우리나라 신대체 요법의 현황

– 인산 민병석 교수 기념 말기 신부전 환자 등록사업 2018 –

Current Renal Replacement Therapy in Korea

-Insan Memorial Dialysis Registry 2018-

KOREAN ESRD REGISTRY

대한신장학회 등록위원회

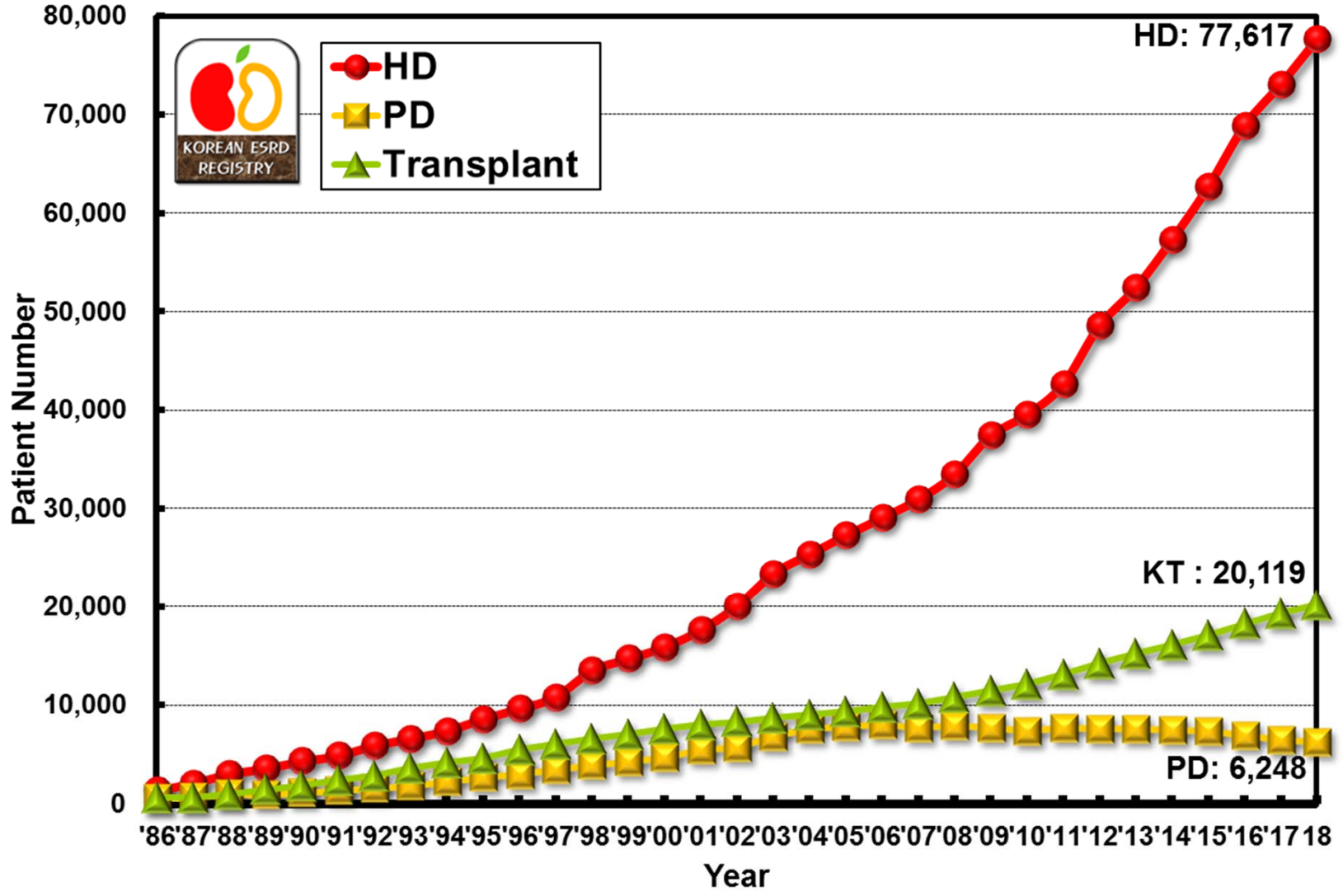
ESRD Registry Committee, Korean Society of Nephrology

Prevalence of Renal Replacement Therapy

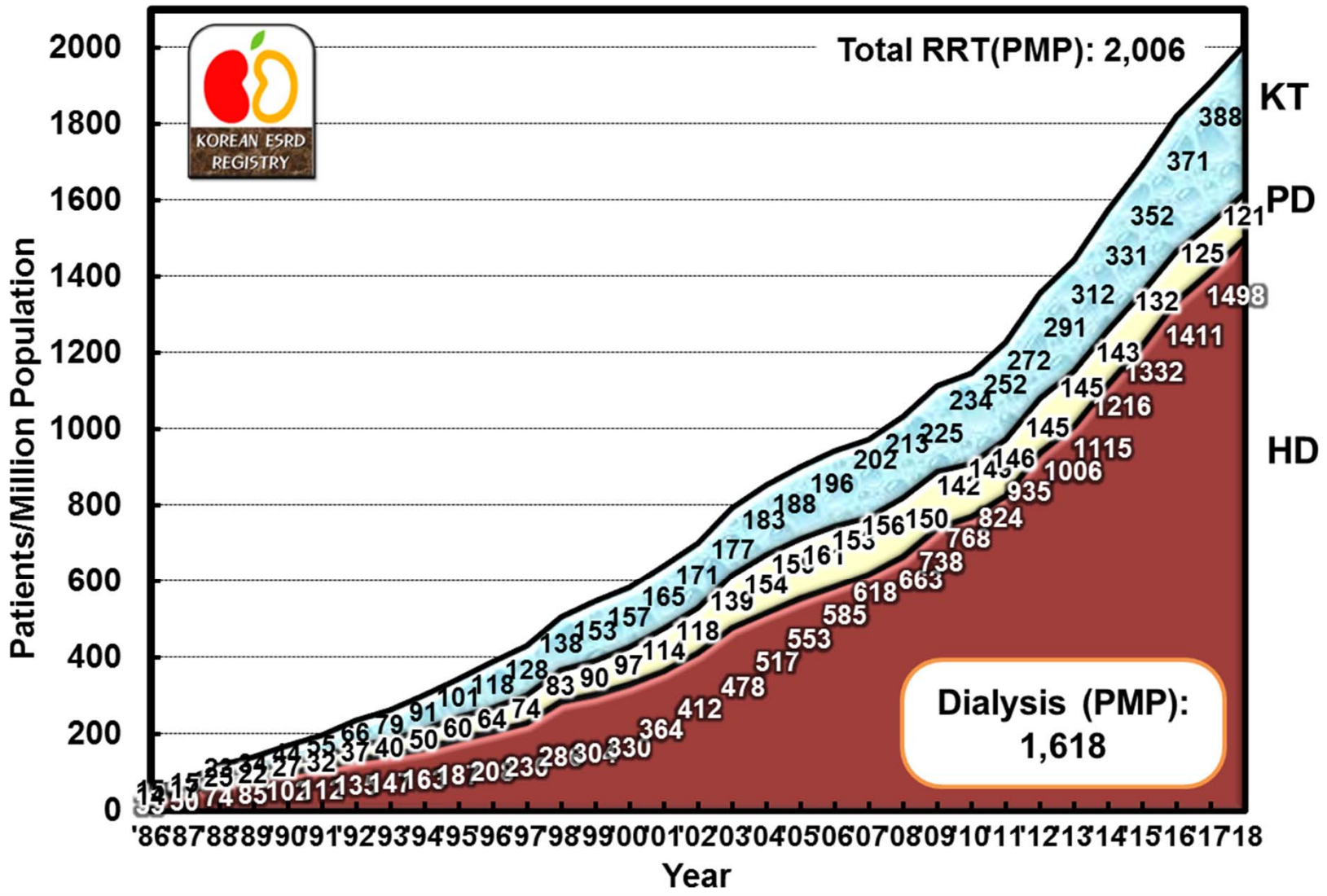
Year	HD		PD		Transplant		Total	
1980	198	(4.9)	30	(0.7)	-	-	228	(6.0)
1986	1,335	(32.6)	573	(13.9)	621	(15.1)	2,534	(61.7)
1988	3,012	(74.0)	1,058	(25.2)	982	(23.4)	5,142	(122.7)
1990	4,311	(101.8)	1,130	(26.7)	1,866	(44.1)	7,307	(172.6)
1992	5,890	(135.3)	1,599	(36.7)	2,862	(65.8)	10,351	(237.8)
1994	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)
2002	20,010	(412.4)	5,712	(117.7)	8,271	(170.5)	33,993	(700.6)
2004	25,335	(516.5)	7,569	(154.3)	8,987	(183.2)	41,891	(854.0)
2006	29,031	(585.0)	7,990	(161.0)	9,709	(195.7)	46,730	(941.7)
2008	33,427	(663.3)	7,840	(155.6)	10,722	(212.8)	51,989	(1031.6)
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)
2016	68,853	(1331.9)	6,842	(132.4)	18,189	(351.8)	93,884	(1816.1)
2017	73,059	(1411.0)	6,475	(125.1)	19,212	(371.0)	98,746	(1907.1)
2018	77,617	(1497.6)	6,248	(120.6)	20,119	(388.2)	103,984	(2006.4)

( ): Number of patients per million population. Rep. of Korea's population at the end of 2018: 51,826,059.

Patient Number of RRT



Point Prevalence of RRT



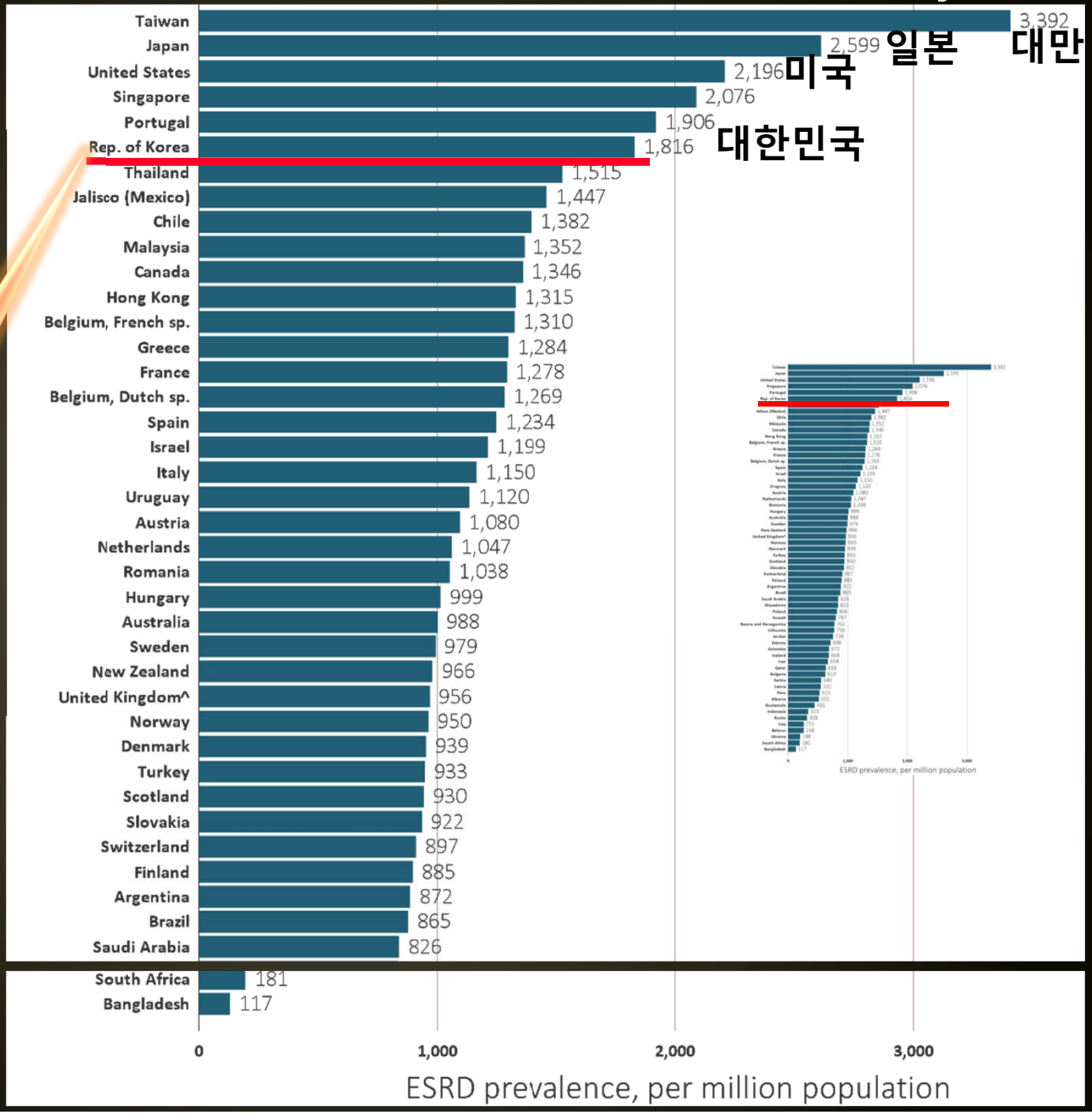
International comparison of ESRD Prevalence

