

FACTORS RELATED TO THE DECREASE IN SKELTAL MUSCLE MASS IN HEMODIALYSIS PATIENTS

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OBJECTIVES

Hemodialysis (HD) patients are prone to malnutrition and are more likely to develop malnutrition-inflammation-atherosclerosis (MIA) syndrome and protein-energy wasting (PEW). They also lose skeletal muscle mass and are susceptible to sarcopenia. We examined the factors related to decreased muscle mass in a state of chronic renal failure.

Pentosidine is an advanced glycation end-product (AGE) that is related not only to cardiovascular complications in chronic renal failure, but also to deteriorating nutritional status. Myostatin is a member of the TGF- β family that negatively controls skeletal muscle mass. It is associated with sarcopenia and in healthy people there is reported to be a reverse correlation between serum myostatin levels and muscle mass.

We focused on pentosidine and myostatin and investigated their relation with skeletal muscle mass. We also investigated the relationship between pentosidine and myostatin.

METHODS

The subjects were 44 HD male patients (mean age 55.8 ± 9.2 years, HD history 15.6 ± 8.4 years) and 28 healthy male adults (mean age 55.9 ± 10.4 years) (Table 1). Plasma pentosidine levels were measured with ELISA (Fushimi Pharmaceutical Co. Japan). Plasma myostatin levels were also measured with ELISA (Immunodiagnostik AG, Germany). Skeletal muscle mass was estimated by multifrequency bioelectrical impedance analysis (MFBIA). The statistical difference was determined by two-sided Student's test. Differences of $P < 0.05$ were considered significant. Pairwise associations were examined with Pearson's correlation coefficient test.

Study 1) Plasma pentosidine and myostatin levels were measured and compared in the 44 HD patients and 28 healthy adults.

Study 2) The correlations between estimated skeletal muscle mass and plasma pentosidine level and between estimated skeletal muscle mass and plasma myostatin level were investigated in the 44 HD patients.

Study 3) The correlation between the plasma pentosidine level and plasma myostatin level was investigated in the 44 HD patients.

