

TEMPORAL TREND FOR IMPROVEMENT OF CAROTID ATHEROSCLEROSIS IN INCIDENT DIALYSIS PATIENTS OVER THE PAST DECADE

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INTRODUCTION AND AIMS

- The medical management for patients with chronic kidney disease (CKD) has changed in the past decade.
- We speculated that this change has led to improve in the prevalence of atherosclerotic cardiovascular disease in patients with CKD.
- The present study analyzes changes in carotid atherosclerosis in incident hemodialysis patients, as well as trends in clinical factors and medications over the past decade.

METHODS

- single-center cross-sectional study
- Between January 2003 and December 2012, 134 consecutive ESKD patients who started hemodialysis enrolled into this study.
- All patients were routinely screened for carotid atherosclerosis by using ultrasonography within three months of starting hemodialysis.
- The patients were categorized into five groups based on the date of the initial dialysis session to compare the historical data of carotid intima-media thickness (IMT) and plaque score with characteristics and medication therapy.

Schema for study design

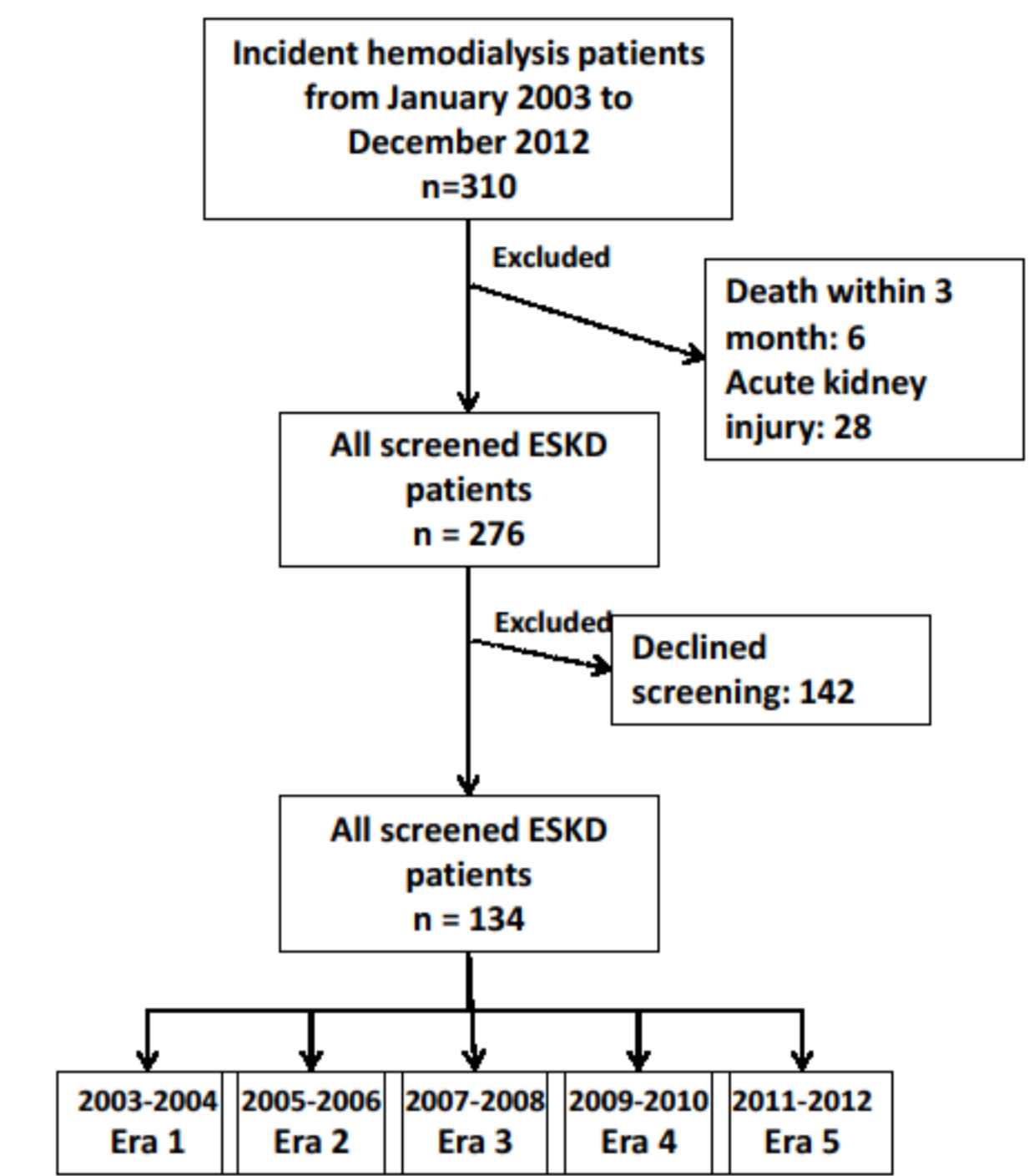


Table 1 Background

	Total	Era1	Era2	Era3	Era4	Era5	p	Jonckheere-Terpstra trend test
Total patients No.	134	16	20	17	42	39		
Age, years	69±12	73±9	64±13	68±10	67±13	74±11	0.034	0.077
BMI, kg/m ²	21.2±3.0	21.1±3.2	20.5±2.9	22.4±2.5	21.6±3.0	20.8±3.0	0.318	0.729
Systolic BP, mmHg	159±25	150±23	165±31	168±17	151±25	162±23	0.062	0.832
Diastolic BP, mmHg	80±19	78±17	83±32	74±12	83±12	79±18	0.562	0.645
Male, %	75.0	75.0	75.0	70.0	85.0	66.0	0.376	0.572
Smoking, %	42.0	56.0	25.0	29.0	40.0	53.0	0.133	0.213
Diabetes, %	61.9	56.0	50.0	82.0	57.0	66.0	0.266	0.487
CAD, %	17.2	6.2	10.0	23.5	16.7	23.1	0.476	0.135
Stroke, %	19.4	12.5	10.0	35.3	23.8	15.4	0.259	0.907
meanIMT right CCA, mm	0.9±0.3	0.7±0.2	0.8±0.2	1.0±0.6	1.0±0.4	0.9±0.4	0.100	0.040
meanIMT left CCA, mm	1.0±0.4	0.8±0.2	0.8±0.2	1.0±0.6	1.0±0.4	1.0±0.4	0.187	0.098
