

PREDICTORS OF CARDIAC TROPONIN T (cTnT) IN CAPD PATIENTS

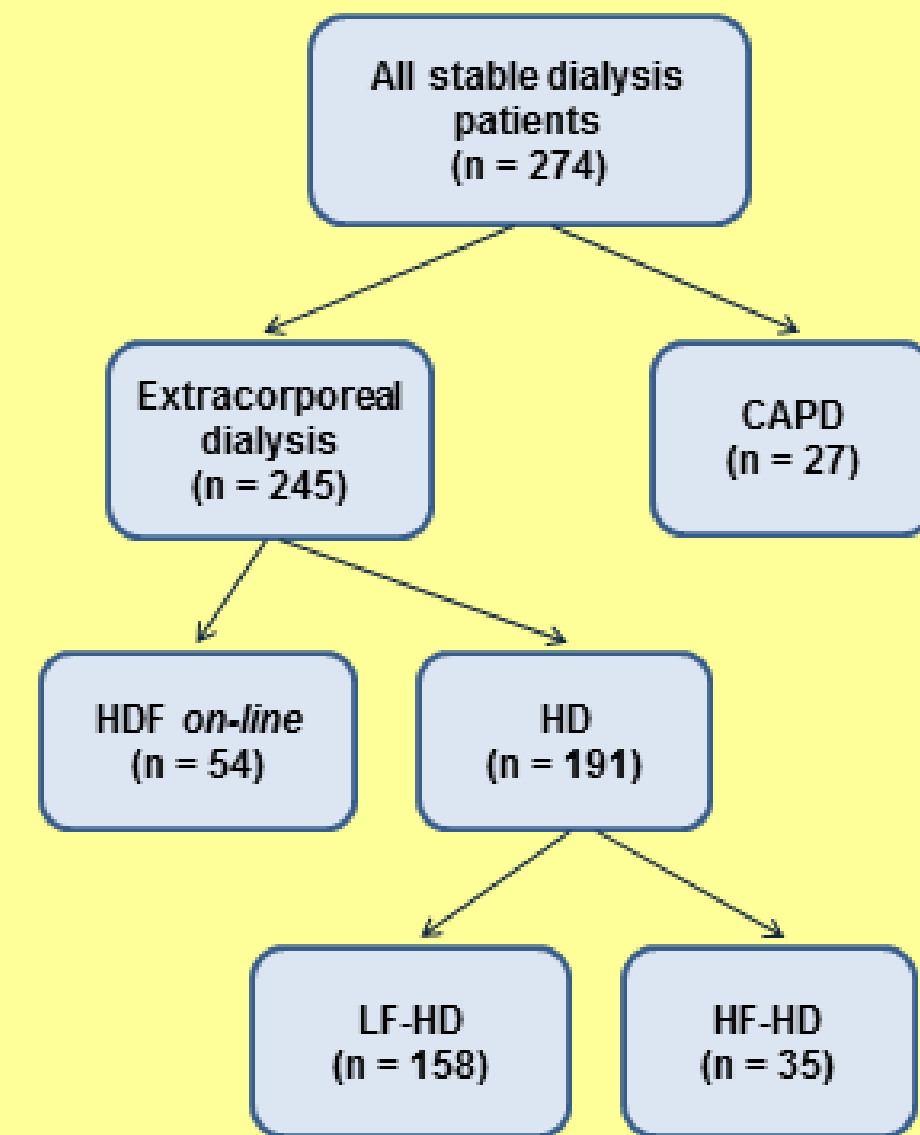
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Objectives:

Dialysis patients show elevated high-sensitivity (hs) cTnT. Peritoneal membrane is more permeable than artificial membranes used for regular extracorporeal dialysis treatment. Therefore, loss of cTnT with dialysate could have an impact on serum cTnT and contribute to lower cTnT in CAPD patients than that shown in extracorporeal dialysis patients. Our aim was to establish predictors of serum hs-cTnT in CAPD patients and to compare hs-cTnT between CAPD, on-line hemodiafiltration (HDF), high-flux hemodialysis (HF-HD) and low flux hemodialysis (LF-HD) patients.

