2021년 우리나라 신대체 요법의 현황
– 인산 민병석 교수 기념 말기 신부전 환자 등록 사업 2021 –

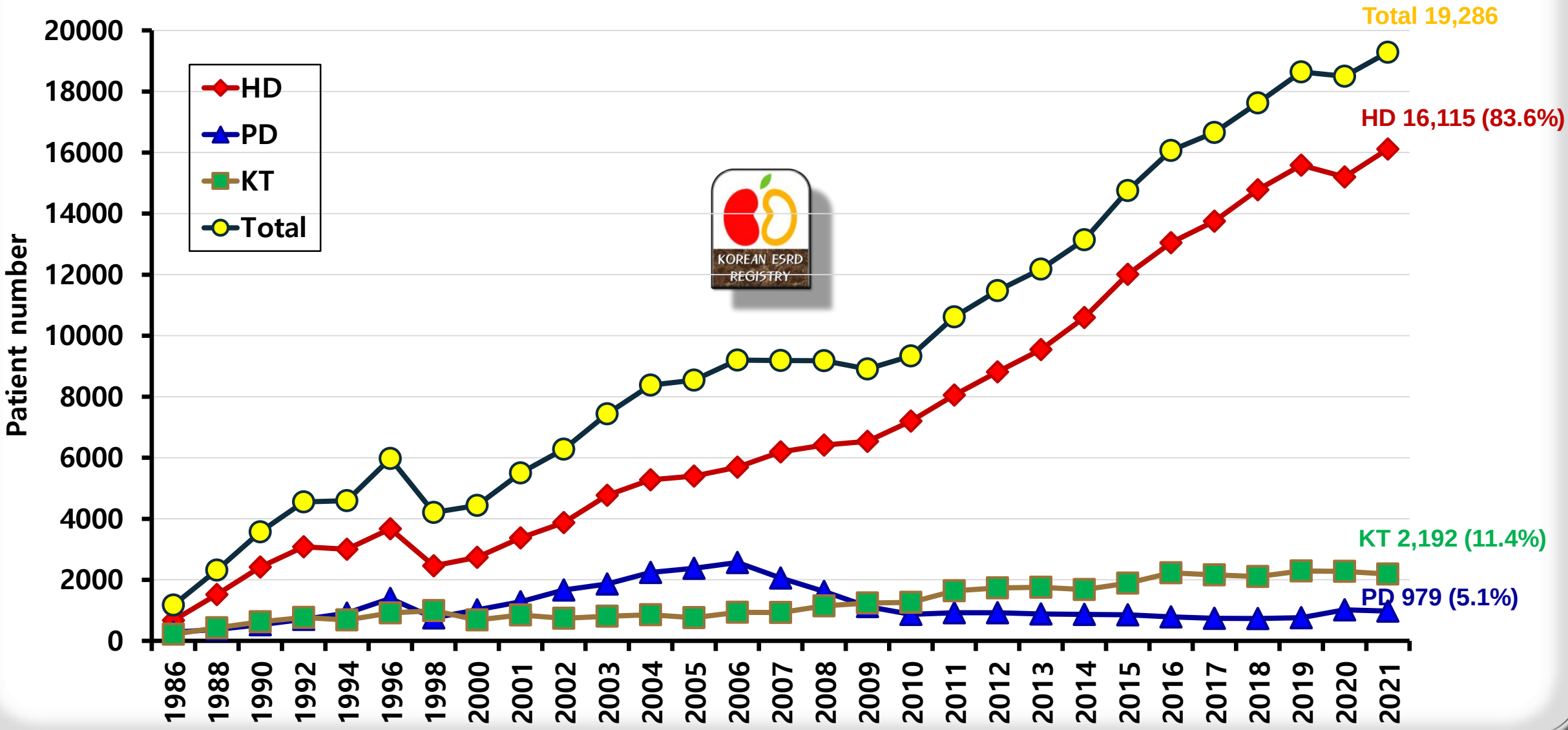
KOREAN RENAL DIALYSIS SYSTEM (KORDS) 2021

대한신장학회 등록위원회
KORDS Committee, Korean Society of Nephrology

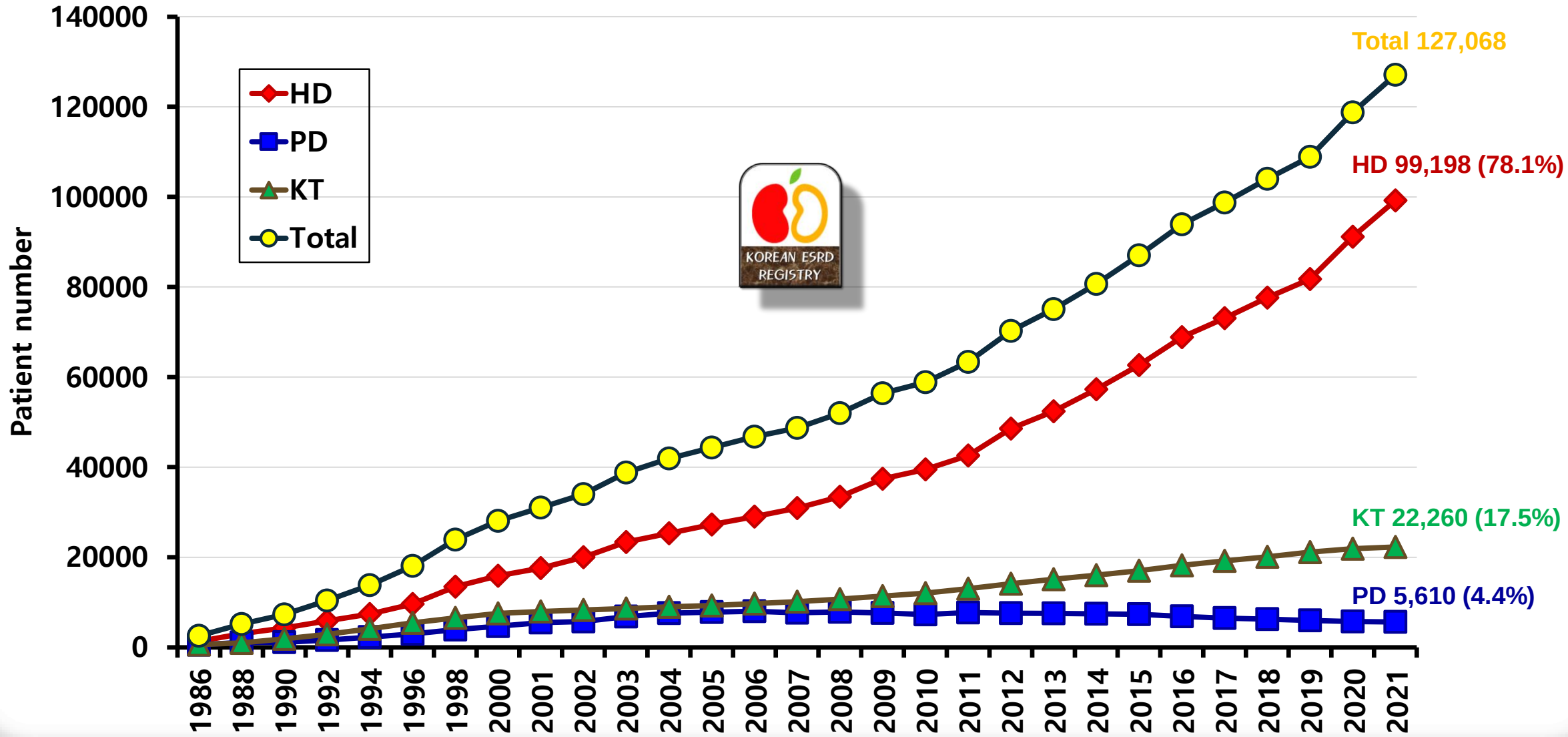
목차 (Contents)

I. 우리나라 말기 신부전 환자의 발병률 및 유병률 분석 (Incidence and Prevalence of ESKD patients in Korea, 2021)

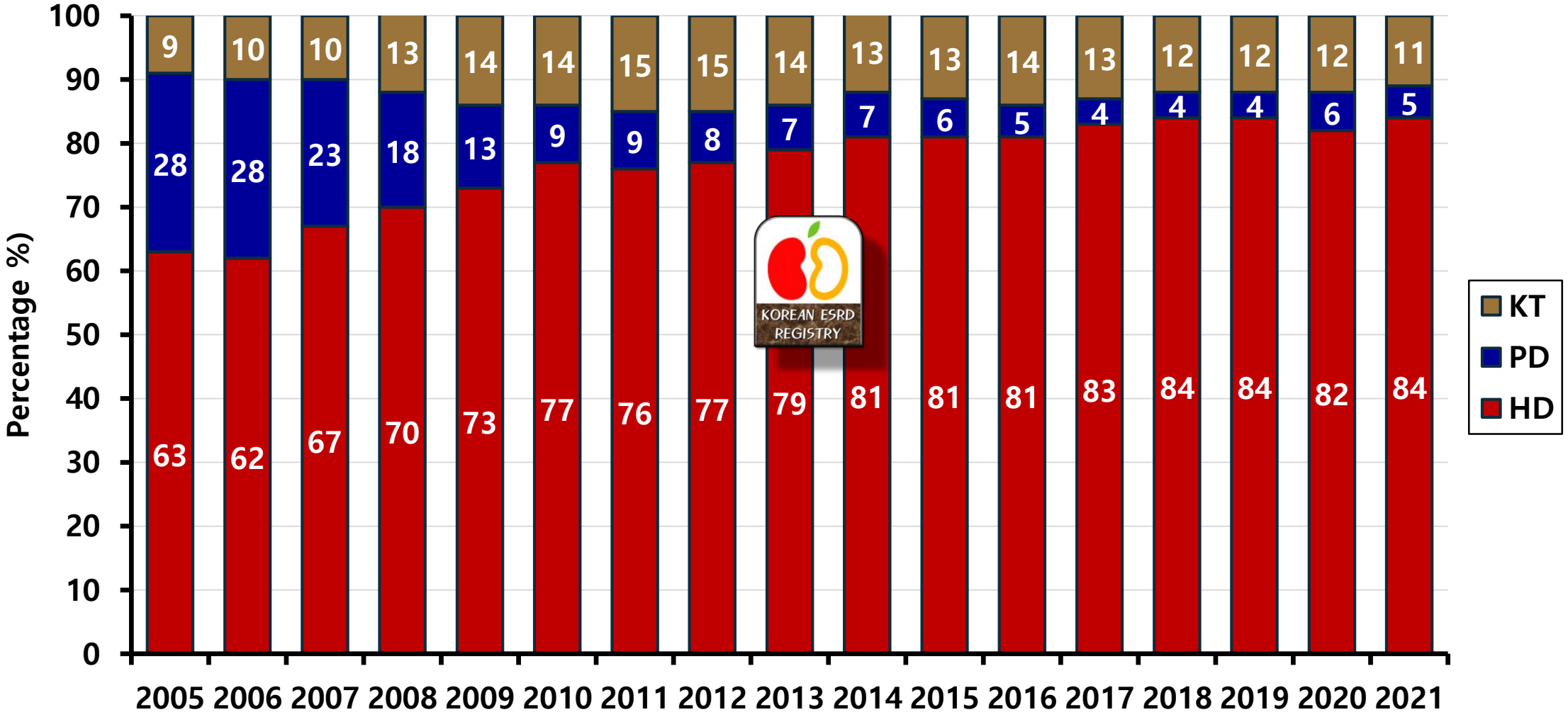
Incidence of ESKD



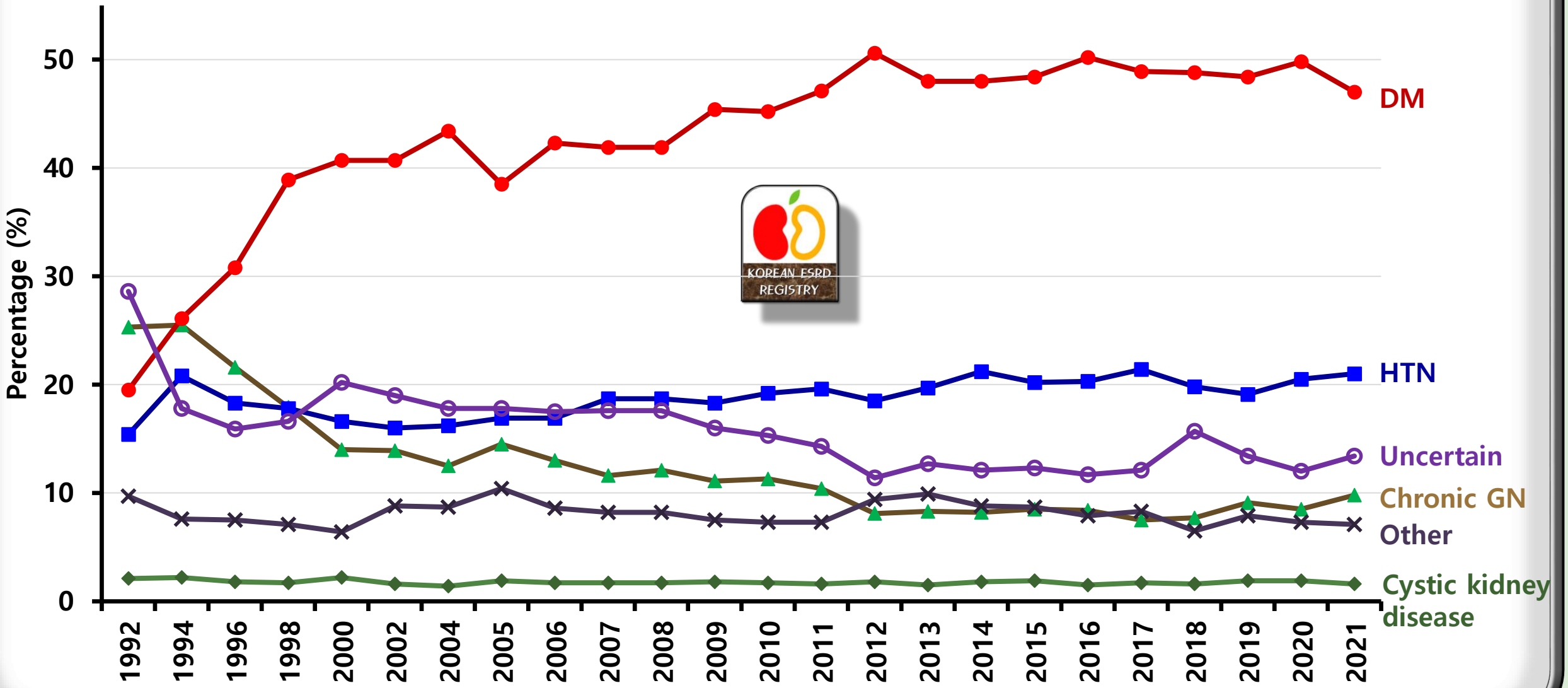
Prevalence of ESKD



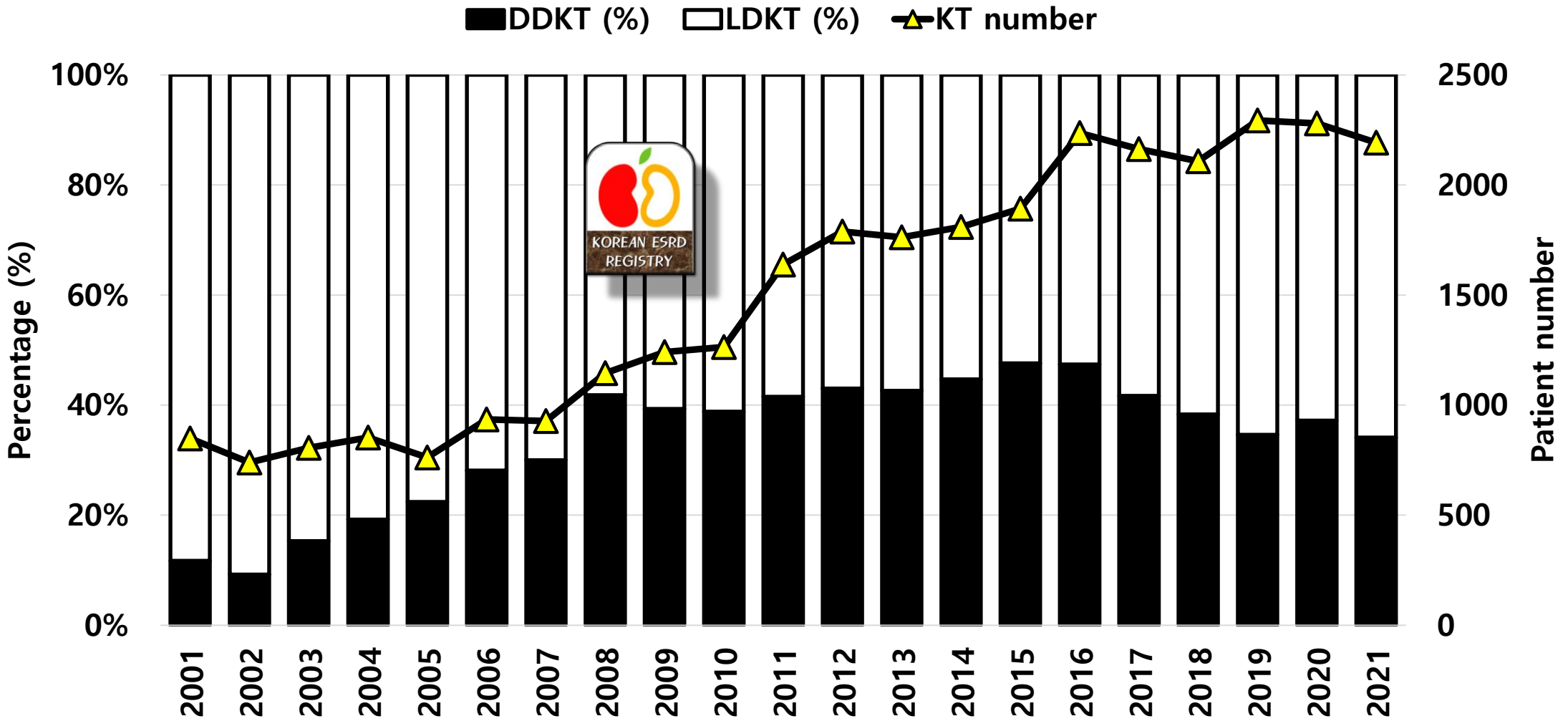
Proportion of Annual ESKD Incidence



Causes of ESKD



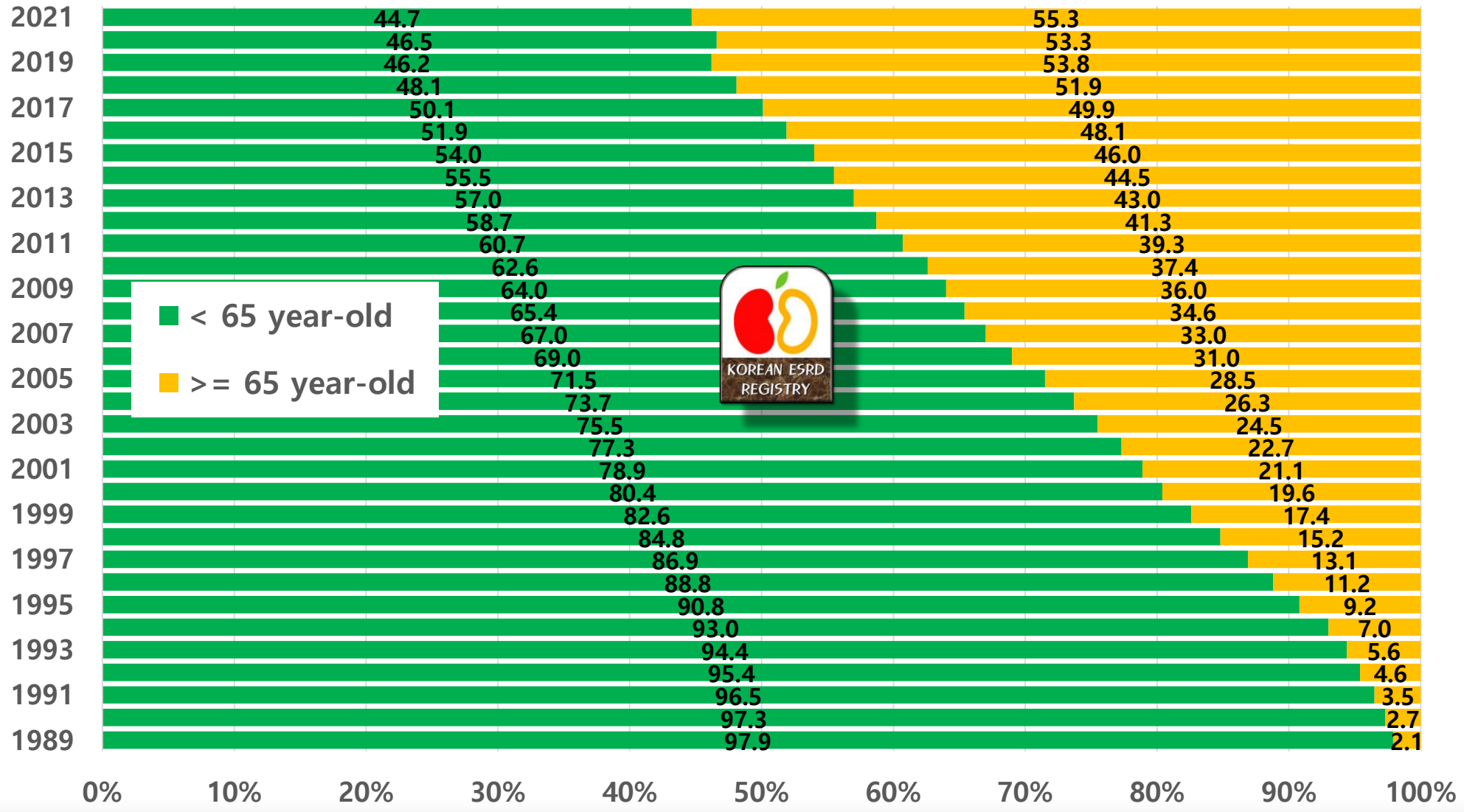
Current Status of Kidney Transplantation (KT)



II. 우리나라 말기신부전 환자와 투석 치료의 특징 (Patients and Dialysis Characteristics of ESKD in Korea, 2021)

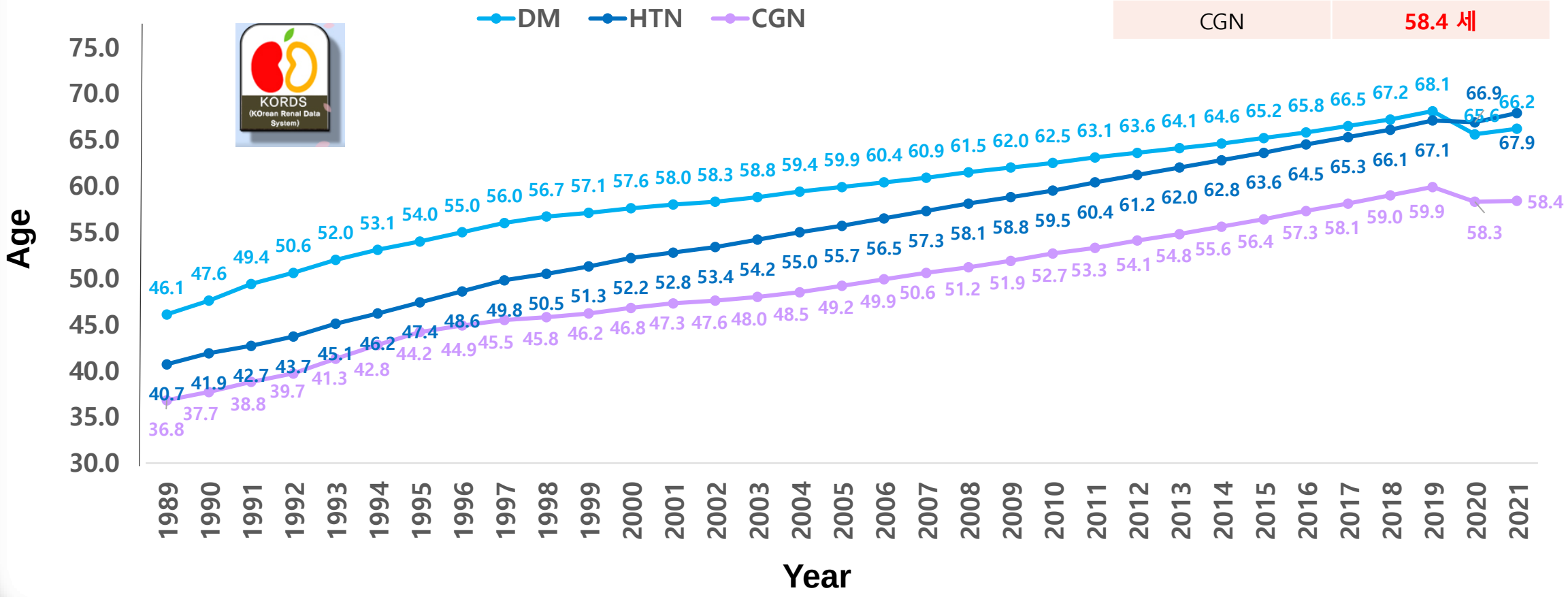
Trend of age in patients with ESKD

Trend in proportion of elderly patients with ESKD

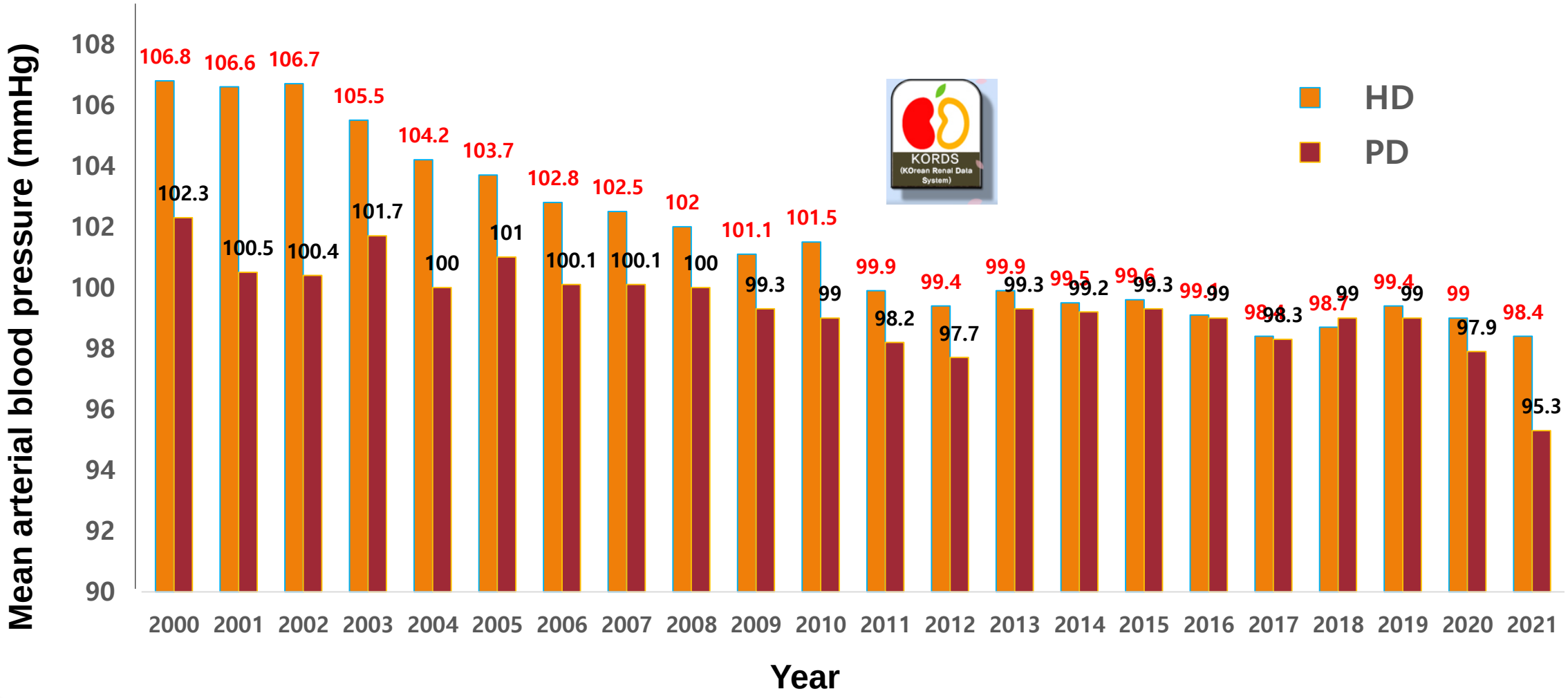


Age distribution of dialysis patients according to underlying diseases

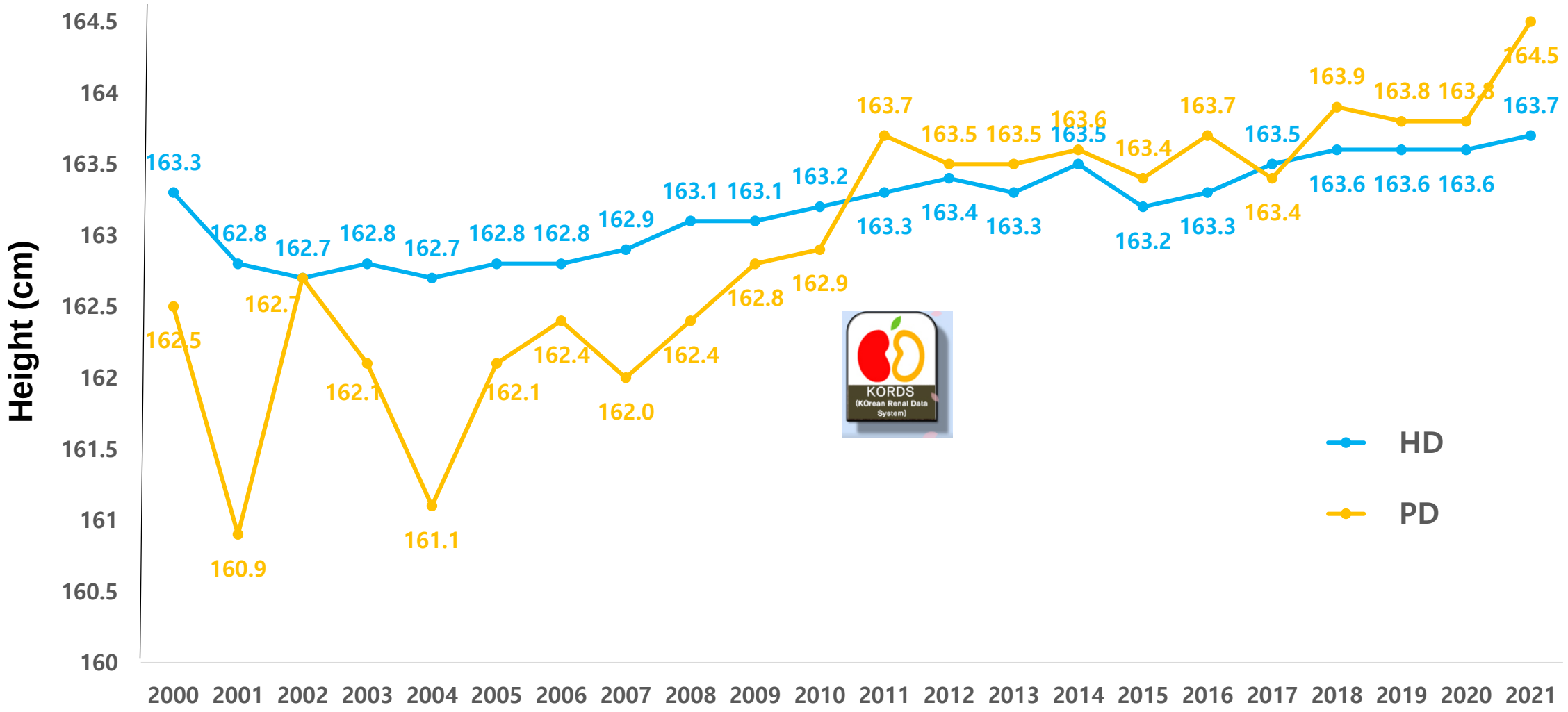
기저 질환	Age (2021년)
DM	66.2 세
HTN	67.9 세
CGN	58.4 세



