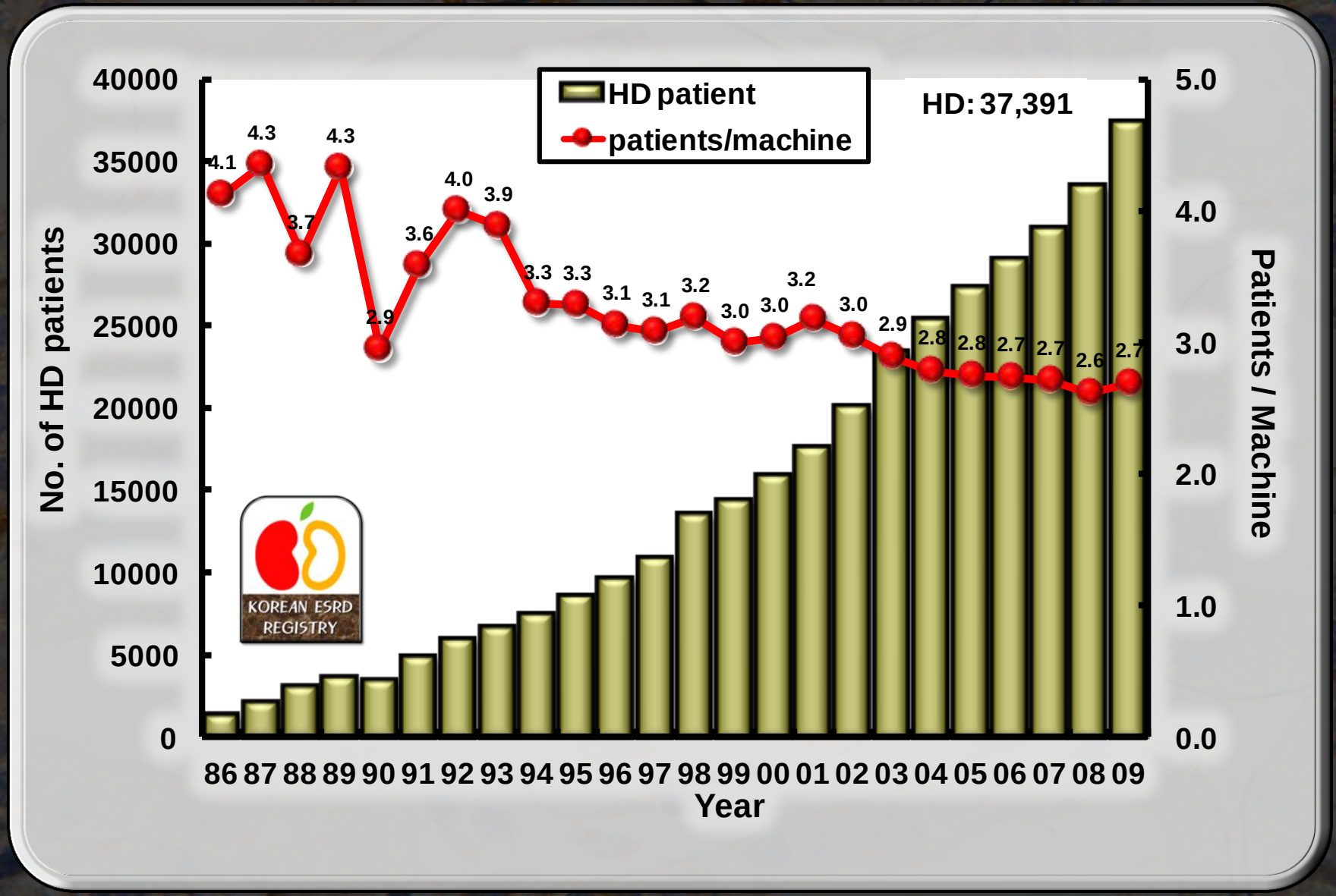
UNITED STATES RENAL DATA SYSTEM
2010 Annual Data Report

U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010.

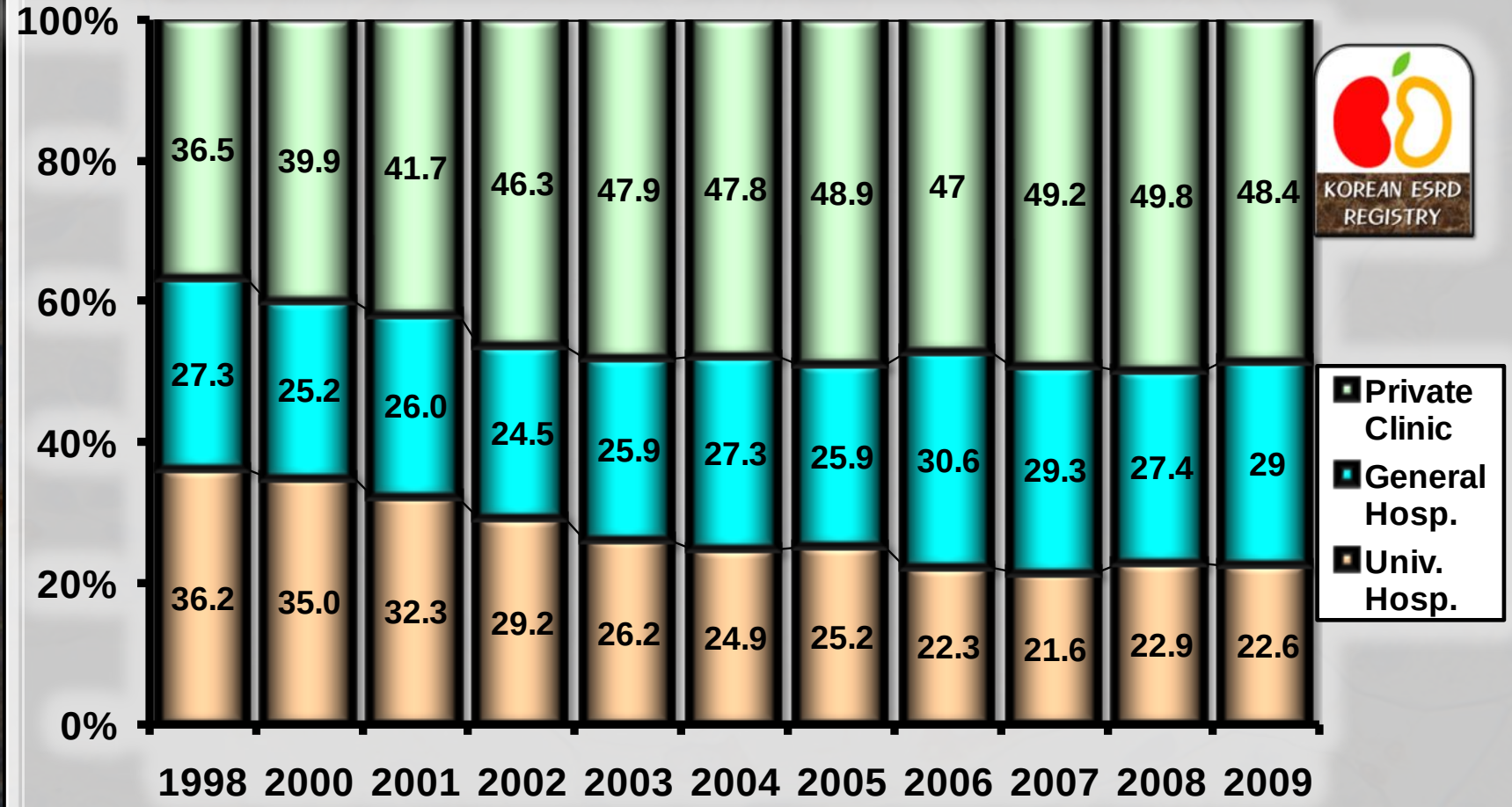
Number of HD Centers & HD Machines



Ratio of HD Machine & HD Patients



HD Pts Proportion of Dialysis Center Type



KOREAN ESRD REGISTRY

행정구역별 투석환자 및 혈액투석기 분포

(2009년말 12월 기준)

	HD pts	PD pts	Total Dialysis pts	Dialysis pts. / Million pop.	Dialysis Centers	HD machines	HD pts./ HD machine
서울 Seoul	8,856	2,469	11,325	1,082	138	3,144	2.8
부산 Busan	2,948	862	3,810	1,066	44	1,112	2.7
대구 Daegu	1,979	754	2,733	1,089	32	718	2.8
인천 Incheon	1,723	403	2,126	771	22	567	3.0
광주 Gwangju	1,452	238	1,690	1,169	30	638	2.3
대전 Daejeon	1,243	261	1,504	1,004	17	501	2.5
울산 Ulsan	659	69	728	644	13	275	2.4
경기 Gyeonggi	7,626	1,257	8,883	757	127	2,966	2.6
강원 Gangwon	1,157	323	1,480	970	23	477	2.4
충북 Chungbuk	1,252	113	1,365	881	22	450	2.8
충남 Chungnam	1,504	94	1,598	770	27	517	2.9
전북 Jeonbuk	1,567	146	1,713	914	18	449	3.5
전남 Jeonnam	1,088	97	1,185	613	25	503	2.2
경북 Gyeongbuk	1,551	185	1,736	642	28	506	3.1
경남 Gyeongnam	2,251	282	2,533	767	37	837	2.7
제주 Jeju	535	65	600	1,056	11	214	2.5
Total	37,391	7,618	45,009	889	614	13,874	2.7

KOREAN ESRD REGISTRY

생활권역별 투석환자 및 혈액투석기 분포

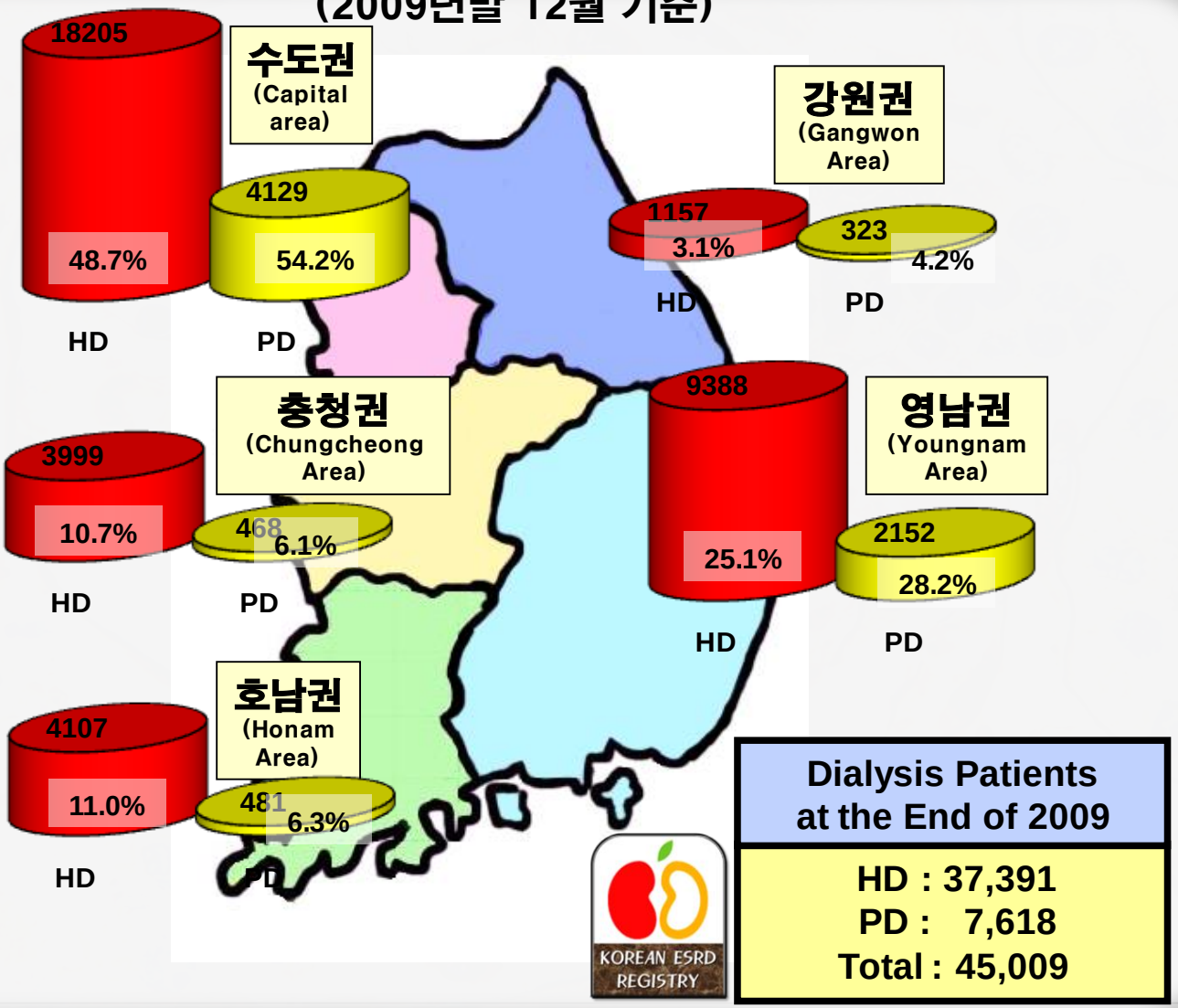
(2009년말 12월 기준)

	Population (%)	HD patients	PD patients	Total Dialysis patients	Dialysis pts /Million pop.	Dialysis centers	Dialysis machine	HD pts / HD machine
수도권 (Capital area)	24,949,900	18,205	4,129	22,334	895	287	6,677	2.7
(Seoul, Incheon, Gyeonggi)	49.3%	48.7%	54.2%	49.6%		46.7%	48.1%	
충청권 (Chungchung)	5,124,040	3,999	468	4,467	872	66	1,468	2.7
(Daejeon, Chungnam, Chungbuk)	10.1%	10.7%	6.1%	9.9%		10.7%	10.6%	
호남권 (Honam)	5,254,408	4,107	481	4,588	873	73	1,590	2.6
(Gwangju, Jeonnam, Jeonbuk)	10.4%	11.0%	6.3%	10.2%		11.9%	11.5%	
영남권 (Youngnam)	13,221,978	9,388	2,152	11,540	873	154	3,448	2.7
(Busan, Daegu, Gyeongnam, Gyeongbuk, Ulsan)	26.1%	25.1%	28.2%	25.6%		25.1%	24.9%	
강원권 (Gangwon)	1,525,542	1,157	323	1,480	970	23	477	2.4
	3.0%	3.1%	4.2%	3.3%		3.7%	3.4%	
Total	50,643,781	37,391	7,618	45,009	889	614	13,874	2.7

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

생활권역별 투석환자 및 혈액투석기 분포

(2009년말 12월 기준)



Dialysis Patients at the End of 2009
HD : 37,391
PD : 7,618
Total : 45,009

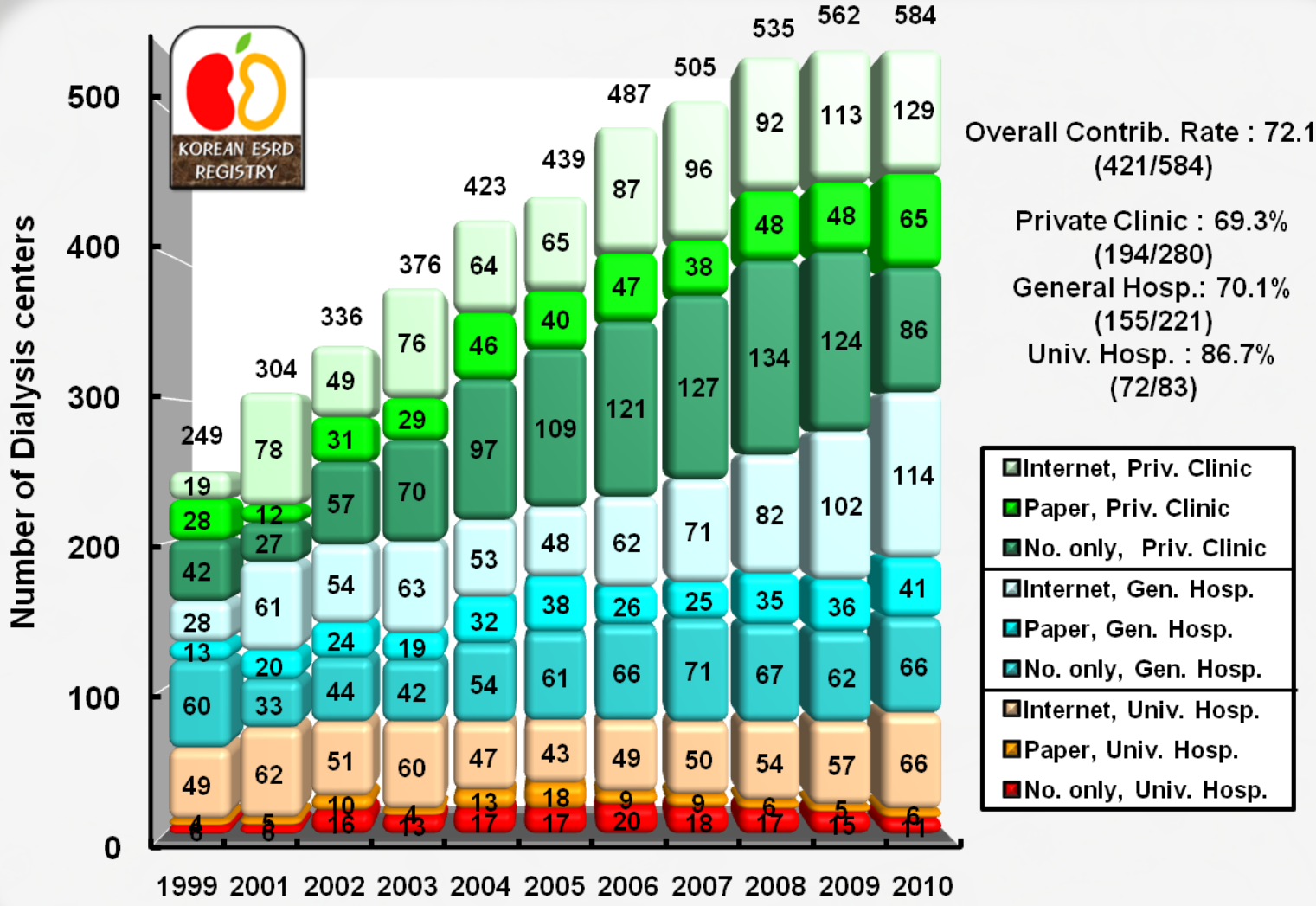
KOREAN ESRD REGISTRY

등록사업에 참여한 의료기관 수 및 응답률

	Dialysis centers*	Internet Input	Paper data	Total contributed center	Contributing rate (%)
서울 Seoul	132	77	24	101	76.5
부산 Busan	41	22	4	26	63.4
대구 Daegu	30	14	4	18	60.0
인천 Incheon	19	7	6	13	68.4
광주 Gwangju	29	16	6	22	75.9
대전 Daejeon	12	10	0	10	83.3
울산 Ulsan	13	6	4	10	76.9
경기 Gyeonggi	120	55	23	78	65.0
강원 Gangwon	23	9	10	19	82.6
충북 Chungbuk	21	10	8	18	85.7
충남 Chungnam	26	14	5	19	73.1
전북 Jeonbuk	18	9	2	11	61.1
전남 Jeonnam	24	11	3	14	58.3
경북 Gyeongbuk	28	15	6	21	75.0
경남 Gyeongnam	39	27	6	33	84.6
제주 Jeju	9	7	1	8	88.9
Total	584	309	112	421	72.1

* 투석의료기관에서 비윤리 의료기관(약30개소)은 제외함.

