

MOVEMENT-RELATED BRAIN MACROPOTENTIALS AS A TOOL IN THE EVALUATION OF TRAINING IN MODERN PENTATHLON ATHLETES

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Gun shooting, among the five disciplines of Modern Pentathlon, is that requires a proper integration of Central, Autonomic and Peripheral Nervous System functions, before making the final trigger press movement.

Practice and exercise improve performances to the level of automatic processing. The "Skilled Motor-Perceptual Task" or SMPT, described by Papakostopoulos (1978, 1980) requests the execution of two movements that aren't separated, but integrated and ballistic. It engages the subject to process the task before making it and allows him, in a brief time, to update his strategy once the task has been made. By this test, it's possible to evaluate motor coordination and timing of skilled actions; these psychomotor activities are detectable on the scalp as Movement-Related Brain Macropotentials (MRBMs) by means of electroencephalographic techniques. Considering that cerebral processing occurring in gun shooting may be correctly evaluated by the SMPT, we recorded the MRBMs in two groups of athletes in gun shooting, aiming to find out some electrophysiological characteristics differentiating the two groups.

We studied 17 athletes of the Italian Federation of Modern Pentathlon: 8 with olympic level performances in gun shooting (Group 1) and 9 who were not at an olympic level but that were in training to reach it (Group 2). Active electrodes were placed at Fpz, Fz, Cz, Pz, LPC, RPC (LPC= Left Precentral area; RPC= Right Precentral area, respectively), P3 and P4, all referred to linked mastoids. EOG and EMG were also recorded. Evoked responses were filtered using a bandpass of 0.02-30 Hz, EMG bandpass was 0.2 Hz-3 kHz and EOG bandpass of 0.5-30 Hz. We evaluated the amplitude of the Bereitschaftspotential (BP) and the amplitude and the latency of the Skilled Performance Positivity (SPP). BP amplitude values were greatest at Cz for both the groups. But, BP amplitudes of Group 2 were larger than those of Group 1 at all the locations; this difference was statistically significant at Cz ($P= 0.02$).

SPP latency mean value was longer in Group 1 than in Group 2; this difference was statistically significant at RPC ($P= 0.01$) and LPC ($P= 0.04$). Concerning its amplitude, it was larger in Group 2 but, in this case, these data were not statistically significant.

In conclusion, SMPT can be an useful method to measure the level of training.