Methods:



Patients were included into the specific dialysis group when they started and continued RRT with this dialysis modality or when dialysis modality was used for at least 3 months from the previous method of RRT.

Hs-cTnT measurement

Hs-cTnT was measured using the Elecsys Troponin T hs STAT assay (Roche, Mannheim, Germany). The upper reference limit (99th percentile) is 0.014 ng/mL with 95% coincidence interval 0.0127 – 0.0249 ng/mL and was obtained in 533 healthy volunteers.

Parameters evaluated in relation to serum hs-cTnT concentration

Demographic

Gender, age

Clinical

Causes of ESRD, comorbid diseases (diabetes mellitus, cardiovascular diseases, arterial hypertension), RRT vintage, modality and adequacy of dialysis, kind of vascular access for extracorporeal dialysis modalities

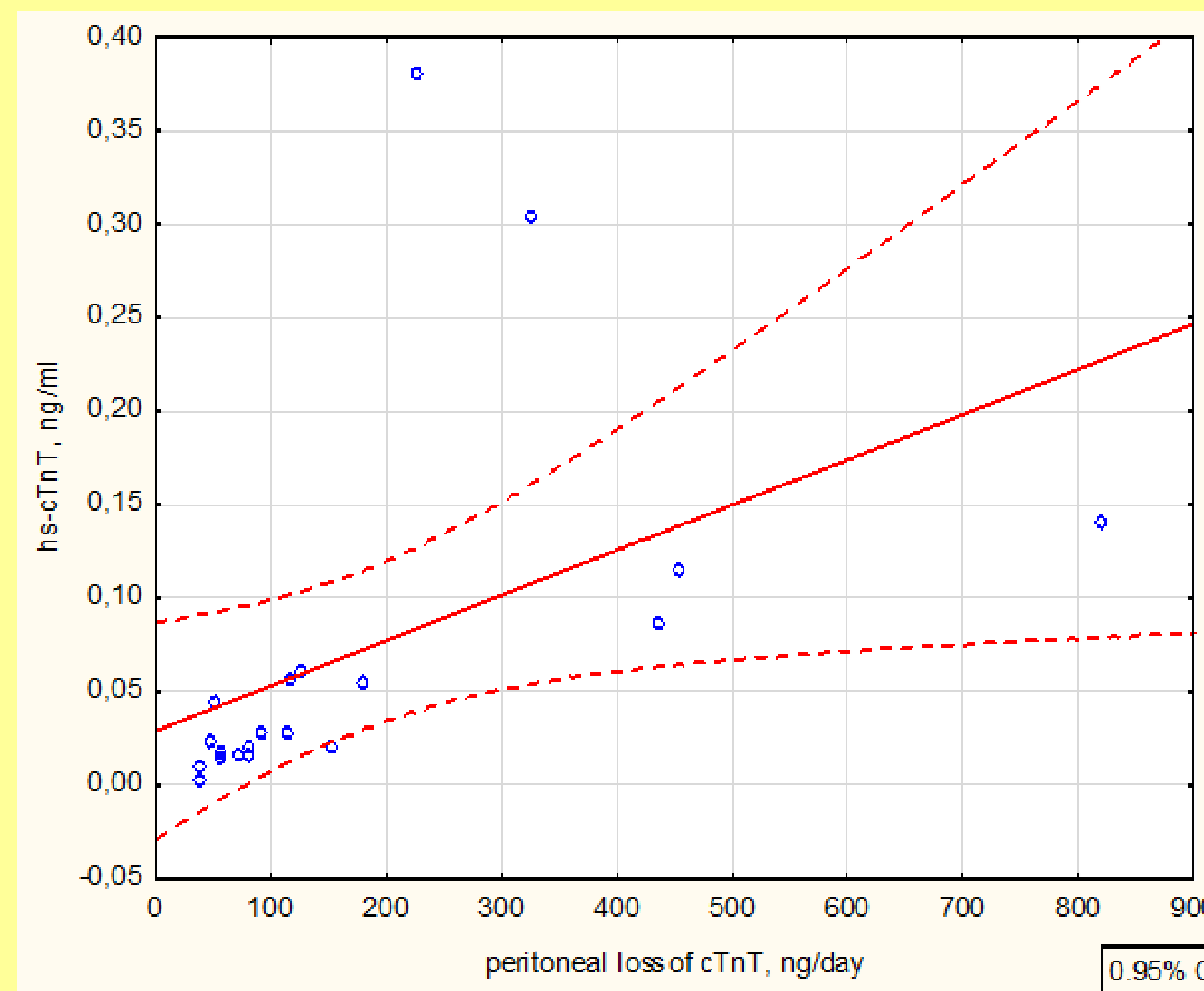
Laboratory

Hs-CRP, albumin, Hb, WBC count, ASP, ALT, Ca, P, PTH, ALP

In multiple regression analyses, demographic, clinical, and laboratory data in various combinations were chosen as possible predictors of hs-cTnT in CAPD patients (n=27), including D/P, peritoneal loss and clearance of hs-cTnT. Serum hs-cTnT of CAPD group was compared with hs-cTnT determined in 54 HDF, 35 HF-HD and 158 LF-HD patients.

Results

Parameter	Value of parameter
Caucasians (n, %)	27 (100)
Male gender (n, %)	10 (37.0)
Age (years)	63.8 ± 18.3
Diabetes mellitus (n, %)	11 (40.7)
Diabetic nephropathy (n, %)	10 (37.0)
Chronic glomerulonephritis (n, %)	4 (14.8)
Hypertensive nephropathy (n, %)	6 (22.2)
Chronic tubulointerstitial nephritis (n, %)	0 (0)