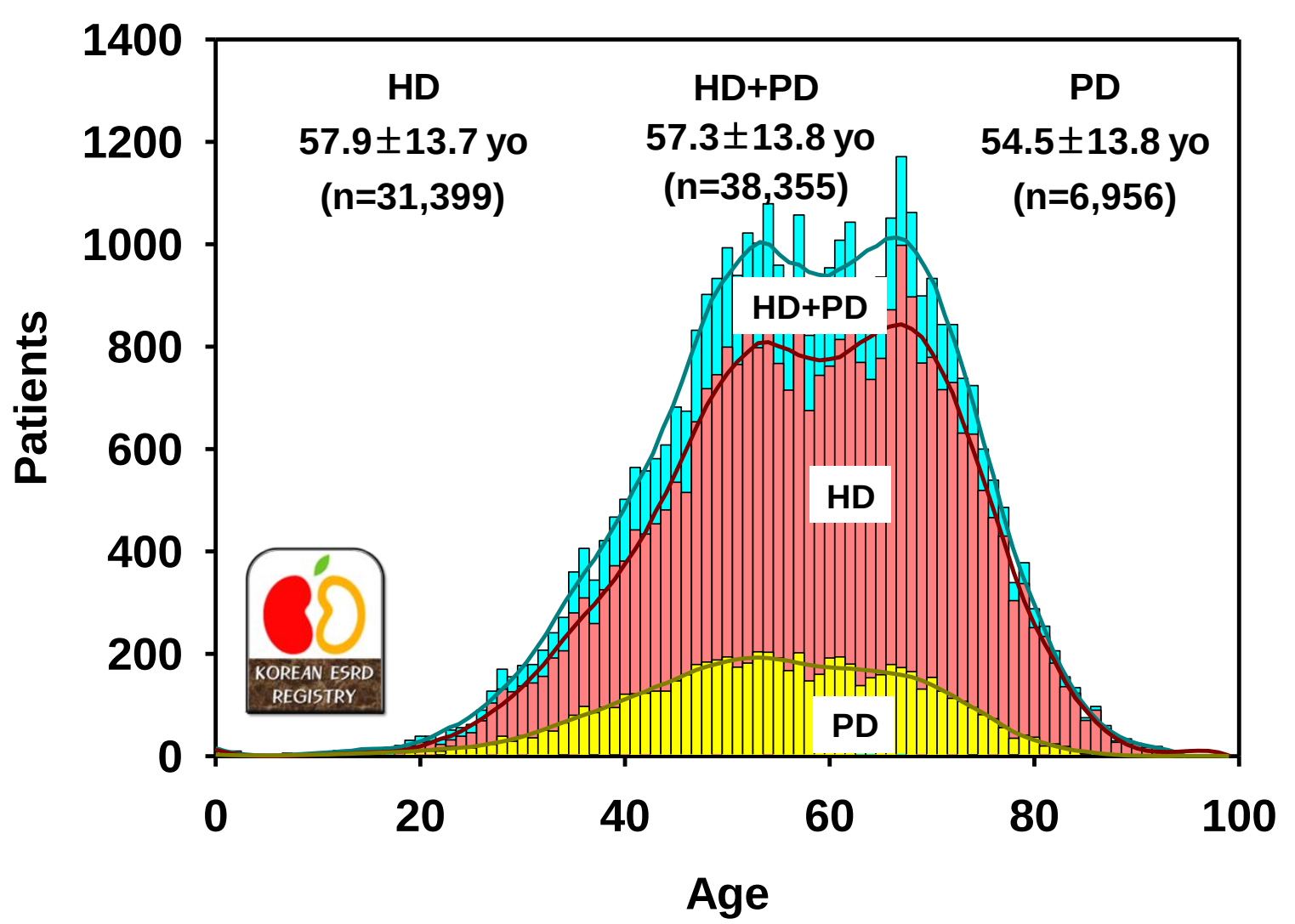
의료기관의 증가와 의료기관별 등록률



Gender Ratio of Dialysis Patients

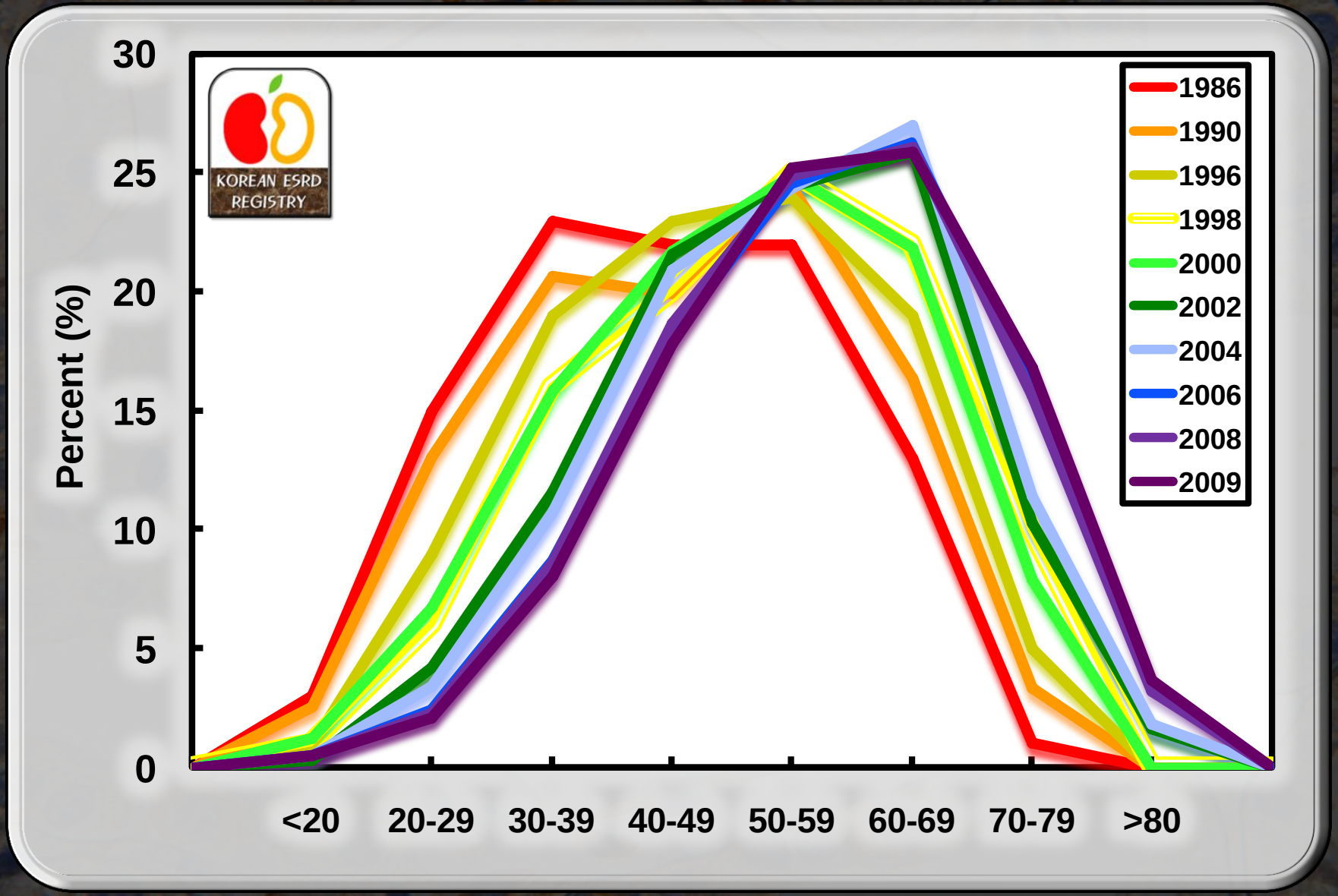
Oct. 2010

Age Distribution of Dialysis Patients

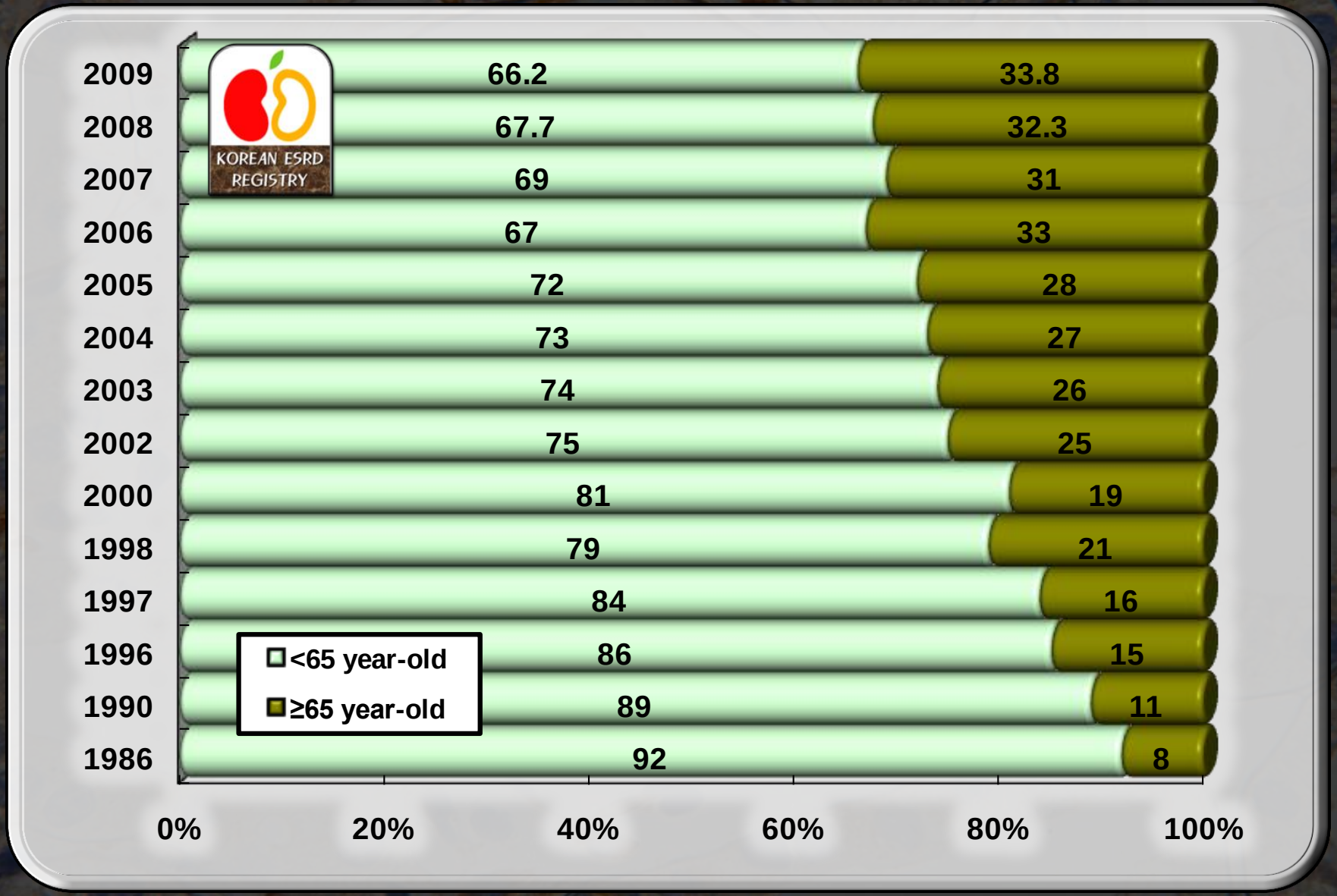


KOREAN ESRD REGISTRY

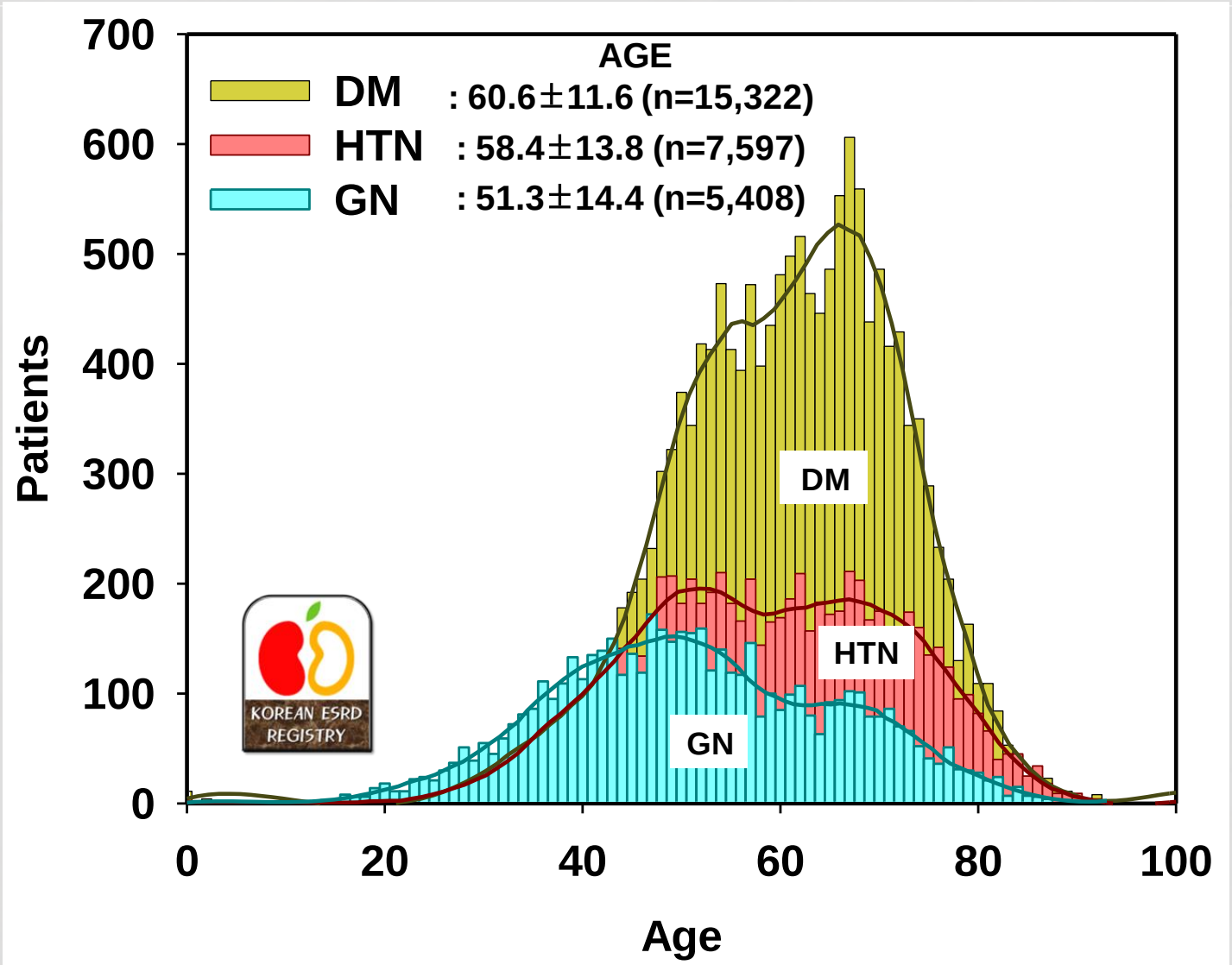
Age Distribution of HD Pts according to Year