1,816 PMP
End of
2016

USRDS
UNITED STATES RENAL DATA SYSTEM

USRDS Report 2018

May 2019

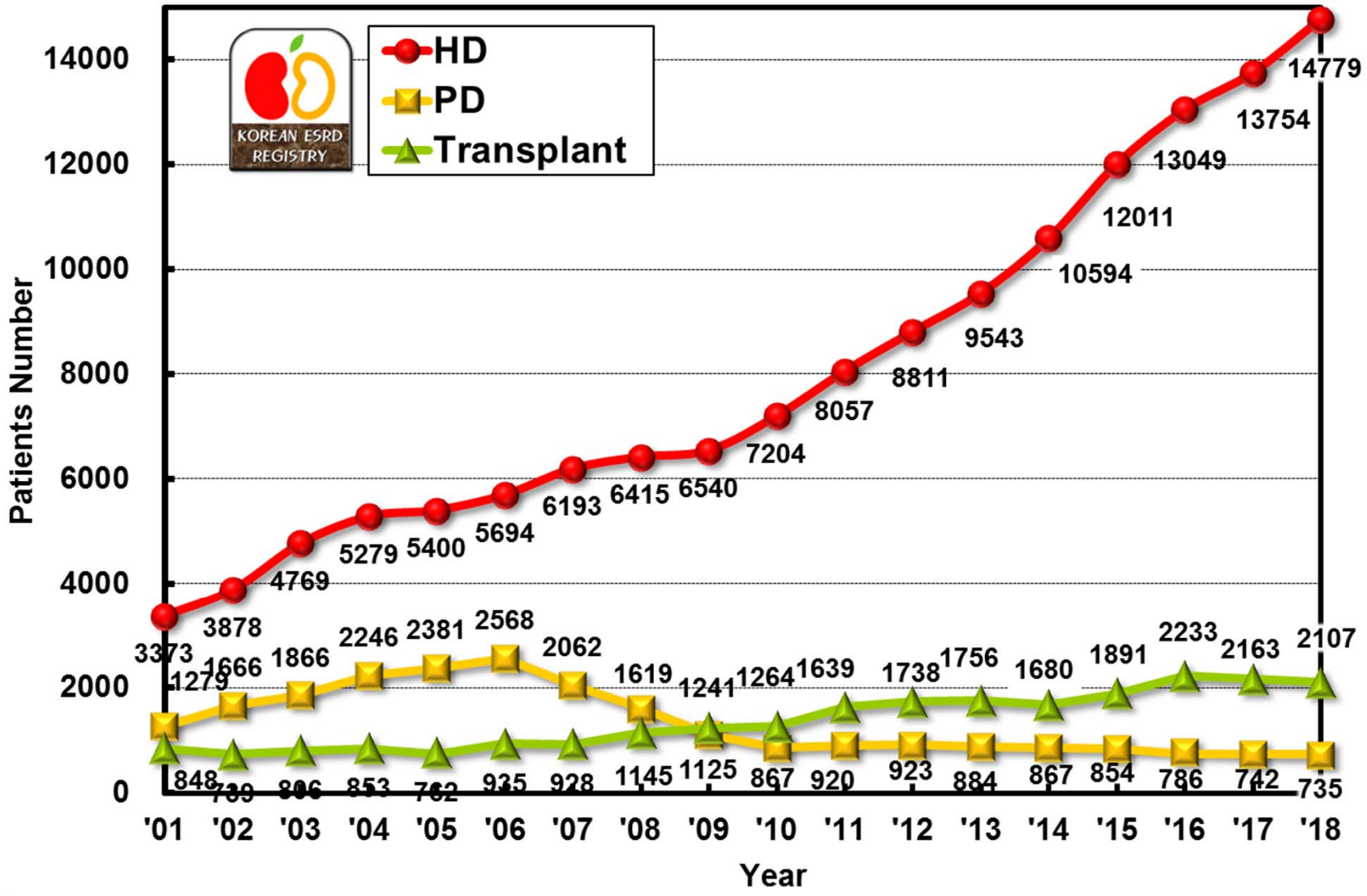


Number of New RRT Patients

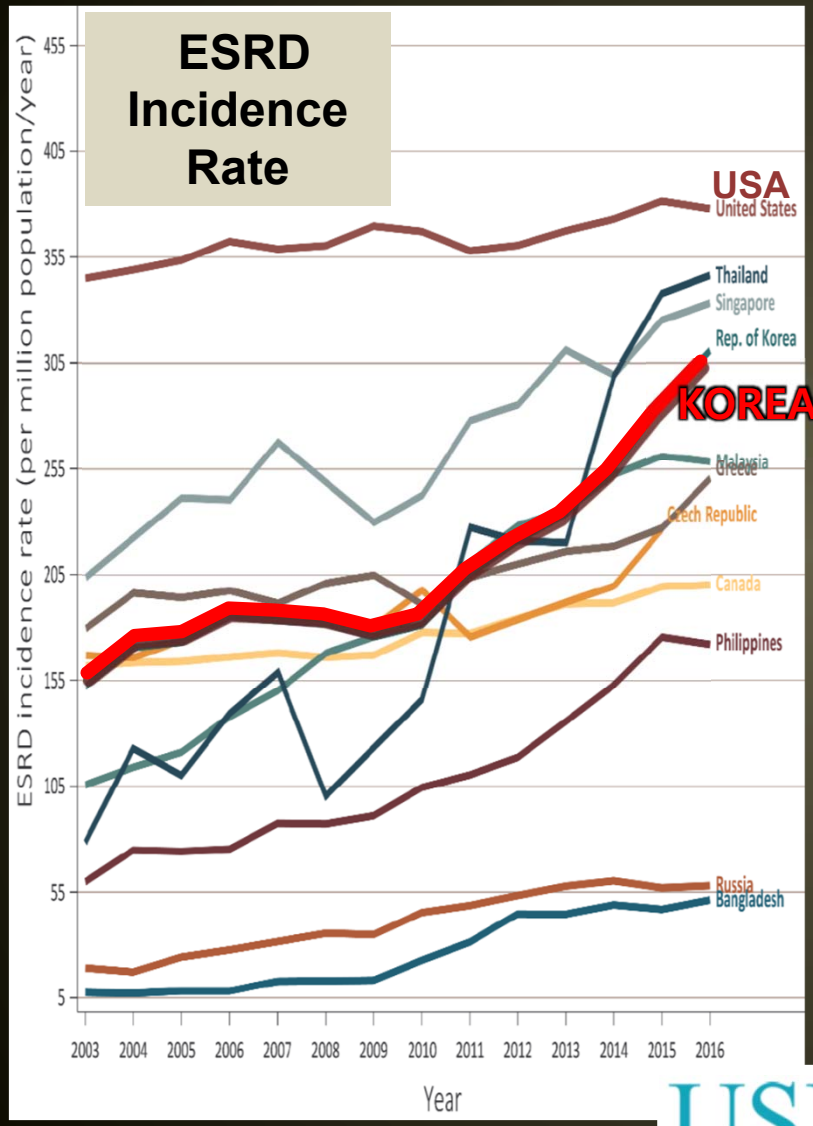
	HD		PD		Transplant		Total	
1986	670	(16.3)	287	(7.0)	221	(5.4)	1,173	(28.7)
1988	1,516	(36.2)	375	(8.9)	428	(10.2)	2,319	(55.3)
1990	2,418	(57.1)	530	(12.5)	624	(14.7)	3,572	(84.3)
1992	3,083	(70.8)	705	(16.2)	765	(17.6)	4,553	(104.6)
1994	2,999	(66.0)	907	(19.9)	685	(15.1)	4,591	(101.1)
1996	3,670	(79.0)	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)
2002	3,878	(79.9)	1,666	(34.3)	739	(15.2)	6,283	(129.5)
2004	5,279	(107.6)	2,246	(45.8)	853	(17.4)	8,378	(170.8)
2006	5,694	(114.7)	2,568	(51.7)	935	(18.8)	9,197	(185.3)
2008	6,415	(127.3)	1,619	(32.1)	1,145	(22.7)	9,179	(182.1)
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)
2016	13,049	(252.4)	786	(15.2)	2,233	(43.2)	16,068	(310.8)
2017	13,754	(265.6)	742	(14.3)	2,163	(41.8)	16,659	(321.7)
2018	14,779	(285.2)	735	(14.2)	2,107	(40.7)	17,621	(340.0)

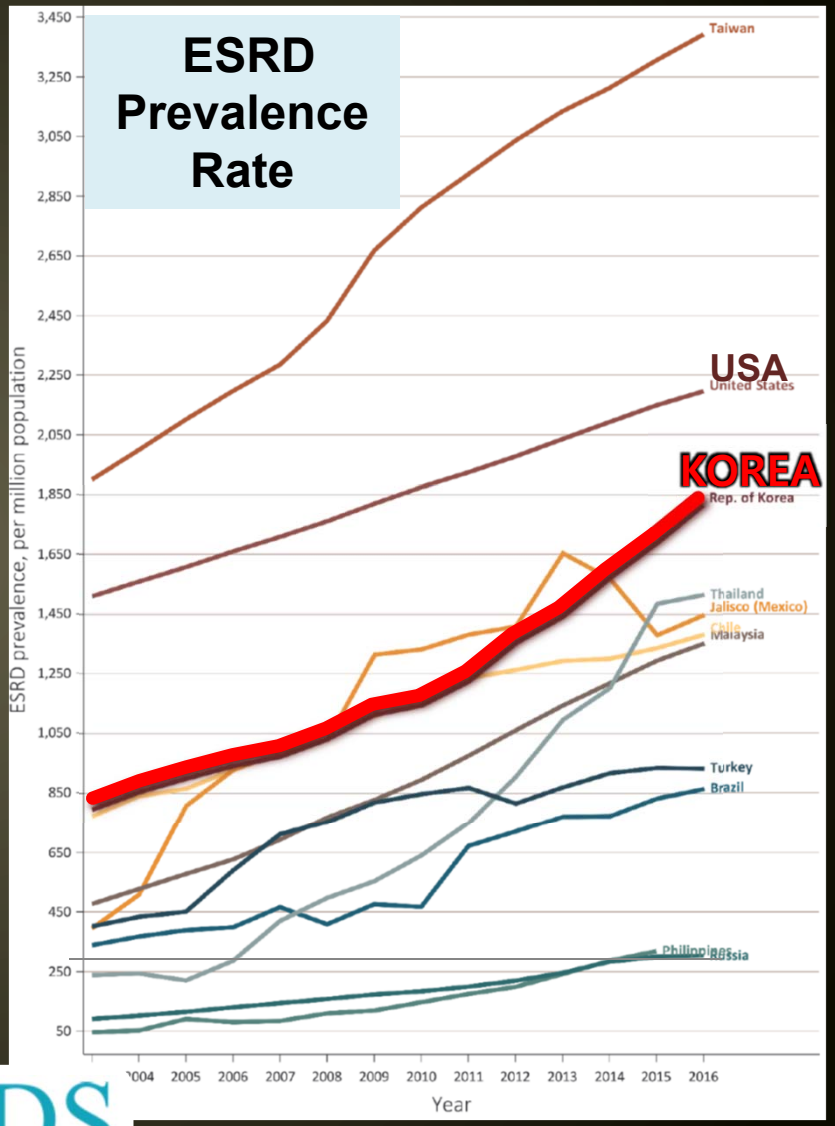
( ): Number of patients per million population. Rep. of Korea's population at the end of 2018: 51,826,059.

Number of New RRT Patients



International Comparison





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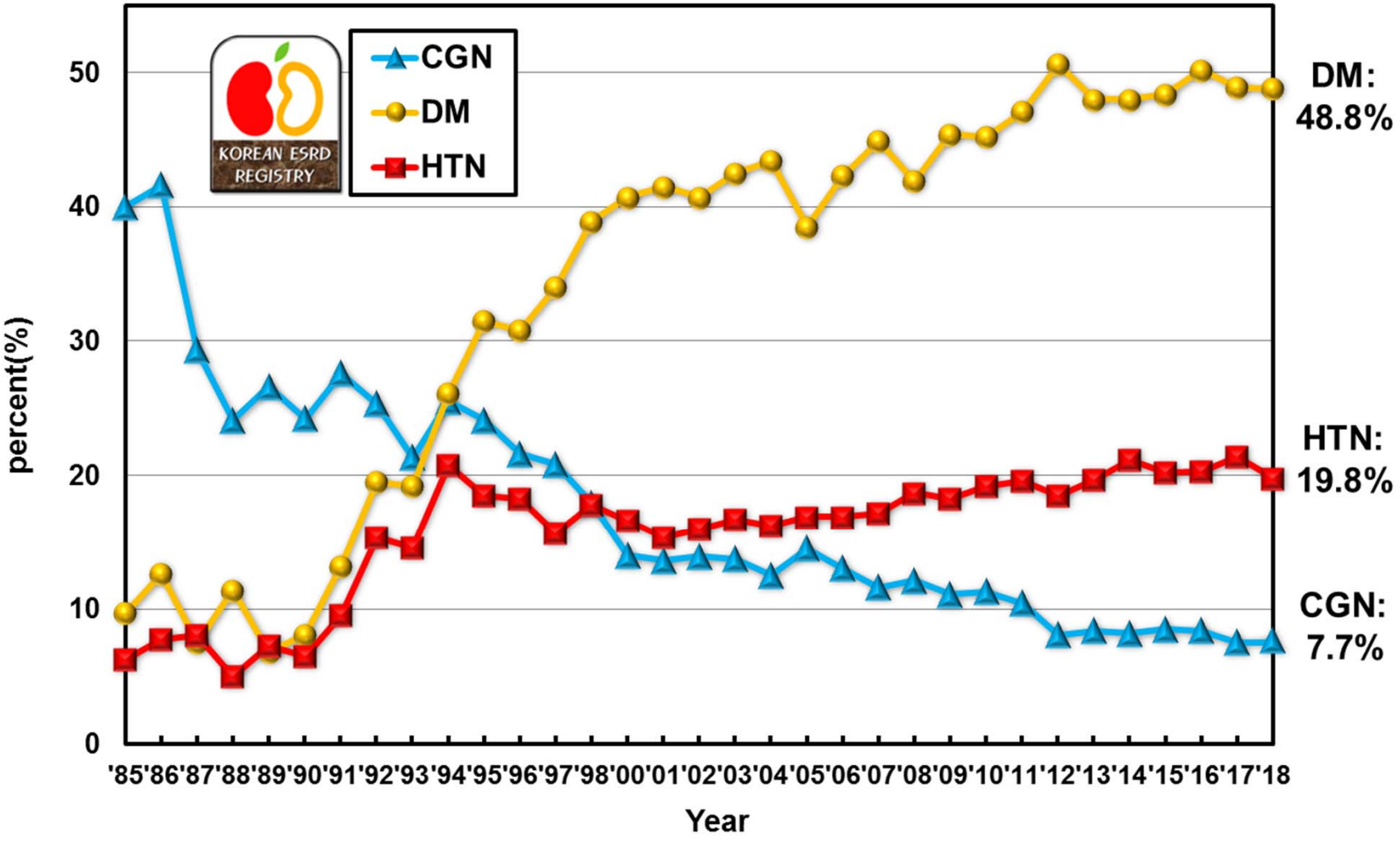
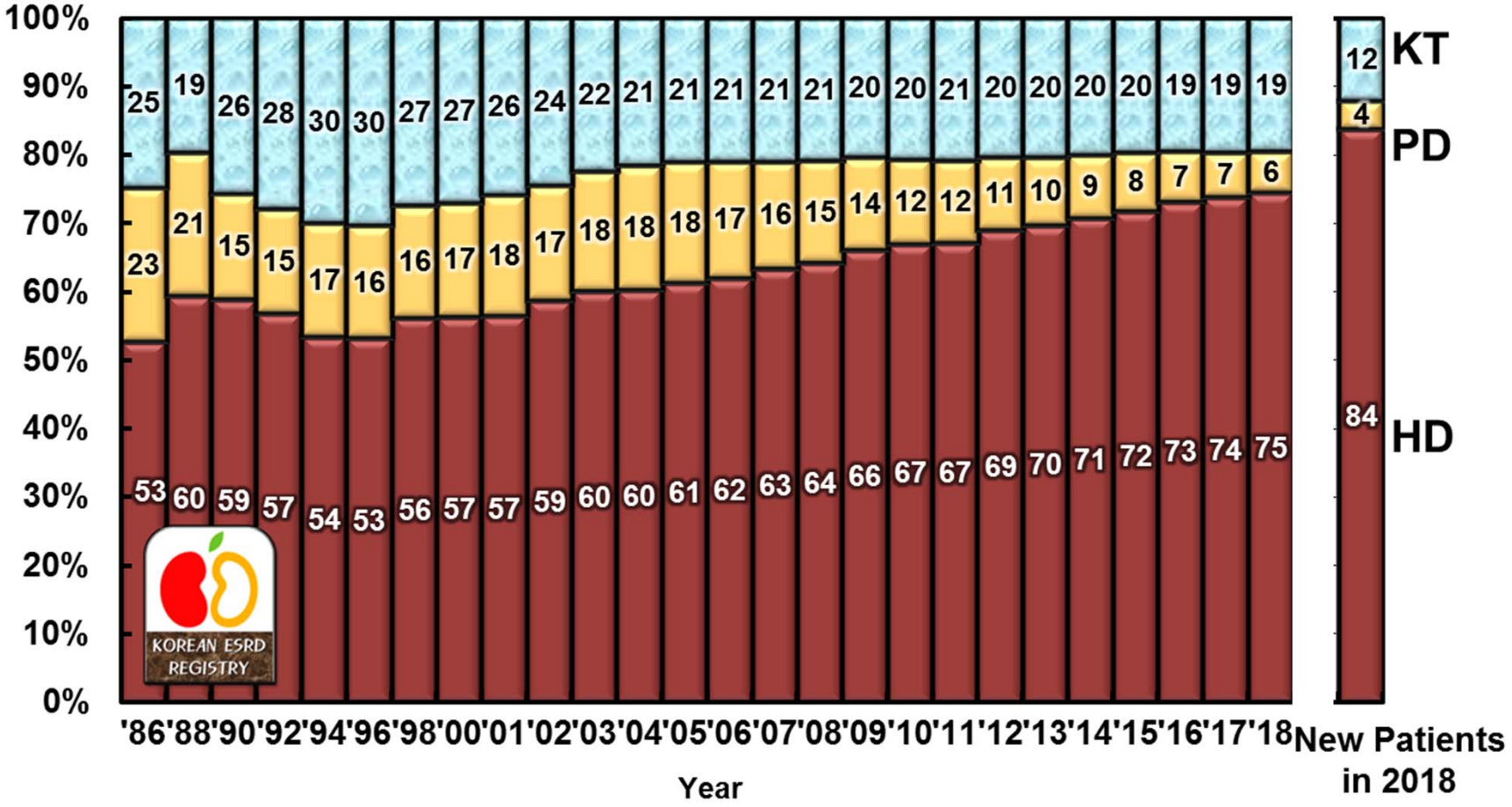
Causes of ESRD in New Patients

Causes	Percent (%)															
	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010	2012	2014	2015	2016	2017	2018
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	8.4	7.5	7.7
Not Histologically confirmed	19.7	20.4	16.7	13.6	10.6	10.0	8.6	9.0	8.2	7.7	4.5	4.4	4.2	3.8	3.7	4.4
Histologically confirmed	5.6	5.0	4.9	4.3	3.4	3.9	3.9	3.9	3.8	3.6	3.6	3.8	4.3	4.5	3.8	3.3
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	50.2	48.9	48.8
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	20.3	21.4	19.8
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	1.5	1.7	1.6
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	0.1	0.0	0.0
Pyelo/interstitial nephritis	1.3	1.1	0.7	1.0	0.8	0.6	0.6	0.6	0.5	0.4	0.5	0.8	0.3	0.4	0.5	0.5
Drugs or nephrotoxic agents	1.3	0.1	0.6	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.4	0.2	0.6	0.3	0.3	0.2
Lupus nephritis	0.8	0.7	1.0	0.5	0.9	0.8	0.6	0.6	0.6	0.5	0.6	0.5	0.3	0.5	0.5	0.5
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	0.3	0.2	0.2
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	0.5	0.4	0.3
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	0.3	0.5	0.3
Other	4.1	2.7	2.8	3.9	3.0	5.6	5.9	6.0	5.8	5.1	6.8	6.1	6.3	5.5	5.9	4.5
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	11.7	12.1	15.7

