

IMPACT OF ON-LINE PRE-DILUTION HEMODIAFILTRATION FOR IMPROVED REMOVAL OF FIBROBLAST GROWTH FACTOR-23

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Introduction and aims

Fibroblast Growth Factor-23 (FGF-23, MW: 32kDa) is a pathogenic factor, causing cardiac hypertrophy and high levels of FGF-23 in blood are reported to be associated with increased cardiovascular events in dialysis patients. Therefore, reducing its level in blood may improve the prognosis of dialysis patients. We examined the efficiency of FGF-23 removal by on-line pre-dilution hemodiafiltration (HDF) and by hemodialysis (HD) with a super high-flux dialyzer and determined which modality is superior in removing FGF-23.

Patients background

Treatment number of pts	HDF 26	HD 20
Age (yrs)	55.8±8.8	61.6±10.8
Dialysis Vintage (yrs)	12.5±9.8	11.8±5.4
Gender M/F	18/8	13/7
Body weight (kg)	59.8±7.8	56.0±10.2
Case of CRF	CGN 12	CGN 6
	DMN 6	DMN 5
	PCK 2	PCK 3
	Others 6	Others 6

Methods

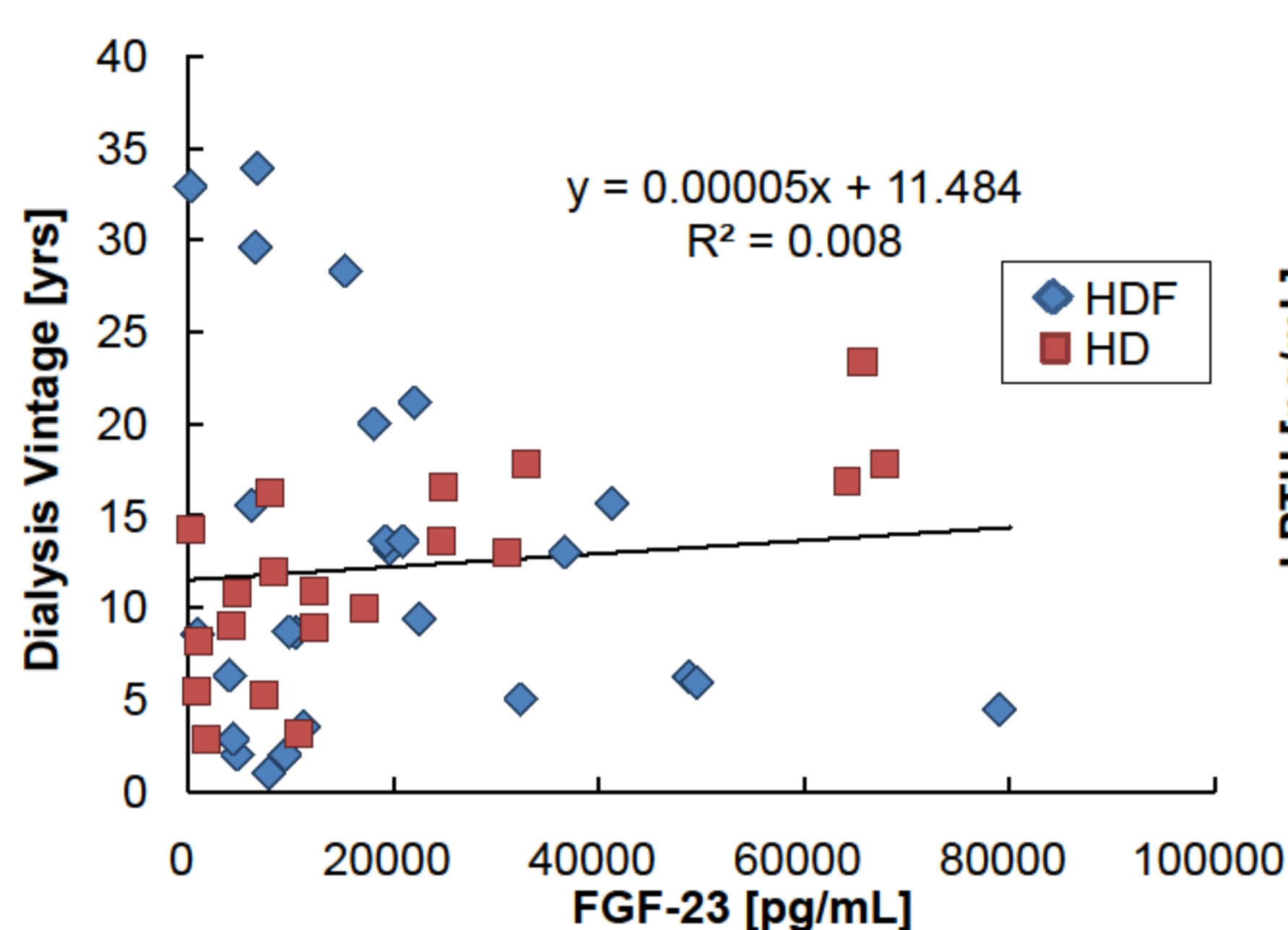
	HDF	HD
Q _B (mL/min)		250
Q _{Dtotal}		500
Treatment time(hrs)		4
Replacement fluid(L/session)	46.7±8.3	
Filter number of pts	MFX-U (PES) 13	FDZ (PEPA) 11
	GDF (PEPA) 8	APS-E (PS) 9
	ABH-P (PS) 3	
	FIX (CTA) 2	