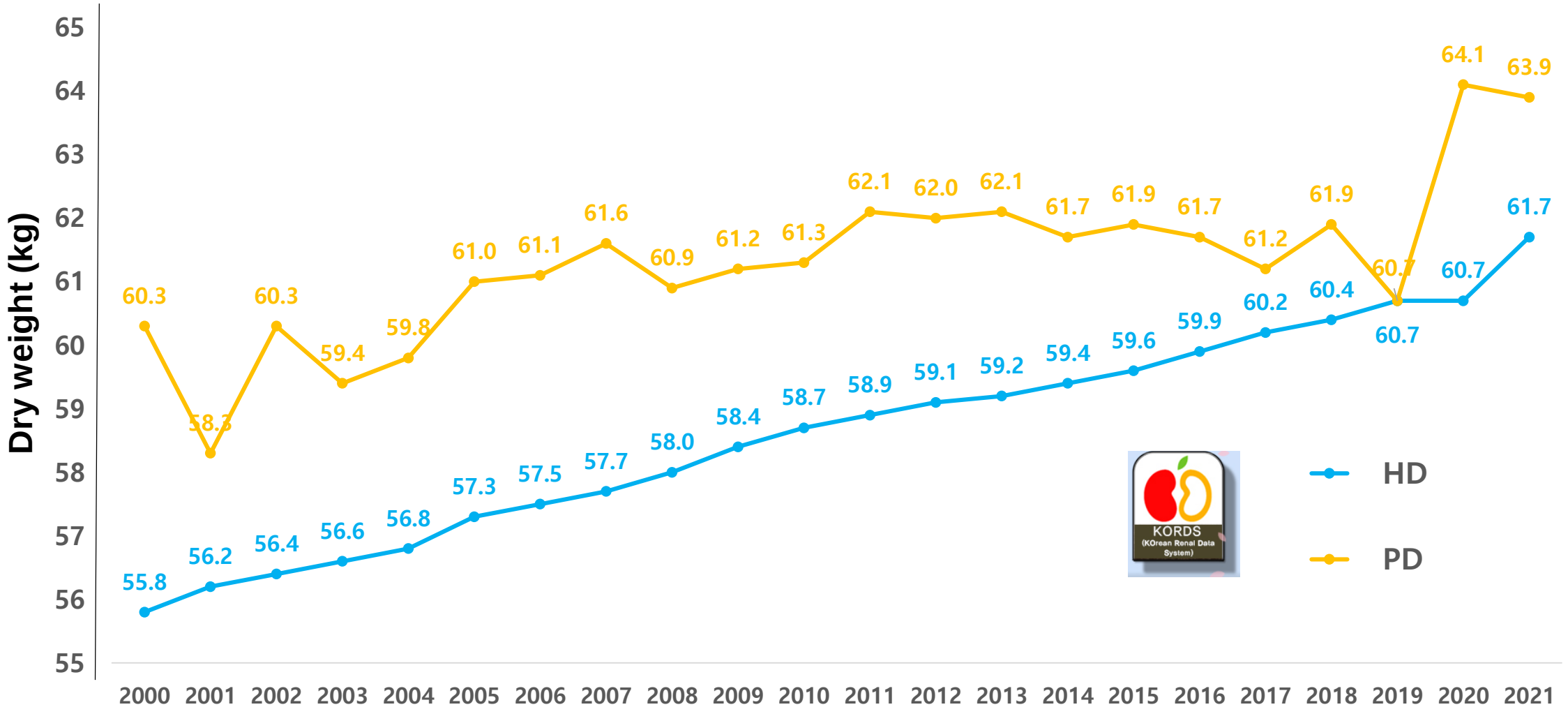
Distribution of mean blood pressure



Distribution of Height

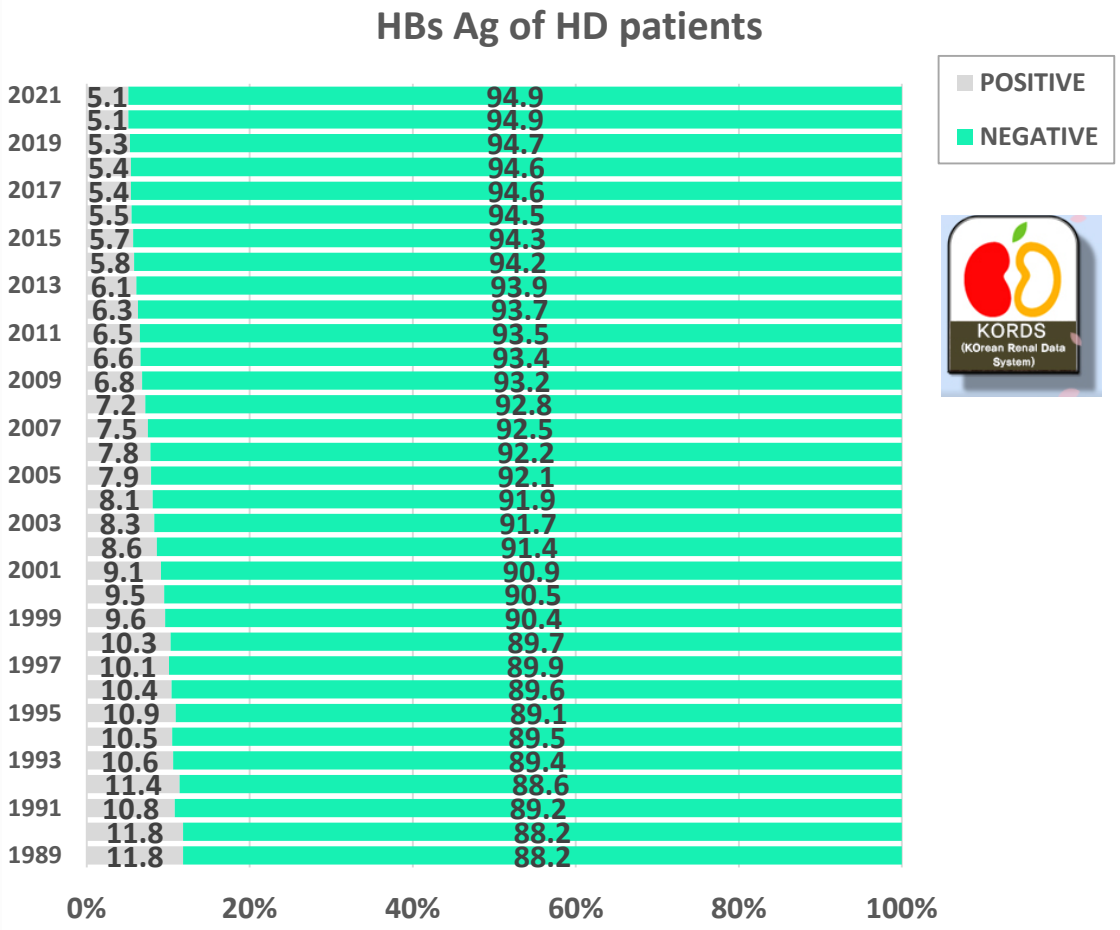


Distribution of Dry weight

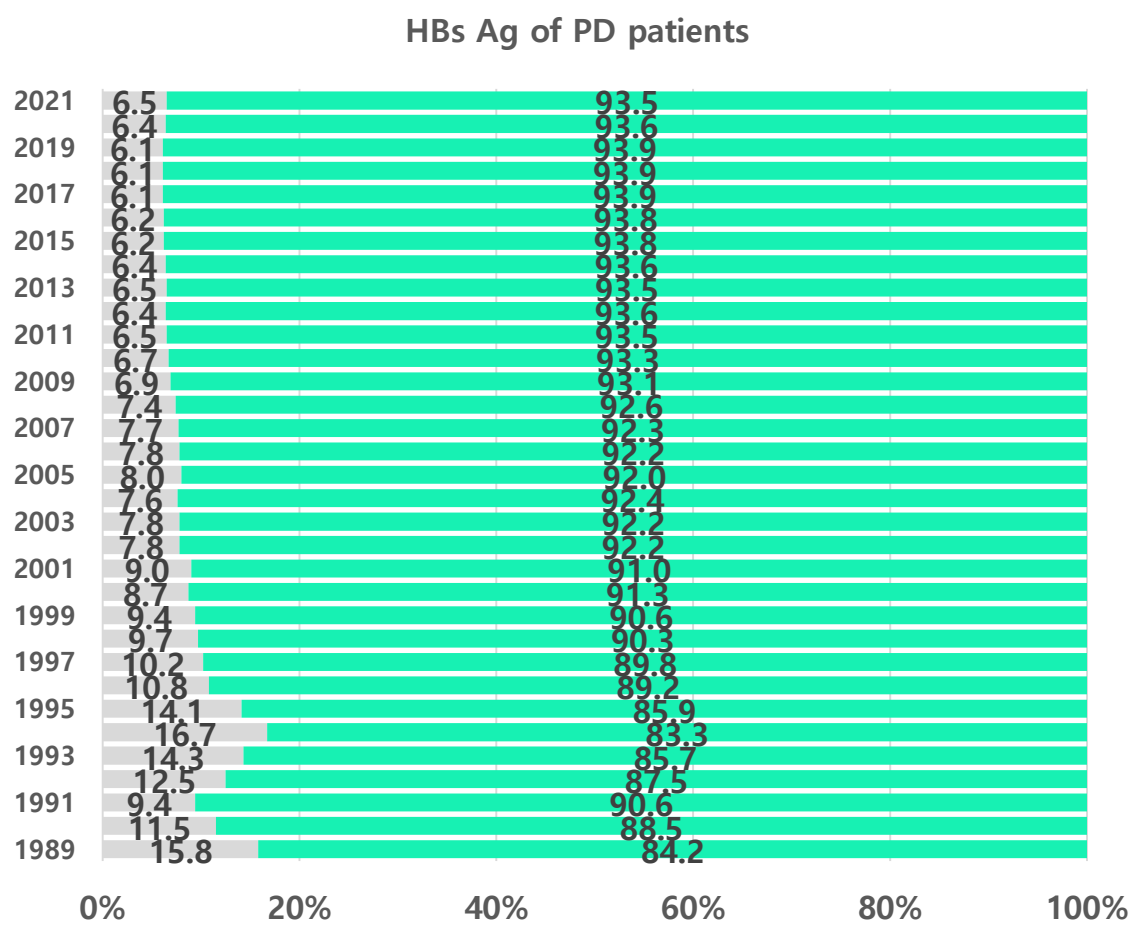


Hepatitis B

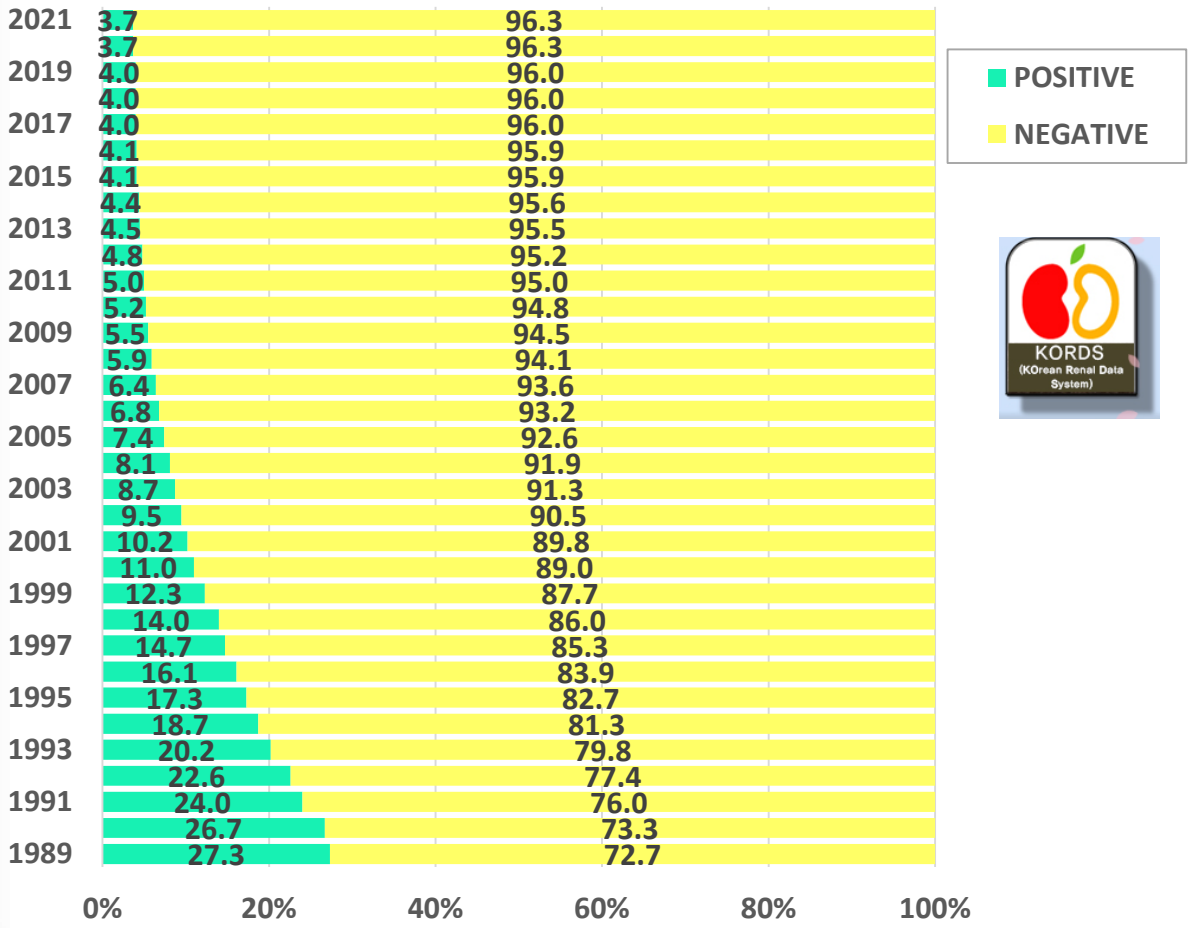
HD



PD



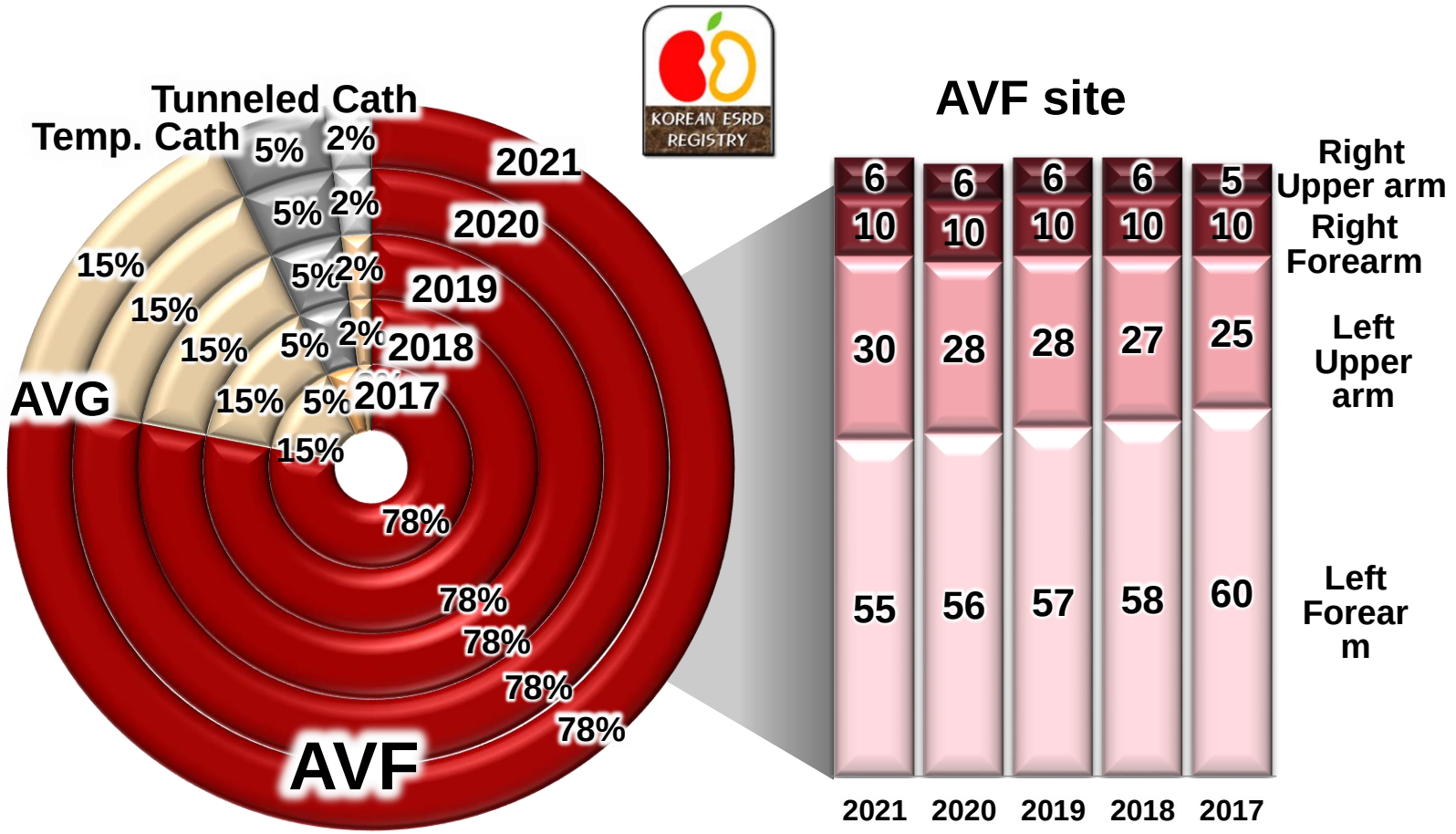
Hepatitis C



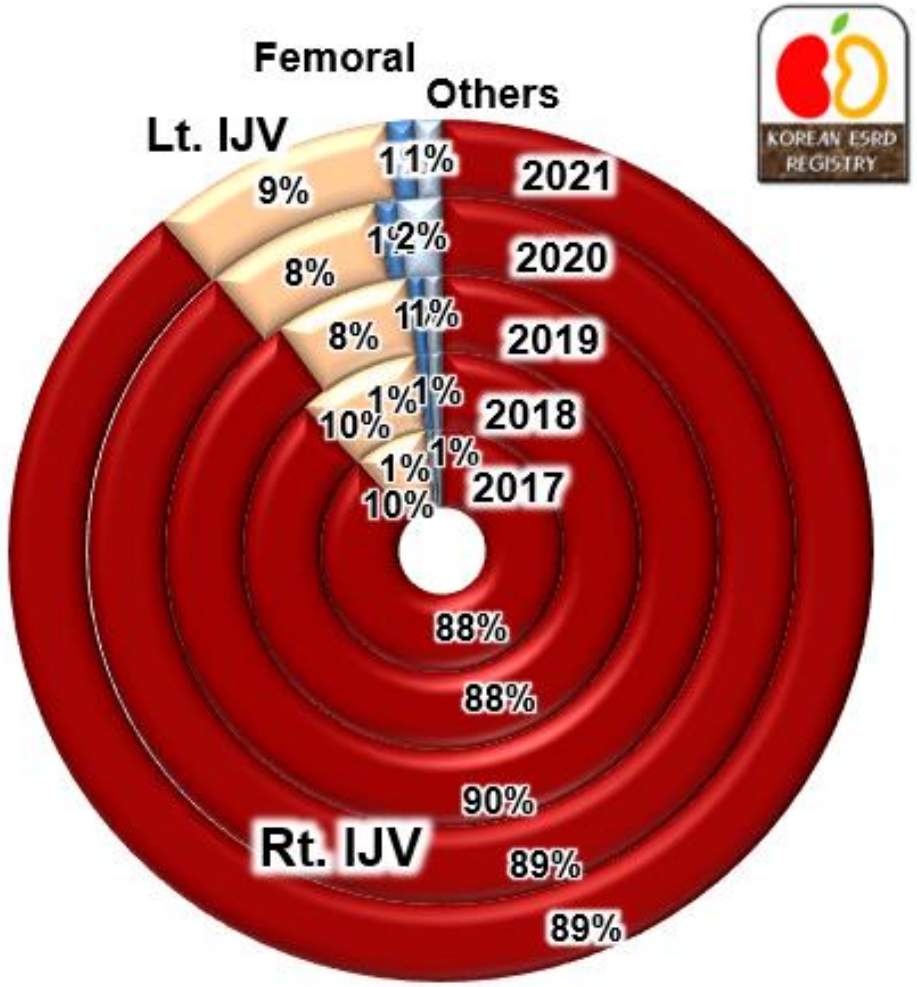
PD

우리나라 혈액 투석 환자의 특징

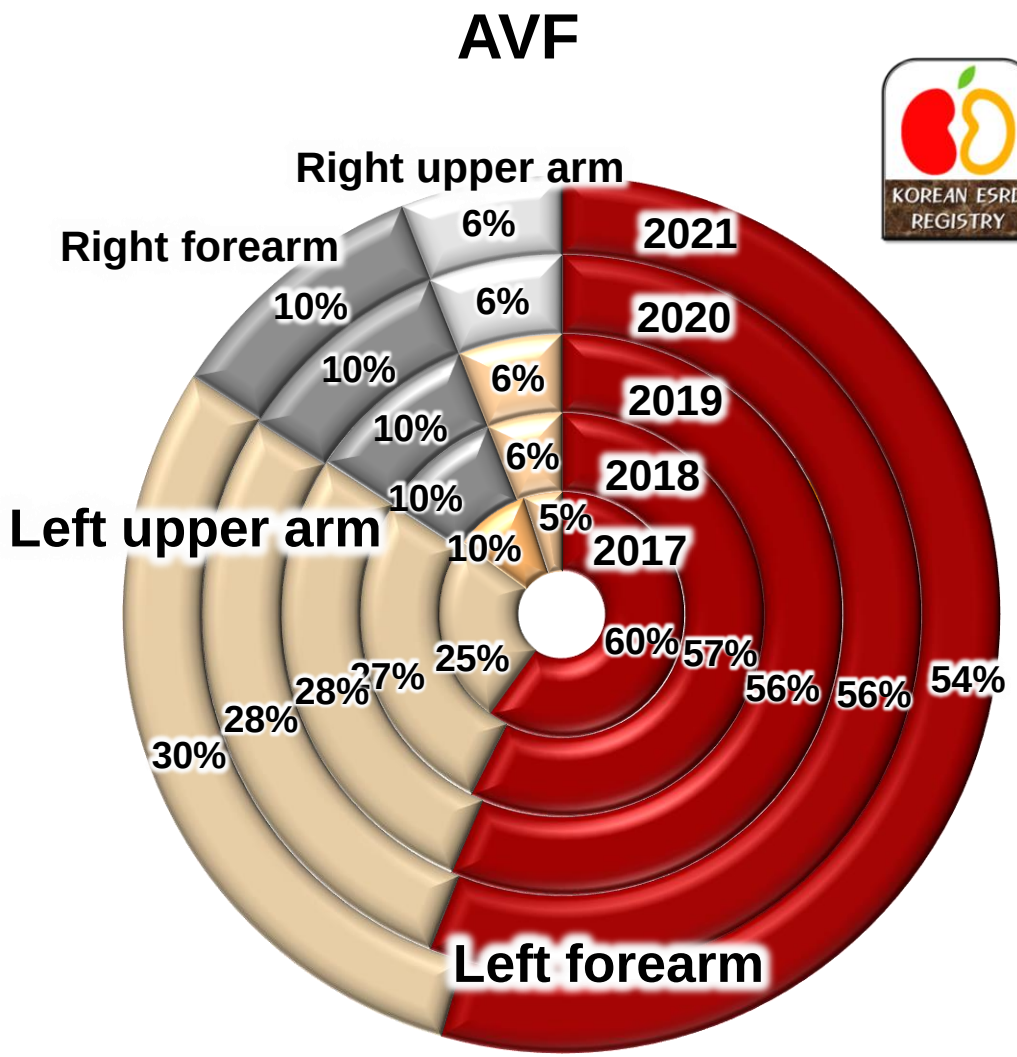
Vascular Access (1)-Distribution of access type