Three Major Causes of ESRD



Proportion of RRT Modalities



Percent Distribution of Dialysis Modalities

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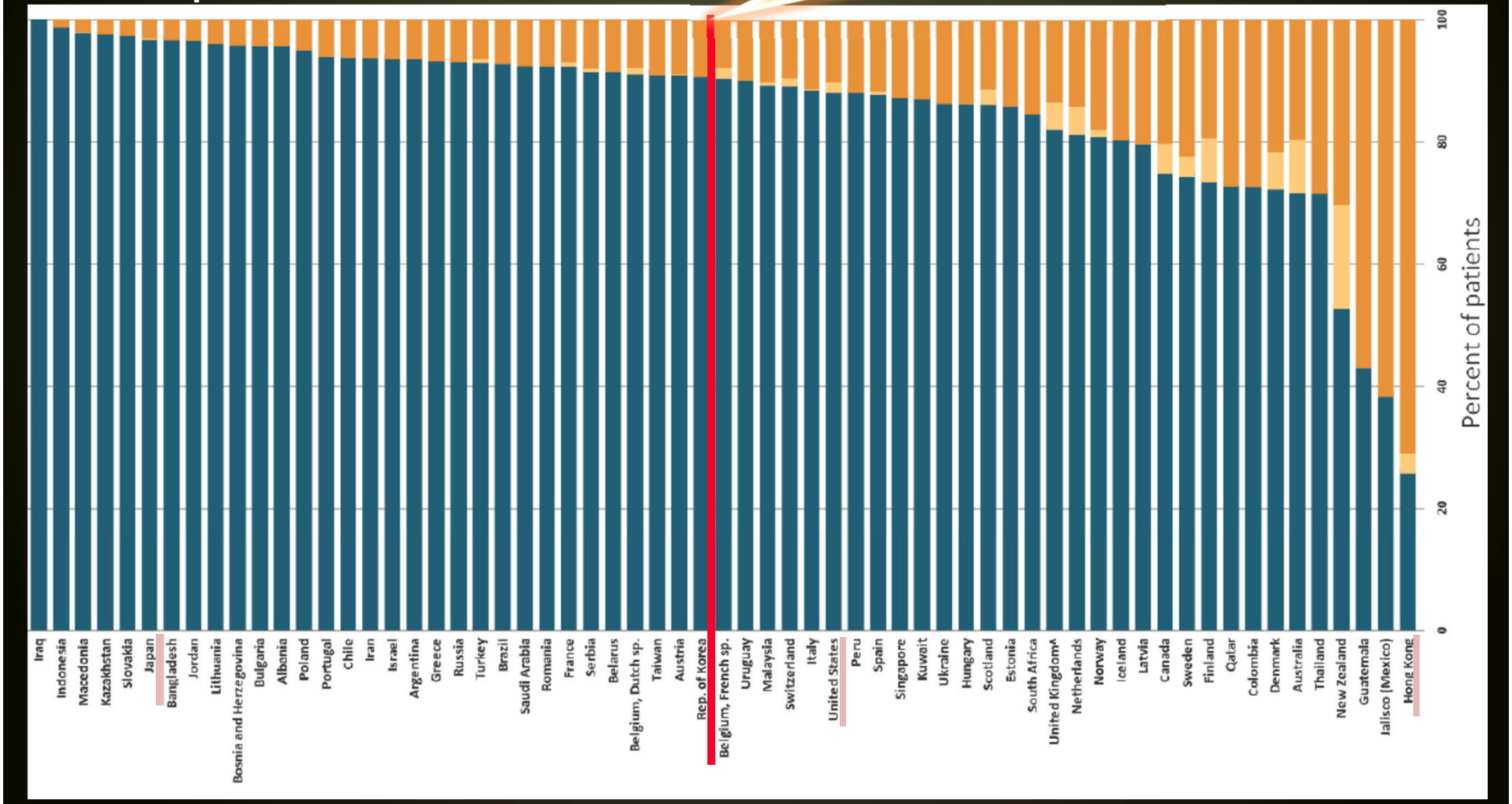
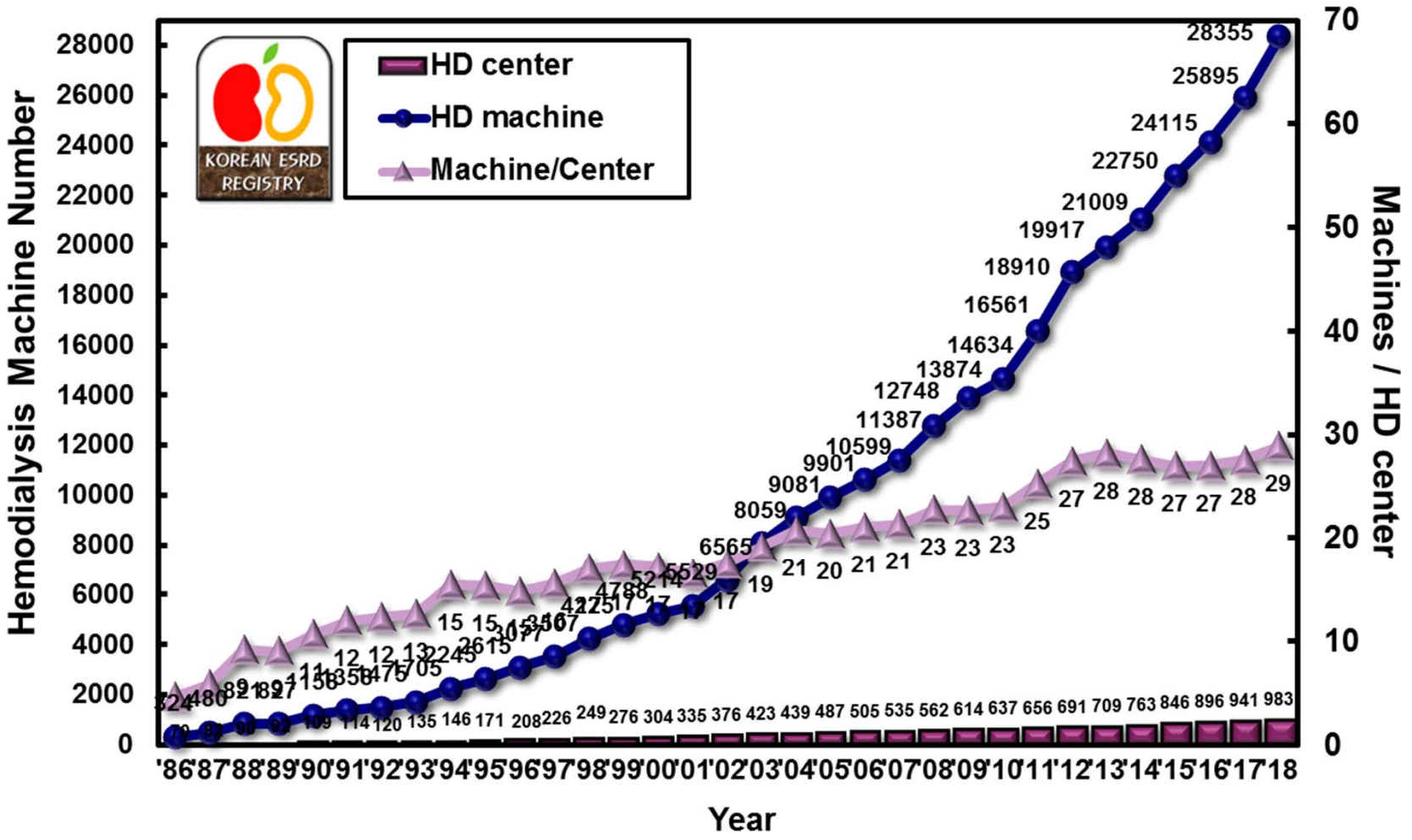


Number of HD Centers & HD Machines

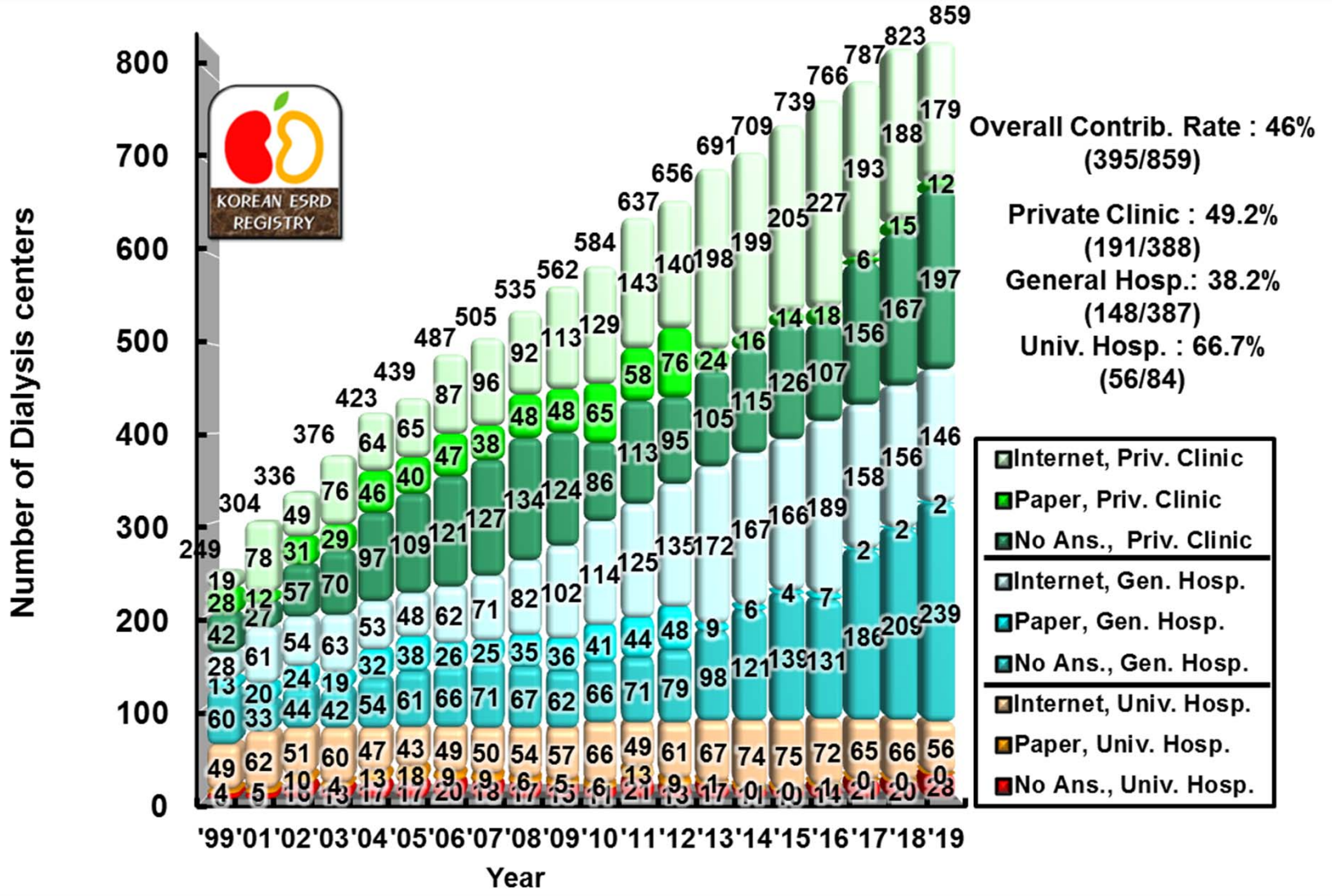


등록사업에 참여한 의료기관 수 및 응답률

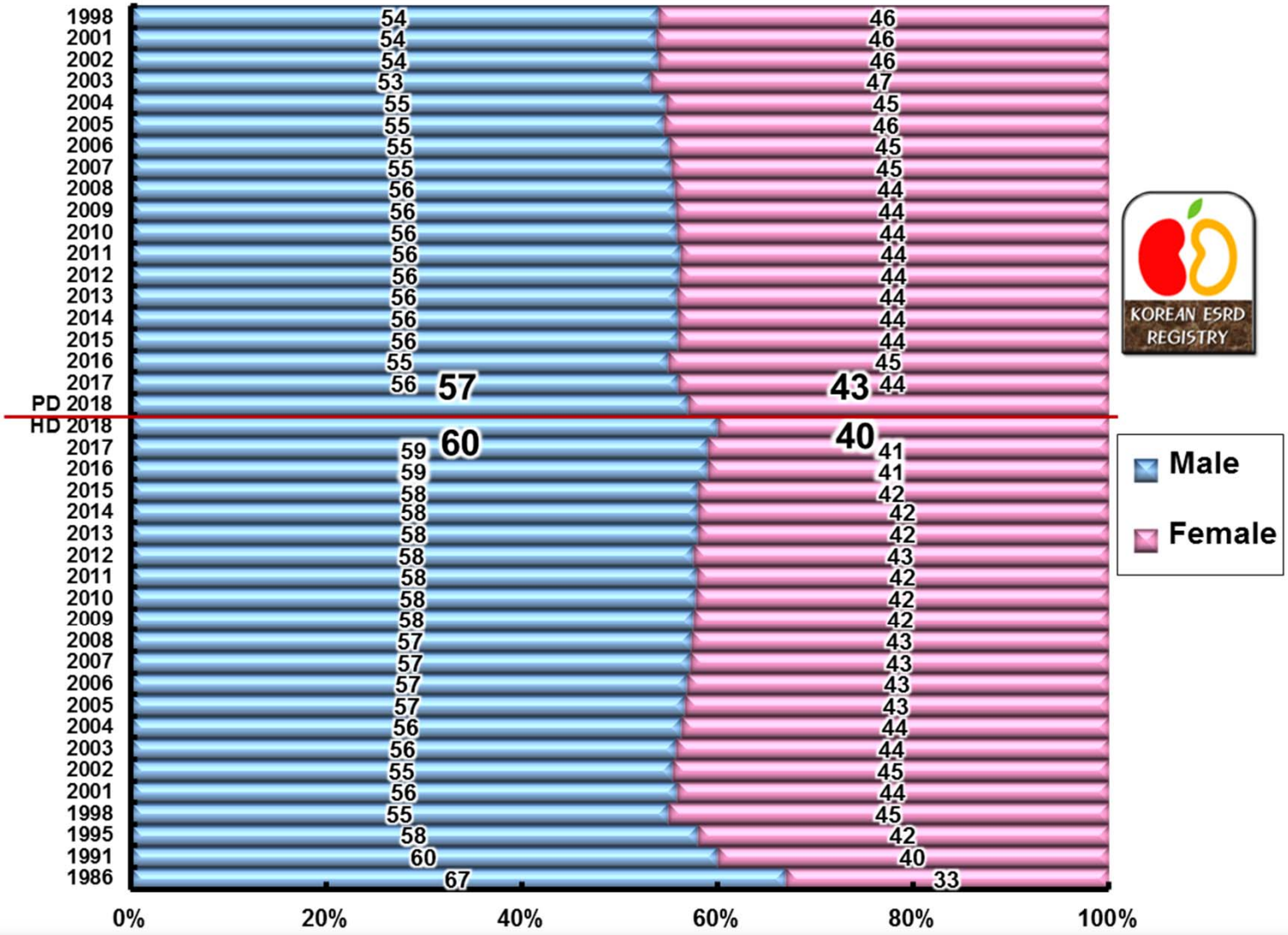
지역	총의료기관수 Dialysis Centers	인터넷 입력 Internet Registration	설문지응답 Paper Registration	등록의료기관 Contributed centers	응답률 Rate(%)
서울 Seoul	181	94	4	98	54.1
부산 Busan	59	28	1	29	49.2
대구 Daegu	42	17	2	19	45.2
인천 Incheon	50	12	1	13	26.0
광주 Gwangju	34	14	0	14	41.2
대전 Daejeon	20	10	0	10	50.0
경기 Gyeonggi	170	66	2	68	40.0
강원 Gangwon	27	17	0	17	63.0
충북 Chungbuk	31	15	1	16	51.6
충남 Chungnam	41	20	1	21	51.2
전북 Jeonbuk	28	10	0	10	35.7
전남 Jeonnam	37	14	0	14	37.8
경북 Gyeongbuk	46	22	1	23	50.0
경남 Gyeongnam	59	27	0	27	45.8
울산 Ulsan	18	9	0	9	50.0
제주 Jeju	13	5	1	6	46.2
세종 Sejong	3	1	0	1	33.3
전국 Total	859	381	14	395	46.0

* 투석의료기관 수에서 비윤리 의료기관 및 소수 환자 수 의료기관은 제외함.