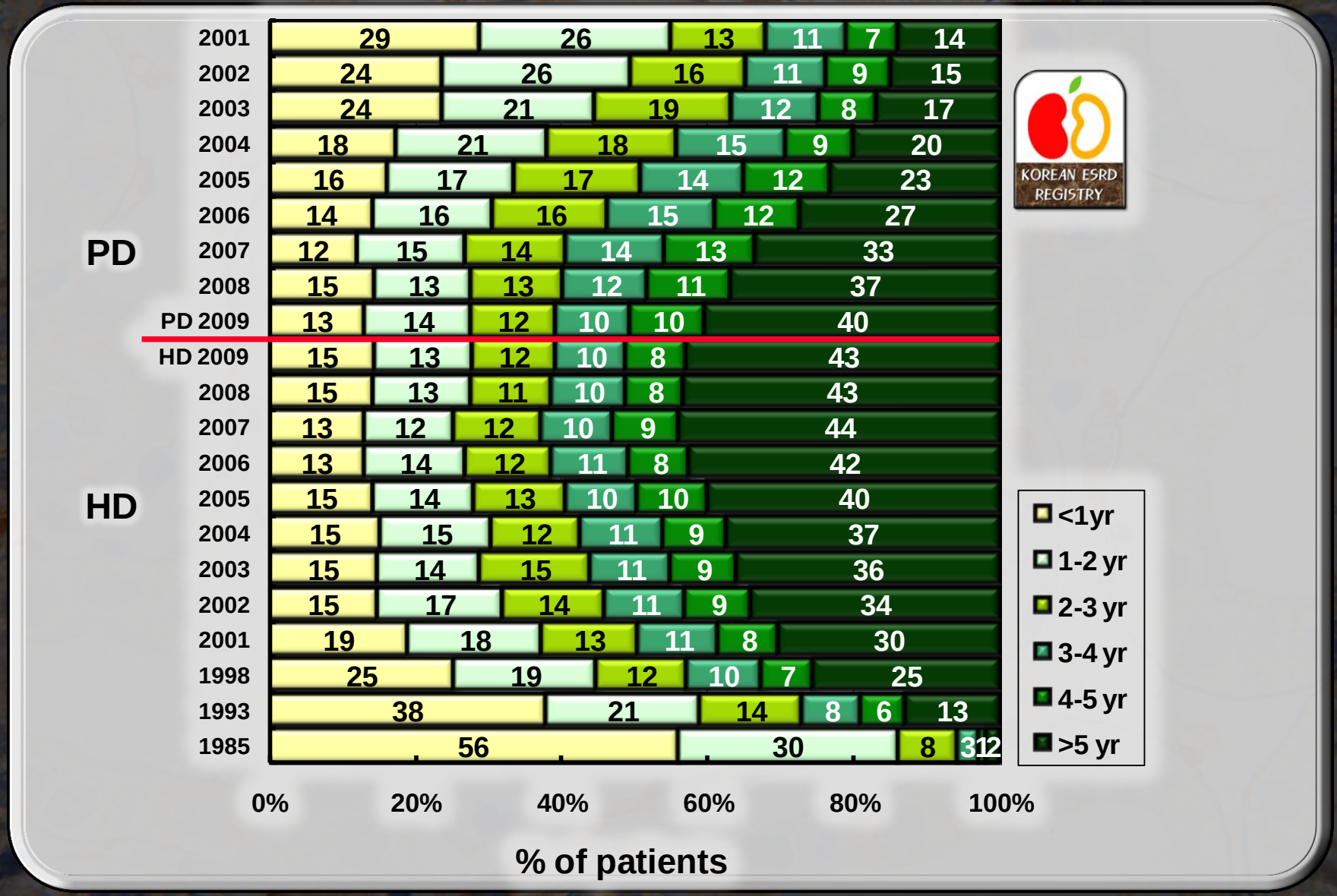
Percent of Elderly Dialysis Patients



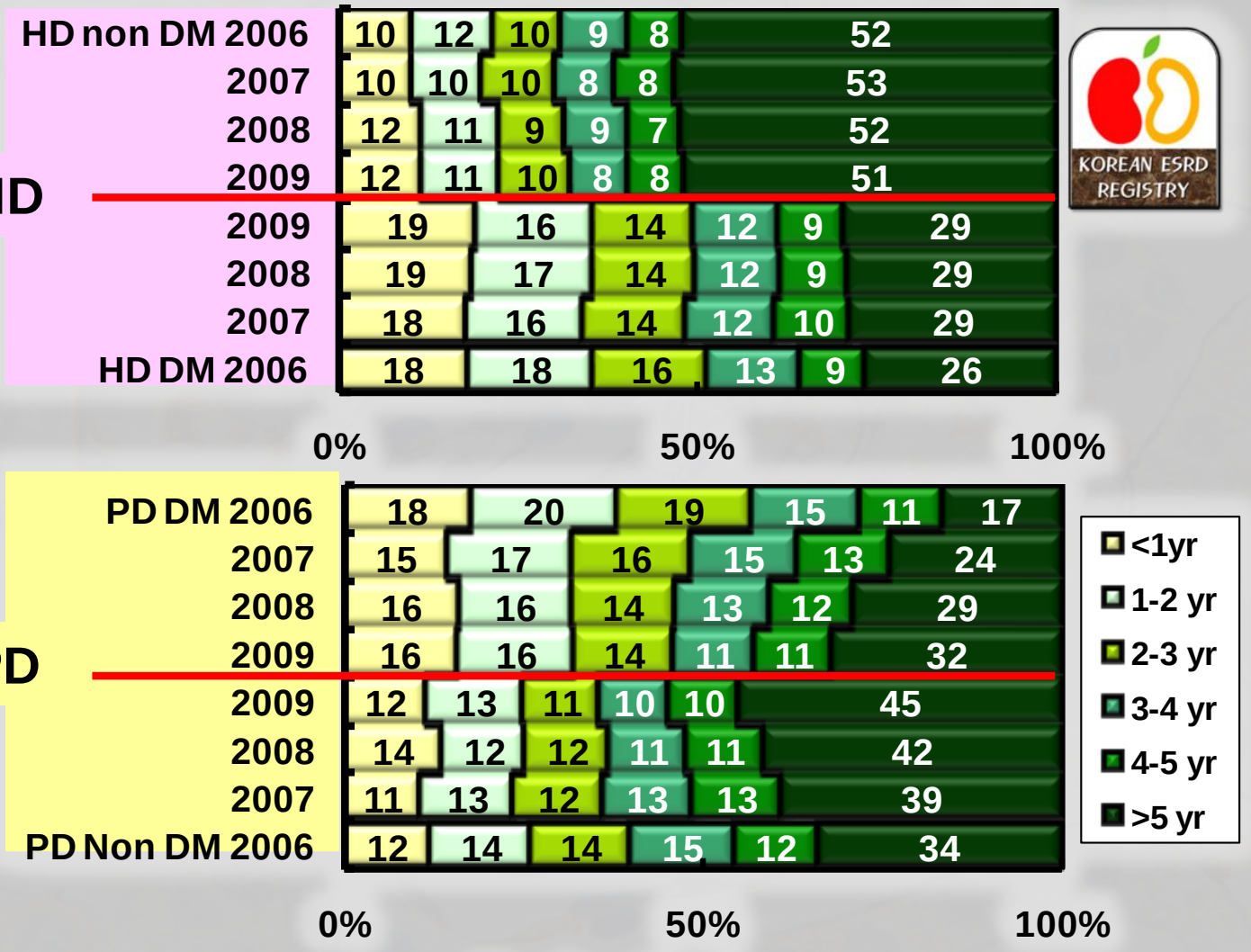
Age Distribution according to ESRD Causes