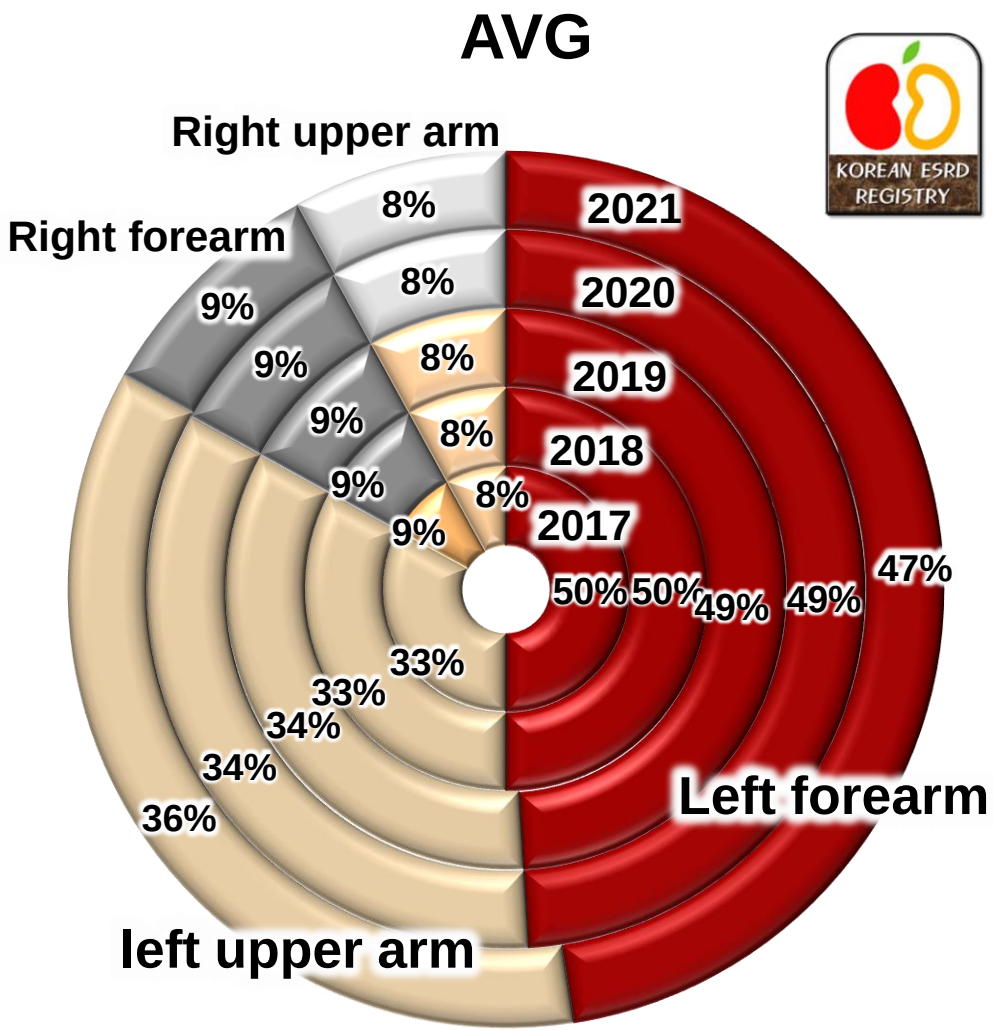


Vascular Access (2)-Location of catheter for HD

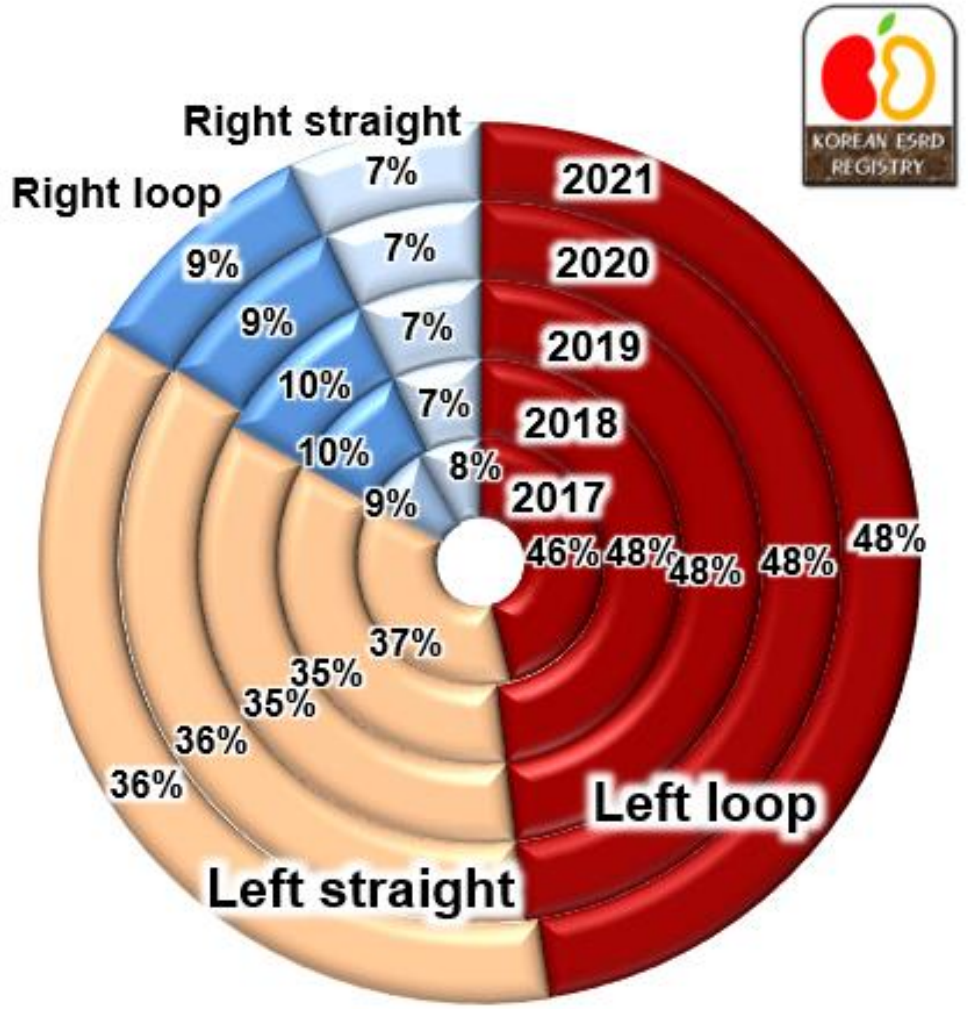


Vascular Access (3)-Distribution of OP site

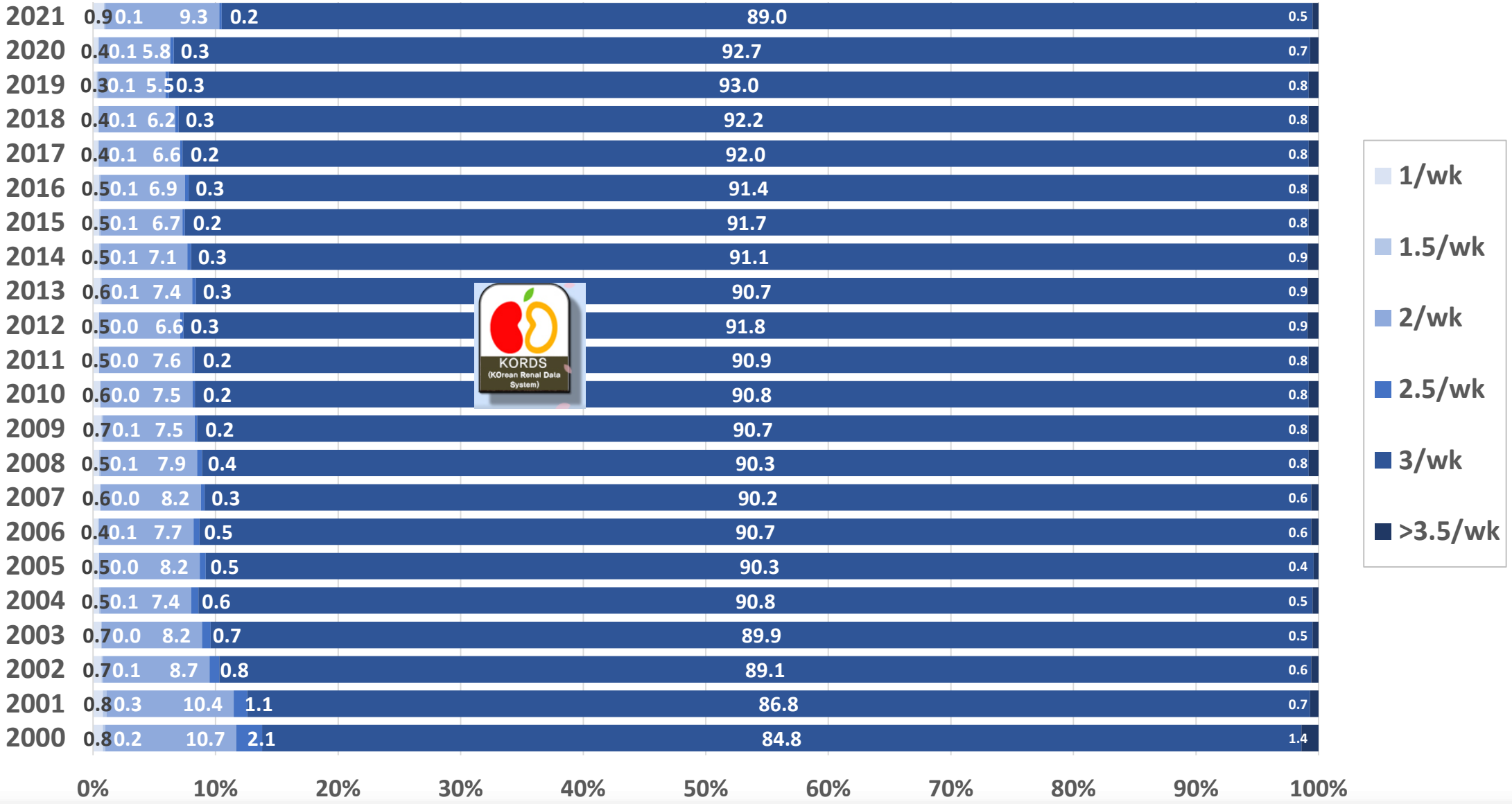




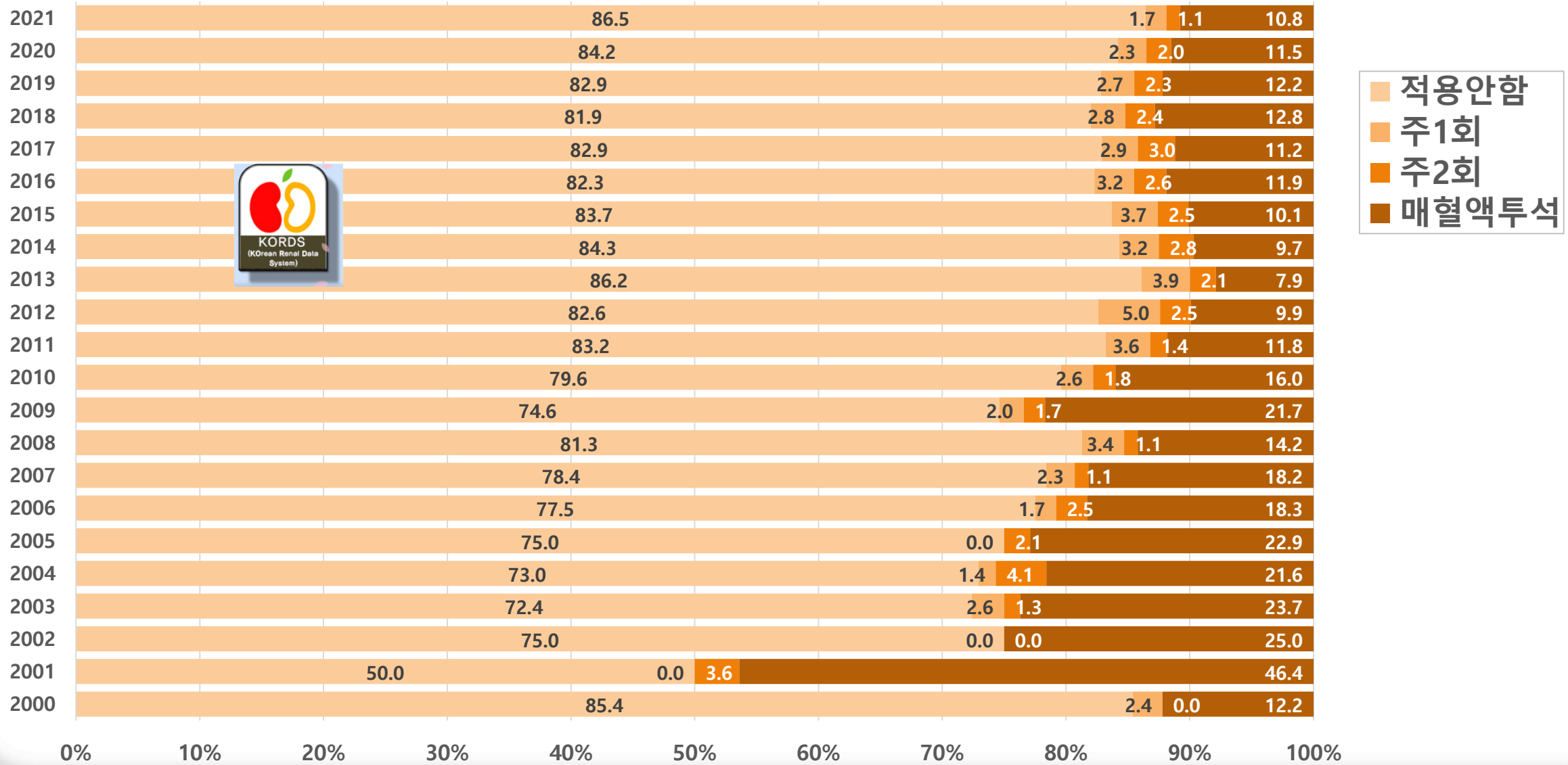
Vascular Access (4)-Type of AVG

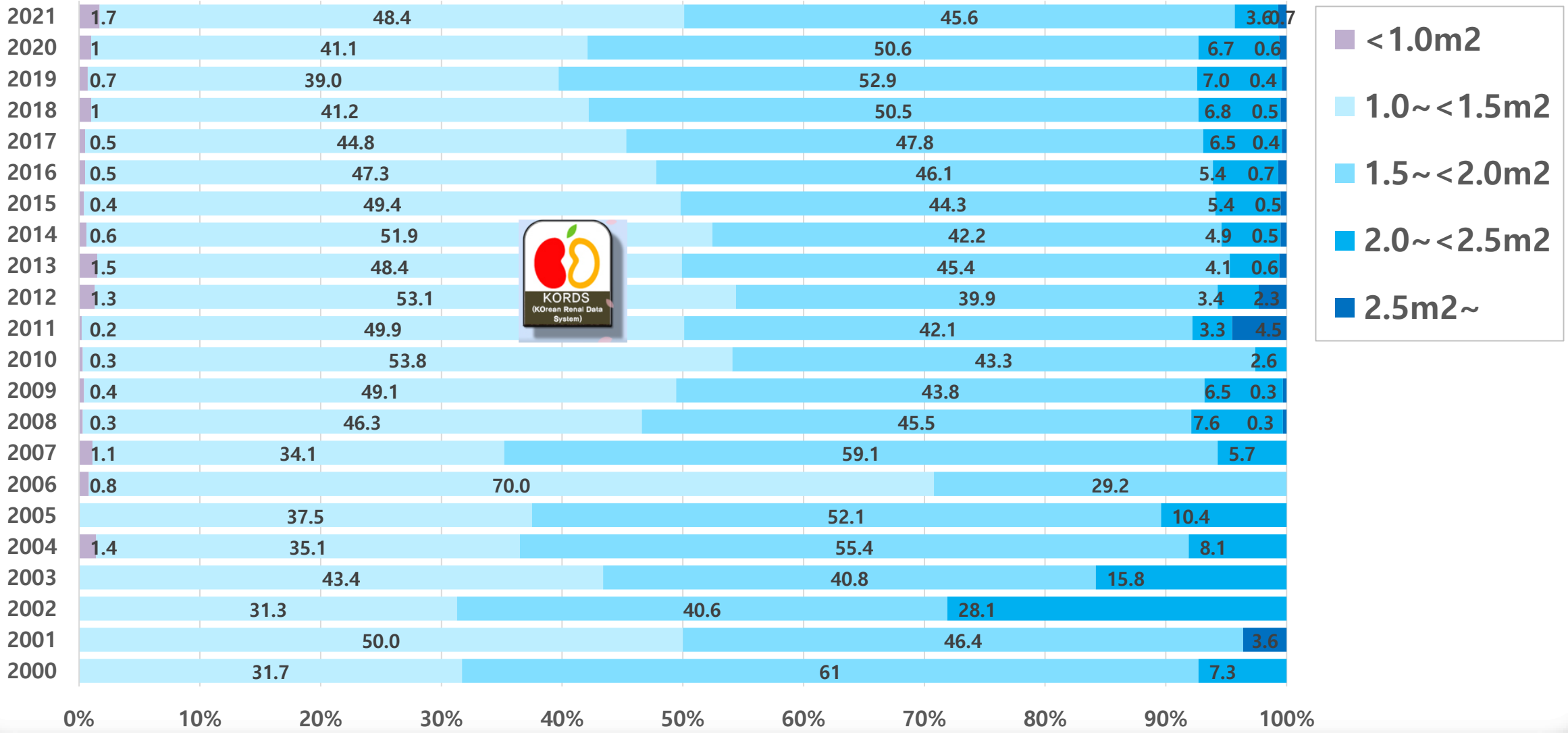


Frequency of HD (session/week)

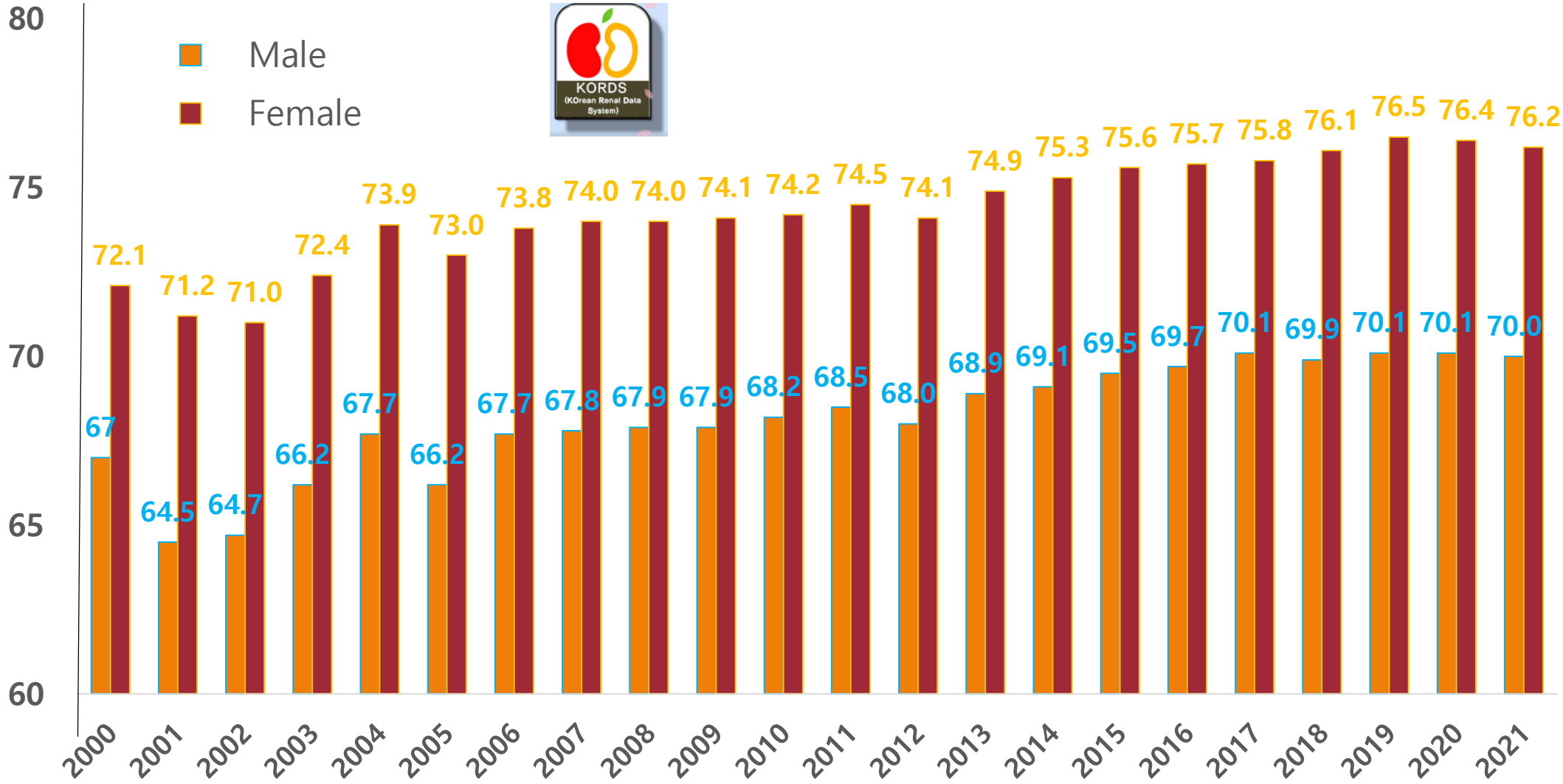


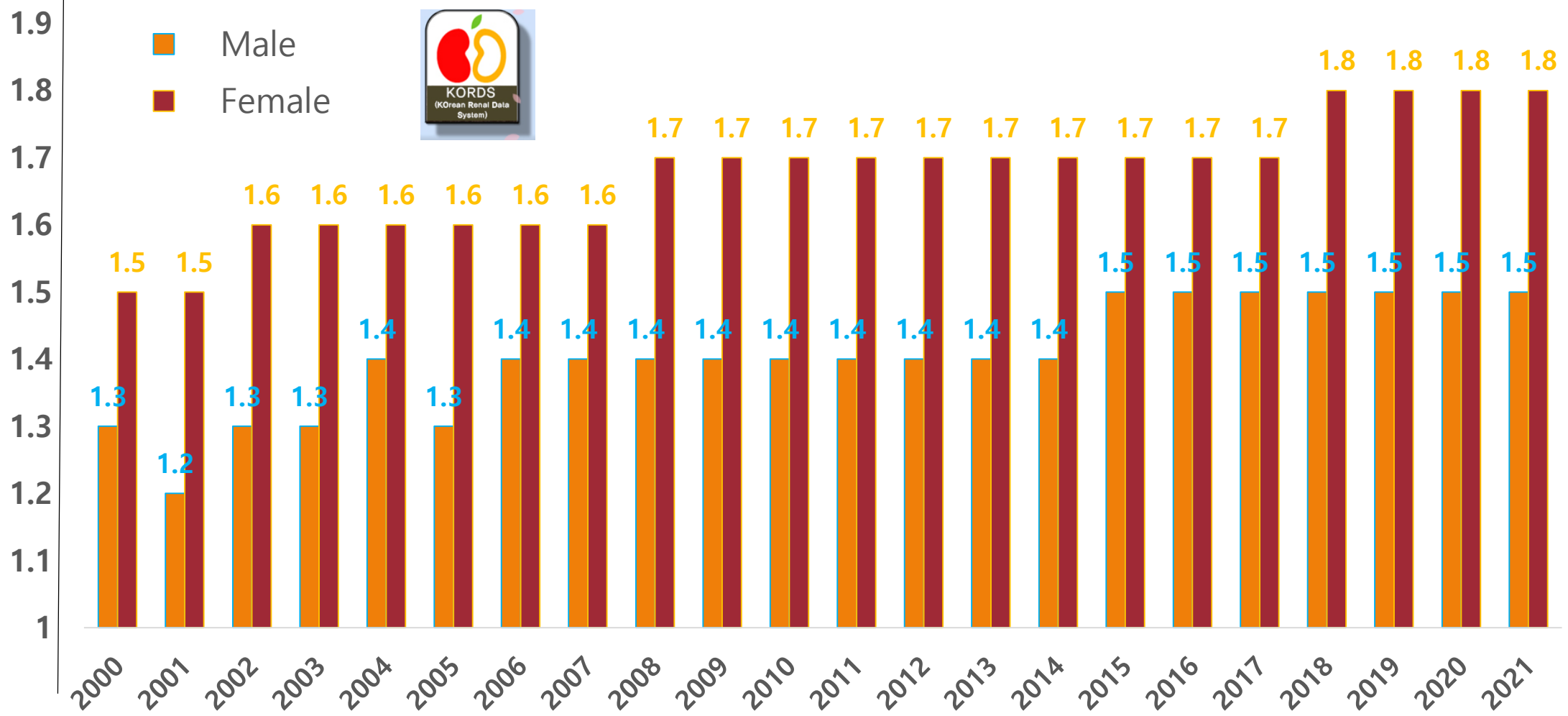
Proportion of HDF




Percent of patients according to the using dialyzer membrane surface area
2021 1.7 48.4 45.6 3.6 0.7
2020 1 41.1 50.6 6.7 0.6
2019 0.7 39.0 52.9 7.0 0.4
2018 1 41.2 50.5 6.8 0.5
2017 0.5 44.8 47.8 6.5 0.4
2016 0.5 47.3 46.1 5.4 0.7
2015 0.4 49.4 44.3 5.4 0.5
2014 0.6 51.9 42.2 4.9 0.5
2013 1.5 48.4 45.4 4.1 0.6
2012 1.3 53.1 39.9 3.4 2.3
2011 0.2 49.9 42.1 3.3 4.5
2010 0.3 53.8 43.3 2.6
2009 0.4 49.1 43.8 6.5 0.3
2008 0.3 46.3 45.5 7.6 0.3
2007 1.1 34.1 59.1 5.7
2006 0.8 70.0 29.2
2005 37.5 52.1 10.4
2004 1.4 35.1 55.4 8.1
2003 43.4 40.8 15.8
2002 31.3 40.6 28.1
2001 50.0 46.4 3.6
2000 31.7 61 7.3
KORDS
(KOrean Renal Data System)
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
<1.0m2
1.0~<1.5m2
1.5~<2.0m2
2.0~<2.5m2
2.5m2~

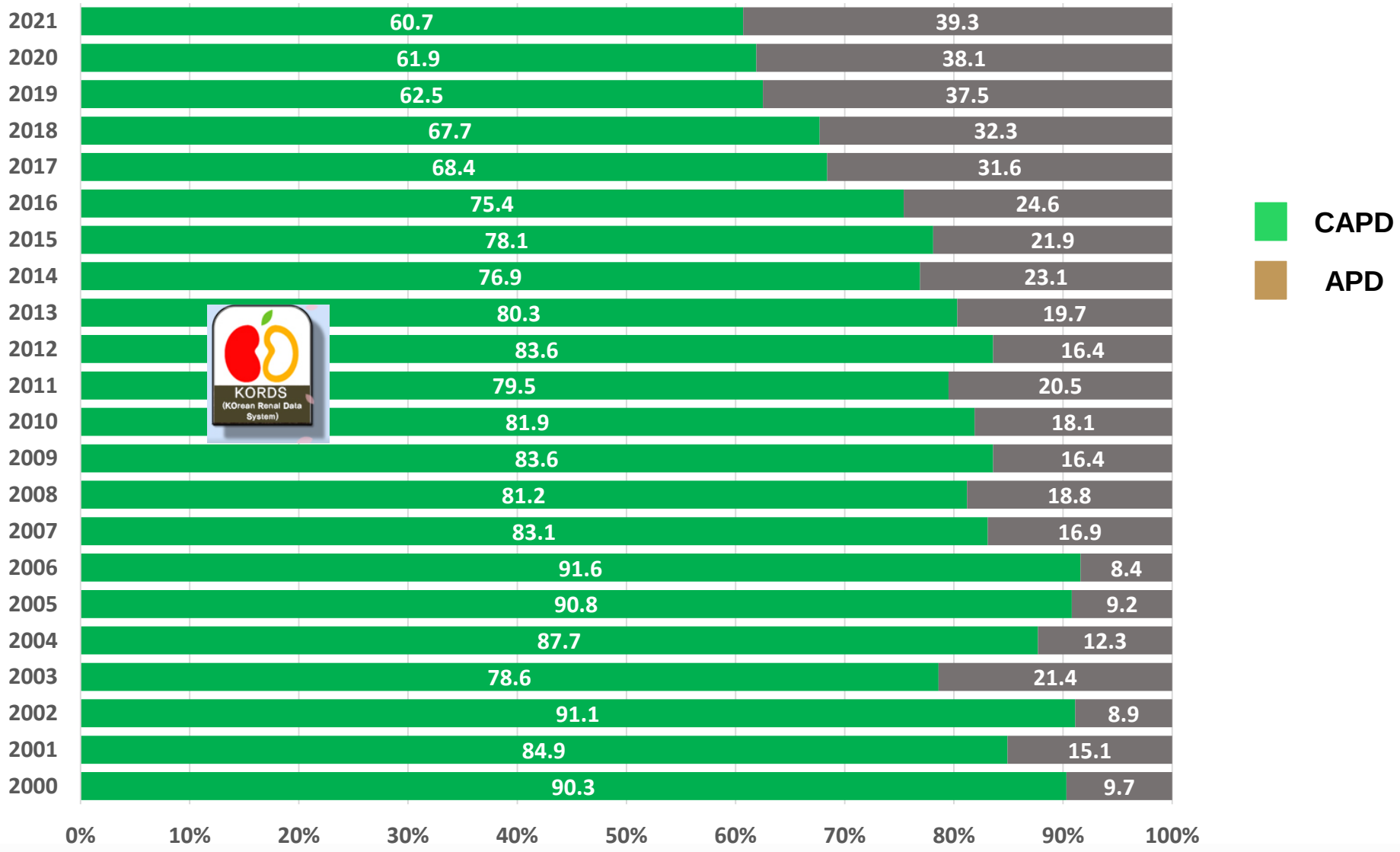
Adequacy of HD (Urea Reduction Rate)