Analysis ; Removal Rate: β 2-microglobulin (β 2-MG: MW 11.8kDa)
 α 1-microglobulin (α 1-MG: MW 33kDa)
 FGF-23 (MW 32kDa)

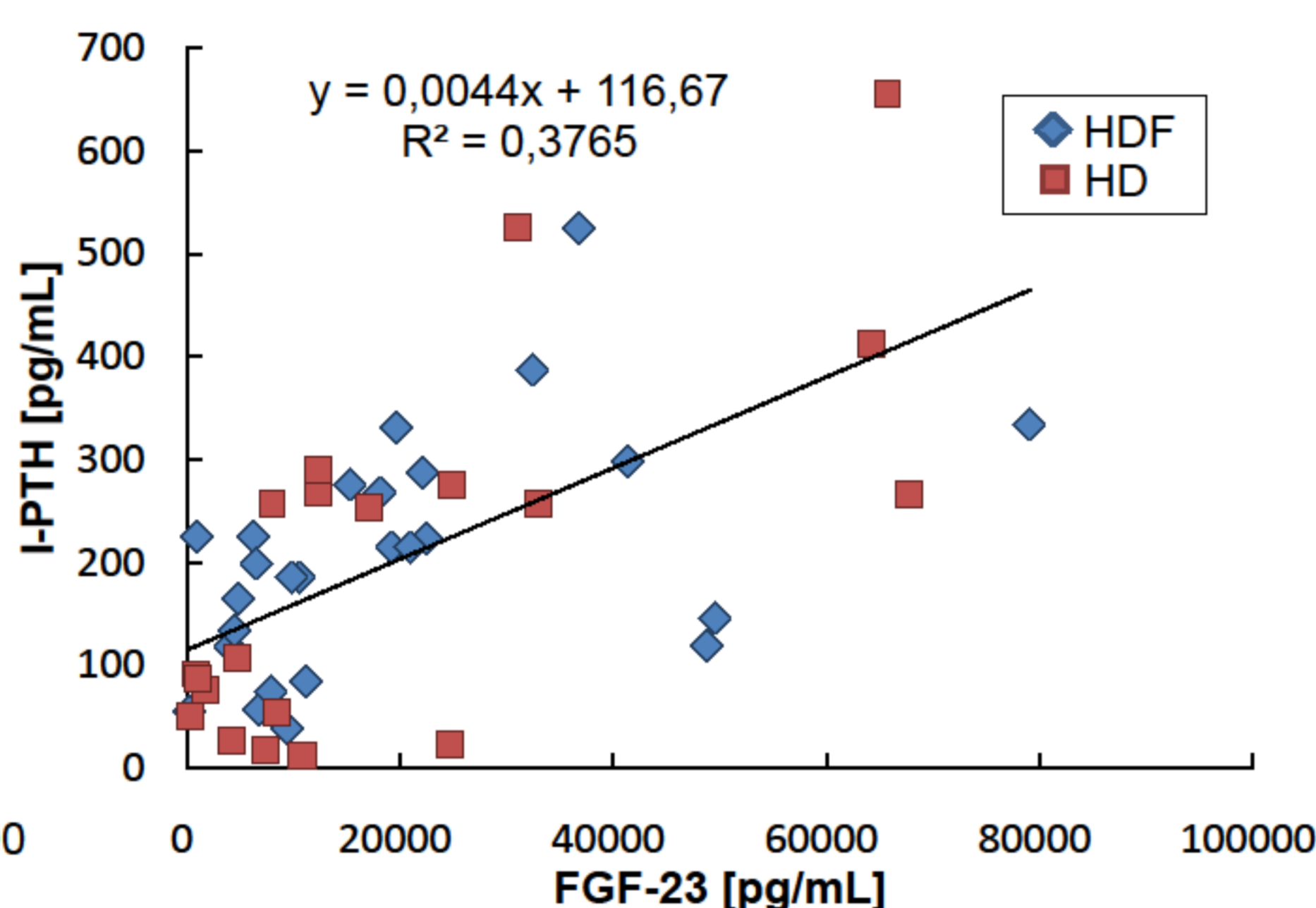
FGF-23 ELISA Kit (Full-length FGF-23, Kainos)