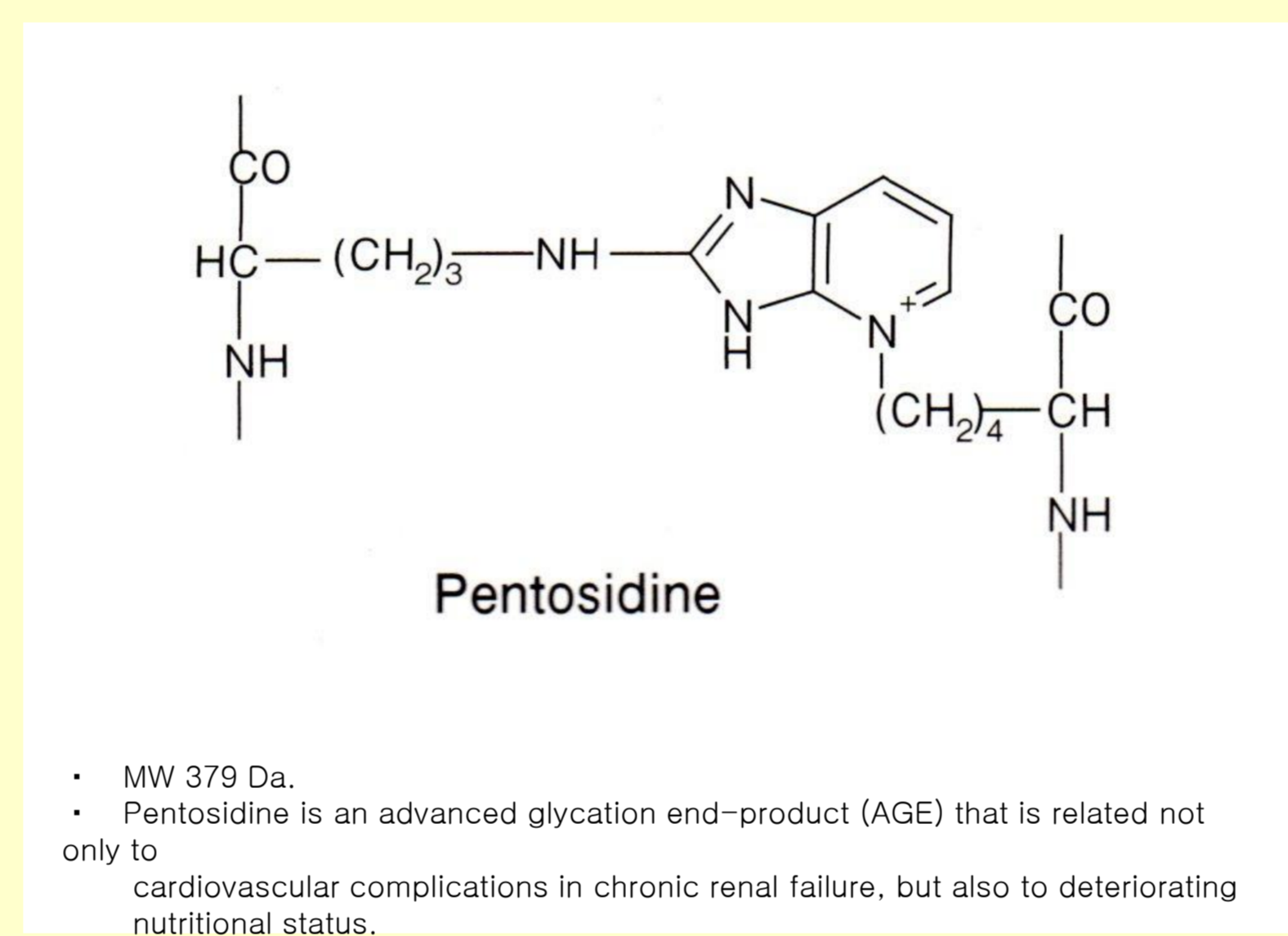