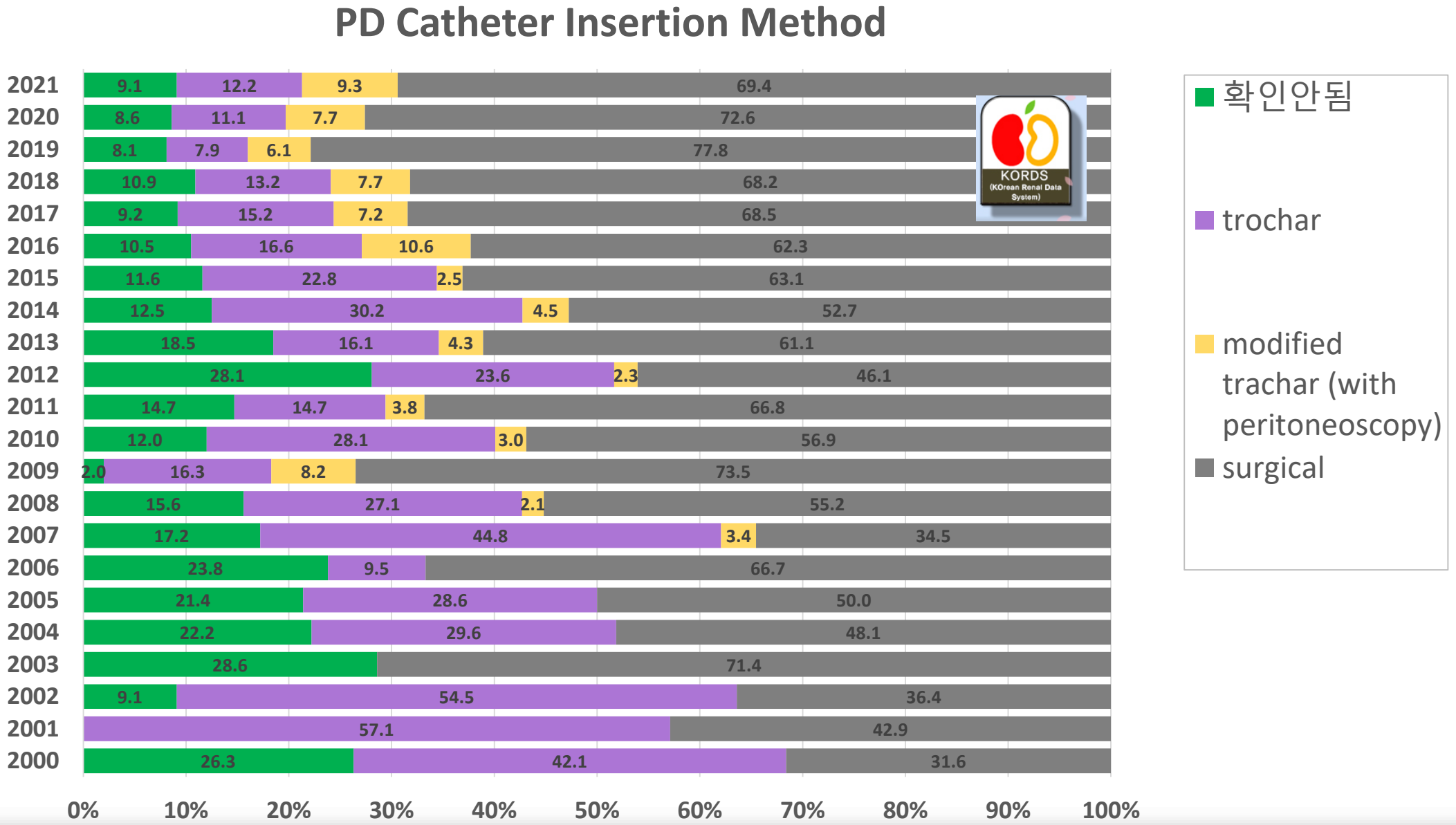



Adequacy of HD (spKt/V)
Male
Female
KORDS
(KOrean Renal Data System)
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
1.5 1.5 1.6 1.6 1.6 1.6 1.6 1.6 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.8 1.8 1.8 1.8
1.3 1.2 1.3 1.3 1.4 1.3 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.5 1.5 1.5 1.5 1.5 1.5 1.5
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

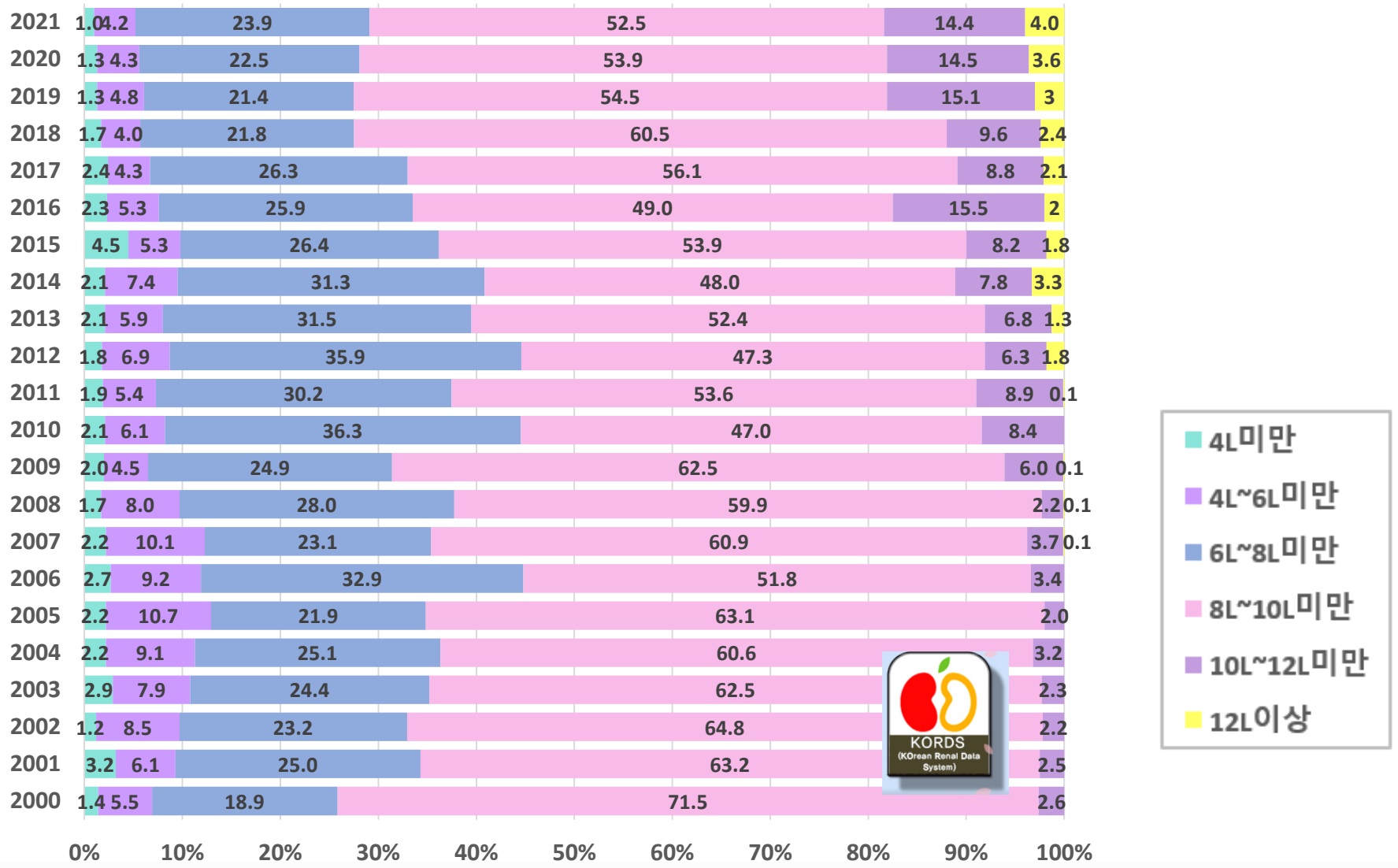
우리나라 복막 투석 환자의 특징

Trends in type of peritoneal dialysis (PD)

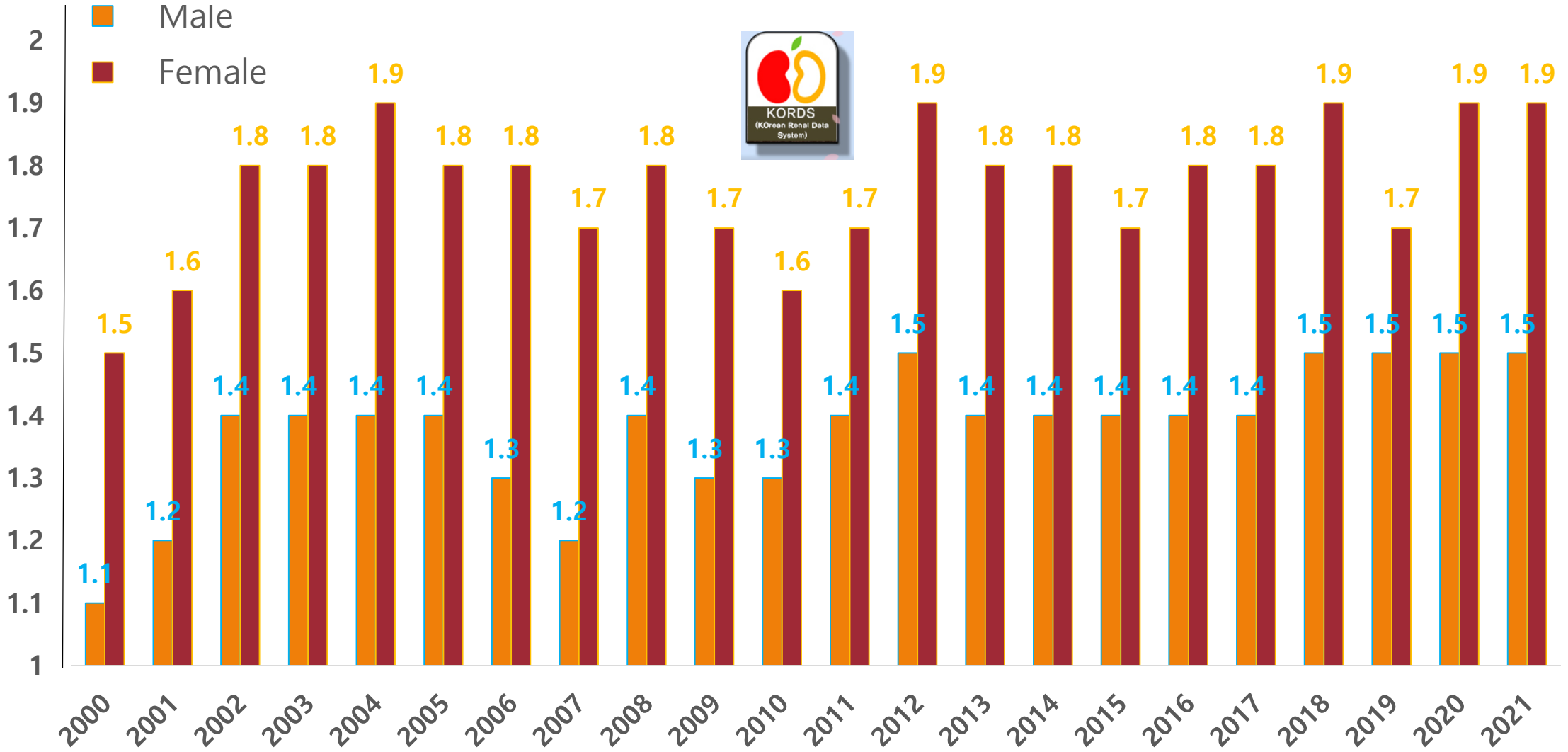



PD Catheter Insertion Method
2021 9.1 12.2 9.3 69.4
2020 8.6 11.1 7.7 72.6
2019 8.1 7.9 6.1 77.8
2018 10.9 13.2 7.7 68.2
2017 9.2 15.2 7.2 68.5
2016 10.5 16.6 10.6 62.3
2015 11.6 22.8 2.5 63.1
2014 12.5 30.2 4.5 52.7
2013 18.5 16.1 4.3 61.1
2012 28.1 23.6 2.3 46.1
2011 14.7 14.7 3.8 66.8
2010 12.0 28.1 3.0 56.9
2009 2.0 16.3 8.2 73.5
2008 15.6 27.1 2.1 55.2
2007 17.2 44.8 3.4 34.5
2006 23.8 9.5 66.7
2005 21.4 28.6 50.0
2004 22.2 29.6 48.1
2003 28.6 71.4
2002 9.1 54.5 36.4
2001 57.1 42.9
2000 26.3 42.1 31.6
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
KORDS
(KOrean Renal Data System)
확인안됨
trochar
modified trachar (with peritoneoscopy)
surgical

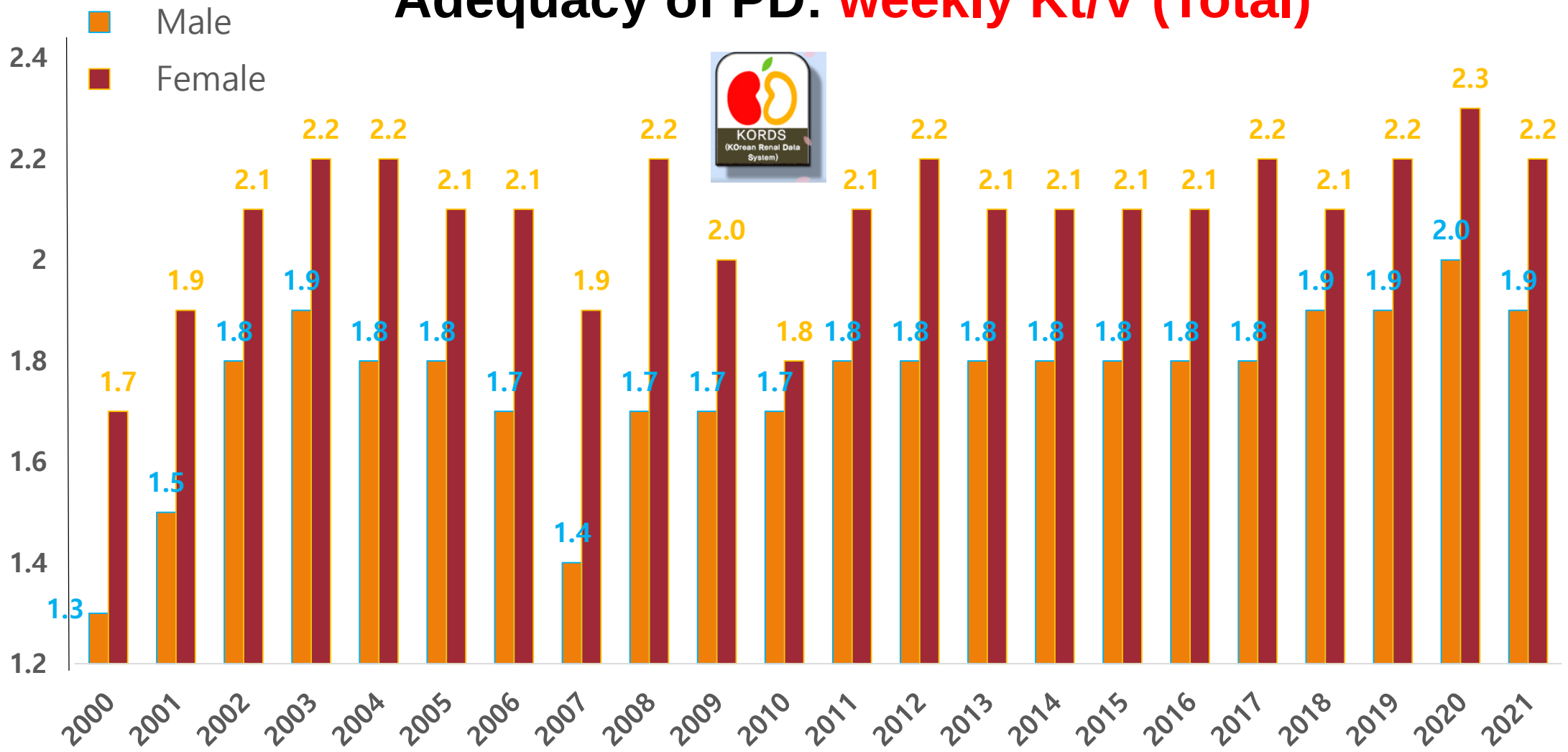
Prescriptions of PD dose per day



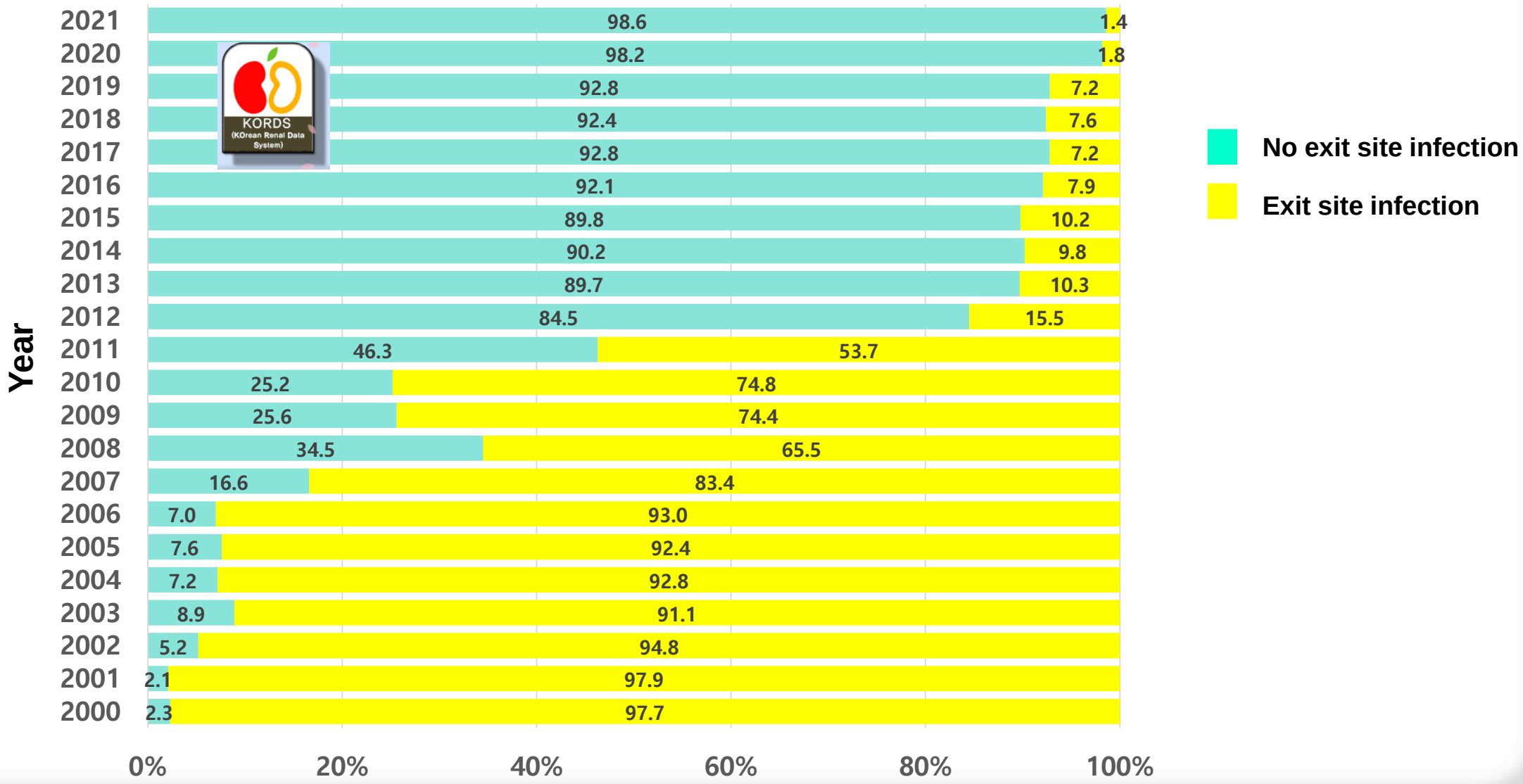
Adequacy of PD: weekly Kt/V (Dialysate)



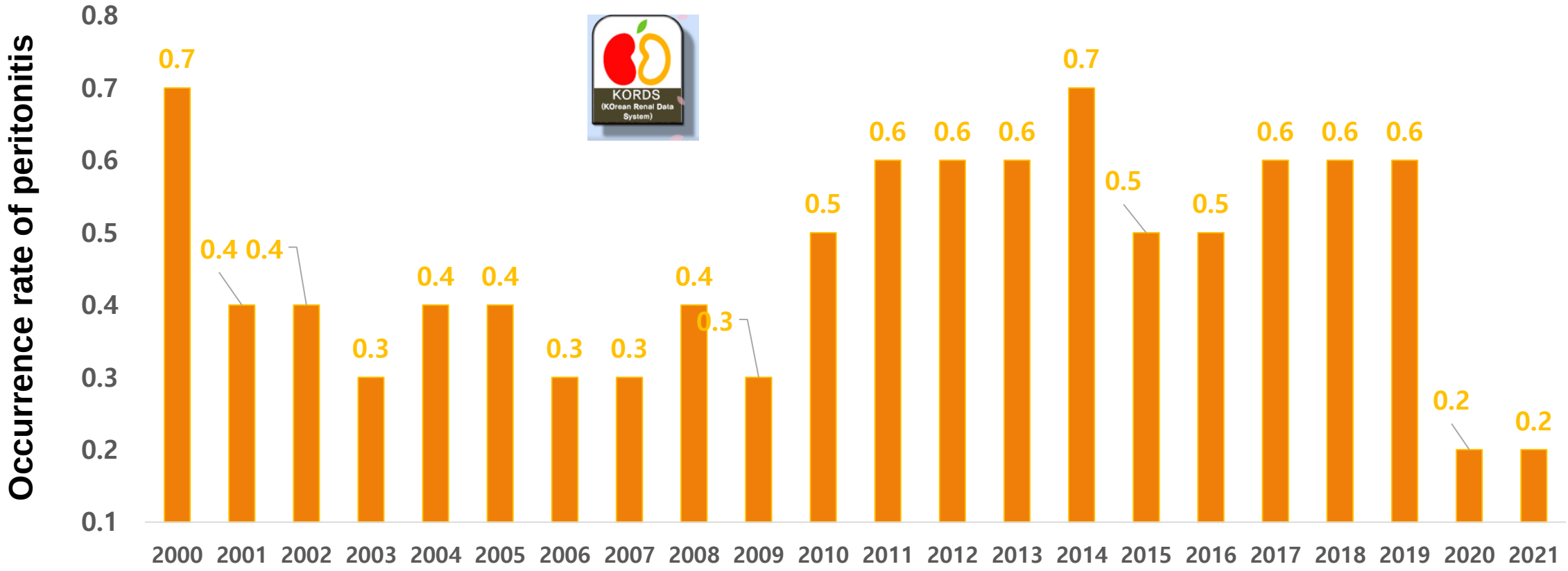
Adequacy of PD: weekly Kt/V (Total)



Trends in Exit infection of PD patients (%)

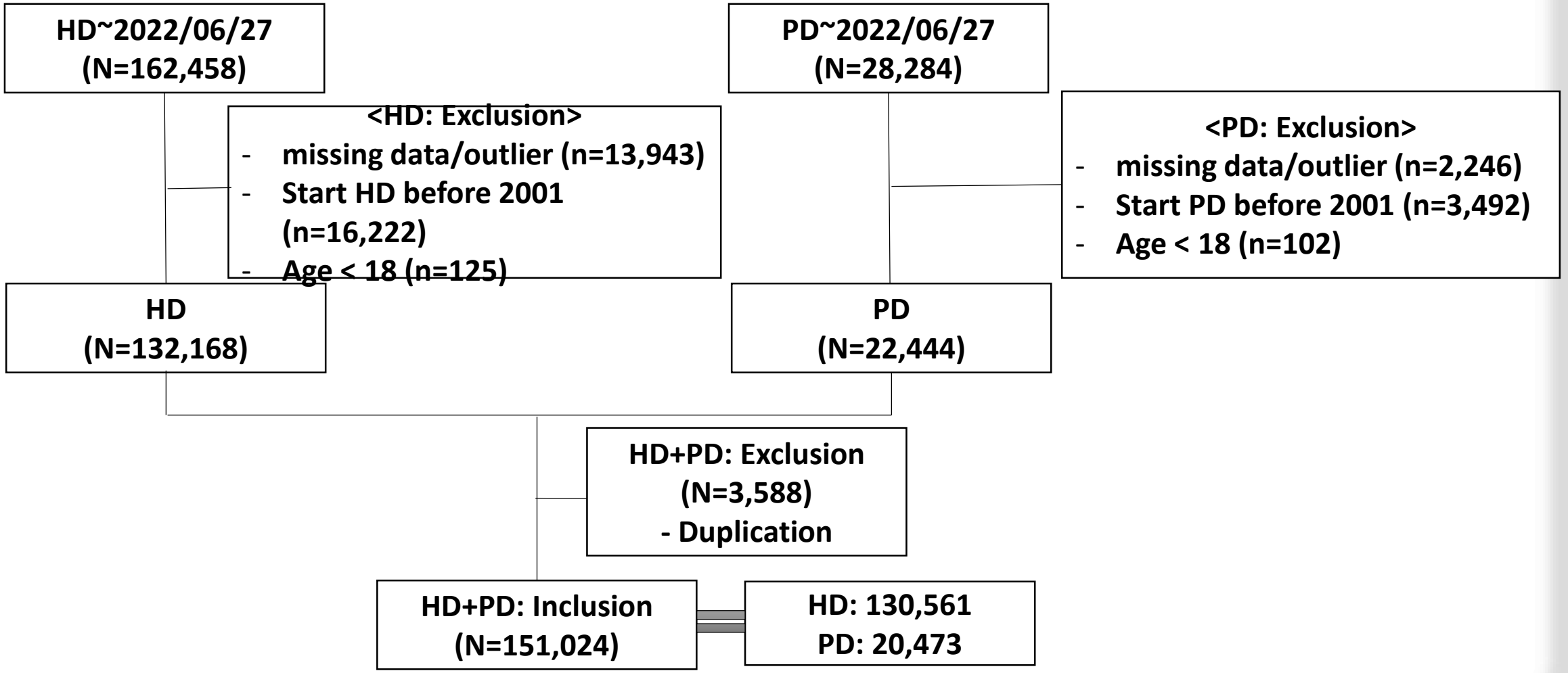


Trends in the occurrence rate of PD-related peritonitis



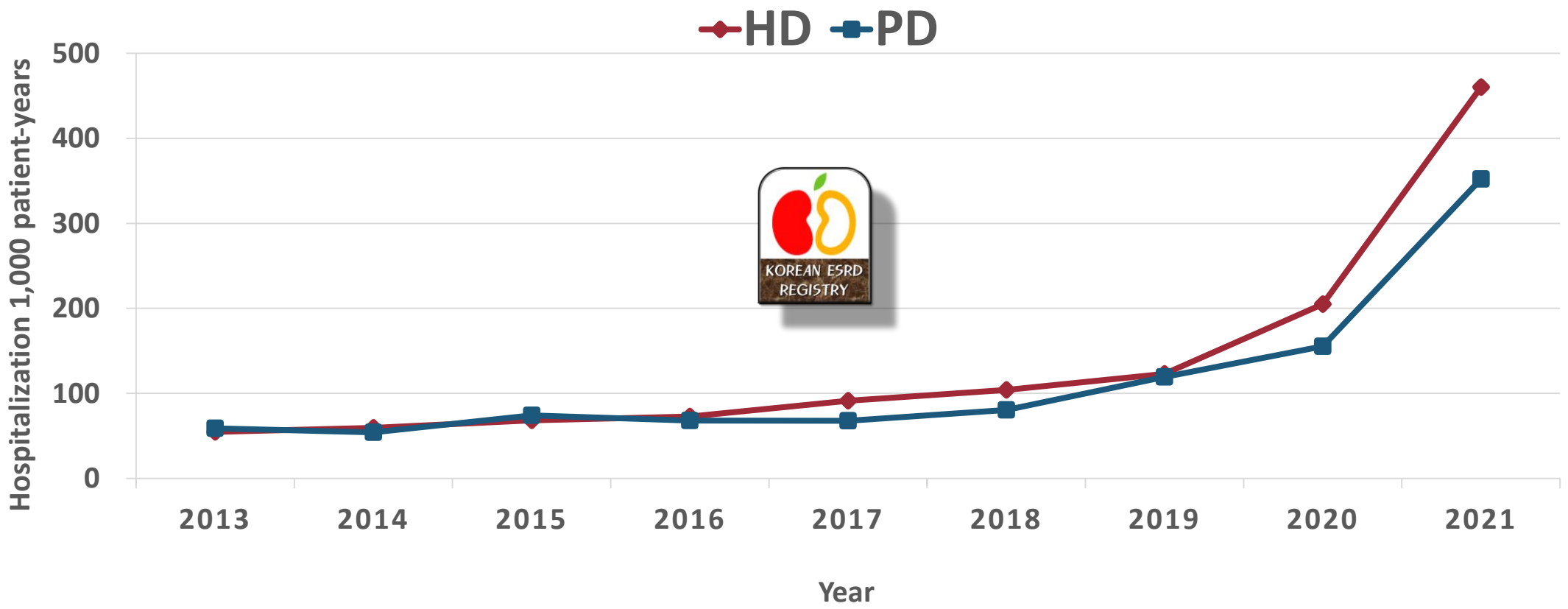
III. 우리나라 말기신부전 환자의 생존율 변화와 위험인자 (Mortality analysis of ESKD patients in Korea)