Coronary artery disease (n, %)	11 (40.7)
- myocardial infarction (n, %)	5 (18.5)
PTCA and stent (n, %)	1 (3.7)
CABG (n, %)	2 (7.4)
Cardiomyopathies (n, %)	8 (29.6)
Mitral valvular disease (n, %)	4 (14.8)
Aortal valvular disease (n, %)	3 (11.1)
Atrial fibrillation (n, %)	1 (3.7)
Heart stimulation device (n, %)	1 (3.7)
NYHA class	
- no or I (n, %)	9 (33.3)
- II (n, %)	10 (37.0)
- III (n, %)	8 (29.6)
- IV (n, %)	0 (0)
Administration of antihypertensive drugs due to arterial hypertension or other reasons (n, %)	24 (88.9)
Poor control of hypertension (n, %)	4 (14.8)
Cerebral stroke (n, %)	2 (7.4)
COPD (n, %)	1 (3.7)
RRT vintage (years)	1.7 (0.04 - 7.4)
Weekly Kt/V	2.56 ± 1.00
Dry body weight (kg)	71.4 ± 12.9
BMI (kg/m ²)	26.5 ± 3.5
Positive HBsAg (n, %)	0 (0)
Positive anti-HBc (n, %)	2 (7.4)
Positive anti-HCV (n, %)	2 (7.4)
Positive HCV RNA (n, %)	1 (3.7)
Positive anti-HIV (n, %)	0 (0)
Albumin (g/dL)	32.4 ± 8.4
Troponin (ng/mL)	0.045 (0.003 - 0.380)
Hs-CRP (mg/L)	8.0 ± 4.3
β2-microglobulin (mg/dL)	1.66 (1.16-2.52)
WBC (G/L)	7.5 ± 1.9
Hb (g/dL)	11.4 ± 1.7
ALT (U/L)	19.0 (9 - 86)
AST (U/L)	20.0 (11-43)
GGT (U/L)	23.0 (9-137)
Ca (mg/dL)	8.9 ± 1.0
P (mg/dL)	4.5 ± 2.1
Ca x P (mg ² /mL ²)	41.0 ± 22.0
PTH (pg/mL)	287 ± 235
ALP (IU/L)	72.0 (23 - 224)
Blood Ph	7.36 ± 0.06
Bicarbonate (mmol/L)	24.0 ± 3.2
Total cholesterol (mg/dL)	236.6 ± 63.0
LDL-Ch (mg/dL)	140.0 ± 50.2
HDL-Ch (mg/dL)	48.7 ± 17.4
Triglycerides (mg/dL)	226.2 ± 85.6



Peritoneal loss of cTnT was 91.7 (37.4 - 819) ng/day and correlated with serum hs-cTnT ($r = 0.823$, $p < 0.001$), clearance was 1.96 (0.64 – 5.0) mL/min.