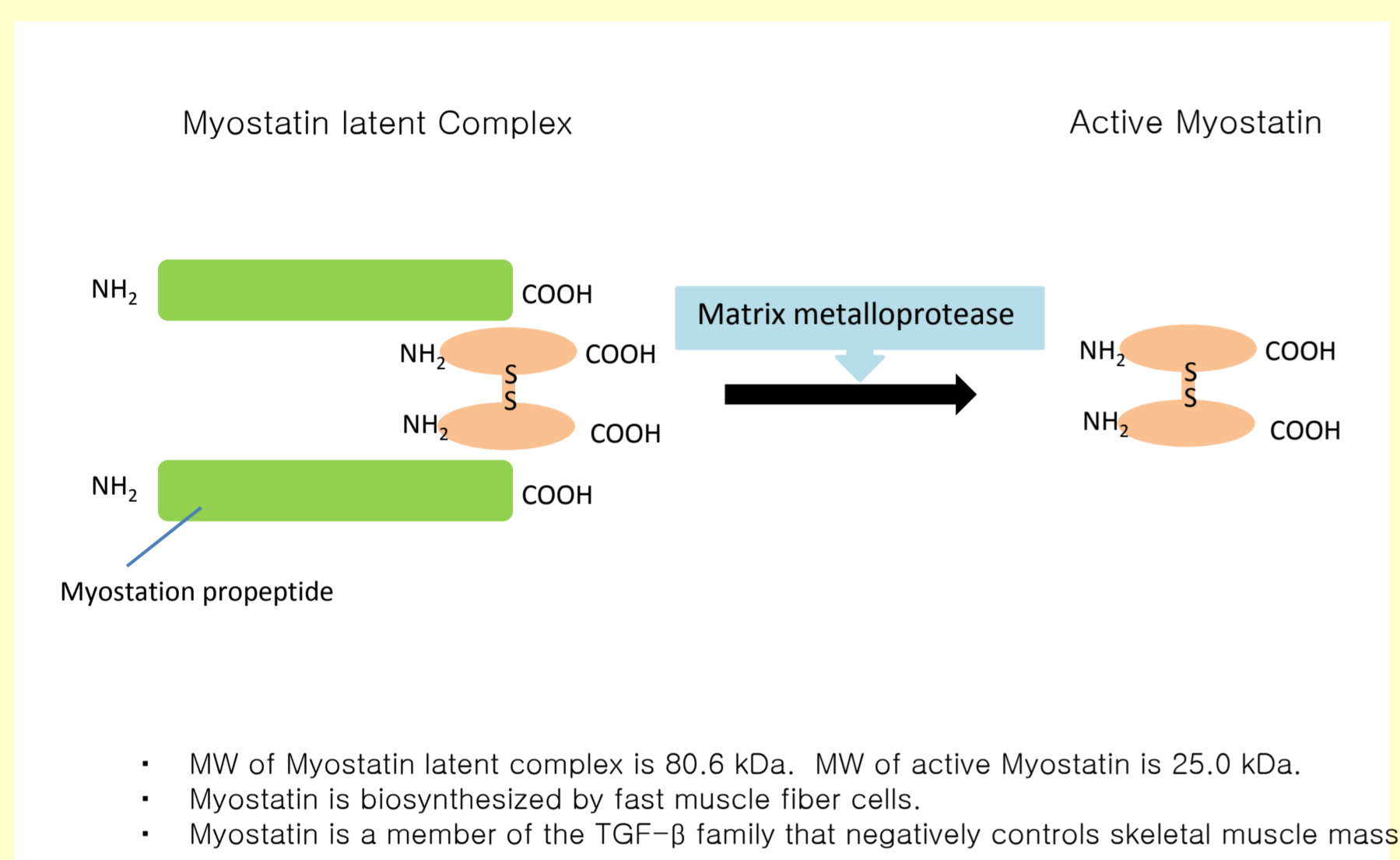