Flow chart of patient selection for the cohort

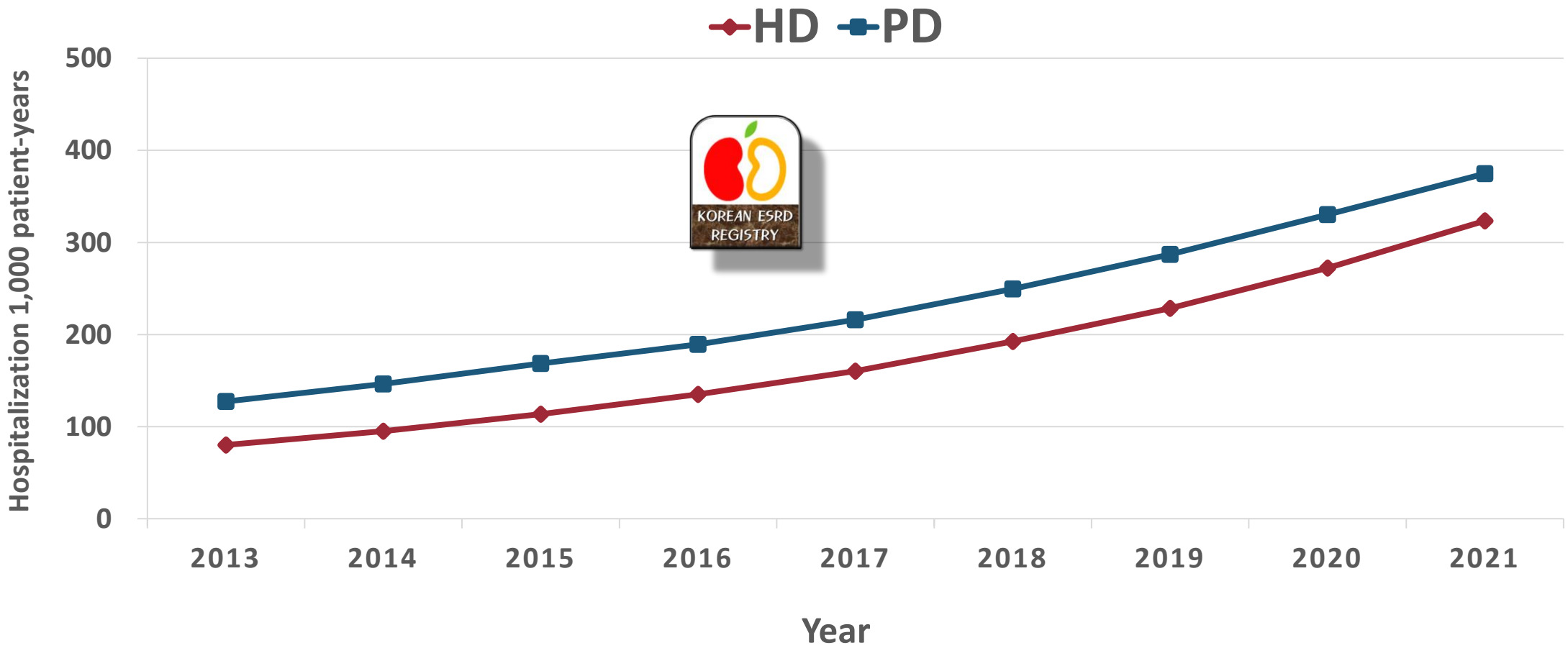


All-cause hospitalization

Unadjusted all-cause hospitalization by overall and treatment modality (HD vs PD) for period prevalent patients, 2001-2021

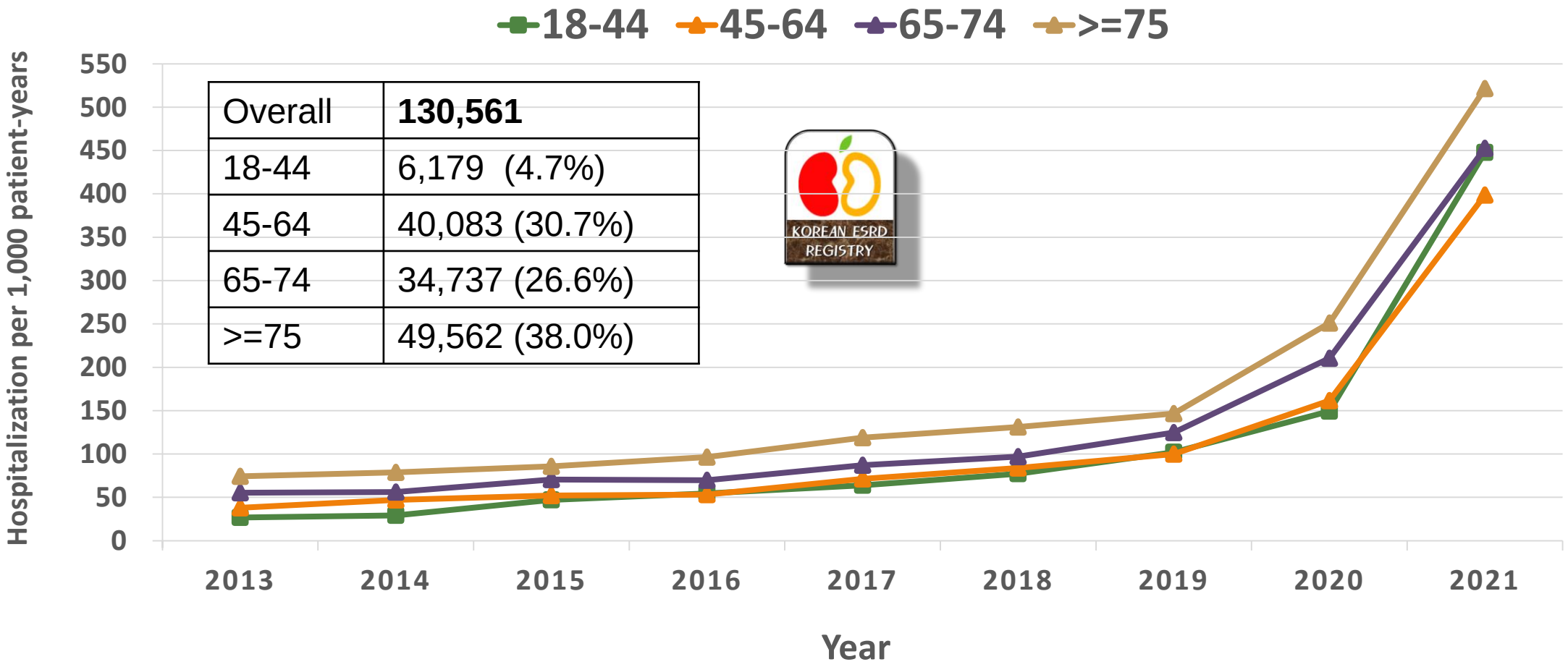


All-cause hospitalization by overall and treatment modality (HD vs PD) for period prevalent patients, 2001-2021, adjusted age and sex



HD patients

All-cause hospitalization by age for period prevalent HD patients, 2001-2021

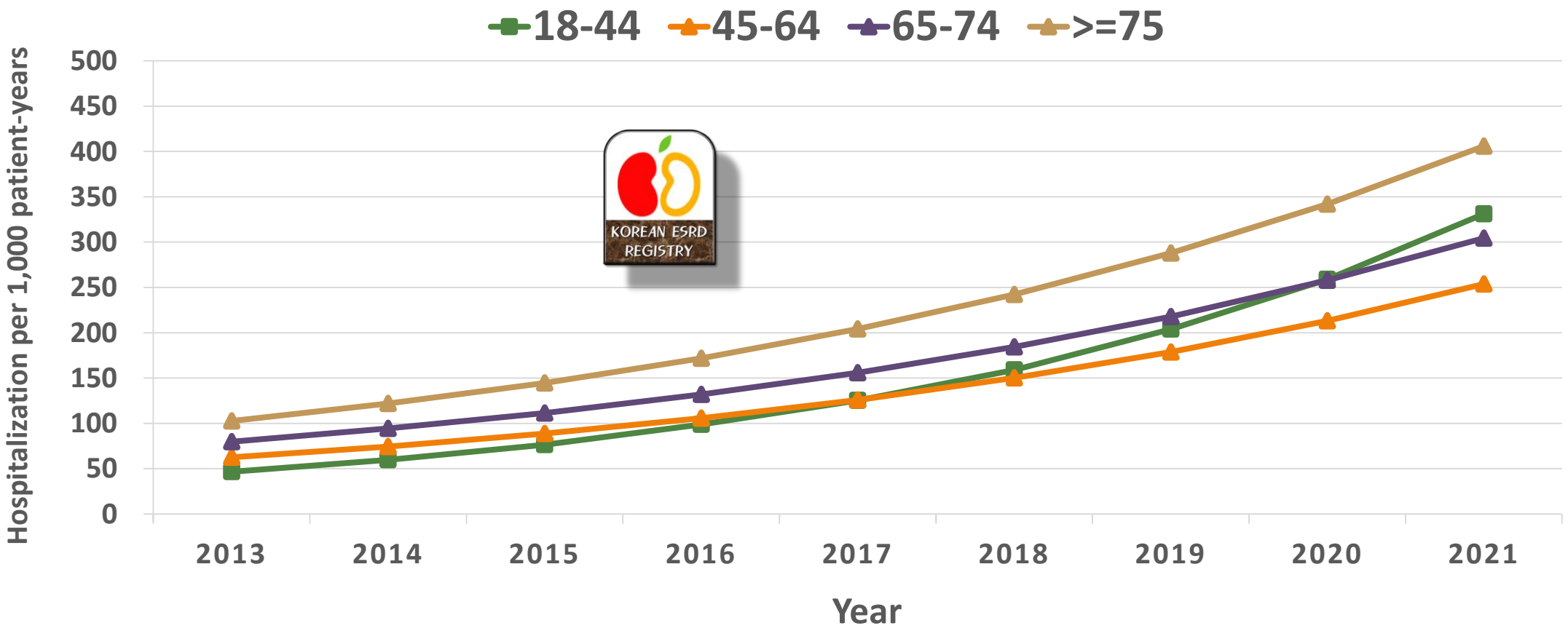


Overall	**130,561**
18-44	6,179 (4.7%)
45-64	40,083 (30.7%)
65-74	34,737 (26.6%)
>=75	49,562 (38.0%)

KOREAN ESRD REGISTRY

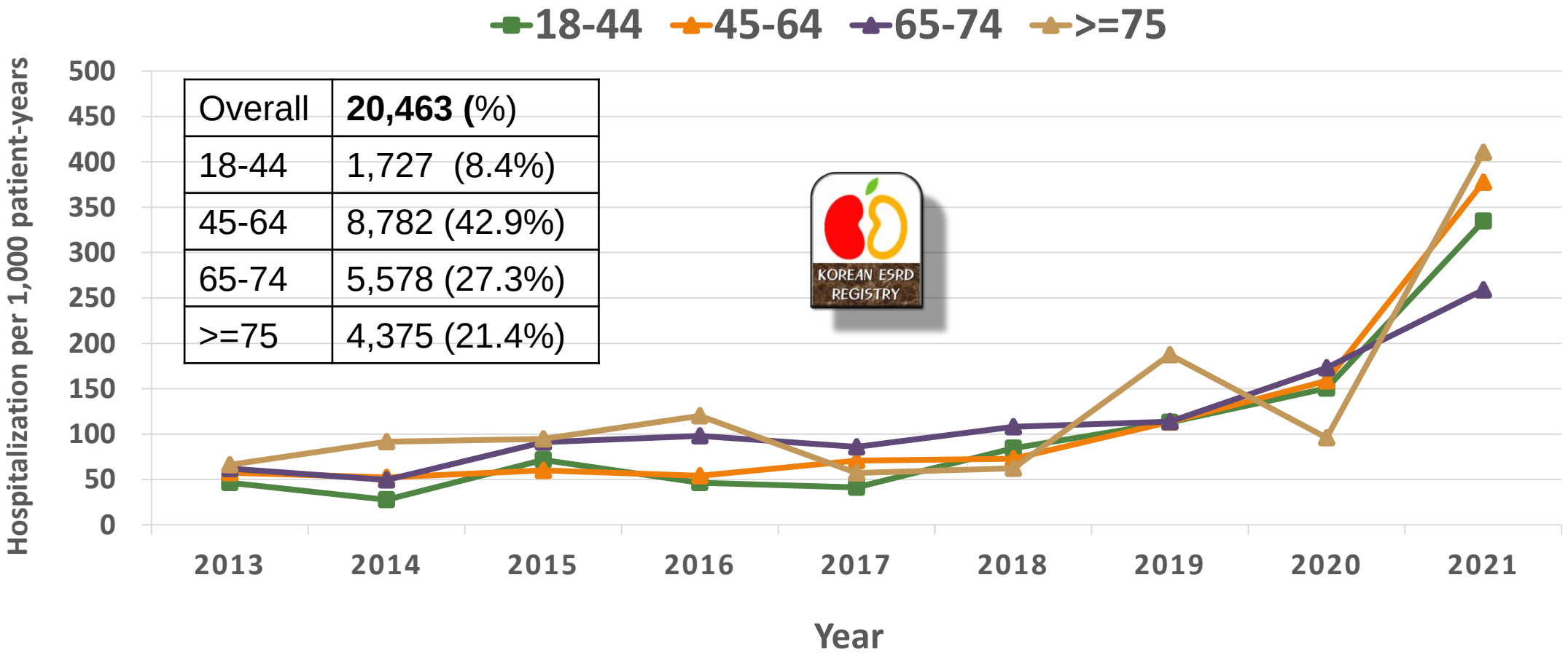
HD patients

All-cause hospitalization by age for period prevalent HD patients, 2001-2021, adjusted(sex)



PD patients

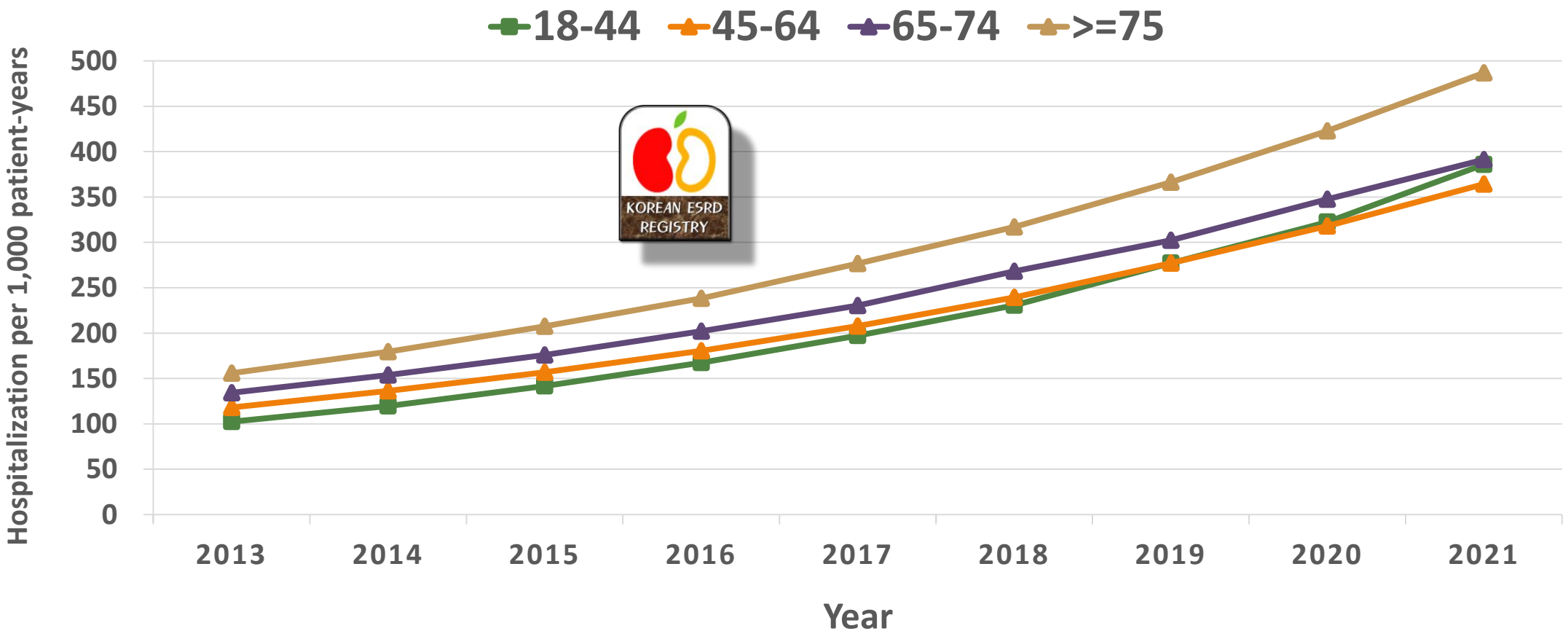
All-cause hospitalization by age for period prevalent PD patients, 2001-2021



Overall	**20,463 (**%)
18-44	1,727 (8.4%)
45-64	8,782 (42.9%)
65-74	5,578 (27.3%)
>=75	4,375 (21.4%)

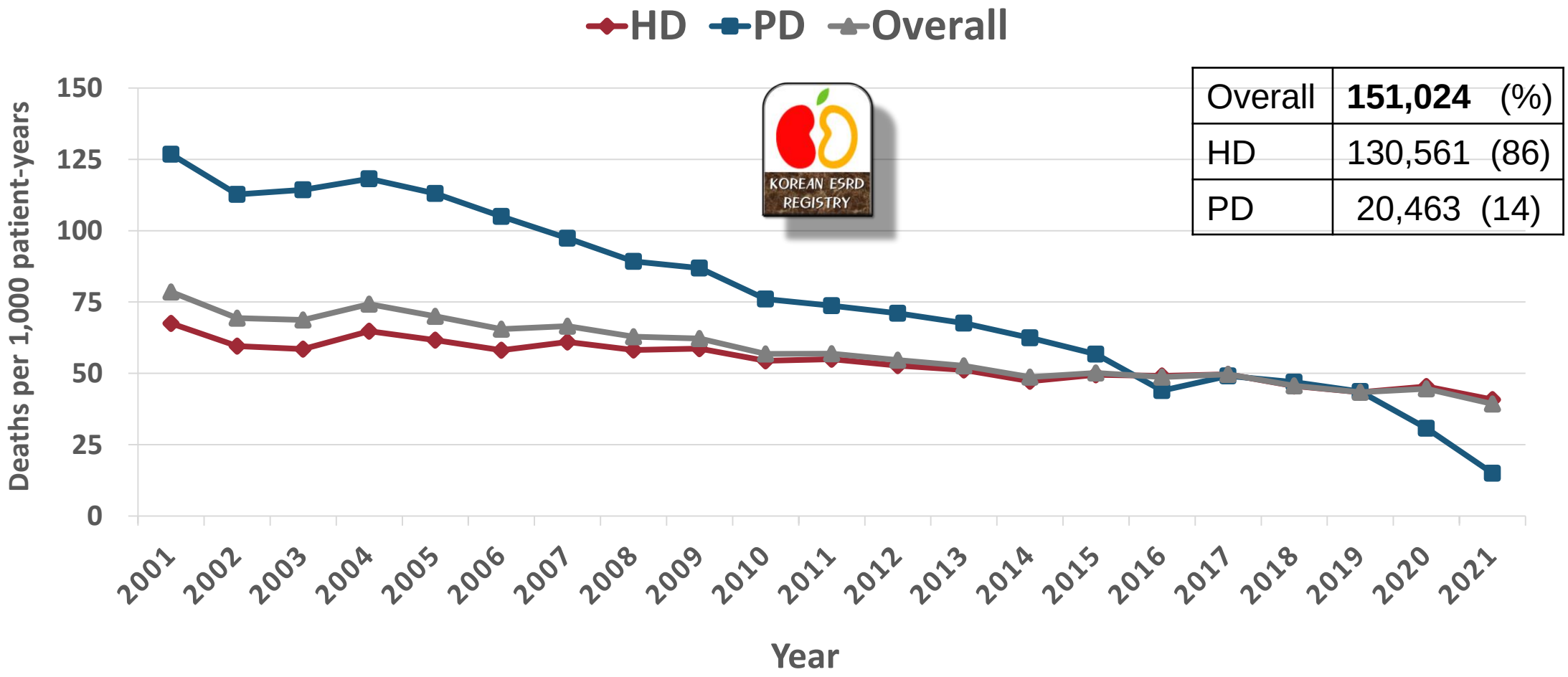
PD patients

All-cause hospitalization by age for period prevalent PD patients, 2001-2021, adjusted(sex)



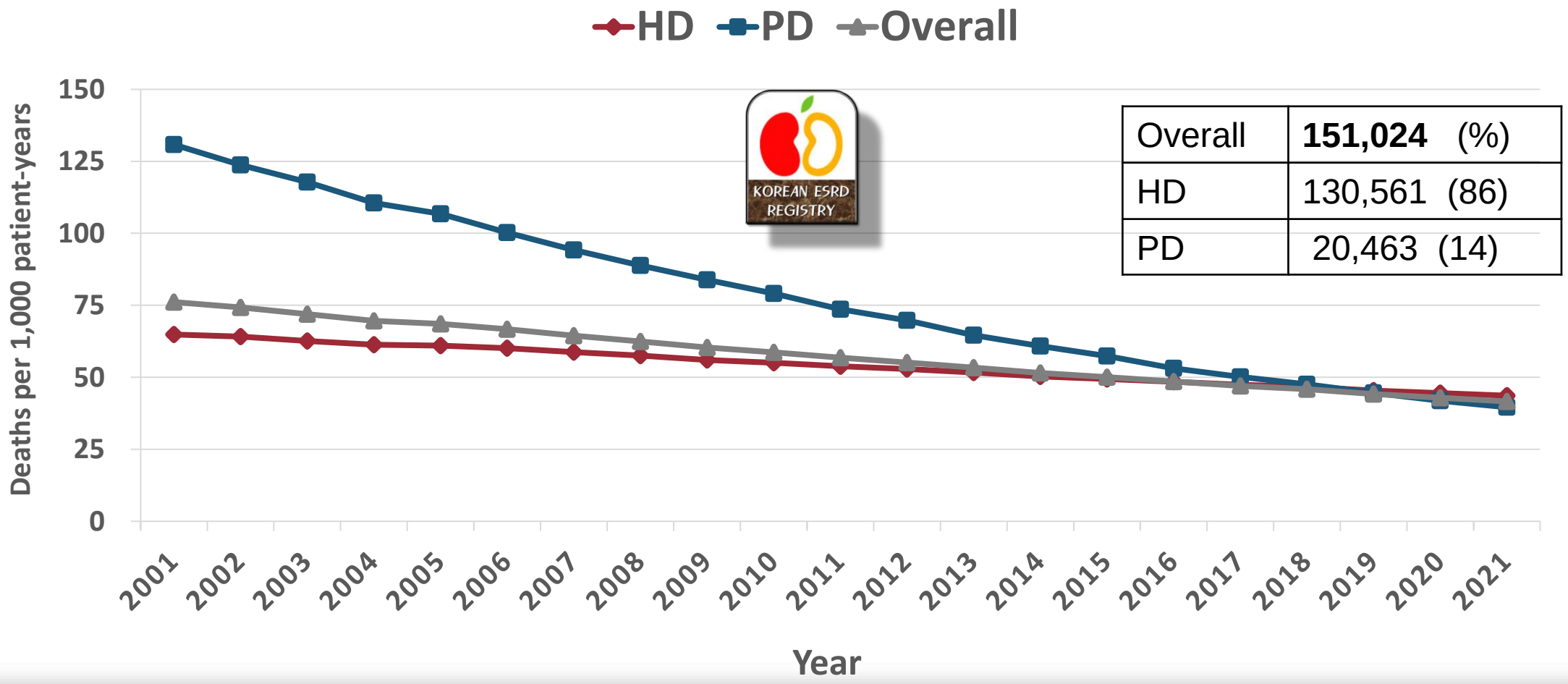
All-cause mortality

Unadjusted all-cause mortality by overall and treatment modality (HD vs PD) for period prevalent patients, 2001-2021



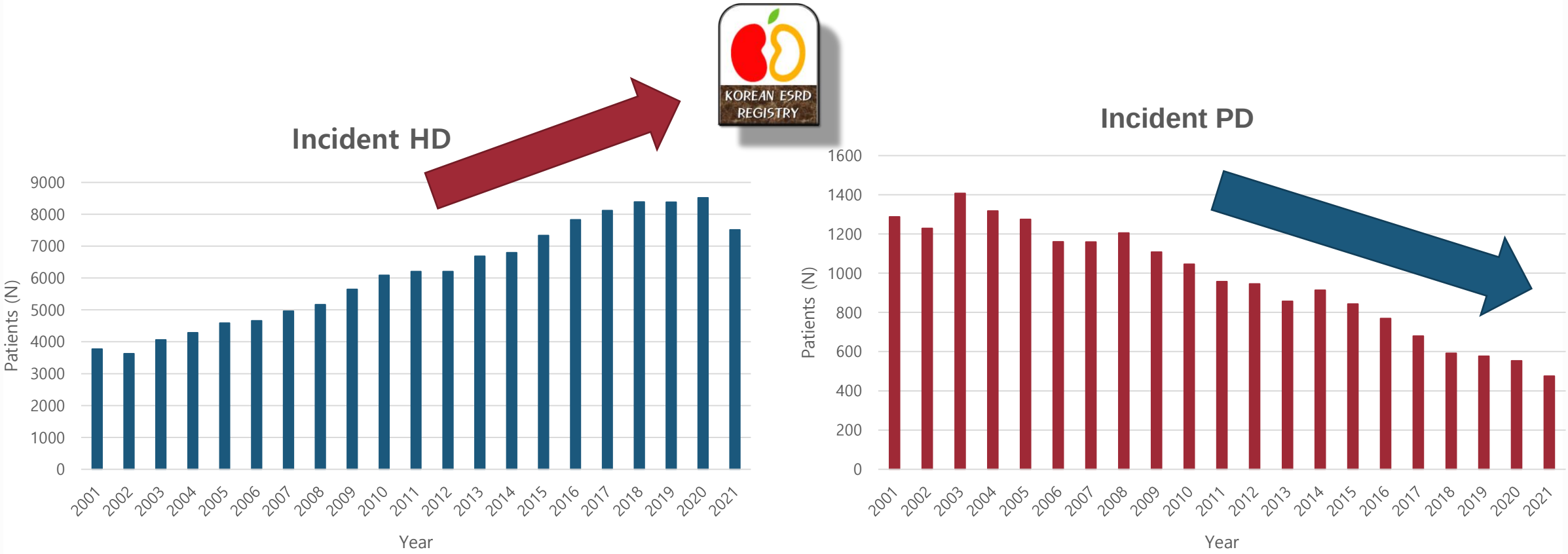
Overall	**151,024** (%)
HD	130,561 (86)
PD	20,463 (14)

Adjusted all-cause mortality by overall and treatment modality (HD vs PD) for period prevalent patients, 2001-2021



Overall	**151,024** (%)
HD	130,561 (86)
PD	20,463 (14)

The number of patients starting dialysis including analysis, 2001-2021

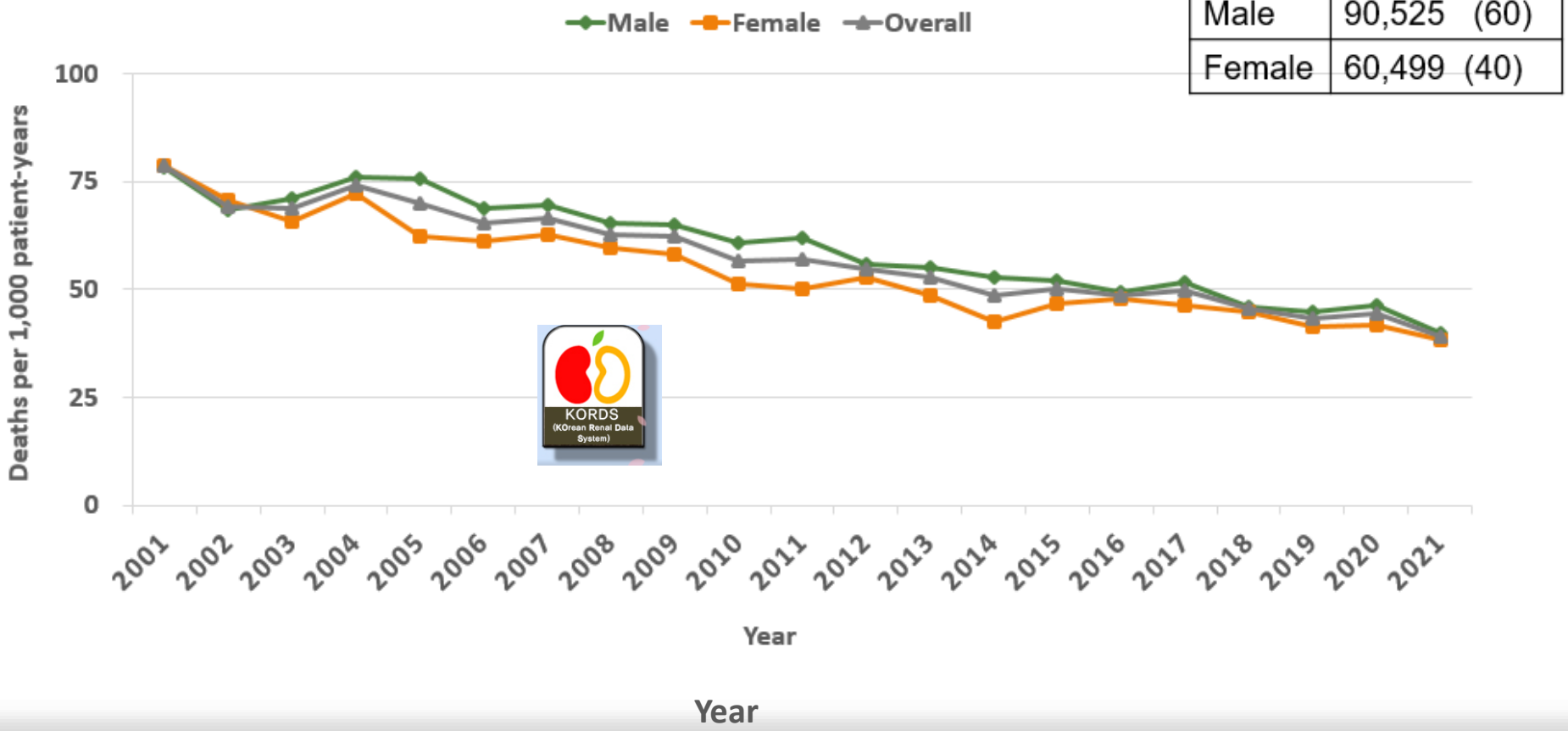


The number of patients who start HD is increased, while that of PD is decreased over time.

