



# Association between CCI and AAC calcification scores and survival in hemodialysis vs transplant patients.

Coca A<sup>1</sup>, Valencia AL<sup>1</sup>, Sánchez J<sup>1</sup>, Ferrer C<sup>1</sup>, Sobrino A<sup>1</sup>, Aller C<sup>1</sup>, Bustamante J<sup>2</sup>, Mendiluce A<sup>1,2</sup>.

<sup>1</sup>Dept of Nephrology, Hospital Clínico Valladolid. <sup>2</sup>Dept of Medicine, Dermatology and Toxicology, School of Medicine, Valladolid, Spain.

## Introduction

The prevalence of vascular calcifications (VC) is significantly higher among hemodialysis and transplant patients compared to the general population and are associated with higher risk of cardiovascular events and death. The cardiovascular calcification index developed by Muntner (CCI) combines abdominal aortic and cardiac valve calcifications in a single diagnostic tool. We aimed to compare the association between CCI and abdominal aortic calcification score (AAC) developed by Kauppila with the incidence of CV events and death in a sample of HD and TX patients.

## Materials and Methods

72 HD and TX patients from our unit were included in the study. We measured vascular calcifications using the CCI and AAC scores. Lateral plain radiographs of the abdomen were evaluated by a single observer. Patients were followed for 36 months. A combined outcome variable (cardiovascular event or death) was used. Anthropometric and analytical data was extracted from our hospital's database. Statistical analysis was performed using IBM SPSS Statistics 22.