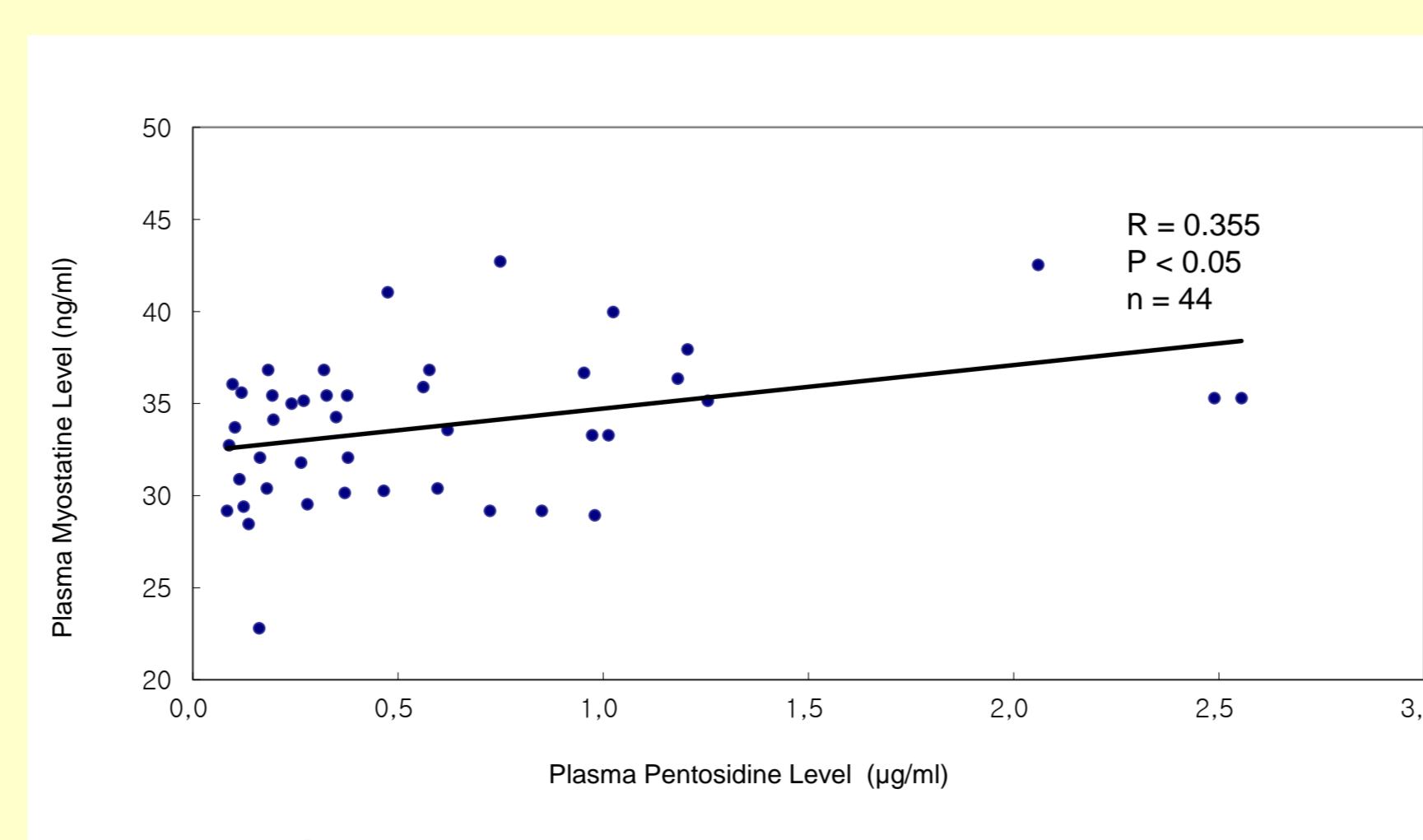
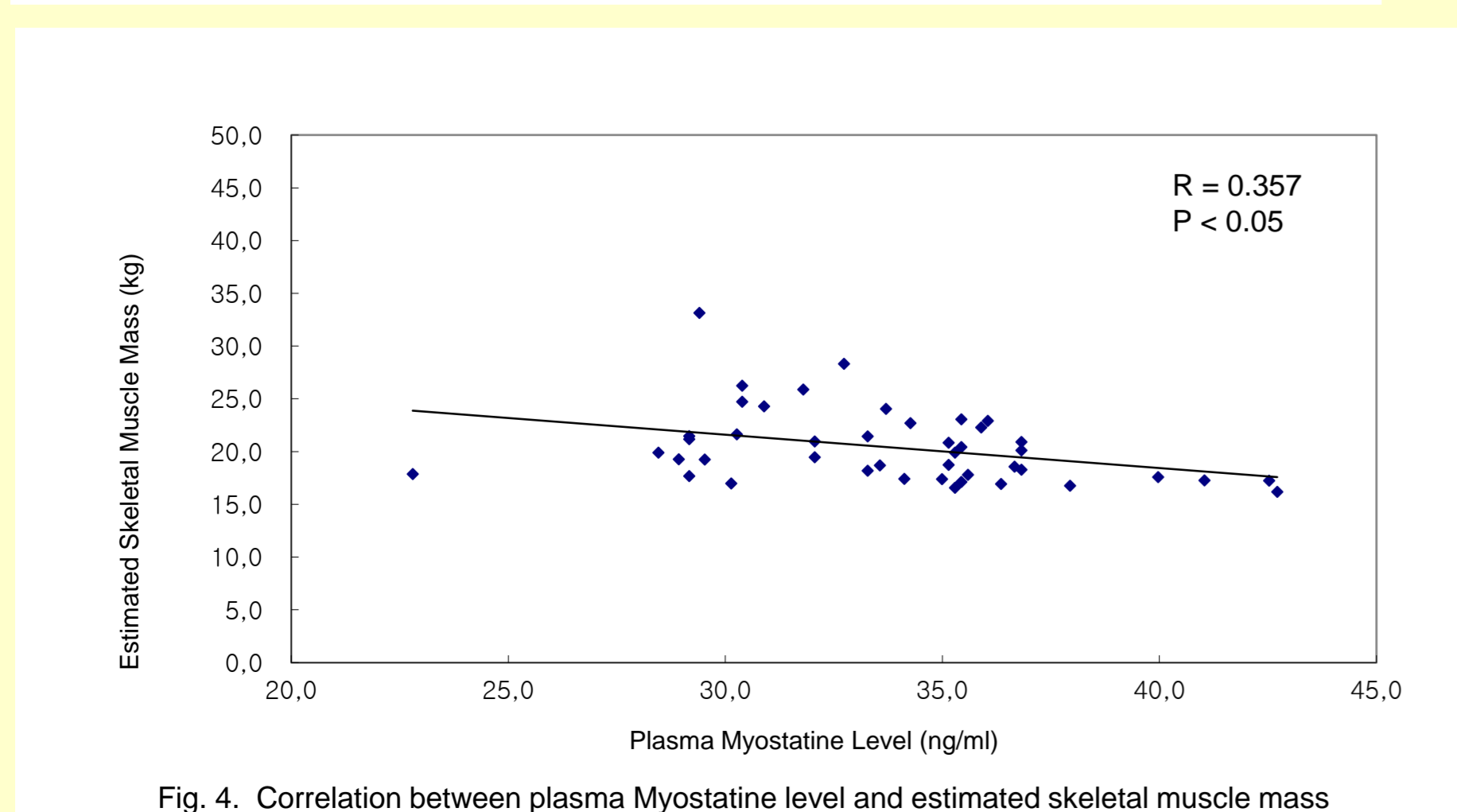