Male vs Female (1)

Unadjusted all-cause mortality by sex (male and female) for period prevalent patients, 2001-2021

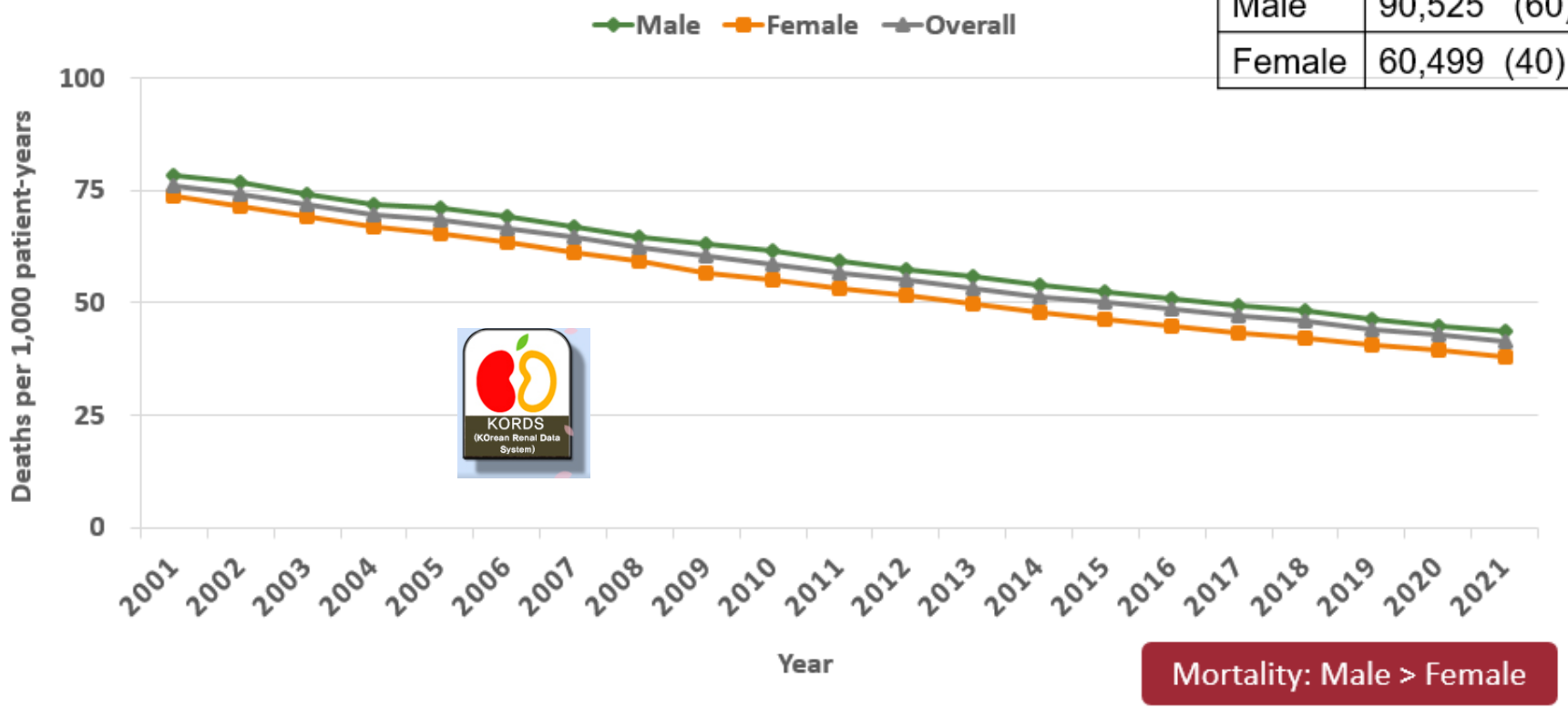
Overall	**151,024** (%)
Male	90,525 (60)
Female	60,499 (40)



Male vs Female (2)

All-cause mortality (deaths per 1,000 patient-years) by sex (male and female) for period prevalent patients, 2001-2021, adjusted (age)

Overall	**151,024** (%)
Male	90,525 (60)
Female	60,499 (40)

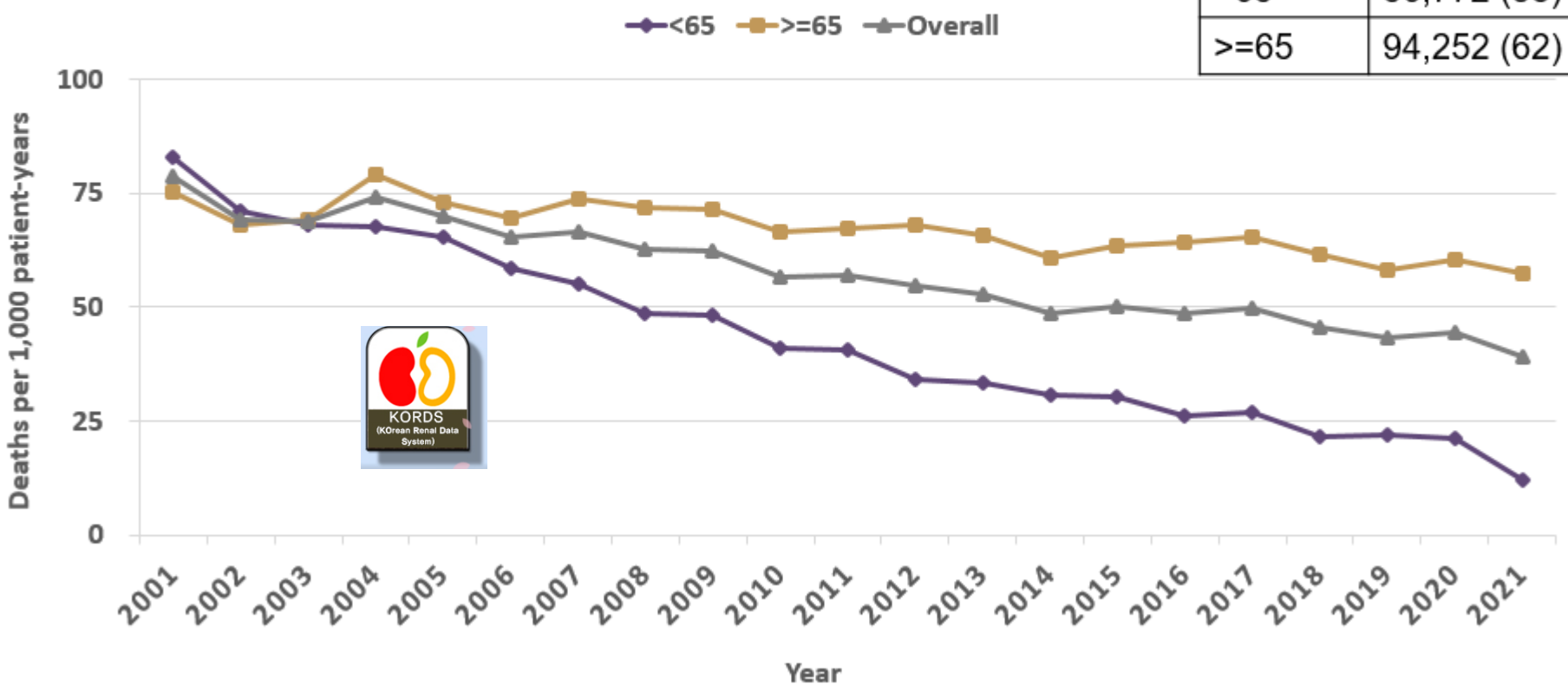


Mortality: Male > Female

Age (1)

Unadjusted all-cause mortality by age for period prevalent patients, 2001-2021

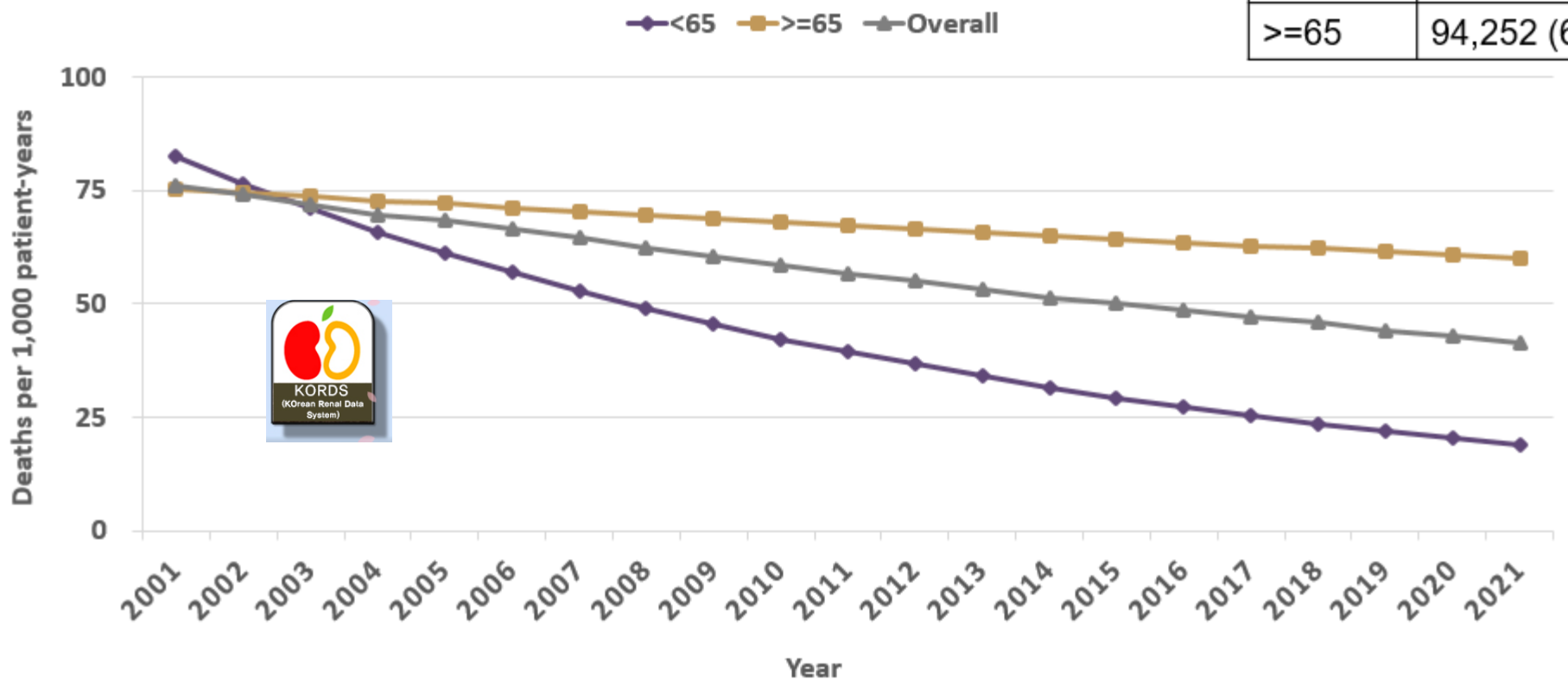
Overall	**151,024** (%)
<65	56,772 (38)
>=65	94,252 (62)



Age (2)

All-cause mortality by age for period prevalent patients, 2001-2021, adjusted(sex)

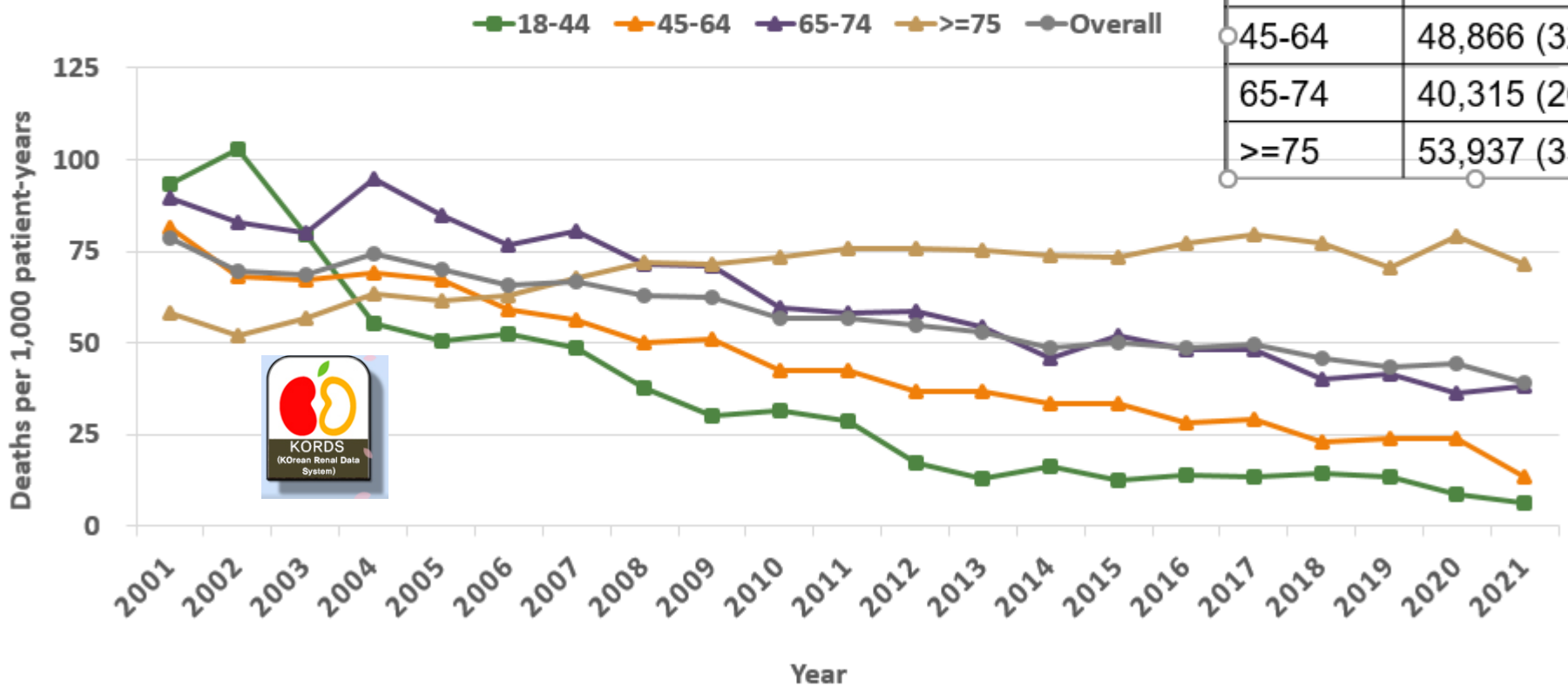
Overall	**151,024** (%)
<65	56,772 (38)
>=65	94,252 (62)



Age (3)

Unadjusted all-cause mortality by age for period prevalent patients, 2001-2021

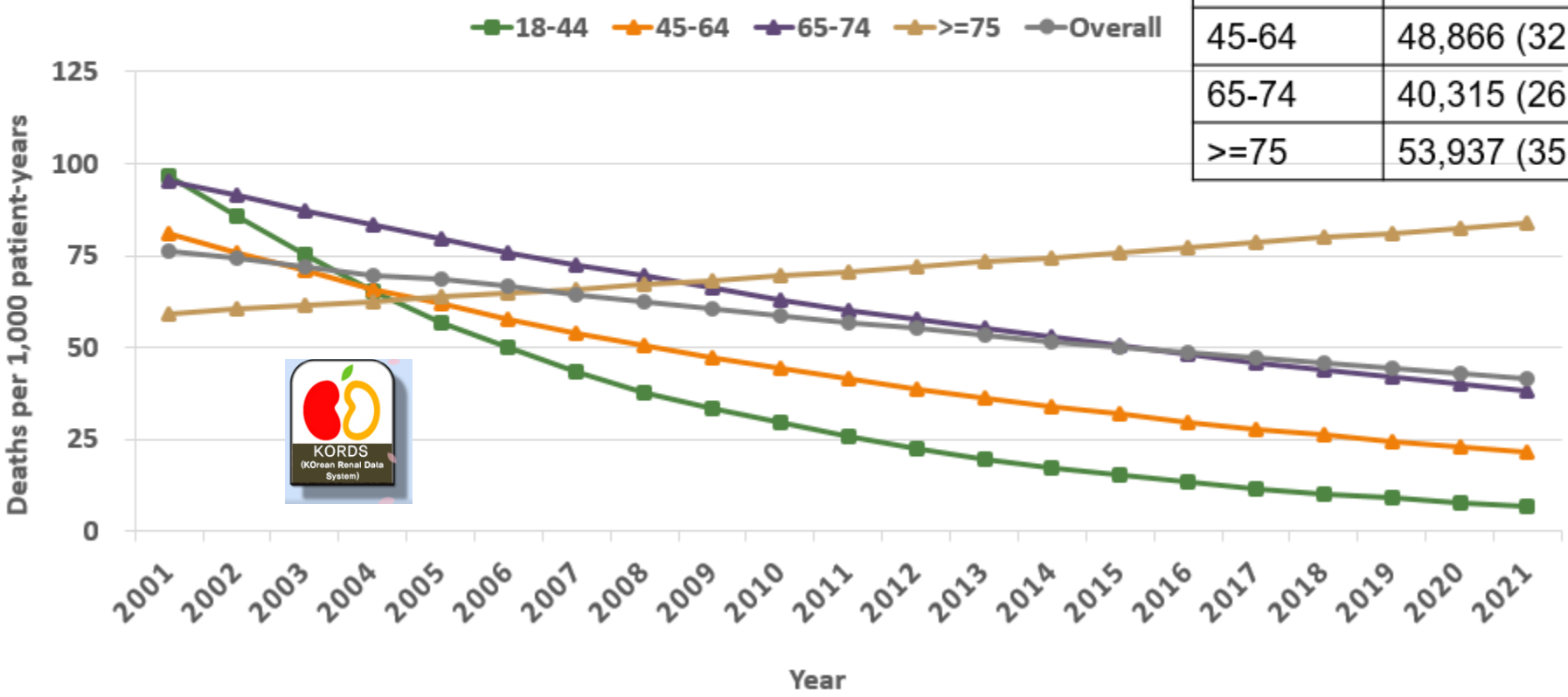
Overall	**151,024** (%)
18-44	7,906 (5.2%)
45-64	48,866 (32.4%)
65-74	40,315 (26.7%)
>=75	53,937 (35.7%)



Age (4)

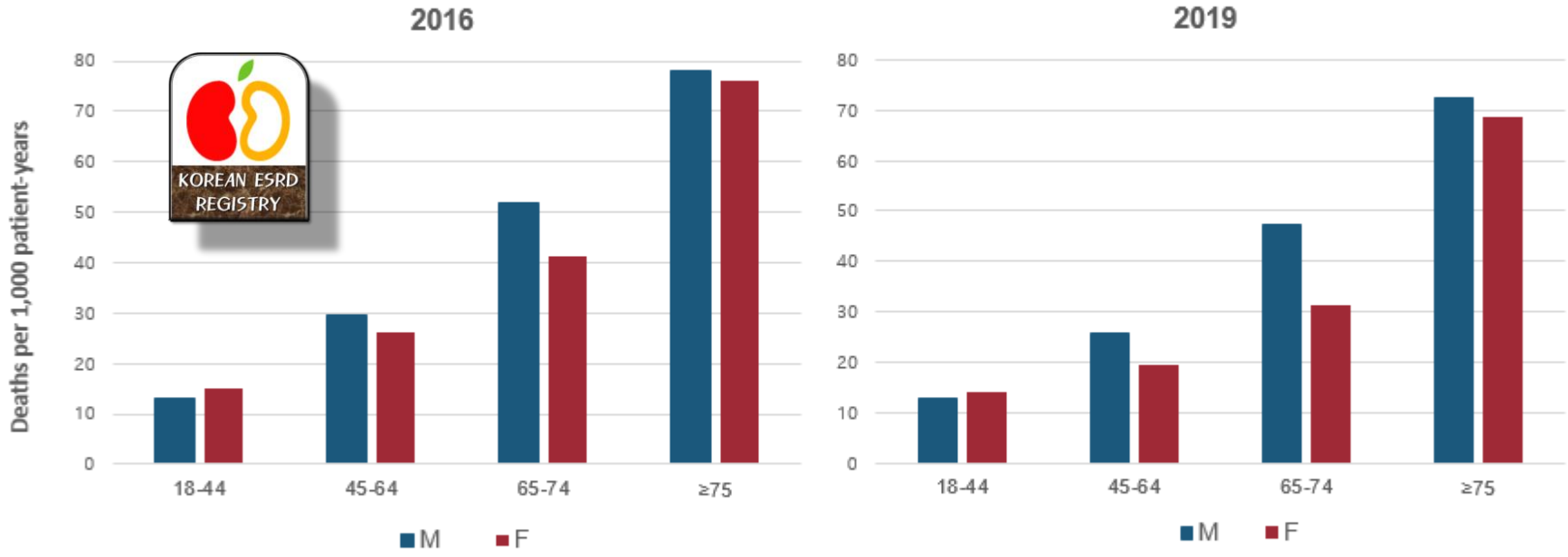
All-cause mortality by age for period prevalent patients, 2001-2021, adjusted(sex)

Overall	**151,024** (%)
18-44	7,906 (5.2%)
45-64	48,866 (32.4%)
65-74	40,315 (26.7%)
>=75	53,937 (35.7%)



Age and Sex

Unadjusted all-cause mortality in prevalent dialysis patients, by age and sex, 2016 & 2019

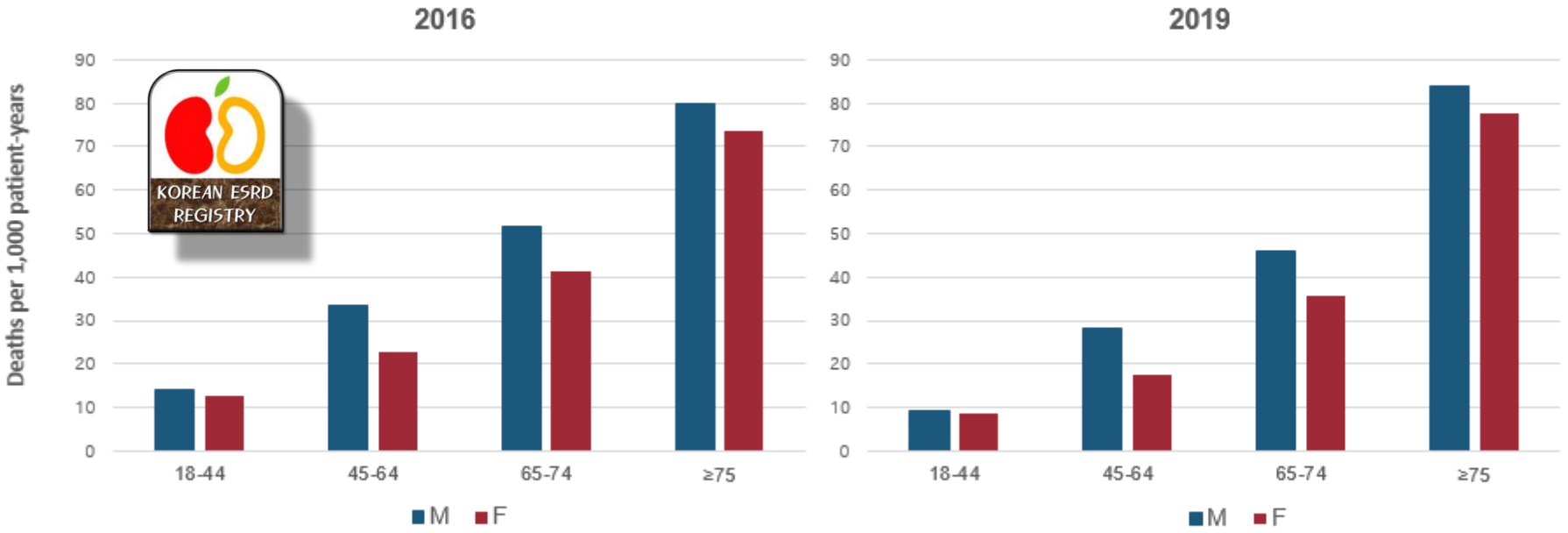


18-44		45-64		65-74		>=75	
male	female	male	female	male	female	male	female
284	225	1829	932	1453	782	1702	1388

18-44		45-64		65-74		>=75	
male	female	male	female	male	female	male	female
376	249	2042	981	1411	801	1719	1375

Age and Sex

Adjusted all-cause mortality in prevalent dialysis patients, by age and sex, 2016 & 2019