Results

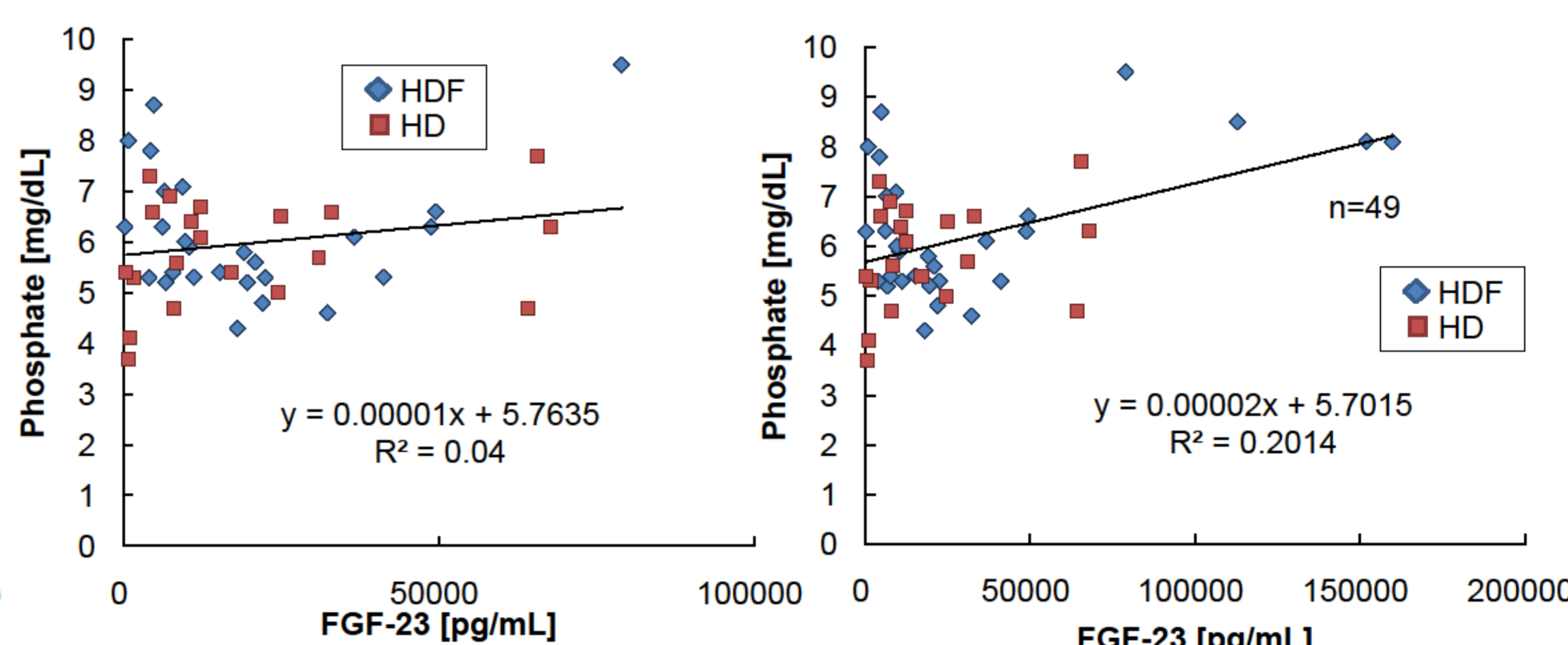
RFGF-23 and dialysis vintage



