INTRODUCTION
The muscle fiber conduction velocity (MFCV) is propagation velocity of interference wave due to a group of muscle fiber action potentials. The MFCV is used to evaluate the muscular disorder and the muscular fatigue. In the many studies, the evaluations of muscular function has been performed in the static contraction (Li and Sakamoto, 1977; Mito and Sakamoto, 2002). The study of muscular function evaluation by MFCV is not reported very much (Masuda et al., 1999). The aim of study is to evaluate the muscular function by MFCV in the static and dynamic contraction.

METHODS
The subjects were ten healthy male volunteers aged 22 to 27 years. Myoelectric signals were recorded from the m. biceps brachii using 15-channel surface electrode array during sub-maximal static and dynamic contractions with the elbow joint kept at five different angle. In the static contraction, subjects maintained an isometric contraction level of 20% MVC for 10 seconds. In the dynamic contraction, subjects exercised forearm with elbow join angle from 50 degrees to 130 degrees at 10 deg/s and 20 deg/s. MFCV was estimated by using the cross-correlation method. In the signals x(t) and y(t) of neighboring channels, the maximum correlation coefficient $R_{xy}(T_s)$ was obtained, where $T_s$ was time shift. Then the MFCV could be calculated using the formula $MFCV = D_e / T_s$, where $D_e$ was the inter-electrode distance of 5 mm.

RESULTS AND DISCUSSION
The location of motor end-plate changed depending on the elbow joint angle. The motor end-plate zone estimated was observed from 8 channel to 14 channel when the elbow angle changed from 50 degree to 80 degree. The same results were obtained in the experiment of dynamic contraction. The muscular length changed depending on the elbow joint angle because the m. biceps brachii was biarticulate muscle (Saitou et al. 1999). Therefore, it was considered that the location of motor end-plate zone was moved depending on the elbow joint angle.

In the static and dynamic contractions, MFCV was increased when the elbow joint angle was decreased as shown in Figure 1. The causes were both the changing of the muscular length changed the cross section of muscle and the contribution percentage to the m. biceps brachii was different at each elbow joint angle. In the relation between MFCV and the contraction type, the MFCV increased in each elbow joint angle in order of the concentric contraction, isometric contraction and eccentric contraction.

The values of MFCV increased in the concentric contraction and decreased in the eccentric contraction depending on the contraction speed. It was considered that the activated motor units were different by the contraction speed and the exercise type.

SUMMARY
The aim of this study was to elucidate the characteristics of muscular functions with the static and the dynamic contractions. The results were obtained as the following. (1) The location of motor end-plate changed depending on the elbow join angle. (2) MFCV was increased when the elbow join angle was decreased in the static and dynamic contractions. (3) The values of MFCV increased in the concentric contraction and decreased in the eccentric contraction depending on the contraction speed.

REFERENCES