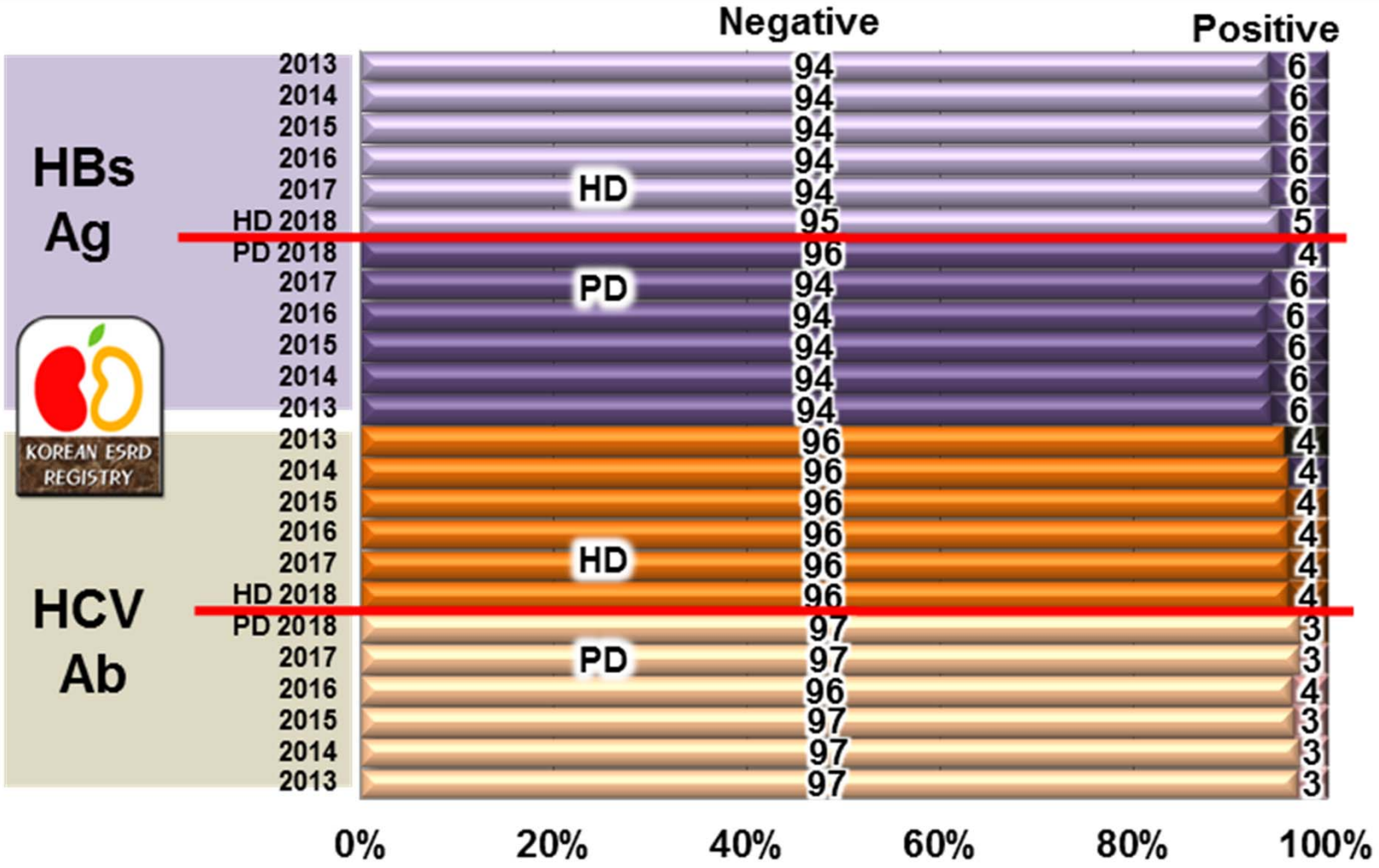
의료기관의 증가와 의료기관별 등록률



Gender Ratio of Dialysis Patients

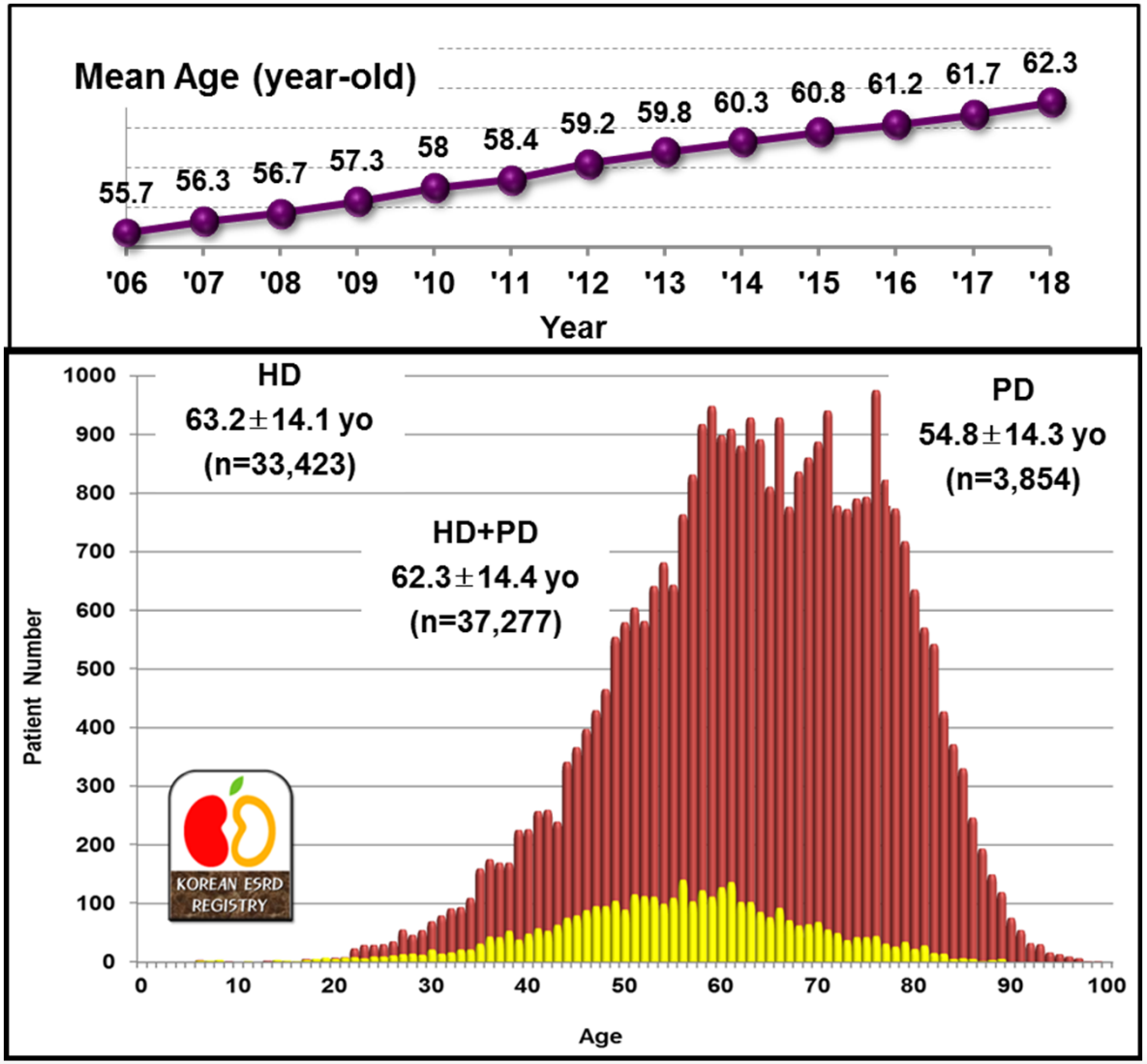


Hepatitis virus

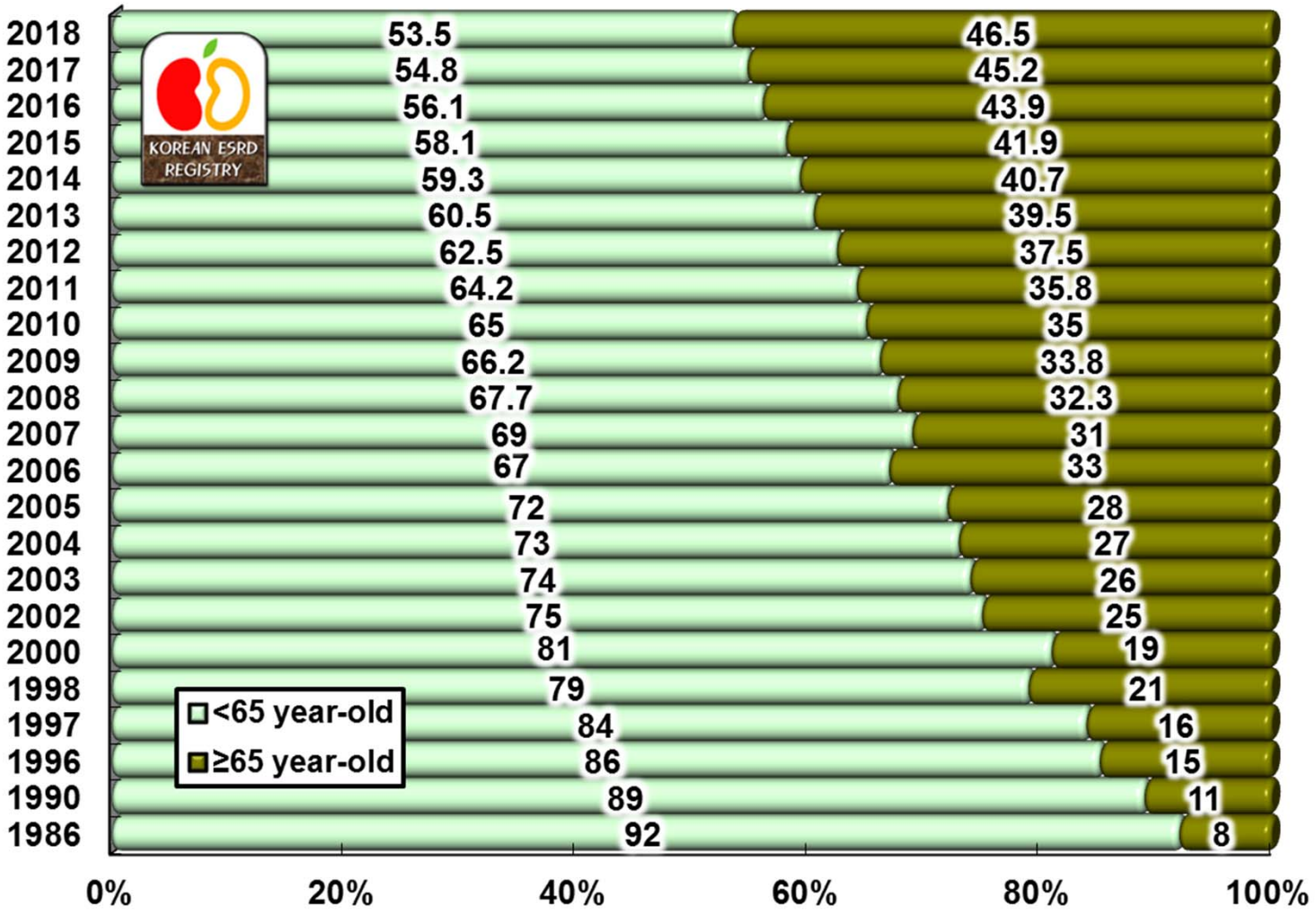


Insurance

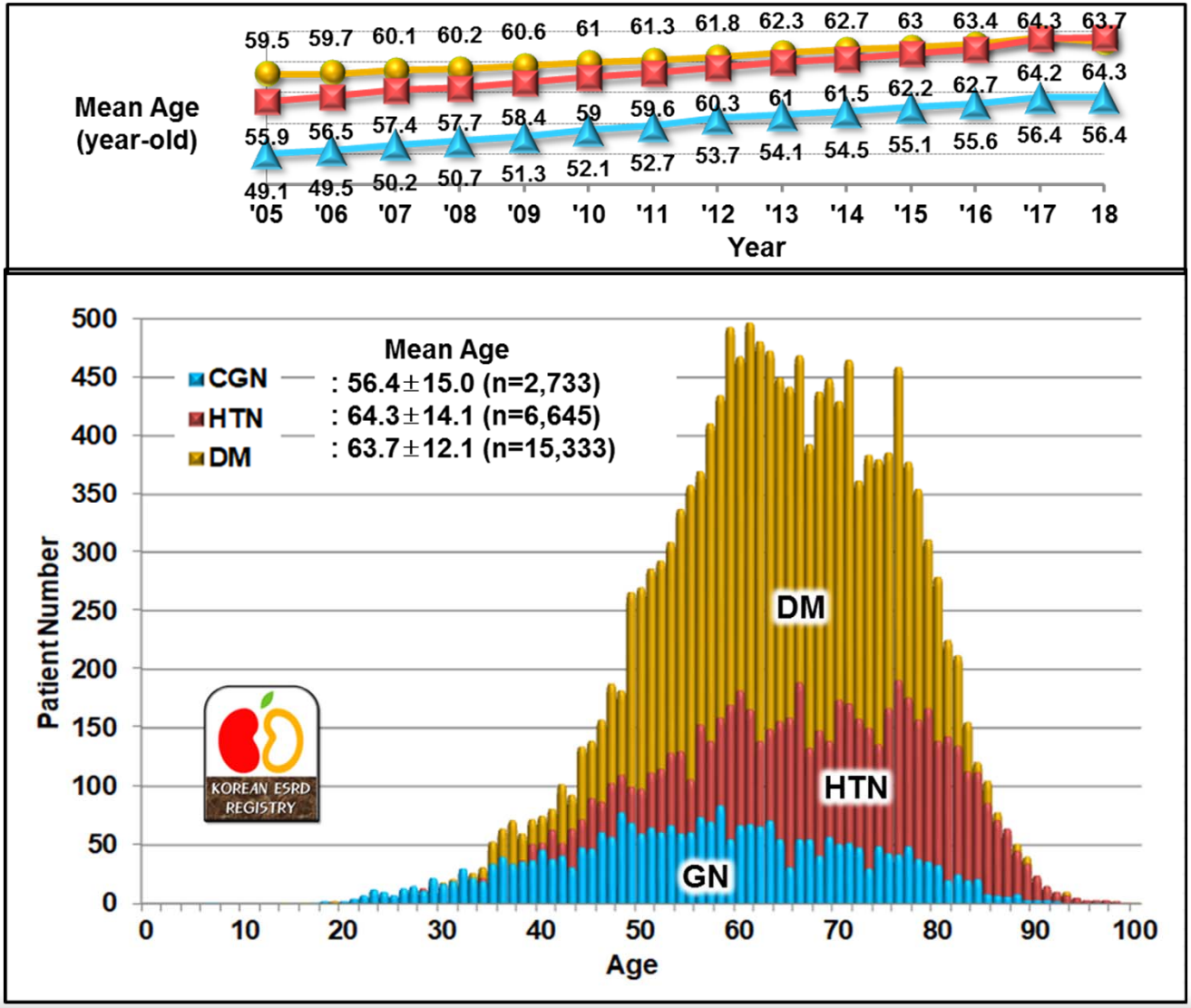
Age Distribution of Dialysis Patients



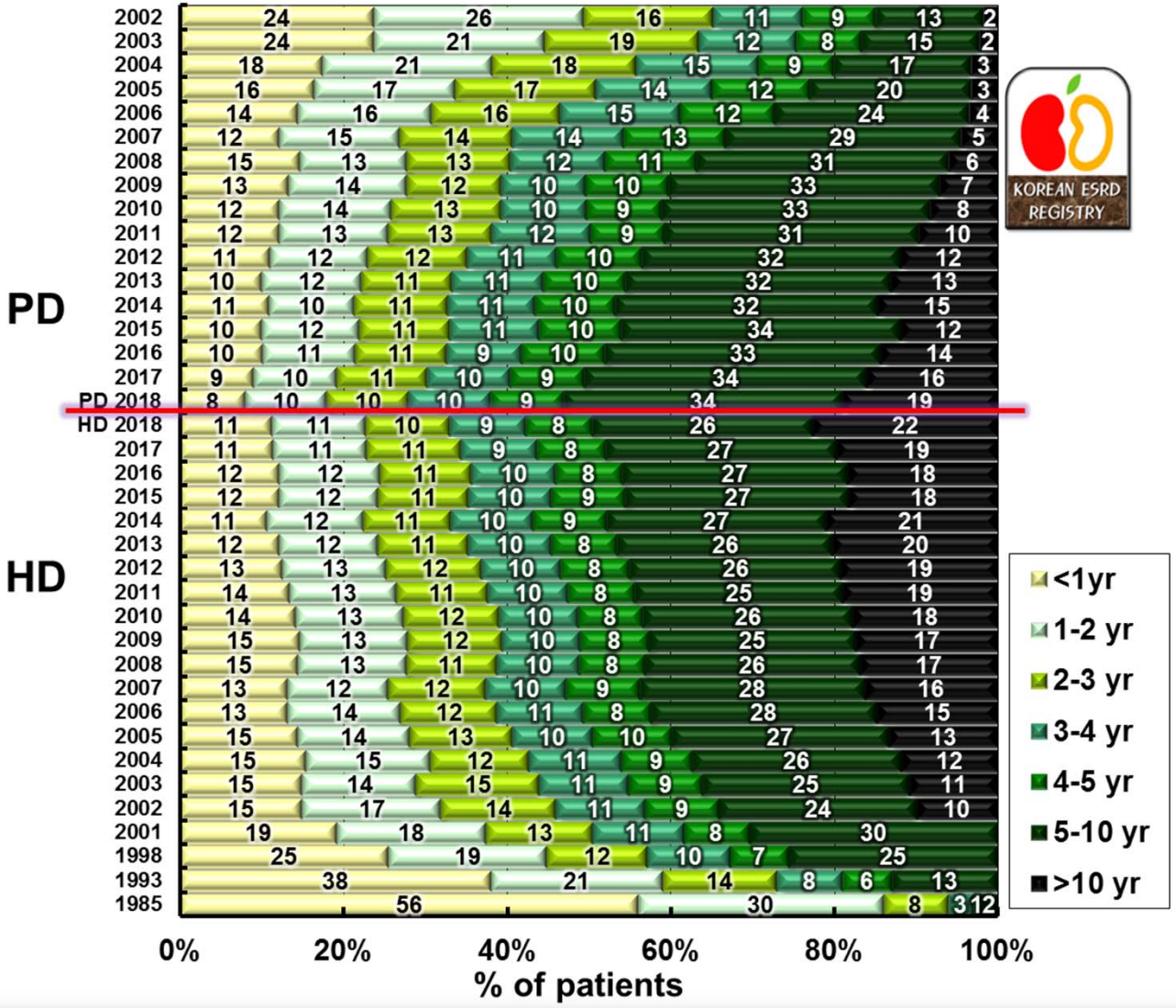
Percent of Elderly Dialysis Patients



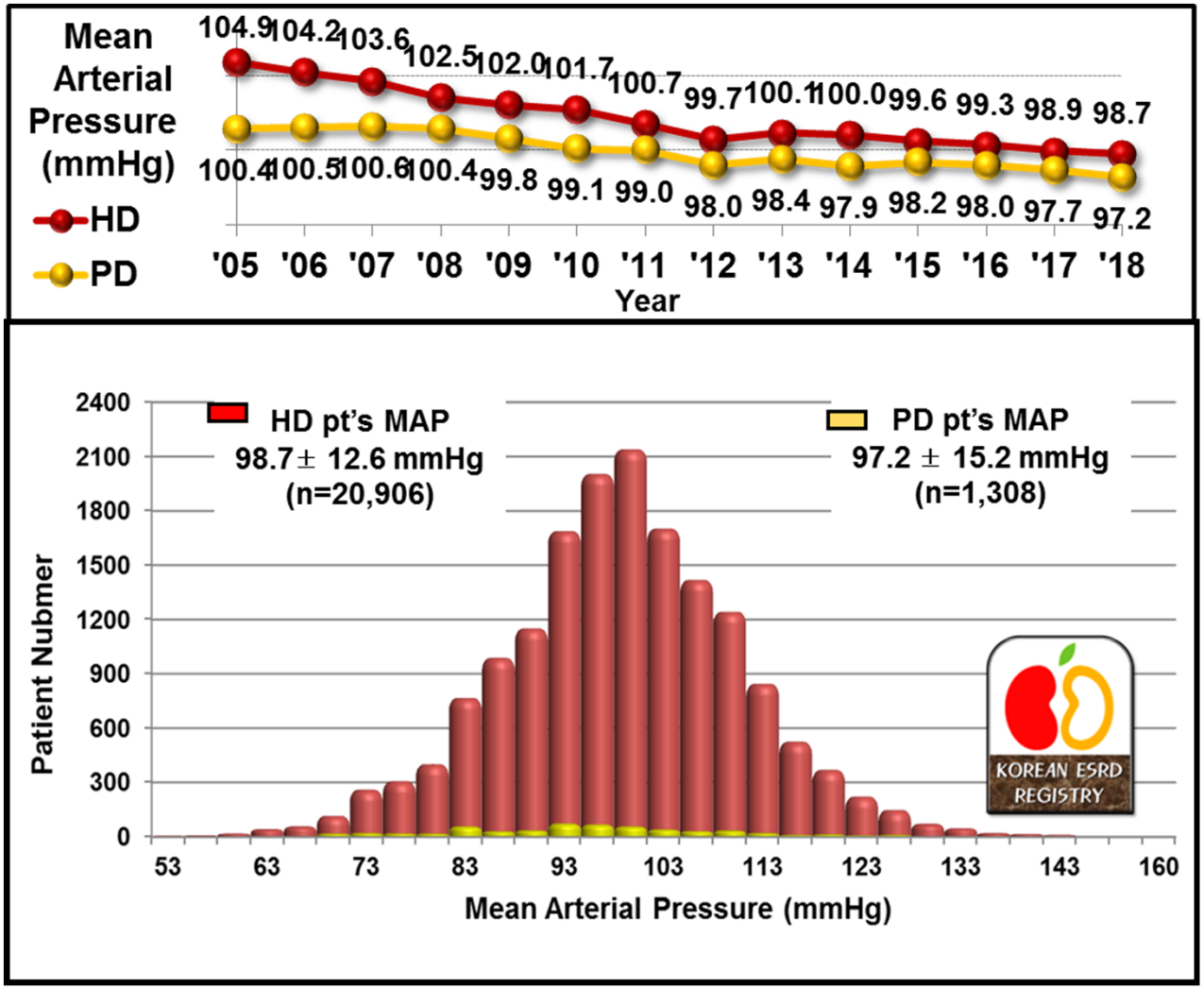
Age Distribution according to ESRD Causes