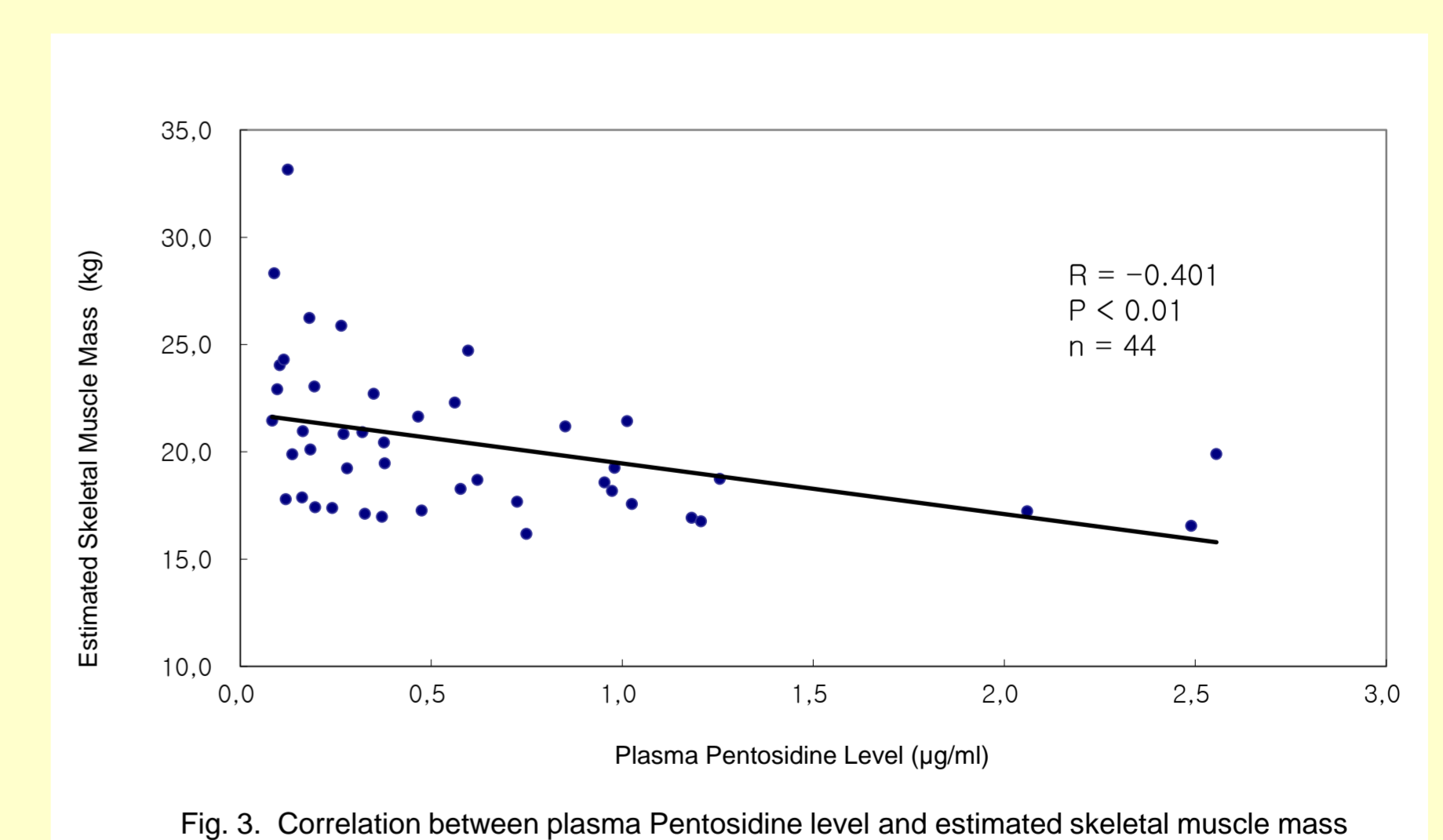
