A New Evaluation Method of Frailty to Estimate Muscle Mass by Using 3⊠Axis Accelerometer （「高齢従命困難者に対する新たなる栄養評価法および運動機能評 価法の開発」にかかる研究報告）

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A New Evaluation Method of Frailty to Estimate Muscle Mass by Using 3-Axis Accelerometer
（「高齢従命困難者に対する新たなる栄養評価法および運動機能評価法の開発」にかかる研究報告）

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OBJECTIVES:

The elderly population in Japan is increasing exponentially in tandem with risk for frailty. It's difficult to assess the frailty degree due to sarcopenia of elderly patients with difficulty to follow orders due to various reasons such as dementia.

This study was conducted in order to evaluate easily the degree of frailty on sarcopenia by using small 8CH motion recorder with 3-axis accelerometer（8CH sensor）.

METHODS:

Subjects were divided 2 groups. One is active elderly group（N＝27, 70.9±4.58 years old）which had potential sarcopenia but still had functional independence, another is young control group（N＝6, 17.3±0.52 y.o.）. 3-axis acceleration and angular velocity were measured by 8CH sensor（MicroStone® apan co.）and obtained 3-axis root mean square value（RMS）while free walking（Fig. 1）. Anthropocentric parameters（body weight, height, arm circumference（AC）, triceps skinfolds（TSF）, arm muscle area（AMA））were done at the same time.

Data were analyzed by using PASW Statistics 18 for Windows. The level of statistical significance was set as p＝0.5.

RESULTS:

Despite there is no difference in body mass the absolute value average of the difference between Y-axis RMS and Z-axis RMS（hereafter RMS|Y-Z|）in elderly group（14.4±10.4%）was larger than in control young student group（7.2±4.5%）（p＜0.05）. So this is suggested that the value of　RMS|Y-Z|　was indicated the risk of frailty especially in elderly.

In addition, this value was negative correlated with Body Mass Index（BMI）, Arm Circumference（AC）, Triceps Skinfold Thickness（TSF）, Arm Muscle Circumference（AMC）, Arm Muscle Area（AMA）and right-handed Grasping Power（GP）only in elderly group.（Table 1）

The parameter indicated shaking body which obtained 3-axis acceleration and angular velocity was larger than $10 \, \text{s/m}^2$ rms in potential salcopenic elderly people who had AMC below 45cm^2.
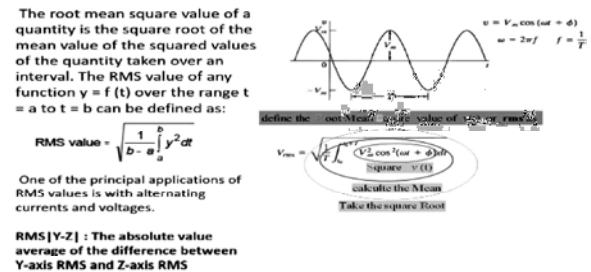

Fig. 1　Root Mean Square（RMS）

Table 1　Correlations between RMS|Y-Z| and other parameter

		BMI	AC	TSF	AMC	AMA	GP	CC	Walking Speed
RMS|Y-Z|	Pearson Correlation	-0.4033	-0.5617	0.5668	-0.7473	-0.7308	-0.4760	-0.3284	-0.2791
	Sig. (2-tailed)	0.03698	0.00230	0.00205	0.00001	0.00002	0.01208	0.09444	0.15865
	N	27	27	27	27	27	27	27	27
	Significant level	p<0.05	p<0.01	p<0.01	p<0.01	p<0.01	p<0.05	N.S.	N.S.

CONCLUSIONS:

This method by using small 8CH motion recorder with 3-axis accelerometer can be used to estimate total-body muscle quality and quantity and evaluate the frailty degree easily in elderly patients.