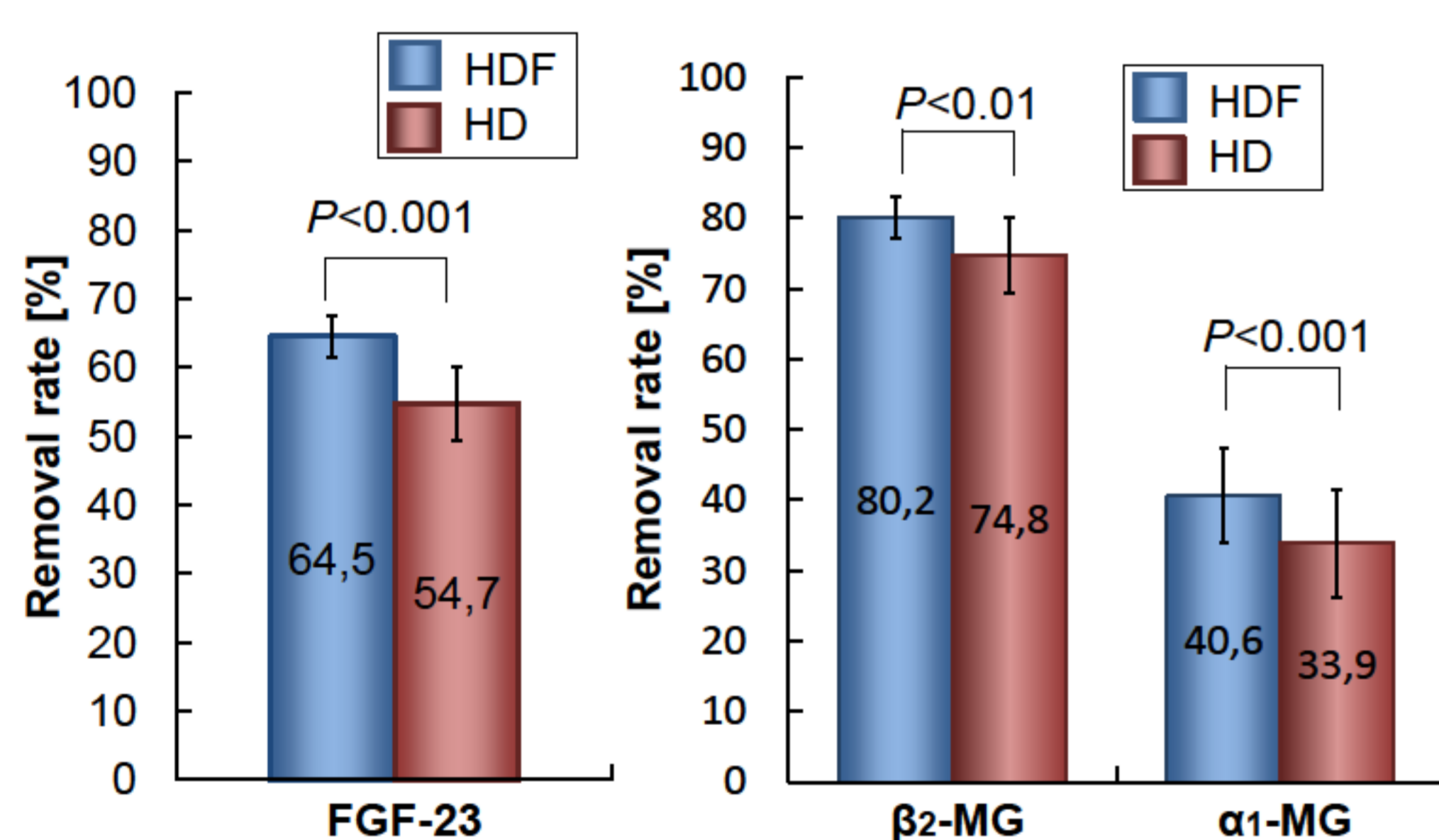
FGF-23 and I-PTH



