Quantification of Muscle Fatigue
using Electromyography (EMG) signals
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The development of assistive apparatus which supports degeneration of physical activity has gain popularity in recent years. With help of the assistive apparatus, such as power-assisted machines, quality of life can be improved. However, most of these apparatus are not designed based on bio signals. Degeneration of function cannot only be caused by lack of appropriate support, but also by overexerting due to extra non-required support, as well as, fatigue due to insufficient support. Thus, the appropriate assistance is not sufficiently achieved. We must design the new assisted machines that interact with the person's body and acquire required feedback from bio-signals.

Surface electromyography contains important information to understand the state of the living body system. Since electromyography is complex non-stationary signals, a common technique to analyze them is the use of the Fourier transformation to acquire frequency information. Some studies found that the electromyography average frequency's decreases due to fatigue. And we make this claim sure with the experiment. (Fig 1) In addition, we made a Forearm bending experiment .It was suggested that there is a correlation in the average frequency and the age of the person. (Fig 2) However, quantification of muscle fatigue only by average frequency of surface electromyography is not enough. In this study we compute the power spectrum of surface electromyography by Fourier transform, then, we try acquiring characteristic features from the power spectrum.

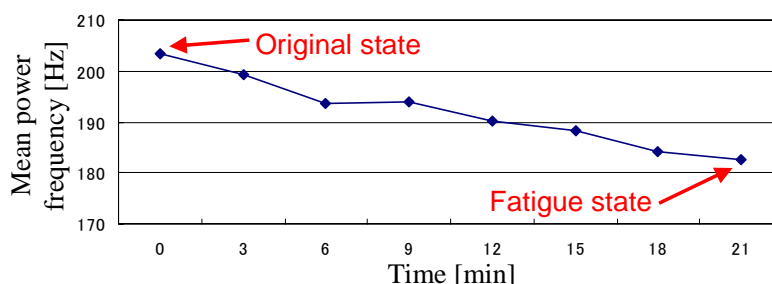*Keywords*: Muscle Fatigue, EMG, Frequency Analysis

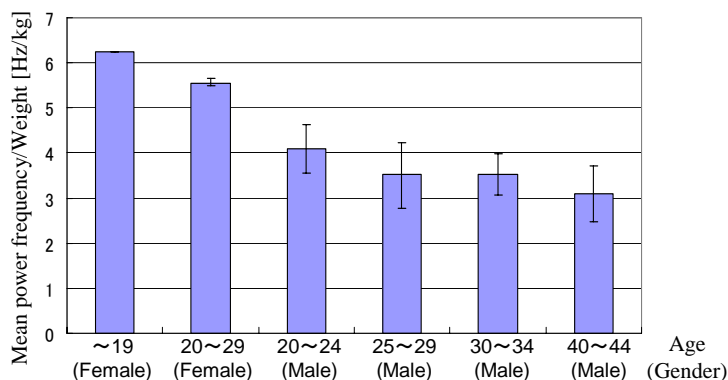Fig.1 The difference on mean power frequency between the normal and fatigue states

Fig.2 The relationship between the mean power frequency and the age of the person