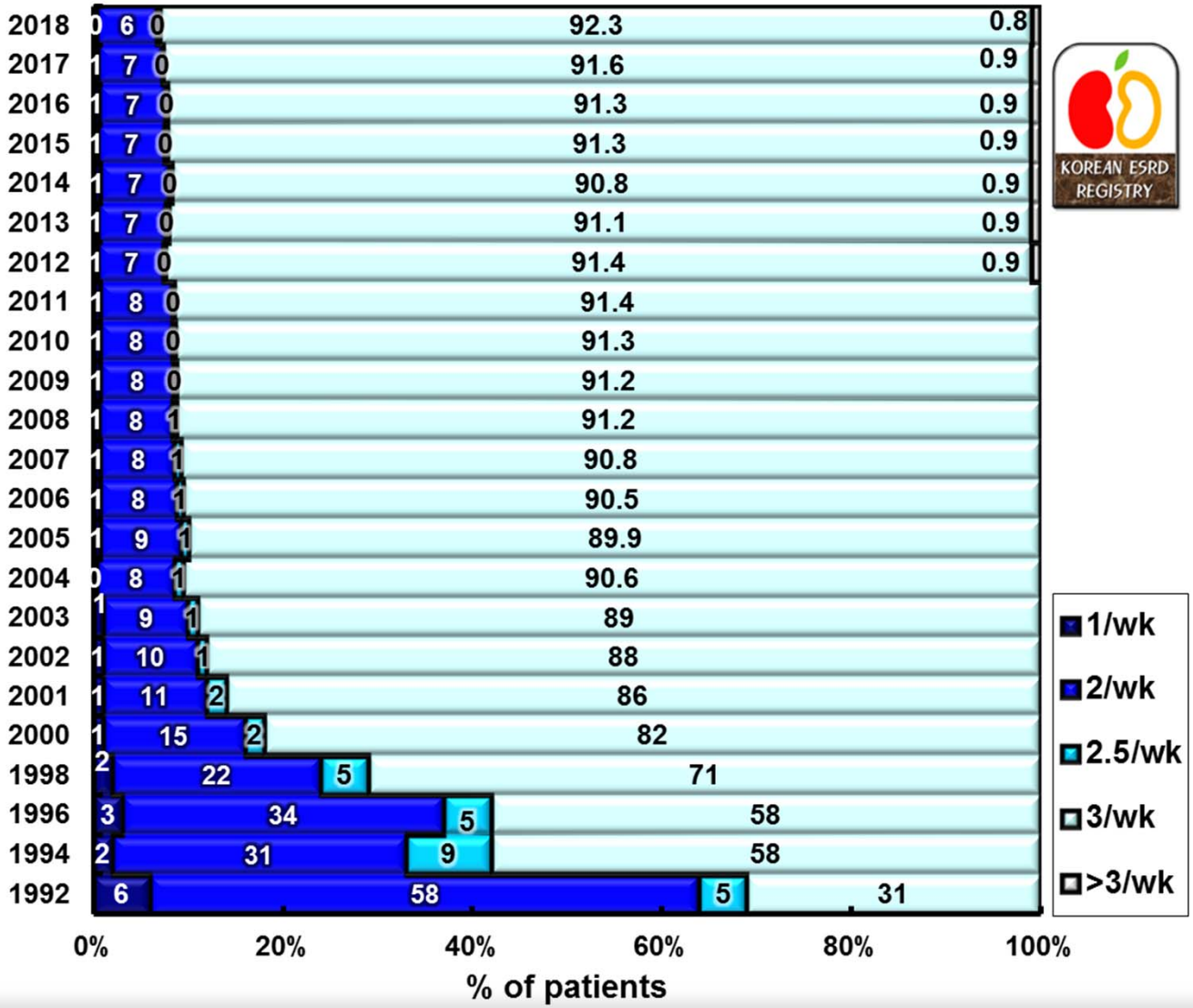
Duration of Dialysis Maintenance



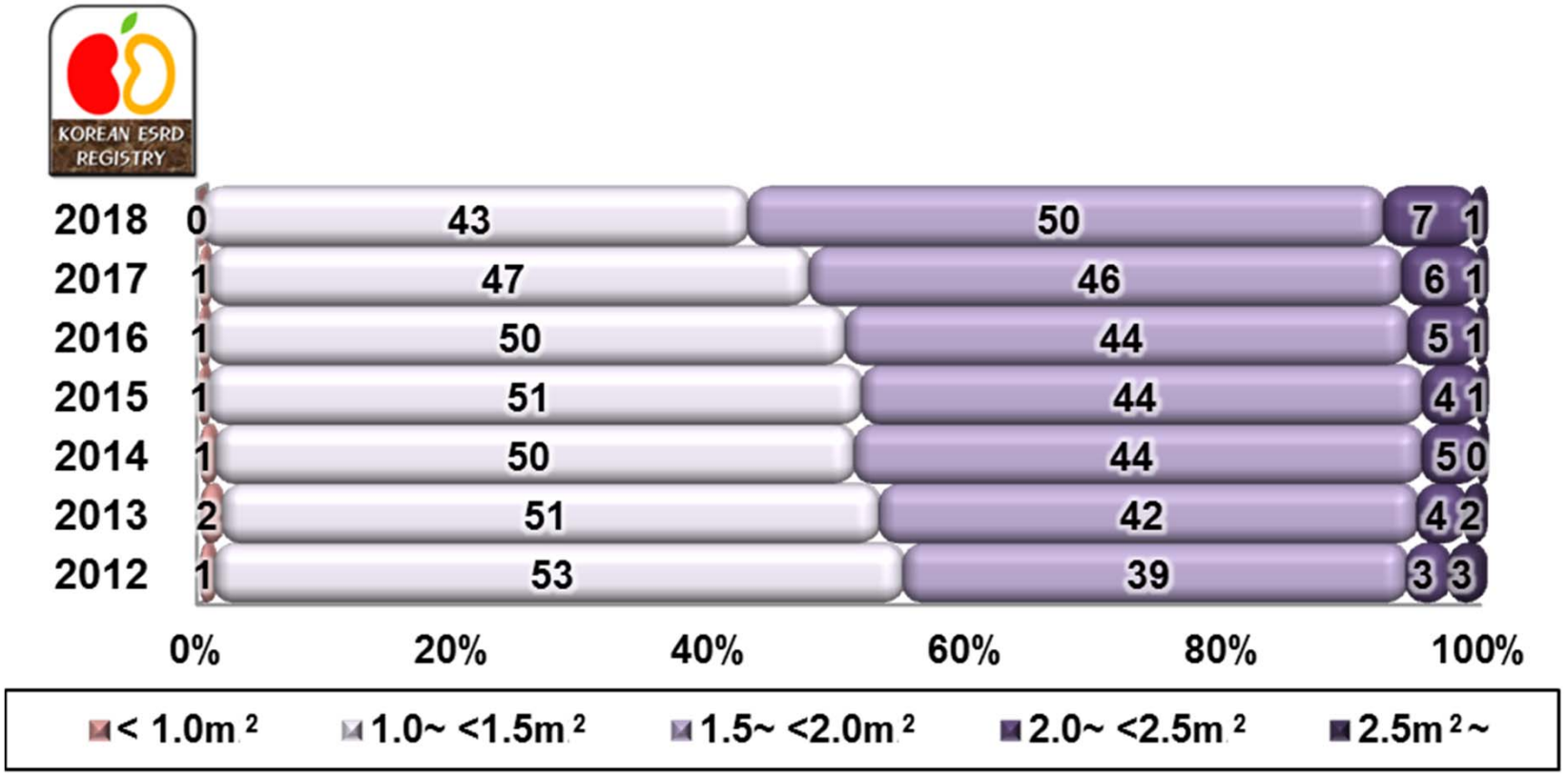
Mean Blood Pressure : HD & PD



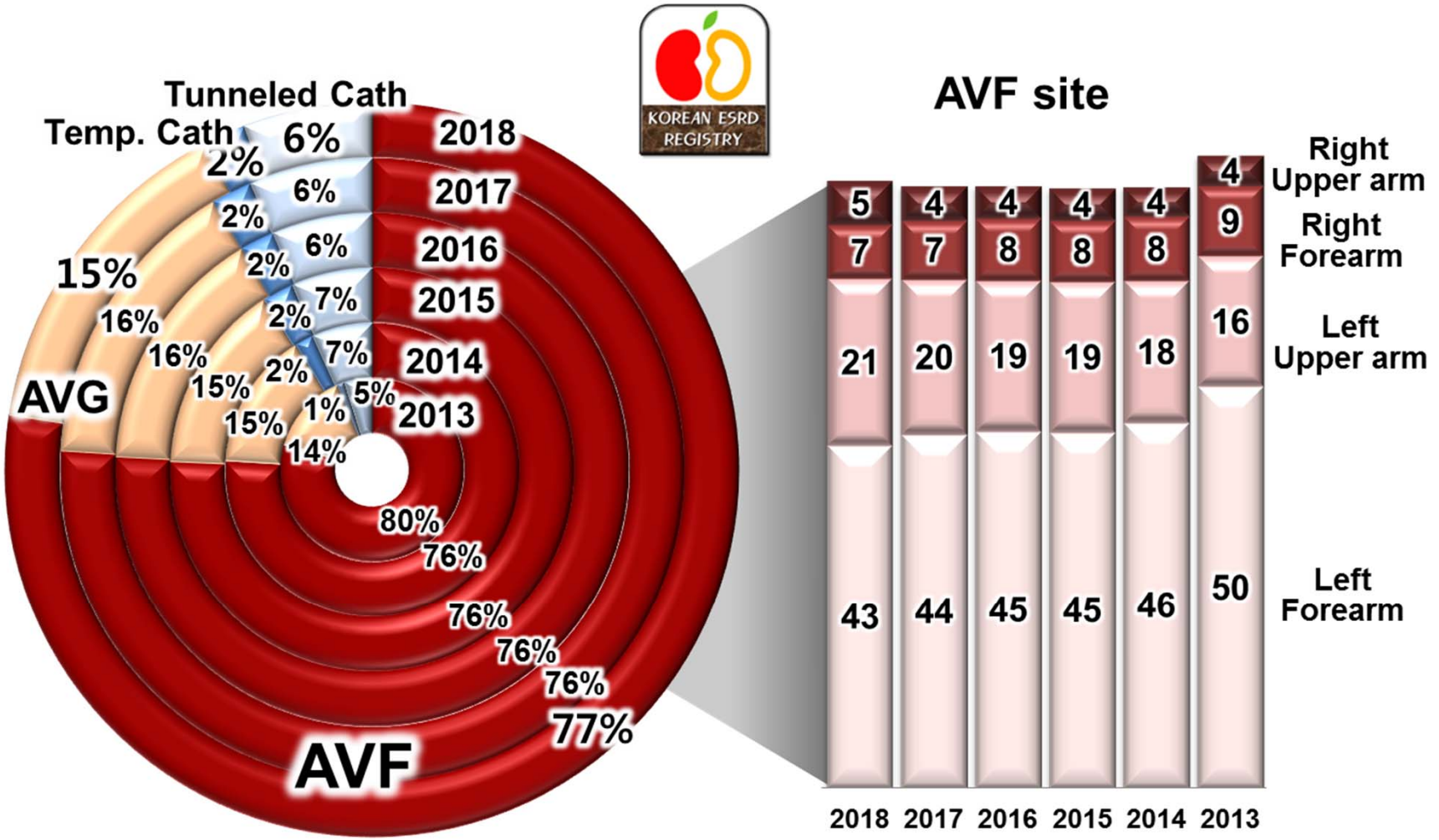
Frequency of HD per Week



Dialyzer Surface Area

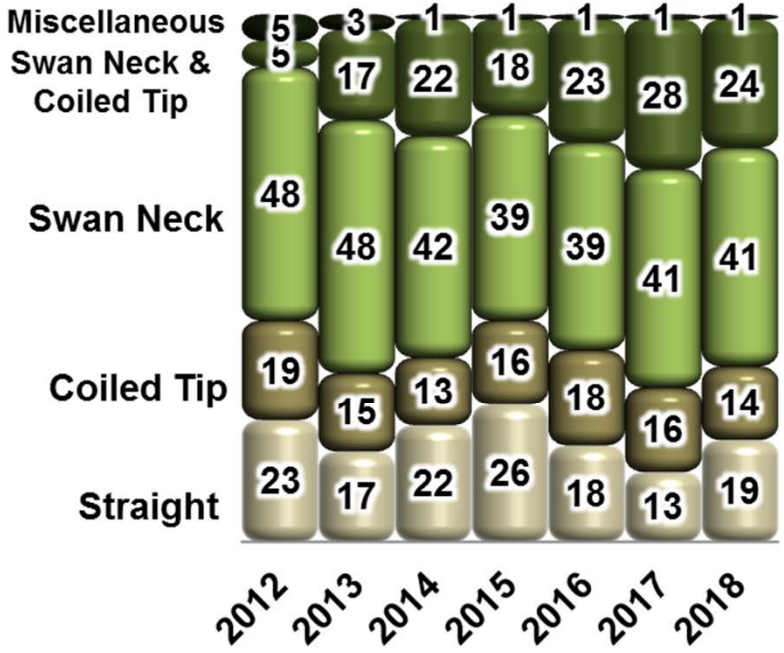


Vascular Access

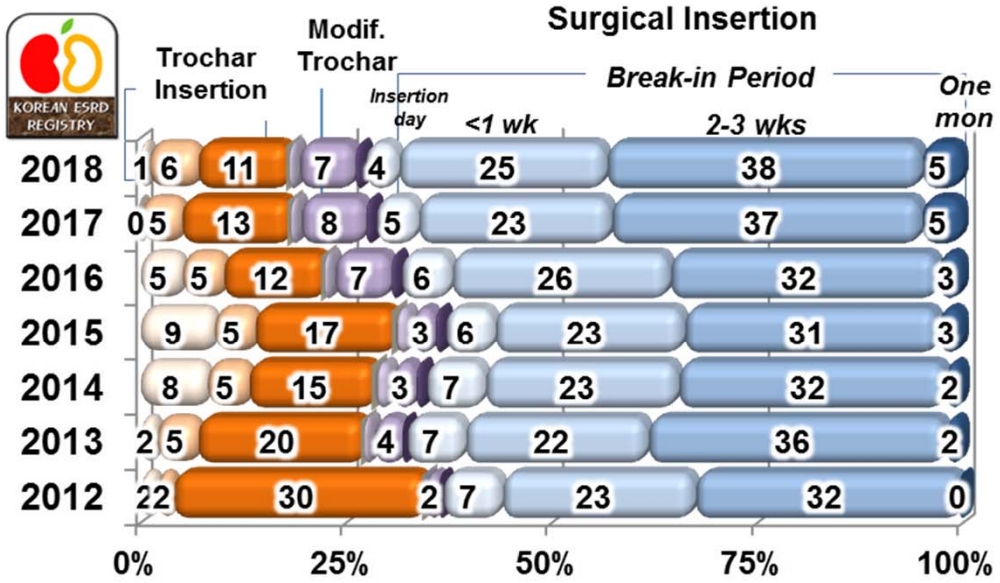


PD Catheter

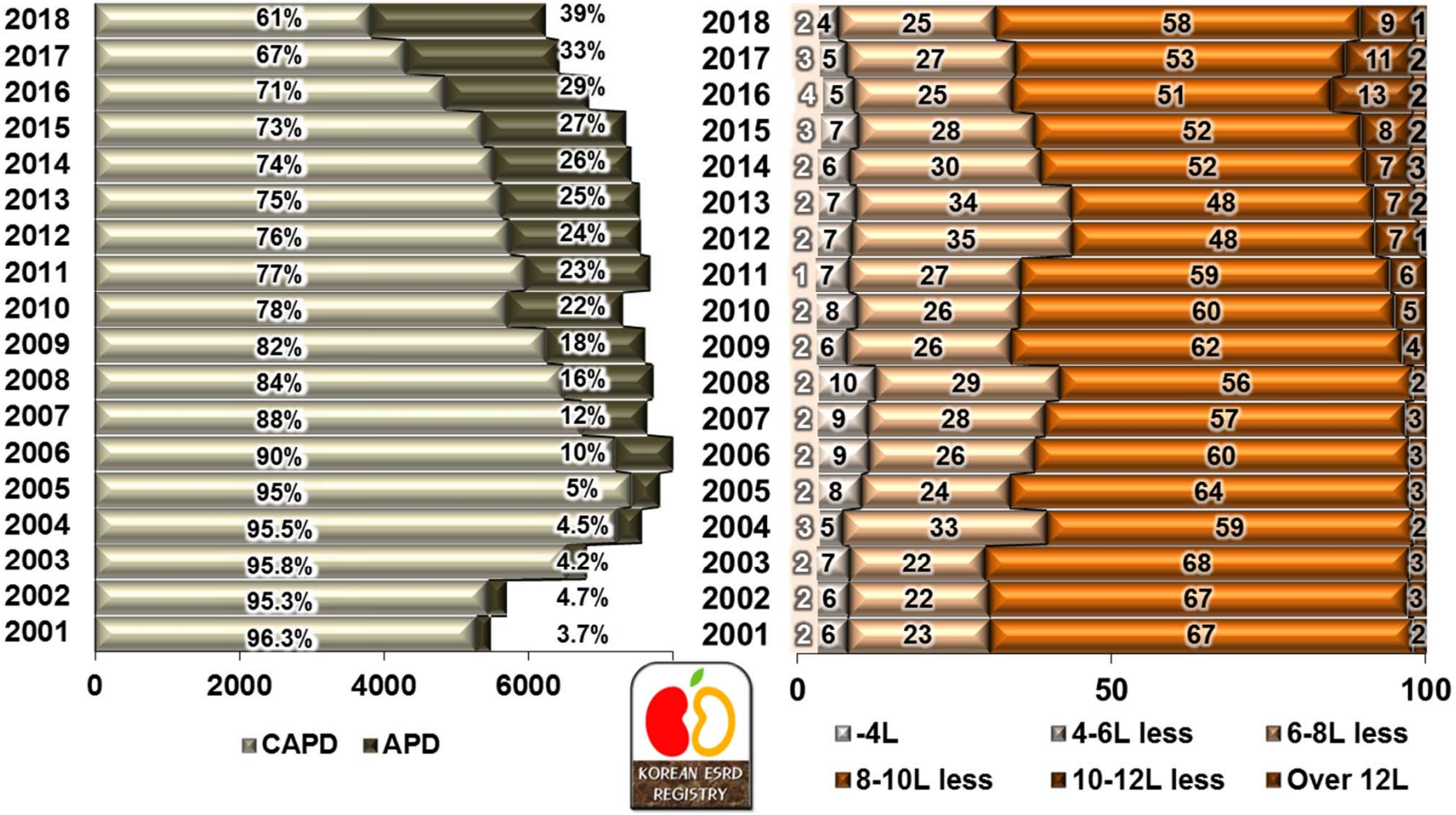
PD Catheter Type



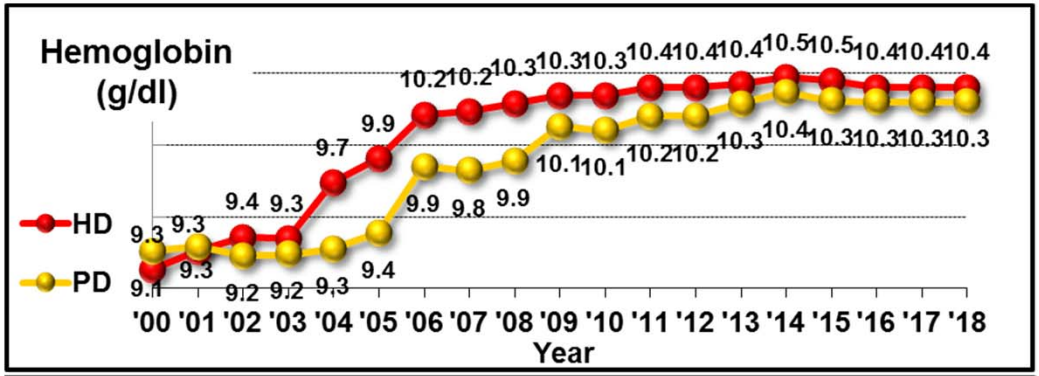
PD Catheter Insertion Method & Break-In Period

