The effect of epoch length on time and frequency domain parameters of electromyographic and mechanomyographic signals

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The selection of epoch lengths affects the time and frequency resolution of electromyographic (EMG) and mechanomyographic (MMG) signals, as well as decisions regarding the signal processing techniques to use for determining the power density spectrum. No previous studies, however, have examined the effects of epoch length on parameters of the MMG signal. The purpose of this study was to examine the differences between epoch lengths for EMG amplitude, EMG mean power frequency (MPF), MMG amplitude, and MMG MPF from the VL and VM muscles during MVIC muscle actions as well as at each 10% of the time to exhaustion (TTE) during a continuous isometric muscle action of the leg extensors at 50% of MVIC. During the MVIC trial, there were no significant ($p > 0.05$) differences between epoch lengths (0.25, 0.50, 1.00, and 2.00-s) for mean absolute values for any of the EMG or MMG parameters. During the submaximal, sustained muscle action, however, absolute MMG amplitude and MMG MPF were affected by the length of epoch. All epoch related differences were eliminated by normalizing the absolute values to MVIC. These findings supported normalizing EMG and MMG parameter values to MVIC and utilizing epoch lengths that ranged from 0.25 to 2.00-s.

EMG

Epoch length

MMG

adult

amplitude modulation

Article

controlled study

electromyography

epoch length

female

human

human experiment

isomeric muscle

leg extensor

leg movement

male

maximum voluntary isometric contraction

mean power frequency

mechanomyographic signals

muscle

muscle contraction

myography

normal human

parameters

priority journal

signal processing

time to exhaustion

vastus lateralis muscle

vastus medialis muscle

biomechanics

electromyography

muscle isometric contraction

physiology

procedures

skeletal muscle

time factor

torque

young adult

Biomechanical Phenomena

Electromyography

Female

Humans

Isometric Contraction

Male

Muscle, Skeletal

Signal Processing, Computer-Assisted

Time Factors

Torque

Young Adult