# Can long time/high dose hemodialysis, LTD decrease in serum interleukin-6, IL-6, tumor necrotic factor-α, TNF-α and fibroblast growth factor-23, FGF-23?

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#### INTRODUCTION AND AIMS

Many studies reported that long time/high dose hemodialysis, LTD improves mortality, blood pressure control, anemia, quality of life, QOL of hemodialysis patients [1-4]. Although routine laboratory data of LTD patients were monitored, any other specific data were not enough reported. High concentrations of the phosphate-regulating hormone-like substance, fibroblast growth factor 23, FGF-23 has been recently recognized as an independent risk factor for disease progression, cardiovascular disease, and death for chronic kidney disease, CKD and hemodialysis patients [5-7]. In this study, we measured FGF-23, cytokines such as serum IL-6 and TNF-α, including routine laboratory data in order to reveal the efficacy of LTD.

#### PATIENTS CHARACTERISTICS

	SD, HDP< 54	LTD, HDP≧54
	SD, HDI 134	
Patients, cases	129 (53 females, 76 males)	77 (27 females, 50 males)
Diabetic nephropathy, cases	28, 21.7%	18, 23.3%
Age, years	66.8±12.8	61.1±11.4
Dialysis Duration, years	$9.4 \pm 8.7$	11.5±7.6
Frequency, times/week	$3.0 \pm 0.1$	$3.6 \pm 0.6$
Dialysis Time, hours/session	13.5±1.3	19.4±3.3
HDP	40.9±4.1	$68.4 \pm 14.5$

SD: Standard Hemodialysis Patients, LTD: Long Time/High Dose Hemodialysis Patients  $HDP = (Dialysis Time) \times (Frequency, times/week)^2$ , an index of dialysis adequacy[8]

#### **METHODS**

- 1. Subjects were 206 hemodialysis patients, who accepted the consent of our study in documents.
- 2. They were well-controlled out-patients in our clinics and divided in two groups, whose hemodialysis product, HDP was higher or lower than 54 (ex. 6 hours/session and 3 times weekly).
- 3. The blood sample was obtained directly through an arteriovenous fistula before hemodialysis on the day of the longest interval between consecutive dialysis sessions.
- 4. Measurements
- > Hemoglobin was measured by an automated cell counter, Sysmex XE-2100 (Sysmex Corp., Kobe, Japan).
- > Albumin, Calcium, inorganic phosphate, i-Phosphate concentrations were measured using Automated Clinical Chemistry Analyzer JCA-BM2250 (JOEL Ltd., Akishima, Tokyo).
- $\triangleright$   $\beta_2$ -MG was measured using latex enhanced imunoturbidimetric assay kit 'EIKEN'β2-M-II (Eiken Chemical Co. Ltd. Tokyo, Japan) and Automated Clinical Chemistry Analyzer JCA-BM9130 (JOEL Ltd., Akishima, Tokyo).
- ➤ Intact parathyroid hormone, i-PTH; Elecsys® PTH and automated immunoanalyzer Modular Analytics (Roche Diagnostics, Mannheim, Germany).
- > IL-6 & TNF-α; PeliKine<sup>TM</sup> human IL-6 ELISA kit & PeliKine Compact<sup>TM</sup> human TNF-α ELISA kit (Sanquin Blood Supply, Amsterdam, The Netherland) and FGF-23; FGF-23 ELISA Kit (KAINOS Laboratories, Inc., Tokyo, Japan). Wellwash & Multiscan FC (Thermo Fisher Scientific Inc., Waltham, MA, USA) were used for measurements.
- 5. Statistical analysis All data and results are expressed as mean  $\pm$  s.d. Statistical analysis was done using unpaired Student's test. A p value <0.05 was considered statistically significant.

### RESULTS

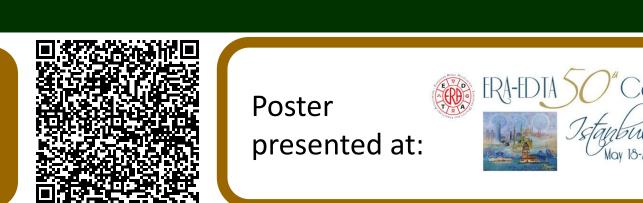
serum concentration	SD patients	LTD patients	p
Hemoglobin, g/dl	$10.8 \pm 1.0$	$11.1 \pm 1.1$	0.097
Albumin, g/dl	$3.9 \pm 0.3$	$4.0 \pm 0.3$	0.219
Calcium, mg/dl	$8.9 \pm 0.6$	$8.9 \pm 0.6$	0.902
i-Phosphate, mg/dl	4.9 ± 1.3	$4.4 \pm 1.0$	< 0.01
$\beta_2$ -MG, mg/l	$27.1 \pm 5.6$	24.4 ± 3.3	< 0.01
i-PTH, pg/ml	$149\pm138$	$143 \pm 156$	0.76
IL-6, pg/ml	6.99 ± 6.78	$4.99 \pm 4.06$	< 0.05
TNF-α, pg/ml	$5.6 \pm 34.3$	$3.8 \pm 16.3$	0.666
FGF-23, mg/dl	$1,182 \pm 905$	789 ± 771	< 0.01

## DISCUSSION & CONCLUSION

- 1. Serum FGF-23 in two groups was lower than those, which were reported, because our Standard Hemodialysis, SD patients had also enough doses of hemodialysis and lower serum i-phosphate.
- 2. What's more, serum FGF-23 in Long Time/High Dose Hemodialysis, LTD patients was significantly lower than that in SD patients. As many studies were reported, LTD removed more phosphate and lower serum i-phosphate decreased FGF-23.
- 3. As serum  $\beta_2$ -MG and IL-6 in LTD patients were significantly lower than those in SD patients, lower  $\beta_2$ -MG might be caused by not only more removal but less production.
- 4. In conclusion, long time/high dose hemodialysis, LTD might bring better outcome to hemodialysis patients.

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