max IMT right, mm	2.2±0.8	2.1±0.5	2.4±0.8	2.0±0.4	2.3±0.9	2.1±0.8	0.465	0.749
max IMT left, mm	2.5±1.0	2.8±1.1	2.8±1.7	2.2±0.6	2.6±0.7	2.4±0.9	0.358	0.318
Plaque score	10.5±7.7	12.6±6.2	15.2±12.9	11.5±8.4	8.9±5.3	8.5±5.3	0.008	0.015
RASI total, %	64.2	68.8	55	52.9	71.4	64.1	0.597	0.649
CCB, %	69.4	75	70	70.6	73.8	61.5	0.778	0.331
Beta blocker, %	20.9	6.2	15	17.6	21.4	30.8	0.296	0.030
Statin, %	30.6	6.2	25	23.5	28.6	48.7	0.024	0.002
Aspirin, %	32.1	12.5	25	47.1	35.7	33.3	0.257	0.280
ESA, %	72.2	56.2	60	82.4	78.6	73.7	0.260	0.183

BMI, body mass index; BP, blood pressure; CAD, coronary artery disease; RAS-I, rennin angiotensin system inhibitor; CCB, Calcium channel blocker; ESA, erythropoietin stimulating agent;

Table 1 Background continuous

	Total	Era1	Era2	Era3	Era4	Era5	p	Jonckheere-Terpstra trend test
Total patients No.	134	16	20	17	42	39		
Alb, mg/dL	3.3±0.4	3.2±0.3	3.3±0.4	3.2±0.4	3.3±0.4	3.4±0.4	0.546	0.129
Cr, mg/dL	9.7±3.6	8.9±2.8	10.3±6.0	9.9±2.7	10.0±2.9	9.2±3.3	0.675	0.973
eGFR, ml/min/1.73m ²	5.1±2.0	5.2±1.1	5.4±2.3	4.7±1.7	4.8±1.5	5.2±2.4	0.287	0.970
UA, mg/dL	8.1±2.1	7.3±1.1	7.7±1.7	7.8±1.9	7.8±2.1	9.1±2.5	0.016	0.008
Ca, mg/dL	8.2±1.2	8.6±1.3	8.1±1.1	8.2±1.2	8.2±0.8	8.1±1.5	0.793	0.008
P, mg/dL	6.2±1.7	6.6±1.5	6.4±2.3	5.8±1.5	6.2±1.7	6.3±1.4	0.84	0.033
T-Chol, mg/dL	169±59	175±44	176±46	168±52	170±79	162±53	0.92	0.109
TG, mg/dL	120±71	146±71	113±43	114±38	121±100	116±66	0.657	0.095
HDL, mg/dL	49±16	41±14	47±11	50±18	50±18	52±16	0.366	0.063
LDL, mg/dL	100±43	117±46	116±54	99±38	92±31	112±42	0.123	0.011
Non-HDL, mg/dL	120±53	145±53	138±57	123±39	111±36	112±47	0.075	0.026
BS, mg/dL	147±49	154±59	154±48	146±48	144±47	143±50	0.91	0.347
HbA1c (HbA1c), %	5.3±0.9	5.8±1.6	5.8±0.5	5.4±0.6	5.2±0.6	5.3±1.1	0.471	0.390
GA, %	19.0±4.4	19.8±1.0	16.9±8.2	21.6±3.8	18.2±4.3	19.5±4.2	0.436	0.688
CRP, mg/dL	0.15±0.340	0.13±0.190	0.15±0.240	0.11±0.240	0.14±0.240	0.16±0.240	0.06	0.225
Hb, g/dL	8.4±1.7	7.5±1.7	7.9±1.4	8.1±1.5	8.5±1.7	9.2±1.7	0.004	<0.001
iPTH, µg/dL	328±354	322±215	235±104	263±102	290±179	405±557	0.565	0.375