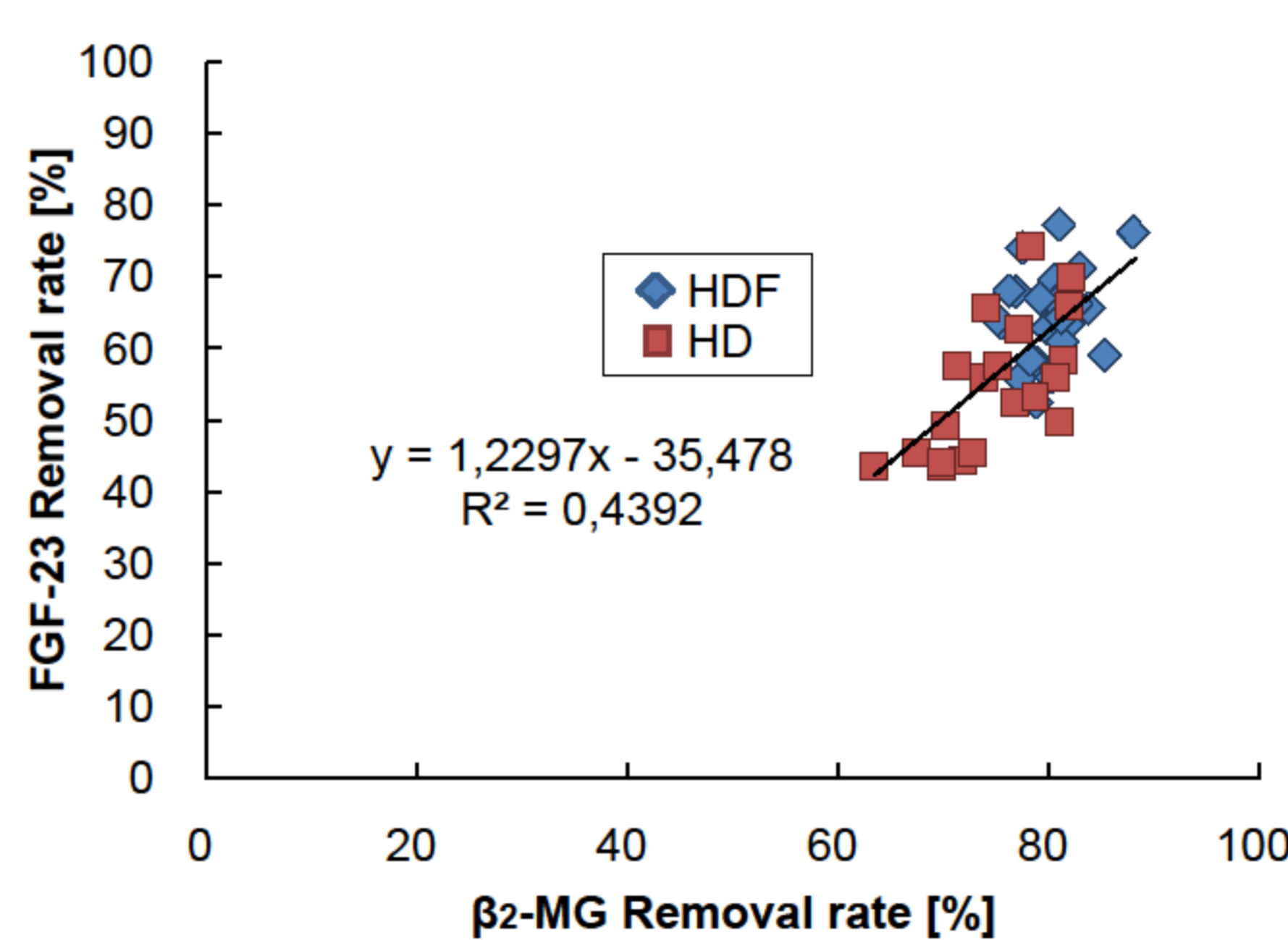
FGF-23 and pre-dialysis level of phosphate