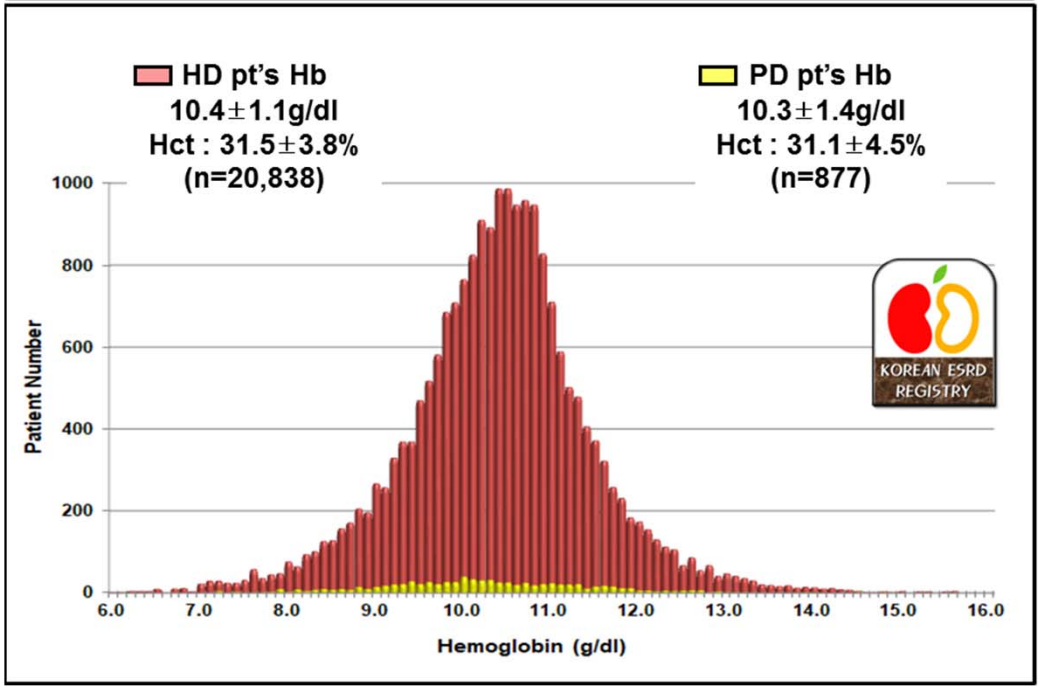


PD Type & Doses

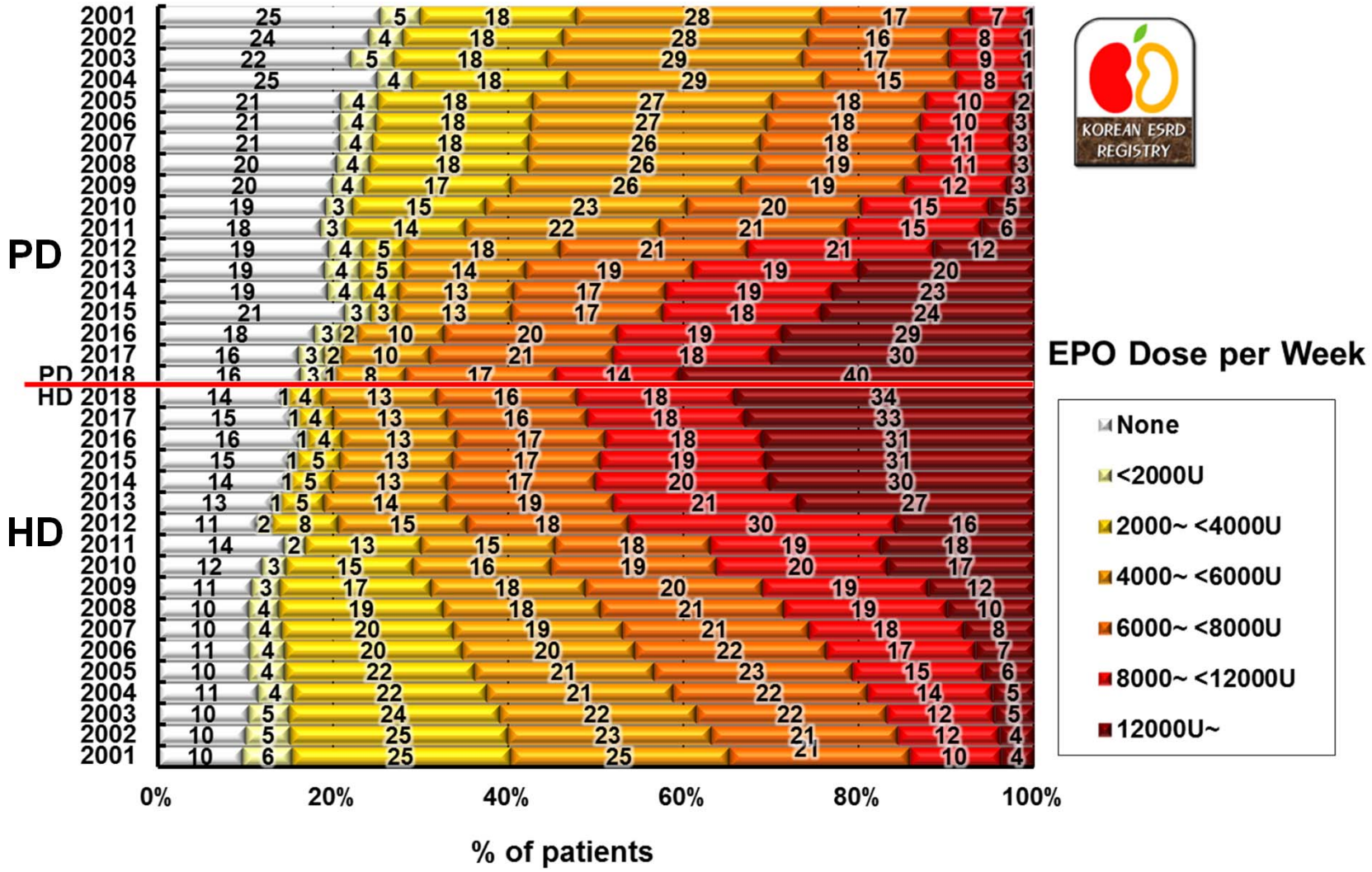


Hemoglobin : HD & PD

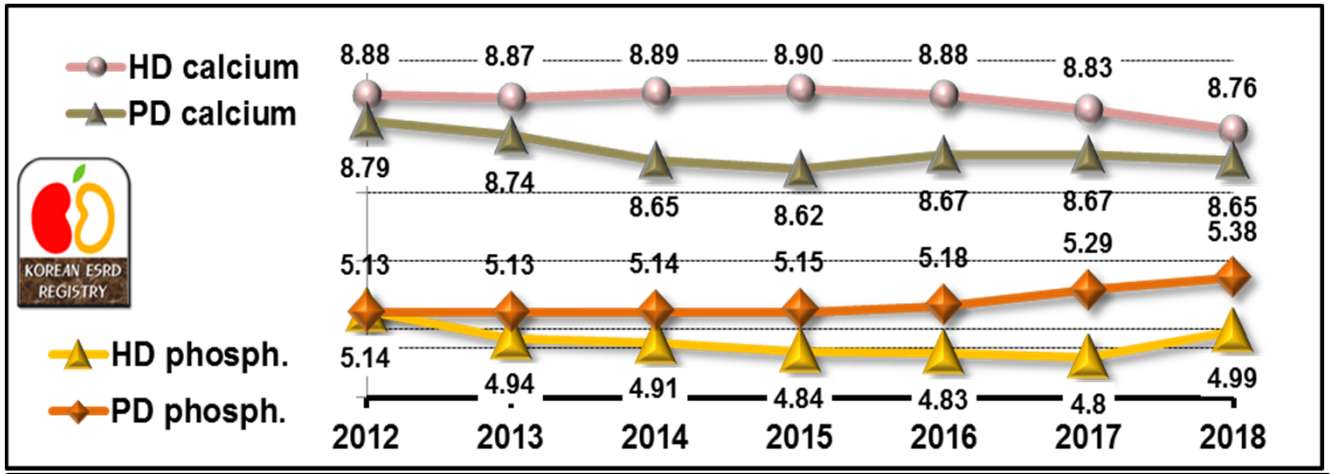


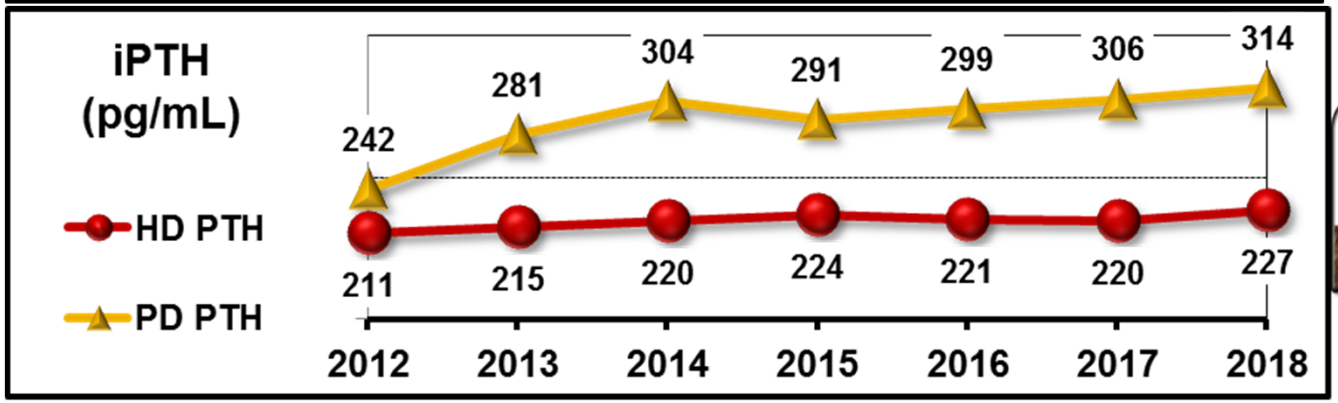


Erythropoietin Doses



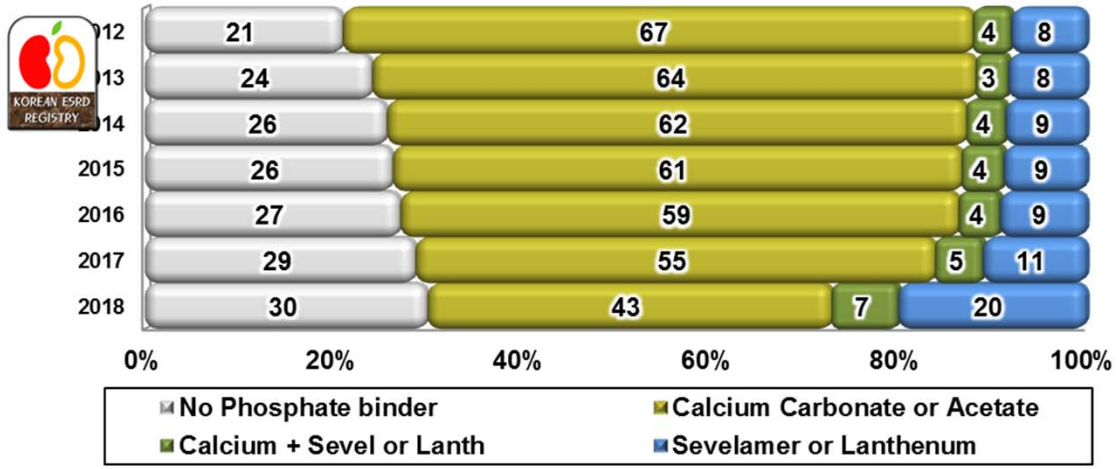
Calcium, Phosphorus & iPTH



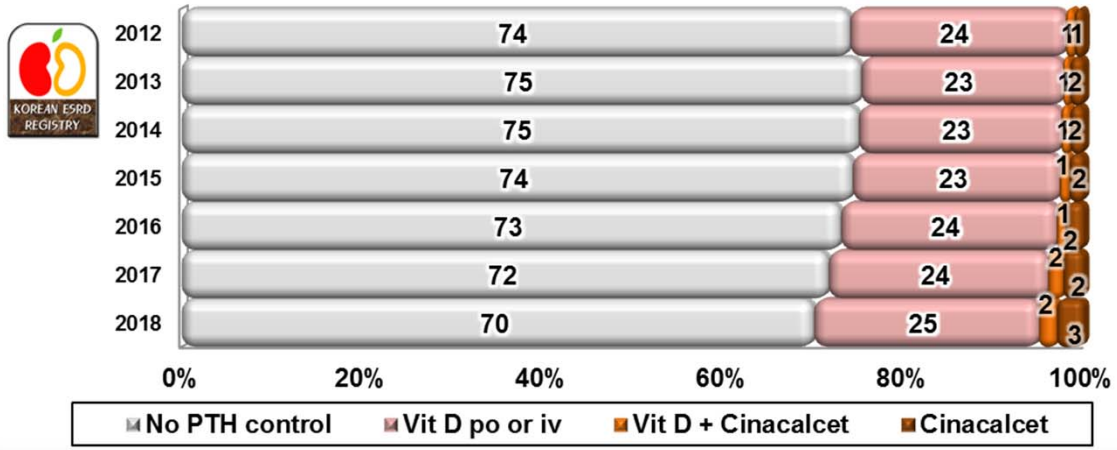


Phosphate Binders & PTH Control

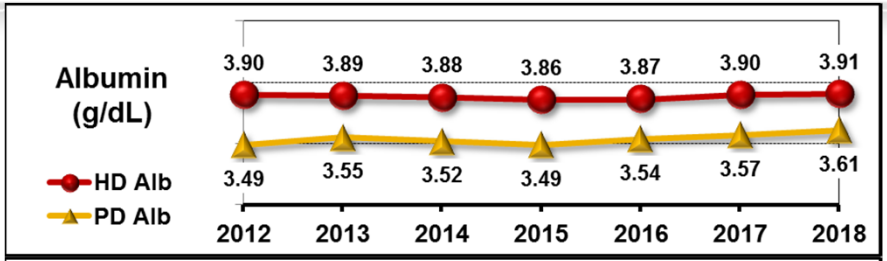
Phosphate Binders

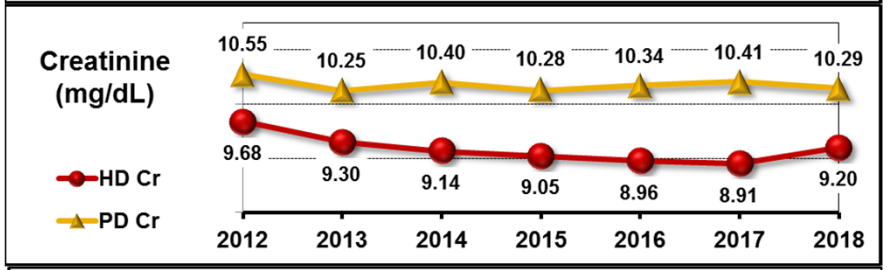


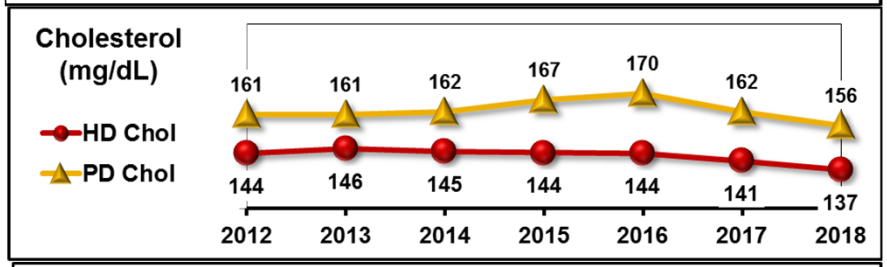
PTH Control

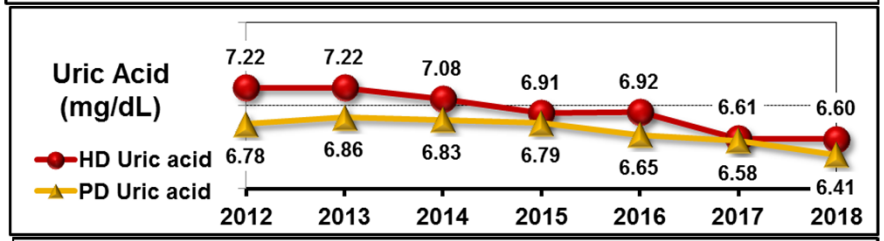


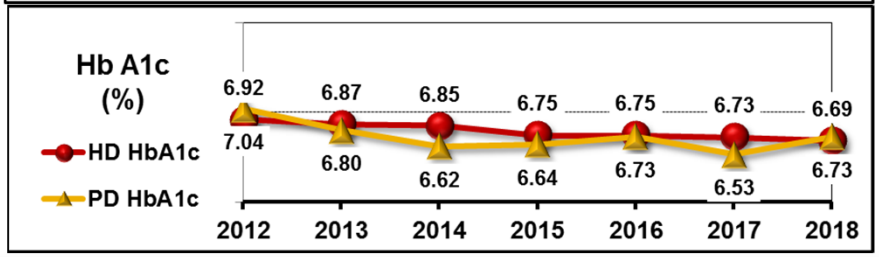
Misc Lab Data



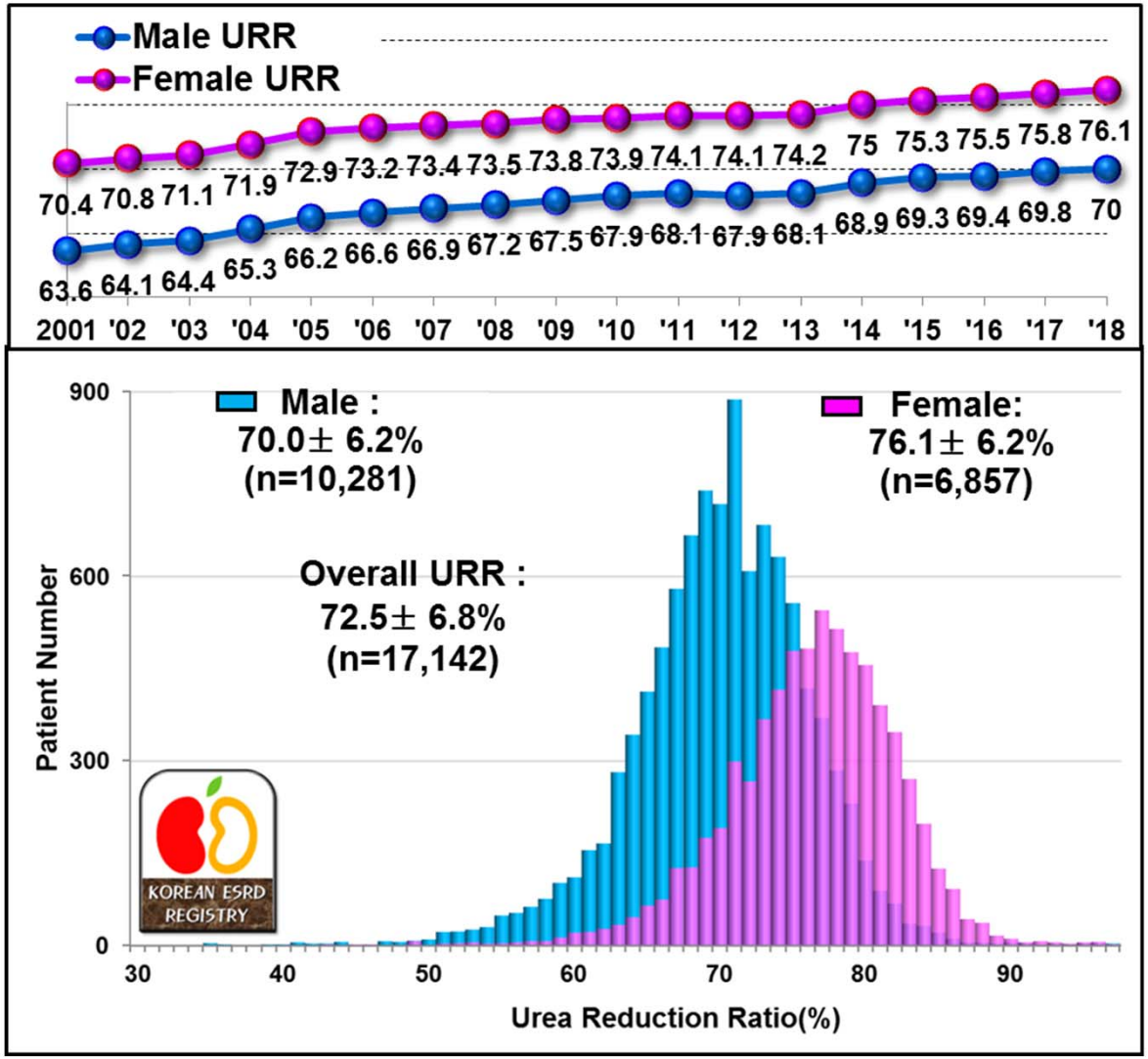




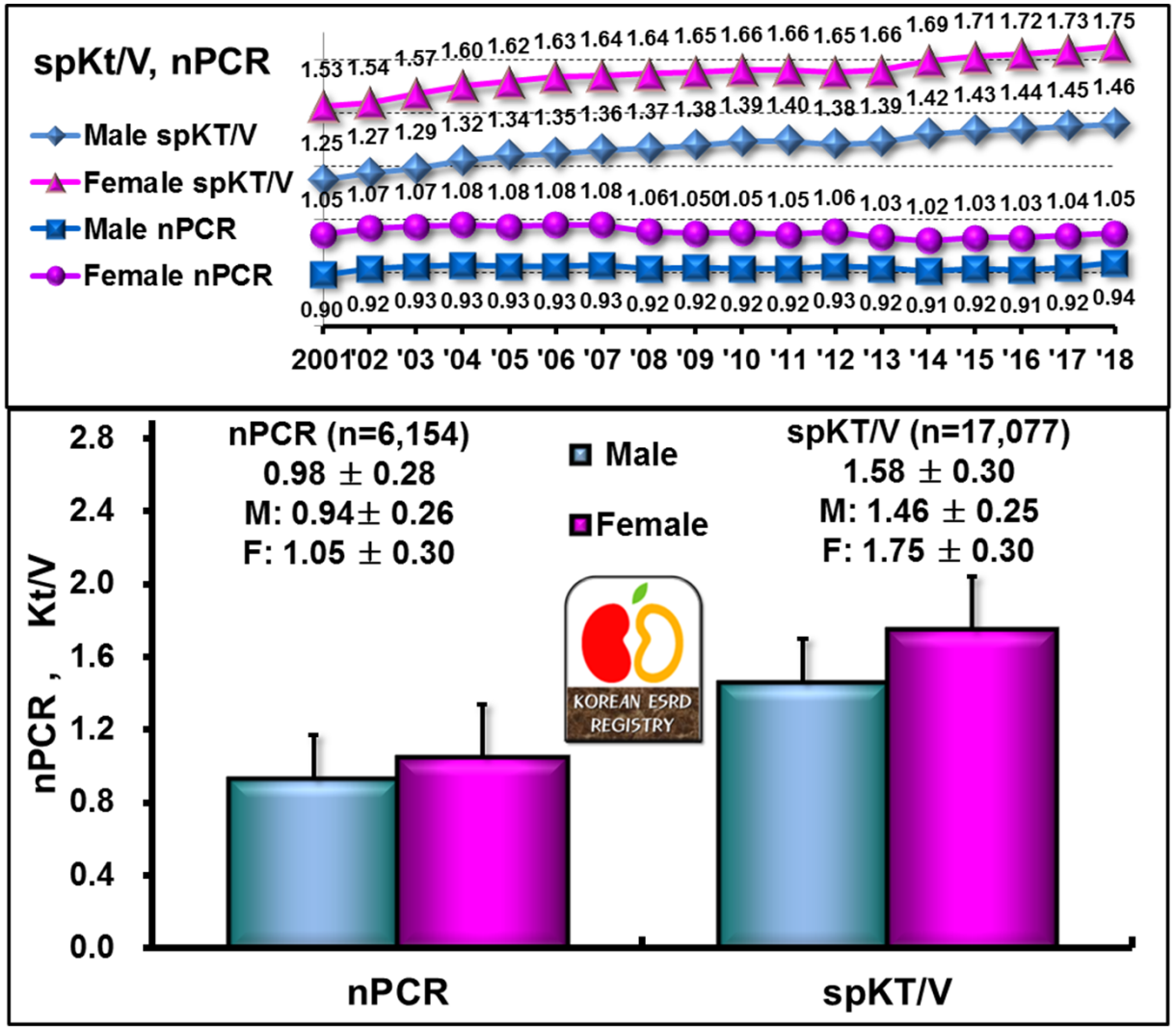




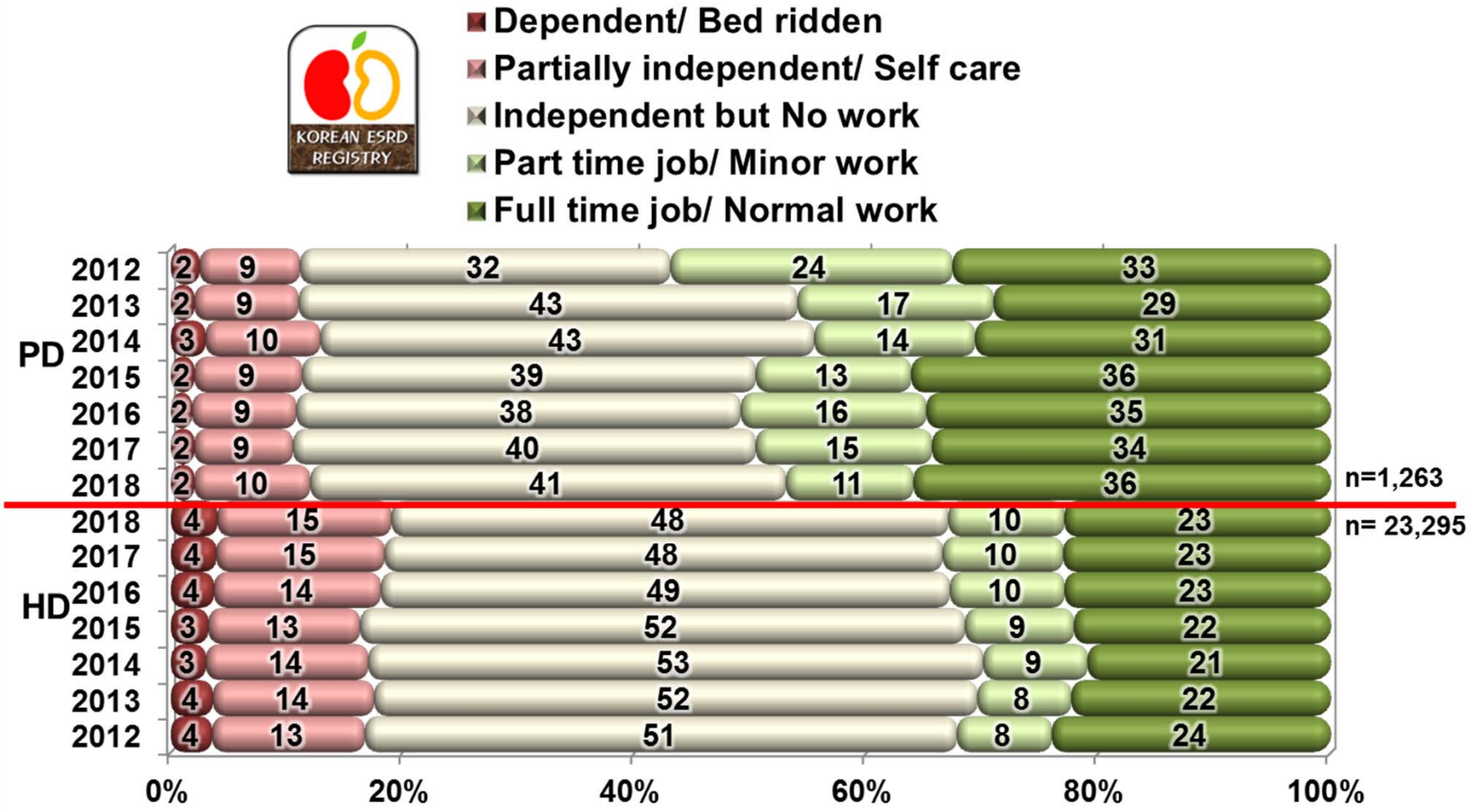
Urea Reduction Ratio



HD Adequacy


spKt/V, nPCR
Male spKT/V
Female spKT/V
Male nPCR
Female nPCR
1.53 1.54 1.57 1.60 1.62 1.63 1.64 1.64 1.65 1.66 1.66 1.65 1.66 1.69 1.71 1.72 1.73 1.75
1.25 1.27 1.29 1.32 1.34 1.35 1.36 1.37 1.38 1.39 1.40 1.38 1.39 1.42 1.43 1.44 1.45 1.46
1.05 1.07 1.07 1.08 1.08 1.08 1.08 1.06 1.05 1.05 1.05 1.06 1.03 1.02 1.03 1.03 1.04 1.05
0.90 0.92 0.93 0.93 0.93 0.93 0.93 0.92 0.92 0.92 0.92 0.93 0.92 0.91 0.92 0.91 0.92 0.94
2001 '02 '03 '04 '05 '06 '07 '08 '09 '10 '11 '12 '13 '14 '15 '16 '17 '18
nPCR (n=6,154)
0.98 ± 0.28
M: 0.94± 0.26
F: 1.05 ± 0.30
Male
Female
spKT/V (n=17,077)