Dialysis modality	Percent of results over 0.014	OR (95% CI)	P
CAPD	88.9	1	
HDF	94.4	2.125 (0.262-16.9)	0.631
HF-HD	82.9	0.604 (0.089-3.222)	0.770
LF-HD	85.4	0.734 (0.131-2.733)	0.901

Logistic analysis also did not show significant differences in prevalence of increased hs-cTnT (>0.014 ng/mL) in relation to dialysis modality.

Serum hs-cTnT (ng/mL, median and range) in CAPD, HDF, HF-HD and LF-HD patients were respectively 0.045 (0.003 - 0.380), 0.050 (0.003 - 0.315), 0.032 (0.008 - 0.595), and 0.047 (0.004 - 0.410). These hs-cTnT were similar in CAPD and extracorporeal dialysis patients (non-adjusted $p = 0.199$, Kruskal-Wallis test; $p = 0.060$ with adjustment for parameters which significantly differed groups: prevalence of coronary artery disease and cardiomyopathies, RRT vintage, serum albumin, hs-CRP, AST, Ca, P, ALP, bicarbonate, total cholesterol, HDL-Ch, triacylglycerols, and ALT).

Multiple regression analysis for the dependent variable hs-cTnT (ng/mL)
 $R = 0.956$, $R^2 = 0.914$, $p < 0.011$