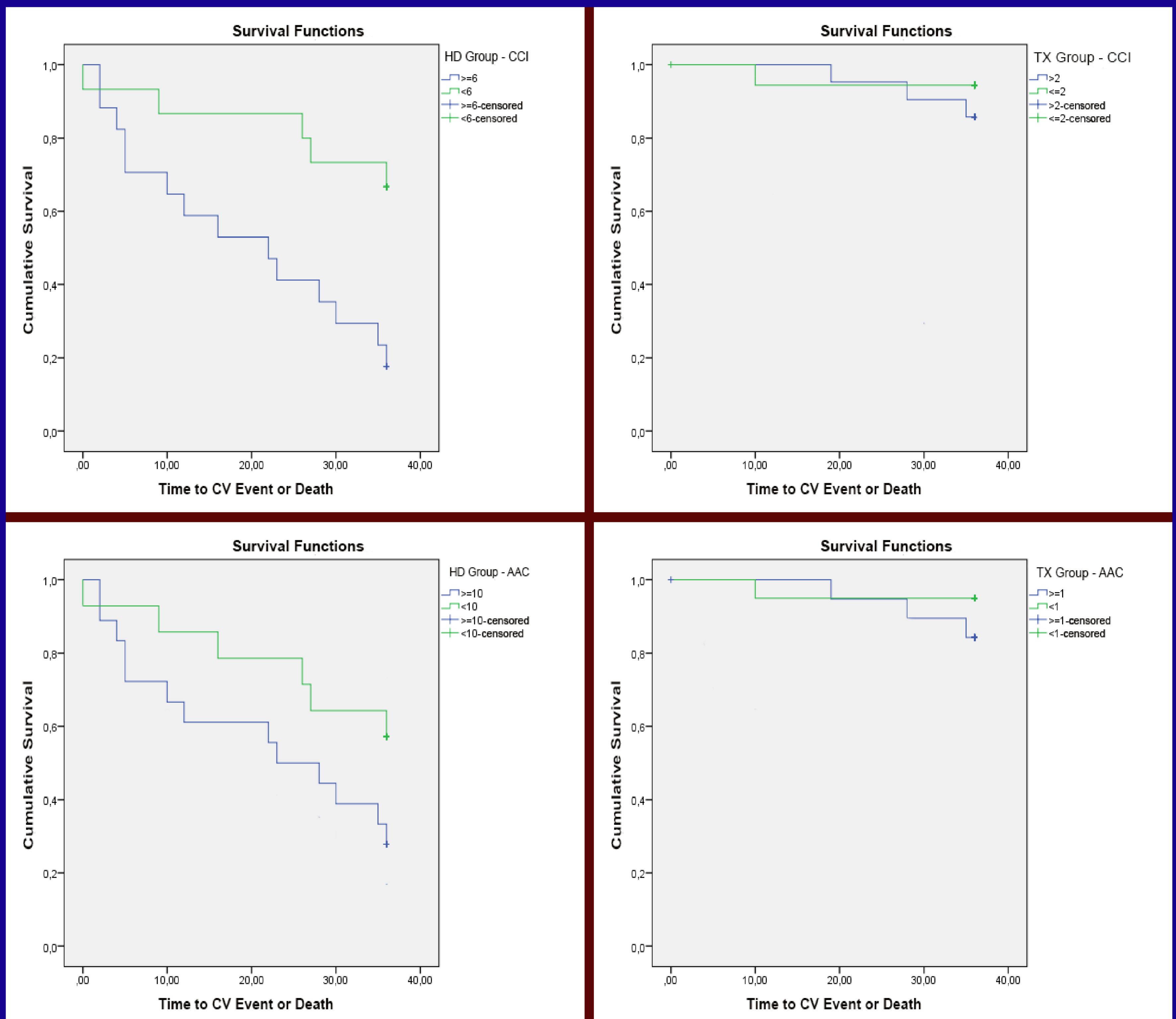
## Results

Mean CCI was 4,4 ± 3,2 (HD: 6,3 ± 3; TX: 2,9 ± 2,5. p<0,001). Mean AAC was 6,7 ± 6,6 (HD: 9,9 ± 6,8; TX: 4,1 ± 5,2. p<0,001). Each group of patients was divided into two categories for low or high VC, using the median of each score as the cut-off point. No association was found between the degree of VC and sex, kidney disease etiology or classic cardiovascular risk factors such as hypertension, diabetes or dyslipidemia in neither of the groups. Relevant clinical and analytical data is summarized in Table 1. Kaplan-Meier analysis showed that the rate of CV events or all-cause mortality was significantly greater in HD patients with higher CCI compared to those without ( $\chi^2=7.916$ ; p=0.005, log-rank test). We found no association between the outcome variable and AAC score in HD patients ( $\chi^2=2.717$ ; p=0.099, log-rank test), nor between the outcome variable and any VC score in TX patients (CCI;  $\chi^2=0.711$ ; p=0.399, log-rank test / AAC;  $\chi^2=1.12$ ; p=0.292, log-rank test).

Table 1

	Hemodialysis Group	Transplant Group	P Value
N	32	40	
Age [years]	58,9±15,4	54,2±12,1	0,157
Sex [male; n (%)]	23 (71,9)	28 (70)	0,862
Kidney Disease Etiology (n, %)			0,034
Diabetic	4 (12,5)	3 (7,5)	
Tubulo-interstitial	11 (34,4)	8 (20)	
Glomerulopathy	1 (3,1)	9 (22,5)	
Polycystic disease	1 (3,1)	8 (20)	
Hypertensive	4 (12,5)	3 (7,5)	
Unknown	11 (34,4)	9 (22,5)	
Dialysis Modality (n, %)			0,001
Hemodialysis	32 (100)	26 (65)	
Peritoneal Dialysis	0 (0)	14 (35)	
Cardiovascular History (n, %)			0,091
No CV history	20 (62,5)	35 (87,5)	
Ischemic heart disease	7 (21,9)	1 (2,5)	
Stroke	1 (3,1)	2 (5)	
Peripheral vascular disease	2 (6,3)	1 (2,5)	
Hypertensive heart disease	1 (3,1)	1 (2,5)	
Dilated cardiomyopathy	1 (3,1)	0 (0)	
Hypertension (n, %)	29 (90,6)	35 (87,5)	0,675
Diabetes (n, %)	9 (28,1)	6 (15)	0,244
Dyslipidemia (n, %)	8 (25)	16 (40)	0,215
Smoking (n, %)	9 (28,1)	8 (20,5)	0,578
Dialysis Vintage (months)	77,6±68,4	37,5±56,3	0,01
Hemoglobin (g/dl)	10,6±1,7	13,3±1,9	0,001
Serum Creatinine (mg/dl)	7,7±2,2	1,6±0,5	0,001
Calcium (mg/dl)	8,8±0,8	9,6±0,5	0,001
Phosphorus (mg/dl)	4,9±1,4	3,2±0,7	0,001
Magnesium (mg/dl)	2,1±0,3	1,9±0,3	0,001
iPTH (pg/ml)	620,5±534,1	110,1±57,2	0,001
Alkaline Phosphatase (U/l)	120,6±74,2	73,8±19,2	0,001
Cholesterol (mg/dl)	140,5±47,4	184,5±40,8	0,001
LDL-Cholesterol (mg/dl)	72,9±37,8	100,1±33,3	0,002
Adragao Score	4,81±2,53	1,55±2,58	0,001
Abdominal Aorta Calcification Score	9,91±6,83	4,08±5,21	0,001
Cardiovascular Calcification Index	6,28±3,01	2,9±2,51	0,001
CV Event or Death	19 (59,4)	13 (40,6)	0,001

Figure A



## Conclusions

Hemodialysis patients had a significantly higher level of vascular calcification compared to transplant patients. Within the hemodialysis group, patients with lower vascular calcification measured by the CCI had a significantly better overall and cardiovascular event-free survival, whereas patients with lower AAC score tended to present better survival. Our study failed to demonstrate an association between vascular calcification scores and cardiovascular event-free and overall survival in transplant patients, probably due to the better prognosis and lower incidence of cardiovascular events and death rate of this group.

