

Publication

Frequency and conduction velocity analysis of the abductor pollicis brevis muscle during early fatigue

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 1196991**Author(s)** Barandun, Marina; von Tscharnner, Vinzenz; Meuli-Simmen, Claudia; Bowen, Vaughan; Valderrabano, Victor**Author(s) at UniBasel** [Valderrabano, Victor](#) ;**Year** 2009**Title** Frequency and conduction velocity analysis of the abductor pollicis brevis muscle during early fatigue**Journal** Journal of electromyography and kinesiology**Volume** 19**Number** 1**Pages / Article-Number** 65-74**Keywords** Hand, Surface electromyogram, EMG, Fatigue, Mean frequency, Muscle fiber conduction velocity, Dispersion, Carpal tunnel syndrome, CTS

The physiological behavior of the abductor pollicis brevis (APB) muscle during early stage of fatigue is important as a reference for future clinical assessment of a pathologically altered muscle, as e.g. in carpal tunnel syndrome. The purpose of this study was to assess changes of force and surface electromyograms (sEMG) during early stage of fatigue of the APB. Thumb abduction force and sEMG derived from a multi-electrode array were recorded during isometric contraction. Electrode placement over the innervation zone (IZ) and the muscle tendon interface were avoided. The sEMGs of two adjacent electrode pairs were selected for the analysis, which yielded (a) motor unit conduction velocities (MUCV) derived from a correlation analysis between the EMGs and (b) mean frequencies obtained by using either fast Fourier (FMF) or Wavelet Transform (WMF). Early fatigue resulted in a relative decay rate of force ($-2.1\% (*)s(-1)$), MUCV ($-1.5\% (*)s(-1)$), FMF ($-4.1\% (*)s(-1)$), WMF ($-3.7\% (*)s(-1)$) and in a change of the power spectrum shape. Lower mean frequencies were observed at greater distances from the IZ independently of fatigue. The APB muscle seems to be fast fatigable and the relative decay rate of mean frequency was significantly larger than the one of force and MUCV.

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