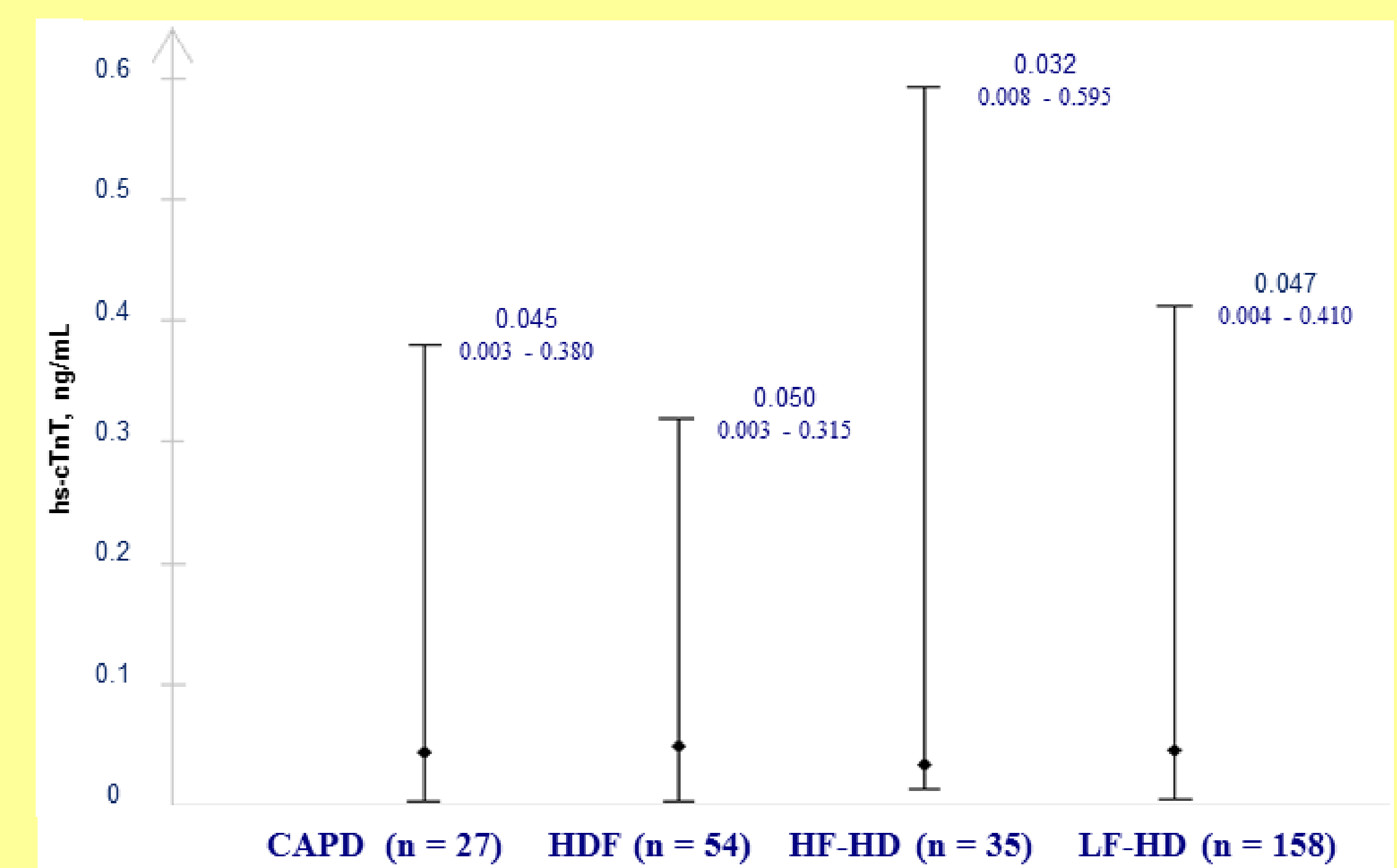
Independent variables	β	p
Intercept		0.256
Age (years)	0.421	0.032
RRT vintage (years)	0.064	0.712
Albumin (g/L)	-0.028	0.904
Bicarbonates (mmol/L)	-0.740	0.024
Phosphorus (mg/dL)	-0.290	0.230
Arterial hypertension 0 = no, 1 = yes	0.513	0.023
Diabetic nephropathy 0 = no, 1 = yes	0.506	0.021
PTH (pg/mL)	0.125	0.587
Triacylglycerols (mg/dL)	-0.527	0.033
Total cholesterol (mg/dL)	0.554	0.013
History of myocardial infarction 0 = no, 1 = yes	0.181	0.371
Peritoneal loss of cTnT (ng/day)	0.201	0.184

In the best model for the logistic regression analysis, predictors of serum hs-cTnT in CAPD patients were age, arterial hypertension, diabetic nephropathy, total cholesterol, triacylglycerols, and bicarbonate concentration, whereas history of myocardial infarction, CAPD duration, serum albumin, P, PTH, and daily peritoneal cTnT loss were insignificant in this model.

Multiple regression analysis for the dependent variable hs-cTnT (ng/mL)
 $R = 0.559$, $R^2 = 0.559$, $p < 0.004$

Independent variables	β	p
Intercept		0.317
RRT vintage (years)	0.076	0.634
Albumin (g/L)	-0.372	0.040
Phosphorus (mg/dL)	0.160	0.269
Bicarbonates (mmol/L)	-0.577	0.008
Arterial hypertension 0 = no, 1 = yes	0.648	0.001
Age (years)	0.534	0.011
Diabetic nephropathy 0 = no, 1 = yes	0.580	0.004
PTH (pg/mL)	-0.192	0.219
Total cholesterol (mg/dL)	0.362	0.071
Triacylglycerols (mg/dL)	-0.296	0.107
History of myocardial infarction 0 = no, 1 = yes	0.220	0.143

In the other model, significant predictors of cTnT were serum albumin, age, hypertension, diabetic nephropathy, and bicarbonate concentration, but not total cholesterol and triacylglycerols.



Conclusions:

Peritoneal loss of cTnT, although varies in wide range in correlation to serum cTnT, is not a predictor of serum cTnT, and CAPD patients have similar cTnT levels like extracorporeal dialysis patients. Serum hs-cTnT is dependent on clinical parameters and related laboratory indices, but is not associated with dialysis modality.

