M O N D O: MONitoring Dialysis Outcomes

Association of changes in lean and fat tissue mass and patient clinical and laboratory parameters

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Background

Protein-energy malnutrition (PEM) has been shown to be a major risk factor for hemodialysis (HD) patient mortality. The aim of this study was to evaluate associations of lean and fat tissue mass and changes in lean and fat tissue mass with clinical and laboratory parameters.

Methods

The MONitoring Dialysis Outcomes (MONDO) consortium consists of HD databases from Renal Research Institute (RRI) clinics in the US; Fresenius Medical Care (FMC) clinics in Europe, Asia Pacific (AP), Latin America (LA); KfH clinics in Germany; Imperial College, London, UK; Hadassah Medical Center, Jerusalem, Israel; and University of Maastricht, The Netherlands.[1]

We extracted data from FMC clinics in Europe for only those patients in whom two or more routine measurements of lean and fat tissue mass using the Fresenius Medical Care Body Composition Monitor were performed within 365 days. Average lean tissue index (LTI) was computed as the ratio of lean tissue mass to body surface area and average fat tissue index (FTI) was computed as a ratio of fat tissue mass to body surface area for these patients. Changes in all variables were computed over the same 365 days using simple linear regression. Correlations between average of parameters or between changes in the course of the first year, respectively, were calculated using Spearman's correlation coefficient.

Parameters	FTI (kg/m^2)	LTI (kg/m^2)
Age (yrs)	0.224**	-0.452**
Albumin (g/dL)	-0.119**	0.32**
CRP (mg/L)	0.236**	-0.174**
Creatinine (mg/dL)	-0.192**	0.396**
nPCR (g/kg/day)	-0.097**	-0.206**
Cholesterol (mg/dL)	0.165**	-0.143**
HDL Cholesterol (mg/dL)	-0.206**	0.008
LDL Cholesterol (mg/dL)	0.161**	-0.185**
Triglycerides (mg/dL)	0.183**	0.029
Pre-dialysis systolic blood pressure (mmHg)	-0.074*	0.122**
Serum Sodium (mmol/L)	0.05	0.053

Table 1. Correlations of baseline parameters (**p<0.05; *p<0.10)

Reference

1. Usvyat L. et al. Blood Purification 2013, 35:37-48

Annual changes in parameters:	Annual change in FTI	Annual change in LTI
Albumin (g/dL/year)	0.067	-0.077**
CRP (mg/L/year)	0.025	0.039
Creatinine (mg/dL/year)	0.046	-0.014
nPCR (g/L/day/year)	0.025	-0.033
Cholesterol (mg/dL/year)	0.113**	-0.079
HDL Cholesterol (mg/dL/year)	0.003	-0.004
LDL Cholesterol (mg/dL/year)	0.064	-0.058
Triglycerides (mg/dL/year)	0.131**	-0.117**

Table 2. Correlations of changes in parameters (**p<0.05; *p<0.10)

Results

We studied 527 chronic HD patients. The median (interquartile range (IQR)) age was 64.7 (56-75) years, 58.5% were male. The median (IQR) LTM and FTM at baseline were 34.9 kg (28.8-42.4) and 25.6 kg (18.7-33.3), respectively.

Baseline FTI was positively and significantly associated with age, C-reactive protein (CRP), cholesterol, low density lipoprotein (LDL) cholesterol and triglycerides. FTI was negatively and significantly associated with albumin, creatinine, nPCR, and high density lipoprotein (HDL) cholesterol. Baseline LTI was positively and significantly associated with albumin, creatinine, and pre-dialysis systolic blood pressure. LTI was negatively and significantly correlated with age, CRP, nPCR, cholesterol, and LDL cholesterol (Table 1).

Changes in FTI were significantly associated with increases in cholesterol and triglycerides. Changes in LTI were associated with declines in albumin and triglycerides (Table 2).

Conclusion

Baseline as well as changes in fat and lean tissue mass are associated with changes in multiple other clinical and laboratory parameters. Multivariate models are needed to understand which factors are most strongly associated with body composition. Survival analyses are also needed to understand whether fat and tissue mass are independently associated with survival.