

Verification of anti-fatigue effect of anserine by angle fatigue indicator based on median frequency changes of electromyograms

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ABSTRACT:

Objective: Anserine, which is abundant in avian species and in a wide range of fish such as bonito and tuna, is reported to have anti-fatigue effect. Although chicken soup and bonito soup is traditionally used to recover from physical fatigue, it is generally difficult to verify the effect in humans. This study was to directly demonstrate the anti-fatigue effect of oceanic anserine in humans.

Methods: Edible-grade anserine was purified from fish extract with food-grade reagents. Subjects were 17 healthy male volunteers (35.5 ± 5 yr., 75.5 ± 5.0 kg). Each subject performed the isometric exercise tolerance test (ETT) on the rectus femoris muscle twice (Ex_1, Ex_2) both for anserine and water conditions on a different day. Median frequency changes (MDF) during

ETTs were calculated and regression curves were calculated over a frequency range of 21-214 Hz. The difference, or angle, between the slopes of Ex_1 and Ex_2 MDF regression curves, which corresponds to the degree of fatigue, was defined as an angle fatigue index and compared between anserine and water intake conditions.

Results: MDF decreased during ETTs in most patients and the slopes of regression curves were larger in Ex_2 than in Ex_1. Angle fatigue index for water (control) was significantly larger than that for anserine ($p < 0.01$, paired t-test, $n = 17$). The result indicates that anserine have an anti-fatigue effect on skeletal muscle in humans.

Conclusions: We proposed the angle fatigue index as a touchstone of the muscle fatigue. The index indicates that anserine is effective to reduce the muscle fatigue in humans.

Keywords: anserine, muscle fatigue, electromyogram, median frequency power, MDF angle