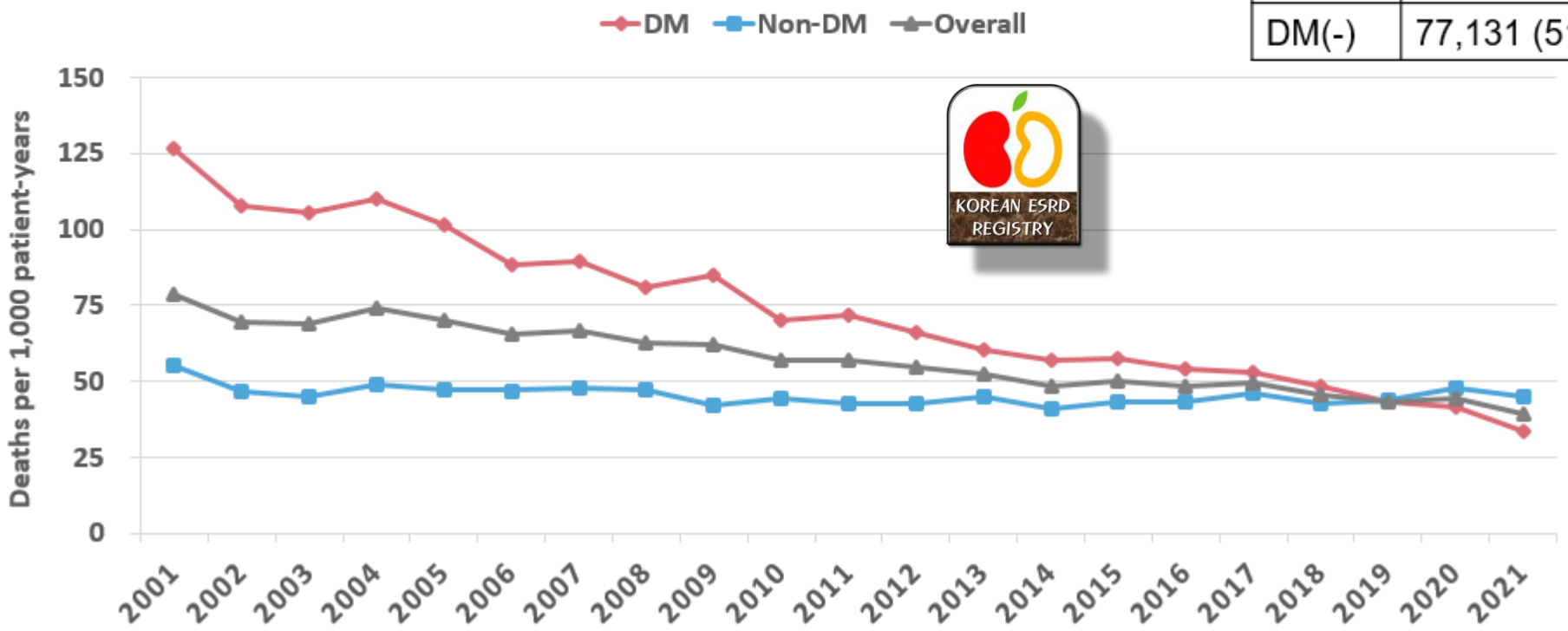
18-44		45-64		65-74		>=75	
male	female	male	female	male	female	male	female
284	225	1829	932	1453	782	1702	1388

18-44		45-64		65-74		>=75	
male	female	male	female	male	female	male	female
376	249	2042	981	1411	801	1719	1375

Diabetes Mellitus (DM) vs Non-DM (1)

Unadjusted all-cause mortality by DM for period prevalent patients, 2001-2021

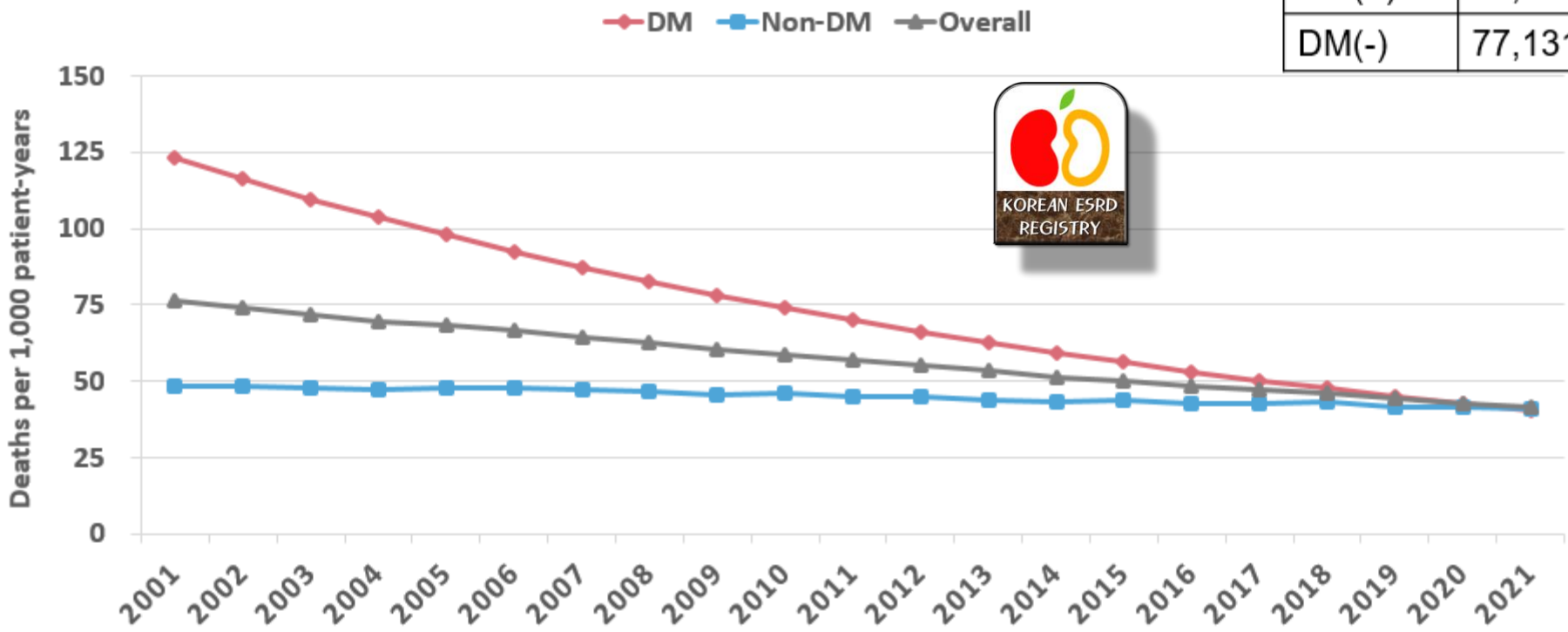
Overall	**151,024** (%)
DM(+)	73,893 (49)
DM(-)	77,131 (51)



Diabetes Mellitus (DM) vs Non-DM (2)

All-cause mortality by DM for period prevalent patients, 2001-2021, adjusted age and sex

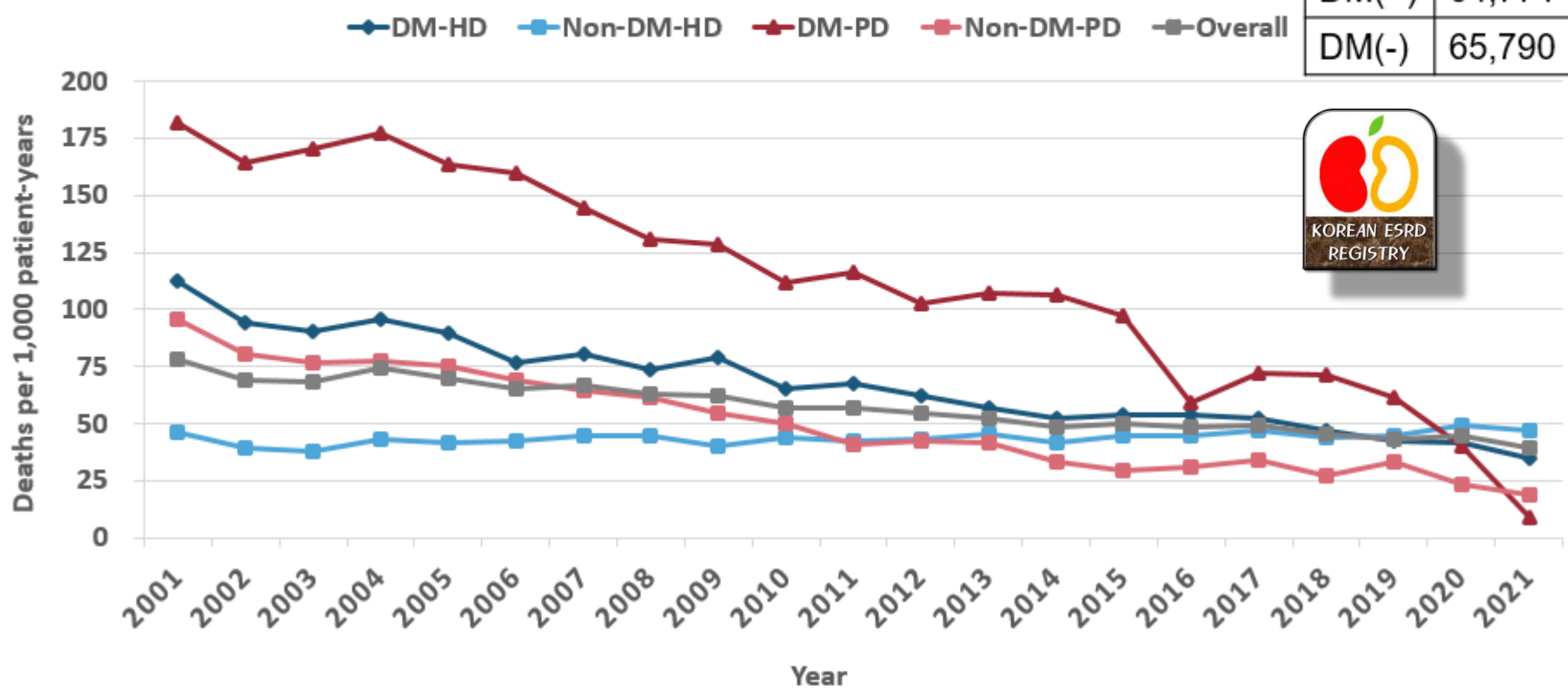
Overall	**151,024** (%)
DM(+)	73,893 (49)
DM(-)	77,131 (51)



Diabetes Mellitus (DM) vs Non-DM (3)

Unadjusted all-cause mortality by DM and treatment modality (HD and PD) for period prevalent patients, 2001-2021

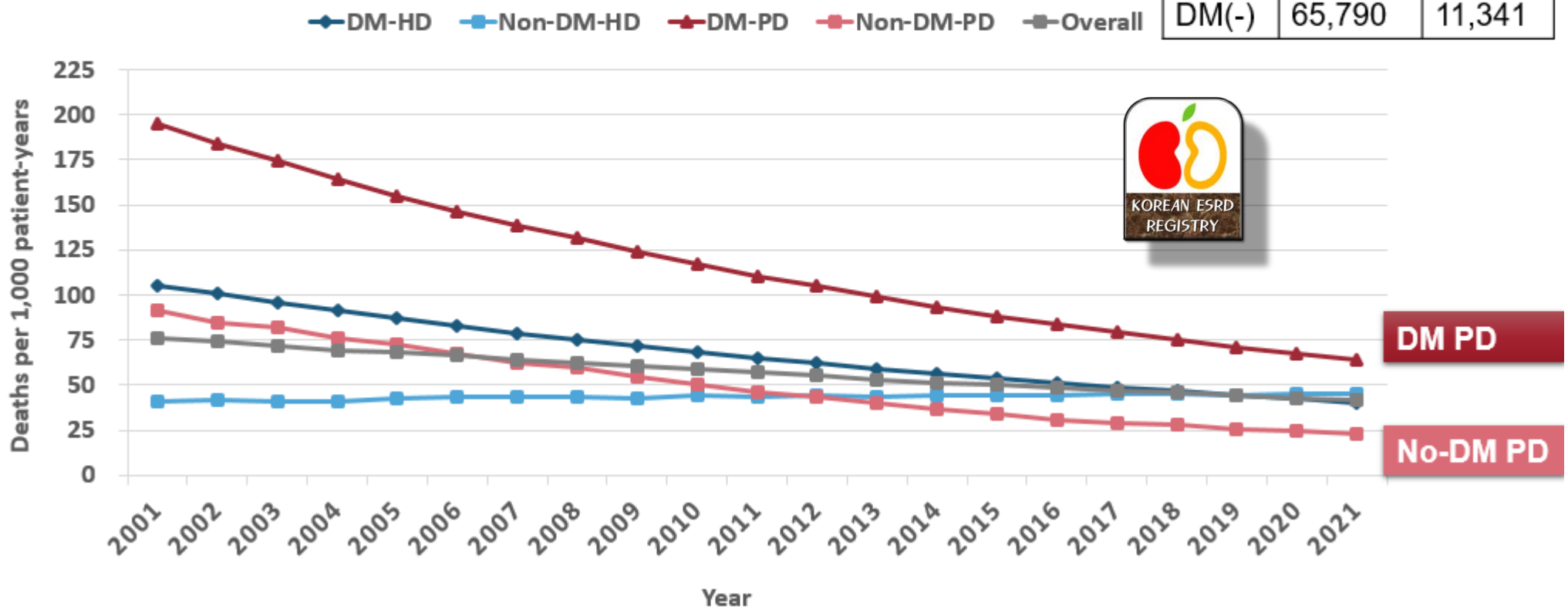
	HD	PD
DM(+)	64,771	9,122
DM(-)	65,790	11,341



Diabetes Mellitus (DM) vs Non-DM (4)

All-cause mortality by DM and treatment modality (HD and PD) for period prevalent patients, 2001-2021, adjusted age and sex

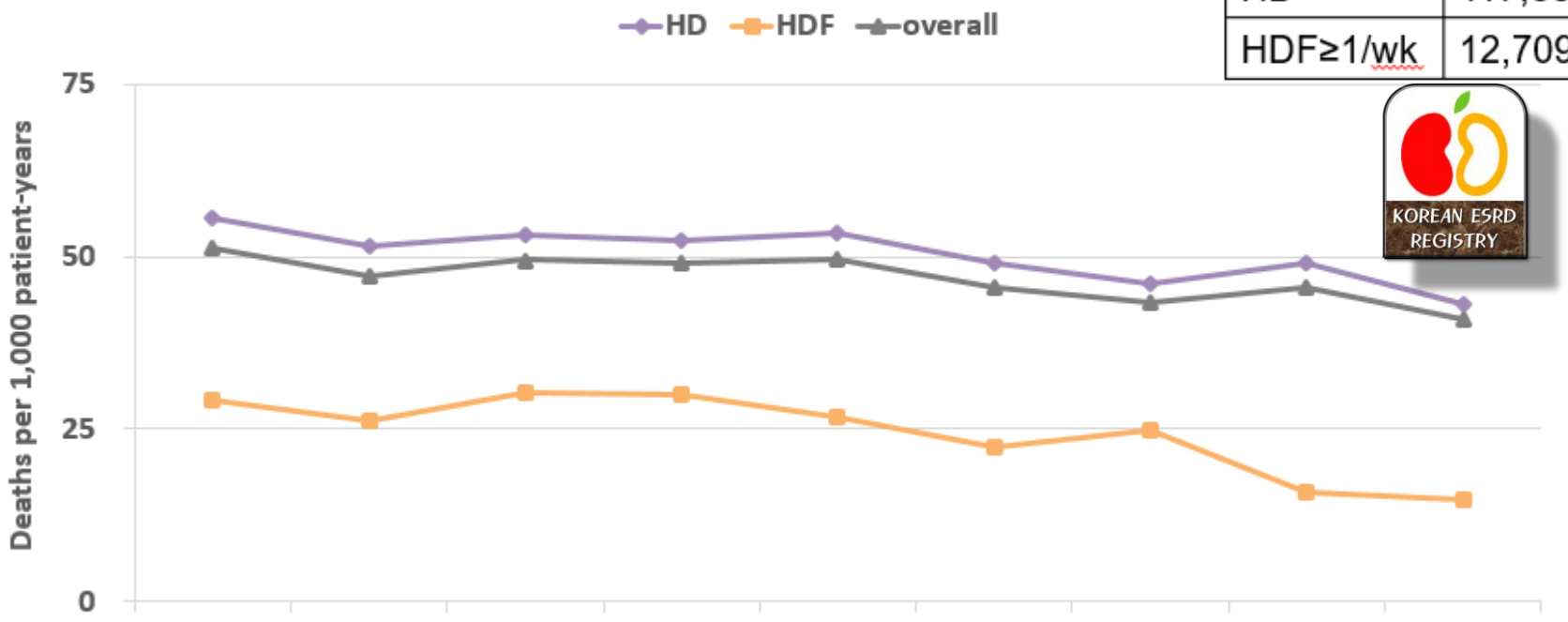
	HD	PD
DM(+)	64,771	9,122
DM(-)	65,790	11,341



HD vs HDF (1)

All-cause mortality by HD technique (HD vs HDF) for period prevalent patients, 2001-2021

All HD	**130,561** (%)
HD	117,852 (90)
HDF≥1/wk	12,709 (10)

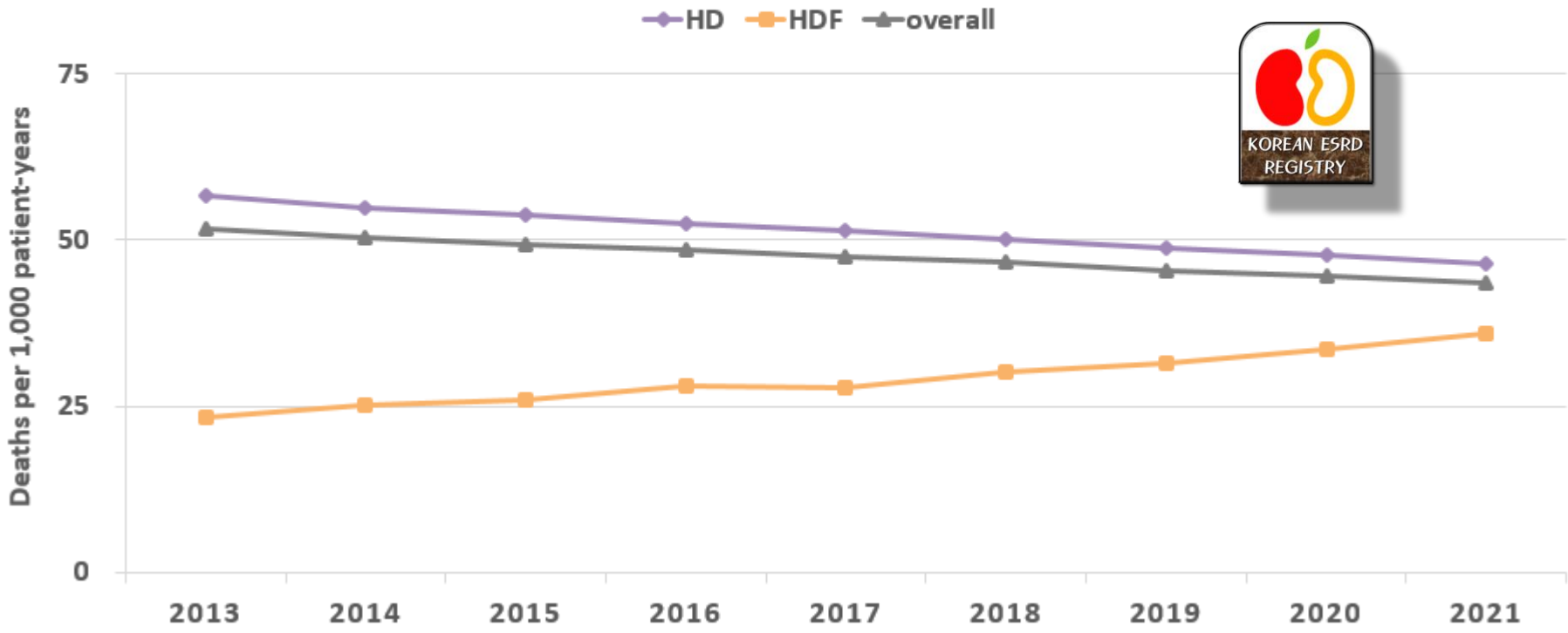


KOREAN ESRD REGISTRY

	2013	2014	2015	2016	2017	2018	2019	2020	2021
HD	5716	5801	6393	6889	7162	7531	7522	7718	7049
HDF ≥1/wk	971	996	944	937	952	856	855	802	466

HD vs HDF (2)

All-cause mortality by HD technique (HD vs HDF) for period prevalent patients, 2001-2021 adjusted age and sex



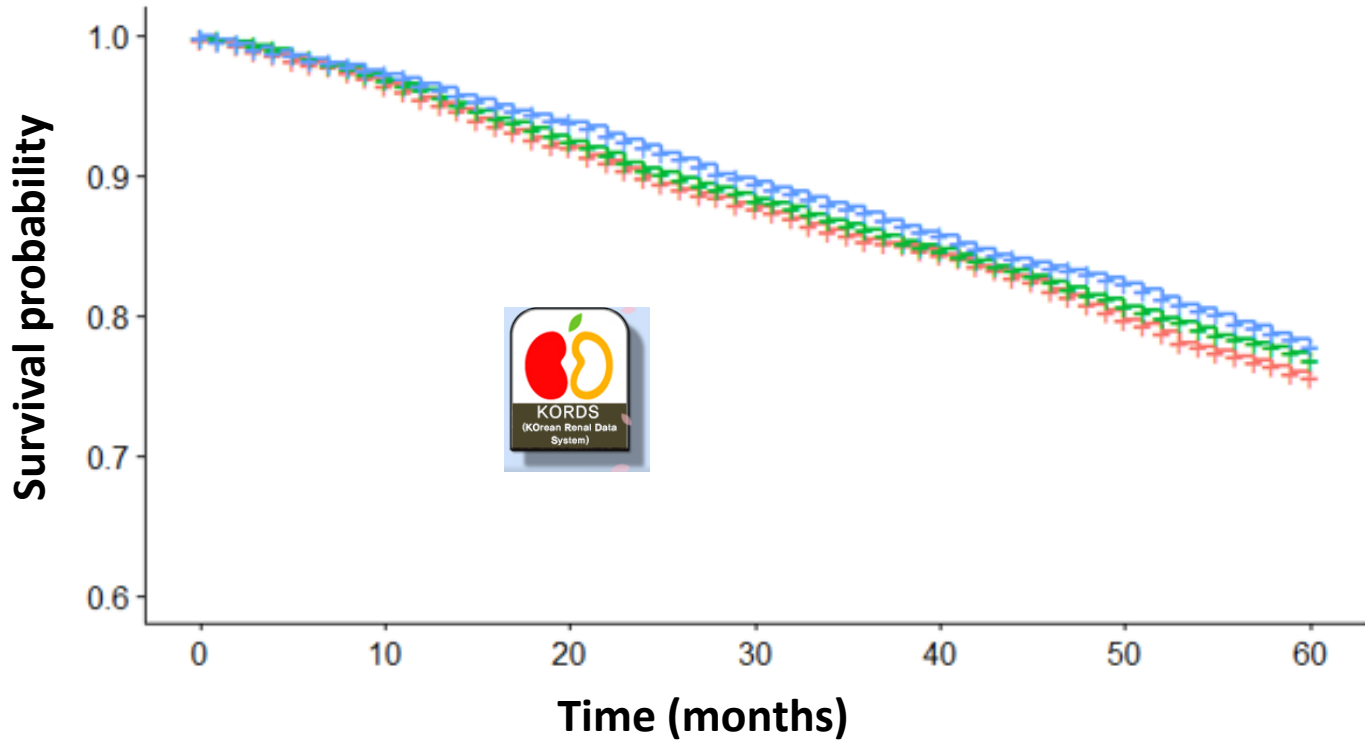
Survival probability of incident dialysis patients

Method

- First 5 years after dialysis: 첫 투석 시작 후 5년간 생존률
- Groups: 2006, 2011, and 2016 각 년도에 첫 투석을 시작한 말기 신부전 환자 (총 3그룹)
- Kaplan-meier estimate for survival analysis
- Adjusted by age and sex
- SAS version 9.4

Incident HD patients

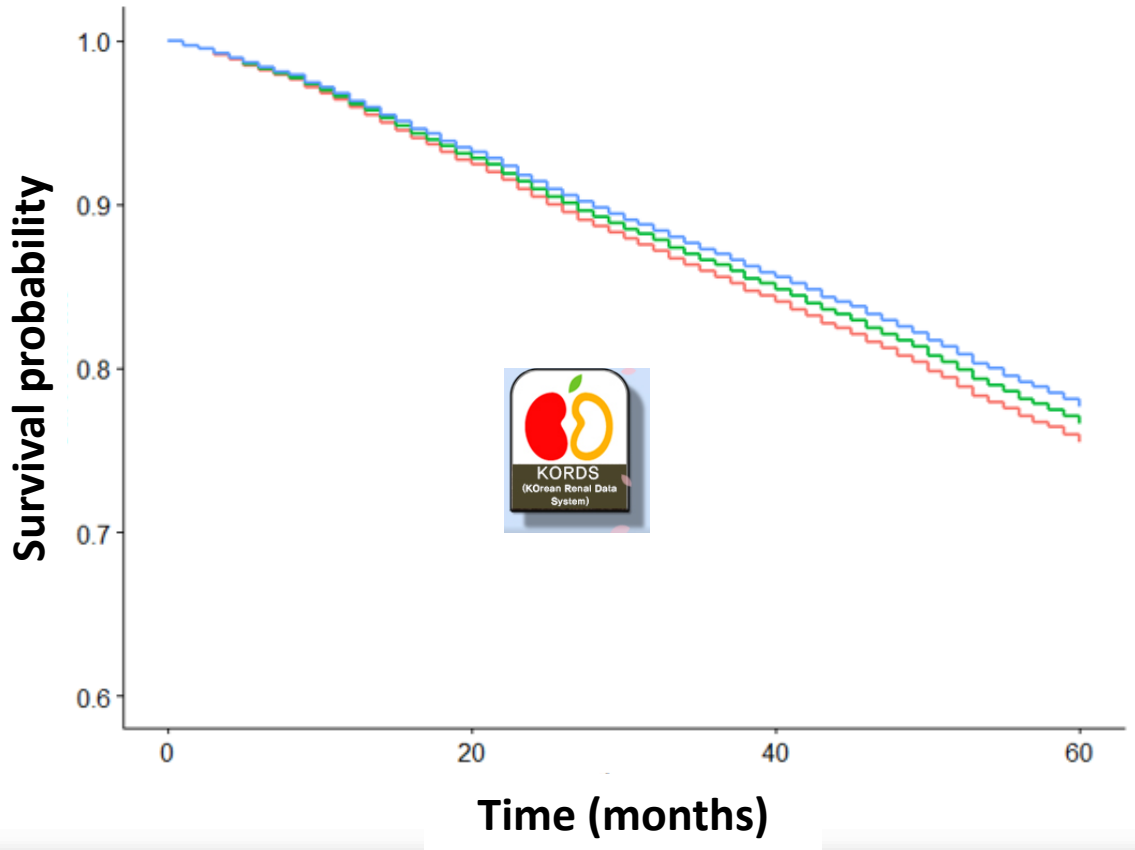
Unadjusted survival of incident ESRD patients over the first 5 years after HD and year of ESRD onset, 2006, 2011, and 2016



2006년에 혈액 투석을 시작한 환
2011년에 혈액 투석을 시작한 환자군
2016년에 혈액 투석을 시작한 환자군

Incident HD patients

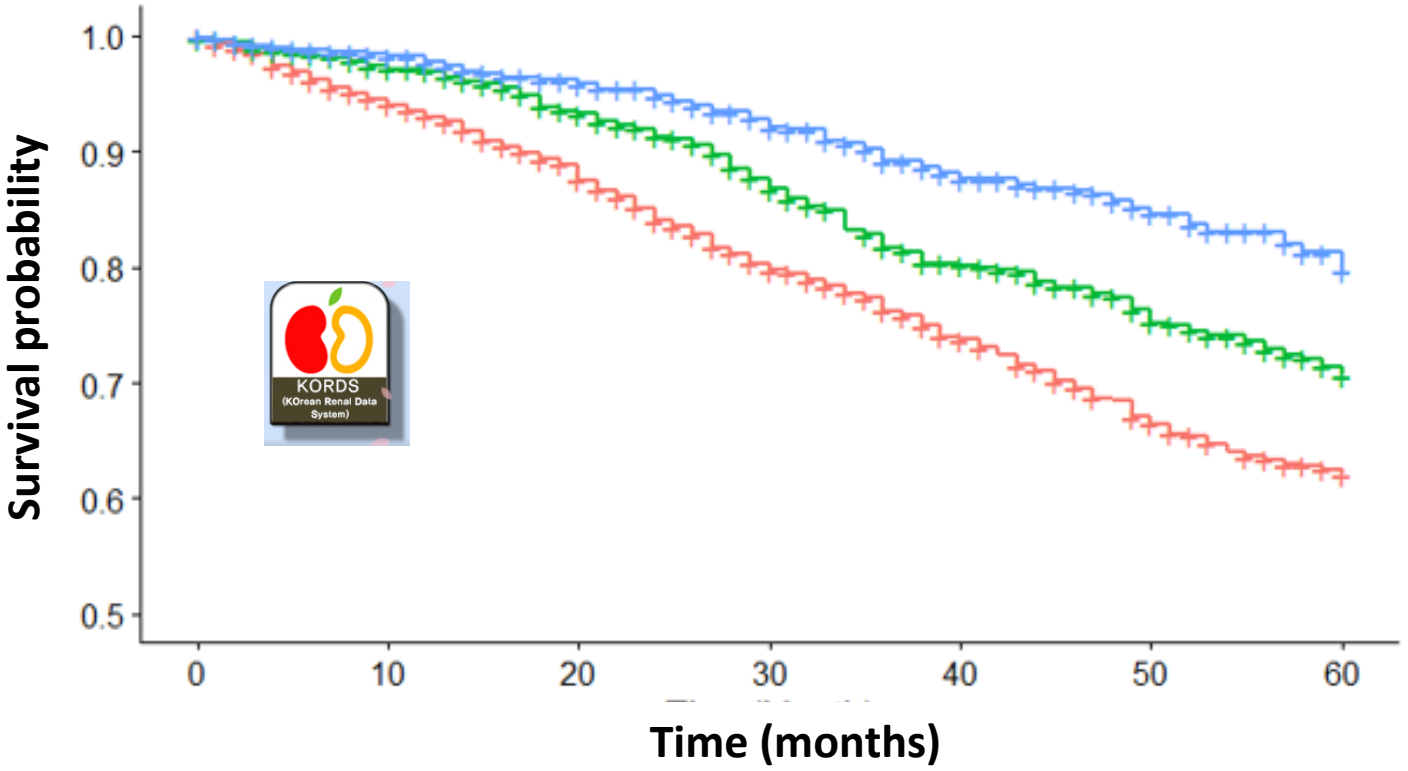
Adjusted survival of incident ESRD patients over the first 5 years after HD and year of ESRD onset, 2006, 2011, and 2016