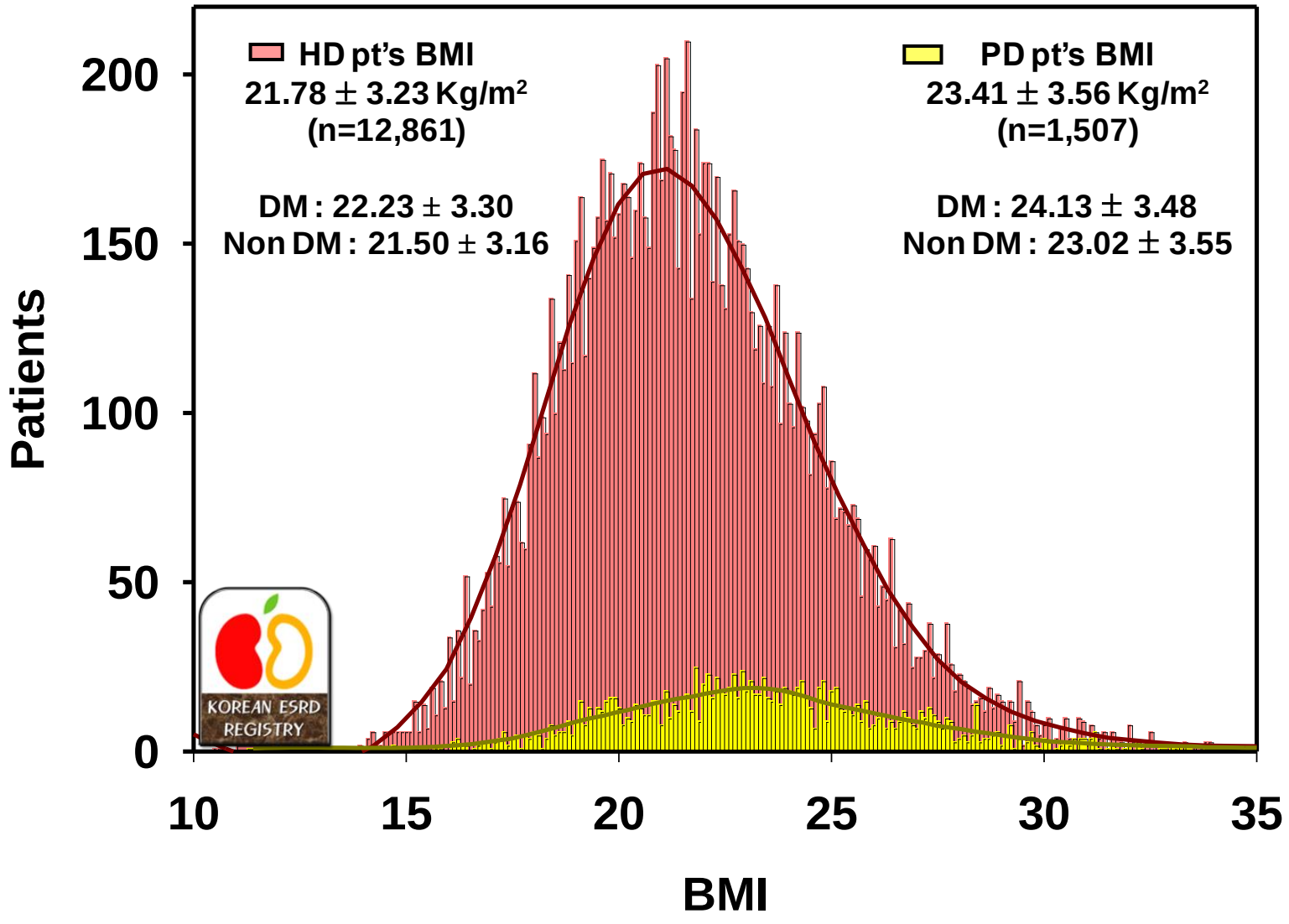
Duration of Dialysis Maintenance



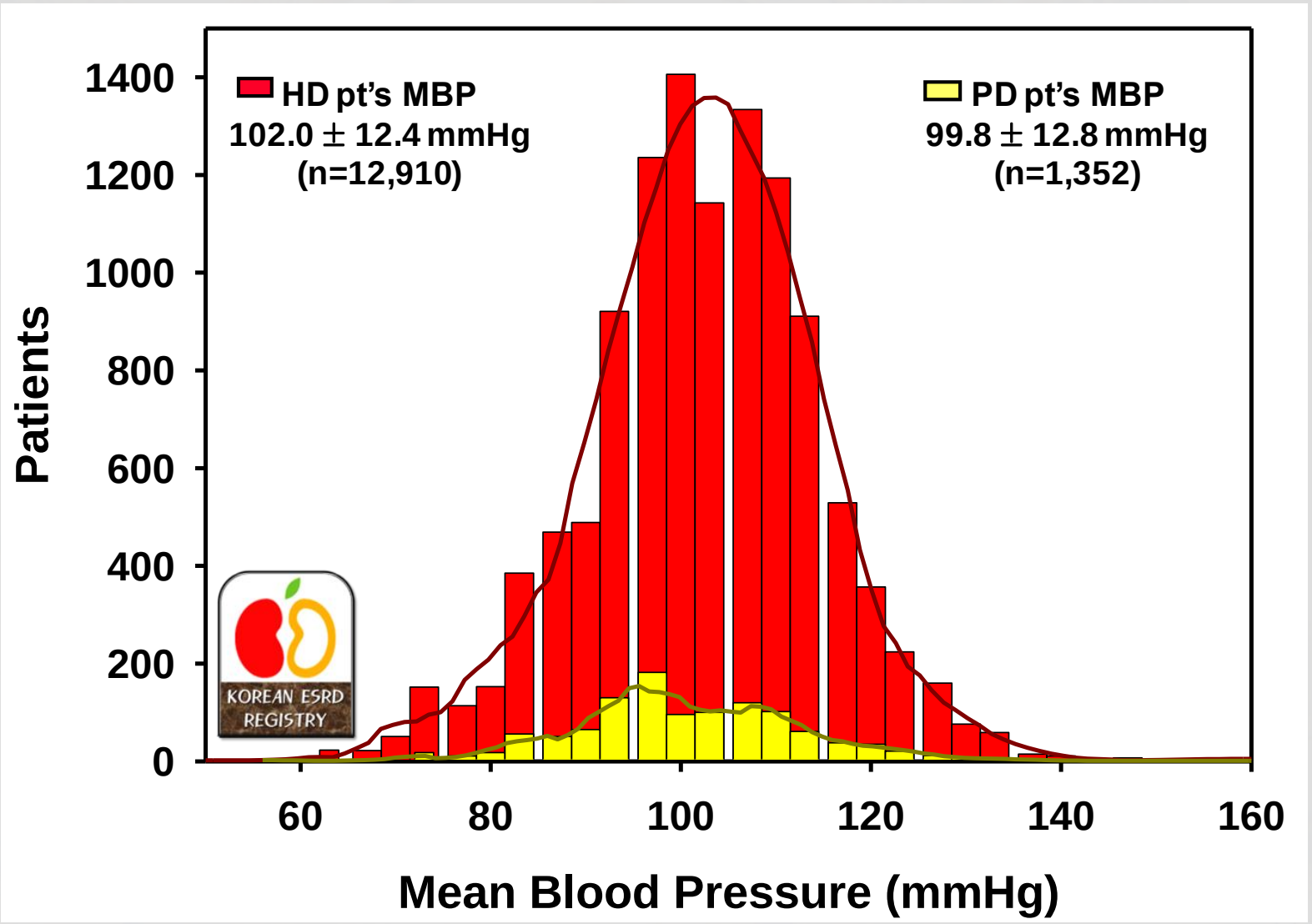
Duration of Dialysis : DM & Non-DM



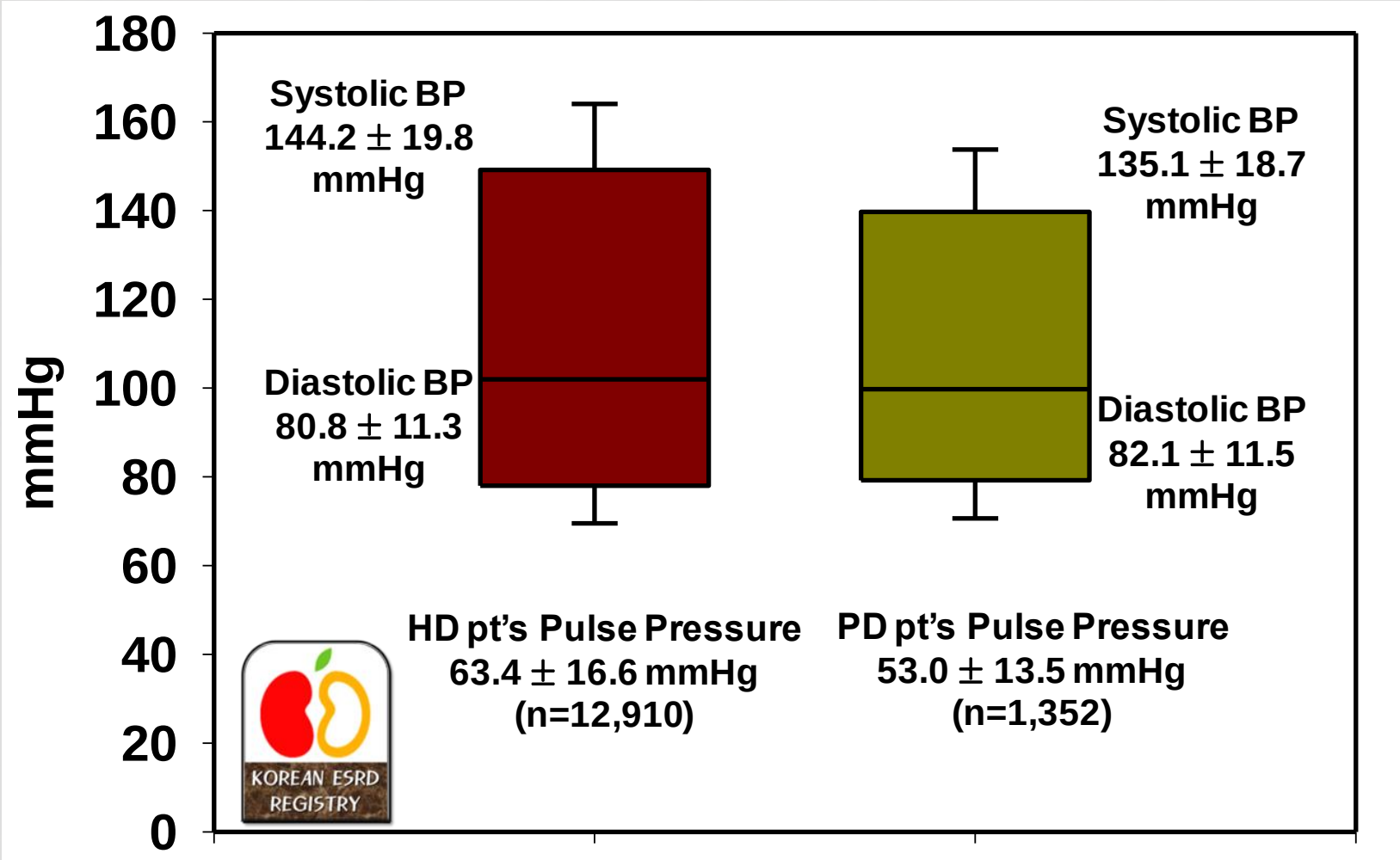
Body Mass Index : HD & PD



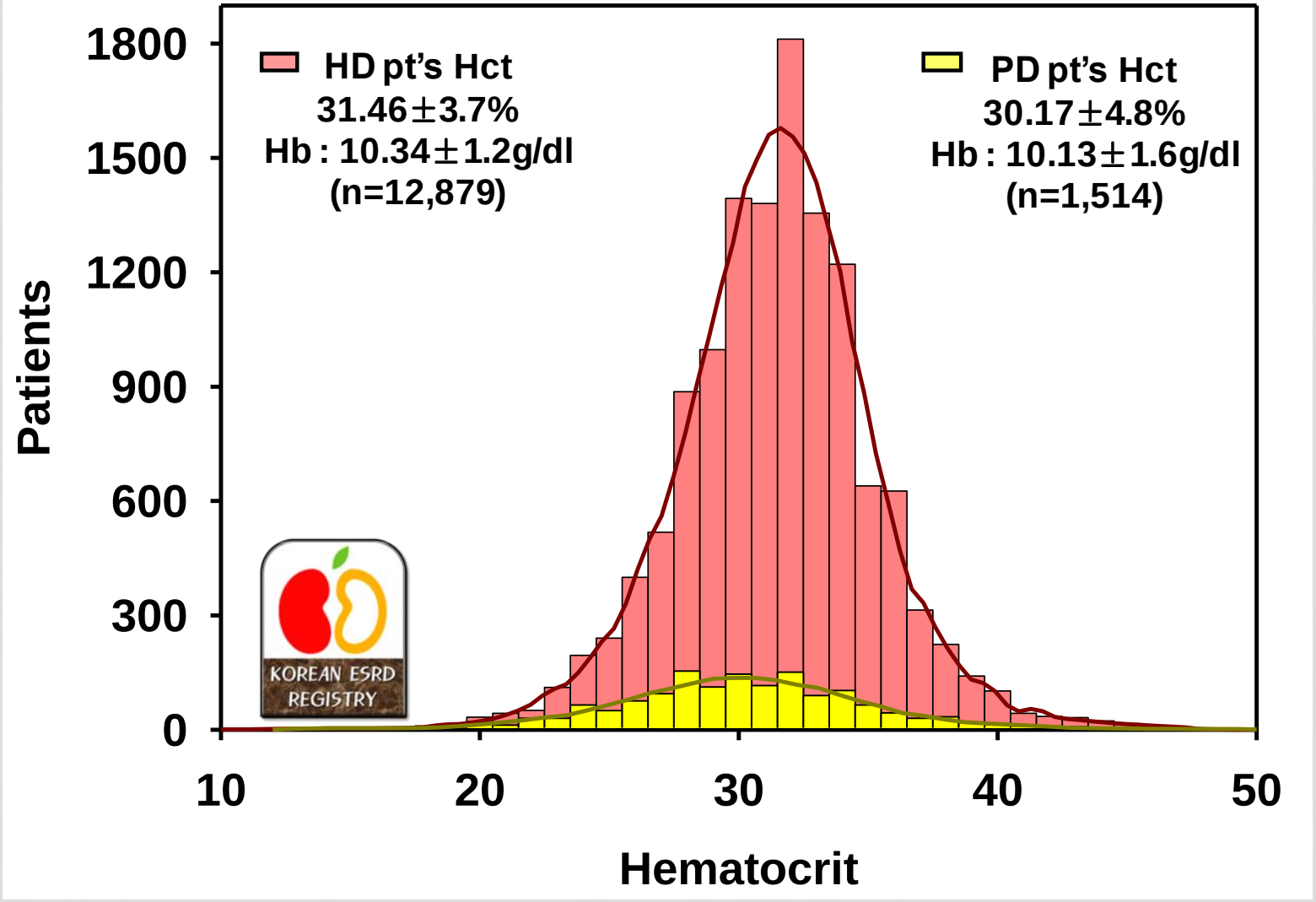
Mean Blood Pressure : HD & PD



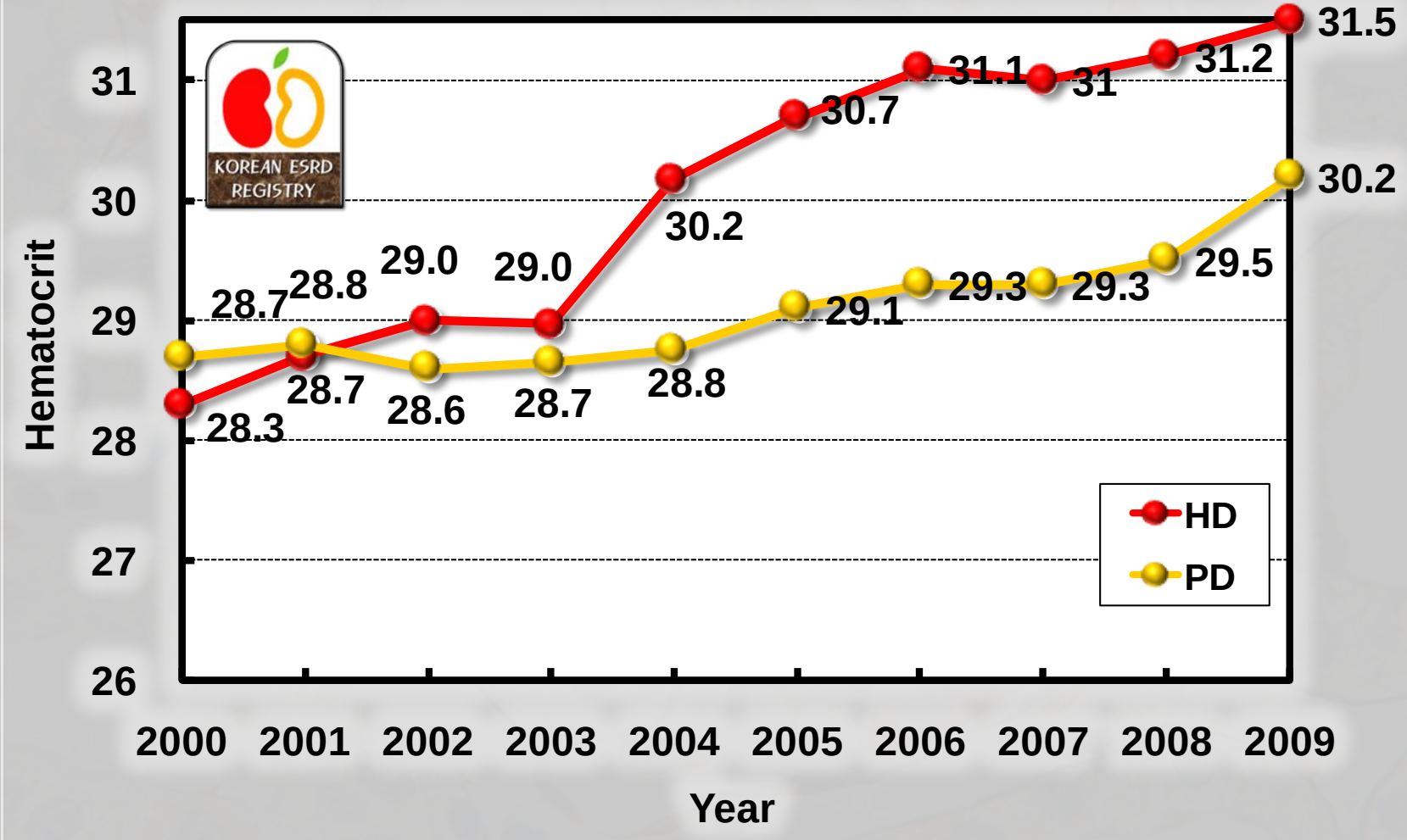
Pulse Pressure : HD & PD



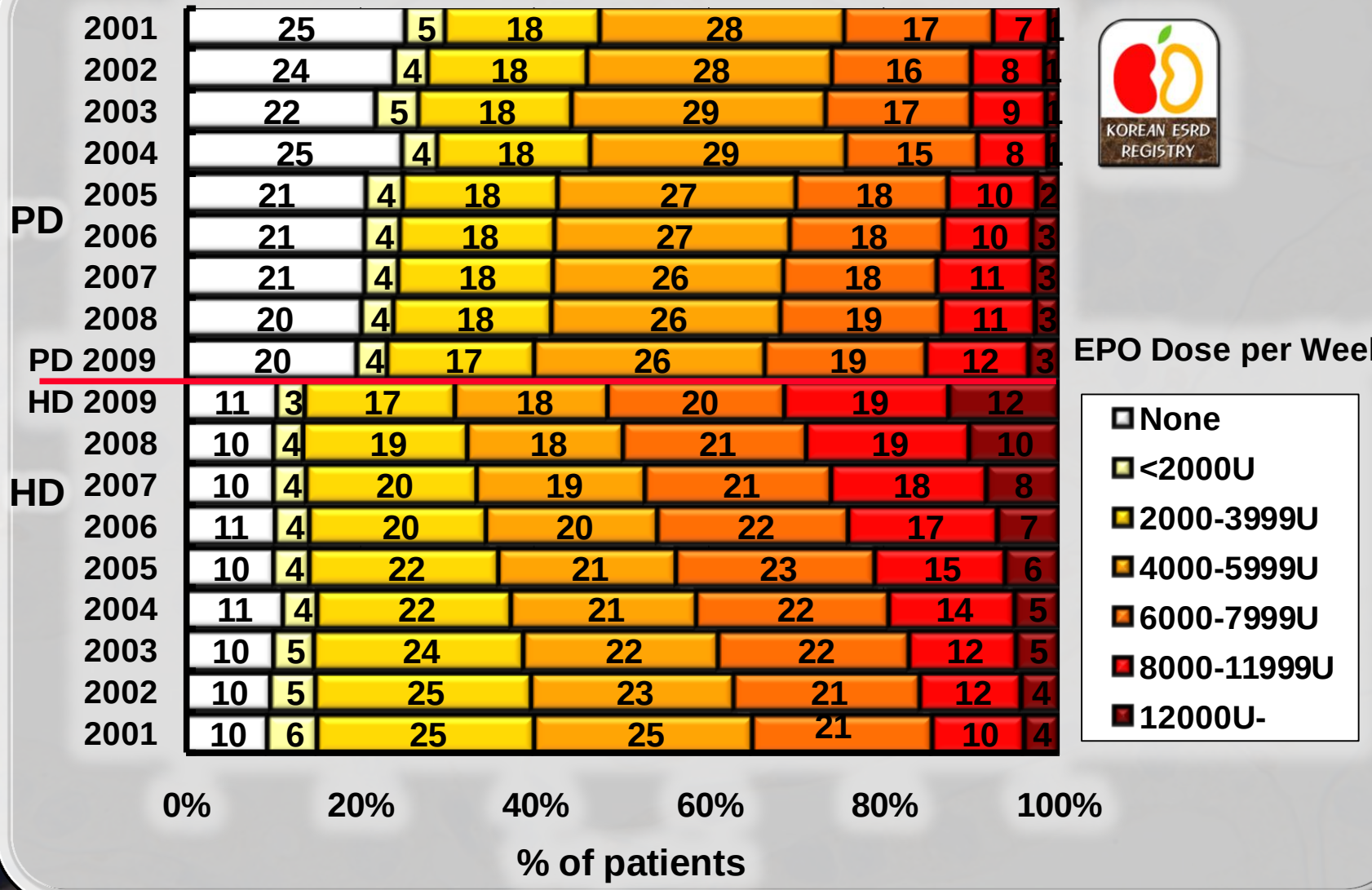
Hematocrit : HD & PD



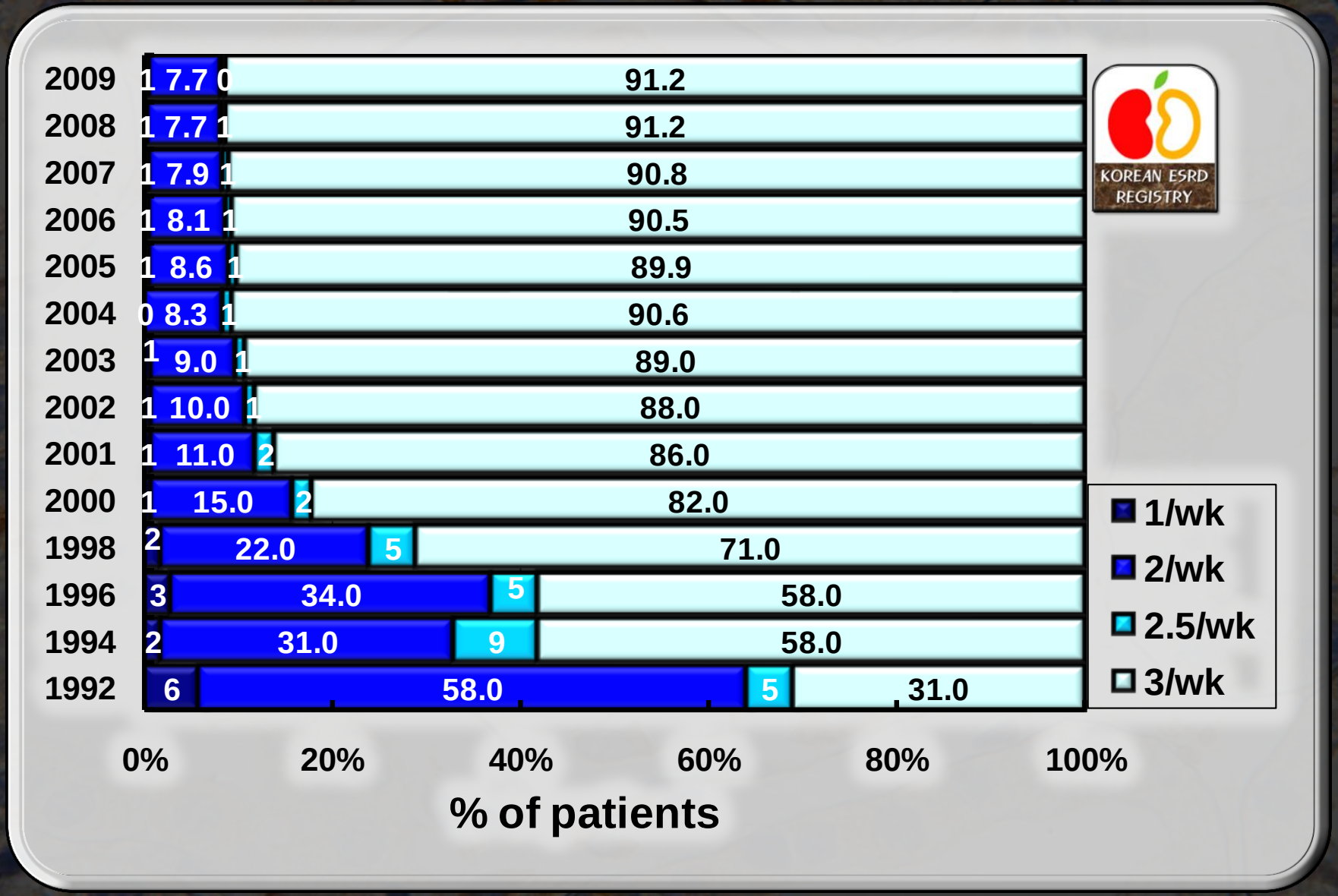
Change of Hematocrit



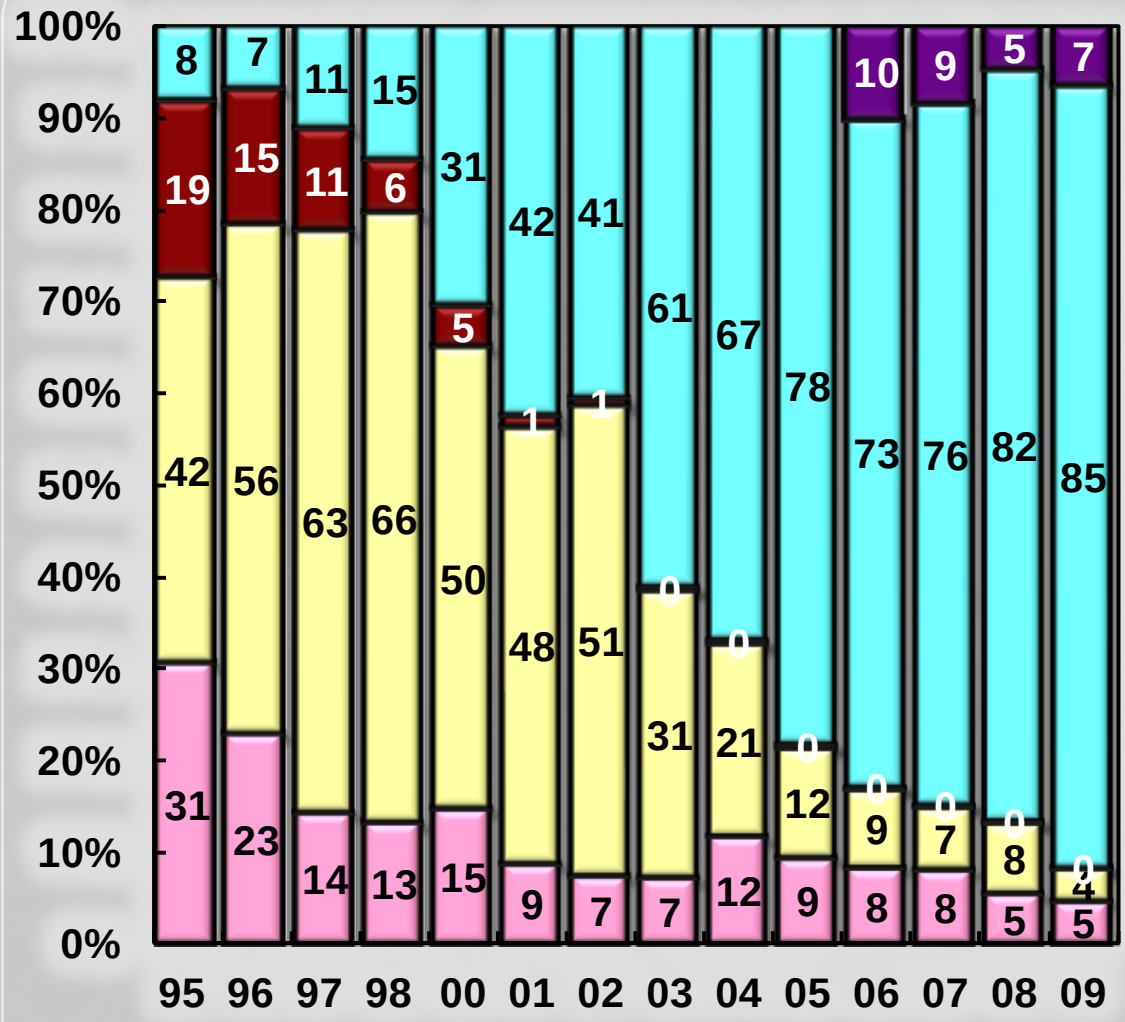
Erythropoietin Doses

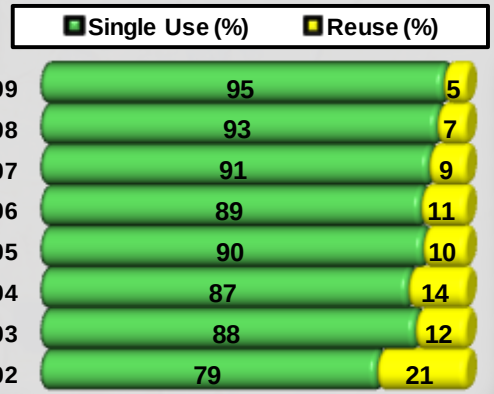


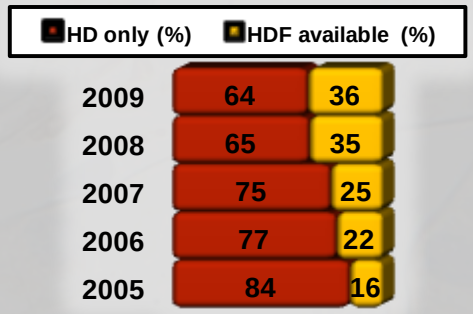
Frequency of HD per Week



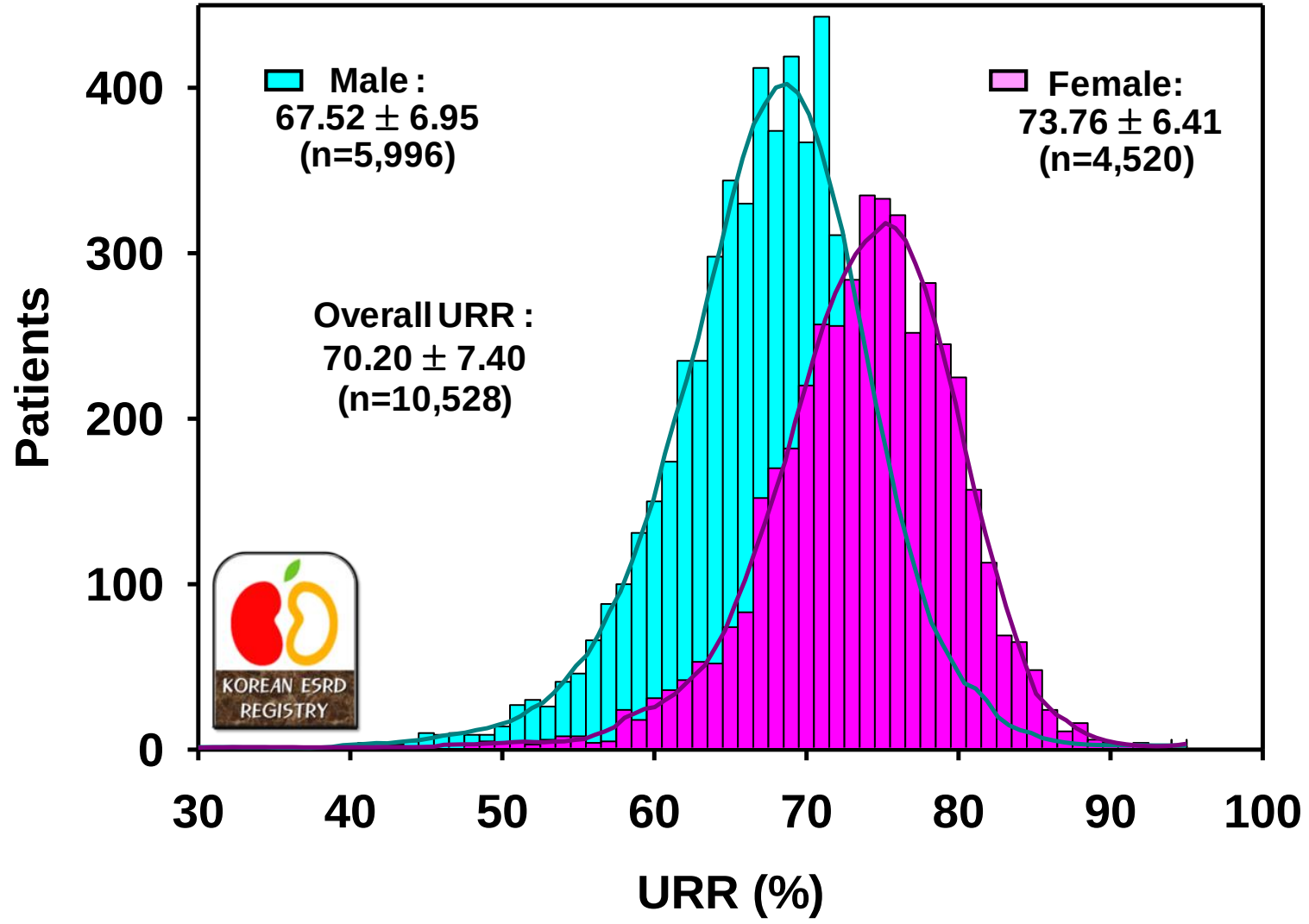
HD Dialyser


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