Ca, calcium; P, phosphate; eGFR, estimated glomerular filtration rate; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; GA, Glico Albumin; iPTH, intact PTH

Table 2 Contribution factor of PS

- Univariate logistic regression analysis

	regression coefficient	95.0%CI		p
		lower	upper	
Age, years	0.286	0.072	0.288	0.001
BMI	-0.215	-0.998	-0.105	0.016
Male, %	0.001	-3.065	3.092	0.993
Smoking, %	0.051	-1.884	3.475	0.558
Diabetes, %	0.051	-1.916	3.54	0.557
CHD, %	0.221	1.084	7.945	0.010
Stroke, %	-0.048	-4.29	2.411	0.580
Alb, mg/dL	-0.192	-6.423	-0.352	0.029
eGFR, ml/min/1.73m ²	0.256	0.317	1.642	0.004
T-Chol, mg/dL	0.13	-0.007	0.042	0.161
TG, mg/dL	0.089	-0.011	0.031	0.348
HDL, mg/dL	-0.042	-0.101	0.063	0.640
LDL, mg/dL	0.335	0.028	0.095	<0.001
Non-HDL, mg/dL	0.319	0.023	0.084	0.001
CRP, mg/dL	0.178	0.171	7.734	0.041
meanIMT right CCA, mm	0.418	5.251	11.622	<0.001
meanIMT left CCA, mm	0.392	4.146	9.883	<0.001
max IMT right, mm	0.627	4.667	7.358	<0.001
max IMT left, mm	0.577	3.091	5.204	<0.001
RASI total, %	-0.058	-3.892	1.832	0.506
Statin, %	0.054	-1.975	3.774	0.537

Results:

- The carotid plaque score gradually declined over 10 years.
- LDL-C and non-HDL-C significantly decreased respectively over time.
- No favorable changes were observed in blood pressure, serum albumin, and c-reactive protein.
- In parallel with this phenomenon, the proportion of statin users significantly increased.
- In Spearman univariate regression analysis, LDL-C and non-HDL-C levels significantly correlated with carotid plaque score.

Conclusions:

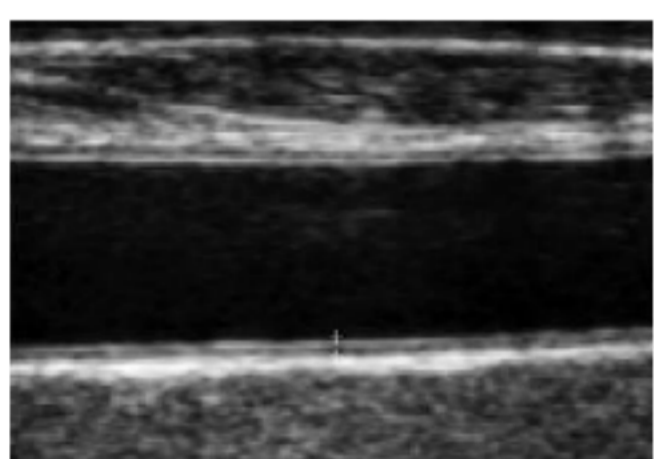
- Carotid atherosclerosis in patients with end-stage kidney disease has remarkably improved over the past decade.
- Changing in the medical management of patients with CKD over time may improve carotid atherosclerosis by favorably affecting dyslipidemia.

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Carotid ultrasound parameters

• Mean intima-media thickness: mean-CCA-IMT
At least 3 measurements were taken over a 1-cm length of each common carotid artery segment, and these measurements on both sides were averaged.



Carotid ultrasound parameters

• Plaque score: PS
Plaque was designated as focal intima-media thickening ≥1.1 mm. The PS was computed by summing up the thickness of all plaques located in both carotid arteries.

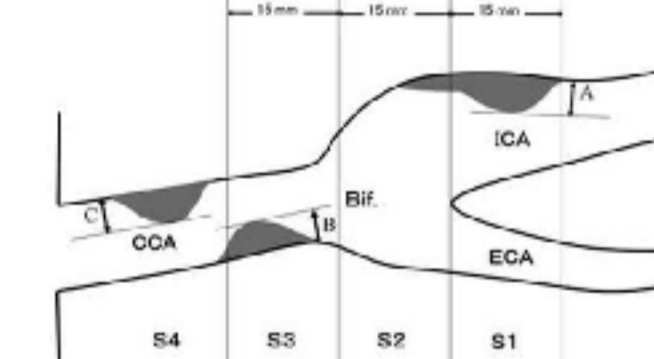


Figure 1 Background