2006년에 혈액 투석을 시작한 환
2011년에 혈액 투석을 시작한 환자군
2016년에 혈액 투석을 시작한 환자군

Incident PD patients

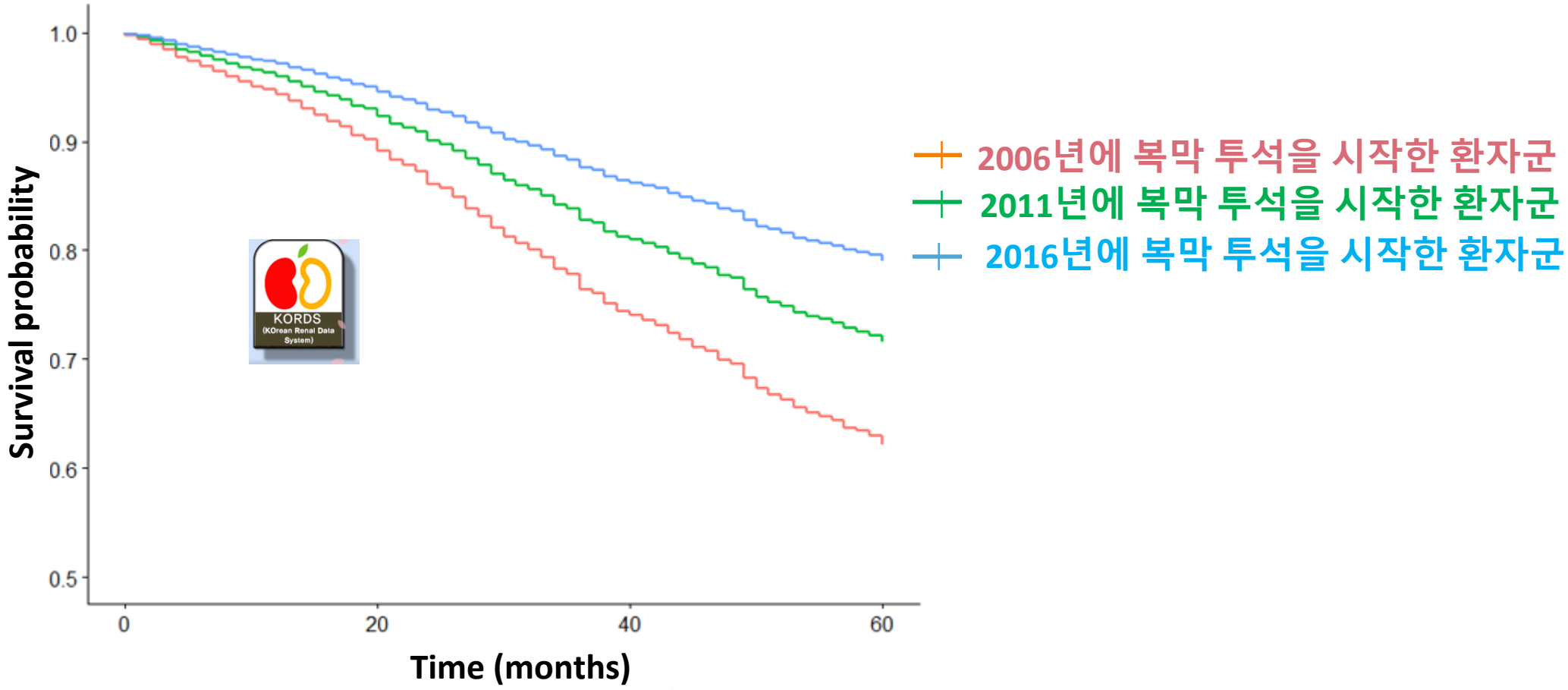
Unadjusted survival of incident ESRD patients over the first 5 years after PD and year of ESRD onset, 2006, 2011, and 2016



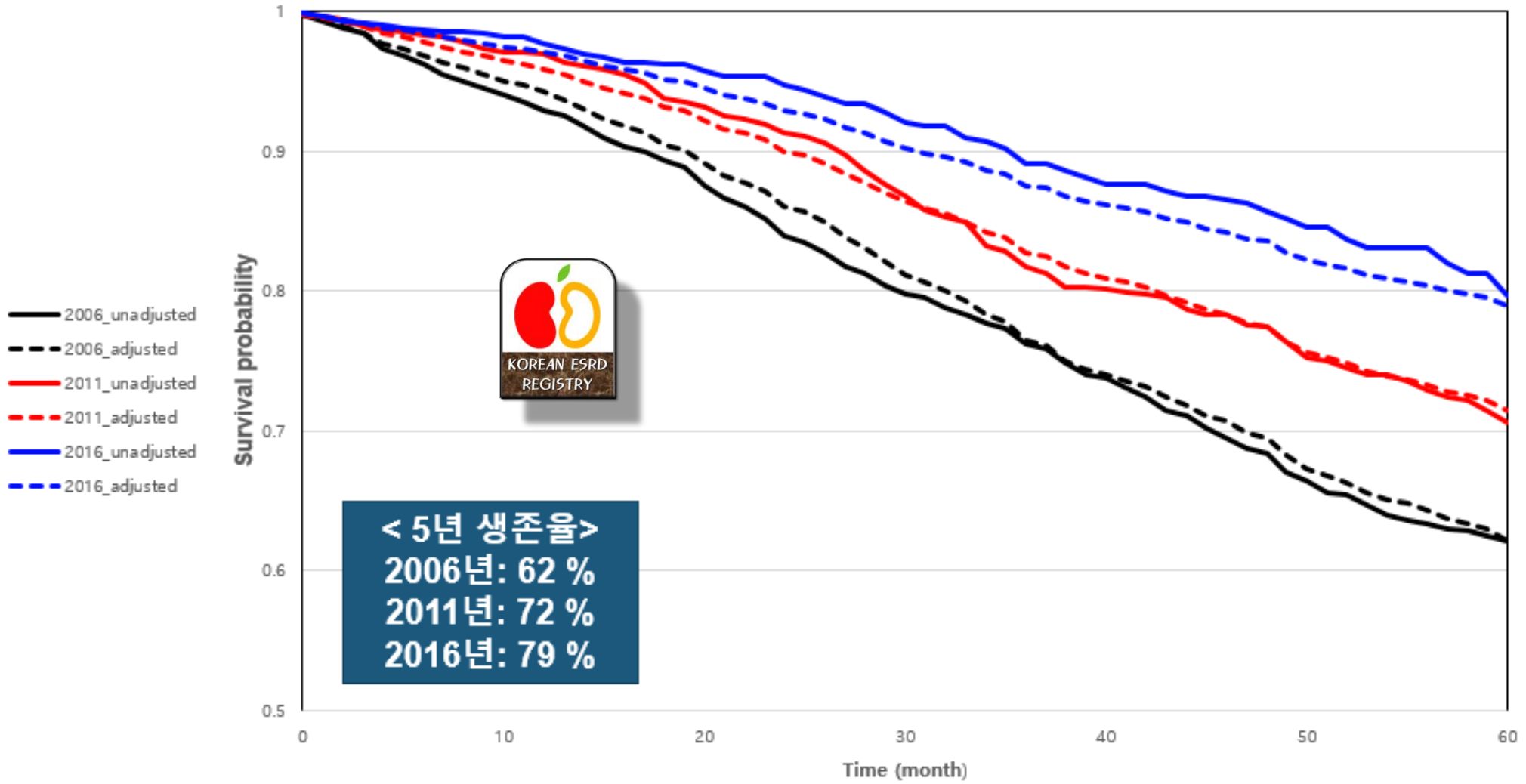
2006년에 복막 투석을 시작한 환자군
2011년에 복막 투석을 시작한 환자군
2016년에 복막 투석을 시작한 환자군

Incident PD patients

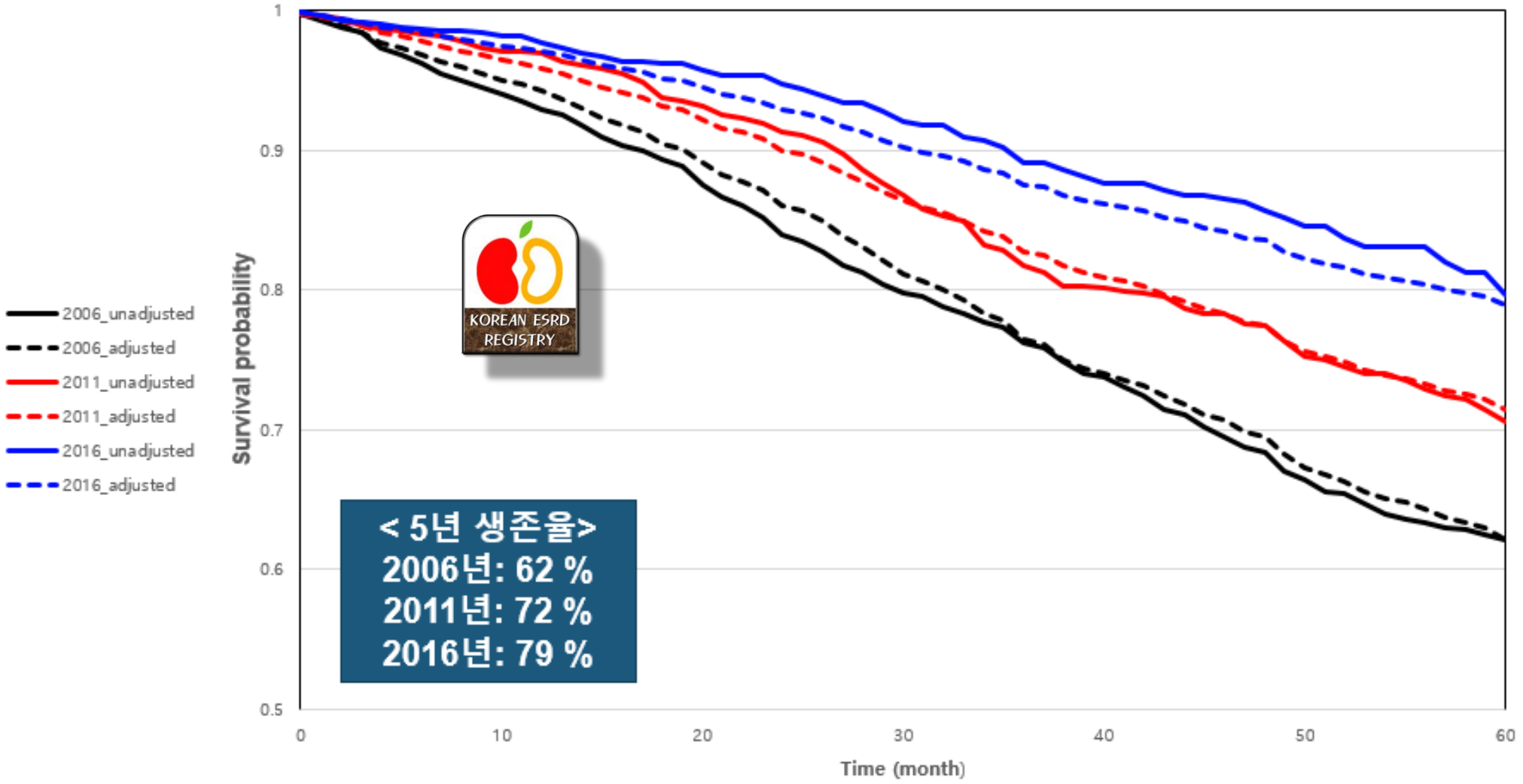
Age and sex-adjusted survival of incident ESRD patients over the first 5 years after PD treatment, 2006, 2011, and 2016



Adjusted survival of incident ESRD patients over the first 5 years after PD and year of ESRD onset, 2006, 2011, and 2016



Adjusted survival of incident ESRD patients over the first 5 years after PD and year of ESRD onset, 2006, 2011, and 2016



Causes of deaths

Method

- Percentages
- 2001-2021
- SAS version 9.4

KOREAN ESRD REGISTRY

Cause-specific mortality (%) in patients with ESRD receiving dialysis, 2001-2021

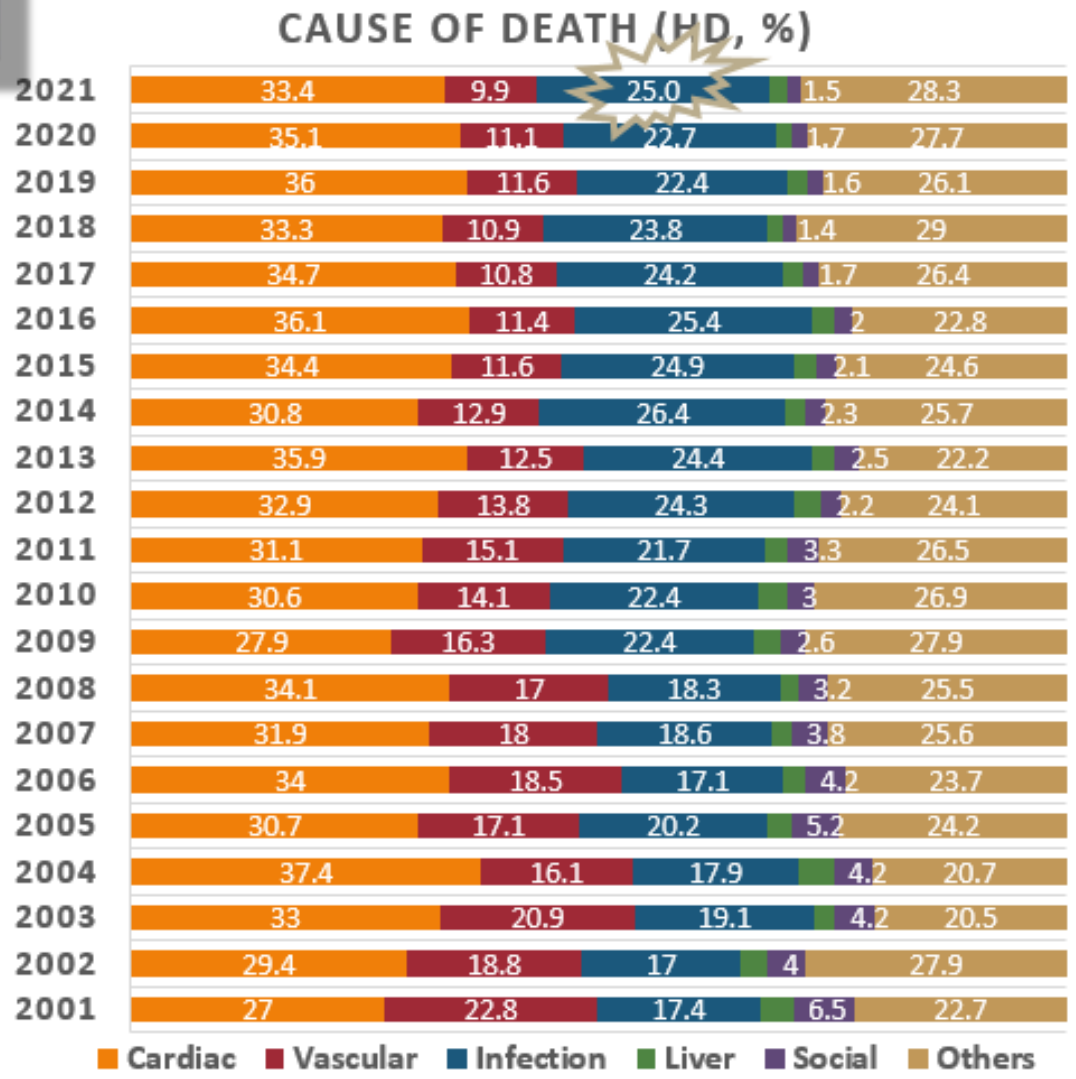
	2001	2005	2007	2009	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cardiac	26.9	30.7	31.7	29.5	32.7	35.8	32.5	36.1	38.1	33.7	33.7	35.8	34.8	34.1
MI	7.7	8.0	7.5	8.0	6.6	7.5	5.7	8.0	5.5	6.5	6.5	7.6	6.0	6.2
cardiac arrest, uremia-associated	11.2	10.4	10.8	8.5	11.0	14.2	14.1	13.1	13.3	12.7	12.4	12.9	13.9	13.1
cardiac arrest, other	8.1	12.4	13.3	13.0	15.0	14.2	12.6	15.0	19.3	14.5	14.8	15.3	14.9	14.8
Vascular	22.7	17.0	17.8	15.9	14.1	13.3	13.2	11.8	10.8	11.4	11.5	11.2	10.7	9.5
cerebrovascular accident	15.1	12.3	13.0	11.0	8.7	8.7	8.5	6.5	6.2	6.2	5.6	6.5	6.0	4.6
pulmonary embolism	0.5	0.6	0.5	0.2	0.2	0.2	0.2	0.9	0.4	0.3	0.3	0.3	0.3	0.2
GI hemorrhage	2.7	1.7	2.7	2.3	2.2	1.2	1.7	1.4	2.0	0.8	1.7	1.8	1.3	1.4
GI embolism	0.1	0.5	0.1	0.5	0.1	0.2	0.2	0.7	0.3	0.3	0.2	0.2	0.2	0.1
others	4.3	1.9	1.6	1.9	3.0	3.0	2.6	2.4	1.9	3.7	3.7	2.4	3.0	3.3
Infection	17.8	20.1	20.2	21.9	23.1	23.5	26.8	24.6	24.5	25.2	22.6	22.9	23.6	25.5
pulmonary	4.5	4.5	4.4	5.9	8.4	8.4	9.0	8.9	9.3	7.7	8.6	8.2	8.7	10.0
septicemia	6.9	9.6	11.7	10.4	9.7	11.9	13.6	11.0	10.2	12.2	10.6	11.2	11.2	10.1
tuberculosis	0.8	0.3	0.2	0.3	0.1	0.1	0.1	1.1	0.1	0.2	0.0	0.1	0.0	0.2
peritonitis	1.1	1.4	1.1	0.8	1.0	0.5	0.7	1.1	1.2	0.7	0.6	0.6	0.7	0.7
others	4.5	4.3	2.9	4.5	4.0	2.7	3.4	2.4	3.6	4.5	2.7	2.9	2.9	4.6
Liver disease	2.6	2.7	2.2	3.1	2.1	2.4	2.2	2.6	2.3	2.0	1.6	2.3	1.7	1.9
hepatic failure d/t HBV	1.6	1.5	1.3	2.2	1.0	1.3	1.0	1.1	0.9	1.1	0.6	1.0	0.8	0.6
hepatic failure d/t others	1.0	1.2	0.8	0.9	1.1	1.1	1.2	1.5	1.5	1.0	1.0	1.4	0.9	1.3
Social	6.3	5.4	3.3	2.5	3.3	2.8	2.5	2.0	2.5	1.5	1.3	1.5	1.8	1.5
patient refused further treatment	2.1	1.1	1.1	0.5	0.4	0.3	0.3	0.3	0.5	0.1	0.0	0.3	0.2	0.2
suicide	3.3	3.3	1.5	1.3	1.4	1.3	1.6	1.0	1.5	0.8	0.8	0.8	1.1	0.9
therapy ceased for other cause	0.9	1.0	0.7	0.8	1.5	1.2	0.7	0.8	0.5	0.8	0.5	0.5	0.5	0.4
Others	23.7	24.0	24.8	27.1	24.7	22.2	22.9	23.0	21.8	26.2	29.3	26.2	27.4	27.6
cachexia	8.1	4.0	4.4	3.3	2.7	1.6	1.5	1.4	0.9	1.0	1.0	0.6	0.5	1.0
malignant	4.4	6.4	5.7	5.7	6.0	5.7	6.0	5.8	6.5	6.6	6.0	5.0	7.1	6.2
accident	0.9	1.4	1.2	1.3	1.6	1.4	2.0	1.0	1.0	1.1	1.3	1.3	1.5	1.4
uncertain	10.3	12.3	13.4	16.8	14.5	13.4	13.4	14.8	13.4	17.6	21.0	19.3	18.4	19.0

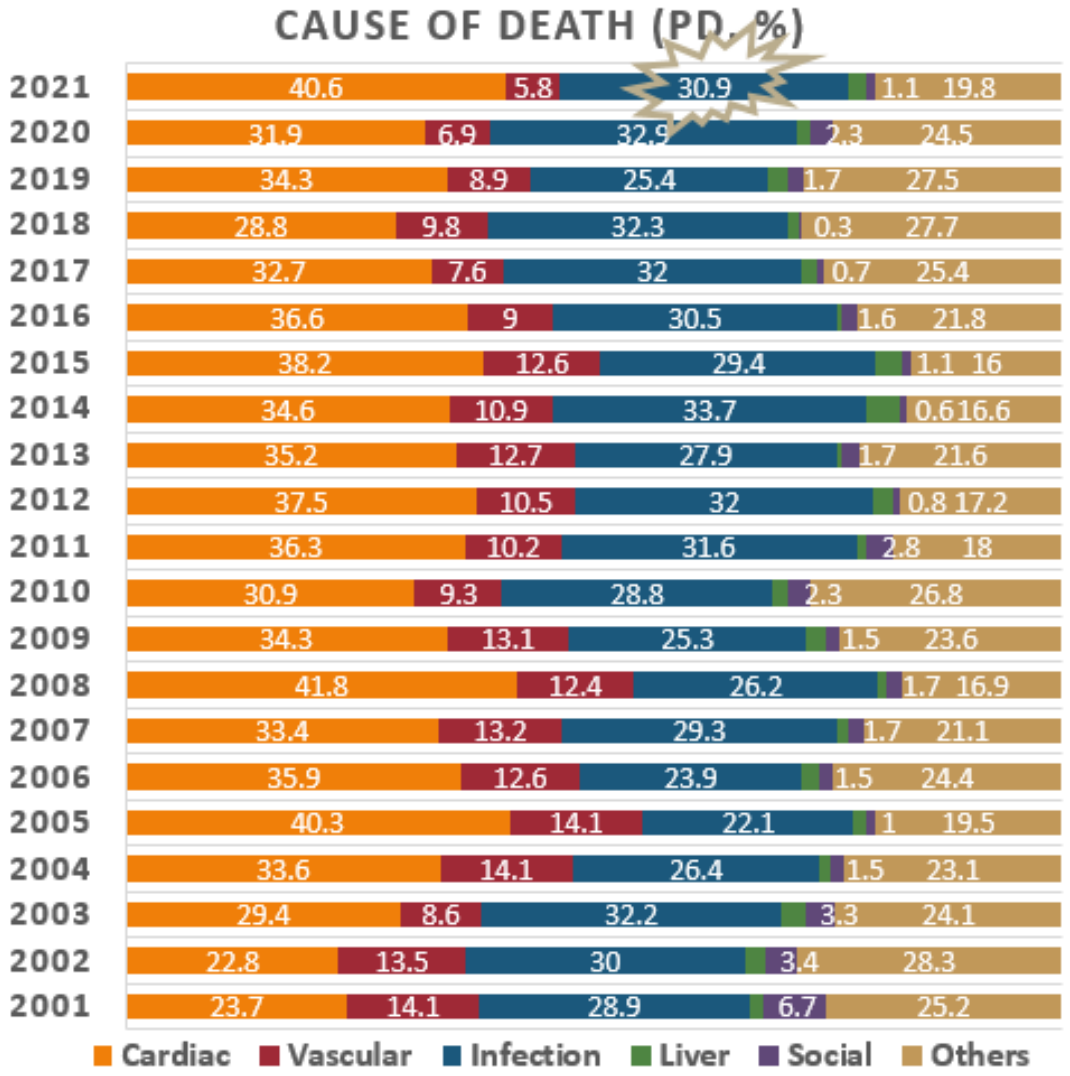
CAUSE OF DEATH (%)

	Cardiac	Vascular	Infection	Liver	Social	Others
2021	34	10	26		2	28
2020	35	11	24		2	27
2019	36	11	23		2	26
2018	34	12	23		1	29
2017	34	12	24		2	27
2016	38	11	24		3	22
2015	36	11	24		2	25
2014	32	14	26		3	24
2013	35	13	24		3	22
2012	33	14	23		3	25
2011	32	15	21		3	26
2010	31	14	22		3	27
2009	28	17	22		3	28
2008	34	17	18		4	26
2007	31	18	19		4	25
2006	33	19	18		5	23
2005	30	18	19		6	24
2004	37	17	18		4	20
2003	32	22	18		4	20
2002	28	18	18		5	29
2001	28	24	17		6	23

KOREAN ESRD REGISTRY

Comparison of cause-specific death, HD versus PD patients





대한 신장학회 등록 사업 등록 현황

등록사업에 참여한 의료기관 수 및 응답률 증가

년도	2019년		2020년		2021년	
지역	총의료기관수	응답률	총의료기관수	응답률	총의료기관수	응답률
서울	185	63.2%	199	70.4%	214	68.7%
부산	62	56.5%	65	73.8%	74	70.3%
대구	43	58.1%	45	86.7%	48	70.8%
인천	45	40.0%	52	73.1%	60	58.3%
광주	35	42.9%	35	71.4%	35	65.7%
대전	19	68.4%	22	77.3%	25	68%
경기	185	46.5%	209	69.4%	236	57.2%
강원	27	48.1%	29	79.3%	32	56.3%
충북	31	54.8%	35	68.6%	36	63.9%
충남	42	50.0%	44	75.0%	44	56.8%
전북	29	48.3%	29	72.4%	30	50%
전남	38	39.5%	40	67.5%	39	41%
경북	47	51.1%	47	76.6%	54	55.6%
경남	64	42.2%	69	76.8%	76	53.9%
울산	17	58.8%	17	70.6%	18	72.2%
제주	13	53.8%	14	85.7%	15	73.3%
세종	3	66.7%	4	50.0%	5	80%
전국	885	51.9%	955	72.8%	1041	61.4%

요약

- 전체 말기 신부전 환자 유병률의 지속적인 증가.
- 노령 투석 환자의 지속적인 증가.
- 원인 신질환에서 당뇨병성 신증의 비율 절반 유지.
- 투석 환자의 사망률 지속적인 감소 추세. 특히 혈액 투석과 복막투석 신환의 5년 생존률의 지속적인 사망률 감소 추세.
- 당뇨 및 고령 환자에서 복막 투석 사망률이 혈액 투석 사망률보다 높음.
- 복막 투석 연관 복막염 감소세 유지.
- 대한신장학회 등록 사업의 전국적 등록률 일시적 감소.

감사의 말씀

- 본 연례 보고가 가능할 수 있었던 것은 말기 신부전 환자 등록에 참여해주신 전국의 인공 신장실 담당의료진의 노고 덕분입니다. 등록해주신 자료를 바탕으로 양질의 결과를 만들어 보고 할 수 있도록 저희 등록 위원회는 더욱 열심히 하겠습니다.
- 더불어 보고서 작성에 도움을 주신 신장학회 사무 선생님, 정선아 선생님, 최아름 선생님, 투석용 의료물품 공급업체 (Baxter Korea, FMC Korea, 보령, B-braun Korea)에도 감사드립니다.

대한신장학회 등록 위원회 배상

대한신장학회
THE KOREAN SOCIETY OF NEPHROLOGY

대한신장학회 등록위원회

KORDS
(KOrean Renal Data System)

- 이사: 김용균(가톨릭의대), 안선호(원광의대)
- 간사: 반태현(가톨릭의대), 김수현(중앙대의대),
- 위원: 구호석(인제의대), 김경민(을지의대), 김기원 (서울원내과), 김태희(인제의대), 김지현 (서울의대), 윤창연(윤영석내과), 윤혜은 (가톨릭의대), 이하정(서울의대), 정희연(경북의대), 최선령(한림의대), 홍유아(가톨릭의대), 황선덕(인하의대)
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- 대한신장학회 사무국: 조지연, 윤유선