95 96 97 98 00 01 02 03 04 05 06 07 08 09
8 7 11 15 31 42 41 61 67 78 10 9 5 7
19 15 11 6 5 1 1 0 0 0 0 0 0 0
42 56 63 66 50 48 51 31 21 12 9 7 8 4
31 23 14 13 15 9 7 7 12 9 8 8 5 5
Polyamide
Polysulfone
Cuprophan
Hemophan
Cellulose

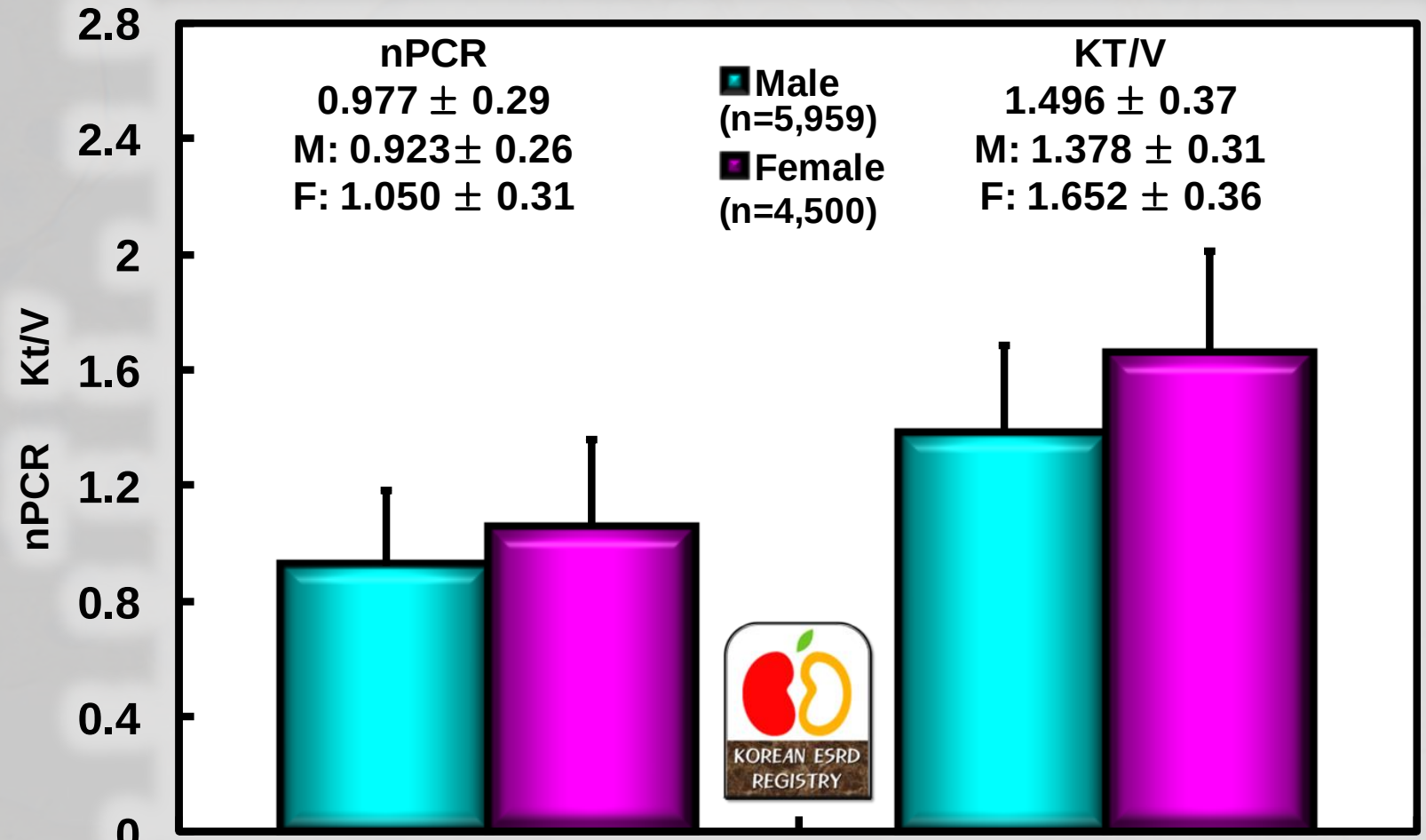

Single Use (%)
Reuse (%)
2009 95 5
2008 93 7
2007 91 9
2006 89 11
2005 90 10
2004 87 14
2003 88 12
2002 79 21


HD only (%)
HDF available (%)
2009 64 36
2008 65 35
2007 75 25
2006 77 22
2005 84 16

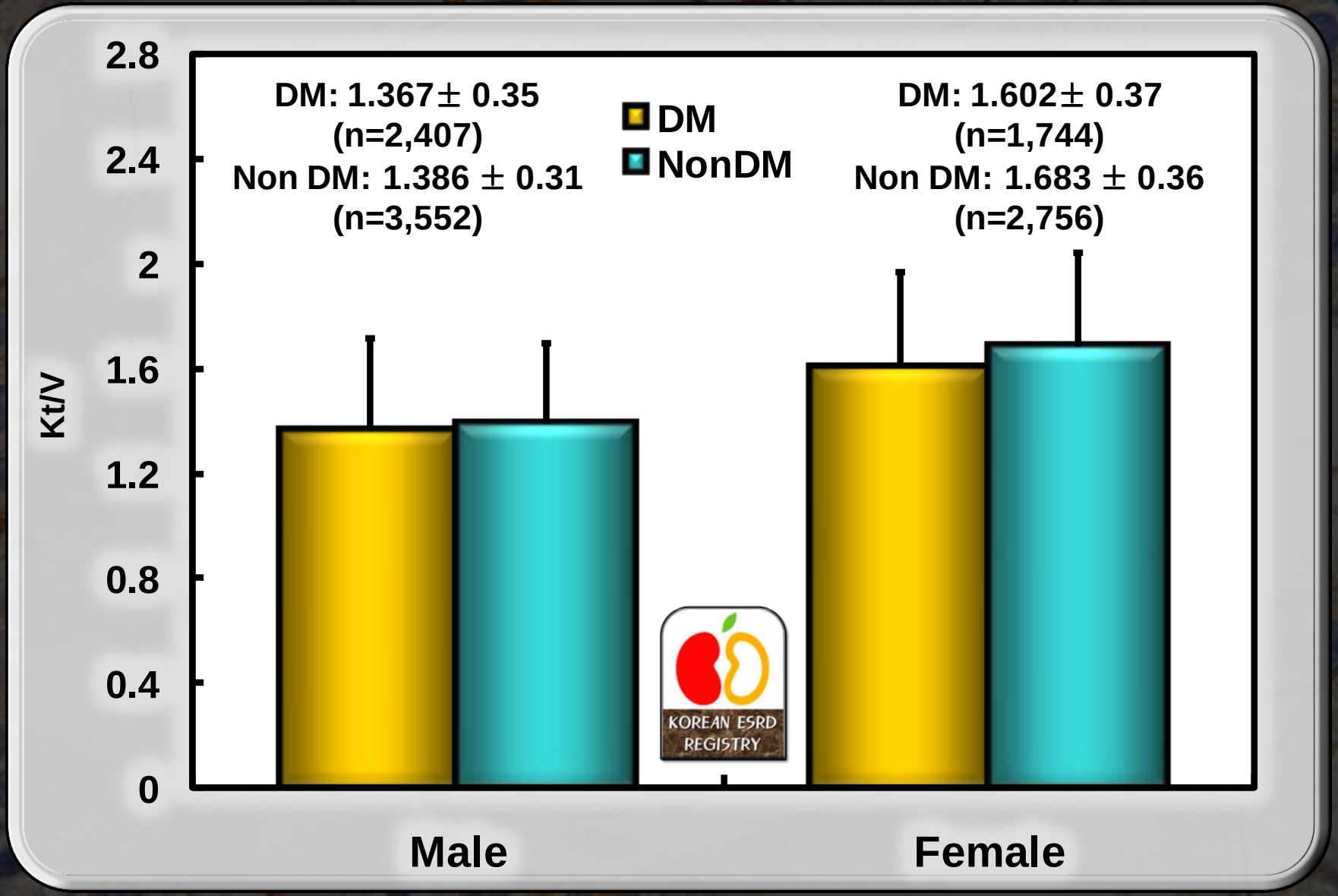
Urea Reduction Ratio



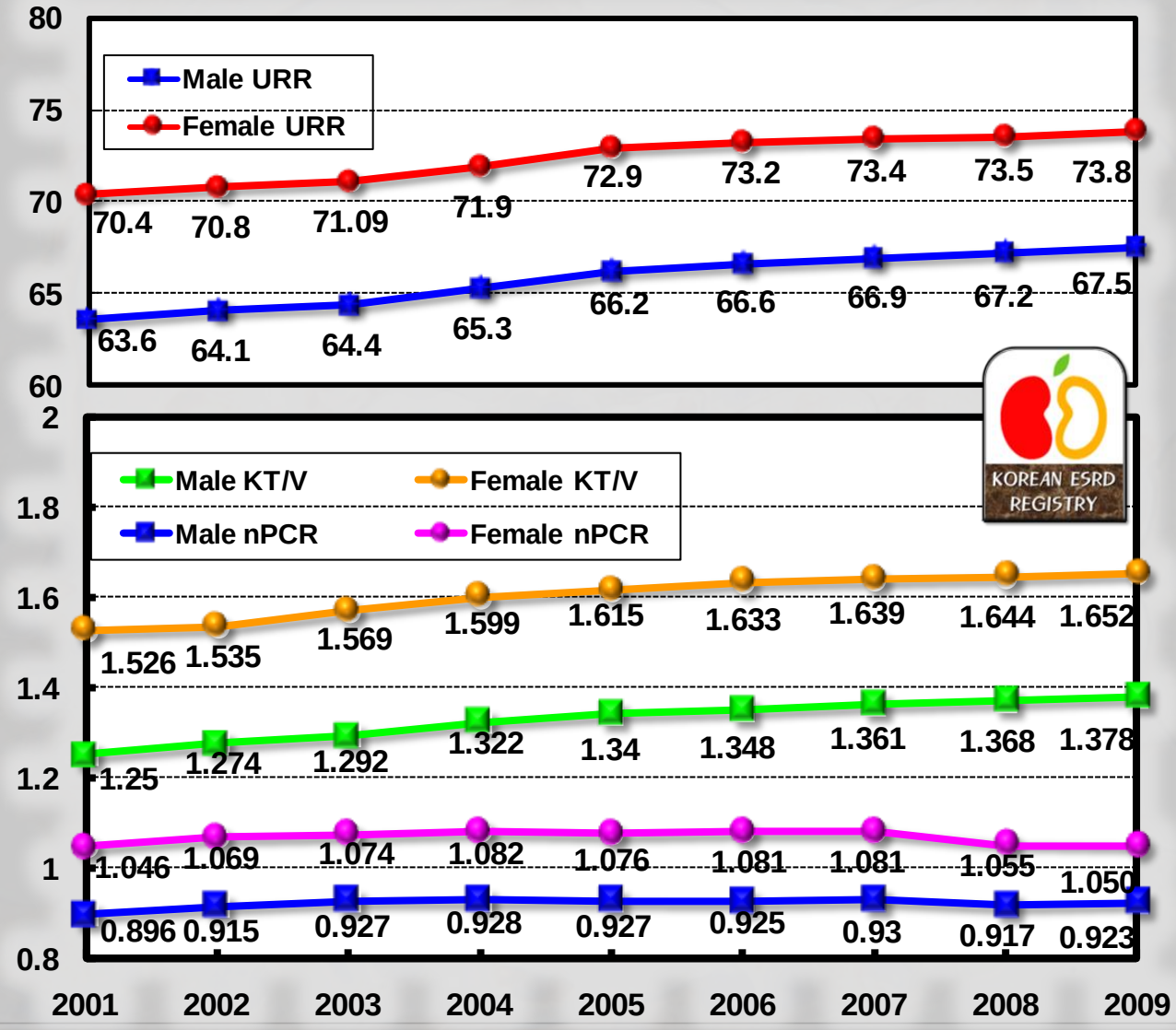
HD Adequacy


nPCR
0.977 ± 0.29
M: 0.923± 0.26
F: 1.050 ± 0.31
Male
(n=5,959)
Female
(n=4,500)
KT/V
1.496 ± 0.37
M: 1.378 ± 0.31
F: 1.652 ± 0.36
nPCR Kt/V
2.8
2.4
2
1.6
1.2
0.8
0.4
0
KOREAN ESRD REGISTRY
nPCR
KT/V