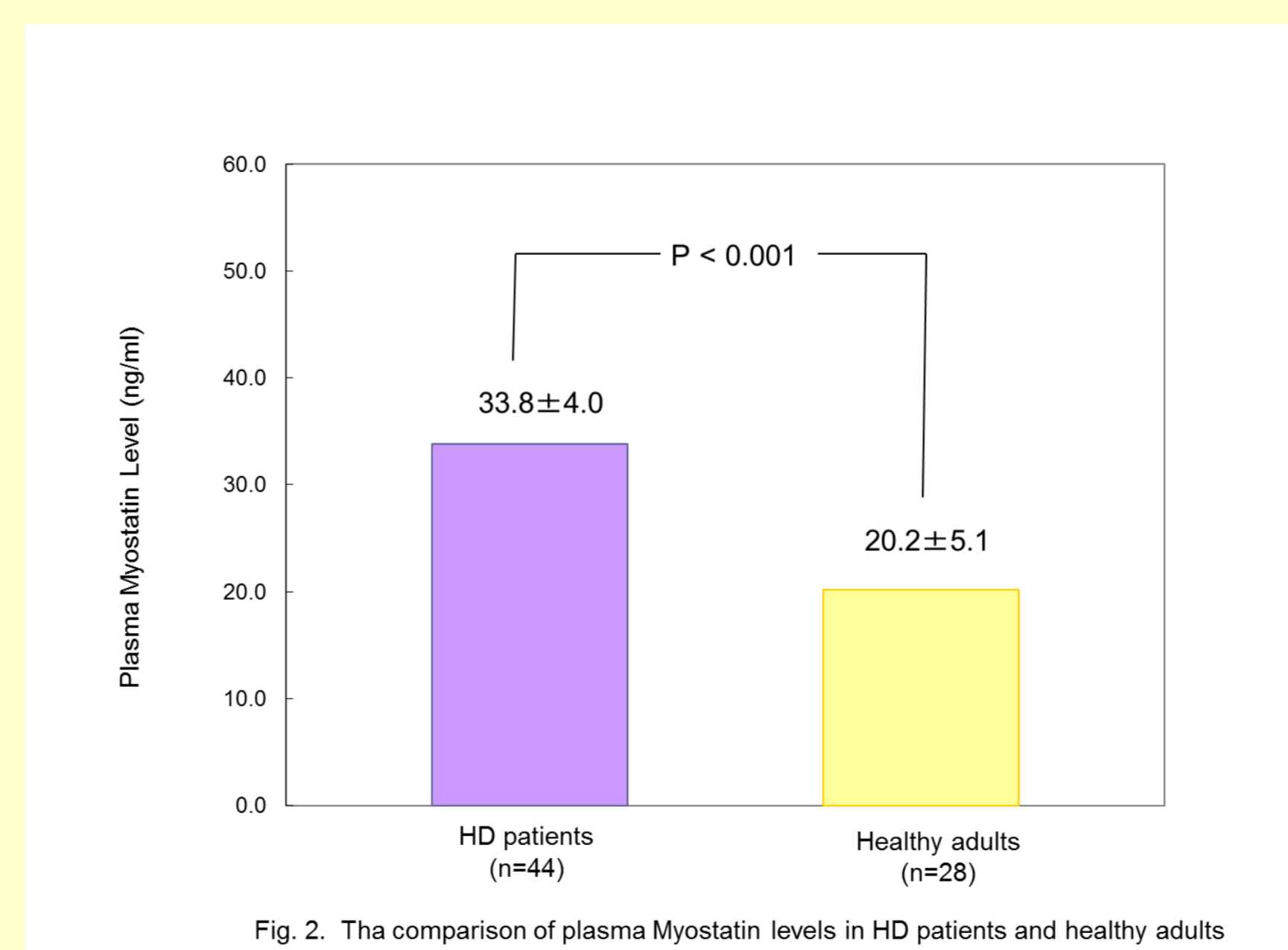