1.58 ± 0.30
M: 1.46 ± 0.25
F: 1.75 ± 0.30
nPCR , Kt/V
2.8
2.4
2.0
1.6
1.2
0.8
0.4
0.0
KOREAN ESRD REGISTRY
nPCR
spKT/V

Rehabilitation of Dialysis Patients



Co-Morbidity of Dialysis Patients

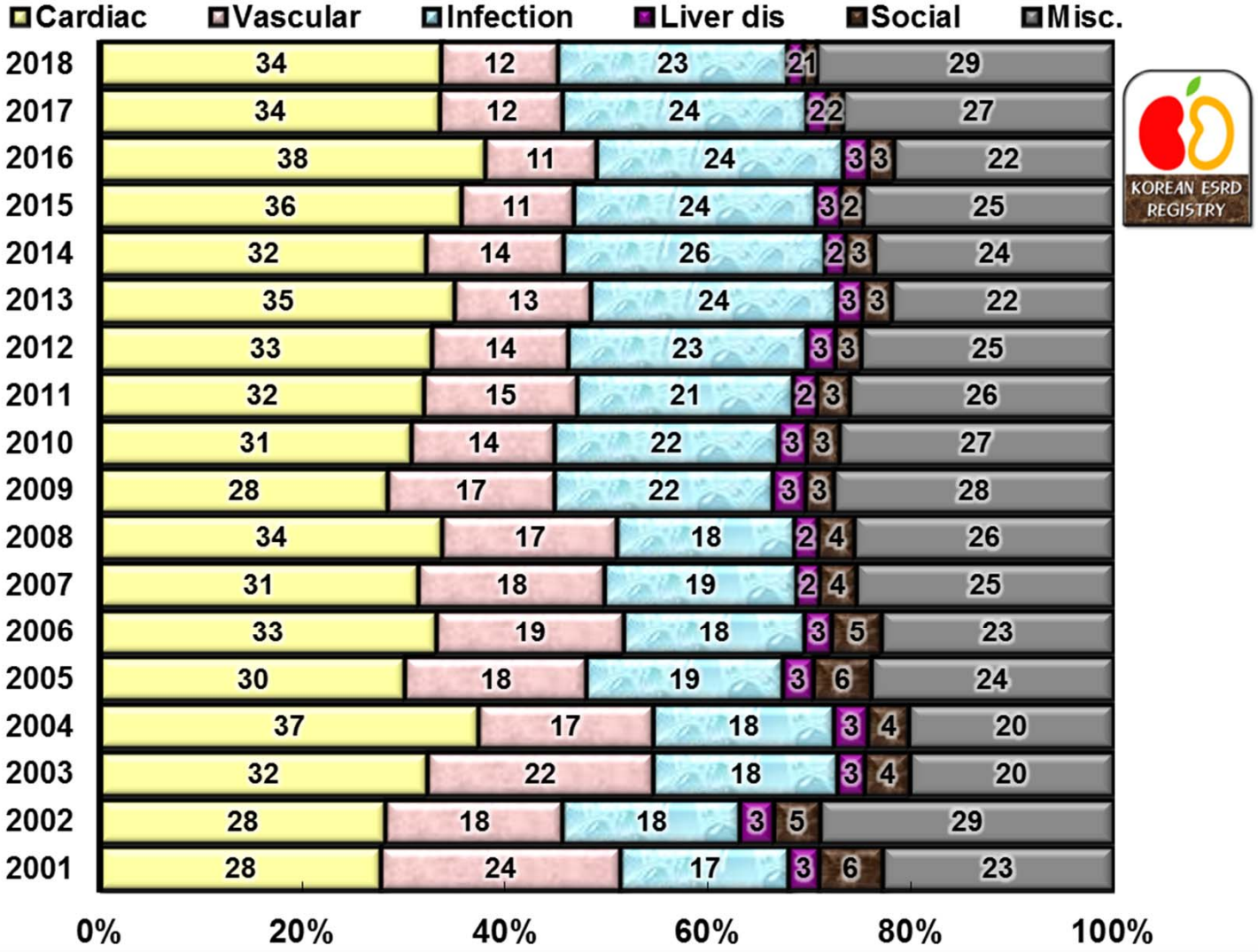
	HD (%, n=40,929)		PD (%, n=1,484)	
Cardiac	**18.8**		**12.2**	
Coronary Artery Disease		9.3		6.4
Congestive Heart Failure		4.9		4.1
Pericardial Effusion		0.4		0.2
Arrythmia		4.3		1.4
Vascular	**46.2**		**56.3**	
Cerebrovascular accident		3.8		3.1
Hypertension		39.8		51.7
Other vascular disease		2.6		1.5
Infection	**5.9**		**12.8**	
Pneumonia		1.8		1.7
Tuberculosis		0.5		0.9
Peritonitis		0.2		7.1
Herpes zoster		0.3		0.2
Access/ exit site infection		0.7		1.2
Other Infection		2.3		1.8
Liver disease	**4.5**		**3.6**	
Hepatitis B		2.5		2.9
Hepatitis C		1.4		0.5
Congestive Liver		0.1		0.0
Hemochromatosis		0.0		0.0
Other liver diseases		0.4		0.2
Gastrointestinal	**15.6**		**10.1**	
Gastric Ulcer		2.4		0.9
Duodenal Ulcer		0.3		0.1
Constipation		5.2		3.9
Other Gastrointestinal Diseases		7.7		5.3
Miscellaneous	**8.9**		**5.0**	
Malnutrition (Alb<2.5g/dl)		0.2		0.2
Malignancy		1.5		0.7
Hypertensive Retinopathy		0.4		0.0
Uremic Dermatitis		2.1		1.1
Uremic Neuritis		0.7		0.2
Uremic Dementia		0.2		0.2
Uremic Ascites / Pleural Effusion		0.3		0.0
Osteodystrophy		0.7		0.9
COPD & other pulm disease		0.6		0.4
Decubitus ulcer/ DM foot		2.2		1.3