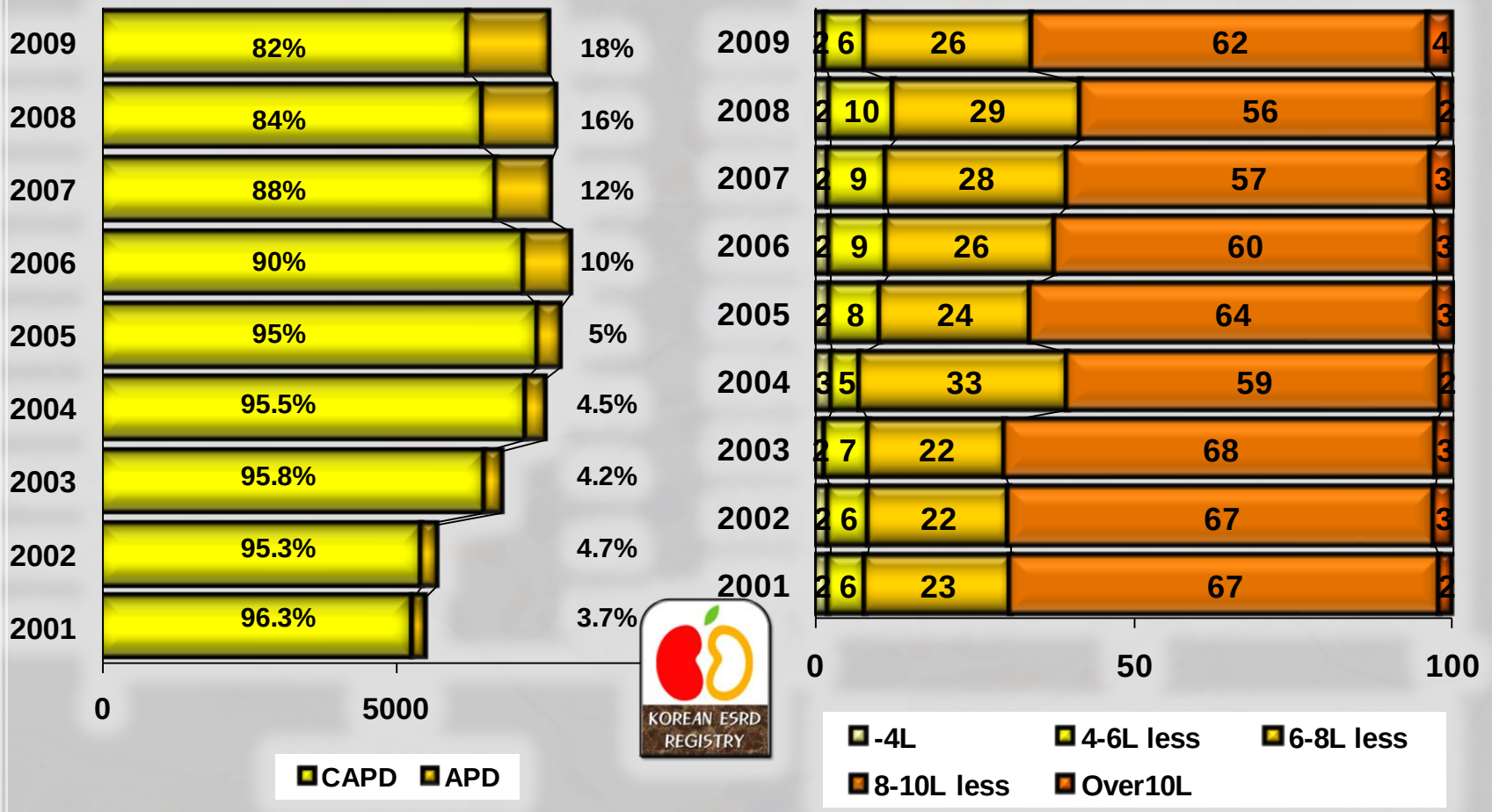
HD Adequacy : DM & Non-DM



Changes of HD Adequacy



PD Type & Doses



KOREAN ESRD REGISTRY

Co-Morbidity of Dialysis Patients

Complications		HD (%)	PD (%)
Cardiac	Coronary Artery Disease Congestive Heart Failure Pericardial Effusion Arrythmia	14.6	15.9
Vascular	Cerebrovascular accident Hypertension Other vascular disease	51.0	55.7
Infection	Pneumonia Tuberculosis Peritonitis Herpes zoster Other Infection	5.2	9.1
Liver disease	Hepatitis B Hepatitis C Congestive Liver Hemochromatosis Other liver diseases	8.2	4.0
Gastrointestinal	Gastric Ulcer Duodenal Ulcer Other Gastrointestinal Diseases	10.1	9.3
Miscellaneous	Malnutrition (Alb<2.5g/dl) Malignancy Hypertensive Retinopathy Uremic Dermatitis Uremic Neuritis Uremic Dementia Uremic Ascites / Pleural Effusion Osteodystrophy	10.9	6.0

*Reported patients number: Hemodialysis =4,120, Perioneal dialysis=397.

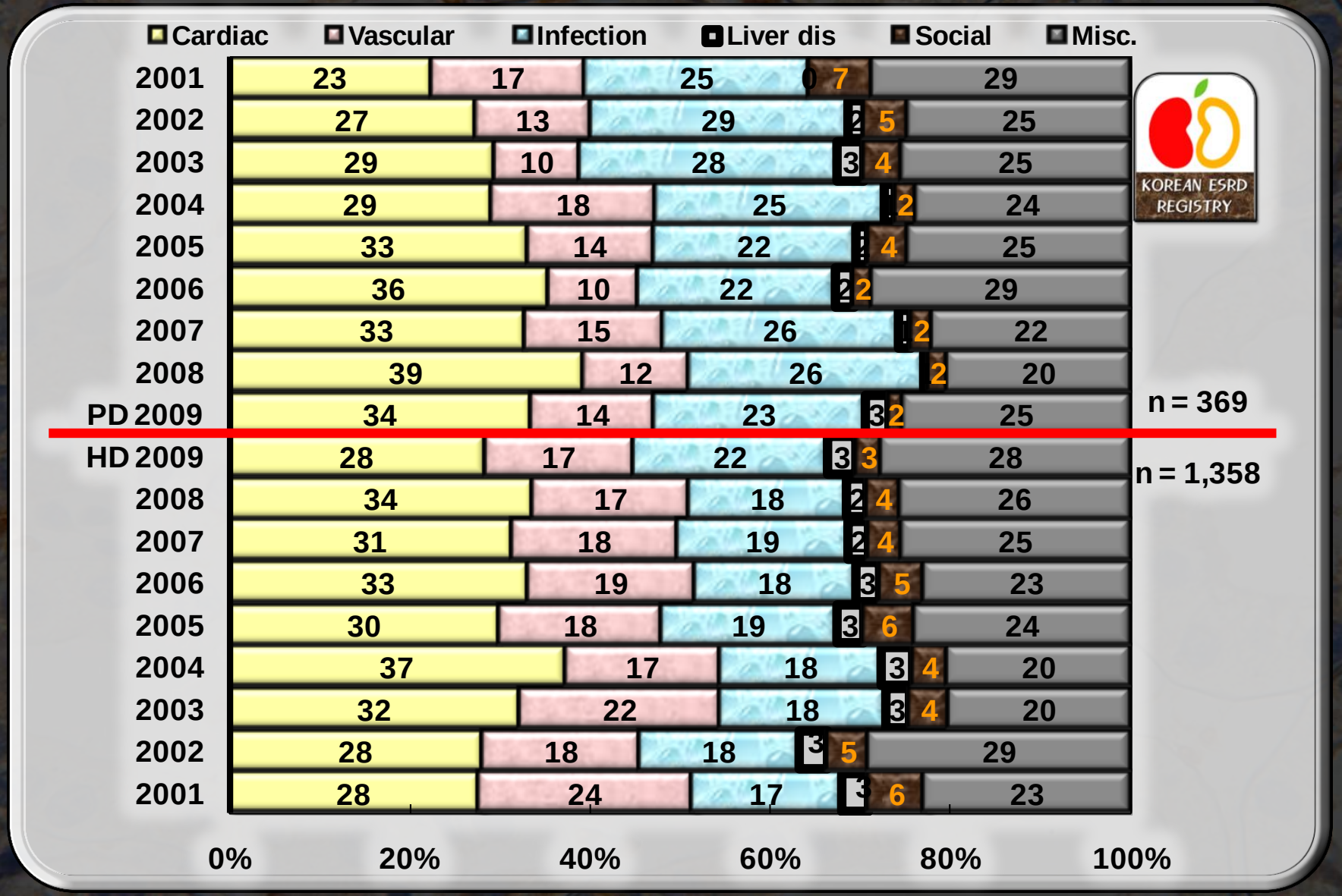
KOREAN ESRD REGISTRY

Causes of Death (%), 1994-2009

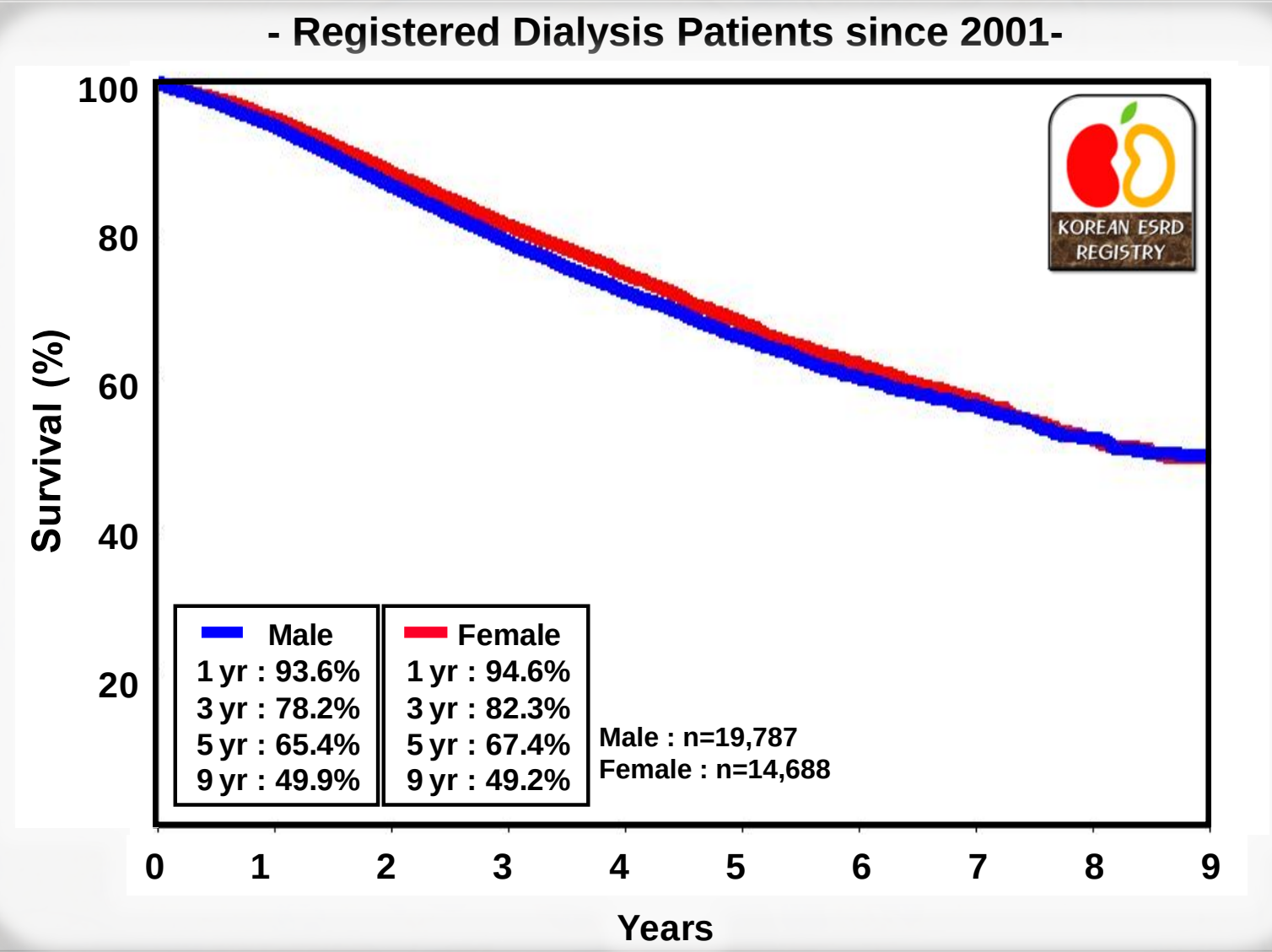
	1994-96	1998	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cardiac	**27.4**	**27.4**	**26.9**	**27.9**	**31.7**	**35.5**	**30.7**	**33.7**	**31.7**	**35.1**	**29.5**
Myocardial infarction	6.4	6.4	7.7	5.5	7.4	8.3	8	9.1	7.5	9.7	8.0
Cardiac arrest, uremia associated	13.7	13.7	11.2	10.6	11.7	13.6	10.4	11.1	10.8	11	8.5
Cardiac arrest, other cause	7.2	7.2	8.1	11.8	12.5	13.6	12.4	13.5	13.3	14.4	13
Vascular	**17.2**	**17.2**	**22.7**	**15.7**	**19.5**	**17.5**	**17**	**16.5**	**17.8**	**16**	**15.9**
Cerebrovascular accident	14.3	14.3	15.1	11.6	14.5	12.8	12.3	11.5	13	12.2	11
Pulmonary embolus	0.2	0.2	0.5	0.4	0.1	0.2	0.6	0.7	0.5	0.1	0.2
Gastrointestinal hemorrhage	1.7	1.7	2.7	1.9	3.2	2	1.7	1.8	2.7	1.9	2.3
Gastrointestinal embolism	0.1	0.1	0.1	0.1	0	0.4	0.5	0.5	0.1	0.1	0.5
Other vascular disease	0.9	0.9	4.3	1.7	1.6	2.1	1.9	2	1.6	1.7	1.9
Infection	**13.5**	**13.5**	**17.8**	**21.6**	**20.5**	**19.5**	**20.1**	**18.8**	**20.2**	**19.5**	**21.9**
Pulmonary infection	2.5	2.5	4.5	4.9	3.6	3.7	4.5	4.2	4.4	4.4	5.9
Septicemia	6.6	6.6	6.9	9.2	9.7	9.4	9.6	8.9	11.7	9	10.4
Tuberculosis	0.3	0.3	0.8	0.5	0.2	0.1	0.3	0.1	0.2	0.1	0.3
Peritonitis	2.1	2.1	1.1	2.5	2	1.5	1.4	1.1	1.1	2	0.8
Other Infection	2	2	4.5	4.5	4.9	4.8	4.3	4.5	2.9	4	4.5
Liver disease	**3.4**	**3.4**	**2.6**	**2.8**	**2.8**	**2.9**	**2.7**	**2.6**	**2.2**	**1.9**	**3.1**
Liver failure due to hepatitis B	1.8	1.8	1.6	1.2	1.8	2.1	1.5	1.4	1.3	1	2.2
Liver failure due to other cause	1.6	1.6	1	1.6	1	0.9	1.2	1.1	0.8	0.8	0.9
Social	**6.2**	**6.2**	**6.3**	**4.7**	**4.4**	**3.6**	**5.4**	**4.2**	**3.3**	**3.3**	**2.5**
Patient refused further treatment	2.9	2.9	2.1	1.8	1	1.1	1.1	0.6	1.1	0.6	0.5
Suicide	2.5	2.5	3.3	1.9	2.3	2	3.3	3	1.5	1.6	1.3
Therapy ceased for other reason	0.8	0.8	0.9	1	1	0.5	1	0.6	0.7	1	0.8
Miscellaneous	**32**	**32**	**23.7**	**27.4**	**21.3**	**21**	**24**	**24.2**	**24.8**	**24.3**	**27.1**
Cachexia	2.9	2.9	8.1	6.8	6.6	6.1	4	3.9	4.4	3.8	3.3
Malignant disease	2.1	2.1	4.4	4.8	3.5	3.6	6.4	5.4	5.7	4.6	5.7
Accident	1.2	1.2	0.9	0.5	1.1	0.9	1.4	1.6	1.2	1	1.3
Uncertain	25.8	25.8	10.3	15.3	10.1	10.3	12.3	13.2	13.4	14.9	16.8