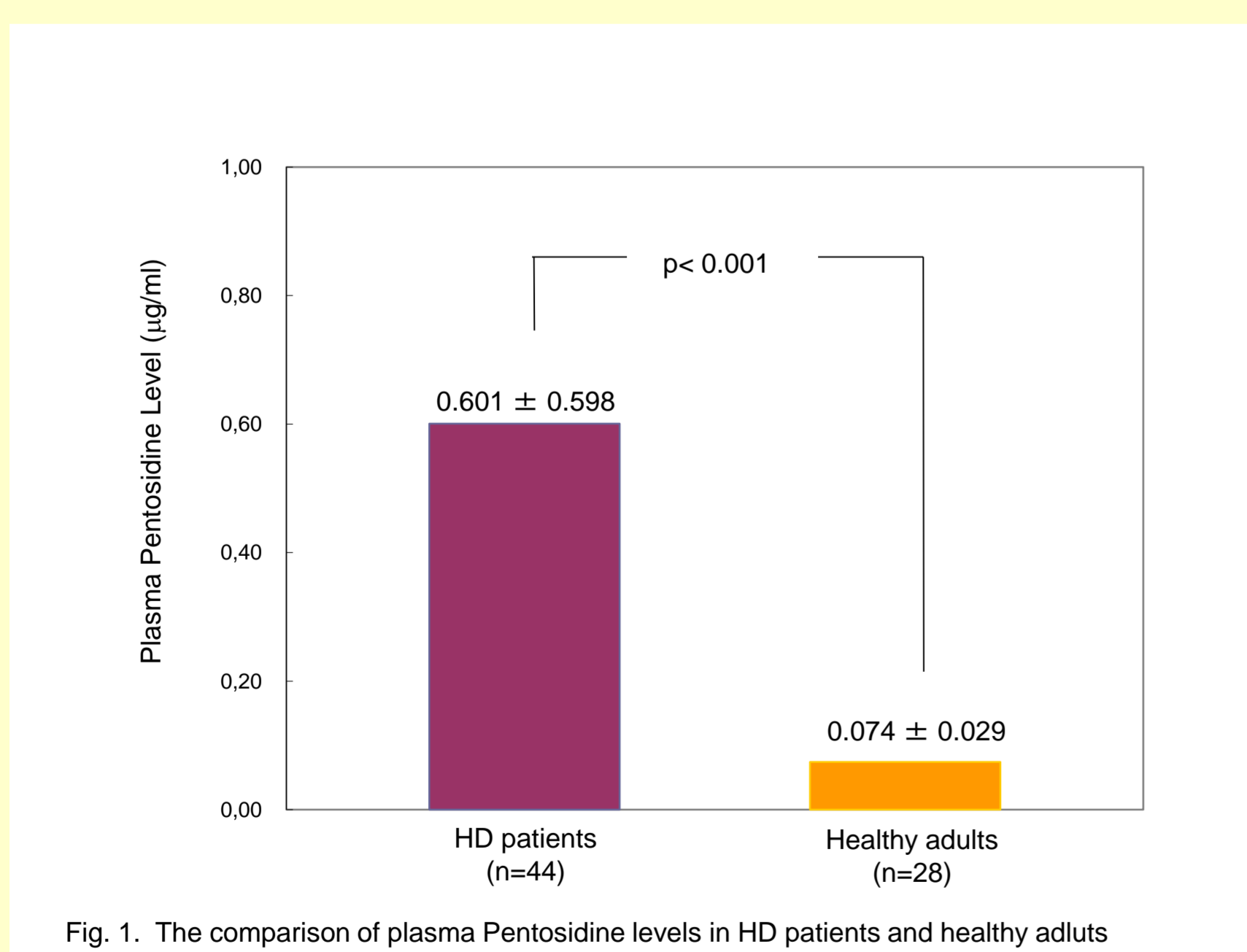