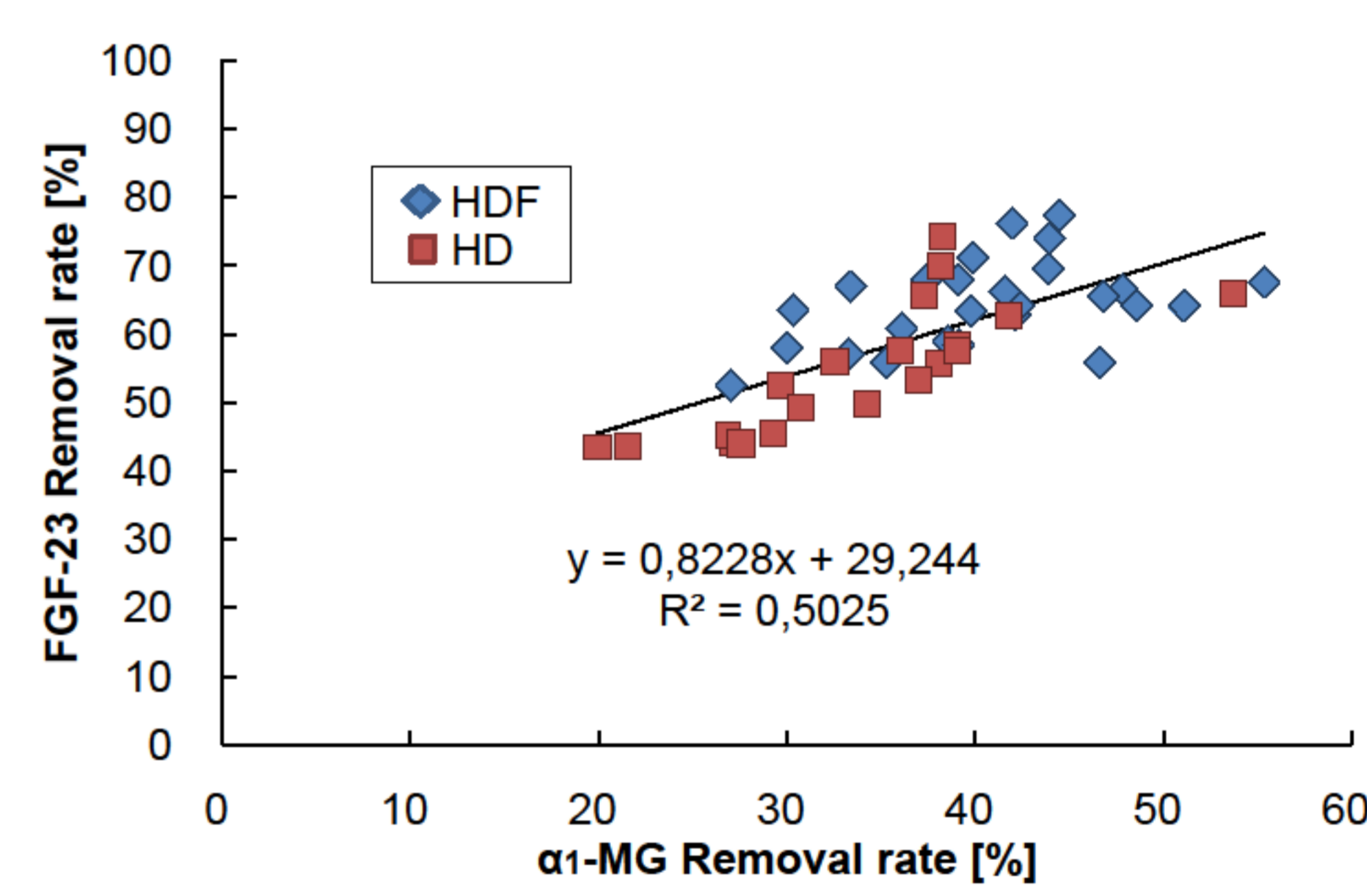
Removal rate of FGF-23, β 2-MG, α 1-MG



FGF-23 and β 2-MG Removal rate



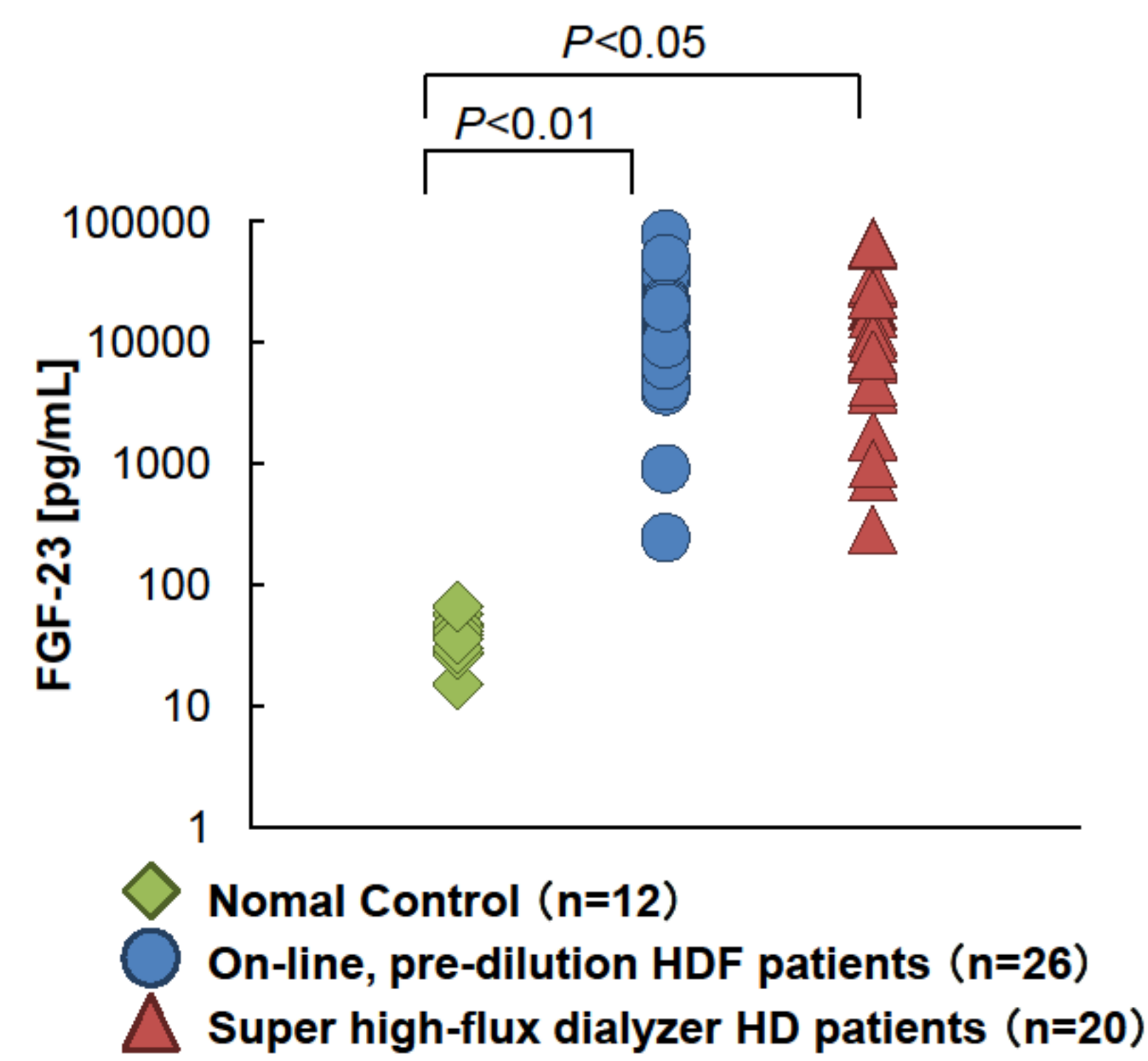
FGF-23 and α 1-MG Removal rate



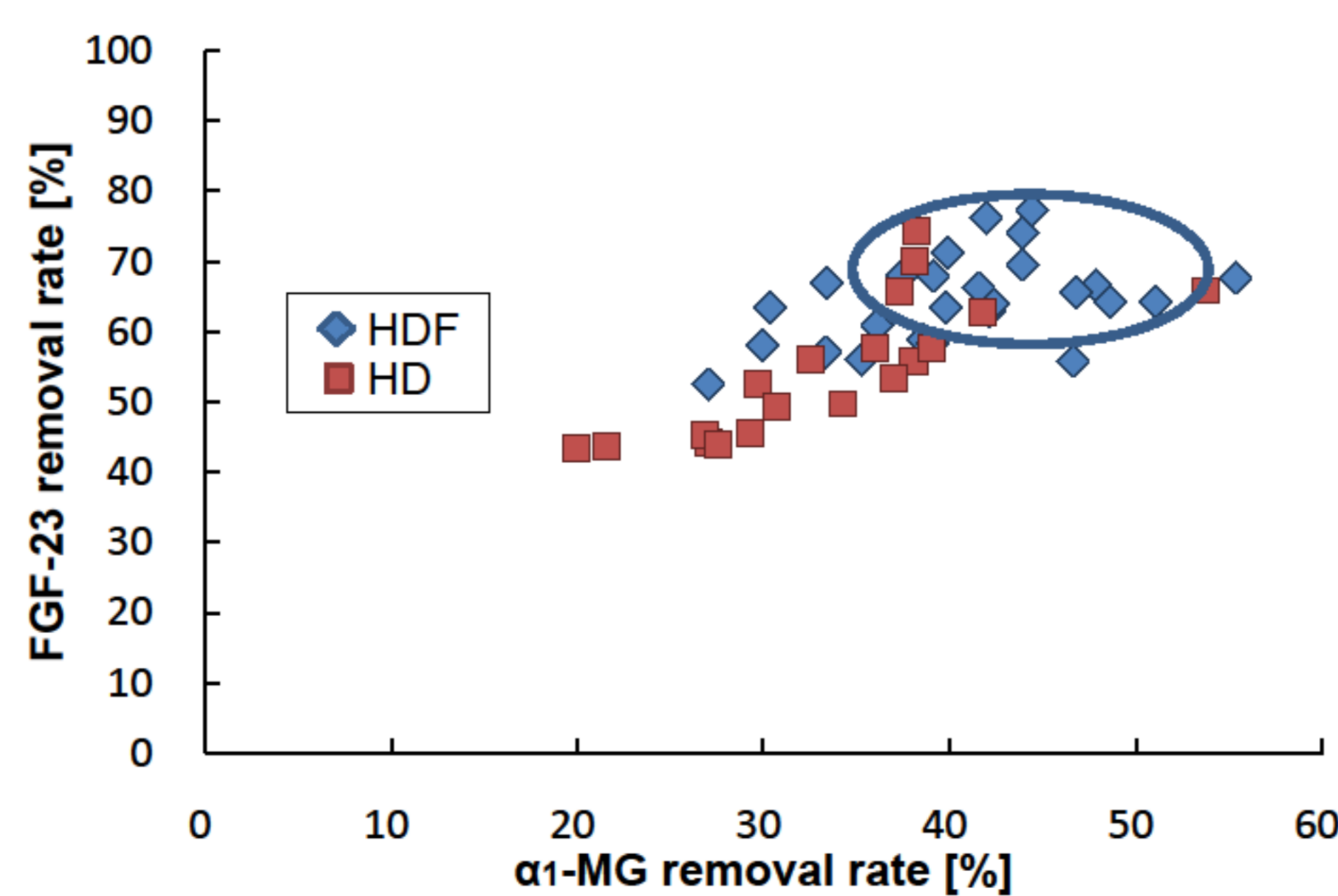
Although the FGF-23 removal rate showed a weak correlation with the β 2-MG removal rate ($R^2 = 0.4392$), the FGF-23 removal rate correlated with the α 1-MG removal rate ($R^2 = 0.5025$).

Discussion

FGF-23 level in normal control and dialysis patients



FGF-23 and α 1-MG Removal rate



HDF showed much excellent characteristics in removing both FGF23 and α 1-MG. It is because convective transport is highly contributed for removing these substances.

The removal performance of the current hemodialysis (HD) with a super high-flux dialyzer has been drastically improved. However, in our study, we found that HDF was significantly superior to HD in removing β 2-MG, FGF-23 and α 1-MG. The substances in the range of LMWP are removed from the blood mainly by convective transport. Since the volume of convective transport can be much easily controlled in a wide range in HDF than in HD that utilizes so-called internal filtration, HDF is preferred for removing FGF-23. If the treatment conditions of HDF is appropriately chosen, it may be expected to lower the FGF-23 level, resulting lowering the incidence of cardiovascular complications of the dialysis patients.

Conclusion

On-line pre-dilution hemodiafiltration is superior for removing FGF-23 to HD with a super high-flux dialyzer.