*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, 2008=1,563, 2009=1,727

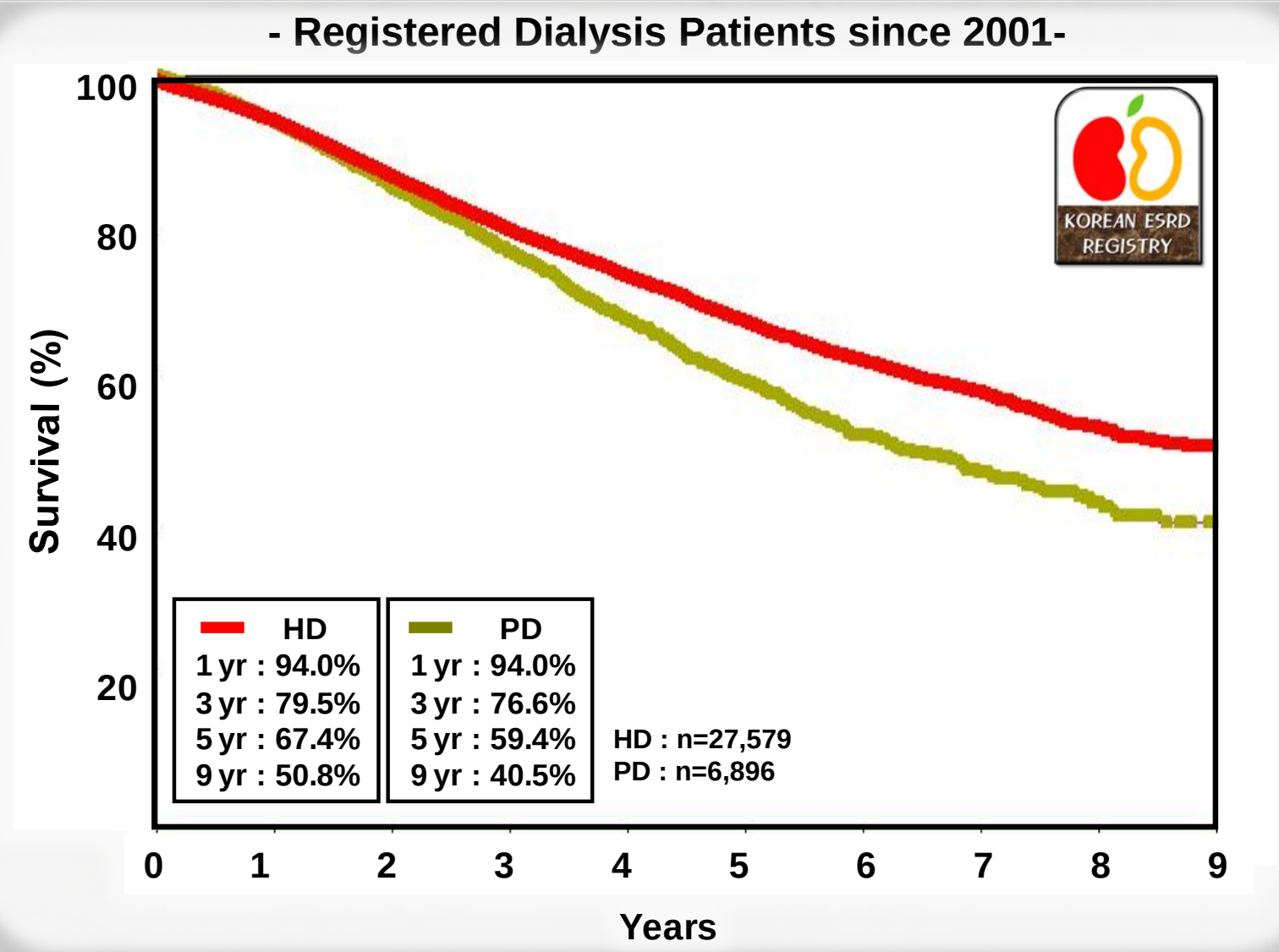
Death Causes, HD & PD



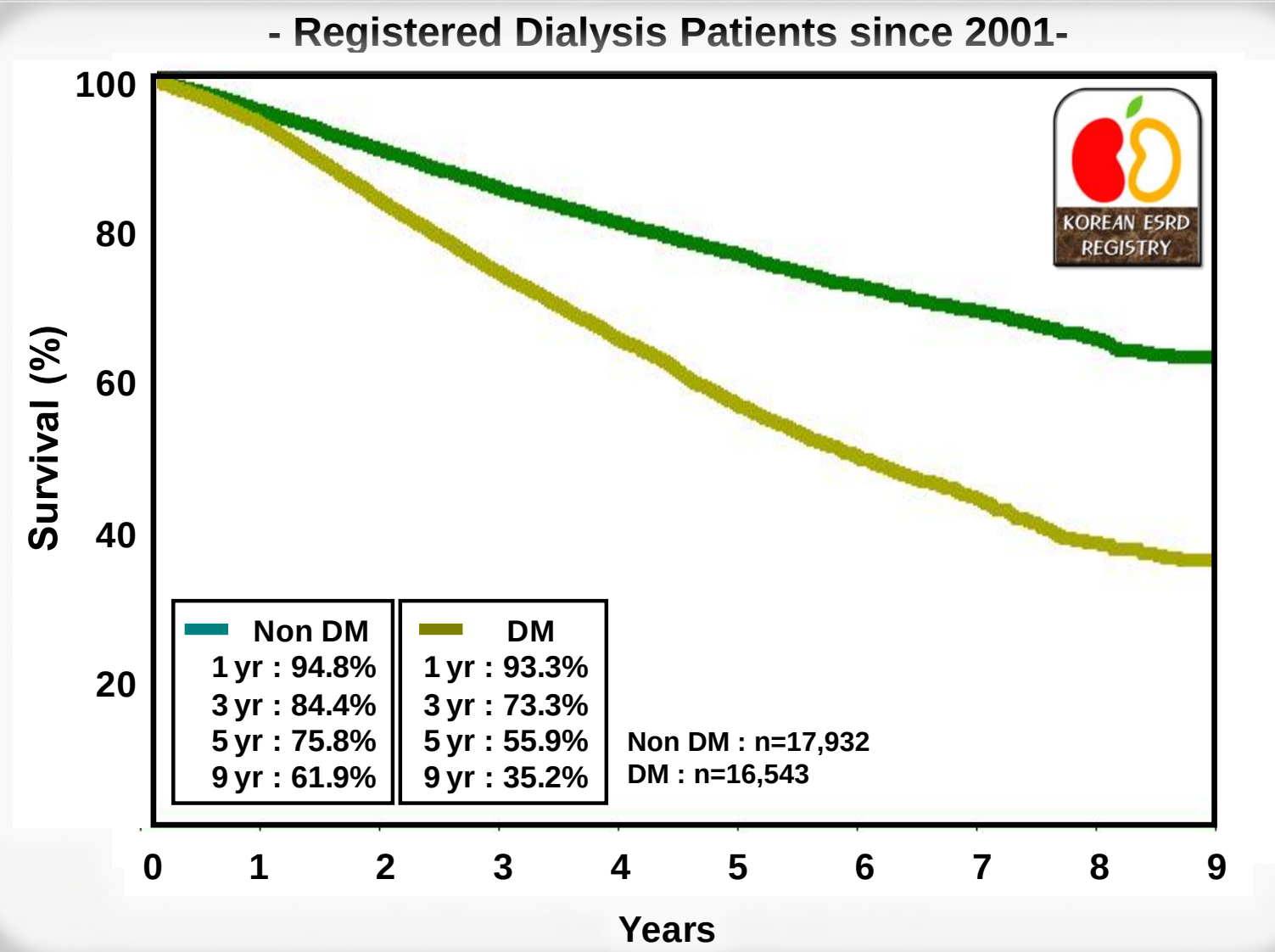
Overall Patient Survival



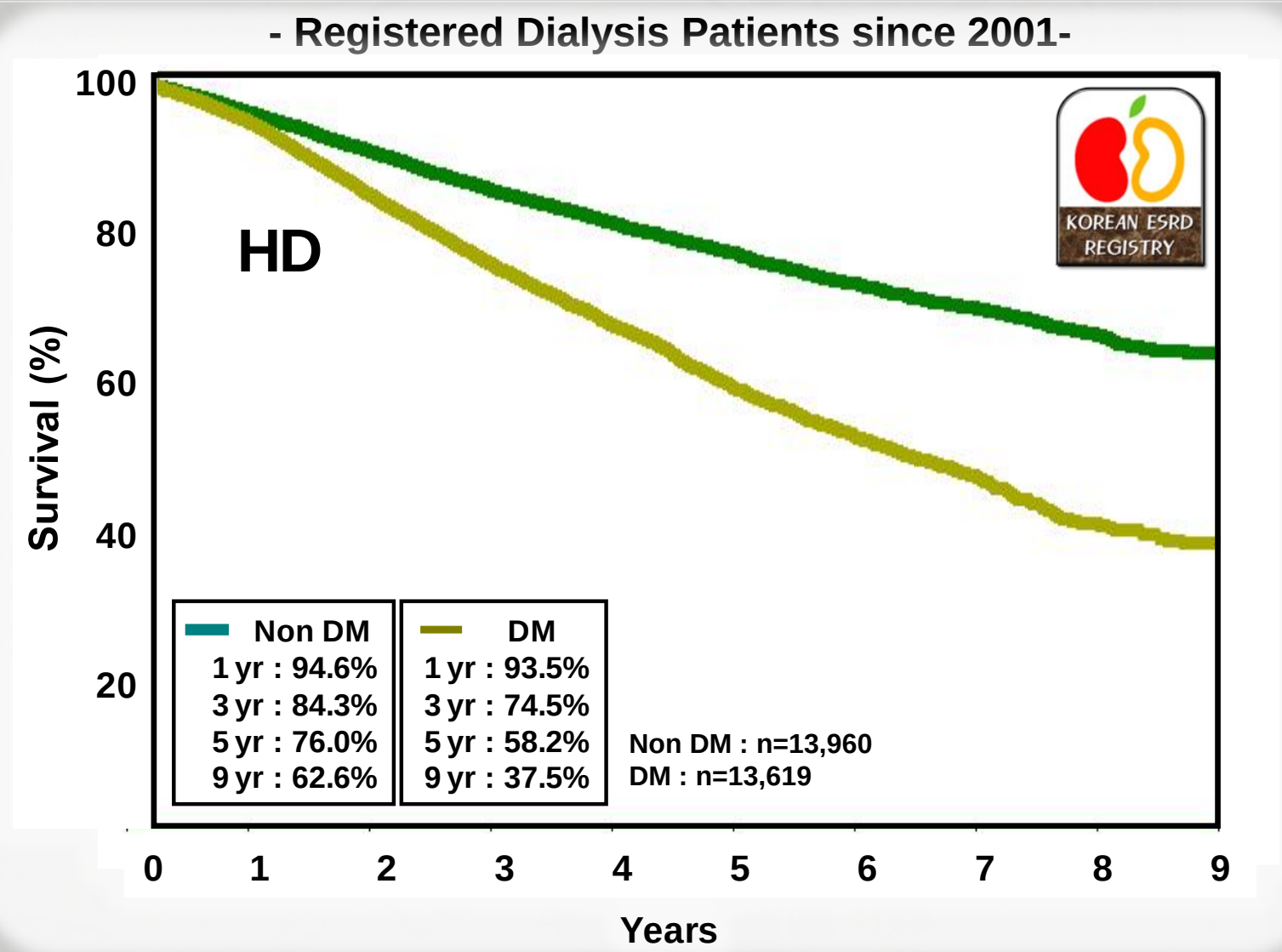
Patient Survival : HD vs PD



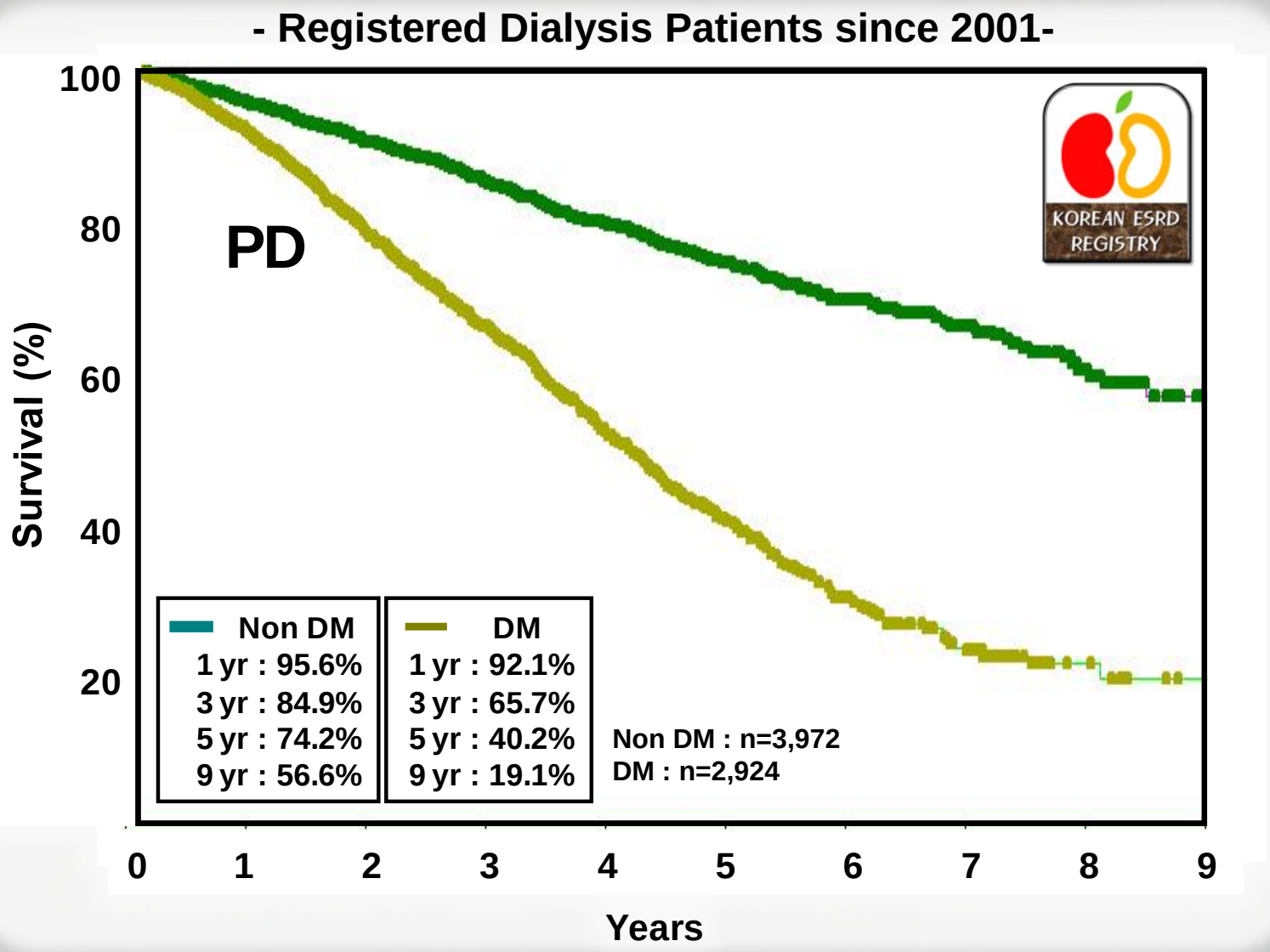
Patients Survival : DM vs Non-DM



HD Pts Survival : DM vs Non-DM



PD Pts Survival : DM vs Non-DM

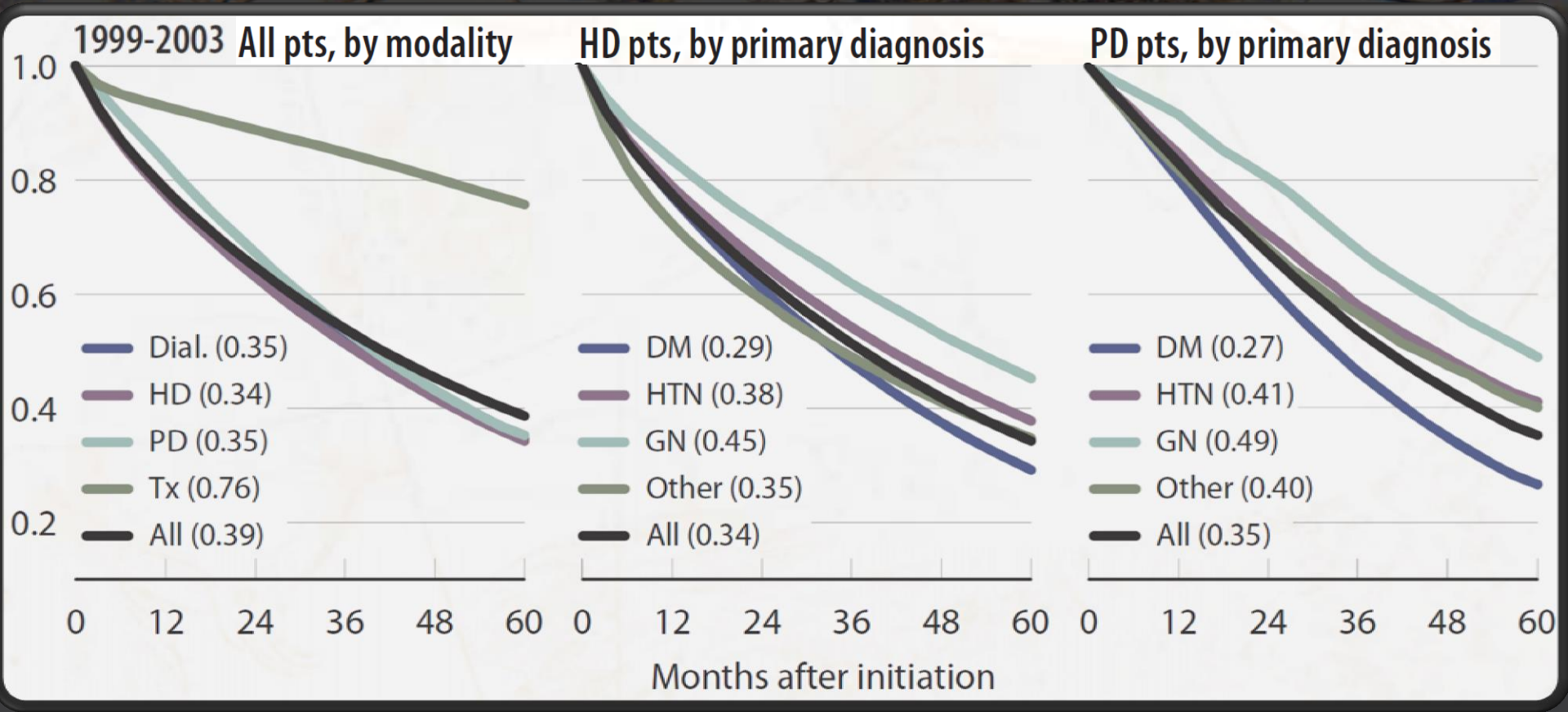


Survival of ESRD Pts, USA

- 2008년 말 투석 환자수 : 38만2천명 (1,183 PMP)
  - 신장이식유지 환자수 :16만 6천명 (516 PMP)
- 혈액투석 환자수 : 35만 5천명
- 복막투석 환자수 : 2만7천명

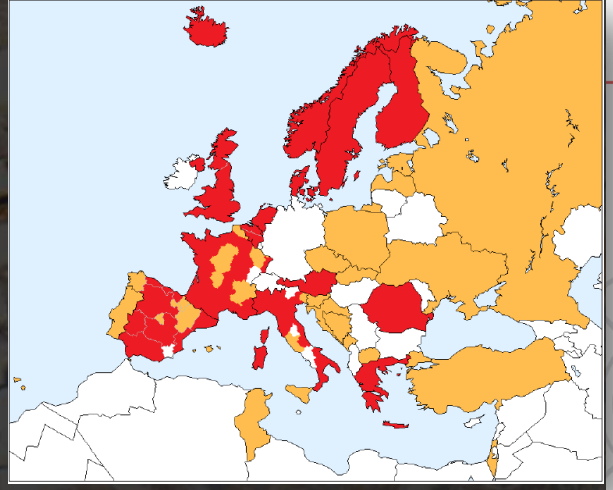
United States Renal Data System
2010 Annual Data Report

U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010.