Table 1. Study Population

	HD patient	Healthy adult	Statistical difference
Number	44	28	
Age	55.8 ± 9.2	55.9 ± 10.4	n. s.
Male : Female	44 : 0	28 : 0	
HD history (yrs)	15.6 ± 8.4		
Body weight (kg)	61.4 ± 11.8	65.2 ± 8.5	n. s.
Height (cm)	169.1 ± 6.1	168.9 ± 5.4	n. s.
BMI (kg/m ²)	21.4 ± 3.5	22.8 ± 2.1	n. s.
HD duration (hrs/session)	4.8 ± 0.7		
Total HD duration (hrs/wk)	15.8 ± 3.3		
Hemodialysis product (HDP)	53.6 ± 20.3		

RESULTS

- The comparison of plasma pentosidine levels in HD patients and healthy adults revealed significantly higher pentosidine levels in HD patients (0.601 ± 0.598 vs 0.074 ± 0.029 , $P < 0.001$) (Fig. 1). The comparison of plasma myostatin levels in HD patients and healthy adults revealed significantly higher myostatin levels in HD patients (33.8 ± 4.0 vs 20.2 ± 5.1 ng/ml, $P < 0.001$) (Fig. 2).
- A significant inverse correlation was seen between estimated skeletal muscle mass and plasma pentosidine level in HD patients ($R = -0.401$, $P < 0.01$) (Fig. 3). A significant inverse correlation was also seen between estimated skeletal muscle mass and plasma myostatin level in HD patients ($R = -0.357$, $P < 0.05$) (Fig. 4).
- A significant positive correlation was seen between plasma pentosidine and plasma myostatin levels in HD patients ($R = 0.355$, $P < 0.05$) (Fig. 5).



CONCLUSIONS

Our data suggest that both pentosidine and myostatin may serve as biomarkers of skeletal muscle loss and deterioration in adult male patients on HD.