Causes of Death (%), 1994-2018

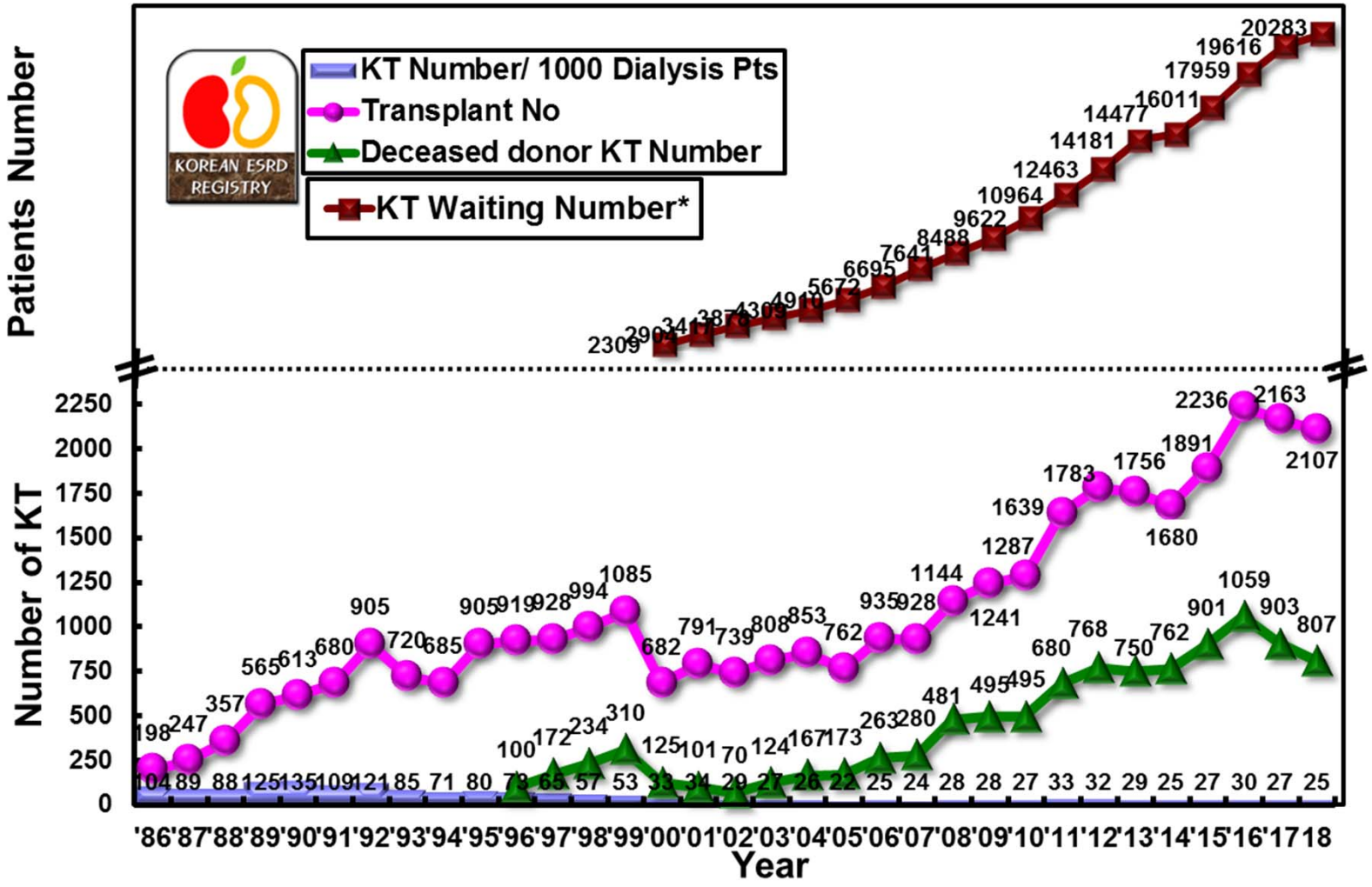
	1994-96	1998	2001	2003	2005	2007	2009	2011	2013	2014	2015	2016	2017	2018
Cardiac	27.4	27.4	26.9	31.7	30.7	31.7	29.5	32.7	35.8	32.5	36.1	38.1	33.7	33.7
Myocardial infarction	6.4	6.4	7.7	7.4	8	7.5	8.0	6.6	7.5	5.7	8.0	5.5	6.5	6.5
Cardiac arrest, uremia associated	13.7	13.7	11.2	11.7	10.4	10.8	8.5	11.0	14.2	14.1	13.1	13.3	12.7	12.4
Cardiac arrest, other cause	7.2	7.2	8.1	12.5	12.4	13.3	13	15.0	14.2	12.6	15.0	19.3	14.5	14.8
Vascular	17.2	17.2	22.7	19.5	17	17.8	15.9	14.1	13.3	13.2	11.8	10.8	11.4	11.5
Cerebrovascular accident	14.3	14.3	15.1	14.5	12.3	13	11	8.7	8.7	8.5	6.5	6.2	6.2	5.6
Pulmonary embolus	0.2	0.2	0.5	0.1	0.6	0.5	0.2	0.2	0.2	0.2	0.9	0.4	0.3	0.3
Gastrointestinal hemorrhage	1.7	1.7	2.7	3.2	1.7	2.7	2.3	2.2	1.2	1.7	1.4	2.0	0.8	1.7
Gastrointestinal embolism	0.1	0.1	0.1	0	0.5	0.1	0.5	0.1	0.2	0.2	0.7	0.3	0.3	0.2
Other vascular disease	0.9	0.9	4.3	1.6	1.9	1.6	1.9	3.0	3.0	2.6	2.4	1.9	3.7	3.7
Infection	13.5	13.5	17.8	20.5	20.1	20.2	21.9	23.1	23.5	26.8	24.6	24.5	25.2	22.6
Pulmonary infection	2.5	2.5	4.5	3.6	4.5	4.4	5.9	8.4	8.4	9.0	8.9	9.3	7.7	8.6
Septicemia	6.6	6.6	6.9	9.7	9.6	11.7	10.4	9.7	11.9	13.6	11.0	10.2	12.2	10.6
Tuberculosis	0.3	0.3	0.8	0.2	0.3	0.2	0.3	0.1	0.1	0.1	1.1	0.1	0.2	0.0
Peritonitis	2.1	2.1	1.1	2	1.4	1.1	0.8	1.0	0.5	0.7	1.1	1.2	0.7	0.6
Other Infection	2	2	4.5	4.9	4.3	2.9	4.5	4.0	2.7	3.4	2.4	3.6	4.5	2.7
Liver disease	3.4	3.4	2.6	2.8	2.7	2.2	3.1	2.1	2.4	2.2	2.6	2.3	2.0	1.6
Liver failure due to hepatitis B	1.8	1.8	1.6	1.8	1.5	1.3	2.2	1.0	1.3	1.0	1.1	0.9	1.1	0.6
Liver failure due to other cause	1.6	1.6	1	1	1.2	0.8	0.9	1.1	1.1	1.2	1.5	1.5	1.0	1.0
Social	6.2	6.2	6.3	4.4	5.4	3.3	2.5	3.3	2.8	2.5	2.0	2.5	1.5	1.3
Patient refused further treatment	2.9	2.9	2.1	1	1.1	1.1	0.5	0.4	0.3	0.3	0.3	0.5	0.1	0.0
Suicide	2.5	2.5	3.3	2.3	3.3	1.5	1.3	1.4	1.3	1.6	1.0	1.5	0.8	0.8
Therapy ceased for other reason	0.8	0.8	0.9	1	1	0.7	0.8	1.5	1.2	0.7	0.8	0.5	0.6	0.5
Miscellaneous	32	32	23.7	21.3	24	24.8	27.1	24.7	22.2	22.9	23.0	21.8	26.2	29.3
Cachexia	2.9	2.9	8.1	6.6	4	4.4	3.3	2.7	1.6	1.5	1.4	0.9	1.0	1.0
Malignant disease	2.1	2.1	4.4	3.5	6.4	5.7	5.7	6.0	5.7	6.0	5.8	6.5	6.6	6.0
Accident	1.2	1.2	0.9	1.1	1.4	1.2	1.3	1.6	1.4	2.0	1.0	1.0	1.1	1.3
Uncertain	25.8	25.8	10.3	10.1	12.3	13.4	16.8	14.5	13.4	13.4	14.8	13.4	17.6	21.0

*Number of patients :1994-1996=981, 1998=911, 2001=761, 2003=894, 2005=1,256, 2007=1,531, 2009=1,727, 2011=1,828, 2013=1,604, 2014=1,534, 2015=891, 2016=1,849, 2017=1,771, 2018=2,432.

Causes of Death (%)

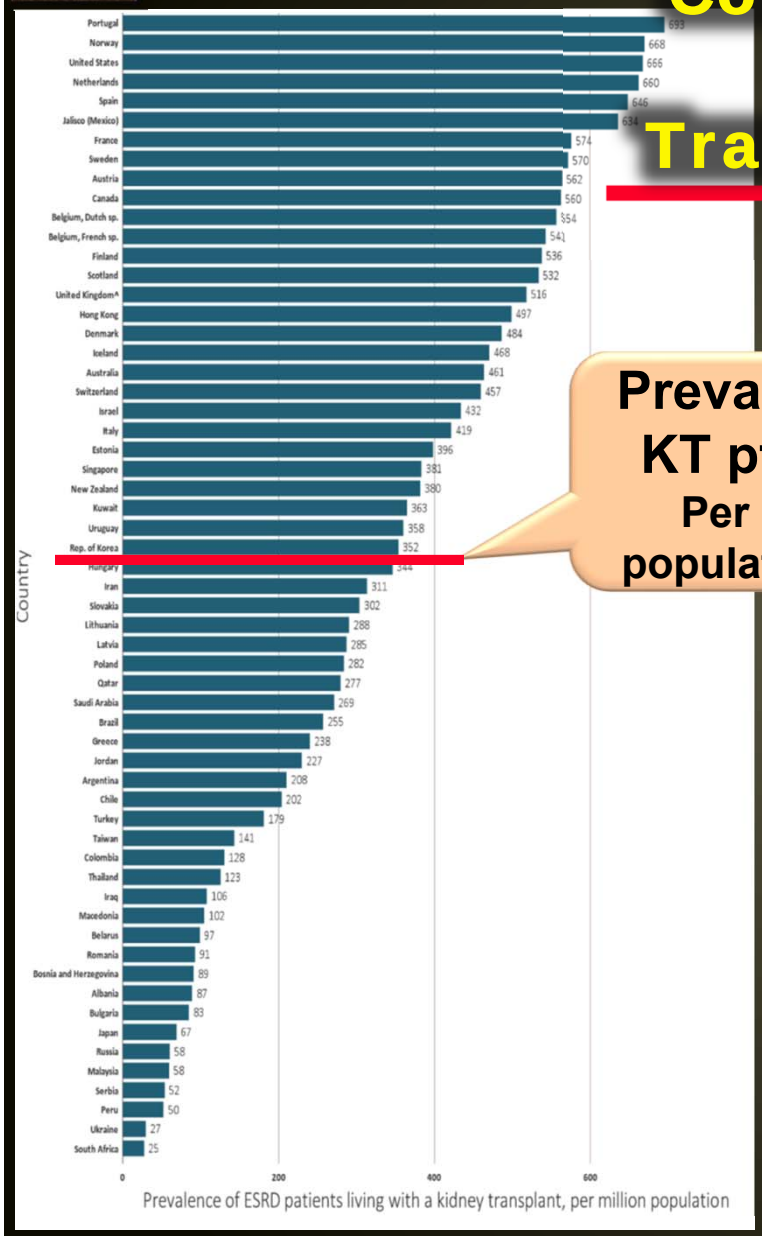


Kidney Transplantation

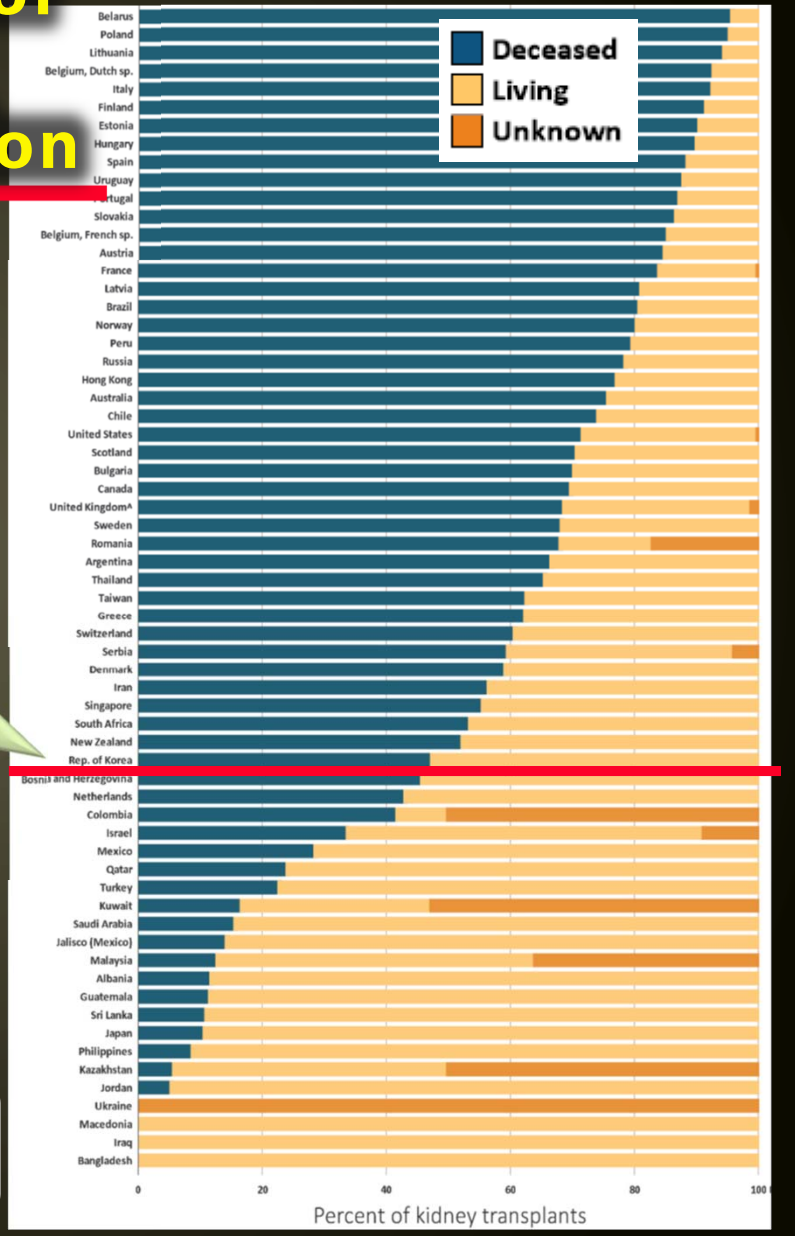


KOREAN ESRD REGISTRY

International Comparison of Kidney Transplantation



Prevalence of KT pts, 352
Per million population, 2016



Deceased Donor 47%, 2016

USRDS
UNITED STATES RENAL DATA SYSTEM

May 2019

USRDS Report 2018

특 징 요 약

- 전체 투석환자 및 혈액투석기관수의 계속적 빠른 증가
- 등록사업의 전국적 등록률 감소
- 복막투석의 감소 및 혈액투석 비율의 증가 유지
- 원인 신질환에서 당뇨병성 신증의 비율 절반 유지
- 혈액투석 효율 점진적 향상, 혈압저하, 인 결합제 변화
- 치료의 효율의 증가에 비하여 재활상태, 합병증, 사망원인의 변화는 거의 없음.

감사의 글

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

  (Baxter Korea, FMC Korea)