KOREAN ESRD REGISTRY

Dialysis in Europe

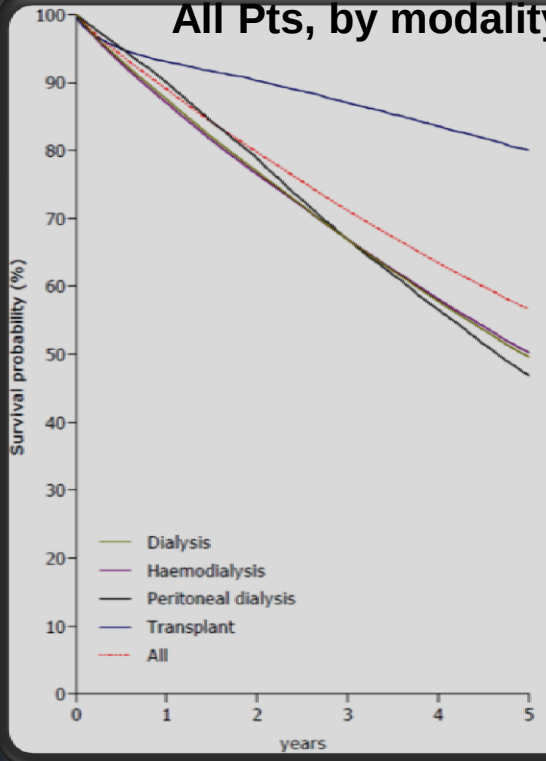


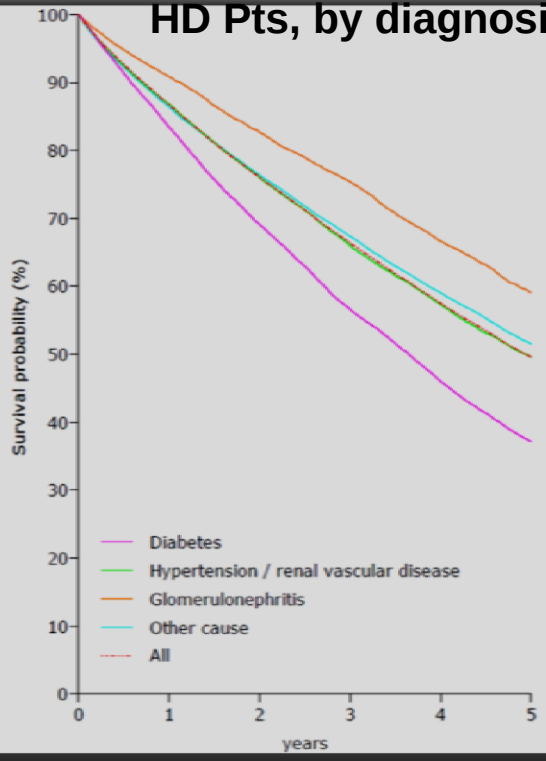
EUROPEAN RENAL ASSOCIATION
EUROPEAN DIALYSIS AND TRANSPLANT ASSOCIATION
Registered Charity No. 1060134

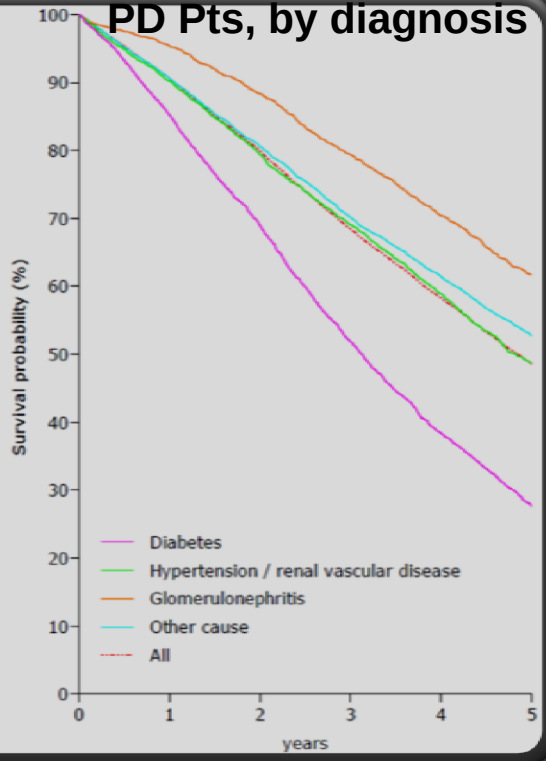
Annual Report 2008

ERA-EDTA Registry

- 2008년 말 기준
  (주요 참여국 통계)
  -투석 환자수 : 22만2천명
  (881 PMP)





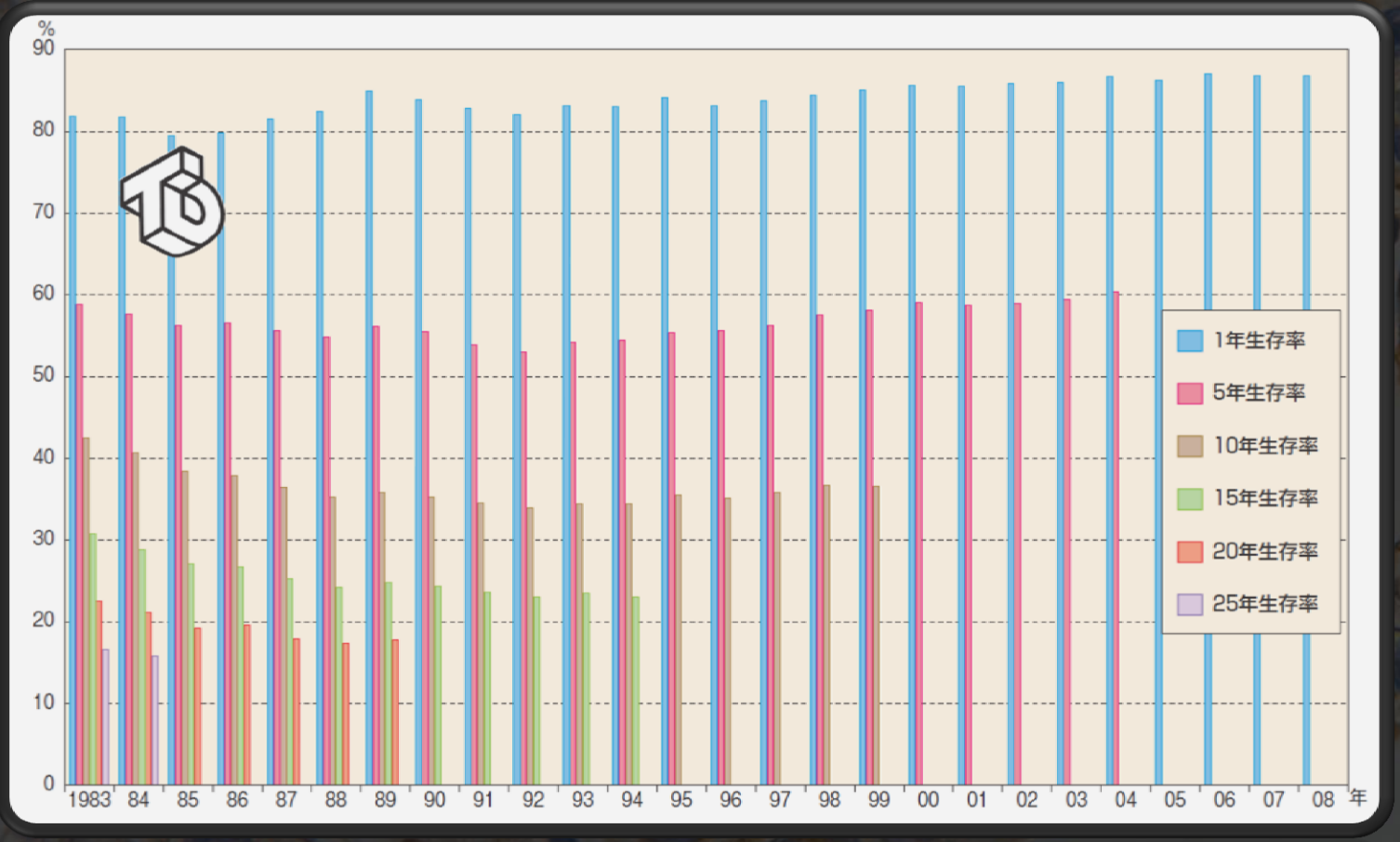


Dialysis in Japan

図　説
わが国の慢性透析療法の現況
2009年12月31日現在
An overview of regular dialysis treatment in Japan as of Dec. 31, 2009

日本透析医学会
Japanese Society for Dialysis Therapy

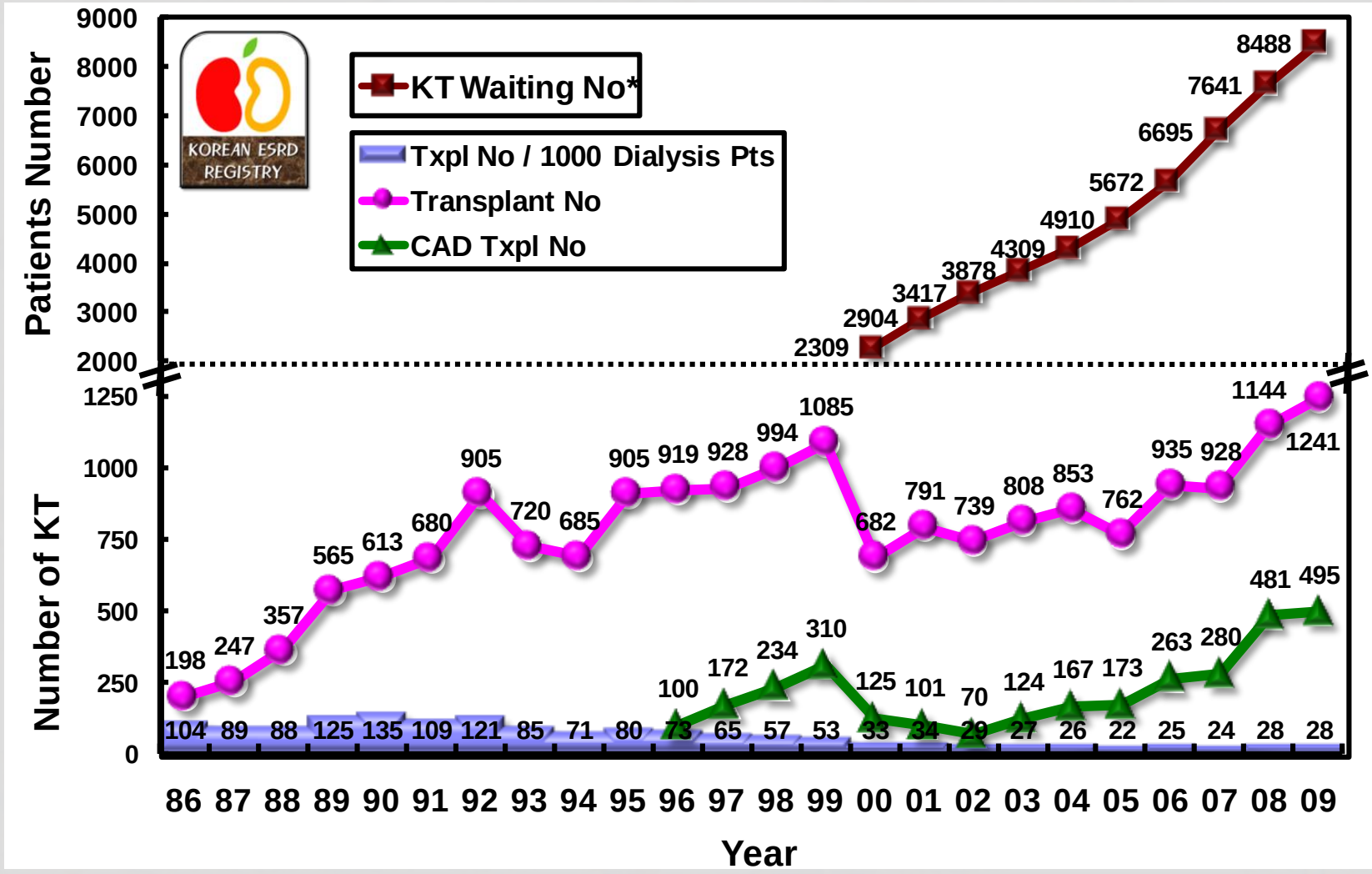
- 2009년 말 기준
  - 투석기관수 : 4,125개소 (혈액투석기 114,702대)
  - 투석 환자수 : 29만675명 (2,279 PMP) : 20년 이상 투석환자수 : 2만명
  - 혈액투석환자수 : 28만명, (주간 23만 9천명 , 야간 4만2천명)
  - 복막투석 환자수: 9,856명



Survial Rate

1 yr : 86.8%
5 yr : 60.4%
10 yr: 36.6%
20 yr: 17.8%

Kidney Transplantation

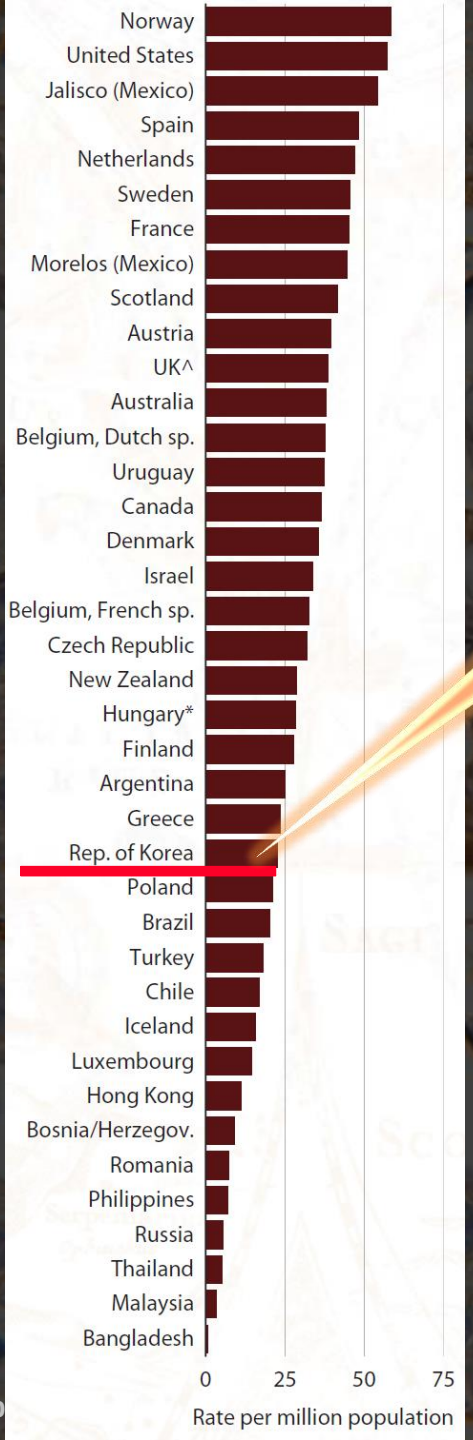


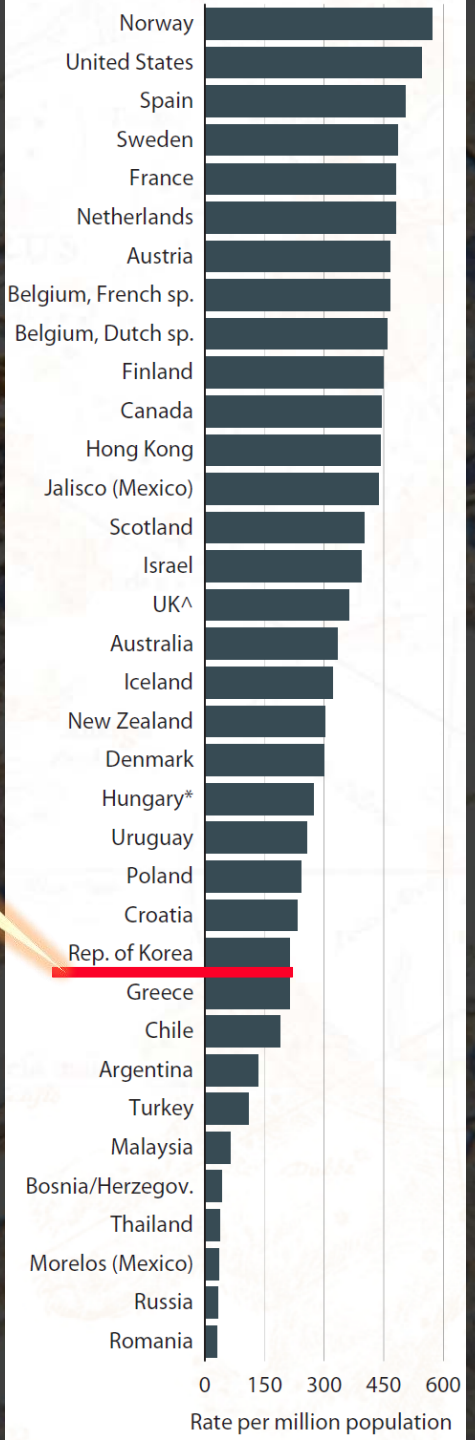
KOREAN ESRD REGISTRY

Kidney Transplantation

Incidence
22.7 PMP
2008

Prevalence
212.8 PMP
2008





United States Renal Data System
2010 Annual Data Report

U.S. Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2010.

Oct. 2010

특 징 요 약

- 투석환자 및 혈액투석기관수의 꾸준한 증가, 비윤리 의료기관 존재
- 복막투석의 감소 및 상대적 혈액투석 비율의 증가
- 원인 신질환에서 당뇨병성 신증의 비율 증가
- 혈액투석 효율 향상, 빈혈 개선
- 신장이식 증가, 특히 사체공여자 증가
- 의료보험 심사평가원의 적정성 평가, 대한신장학회의 투석기관 인증제에 따른 등록사업의 변화예정

감사의 글

- 전국의 인공신장실 담당의료진
- 대한신장학회 사무국
- 투석용 의료물품 공급업체 :

(FMC Korea, 보령제약, Baxter Korea)